CITY OF KEIZER MISSION STATEMENT

KEEP CITY GOVERNMENT COSTS AND SERVICES TO A MINIMUM BY PROVIDING CITY SERVICES TO THE COMMUNITY IN A COORDINATED, EFFICIENT, AND LEAST COST FASHION

AGENDA

KEIZER CITY COUNCIL

REGULAR SESSION

Monday, August 21, 2017

7:00 p.m.

Robert L. Simon Council Chambers

Keizer, Oregon

1. **CALL TO ORDER**

2. **ROLL CALL**

3. **FLAG SALUTE**

4. **SPECIAL ORDERS OF BUSINESS**

5. **COMMITTEE REPORTS**

6. **PUBLIC TESTIMONY**
   This time is provided for citizens to address the Council on any matters other than those on the agenda scheduled for public hearing.

7. **PUBLIC HEARINGS**

   a. **Casamigos Restaurant & Cantina Liquor License Application**

   b. **Proposed Keizer Development Code Text Amendment – Section 2.309 (Landscaping Requirements)**

   c. **RESOLUTION - Adopting Updates to the City of Keizer Representation in the Marion County Multi-Jurisdictional Hazard Mitigation Plan**

8. **ADMINISTRATIVE ACTION**

   a. **RESOLUTION – Authorizing City Manager to Enter Into Agreement for Management of Events Rental Room/Gazebo at Keizer Heritage Foundation**

   b. **ORDINANCE – Amending Keizer Development Code Regarding Section 2.303 (Off Street Parking and Loading) Amending Ordinance 98-389**

   c. **Master Plan Application – Keizer Station Area B**

d. **Keizer Station Area A Master Plan Amendment to Be Heard by City Council**

e. **Surplus Property Report Fiscal Year 2016-17**

9. CONSENT CALENDAR

a. **RESOLUTION – Authorizing the City Manager to Enter Into An Agreement with Dreamland Skateparks LLC for Carlson Skate Park Repair**

b. **Approval of July 10, 2017 Work Session Minutes**

c. **Approval of July 17, 2017 Regular Session Minutes**

10. COUNCIL LIAISON REPORTS

11. OTHER BUSINESS

This time is provided to allow the Mayor, City Council members, or staff an opportunity to bring new or old matters before the Council that are not on tonight's agenda.

12. WRITTEN COMMUNICATIONS

To inform the Council of significant written communications.

13. AGENDA INPUT

September 5, 2017 (Tuesday)
7:00 p.m. City Council Regular Session

September 11, 2017
5:45 p.m. – City Council Work Session
- **Parks Tour**

September 18, 2017
7:00 p.m. City Council Regular Session

14. ADJOURNMENT

The City of Keizer is committed to providing equal access to all public meetings and information per the requirements of the ADA and Oregon Revised Statutes (ORS). The Keizer Civic Center is wheelchair accessible. If you require any service that furthers inclusivity to participate, please contact the Office of the City Recorder at least 48 business hours prior to the meeting by email at davist@keizer.org or phone at (503)390-3700 or (503)856-3412. Most regular City Council meetings are streamed live through the City's website and cable-cast on Comcast Channel 23 within the Keizer City limits. Thank you for your interest in the City of Keizer.

CITY COUNCIL MEETING: August 21, 2017

AGENDA ITEM NUMBER:

TO: **MAYOR CLARK AND CITY COUNCIL MEMBERS**

THROUGH: **CHRIS C. EPPLEY**
CITY MANAGER

FROM: **TRACY L. DAVIS, MMC**
CITY RECORDER

SUBJECT: **CASAMIGOS MEXICAN RESTAURANT & CANTINA – LIQUOR LICENSE APPLICATION**

BACKGROUND:

On July 27, 2017 the City received an application for a new liquor license for Casamigos Mexican Restaurant & Cantina which will be located at 5005 River Road North, Keizer, Oregon. The application is for a full on-premises license and the applicant is Angel Ramirez. As required by Keizer Ordinance a public hearing was scheduled; notice was published and mailed to all property owners within 200 feet of the proposed establishment. The Keizer Police Department reports a clear background check on the applicants. In addition, the Keizer Community Development Department finds the location of the establishment to be properly zoned and has no additional comment on the application.

RECOMMENDATION:

It is recommended the public hearing be opened to allow testimony from the applicants or other interested individuals and upon completion, the hearing be closed. It is further recommended the Council recommend approval of the application for Casamigos Mexican Restaurant & Cantina under the guidelines as established by ORS 471.178 and the Ordinances of the City of Keizer. This recommendation shall then be forwarded to the Oregon Liquor Control Commission for final approval.

OREGON LIQUOR CONTROL COMMISSION
LIQUOR LICENSE APPLICATION

Application is being made for:

LICENSE TYPES

- [X] Full On-Premises Sales ($402.60/yr)
  - [X] Commercial Establishment
  - [ ] Caterer
  - [ ] Passenger Carrier
  - [ ] Other Public Location
  - [ ] Private Club
- [ ] Limited On-Premises Sales ($202.60/yr)
- [ ] Off-Premises Sales ($100/yr)
  - [ ] with Fuel Pumps
- [ ] Brewery Public House ($252.60)
- [ ] Winery ($250/yr)
- [ ] Other: _____

ACTIONS

- [ ] Change Ownership
- [X] New Outlet
- [ ] Greater Privilege
- [ ] Additional Privilege
- [ ] Other _____

90-DAY AUTHORITY

[ ] Check here if you are applying for a change of ownership at a business that has a current liquor license, or if you are applying for an Off-Premises Sales license and are requesting a 90-Day Temporary Authority

APPLYING AS:

[ ] Limited Partnership [X] Corporation [ ] Limited Liability Company [ ] Individuals

CITY AND COUNTY USE ONLY

Date application received: 7/27/17

The City Council or County Commission:

_____
(name of city or county)

recommends that this license be:

❑ Granted ❑ Denied

By: _____
(signature) (date)

Name: _____

Title: _____

OLCC USE ONLY

Application Rec'd by: MH

Date: 7/20/17

90-day authority: ❑ Yes ☑ No

1. Entity or Individuals applying for the license: [See SECTION 1 of the Guide]

① Casamigo's Inc. ③ _____

② _____ ④ _____

2. Trade Name (dba): Casamigos Mexican Restaurant & Cantina

3. Business Location: ~~5015~~ 5005 River Rd N, ~~Suite 5005~~, Keizer, Marion, OR 97303
(number, street, rural route) (city) (county) (state) (ZIP code)

4. Business Mailing Address: 3140 Lancaster Dr NE Salem, OR 97305
(PO box, number, street, rural route) (city) (state) (ZIP code)

5. Business Numbers: 503-315-7000 _____
(phone) (fax)

6. Is the business at this location currently licensed by OLCC? [ ] Yes [X] No

RECEIVED
OREGON LIQUOR CONTROL COMMISSION
JUL 18 2017
SALEM REGIONAL OFFICE

7. If yes to whom: _____ Type of License: _____

8. Former Business Name: N/A

9. Will you have a manager? [X] Yes [ ] No Name: Angel Ramirez
(manager must fill out an Individual History form)

10. What is the local governing body where your business is located? Marion County
(name of city or county)

11. Contact person for this application: Angel Ramirez 503-315-7000
(name) (phone number(s))

~~3140 Lancaster Dr NE~~, Salem, OR 97305
(address) (fax number) (e-mail address)

I understand that if my answers are not true and complete, the OLCC may deny my license application.

Applicant(s) Signature(s) and Date:

① [signature] Date 7/06/17 ③ [signature] Date 7-6-17

② [signature] Date 7-06-17 ④ [signature] Date 7-6-17

OREGON LIQUOR CONTROL COMMISSION

CORPORATION QUESTIONNAIRE

Please Print or Type

Corporation Name: Casamigo's Inc. Year Incorporated: 2016

Trade Name (dba): Casamigos Mexican Restaurant & Cantina

Business Location Address: ~~5015~~ 5005 River Road N. ~~Suite 5005~~

City: Keizer ZIP Code: 97303

List Corporate Officers:

(name)	(title)
Rafael Mora	President
Olga Mora	Secretary / Treasurer
Angel Ramirez	Vice President
Anel Ramirez	Vice President

List Board of Directors:

Rafael & Olga Mora
(name)
Angel & Anel Ramirez

List Stockholders: (Note: If any stockholder is another legal entity, that entity may also need to complete another Corporation Questionnaire. See Liquor License Application Guide for more information.)

Stockholders:	Number of Shares Held:
Rafael & Olga Mora	50
Angel & Anel Ramirez	50

Number of Stock Shares:

Issued: 100

Unissued: Ø

Total Shares Authorized to Issue: 100

Server Education Designee: Jose Angel Ramirez DOB: 7-12-68
(See Liquor License Application Guide for more information) DE: 4/21/17, Exp: 4/21/22

I understand that if my answers are not true and complete, the OLCC may deny my license application.

Officer's Signature: Rafael Mora President **Date:** 7/06/17
(name) (title)

1-800-452-OLCC (6522)
www.oregon.gov/olcc

(rev. 08/11)

OREGON LIQUOR CONTROL COMMISSION

BUSINESS INFORMATION

Please Print or Type

Applicant Name: Casamigo's Inc Phone: 503-689-5557

Trade Name (dba): Casamigos Mexican Restaurant & Cantina

Business Location Address: 5015 River Road N, Suite 5005

City: Keizer, OR ZIP Code: 97303

DAYS AND HOURS OF OPERATION

Business Hours:

Sunday	11AM	to	10PM
Monday	11AM	to	10PM
Tuesday	11AM	to	10PM
Wednesday	11AM	to	10PM
Thursday	11AM	to	10PM
Friday	11AM	to	11PM
Saturday	11AM	to	11PM

Outdoor Area Hours:

Sunday	11AM	to	10PM
Monday	11AM	to	10PM
Tuesday	11AM	to	10PM
Wednesday	11AM	to	10PM
Thursday	11AM	to	10PM
Friday	11AM	to	11PM
Saturday	11AM	to	11PM

The outdoor area is used for:

☒ Food service Hours: 11AM to 10PM

☒ Alcohol service Hours: 11AM to 10PM

☐ Enclosed, how _____

The exterior area is adequately viewed and/or supervised by Service Permittees.

_____ (Investigator's Initials)

Seasonal Variations: ☐ Yes ☒ No If yes, explain: _____

ENTERTAINMENT

Check all that apply:

- ☐ Live Music
- ☒ Recorded Music
- ☐ DJ Music
- ☐ Dancing
- ☐ Nude Entertainers
- ☐ Karaoke
- ☐ Coin-operated Games
- ☒ Video Lottery Machines
- ☐ Social Gaming
- ☐ Pool Tables
- ☐ Other: _____

DAYS & HOURS OF LIVE OR DJ MUSIC

Sunday	_____	to	_____
Monday	_____	to	_____
Tuesday	_____	to	_____
Wednesday	_____	to	_____
Thursday	_____	to	_____
Friday	_____	to	_____
Saturday	_____	to	_____

SEATING COUNT

Restaurant: 78 Outdoor: 0

Lounge: 46 Other (explain): 0

Banquet: 44 Total Seating: 168

OLCC USE ONLY

Investigator Verified Seating: ____(Y) ____(N)

Investigator Initials: _____

Date: _____

I understand if my answers are not true and complete, the OLCC may deny my license application.

Applicant Signature: [signature] **Date:** 7/06/17

1-800-452-OLCC (6522)

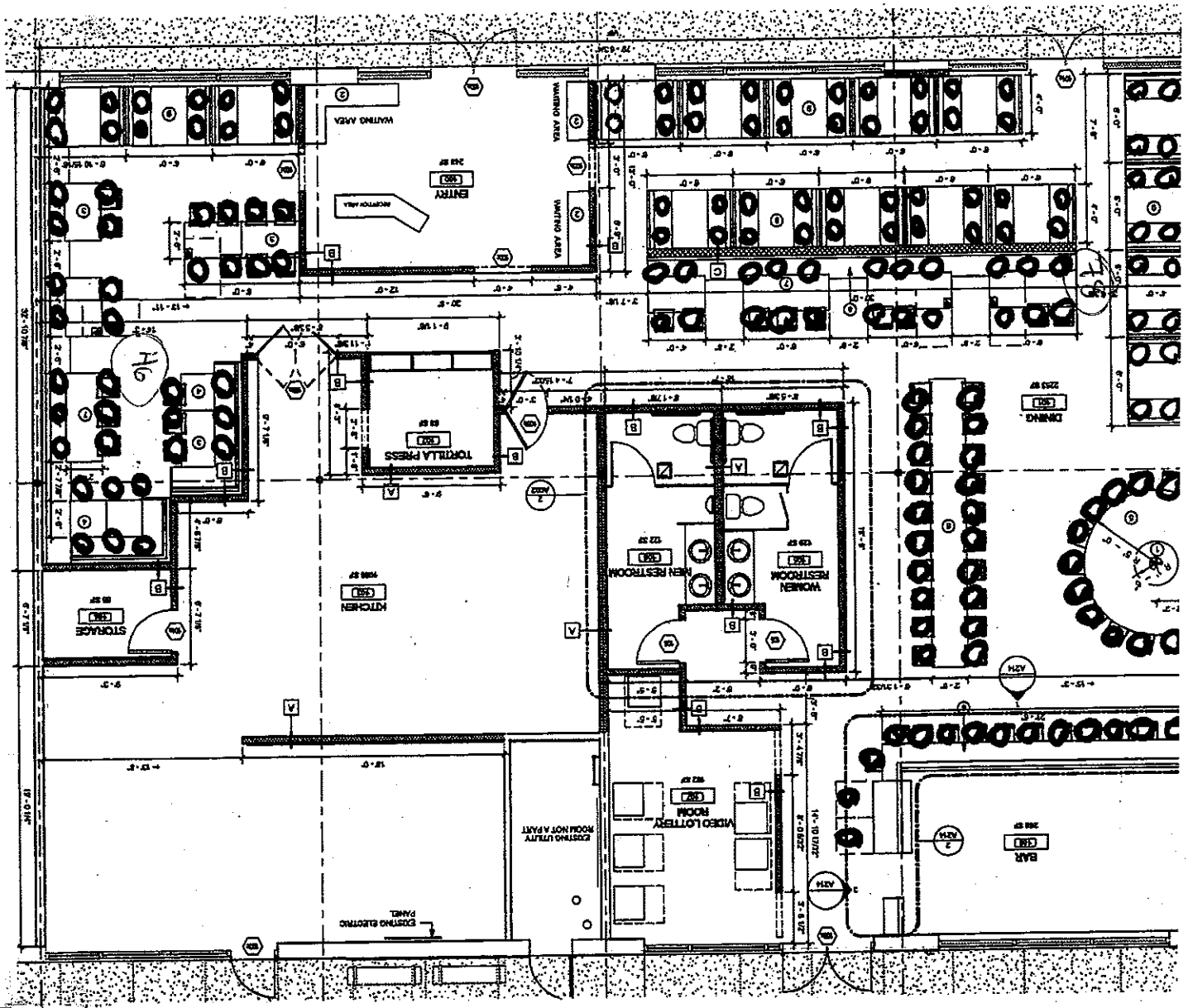
www.oregon.gov/olcc

(rev. 12/07)

OREGON LIQUOR CONTROL COMMISSION

FLOOR PLAN

- **Your floor plan must be submitted on this form.**
- Use a separate Floor Plan Form for each level or floor of the building.
- The floor plan(s) must show the specific areas of your premises (e.g. dining area, bar, lounge, dance floor, video lottery room, kitchen, restrooms, outside patio and sidewalk cafe areas.)
- Include all tables and chairs (see example on back of this form). Include dimensions for each table if you are applying for a Full On-Premises Sales license.



Casamigo's Inc
Applicant Name

Casamigos Mexican Restaurant & Cantina
Trade Name (dba):

Keizer, OR 97303
City and ZIP Code

.....OLCC USE ONLY.....
MINOR POSTING ASSIGNMENT(S)

Date:_____ Initials:_____

1-800-452-OLCC (6522)
www.oregon.gov/olcc

(rev. 09/1

COUNCIL MEETING: August 21, 2017
AGENDA ITEM NUMBER: _____

TO: **MAYOR CLARK AND CITY COUNCIL MEMBERS**

THROUGH: **CHRIS EPPLEY, CITY MANAGER**
NATE BROWN, COMMUNITY DEVELOPMENT DIRECTOR

FROM: **SHANE WITHAM, SENIOR PLANNER**

SUBJECT: Proposed text amendment relating to landscaping requirements. Keizer Development Code (KDC) Section 2.309

Attachments:

- **Section 2.309 (Site and Landscaping Design) – draft**

ISSUE:
The proposed revisions to KDC Section 2.309 relate to the standards governing landscaping requirements. The Planning Commission held a public hearing on July 12, 2017 to consider the proposed changes and voted to support the proposed text amendment with a 5-1 vote. The vote in opposition was specifically due to the proposed language surrounding the requirement of a 1% contribution for public amenities.

DISCUSSION:
It was brought to the attention of planning staff that clarification was needed in the Keizer Development Code to allow the City to receive funds in lieu of significant tree replacement. Historically, the Community Development Director has allowed monetary compensation to be provided in lieu of on-site tree mitigation in certain circumstances. This proposed text amendment will clarify this arrangement as an allowed alternative. This amendment will provide additional standards and clarifications pertaining to site landscaping requirements. The following changes are proposed:

- Lowers threshold for requiring compliance with landscaping requirements (including parking lot trees) to include interior remodeling over $100,000 in value, regardless of exemptions found in Section 2.315 (Design Standards). Interior remodeling is currently exempt.
- Clarifies significant tree replacement requirements and the allowance for off-site tree mitigation.
- Adds requirement that 1% of the project cost be dedicated to on-site public amenities such as street benches, water features or art. This would apply to all commercial construction. Also provides ability to contribute to City art fund in lieu of providing amenities in association with a project.

RECOMMENDATION:
That the City Council open the public hearing to consider the proposed text amendment and direct staff to prepare an ordinance with findings to adopt the proposed revisions.

2.309 SITE AND LANDSCAPING DESIGN

2.309.01 Purpose

The purpose of the site and landscaping design requirements is to provide standards that can be used in the development of property. A development design that incorporates landscaping serves to enhance the appearance of not only the subject property but also that of the City; provides shade and windbreaks where appropriate to conserve energy in building and site design; provide public amenities, and provides for buffering and screening of dissimilarconflicting land uses. (0706)

2.309.02 Scope

A. Landscaping Required. All new construction, as well as expansion of, or redevelopment of structures including interior remodeling over $100,000 in value as specified in Section 2.315, or any parking lots reconfiguration for commercial, multi-family, or industrial uses shall be subject to the site and landscaping requirements of this Section. (07/06)

B. Landscape Plan Review. Landscaping plans shall be submitted for review subject to procedures of this Section and subject to Type 1-A review procedures set forth in section 3.2. (07/06)

C. Tree Plan. A tree plan in accordance with section 2.309.04.B.7 is required with all Type II and III applications and the following Type I applications: Conditional Use and Partitioning. (5/98)

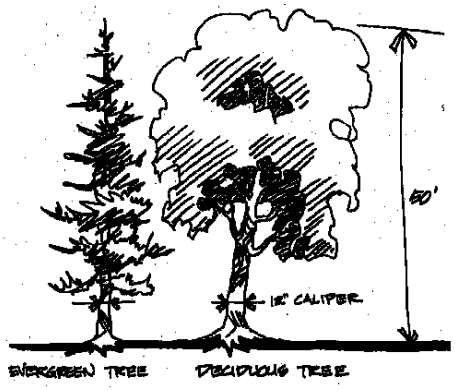
2.309.03 Minimum Area Requirements

Landscaped areas may include landscaping around buildings; open spaces and outdoor recreation areas; islands and perimeter planting areas in parking and loading areas; and areas devoted to buffering and screening as required in this Section and elsewhere in this Ordinance. The minimum areas devoted to landscaping are established within the applicable zone district the property lis located. (07/06)

Expansions. For addition(s) onto an existing development including interior remodeling as specified in Section 3.15, and parking lots, the minimum new landscaped area shall be determined by: first calculating the percentage of the increase of total floor area or parking area; multiplying the gross site area by this percentage of increase; multiplying the resulting area by the minimum percentage for the type of development, as noted above. This provision is not intended to include phase construction within a development. (07/06)

2.309.04 General Provisions

A. Landscaped Area. For purposes of satisfying the minimum requirements of this Ordinance, a "landscaped area" must be planted in a mixture of landscaping elements to include such things as lawn, ground cover plants, shrubs, annuals, perennials or trees, or desirable native vegetation, or be used for other landscape elements such as site furnishings, water features, artwork, or other similar features that provide aesthetic value and open space ~~as defined in this Ordinance~~. Landscaping shall be designed, planted, and maintained in accordance with professional landscaping standards. Landscaping installed over asphalt shall be prohibited. (07/06)



Significant Trees

B. Submittal Requirements. A submitted landscaping plan shall include the following: (5/98)

1. Type, variety, scale and number of plants used; (5/98)

2. Placement and spacing of plants; (5/98)

3. Size and location of landscaped areas; (5/98)

4. Contouring, shaping and preparation of landscaped areas; (5/98)

5. Use and placement of non-plant elements within the landscaping used as accents. Such elements may only be used minimally and shall total no more than 25 percent of the total landscape area. ~~.~~ (5/98)

6. Method of irrigation. (5/98)

7. Location, and identification of any trees, both existing and planned consistent with Section 2.309.04.C. (07/06)

   a. On the Landscaping Plan, the existing significant trees identified by their common names, along with the size of such significant trees. Existing significant trees shall include any trees which were removed within the two-year period prior to the date the application was first submitted shall be shown on the landscape plan. (07/06)

b. Which significant trees are proposed to be removed, or have been removed within the past two years. (07/06)

c. Which significant trees are to be left standing and what steps will be taken to protect and preserve those trees according to current best management practices. (5/98)

d. Location, size and type of replacement trees proposed to be added, if any. (5/98)

C. Significant Trees. As used herein, "significant ~~trees'~~ trees" are trees having a height of more than fifty (50) feet and/or having a trunk whose diameter is more than twelve (12) inches diameter at breast height(DBH) (5 feet above ground level). (07/06)

a. The City recognizes that factors such as disease, safety concerns, and site development requirements may require removal of significant trees. Depending on these factors, the removal of significant trees may be appropriate and approved as part of the landscaping plan. Development of the property shall be in conformance with an approved landscaping site plan that is a condition of a land use approval or a building permit. ~~The City may require that s~~Significant trees ~~that are~~ removed (including trees removed within the two years prior to the application) must be replaced at the rate of ~~up to~~ two new trees for each significant tree removed or less if a large tree specimen ~~which will result in an increased tree~~ size is planted. Replacement trees ~~shall have a trunk, when measured at six (6) inches above ground level, of at least two (2) inches when planted, and~~ shall be a type that will be at least twelve (12) inches (DBH)~~in diameter at ground level~~ when fully mature. At the time of planting, replacement trees shall be planted in accordance with the standards of section 2.309.06. In lieu of an on-site tree replacement plan, an off-site tree mitigation plan ~~that is~~ consistent with requirements within this section shall be submitted to the Community Development Director for approval. Such off-site location shall be within the the public right of way, on public property, or on private property if qualifying as a streetscape tree, ~~city limits or in a city park as~~ and must be approved by the City~~Community Development Director~~. If no suitable off-site location is identified for the immediate installation of replacement trees, a contribution to the City's landscape mitigation fund in the amount equal to the cost of a replacement tree (including installation) as determined by the City may be made for the City to install replacement trees at a later date, as determined appropriate. Such funds shall be used only for replacement tree planting. (07/07)

b. The above provisions include and apply to all significant trees located on the subject property or on any adjacent public right-of-way. These requirements shall be applied to both public and private development.

D. Existing Vegetation. The landscape design shall also incorporate as much of the existing desirable vegetation on the site as is possible. (07/06)

E. One Percent for Public Amenities. One percent of the total cost of construction, reconstruction, refurbishment, remodeling, or alteration of any commercial or industrial building shall be expended for the acquisition and installation of public amenities. Such amenities shall include such things as public site furniture, water features, public art, or other features specifically intended to be used by the general public, even though they remain in private ownership. In lieu of providing amenities, a property owner may choose, because of site constraints or minimal scope of a project, to pay into the City public art fund the amount so specified.

2.309.05 Screening and Buffering

A. Screening and Buffering. Screening and Buffering shall be used to mitigate visual impacts, dust, or noise, and to provide for compatibility between dissimilar adjoining uses. Screening and buffering shall be used to eliminate or reduce the impacts of the following uses: (07/06)

1. Commercial and industrial uses when abutting residential uses. (5/98)

2. Industrial uses when abutting commercial uses if necessary due to site conditions. (5/98)

3. Service areas and facilities, including garbage and waste disposal containers, recycling bins, and loading areas. (5/98)

4. Outdoor storage areas. (5/98)

5. Parking areas for 20 or more vehicles for multi-family developments, or 30 or more vehicles for commercial or industrial uses. (5/98)

6. At and above-grade electrical and mechanical equipment, such as transformers, heat pumps, and air conditioners. (5/98)

7. Multifamily developments when abutting lower density residential uses. ~~Shall be used to mitigate adverse visual~~

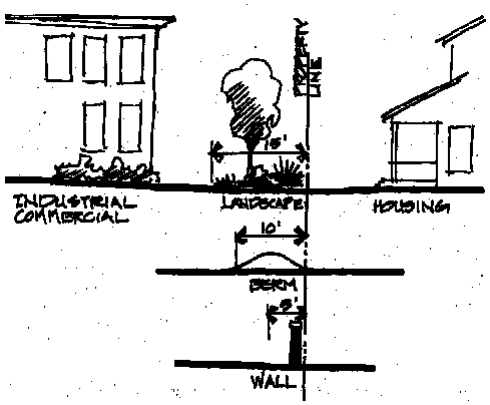
~~impacts, dust, noise, or pollution, and to provide for compatibility between dissimilar adjoining uses~~. ~~(07/06)~~

B. Where screening or buffering is determined to be necessary, one of the following alternatives shall be employed: (07/06)

1. Width not less than 15 feet shall be planted with the following materials: (07/06)

a. At least one row of deciduous or evergreen trees staggered and spaced not more than 15 feet apart. (5/98)

b. At least one row of evergreen shrubs that will grow to form a continuous hedge at least five feet in height within one year of planting. (5/98)



Alternative Buffering Techniques

c. Lawn, low-growing evergreen shrubs or evergreen ground cover covering the balance of the area. (5/98)

2. Width not less than 10 feet shall be developed in accordance with the following standards: (07/06)

a. Berm form should not slope more than 40 percent (1:2.5) on the side away from the area screened from view. The slope for the other side (screened area) may vary. (5/98)

b. A dense evergreen hedge shall be located so as to most effectively buffer the proposed use. (5/98)

c. The combined total height of the berm and hedge shall be not less than five feet. (5/98)

3. Width must not be less than five feet shall be developed in accordance with the following standards: (07/06)

a. A masonry wall or sight-obscuring fence not including vinyl slatted chain link fences not less than six feet in

height. In addition, a fence shall be maintained in a safe and attractive manner. (07/06)

b. A mixture of lawn, low-growing evergreen shrubs, and evergreen ground cover covering the balance of the area. (07/06)

4. Other alternative methods which produce an adequate screening or ~~buffering,~~buffering may be approved by the City. (07/06)

2.309.06 Planting and Maintenance

A. Planting Height. No sight-obscuring plantings exceeding 30 inches in height shall be located within any required vision clearance area in accordance with Section 2.312.09 of this Ordinance. (5/98)

B. Plant Materials. Plant materials shall not cause a hazard. Landscape plant materials over walkways, pedestrian paths and seating areas shall be pruned to a minimum height of eight feet and to a minimum height of 1~~3~~5 feet over streets and vehicular traffic areas. (5/98)

C. Utility Interference. Landscape plant materials shall be selected which do not generally interfere with utilities above or below ground. (5/98)

D. Installation. Landscape plant materials shall be properly guyed and staked to current industry standards as necessary. Stakes and guy wires shall not interfere with vehicular or pedestrian traffic. (5/98)

E. Suitability. Plant materials shall be suited to the conditions under which they will be growing. As an example, plants to be grown in exposed, windy areas that will not be irrigated should be sufficiently hardy to thrive under these conditions. Plants should have vigorous root systems, and be sound, healthy, free from defects, diseases, and infections. (5/98)

F. Deciduous Trees. Deciduous trees shall have a minimum caliper of 2 inches (DBH), and a minimum height of 8 feet at the time of planting. (07/06)

G. Evergreen Trees. Evergreen trees shall be a minimum of 8~~6~~ feet in height and fully branched at time of planting. (5/98)

H. Shrubbery. Shrubs shall be supplied in a minimum 1 gallon containers or 8 inch burlap balls with a minimum spread of 12 to 15 inches. (5/98)

I. Ground Cover. Ground cover plants shall be spaced in accordance with current nursery industry standards to achieve covering of the planting area. Rows of plants are to be staggered for a more effective covering. Ground cover shall be supplied in a minimum 4 inch size container. (07/06)

J. Irrigation. All developments are required to provide appropriate methods of irrigation for the landscaping. Sites with over 1,000 square feet of landscaped area shall be irrigated with automatic sprinkler systems to insure the continued health and attractiveness of the plant materials unless otherwise approved by the Zoning Administrator. Sprinkler heads shall not cause any hazard to the public. Irrigation shall not be required in wooded areas, wetlands, floodplains, or along natural drainage channels or stream banks. (07/06)

K. Re-planting. Trees or shrubbery which die-off shall be replaced with a new plant of the same or similar type. Replacement is ~~ultimately~~ the responsibility of the property owner. (5/98)

L. Maintenance. Landscaping shall be continually maintained. Appropriate methods of care and maintenance of landscaped plant material shall be provided by the owner of the property. This requirement applies to existing, as well as new development. (5/98)

M. Plant Protection. Landscape plant material shall be protected from damage due to heavy foot traffic or vehicular traffic by protective tree grates, pavers or other suitable methods. (5/98)

COUNCIL MEETING: August 21, 2017

AGENDA ITEM NUMBER:_____

TO: **MAYOR CLARK AND CITY COUNCIL MEMBERS**

THROUGH: **CHRIS EPPLEY**
CITY MANAGER

FROM: **BILL LAWYER**
PUBLIC WORKS DIRECTOR

SUBJECT: **Marion County Multi-Jurisdictional Hazard Mitigation Plan**

Summary

In 2011, the Keizer City Council approved the City of Keizer's addendum to the Marion County Multi-Jurisdictional Natural Hazard Mitigation Plan. The City's plan was approved by FEMA and therefore allows the City to be eligible for FEMA disaster mitigation related funding. A hazards mitigation plan (HMP) identifies actions that strengthen a community's ability to withstand and recover from the damaging effects of hazards.

Review and updates to a hazards mitigation plan (HMP) are required on a scheduled basis and Marion County Emergency Management staff coordinated efforts with regional cities and consultants to update the 2011 plan. In order for Marion County to get final approval from FEMA, the City of Keizer, and all other cities included in the plan, must formally approve the addendum to the Marion County Multi-Jurisdictional Hazard Mitigation Plan (HMP) plan through a public hearing and resolution.

Fiscal Impact

There is no direct fiscal impact related to this action.

Recommendation

Staff recommends the City Council open the public hearing, take testimony, and if there are no questions or concerns, close the hearing and adopt the attached resolution.

CITY COUNCIL, CITY OF KEIZER, STATE OF OREGON

Resolution R2017-_____

ADOPTING UPDATES TO THE CITY OF KEIZER REPRESENTATION IN THE MARION COUNTY MULTI-JURISDICTIOINAL HAZARD MITIGATION PLAN

WHEREAS, the City of Keizer recognizes the threat that hazards pose to people, property and infrastructure within our community;

WHEREAS, undertaking hazard mitigation actions will reduce the potential for harm to people, property and infrastructure from future hazard occurrences;

WHEREAS, an adopted Natural Hazards Mitigation Plan is required as a condition of future funding for mitigation projects under multiple FEMA pre- and post-disaster mitigation grant programs;

WHEREAS, the City of Keizer adopted the City of Keizer's representation in the Marion County Natural Hazards Mitigation Plan, on December 7, 2009 by Resolution R2009-1999;

WHEREAS, the City of Keizer updated its addendum to the Marion County Natural Hazards Mitigation Plan by Resolution R2011-2157;

WHEREAS, the City of Keizer has fully participated in the FEMA prescribed mitigation planning process to prepare the Marion County, Multi-Jurisdictional Hazard Mitigation Plan, which has established a comprehensive, coordinated planning process to eliminate or minimize these vulnerabilities;

Keizer City Attorney
930 Chemawa Road NE
PO Box 21000
Keizer, Oregon 97307
503-390-3700

WHEREAS, the City of Keizer has identified hazard risks and prioritized a number of proposed actions and programs needed to mitigate the vulnerabilities of the City of Keizer to the impacts of future disasters within the Marion County, Multi-Jurisdictional Hazard Mitigation Plan;

WHEREAS, these proposed projects and programs have been incorporated into the Marion County, Multi-Jurisdictional Hazard Mitigation Plan that has been prepared and promulgated for consideration and implementation by the cities of Marion County;

WHEREAS, the Oregon Office of Emergency Management and Federal Emergency Management Agency, Region X officials have reviewed the Marion County, Multi-Jurisdictional Hazard Mitigation Plan and pre-approved it (dated, April 14, 2017) contingent upon this official adoption of the participating governments and entities;

WHEREAS, the Marion County, Multi-Jurisdictional Hazard Mitigation Plan is comprised of three volumes: Volume I – Basic Plan, Volume II – City Addenda, and Volume III – Appendixes, collectively referred to herein as the Marion County, Multi-Jurisdictional Hazard Mitigation Plan;

WHEREAS, the Marion County, Multi-Jurisdictional Hazard Mitigation Plan is in an on-going cycle of development and revision to improve its effectiveness;

WHEREAS, the City Council wishes to adopts the Marion County, Multi-Jurisdictional Hazard Mitigation Plan;

NOW, THEREFORE,

Keizer City Attorney
930 Chemawa Road NE
PO Box 21000
Keizer, Oregon 97307
503-390-3700

BE IT RESOLVED by the City Council of the City of Keizer that the Marion County, Multi-Jurisdictional Hazard Mitigation Plan is adopted as an official plan.

BE IT FURTHER RESOLVED that the City Manager is instructed to develop, approve, and implement the mitigation strategies and any administrative changes to the Marion County, Multi-Jurisdictional Hazard Mitigation Plan.

BE IT FURTHER RESOLVED that the attached Volume II: City Addenda to the Marion County Multi-Jurisdictional Natural Hazards Mitigation Plan is hereby adopted.

BE IT FURTHER RESOLVED that the City of Keizer will submit this Resolution to the Oregon Office of Emergency Management and Federal Emergency Management Agency, Region X officials to enable final approval of the Marion County, Multi-Jurisdictional Hazards Mitigation Plan.

BE IT FURTHER RESOLVED that this Resolution shall take effect immediately upon the date of its passage.

PASSED this _____ day of _____, 2017.

SIGNED this _____ day of _____, 2017.

_____
Mayor

_____
City Recorder

Keizer City Attorney
930 Chemawa Road NE
PO Box 21000
Keizer, Oregon 97307
503-390-3700

Marion County Multi-Jurisdictional Hazard Mitigation Plan

Marion County and the Cities of: Aumsville, Aurora, Detroit, Gates, Idanha, Keizer, Silverton, Stayton, Turner and Woodburn

April 2017

Volume II: City Addenda

Prepared for:

Marion County Emergency Management

Prepared by:

University of Oregon
Community Service Center
Community Planning Workshop &
Oregon Partnership for Disaster Resilience

UNIVERSITY OF OREGON

CSC Community Service Center

CPW

OREGON PARTNERSHIP FOR DISASTER RESILIENCE

This Natural Hazard Mitigation Plan was prepared by:

CSC
Community Service Center

With support from:

UNIVERSITY OF OREGON

PPPM
Department of Planning, Public Policy and Management
School of Architecture and Allied Arts

Planning grant funding provided by:

FEMA

Federal Emergency Management Agency (FEMA)
Pre-Disaster Mitigation Program
Grant: EMS-2014-PC-0005
Sub-grant Application Reference: PDMC-PL-10-OR-2013-001, and

Additional Support Provided by:

SPECIAL THANKS & ACKNOWLEDGEMENTS

Marion County developed this Multi-Jurisdictional Hazard Mitigation Plan (MJHMP) through a regional partnership funded by the Federal Emergency Management Agency's (FEMA) Pre-Disaster Mitigation (PDM) Competitive Grant Program: EMS-2014-PC-0011, Sub-grant Application Reference: PDMC-PL-10-OR-2014-002. This updated Hazard Mitigation Plan is a collaboration between Marion County and the Cities of Aumsville, Aurora, Detroit, Gates, Idanha, Keizer, Silverton, Stayton, Turner and Woodburn. Planning process, plan templates and plan development support provided by the Oregon Partnership for Disaster Resilience (OPDR) at the University of Oregon's Community Service Center.

Special thanks to Ed Flick, Marion County Emergency Manager for his enterprise-wide vision for resilience in Marion County; and to Kathleen Silva, Marion County Emergency Preparedness Coordinator for her leadership in convening the steering committee and lifeline sector advisory committees.

Marion County HMP Update Steering Committees

Marion County

Name	Position	Organization
Bill Lawyer	Director	City of Keizer Public Works
Boyd Keyser	Superintendent	North Marion School District
Brandon Reich	Senior Planner	Marion County Planning
Brent Stevenson	Manager	Santiam Water Control District
Caitlin Esping	AmeriCorps VISTA	Marion County Emergency Management
Dale Huitt	Deputy Sheriff	Marion County Sheriff
Danielle Gonzalez	Management Analyst	Marion County Community Services
David Sawyer	Administrator	City of Turner
Derrel Lockard	Superintendent	City of Aurora Public Works
Dianne Hunt	Director	City of Silverton Administrative Services
Don Charpillon		East Salem Suburban Neighborhood Association
Ed Flick	Emergency Manager	Marion County Emergency Management
Jason Horton	Communications Coordinator	City of Woodburn
Jeff Fossholm	Chief of Police	City of Silverton Police Department
Jennifer Warner	Technician	City of Keizer Public Works
Jim Ferraris	Police Chief	Woodburn Police Department
Kathleen Silva	Emergency Preparedness Coordinator	Marion County Emergency Management
Kelly Richardson	Manager/City Recorder	City of Aurora City Hall Administration
Kris Sallee	Councilor	City of Aurora City Council
Mathias Reyes	Project Manager	City of Keizer Public Works
Matt Knudsen	Environmental Specialist	Marion County Public Works
Michael Johnson	Chair	East Salem Suburban Neighborhood Association
Randy Scott	Director	City of Woodburn Public Works
Rick Sebens	Chief of Police	City of Stayton Police Department
Roger Stevenson	Emergency Manager	City of Salem Emergency Management

City of Aumsville

- Richard Schmitz, Chief of Police
- Steve Oslie, Public Works Director

City of Aurora

- Kris Sallee, City Council
- Kelly Richardson, City Recorder
- Derrel Lockard, Public Works Superintendent
- Boyd Keyser, Marion County School District

City of Detroit

- Christine Pavoni, City Recorder
- Robert Bruce, Certified Water Technician

City of Gates

- Jerry Marr, Mayor
- Traci Archer, Recorder
- Leeroy Davis

City of Idanha

- Karen Clark, Mayor
- Robert Bruce, Certified Water Technician

City of Keizer

- Bill Lawyer, Public Works Director
- Jennifer Warner, Public Works Technician
- Mathias Reyes, Drinking Water Technician
- Nate Brown, Community Development Director
- Elizabeth Sagmiller, Environmental Division Manager
- Sam Litke, Senior Planner
- Shane Witham, Associate Planner

City of Mill City

- David Kinney, Planning Advisor
- Stacie Cook, City Recorder

City of Silverton

- Dianne Hunt, Emergency Manager
- Jeff Fossholm, Police Chief

City of Stayton

- Dan Fleishman, Planning & Development Director
- Henry Porter, Mayor
- Rich Sebens, Emergency Manager
- Lance Ludwick, Public Works

City of Turner

- David Sawyer, City Administrator
- Garry Tiffin, Mayor
- Richard Bates
- Chuck Roberts
- Larry Lullay
- John Taylor

City of Woodburn

- Jason Horton, Public Information Officer
- Randy Scott, Public Works Director
- Jim Ferraris, Chief of Police
- Paul Iverson, Fire District Chief

Community Service Center Team

- Robert Parker, Director
- Josh Bruce, Director OPDR
- Michael Howard, Assistant Program Manager
- Aniko Drlik-Muehleck, Project Director
- Craig Wiroll, Project Manager
- Amanda Kohn, Research Associate
- Bree Nicolello, Research Associate
- Dan Lokic, Research Associate
- Tyce Herrman, Research Associate
- Mugs Scherer, Research Associate

Additional Thanks:

To the Department of Geology and Mineral Industries for assistance with hazard data; the Department of Land Conservation and Development staff in the hazards for flood data, mapping and process support; to the Oregon Military Department Office of Emergency Management for grant administration and process support.

Special thanks to all of the local Marion County partner agencies and representatives who participated in the lifeline sector analysis:

- Communications: Capital Community Television (CCTV), Amateur Radio Emergency Service (ARES), Marion Area Multi-Agency Emergency Telecommunications Dispatch Center (METCOM 911), Santiam Canyon Phone, Willamette Valley Communications Center (WVCC), Frontier, Verizon, Oregon Statewide Interoperability Coordinator (SWIC), Service Master of Salem, Pacific Gas and Electric Company (PGE).
- Energy: Pacific Gas and Electric.
- Transportation: City of Salem, City of Woodburn, Marion County Public Works, Marion County Sherriff's Office, ODOT, Salem Public Works, Salem-Keizer School District, Salem-Keizer Transit, Woodburn Transit Service.
- Water: City of Stayton, City of Salem, City of Keizer, City of Turner, Marion County, North Santiam Watershed Council.

About the Community Service Center

The Community Service Center (CSC), a research center affiliated with the Department of Planning, Public Policy, and Management at the University of Oregon, is an interdisciplinary organization that assists Oregon communities by providing planning and technical assistance

to help solve local issues and improve the quality of life for Oregon residents. The role of the CSC is to link the skills, expertise, and innovation of higher education with the transportation, economic development, and environmental needs of communities and regions in the State of Oregon, thereby providing service to Oregon and learning opportunities to the students involved.

About the Oregon Partnership for Disaster Resilience

The Oregon Partnership for Disaster Resilience (OPDR) is a coalition of public, private, and professional organizations working collectively toward the mission of creating a disaster-resilient and sustainable state. Developed and coordinated by the Community Service Center at the University of Oregon, the OPDR employs a service-learning model to increase community capacity and enhance disaster safety and resilience statewide.

Plan Template Disclaimer

This Hazard Mitigation Plan is based in part on a plan template developed by the Oregon Partnership for Disaster Resilience. The template is structured to address the requirements contained in 44 CFR 201.6; where language is applicable to communities throughout Oregon, OPDR encourages the use of standardized language. As part of this regional planning initiative, OPDR provided copies of the plan templates to communities for use in developing or updating their hazards mitigation plans. OPDR hereby authorizes the use of all content and language provided to Marion County in the plan template.

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CITY OF AUMSVILLE ADDENDUM

Purpose

This document serves as the City of Aumsville's Addendum to the Marion County Multi-Jurisdictional Hazards Mitigation Plan (MHMP, HMP). This addendum supplements information contained in Volume I (Basic Plan) of this HMP. The Basic Plan serves as the foundation for this jurisdiction's addendum. Volume III (Appendices) provides additional information (particularly regarding participation and mitigation strategy). This addendum meets the following requirements:

- Multi-jurisdictional **Plan Adoption** §201.6(c)(5),
- Multi-jurisdictional **Participation** §201.6(a)(3),
- Multi-jurisdictional **Mitigation Strategy** §201.6(c)(3)(iv), and
- Multi-Jurisdictional **Risk Assessment** §201.6(c)(2)(iii).

Plan Process, Participation, and Adoption

This section of the HMP addendum addresses 44 CFR 201.6(c)(5), *Plan Adoption*, and 44 CFR 201.6(a)(3), *Participation.*

In the summer and fall of 2016, the Oregon Partnership for Disaster Resilience (OPDR) at the University of Oregon's Community Service Center (CSC) partnered with the Oregon Military Department's Office of Emergency Management (OEM), and Marion County cities, including Aumsville, to update their addendum to the Marion County HMP, which expired July 8, 2016. This project is funded through the Federal Emergency Management Agency's (FEMA) FY14 Pre-Disaster Mitigation Competitive Grant Program (PDMC-PL-10-OR-2014-002).

By developing this addendum to the Marion County HMP, locally adopting it, and having it approved by FEMA, the City of Aumsville will gain eligibility for FEMA Hazard Mitigation, Pre-Disaster Mitigation, and Flood Mitigation Assistance grant program funds.

The Marion County HMP, and Aumsville addendum, are the result of a collaborative effort between citizens, public agencies, non-profit organizations, the private sector, and regional organizations. A project steering committee guided the process of developing the plan. For more information on the composition of the steering committee see the *Acknowledgements*, *Plan Summary*, and *Plan Process* (Volume III, Appendix B).

The Aumsville City Administrator is the designated local convener of this addendum. The Convener will take the lead in implementing, maintaining, and updating the addendum to the HMP in collaboration with Marion County Emergency Management.

Representatives from the City of Aumsville steering committee met formally on one occasion: October 12, 2016 (see Appendix B for more information).

The city's addendum reflects decisions decided upon at the plan update meeting and during subsequent work and communication with OPDR.

The City of Aumsville Steering Committee is comprised of representatives from the following departments:

- Convener, City Administrator
- Police representative
- Fire representative
- Public Works Director
- School District
- Marion County Emergency Management (as necessary)
- Marion County Public Works representative (as necessary)

Aumsville used multiple approaches to engage the public. First, the City established steering committee representatives from across the city. Next, the city actively participated in countywide community engagement activities described in Volume I, Section 4 and in Appendix B. City staff also presented the draft plan to the City Council during an open public council session. The Steering Committee was closely involved throughout the development of the plan and served as the local oversight body for the plan's development. In addition, community members outside of the steering committee were provided an opportunity for comment via the plan review process (see Appendix B for more information).

The Marion County HMP was approved by FEMA on [Month] [Day], 2017 and the Aumsville addendum was adopted via resolution on [Month] [Day], 2017. This HMP is effective through [Month] [Day], 2022.

Mitigation Strategy

This section of the HMP addendum addresses 44 CFR 201.6(c)(3(iv), *Mitigation Strategy*.

During the 2016 Marion County and Aumsville update process, OPDR and a representative from Marion County Emergency Management assisted the steering committee with developing mitigations that will meet Aumsville's unique situation. The proposed actions were then re-reviewed by the steering committee to finalize. Aumsville developed a list of priority actions (Appendix A-1), any actions that were not prioritized were placed in the Action Item Pool (Appendix A-2) and will be considered during the semi-annual meetings.

Priority Actions

The city is listing a set of high priority actions in an effort to focus attention on an achievable set of high leverage activities over the next five-years. The city's priority actions are listed in Table AM-1 on the following page.

Action Item Pool

Table AM-2 on the following pages presents a pool of mitigation actions. This expanded list of actions is available for local consideration as resources, capacity, technical expertise and/or political will become available.

Table AM-1. Aumsville Priority Action Items

Action Item ID	Hazard	Action Item	Coordinating Organization	Partner Organizations	Timeline
Priority Actions					
P-1	Flood	Remove culvert on 1st and Gordon and replace with a bridge.	Public Works	City Administration/	Short-Term
P-2	Flood	Upsize culverts on Bishop Rd.	Public Works	City Administration/	Short-Term
P-3	Flood	Create an agreement for flood mitigation along Beaver Creek and Mill Creek/Highberger Ditch (agreement would have to be regional). Aumsville could do the following: *Use city property as a water detention space *Increase the detention capacity to accommodate effects of new development *Update the Stormwater Mangement Plan	City Administration	Public Works, State Representatives, regional partners	Ongoing
P-4	Earthquake	Assess the seismic vulnerability of the City's reservoir (as described in the 2015 Water Plan). Retrofit facility as funding becomes available.	Public Works	City Administration/ City Council	Short-Term/ Long Term

Source: City of Aumsville HMP Steering Committee, 2016.

Table AM-2. Aumsville Action Item Pool

Action Item ID	Hazard	Action Item	Coordinating Organization	Partner Organizations	Timeline
Action Item Pool					
Multi-Hazard					
MH-1	Multi-Hazard	Develop memorandum of understanding with the gas station that gives emergency services first access to station's stored fuel.	City Administration		Short-Term
MH-2	Multi-Hazard	Update the City's Emergency Operations Plan. Important components to include are: *A list of vulnerable populations *Fuel management and access plan *Detailed asset inventory	Police Chief and City staff	Marion Co.	Short-Term
MH-3	Multi-Hazard	Identify and purchase materials the City needs to operate successfully in an emergency situation.	City Administration	Police, Fire	Short-Term
MH-4	Multi-Hazard	Develop a communications plan between the City, Police, and Fire. This will include purchasing more radios so all key personnel can be in contact during an emergency.	Public Works	Police, Fire	Short-Term
MH-5	Multi-Hazard	Develop memoranda of understanding with facilities that could function as emergency shelters during a hazard event.	City Administration	Red Cross	Long-Term
MH-6	Multi-Hazard	Update the Aumsville Comprehensive Plan to reflect statewide land use Goal 7 language surrounding natural hazards.	City Administration	Mid-Willamette Valley Council of Governments	Long-Term
MH-7	Multi-Hazard	Include emergency preparedness resources in the City's monthly newsletter.	City Executive Office	Marion Co.	Ongoing
MH-8	Multi-Hazard	Hold an annual preparedness fair.	City Executive Office		Ongoing
MH-9	Multi-Hazard	Participate in Maron County's MORE Agreement.	City Administration	Marion Co.	Ongoing
MH-10	Multi-Hazard	Develop stronger connections with the business community and encourage businesses to develop continuity of operations plans.	City Administration	Businesses	Ongoing
Drought					
DT-1	Drought	Partner with Marion County to support local agencies' training on water conservation measures.	Public Works	Marion Co.	Ongoing
DT-2	Drought	Participate in Marion Co Drought Contingency Plan.	Public Works	Marion Co.	Short-Term/ Ongoing

Source: City of Aumsville HMP Steering Committee, 2016.

Table AM-2. Aumsville Action Item Pool (Continued)

Action Item ID	Hazard	Action Item	Coordinating Organization	Partner Organizations	Timeline
Action Item Pool					
Earthquake					
EQ-1	Earthquake	Complete seismic assessment on criticial facilities (water tower assessment currently underway). Retrofit facilities based on recommendations of the assessment.	Public Works	City Administration/ City Council	Short-Term
EQ-2	Earthquake	School seismic retrofitting action - need to talk to school district representative.	School District	Business Oregon - IFA	Short-Term
EQ-3	Earthquake	Purchase a 4-wheel drive vehicle that could provide transportation if major access points to the city are not passable.	Public Works	City Council	Short-Term
EQ-4	Earthquake	Consider requiring new city facilities to exceed the minimum structural requirements for seismic loading.	City Council	Marion Co. Building Inspection	Long-Term
EQ-5	Earthquake	Install automatic shut-off valves in all city facilities that use natural gas.	Public Works	City Council	Long-Term
EQ-6	Earthquake	Develop dam inundation maps.	Risk MAP		Long-Term
EQ-7	Earthquake	Encourage residents to prepare and maintain 2-week survival kits.	City Executive Office	Marion Co.	Ongoing
EQ-8	Earthquake	Send city employees to Marion County's ATC 20 training.	City Administration	Marion Co.	Ongoing
Flood					
FL-1	Flood	Develop updated floodplain maps.	Risk MAP		Long-Term
FL-2	Flood	Host an educational event targeted at flood-vulnerable residents that provides information about participating in the National Flood Insurance Program and other flood mitigation activities.	Public Works	City Executive Office	Ongoing
Severe Weather					
SW-1	Severe Storm	Require new development to put power lines underground.	City Administration		Short-Term
SW-2	Severe Storm	Encourage Pacific Power to underground lines as they are able.	City Administration		Ongoing

Source: City of Aumsville HMP Steering Committee, 2016.

Plan Implementation and Maintenance

The City Council will be responsible for adopting the City of Aumsville addendum to the Marion County HMP. This addendum designates a convener and a coordinating body to oversee the development and implementation of action items. Because the city addendum is part of the county's multi-jurisdictional HMP, the city will look for opportunities to partner with the county. The city's steering committee will convene after adoption of the City of Aumsville addendum on an annual schedule; the county meets on a semi-annual basis. The City of Aumsville convener will participate in the Marion County HMP meetings and will report on city specific activities as appropriate. The steering committee will be responsible for identifying new risk assessment data, reviewing status of mitigation actions, identifying new actions, and seeking funding to implement the city's mitigation strategy (actions). The convener will also remain active in the county's implementation and maintenance process (see Volume I, Section 4 for more information).

The city will utilize the same prioritization process as the county (See Volume I, Section 4: Plan Implementation and Maintenance and Volume IV, Appendix D: Economic Analysis of Hazard Mitigation Projects for more information).

Implementation through Existing Programs

Many of the Hazards Mitigation Plan's recommendations are consistent with the goals and objectives of the city's existing plans and policies. Where possible, the City of Aumsville will implement the HMP's recommended actions through existing plans and policies. Plans and policies already in existence have support from local residents, businesses, and policy makers. Many land-use, comprehensive, and strategic plans get updated regularly, allowing them to adapt to changing conditions and needs. Implementing the HMP's action items through such plans and policies increases their likelihood of being supported and implemented.

The Aumsville Comprehensive Plan was first acknowledged by Oregon Land Conservation and Development Commission in 1977. The City most recently updated the entire plan, including updates to the Natural Hazards section, in December of 1999.[1] The Aumsville Comprehensive plan (Chapter 5, Goal 7) calls out floods and seismic hazards as the two hazards likely to impact Aumsville. The plan does not mention landslide or wildfire in the natural hazards section (Chapter 5, Goal 7). The plan does contain a general goal "to protect life and property of area residents from natural disasters and hazards." In addition, the plan contains two specific policies related to the flood hazard and two related to seismic hazard. There are no other hazard-related policies listed. The City implements the plan through regulatory controls found in the Development Ordinance. The City first adopted the Development Ordinance in 1986 and has completed numerous updates since, with the most recent occurrence in May of 2016.[2]

---

[1] Aumsville Comprehensive Plan (1999). Chapter 5: Resources. Goal 7: Natural Disasters and Hazards, p. 19-21; p. 24-25.

[2] Ordinance No. 323. "An Ordinance establishing comprehensive planning regulations for the City of Aumsville, Oregon." http://www.aumsville.us/files/Ord-323--Dev-Reg-8-1_4o8kcqk2.pdf

Aumsville also implements elements of the Comprehensive Plan related to natural hazards through the following Plans:

- City of Aumsville Visioning Plan, August 2015, updated April 2016[3]
- Aumsville Water Master Plan, April 2015[4]
- City of Aumsville Transportation System Plan, October 2010[5]

Continued Public Participation

Keeping the public informed of the City's efforts to reduce the risk associated with future hazards events is important for successful plan implementation and maintenance. The City is committed to involving the public in the plan review and updating process. The City will add all-hazard mitigation activities to the City of Aumsville Visioning Plan which is reviewed monthly by the City Council. This will give the public an opportunity to remain aware of efforts surrounding mitigation and create a regular space for input. Also see Volume I, Section 4, for more information about the public input process for this Multi-Jurisdictional Hazards Mitigation Plan.

Plan Maintenance

The Marion County Multi-Jurisdictional Hazards Mitigation Plan and city addendum will be updated every five years in accordance with the update schedule outlined in the Disaster Mitigation Act of 2000. During the county plan update process, the city will also review and update its addendum. The convener will be responsible for convening the steering committee to address the questions outlined below.

- Are there new partners that should be brought to the table?
- Are there new local, regional, state, or federal policies influencing natural hazards that should be addressed?
- Has the community successfully implemented any mitigation activities since the plan was last updated?
- Have new issues or problems related to hazards been identified in the community?
- Are the actions still appropriate given current resources?
- Have there been any changes in development patterns that could influence the effects of hazards?
- Have there been any significant changes in the community's demographics that could influence the effects of hazards?
- Are there new studies or data available that would enhance the risk assessment?
- Has the community been affected by any disasters? Did the plan accurately address the impacts of this event?

---

[3] This document guides the City in day-to-day operations and is revisited regularly by the City Council. Related to natural hazards, the Plan includes goals and projects around water, sewer, street and storm drainage, police, public works, transportation, and emergency management. http://www.aumsville.us/files/April-2016-Visioning-Plan.pdf

[4] http://www.aumsville.us/files/Aumsville-WMP.pdf

[5] http://www.aumsville.us/files/Aumsville-TSP-ORD-603.pdf

These questions will help the steering committee determine what components of the mitigation plan need updating. The steering committee will be responsible for updating any deficiencies found in the plan.

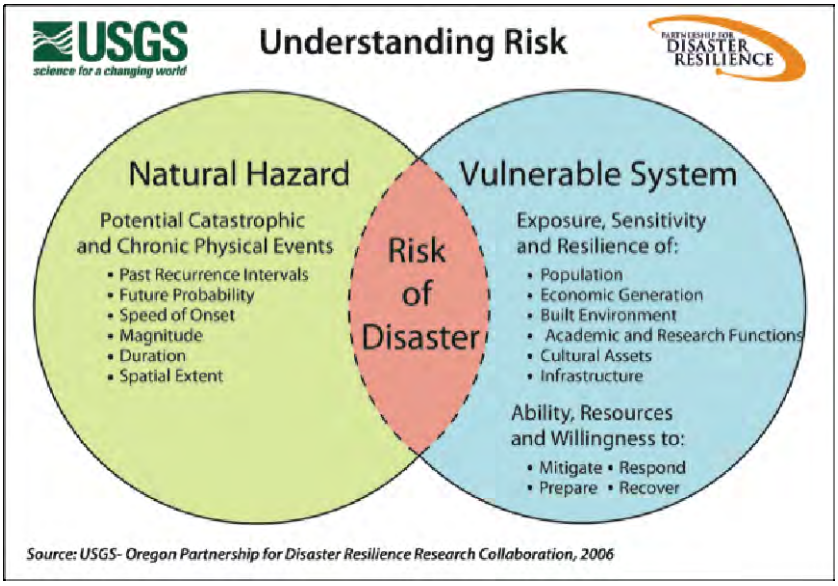
Risk Assessment

This section of the HMP addendum addresses 44 CFR 201.6(b)(2) - Risk Assessment. In addition, this chapter can serve as the factual basis for addressing Oregon Statewide Planning Goal 7 – Areas Subject to Natural Hazards. Assessing natural hazard risk has three phases:

- **Phase 1:** Identify hazards that can impact the jurisdiction. This includes an evaluation of potential hazard impacts – type, location, extent, etc.
- **Phase 2:** Identify important community assets and system vulnerabilities. Example vulnerabilities include people, businesses, homes, roads, historic places and drinking water sources.
- **Phase 3:** Evaluate the extent to which the identified hazards overlap with, or have an impact on, the important assets identified by the community.

The local level rationale for the identified mitigation strategies (action items) is presented herein, and within Section 2, *Risk Assessment*, and Appendix C, *Community Profile*. The risk assessment process is graphically depicted in Figure AM-1 below. Ultimately, the goal of hazard mitigation is to reduce the area of risk, where hazards overlap vulnerable systems.

Figure AM-1. Understanding Risk



Risk Assessment Approach

A risk assessment is intended to provide the, "factual basis for activities proposed in the strategy to reduce loses from identified hazards."[6] To complete the risk assessment, the

[6] 44 CFR 201.6(2)(i)

HMP update team first updated the description, type, location and extent of each hazard. Next, the team updated the vulnerability information based on each hazard's potential impact on the community.

The Marion County Basic Plan (Volume I, Section II) Risk Assessment describes in detail the methods used to assess risk. In summary, Marion County has prepared a Threat Hazard Identification and Risk Assessment as a formal annex to the Marion County Emergency Operation Plan. The assessment uses a method developed by BOLD Planning[7]. This city addendum builds on the county level assessment to produce a similar assessment for the City of Aumsville. The assessment specifically examines:

1. Probability (frequency) of event
2. Magnitude of event
3. Expected warning time before event
4. Expected duration of event

Refer to Page 2-4 of the Marion County Basic HMP for a description of the scoring values for each ranking category.

Hazard Analysis

The assessment identifies three levels of risk: High, Moderate and Low.

High - High probability of occurrence; at least 50 percent or more of population at risk from hazard; significant to catastrophic physical impacts to buildings and infrastructure; major loss or potential loss of functionality to all essential facilities (hospital, police, fire, EOC and shelters).

Moderate - Less than 50 percent of population at risk from hazard; moderate physical impacts to buildings and infrastructure; moderate potential for loss of functionality to essential facilities.

Low - Low probability of occurrence or low threat to population; minor physical impacts.

A summary of the risk assessment findings and rankings is presented in Table AM-3.

[7] BOLD Planning is a consulting firm specializing in the development of actionable emergency plans. For more information, visit: http://www.boldplanning.com/

Table AM-3. Hazard and Vulnerability Assessment Summary

Hazard Profile Summary for Aumsville Usinging Bold Planning Analysis Scoring							
Natural Hazard	Probability	Warning Time	Magnitude	Duration	CPRI	Local Planning Significance	County Planning Significance
Weight Factor	0.45	0.3	0.15	0.1			
Earthquake*	4	4	4	4	4.00	High	High
Severe Weather/Storm**	4	1	3	3	2.85	Moderate	High
Flood	3	2	3	4	2.80	Moderate	High
Drought	3	1	3	4	2.50	Moderate	High
Extreme Weather - High Temperature	3	1	2	4	2.35	Moderate	Moderate
Wildland Interface Fire	1	4	2	2	2.15	Moderate	Moderate
Dam or Levee Failure	1	2	4	4	2.05	Moderate	Moderate
Landslide	1	2	2	2	1.55	Low	High
Volcanic Eruption	1	1	1	4	1.30	Low	Low
*Note: Earthquake probability listed to match county level analysis. See below for more detailed probability assessment.							
**Note: Includes tornado hazard							

Source: BOLD Planning Risk Assessment Method; Analysis by UO Community Service Center.

Community Asset Identification

This section provides information on city specific assets. For additional information on the characteristics of Aumsville, in terms of geography, environment, population, demographics, employment and economics, as well as housing and transportation see Volume III, Appendix C, *Community Profile*. Many of these community characteristics can affect how hazards impact communities and how communities choose to plan for all-hazard mitigation. Considering the city specific assets during the planning process can assist in identifying appropriate measures for hazard mitigation.

Community Characteristics

The city of Aumsville is located in Marion County, Oregon, southeast of Salem, just south of Hwy 22 at Exit 9. Aumsville is located in Oregon's Willamette Valley, which experiences a moderate climate. In August, the average high temperature is 80 degrees and the average low temperature is 52 degrees. Wintertime temperatures in January range from an average high of 47 degrees to an average low of 33 degrees. The average annual precipitation is 39.6 inches. Aumsville is bordered on the north by Beaver Creek and on the south by Mill Creek. Mill Creek has a small offshoot on the southeastern side of town called Highberger Ditch. Aumsville is almost completely flat.

The Population Research Center at Portland State University lists Aumsville's 2015 population at 3,945. This represents a 26% increase from 2000. For more demographic information, refer to Appendix C.

Economy

Historically, Aumsville was an agricultural community. Although agriculture is still an important industry in the surrounding areas, almost three-quarters of the labor force in Aumsville are now employed in construction, services, and retail trade.[8] Median household

[8] Business Oregon – Oregon Prospector. Total Employees by Major SIC (2016) for Aumsville, OR. http://oregon.zoomprospector.com/

income in Aumsville in 2014 was $50, 319. For more economic information, refer to Appendix C.

Critical and Important Facilities

Aumsville's critical and important facilities include the following:

Transportation

- Highway OR-22 (North Santiam Highway)
- Shaw Hwy overpass on Hwy 22
- Aumsville Highway SE
- Mill Creek Bridge on W. Stayton Rd.
- Mill Creek Bridge on W end of Mill Creek Rd (this bridge hosts a fiber optic cable)
- Beaver Creek Bridge on Aumsville Hwy
  Note: City of Aumsville is not responsible for any of these highways or bridges – they are all managed by Marion County or ODOT

Energy

- Electricity Source: Pacific Power
  - All transmission lines, no substations
- Fuels used by the City:
  - City does not have a fuel station – fuel bought retail (note that the local fuel station probably does not have a back-up power source to pump gas from underground tanks)
  - City Hall back-up fuel: diesel generator for a well, City Hall/Police, and Fire Department – diesel will last for 24 hours
  - Public Works back-up fuel: 500 gallons of diesel, up to 1000 gallons of gas above ground – there are electric pumps now, but fuel could be manually pump if necessary
  - Wastewater Treatment Plan back-up fuel: diesel generator – diesel will last for 24 hours
  - Well site #1 back-up fuel: diesel generator – diesel will last for 24 hours
- School District has propane and diesel back-up

Water

- Drinking water sources:
  - Reservoir – 1 million gallons
  - Tower Well, located at 195 N. 5th St. (has back-up generator) – 100,000 gallons
  - Boone Well #1, located at 1105 Main St. (has back-up generator)
  - Reservoir Well, located at 9313 Mill Creek Rd.
  - Boone Well #2, located at 1105 Main St.
  - Church Well, located at 675 Grizzly St.
  - Two water filters that will filter 3,000 gallons per day (pumped from surface water sources)
- Wastewater Treatment Plant, 955 Olney St.: pond system

Communication

- Water Tower, 195 N. 5th St.: hosts 4 cellular providers
- Wastewater Treatment Plant, 955 Olney St.: hosts one cell tower (owned by a cellular provider) with a diesel generator with back-up fuel for 24 hours
- Telephone (ground line) switching station, 980 Main St.: has a diesel generator with back-up fuel for 24 hours
- City-owned vehicle mounted radios provide the ability to interconnect Police and Fire
- Police and Fire can dispatch out of the Police and Fire stations
- 1 amateur radio, located off of Cedar Lane

Emergency Services

- Police:
  - Police Department, 597 Main St.
- Fire: Aumsville Rural Fire Protection District
  - 490 Church St.
  - Shaw Station, 5604 Shaw Highway SE
- Medical
  - Aumsville Medical Clinic, 205 Main St. (note this is really just a doctor's office)

Cultural/Historical Resources

- Old City Hall is the Historic Museum, 599 Main St.
- Events that may have large crowds:
  - June: Emergency Preparedness fair/School Carnival
  - June – August, Mondays & Fridays: Kids summer parks program (run by the City)
  - August: Aumsville Corn Festival (10,000 – 12,000 attendance)
  - November: Saturday before Thanksgiving: Turkey Bingo (500-600 attendance)

Functional and Access Needs (Vulnerable Populations)

- Schools:
  - Aumsville Elementary School, 572 N. 11th St. (3 separate buildings)
  - Willamette Valley Baptist Church and School, 650 N. 1st St.
  - Kuntry Kids (Daycare), 200 Main St.
- Lower-income areas:
  - S 5th St next to Mill Creek
  - 11th St and Olney

See hazard sections below and Section 2, *Risk Assessment*, for potential hazard vulnerabilities to these facilities.

Hazard Characteristics

Drought

The characteristics of drought in Aumsville are the same for the county as a whole.

Table AM-4. Drought Summary

Hazard	Drought
Type	Climatic
Speed of Onset	Slow
Location	Varies, County Wide
Extent	Moderate to Severe Drought*
Prior Occurance	Three > 6 months duration since 1982
Probability	~9%

*Defined as between -2 and -4 on the National Resource Conservation Service (NRCS) Surface Water Supply Index (SWSI)

Sources: Oregon NHMP; NRCS; analysis by OPDR

The probability of drought in Aumsville is likely, the same as for the county as a whole. The City's water supply comes primarily from subsurface sources, making vulnerability to drought moderate. Overall, the planning significance of drought is moderate, slightly lower than the county.

Volume I, Section 2, *Risk Assessment*, adequately describes the characteristics of drought hazards, as well as the location and extent of a potential event. Due to a cool, wet climate, past and present weather conditions have generally spared Marion County communities from the effects of drought. Governor Kate Brown declared a drought emergency for all of Marion County in September 2015.

According Aumsville's 2015 Water Master Plan, Aumsville's five wells deposit water into a 1-million-gallon reservoir. Water is treated in the reservoir with chlorine and then distributed out via a booster pump station to water customers. In the future, water will receive additional filtration before entering the reservoir.

The 2015 Water Master Plan includes a section on water conservation, including a list of exiting or proposed water conservation programs. The Plan also provides a Water Curtailment Plan with accompanying curtailment actions.

Please review the Risk Assessment (Volume I, Section 2) for additional information on this hazard.

Earthquake

The characteristics of both a crustal earthquake and a Cascadia Subduction Zone (CSZ) earthquake are similar to the county as a whole.

Table AM-5. Earthquake Summary Crustal

Hazard	Earthquake - Crustal
Type	Geologic
Location	Multiple active faults; Willamette Valley
Speed of Onset	Rapid
Extent	Very Strong to Severe shaking ~ 500 yrs*
Prior Occurance	One over Magnitude 5 last 100 yrs**
Probability	Approximately 1% annual

*DOGAMI HazVu; ** PNSN - 1993 Scotts Mills just north of Marion County

Sources: DOGAMI - Oregon HazVu; Oregon NHMP; Pacific Northwest Seismic Network

Table AM-6. Earthquake Summary Subduction

Hazard	Earthquake - Subduction
Type	Geologic
Location	Primarily west of the Cascades; CA - BC
Speed of Onset	Rapid
Extent	Catastrophic
Prior Occurance	One over Magnitude 9 last 500 yrs
Probability	Magnitude 9+ is 7% - 12% over 50 yrs**

*DOGAMI HazVu; **Oregon Natural Hazard Mitigation Plan, anlysis by Oregon Department of Geology and Mineral Industries.

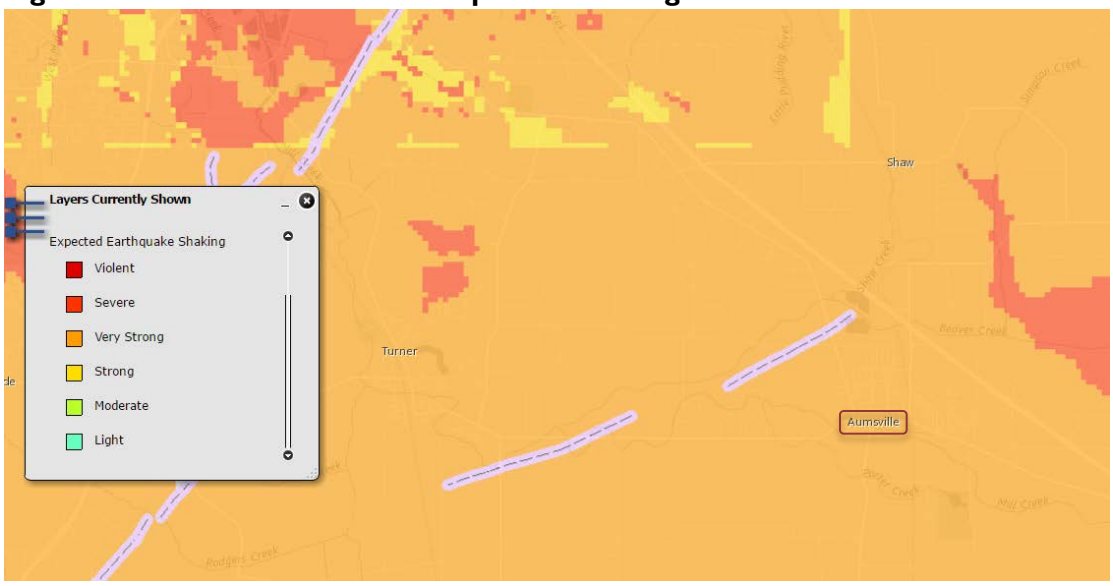
Sources: DOGAMI - Oregon HazVu; Oregon NHMP; Pacific Northwest Seismic Network

Aumsville's probability for a Crustal Earthquake event is "possible" and their vulnerability to a Crustal Earthquake event is "limited". The county steering committee determined that the probability for a Cascadia Subduction Zone (CSZ) Earthquake event is "highly likely" and that the vulnerability to a Cascadia Earthquake event is "catastrophic". This hazard was not rated as distinct CSZ and crustal events in the previous HMP. There is one locally active fault within the Aumsville city limits, one crossing over on the far northwest corner of the town. Other active faults also exist about six miles to the northwest and west. The 1993 Scott Mills quake caused $28 million in damages to cities throughout Marion County. No damaging earthquake events occurred during the previous five years.

Volume I, Section 2, *Risk Assessment*, adequately describes the characteristics of earthquake hazards, history, as well as the location and extent of a potential event. Generally, an event that affects the county is likely to affect Aumsville as well. Previous occurrences are well-documented within the county's plan, and the community impacts described by the county would generally be the same for Aumsville as well.

Earthquake-induced damages are difficult to predict, and depend on the size, type, and location of the earthquake, as well as site-specific building and soil characteristics. Presently, it is not possible to accurately forecast the location or size of earthquakes, but it is possible to predict the behavior of soil at any particular site. In many major earthquakes, damages have primarily been caused by the behavior of the soil. Figure AM-2 shows that ground shaking in Aumsville for both crustal and subduction earthquakes are expected to be very strong.

Figure AM-2. Active Faults and Expected Shaking



Source: Oregon HazVu: Statewide Geohazards Viewer (DOGAMI)

The Aumsville steering committee identified liquefaction as a primary concern related to the earthquake hazard. The committee suggested conducing analysis of the city's critical facilities to understand how they will be impacted by earthquake. As a top priority identified in the 2015 Water Master Plan, the City would like to assess the seismic vulnerability of the 1-million-gallon reservoir that contains the City's entire drinking water supply.

In 2007, the Department of Geology and Mineral Industries (DOGAMI) conducted a seismic needs assessment for public school buildings, acute inpatient care facilities, fire stations, police stations, sheriffs' offices, and other law enforcement agency buildings. Buildings were ranked for the "probability of collapse" due to the maximum possible earthquake for any given area. This report assigned a "low" probability of collapse to Aumsville's police station and rural fire protection district station. The report did not rate the probability of collapse for Aumsville Elementary School, originally built in 1910 and remodeled in 1987. In the future, the school district should conduct a seismic assessment to identify any structural issues that should be addressed to reduce potential for collapse. It is possible that after City employees attend the ATC 20 training, they may have the capacity and ability to help perform a preliminary assessment of the school facility.

In an effort to prepare residents for a potentially devastating seismic event, the Aumsville Executive Office will begin to encourage residents to prepare 2-week survival kits through various outreach events.

Please review the Risk Assessment (Volume I, Section 2) for additional information on this hazard.

Flood

Table AM-7. Flood Summary

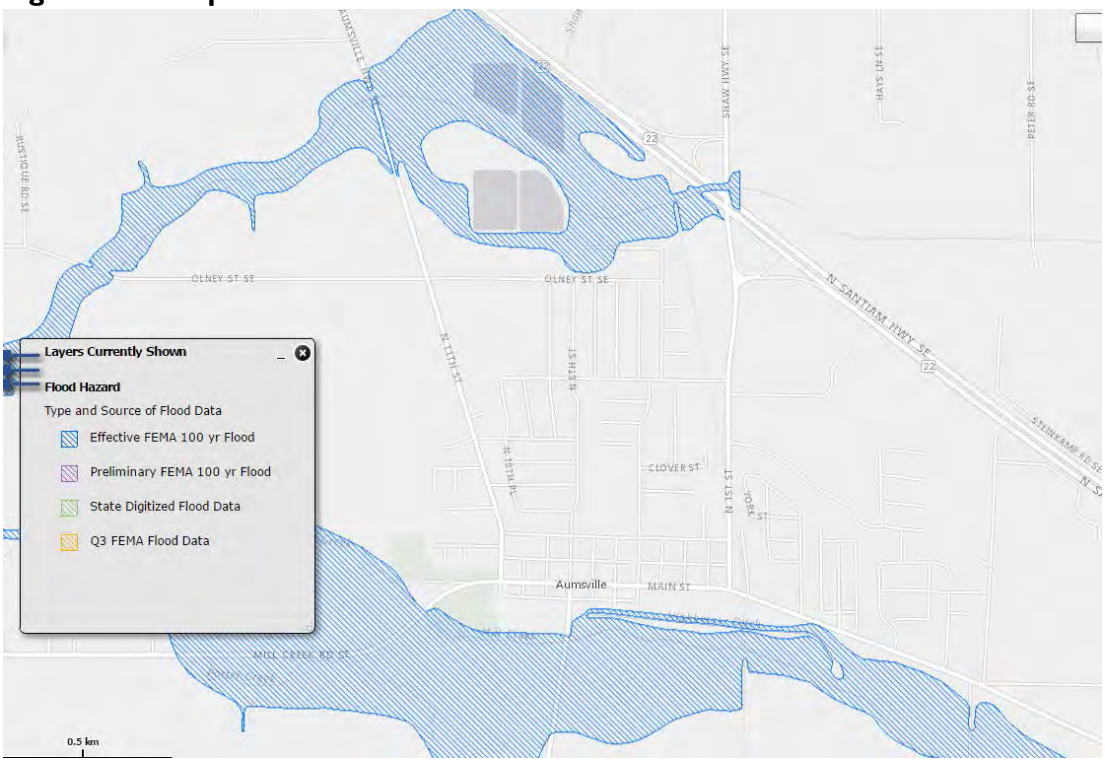
Hazard	Flood
Type	Climatic
Speed of Onset	Slow to moderate
Location	Mapped flood zones, floodplain
Extent	Moderate to severe
Prior Occurance	Four significant events since 1964
Probability	1% annual within SFHA

Sources: DOGAMI - Oregon HazVu; Oregon NHMP

Volume I, Section 2, Risk Assessment, describes the causes and characteristics of flooding hazards within the region. Aumsville's probability for riverine flood is likely and vulnerability to flood is critical.

Portions of Aumsville have areas of flood plains (special flood hazard areas). These include areas along Mill Creek and the Highberger Ditch, and Beaver Creek (see Figure AM-3). Furthermore, other portions of Aumsville, outside of the mapped floodplains, are also subject to significant, repetitive flooding from local storm water drainage.

Figure AM-3. Special Flood Hazard Area



Source: [Oregon HazVu: Statewide Geohazards Viewer (DOGAMI)]

Historically, Aumsville has experienced major floods in 1996, around 2000, and in 2011. Since then, no major floods have affected the population, but Aumsville continues to experience regular localized flooding during the wet season. In particular, the steering

committee noted issues along Bishop Road, 1st Street, and in the Highberger Ditch area. The steering committee also noted that Porter Boone and Mill Creek Parks often flood during the winter. According to the steering committee, many of the flooding issues affecting Aumsville can be attributed to poor ditch maintenance.

National Flood Insurance Program (NFIP)

FEMA modernized the Aumsville Flood Insurance Rate Maps (FIRMs) in January of 2000. The table below shows that as of October 2016, Aumsville has 19 National Flood Insurance Program (NFIP) policies in force. Of those, 7 are for properties that were developed before development of the initial FIRM. Aumsville has not had any Community Assistance Visit (CAV) and is not a member of the Community Rating System (CRS). Table AM-8 shows that all of the flood insurance policies are for single-family residential structures. There have been no paid flood claims in Aumsville.

The Community Repetitive Loss record for Aumsville identifies no Repetitive Loss Properties[9] and no Severe Repetitive Loss Properties[10].

Table AM-8. Flood Insurance Detail

Jurisdiction	Effective FIRM and FIS	Initial FIRM Date	Total Policies	Pre-FIRM Policies	Policies by Building Type: Single Family	2 to 4 Family	Other Residential	Non-Residential	Minus Rated A Zone	Minus Rated V Zone
Marion County	-	-	2,067	1,239	1,614	115	105	232	97	0
Aumsville	1/19/2000	3/1/1979	19	7	19	0	0	0	2	0

Jurisdiction	Insurance in Force	Total Paid Claims	Pre-FIRM Claims Paid	Substantial Damage Claims	Total Paid Amount	Repetitive Loss Structures	Severe Repetitive Loss	CRS Class Rating	Last Community Assistance
Marion County	$ 514,268,700	298	226	16	$ 5,732,543	11	2	-	-
Aumsville	$ 4,515,700	0	0	0	$ -	0	0	N/A	none

Source: Information compiled by Department of Land Conservation and Development, October, 2016.

Please review the Risk Assessment (Volume I, Section 2) for additional information on this hazard.

[9] A Repetitive Loss (RL) property is any insurable building for which two or more claims of more than $1,000 were paid by the National Flood Insurance Program (NFIP) within any rolling ten-year period, since 1978. A RL property may or may not be currently insured by the NFIP.

[10] A Severe Repetitive Loss (SRL) property is a single family property (consisting of 1 to 4 residences) that is covered under flood insurance by the NFIP and has incurred flood-related damage for which 4 or more separate claims payments have been paid under flood insurance coverage, with the amount of each claim payment exceeding $5,000 and with cumulative amount of such claims payments exceeding $20,000; or for which at least 2 separate claims payments have been made with the cumulative amount of such claims exceeding the reported value of the property.

Landslide

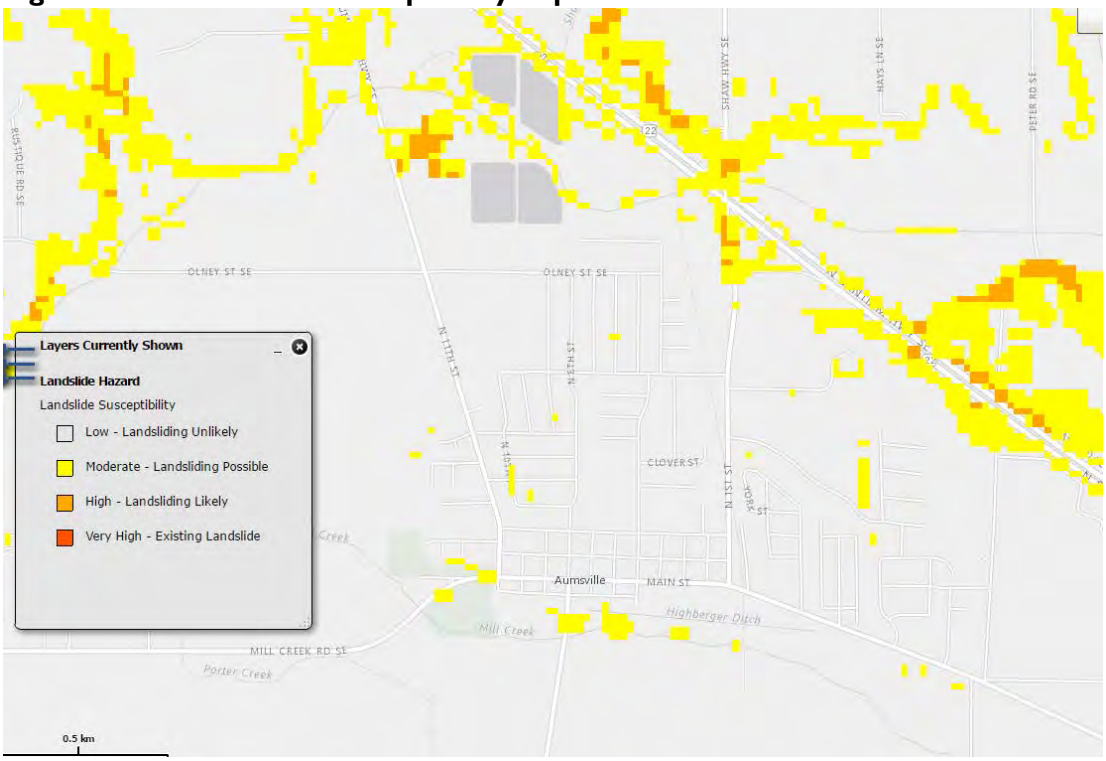
Table AM-9: Landslide Summary

Hazard	Landslide
Type	Climatic/Geologic
Speed of Onset	Slow to rapid
Location	Waterways (banks) and transportation facilities
Extent	Minor
Prior Occurance	No major events
Probability	Low for minor events; less than 5% major events

Sources: DOGAMI - Oregon HazVu; Oregon NHMP

Volume I, Section 2, *Risk Assessment*, adequately describes the causes and characteristics of landslides, and appropriately identifies previous landslide occurrences within the region. Aumsville has a relatively flat topography. Aumsville's probability for landslide is unlikely (which is lower than the county's rating) and their vulnerability to landslide is limited (which is also lower than the county's rating). Figure AM-4 shows that landslide risk in Aumsville is very low.

Figure AM-4. Landslide Susceptibility Exposure



Source: [Oregon HazVu: Statewide Geohazards Viewer (DOGAMI)]

Please review the Risk Assessment (Volume I, Section 2) for additional information on this hazard.

Volcano

Table AM-10: Volcano Summary

Hazard	Volcano
Type	Geologic
Speed of Onset	Slow to rapid
Location	Cascade Mountains
Extent	Minor
Prior Occurance	One significant event since 1916 (Mount St. Helens)
Probability	<1% annual

Sources: DOGAMI - Oregon HazVu; Oregon NHMP

Volume I, Section 2, *Risk Assessment*, adequately describes Aumsville's risk to volcanic events. The steering committee determined that the city's probability for volcanic event is unlikely and their vulnerability to volcano is negligible.

The causes and characteristics of a volcanic event are appropriately described within the county's plan, as well as the location and extent of potential hazards. Previous occurrences are well-documented within the county's plan. Aumsville is very unlikely to experience anything more than volcanic ash during a volcanic event. When Mt. Saint Helens erupted in 1980, the city was not impacted.

Please review the Risk Assessment (Volume I, Section 2) for additional information on this hazard.

Wildfire

Table AM-11: Wildfire Summary

Hazard	Wildfire
Type	Climatic, Human Caused
Speed of Onset	Moderate to rapid
Location	Outside city limit
Extent	Minor to moderate
Prior Occurance	No history inside city limit
Probability	<1% annual

Sources: Marion County NHMP

Volume I, Section 2, *Risk Assessment*, adequately describes the causes and characteristics of wildfires, as well as the county and city's history of wildfire events. The City's probability for wildfire is unlikely and the vulnerability to wildfire is limited. Aumsville is surrounded on all sides by open farmland and waterways, and there are no forests within the city limits. Due to its location, Aumsville faces minimal risk of experiencing wildfires. There is no history of wildfire events in Aumsville.

The County updated the Community Wildfire Protection Plan in 2016 and Aumsville is not listed as a "Community at Risk."

Please review the Risk Assessment (Volume I, Section 2) for additional information on this hazard.

Severe Weather

Table AM-12: Severe Weather Summary

Hazard	Severe Weather/Storm
Type	Climatic
Speed of Onset	Slow to moderate
Location	Countywide
Extent	Minor to severe
Prior Occurance	Minor events occur annually; ~30 moderate to severe events countywide over the past 130 years
Probability	100% for minor events, 23% for moderte to severe events

Sources: Marion County NHMP

Volume I, Section 2, *Risk Assessment*, adequately describes the causes and characteristics of windstorms and severe winter storms, as well as the location and extent of these hazards. Aumsville's probability for windstorm and severe winter storms is highly likely and vulnerability is critical.

Significant wind events occur in Aumsville each year, sometimes interrupting services, downing trees, and causing power outages. In December 2010, a tornado touched down in Aumsville, causing around $1.2 million dollars in damage.[11] Since this event, Aumsville has not experienced wind events that were quite as severe. Because windstorms typically occur during winter months, they are sometimes accompanied by ice, freezing rain, flooding, and very rarely, snow.

Severe winter storms can consist of rain, freezing rain, ice, snow, cold temperatures, and wind. They originate from troughs of low pressure offshore that ride along the jet stream during fall, winter, and early spring months. Severe winter storms affecting Aumsville typically originate in the Gulf of Alaska or in the central Pacific Ocean. These storms are most common from November through March.

Major winter storms can and have occurred in the Aumsville area, and while they typically do not cause significant damage, they are frequent and have the potential to impact economic activity. During a storm in the winter of 2012-13, the steering committee reported that residents experienced power outages for 4 days, accompanied by numerous downed tree limbs. The most recent winter storms (December 2016 – January 2017) included snow and ice and resulted in transportation and power interruptions combined with government office and school closures. A disaster declaration is currently pending.

Please review the Risk Assessment (Volume I, Section 2) for additional information on this hazard.

[11] Joseph Rose (2010). "Aumsville Tornado: 'Amazingly, no one was seriously hurt.'" *The Oregonian*. http://www.oregonlive.com/weather/index.ssf/2010/12/aumsville_tornado_amazingly_no.html

CITY OF AURORA ADDENDUM

Purpose

This document serves as the City of Aurora's Addendum to the Marion County Multi-Jurisdictional Hazards Mitigation Plan (MHMP, HMP). This addendum supplements information contained in Volume I (Basic Plan) of this HMP. The Basic Plan serves as the foundation for this jurisdiction's addendum. Volume III (Appendices) provides additional information (particularly regarding participation and mitigation strategy). This addendum meets the following requirements:

- Multi-jurisdictional **Plan Adoption** §201.6(c)(5),
- Multi-jurisdictional **Participation** §201.6(a)(3),
- Multi-jurisdictional **Mitigation Strategy** §201.6(c)(3)(iv), and
- Multi-Jurisdictional **Risk Assessment** §201.6(c)(2)(iii).

Plan Process, Participation, and Adoption

This section of the HMP addendum addresses 44 CFR 201.6(c)(5), *Plan Adoption*, and 44 CFR 201.6(a)(3), *Participation.*

In the summer and fall of 2016, the Oregon Partnership for Disaster Resilience (OPDR) at the University of Oregon's Community Service Center (CSC) partnered with the Oregon Military Department's Office of Emergency Management (OEM), and Marion County cities, including Aurora, to update their addendum to the Marion County HMP, which expired July 8, 2016. This project is funded through the Federal Emergency Management Agency's (FEMA) FY14 Pre-Disaster Mitigation Competitive Grant Program (PDMC-PL-10-OR-2014-002).

By developing this addendum to the Marion County HMP, locally adopting it, and having it approved by FEMA, the City of Aurora will gain eligibility for FEMA Hazard Mitigation, Pre-Disaster Mitigation, and Flood Mitigation Assistance grant program funds.

The Marion County Multi-Jurisdictional HMP, and Aurora addendum, are the result of a collaborative effort between citizens, public agencies, non-profit organizations, the private sector, and regional organizations. A project steering committee guided the process of developing the plan. For more information on the composition of the steering committee see the *Acknowledgements*, *Plan Summary*, and *Plan Process* (Volume III, Appendix B).

The Aurora City Recorder is the designated local convener of this addendum. The Convener will take the lead in implementing, maintaining, and updating the addendum to the HMP in collaboration with Marion County Emergency Management.

Representatives from the City of Aurora steering committee (including representatives from the North Marion School District) met formally on one occasion: October 12, 2016 (see Appendix B for more information).

The city's addendum reflects decisions decided upon at the plan update meeting and during subsequent work and communication with OPDR.

The City of Aurora Steering Committee is comprised of representatives from the following departments:

- Convener, City of Aurora City Recorder
- City of Aurora Administrative Assistant
- City of Aurora Wastewater Treatment Plant Operator
- City of Aurora Finance Officer
- Marion County Sheriff
- Fire Chief, Aurora Rural Fire Protection District
- North Marion School District – Public/Private Schools K-12
- Marion County Emergency Management Representative (as necessary)
- American Red Cross Representative
- CenturyTel Representative
- Willamette Broadband Representative

Aurora used multiple approaches to engage the public. First, the City established steering committee representatives from across the city. Next, the city actively participated in countywide community engagement activities described in Volume I, Section 4 and in Appendix B. City staff also presented the draft plan to the City Council during an open public council session. The Steering Committee was closely involved throughout the development of the plan and served as the local oversight body for the plan's development. In addition, community members outside of the steering committee were provided an opportunity for comment via the plan review process (see Appendix B for more information).

The Marion County HMP was approved by FEMA on [Month] [Day], 2017 and the Aurora addendum was adopted via resolution on [Month] [Day], 2017. This HMP is effective through [Month] [Day], 2022.

Mitigation Strategy

This section of the HMP addendum addresses 44 CFR 201.6(c)(3(iv), *Mitigation Strategy*.

During the 2016 Marion County and Aurora update process, OPDR and a representative from Marion County Emergency Management assisted the steering committee with developing mitigations that will meet Aurora's unique situation. The proposed actions were then re-reviewed by the steering committee to finalize. Aurora developed a list of priority actions (Appendix A-1), any actions that were not prioritized were placed in the Action Item Pool (Appendix A-2) and will be considered during the annual meetings. For a status update on each of Aurora's 2009 mitigation actions, see Appendix A-2.

Priority Actions

The City is listing a set of high priority actions in an effort to focus attention on an achievable set of high leverage activities over the next five-years. The City's priority actions are listed in Table AR-1 on the following page.

Action Item Pool

Table AR-2 on the following pages presents a pool of mitigation actions. This expanded list of actions is available for local consideration as resources, capacity, technical expertise and/or political will become available.

Table AR-1. Aurora Priority Action Items

Action Item ID	Hazard	Action Item	Coordinating Organization	Partner Organizations	Timeline
Priority Actions					
P-1	Multi-Hazard	Create and publicize alternative transportation routes in the event of road closures.	City Planner	Public Works	Short-Term
P-2	Earthquake	Seek funding to further assess the "probability of collapse" for North Marion High School.	N. Marion School District		Short-Term
P-3	Earthquake	Work with the Salem Red Cross to identify potential shelters within the city. Create MOUs and partner with Red Cross to make it official.	City Recorder	Administrative Assistant	Short-Term
P-4	Windstorm	Identify backup power needs and acquire new backup generators (not propane) for the School District (which serves as the Emergency Shelter).	N. Marion School District		Short-Term
P-5	Windstorm	Acquire emergency backup generators for all critical facilities (including City Hall and 2 wells). Do not purchase generators fueled by propane.	Public Works	Administrative Assistant	Short-Term

Source: City of Aurora HMP Steering Committee, 2016.

Table AR-2. Aurora Action Item Pool

Action Item ID	Hazard	Action Item	Coordinating Organization	Partner Organizations	Timeline
Action Item Pool					
Multi-Hazard					
MH-1	Multi-Hazard	Publicize and sign residents up for the reverse 911 system.	Fire District	City of Aurora, N. Marion School District	Short-Term/ Ongoing
MH-2	Multi-Hazard	Publicize/educate residents about signing up for the Aurora Alerts email system/expand to include text and social media.	City Recorder	Administrative Assistant	Short-Term/ Ongoing
MH-3	Multi-Hazard	Expand the emergency communication system to include text and social media.	N. Marion School District		Short-Term
MH-4	Multi-Hazard	Build relationships with sister counties/jurisdictions/districts and create mutual aid agreements.	City Recorder	N. Marion School District	Long-Term/ Ongoing
MH-5	Multi-Hazard	Partner with private sector and create mutual aid agreements.	City Recorder	N. Marion School District	Long-Term/ Ongoing
MH-6	Multi-Hazard	Develop a multi-agency emergency response team for northern Marion Co.	Marion County Emergency Management	N. Marion School District	Short-Term
Drought					
DT-1	Drought	Update the Water Conservation Plan.	Public Works	City Planner	Long-Term
DT-2	Drought	Partner with Marion County to support agencies' determination of locations for additional aquifer studies that might lead to greater water supplies and help determine funding sources for the studies.	City Council	Marion County	Long-Term
Earthquake					
EQ-1	Earthquake	Send city employees to the County's ATC 20 training.	Public Works	City Recorder	Short-Term/ Ongoing
EQ-2	Earthquake	Encourage reduction of nonstructural and structural earthquake hazards in homes, schools, businesses, and government offices through public education.	City Recorder	Administrative Assistant	Ongoing
EQ-3	Earthquake	Seek funding to further assess the 'probability of collapse' for Aurora City Hall.	Public Works	City Recorder	Long-Term
EQ-4	Earthquake	Continue to run earthquake drills.	N. Marion School District		Ongoing
EQ-5	Earthquake	Encourage residents to prepare and maintain 2-week survival kits. Publicize through City newsletter, website, and the resilience and preparedness trainings the School District is creating.	City Recorder/ Administrative Assistant	N. Marion School District	Short-Term/ Ongoing

Source: City of Aurora HMP Steering Committee, 2016.

Table AR-2. Aurora Action Item Pool (Continued)

Action Item ID	Hazard	Action Item	Coordinating Organization	Partner Organizations	Timeline
Action Item Pool					
Flood					
FL-1	Flood	Create a Stormwater Master Plan.	Public Works	City Planner	Long-Term
FL-2	Flood	Continue compliance with the National Flood Insurance Program through the enforcement of local floodplain ordinances.	Public Works		Ongoing
FL-3	Flood	Identify strategies for mitigating and/or preventing flooding from impacting the city's wastewater lagoon system.	Public Works		Long-Term/ Ongoing
FL-4	Flood	Work with property owners who regularly experience flooding along the Pudding River to mitigate their risks.	Public Works		Long-Term
Severe Weather					
SW-1	Severe Storm	Educate citizens about ways to weatherize their homes, as well as safe emergency heating equipment.	City Recorder	Administrative Assistant	Short-Term/ Ongoing
SW-2	Windstorm	Support/encourage electrical utilities to use underground construction methods where possible to reduce power outages from windstorms.	Public Works		Ongoing
SW-3	Windstorm	Review code and revise to require new developments to underground utilities if requirement doesn't currently exist.	City Planner	City Recorder	Long-Term
SW-4	Windstorm	Outreach to PGE about undergrounding power lines that run along Grim (serving the School District).	N. Marion School District		Short-Term
Wildfire					
WF-1	Fire	Outreach to residents on the hillside at the end of 4th Street adjacent to Pudding River about performing fuel reduction projects.	Fire District		Short-Term
WF-2	Fire	Check with the fireworks storage facility at the end of Ottaway to make sure they have a safety plan.	Fire District		Short-Term

Source: City of Aurora HMP Steering Committee, 2016.

Plan Implementation and Maintenance

The City Council will be responsible for adopting the City of Aurora addendum to the Marion County HMP. This addendum designates a convener and a coordinating body to oversee the development and implementation of action items. Because the city addendum is part of the county's multi-jurisdictional HMP, the city will look for opportunities to partner with the county. The city's steering committee will convene after adoption of the City of Aurora addendum on an annual schedule (in late-July or early-August before the school year begins); the county meets on a semi-annual basis. The City of Aurora convener will participate in the Marion County HMP meetings and will report on city specific activities as appropriate. The steering committee will be responsible for identifying new risk assessment data, reviewing status of mitigation actions, identifying new actions, and seeking funding to implement the city's mitigation strategy (actions). The convener will also remain active in the county's implementation and maintenance process (see Volume I, Section 4 for more information).

The city will utilize the same prioritization process as the county (See Volume I, Section 4: Plan Implementation and Maintenance and Volume IV, Appendix D: Economic Analysis of Hazard Mitigation Projects for more information).

In the near future, the City of Aurora would like to transition to updating the city addendum via a North Marion County Coordinating Board, which will include members of the current steering committee, in addition to representatives from surrounding communities. When first formed, the North Marion County Coordinating Board will meet two to three times to establish relationships and a mission, and thereafter meet once or twice per year. By bringing together representatives from multiple jurisdictions and agencies, the North Marion County Coordinating Board aims to better align mitigation actions that will benefit the entire region.

Implementation through Existing Programs

Many of the Hazards Mitigation Plan's recommendations are consistent with the goals and objectives of the city's existing plans and policies. Where possible, the City of Aurora will implement the HMP's recommended actions through existing plans and policies. Plans and policies already in existence have support from local residents, businesses, and policy makers. Many land-use, comprehensive, and strategic plans get updated regularly, allowing them to adapt to changing conditions and needs. Implementing the HMP's action items through such plans and policies increases their likelihood of being supported and implemented.

Aurora's Comprehensive Plan: 2009 – 2029 was first acknowledged by the Oregon Land Conservation and Development Commission in 1980. The City most recently updated the entire plan, including updates to the Natural Hazards section, in November of 2009.[1] The Aurora Comprehensive Plan (Part V, Section B(4)) calls out floods, soil instability, and earthquakes as the hazards likely to impact Aurora. The plan does not mention directly

[1] Aurora Comprehensive Plan (2009). Ordinance 458. Part V: Resources, Section B(4), p. 71-72. Part IX: Policies, Section G: Natural Hazards (Goal 7), p. 91-92.

mention drought, severe storms, or wildfire in the natural hazards sections. The plan does contain a general objective "to protect life and property from natural hazards due to flood or landslides." In addition, the plan contains two policies and three implementing actions. The policies prohibit development within the 100-year flood plain and require special consideration for structures that will be built on slopes. The City implements the plan through regulatory controls found in the Land Development Ordinance. The City's latest update to the Land Development Ordinance occurred in December of 2016.[2]

Aurora also implements elements of the Comprehensive Plan related to natural hazards through the following Plans:

- City of Aurora Transportation System Plan, updated in 2009
- City of Aurora Water System Master Plan, updated in March 2009
- City of Aurora Water Management and Conservation Plan, updated in June 2009

Continued Public Participation

Keeping the public informed of the City's efforts to reduce the risk associated with future hazard events is important for successful plan implementation and maintenance. The city is committed to involving the public in the plan review and updated process. See Volume I, Section 4, for more information.

Plan Maintenance

The Marion County Multi-Jurisdictional Hazards Mitigation Plan and city addendum will be updated every five years in accordance with the update schedule outlined in the Disaster Mitigation Act of 2000. During the county plan update process, the City will also review and update its addendum. The convener will be responsible for convening the steering committee to address the questions outlined below.

- Are there new partners that should be brought to the table?
- Are there new local, regional, state, or federal policies influencing natural hazards that should be addressed?
- Has the community successfully implemented any mitigation activities since the plan was last updated?
- Have new issues or problems related to hazards been identified in the community?
- Are the actions still appropriate given current resources?
- Have there been any changes in development patterns that could influence the effects of hazards?
- Have there been any significant changes in the community's demographics that could influence the effects of hazards?
- Are there new studies or data available that would enhance the risk assessment?
- Has the community been affected by any disasters? Did the plan accurately address the impacts of this event?

[2] Ordinance No. 484. "Title 16: Land Development." http://www.ci.aurora.or.us/images/stories/amc-pdf/or-aurora-t16a.pdf

These questions will help the steering committee determine what components of the mitigation plan need updating. The steering committee will be responsible for updating any deficiencies found in the plan.

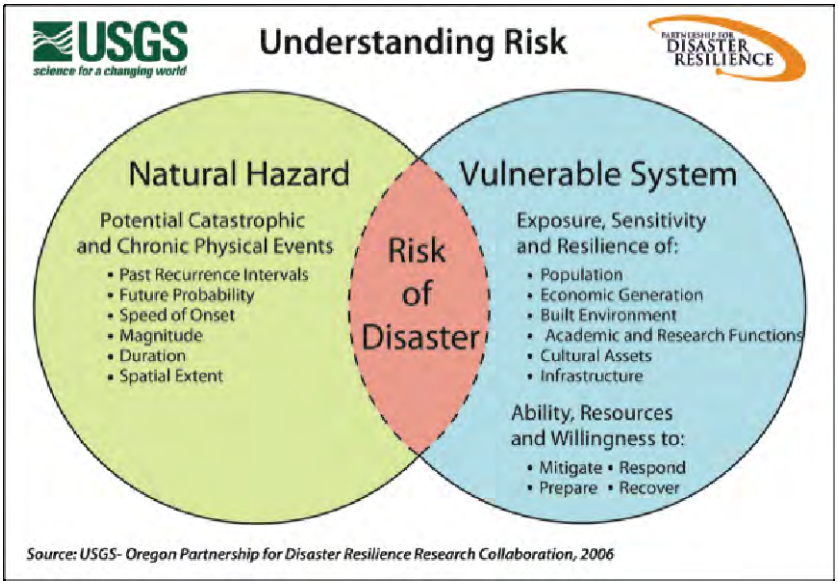
Risk Assessment

This section of the HMP addendum addresses 44 CFR 201.6(b)(2) - Risk Assessment. In addition, this chapter can serve as the factual basis for addressing Oregon Statewide Planning Goal 7 – Areas Subject to Natural Hazards. Assessing natural hazard risk has three phases:

- **Phase 1:** Identify hazards that can impact the jurisdiction. This includes an evaluation of potential hazard impacts – type, location, extent, etc.
- **Phase 2:** Identify important community assets and system vulnerabilities. Example vulnerabilities include people, businesses, homes, roads, historic places and drinking water sources.
- **Phase 3:** Evaluate the extent to which the identified hazards overlap with, or have an impact on, the important assets identified by the community.

The local level rationale for the identified mitigation strategies (action items) is presented herein, and within Section 2, *Risk Assessment*, and Appendix C, *Community Profile*. The risk assessment process is graphically depicted in Figure AR-1 below. Ultimately, the goal of hazard mitigation is to reduce the area of risk, where hazards overlap vulnerable systems.

Figure AR-1. Understanding Risk



Risk Assessment Approach

A risk assessment is intended to provide the, "factual basis for activities proposed in the strategy to reduce loses from identified hazards."[3] To complete the risk assessment, the

[3] 44 CFR 201.6(2)(i)

HMP update team first updated the description, type, location and extent of each hazard. Next, the team updated the vulnerability information based on each hazard's potential impact on the community.

The Marion County Basic Plan (Volume I, Section II) Risk Assessment describes in detail the methods used to assess risk. In summary, Marion County has prepared a Threat Hazard Identification and Risk Assessment as a formal annex to the Marion County Emergency Operation Plan. The assessment uses a method developed by BOLD Planning[4]. This city addendum builds on the county level assessment to produce a similar assessment for the City of Aurora. The assessment specifically examines:

1. Probability (frequency) of event
2. Magnitude of event
3. Expected warning time before event
4. Expected duration of event

Refer to Page 2-4 of the Marion County Basic HMP for a description of the scoring values for each ranking category.

Hazard Analysis

The assessment identifies three levels of risk: High, Moderate and Low.

High - High probability of occurrence; at least 50 percent or more of population at risk from hazard; significant to catastrophic physical impacts to buildings and infrastructure; major loss or potential loss of functionality to all essential facilities (hospital, police, fire, EOC and shelters).

Moderate - Less than 50 percent of population at risk from hazard; moderate physical impacts to buildings and infrastructure; moderate potential for loss of functionality to essential facilities.

Low - Low probability of occurrence or low threat to population; minor physical impacts.

A summary of the risk assessment findings and rankings is presented in Table AR-3.

[4] BOLD Planning is a consulting firm specializing in the development of actionable emergency plans. For more information, visit: http://www.boldplanning.com/

Table AR-3. Hazard and Vulnerability Assessment Summary

Hazard Profile Summary for Aurora Usinging Bold Planning Analysis Scoring							
Natural Hazard	Probability	Warning Time	Magnitude	Duration	CPRI	Local Planning Significance	County Planning Significance
Weight Factor	0.45	0.3	0.15	0.1			
Earthquake*	4	4	4	4	4.00	High	High
Severe Weather/Storm**	4	1	3	3	2.85	Moderate	High
Flood	3	2	3	4	2.80	Moderate	High
Drought	3	1	3	4	2.50	Moderate	High
Extreme Weather - High Temperature	3	1	2	4	2.35	Moderate	Moderate
Wildland Interface Fire	1	4	2	2	2.15	Moderate	Moderate
Dam or Levee Failure	1	2	4	4	2.05	Moderate	Moderate
Landslide	2	2	2	2	2.00	Moderate	High
Volcanic Eruption	1	1	1	4	1.30	Low	Low
*Note: Earthquake probability listed to match county level analysis. See below for more detailed probability assessment.							
**Note: Includes tornado hazard							

Source: BOLD Planning Risk Assessment Method; Analysis by UO Community Service Center.

Community Asset Identification

This section provides information on city specific assets. For additional information on the characteristics of Aurora, in terms of geography, environment, population, demographics, employment and economics, as well as housing and transportation see Volume III, Appendix C, *Community Profile*. Many of these community characteristics can affect how hazards impact communities and how communities choose to plan for natural hazard mitigation. Considering the city specific assets during the planning process can assist in identifying appropriate measures for natural hazard mitigation.

Community Characteristics

The city of Aurora is located in the Willamette Valley in Marion County, Oregon, approximately 23 miles south of the city of Portland. Aurora experiences a moderate climate with an average high temperature of 82 degrees and low of 54 degrees in August, and an average high temperature of 47 and low of 35 in January.[5] The city receives an average annual precipitation of 40.67 inches.[6] Aurora is located on a gently sloping hill bordered by Mill Creek to the west and the Pudding River to the east. Surrounding the rural community is hilly farm and forest land.

The Population Research Center at Portland State University lists Aurora's 2015 population at 950. This represents a 30% increase from 2000. For more demographic information, refer to Appendix C.

Economy

Historically, Aurora's economy focused on agriculture and manufacturing, which remain major employment sectors today. The city also has large heritage tourism component, which capitalizes on Aurora's history as a religious colony and large number of historic buildings dating to the 1850s. Aurora is also known as the "Antique Capital," and the city's

[5] Weatherbase.com, "Aurora Oregon," http://www.weatherbase.com, accessed 2/21/17.

[6] Western Regional Climate Center, "Aurora Oregon," http://www.wrcc.dri.edu/summary/Climsmor.html, accessed 2/21/17.

downtown has several large antiques retailers which draw a number of visitors to the community. Median household income in Aurora in 2014 was $72,656. For more economic information, refer to Appendix C.

Critical and Important Facilities

Aurora's critical and important facilities include the following:

Transportation

- Two bridges provide primary access to the city from I-5 and Hwy 99E:
  - Mill Creek Bridge (County-owned) – City sewer and water co-located
  - Pudding River Bridge (ODOT-owned)
  - If either collapsed, transportation in and out of the city would require lengthy detours.
- Aurora State Airport, 22801 Airport Rd NE, Aurora
- School district: contracts out bus service to Canby (diesel)
- Canby CAT bus runs along Hwy 99E between Canby and Woodburn
  Note: Hwy 99E and Ehlen Rd are the only 2 entrances to town (if bridges are out, it would be difficult to get in and out).
  Note: Intersection of Ehlen Rd. and the railroad tracks is dangerous.
  Note: The wastewater treatment plant is across a bridge – in the event of a train derailment or bridge collapse, the wastewater treatment plant would not be accessible.

Energy

- PGE – electricity (all above ground lines)
- NW Natural – natural gas
- City gets fuel from Shell Station in town
- Fire gets fuel from various gas stations
- City Hall (21420 Main St.) would likely shut down without power, even if the building did withstand seismic activity. City Hall does not currently have a backup generator.
- Fire Station (21390 Main St.) has a generator that would run the whole station. Generator runs on natural gas, but could also run on propane. The fire station does not keep reserves of natural gas or propane.

Water

- City Water and Wastewater:
  - Water treatment plant (14682 Ottaway Rd.) – Includes filtration system and a reservoir that treats water drawn from 5 city wells. Water from the treatment plant is then pumped back to residents.
  - Three city wells have generators, 2 do not, and there is 1 traveling diesel generator.
  - Wastewater treatment plant (21496 Mill Race Rd.) – Completed in 2001 with a maximum capacity of 2000 residents.
    Note: Sewer pump station is vulnerable to Mill Creek flooding events, and the wastewater treatment plant could be vulnerable as well.
    Note: The water tower in town does not have water, just communications.

- North Marion School District Water and Wastewater:
    - Two wells and a 355,000-gallon water tank with its own filtration system. This system is equipped with a propane back-up generator. Propane is stored in a 100-gallon above ground storage tank.
    - Sewer system, equipped with a propane back-up generator.

Communication

- City Communications:
    - The City has a server with a backup system, but the three hard drives with backed-up data are stored on-site.
    - All City records, including finances, utility billing records, payroll accounts, etc., are stored at City Hall.
    - Public Works has a cell phone but no radio capabilities.
    - Fire and Sheriff have radio communications with each other.
- Water Tower (this is actually a communications tower; it does not hold water):
    - The Fire District has their communications located on the water tower. They also have a backup generator.
    - The Sheriff has communications equipment located on the water, but it is currently turned off.
    - Three cell phone companies – Verizon, Sprint, AT&T – use the water tower and they all have backup generators.
- North Marion School District:
    - The School District has a radio connection with the County and other emergency responders, along with emergency backup power.

Emergency Services

- Police:
    - Located at City Hall (21420 Main St.) – the Marion County Sheriff provides police services.
- Fire: Aurora Fire District
    - Located at 21390 Main S.
    - The building is in the process of seismic upgrades (about 90% complete).
- Medical (none in Aurora):
    - Woodburn and Canby have immediate care facilities (Providence in Canby – sometimes not staffed by doctors, Legacy in Woodburn)
    - Meridian Park Hospital in Tualatin
    - Willamette Falls Hospital in Oregon City
    - Silverton Hospital in Silverton
    - Providence Medical Center in Newberg
    - Salem General Hospital
    - Ambulance is out of Woodburn, secondary out of Canby, third out of Wilsonville or Tualatin

Cultural/Historical Resources

- Historic district encompasses 150 acres of the city and includes buildings and historic sites, including the Aurora Old Colony Historical Museum (1538 2nd St.).
- Events that may have large crowds:

- City Hall – court held here Wednesdays every 3 months; monthly 3 evening meeting held
- American Legion Hall: church services on Sundays
- Aurora Presbyterian Church & Christ Lutheran Church: services on Sundays
- McLaren Auction House: some evening events
- Aurora Historical Museum: Colony Hand Spinners Guild in March and Strawberry Social in June
- Mothers' Day weekend: wine and chocolate walk
- August: Aurora Colony Days Festival – biggest event of the year with a couple thousand visitors
- Summer: Music in the Park on Wednesday nights
- School District events

Functional and Access Needs (Vulnerable Populations)

- Schools:
  - North Marion Primary School
  - North Marion Middle School
  - North Marion Intermediate School
  - North Marion High School
  - 2,000 students and 250 staff on the 55-acre North Marion School District property (20246 Grim Rd.)
- Lower-income areas:
  - Deer Creek Trailer Park (southwest of the airport)
  - Walnut St. and Filbert St.

  Note: Aurora is a retirement community, so there may be residents with special medical needs.

See hazard sections below and Section 2, *Risk Assessment*, for potential hazard vulnerabilities to these facilities.

Hazard Characteristics

Drought

The characteristics of drought in Aurora are the same for the county as a whole.

Table AR-4. Drought Summary

Hazard	Drought
Type	Climatic
Speed of Onset	Slow
Location	Varies, County Wide
Extent	Moderate to Severe Drought*
Prior Occurance	Three > 6 months duration since 1982
Probability	~9%

*Defined as between -2 and -4 on the National Resource Conservation Service (NRCS) Surface Water Supply Index (SWSI)

Sources: Oregon NHMP; NRCS; analysis by OPDR

The probability of drought in Aurora is likely, the same as for the county as a whole. The City's water supply comes primarily from subsurface sources, making vulnerability to drought moderate. Overall, the planning significance of drought in Aurora is moderate.

Volume I, Section 2, *Risk Assessment*, adequately describes the characteristics of drought hazards, as well as the location and extent of a potential event. Due to a cool, wet climate, past and present weather conditions have generally spared Marion County communities from the effects of drought. According to the steering committee, Aurora has twice implemented their water curtailment ordinance, first in 2010 and then in 2014. Governor Kate Brown declared a drought emergency for all of Marion County in September 2015.

Aurora has five wells that send water through a filtration system and into a reservoir, located on Ottaway Rd. Water from the reservoir is then pumped back to residential and commercial customers in Aurora.

Aurora has a Water Management and Conservation Plan, last update in 2009. The Plan will be updated again soon to more directly address drought issues. The City also has a water curtailment ordinance.

Please review the Risk Assessment (Volume I, Section 2) for additional information on this hazard.

Earthquake

The characteristics of both a crustal earthquake and a Cascadia Subduction Zone (CSZ) earthquake are similar to the county as a whole.

Table AR-5. Earthquake Summary Crustal

Hazard	Earthquake - Crustal
Type	Geologic
Location	Multiple active faults; Willamette Valley
Speed of Onset	Rapid
Extent	Very Strong to Severe shaking ~ 500 yrs*
Prior Occurance	One over Magnitude 5 last 100 yrs**
Probability	Approximately 1% annual

*DOGAMI HazVu; ** PNSN - 1993 Scotts Mills just north of Marion County

Sources: DOGAMI - Oregon HazVu; Oregon NHMP; Pacific Northwest Seismic Network

Table AR-6. Earthquake Summary Subduction

Hazard	Earthquake - Subduction
Type	Geologic
Location	Primarily west of the Cascades; CA - BC
Speed of Onset	Rapid
Extent	Catastrophic
Prior Occurance	One over Magnitude 9 last 500 yrs
Probability	Magnitude 9+ is 7% - 12% over 50 yrs**

*DOGAMI HazVu; **Oregon Natural Hazard Mitigation Plan, anlysis by Oregon Department of Geology and Mineral Industries.

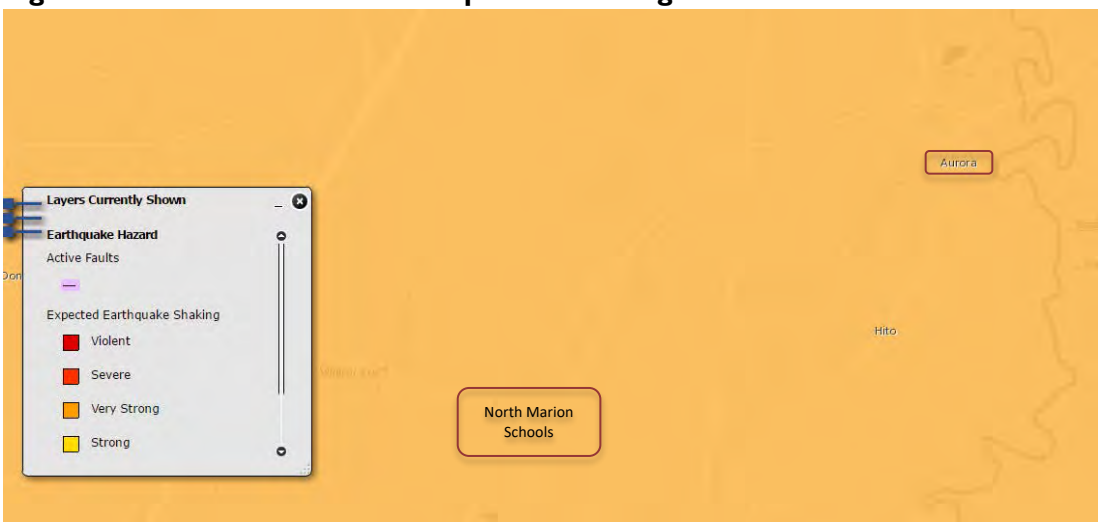
Sources: DOGAMI - Oregon HazVu; Oregon NHMP; Pacific Northwest Seismic Network

Aurora's probability for a Crustal Earthquake event is "possible" and their vulnerability to a Crustal Earthquake event is "limited". The county steering committee determined that the probability for a Cascadia Subduction Zone (CSZ) Earthquake event is "highly likely" and that the vulnerability to a Cascadia Earthquake event is "catastrophic". This hazard was not rated as distinct CSZ and crustal events in the previous HMP. There are no locally active faults within the Aurora city limits. The nearest active fault runs northwest to southeast just outside of Canby, about five miles away from Aurora. The 1993 Scott Mills quake caused $28 million in damages to cities throughout Marion County. No damaging earthquake events occurred during the previous five years.

Volume I, Section 2, *Risk Assessment*, adequately describes the characteristics of earthquake hazards, history, as well as the location and extent of a potential event. Generally, an event that affects the county is likely to affect Aurora as well. Previous occurrences are well-documented within the county's plan, and the community impacts described by the county would generally be the same for Aurora as well.

Earthquake-induced damages are difficult to predict, and depend on the size, type, and location of the earthquake, as well as site-specific building and soil characteristics. Presently, it is not possible to accurately forecast the location or size of earthquakes, but it is possible to predict the behavior of soil at any particular site. In many major earthquakes, damages have primarily been caused by the behavior of the soil. Figure AR-2 shows that ground shaking in Aurora and the North Marion School District's property for both crustal and subduction earthquakes are expected to be very strong.

Figure AR-2. Active Faults and Expected Shaking



Source: Oregon HazVu: Statewide Geohazards Viewer (DOGAMI)

The Aurora steering committee identified liquefaction as a primary concern related to the earthquake hazard. The committee indicated that many critical facilities and transportation routes might not withstand a high magnitude earthquake. In particular, the committee expressed concerns over City Hall, the two bridges in the north of town, and the North Marion High School. The committee identified mitigation efforts to address these vulnerabilities as "priority actions" in this plan.

In 2007, the Department of Geology and Mineral Industries (DOGAMI) conducted a seismic needs assessment for public school buildings, acute inpatient care facilities, fire stations, police stations, sheriffs' offices, and other law enforcement agency buildings.[7] Buildings were ranked for the "probability of collapse" due to the maximum possible earthquake for any given area. This report assigned a "moderate" probability of collapse to Aurora's fire district station, which has since undergone seismic retrofits. The report assigned a "moderate" probability of collapse to Aurora's police department (located at City Hall). The report rated the schools owned by the North Marion School District as low, with the exception of North Marion High School, which received a high rating. The North Marion School District intends to perform a seismic assessment of the high school in the near future.

In an effort to prepare residents for a potentially devastating seismic event, the Aurora City Recorder and Administrative Assistant will begin to encourage residents to prepare 2-week survival kits through various outreach events.

Please review the Risk Assessment (Volume I, Section 2) for additional information on this hazard.

[7] Lewis, Don (2007). "Statewide Seismic Needs Assessment: Implementation of Oregon 2005 Senate Bill 2 Relating to Public Safety, Earthquakes, and Seismic Rehabilitation of Public Buildings." Department of Geology and Mineral Industries, Open-File Report O-07-02.

Flood

Table AR-7. Flood Summary

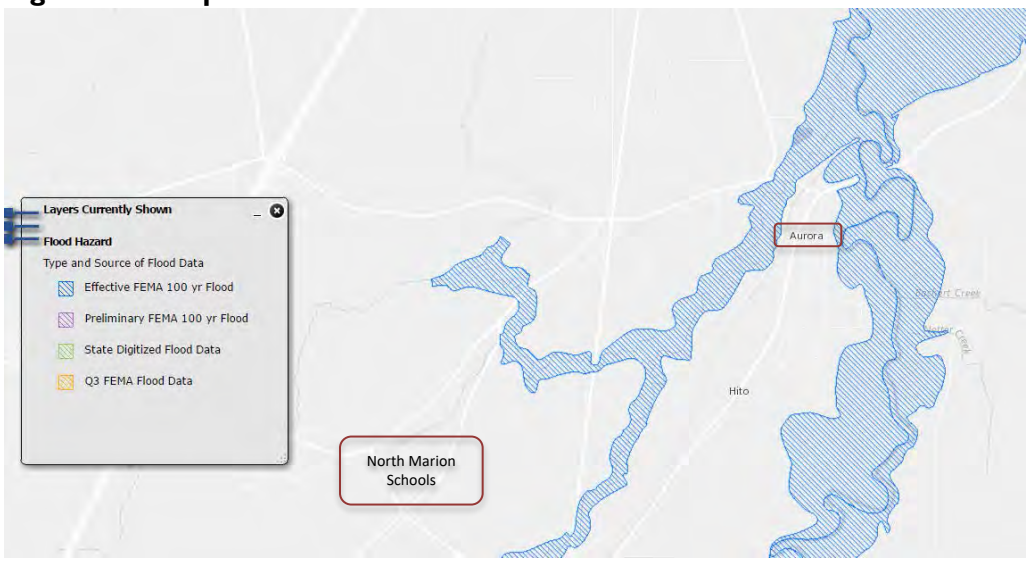
Hazard	Flood
Type	Climatic
Speed of Onset	Slow to moderate
Location	Mapped flood zones, floodplain
Extent	Moderate to severe
Prior Occurance	Four significant events since 1964
Probability	1% annual within SFHA

Sources: DOGAMI - Oregon HazVu; Oregon NHMP

Volume I, Section 2, Risk Assessment, describes the causes and characteristics of flooding hazards within the region. Aurora's probability for riverine flood is likely and vulnerability to flood is critical.

Portions of Aurora have areas of flood plains (special flood hazard areas). These include areas along Mill Creek and the Pudding River (see Figure AR-3). Historically, Aurora has experienced major floods in 1986, 1996, and in 2011 on the Pudding River. Since then, no major floods have affected the population, but Aurora continues to experience regular localized flooding during the wet season. According to the steering committee, properties along the Pudding River experience the most regular flooding. In these instances, structures are rarely affected. In the past, Mill Race Rd. (the gravel road leading to the Wastewater Treatment Plant) experienced flooding issues, but these issues have been resolved.

Figure AR-3. Special Flood Hazard Area



Source: [Oregon HazVu: Statewide Geohazards Viewer (DOGAMI)]

National Flood Insurance Program (NFIP)

FEMA modernized the Aurora Flood Insurance Rate Maps (FIRMs) in January of 2000. The table below shows that as of October 2016, Aurora had 2 National Flood Insurance Program (NFIP) policies in force. Of those, 1 was for a property that was developed before

development of the initial FIRM. Aurora has not had any Community Assistance Visit (CAV) and is not a member of the Community Rating System (CRS). Table AR-8 shows that one flood insurance policy is for single-family residential structure and the other is for a 2-4 family residential structure. There have been no paid flood claims in Aurora.

The Community Repetitive Loss record for Aurora identifies no Repetitive Loss Properties[8] and no Severe Repetitive Loss Properties[9].

Table AR-8. Flood Insurance Detail

Jurisdiction	Effective FIRM and FIS	Initial FIRM Date	Total Policies	Pre-FIRM Policies	Policies by Building Type: Single Family	2 to 4 Family	Other Residential	Non-Residential	Minus Rated A Zone	Minus Rated V Zone
Marion County	-	-	2,067	1,239	1,614	115	105	232	97	0
Aurora	1/19/2000	6/5/1997	2	1	1	1	0	0	0	0

Jurisdiction	Insurance in Force	Total Paid Claims	Pre-FIRM Claims Paid	Substantial Damage Claims	Total Paid Amount	Repetitive Loss Structures	Severe Repetitive Loss	CRS Class Rating	Last Community Assistance
Marion County	$ 514,268,700	298	226	16	$ 5,732,543	11	2	-	-
Aurora	$ 700,000	0	0	0	$ -	0	0	N/A	none

Source: Information compiled by Department of Land Conservation and Development, October, 2016.

Please review the Risk Assessment (Volume I, Section 2) for additional information on this hazard.

Landslide

Table AR-9: Landslide Summary

Hazard	Landslide
Type	Climatic/Geologic
Speed of Onset	Slow to rapid
Location	Waterways (banks) and transportation facilities
Extent	Minor
Prior Occurance	No major events
Probability	Low for minor events; less than 5% major events

Sources: DOGAMI - Oregon HazVu; Oregon NHMP

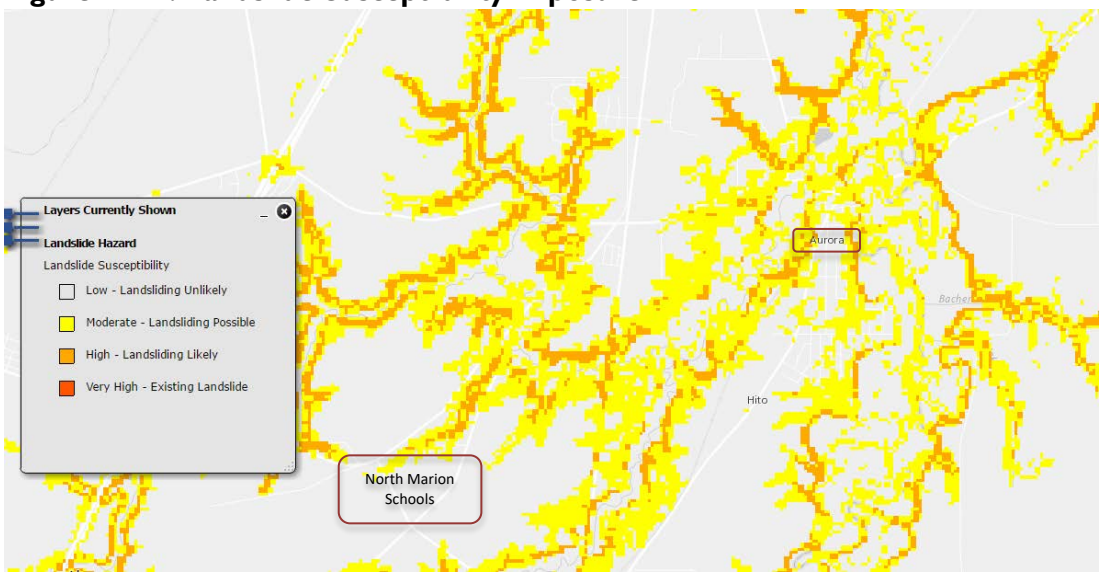
Volume I, Section 2, *Risk Assessment*, adequately describes the causes and characteristics of landslides, and appropriately identifies previous landslide occurrences within the region. Aurora has a relatively flat topography. Aurora's probability for landslide is possible (which is lower than the county's rating) and their vulnerability to landslide is limited (which is also lower than the county's rating). Figure AR-4 shows that landslide risk in Aurora is low to

[8] A Repetitive Loss (RL) property is any insurable building for which two or more claims of more than $1,000 were paid by the National Flood Insurance Program (NFIP) within any rolling ten-year period, since 1978. A RL property may or may not be currently insured by the NFIP.

[9] A Severe Repetitive Loss (SRL) property is a single family property (consisting of 1 to 4 residences) that is covered under flood insurance by the NFIP and has incurred flood-related damage for which 4 or more separate claims payments have been paid under flood insurance coverage, with the amount of each claim payment exceeding $5,000 and with cumulative amount of such claims payments exceeding $20,000; or for which at least 2 separate claims payments have been made with the cumulative amount of such claims exceeding the reported value of the property.

moderate in most populated areas, but moderate to high in other areas, particularly along Mill Creek and the Pudding River.

Figure AR-4. Landslide Susceptibility Exposure



Source: Oregon HazVu: Statewide Geohazards Viewer (DOGAMI)

Please review the Risk Assessment (Volume I, Section 2) for additional information on this hazard.

Volcano

Table AR-10: Volcano Summary

Hazard	Volcano
Type	Geologic
Speed of Onset	Slow to rapid
Location	Cascade Mountains
Extent	Minor
Prior Occurance	One significant event since 1916 (Mount St. Helens)
Probability	<1% annual

Sources: DOGAMI - Oregon HazVu; Oregon NHMP

Volume I, Section 2, *Risk Assessment*, adequately describes Aurora's risk to volcanic events. The steering committee determined that the city's probability for volcanic event is unlikely and their vulnerability to volcano is negligible.

The causes and characteristics of a volcanic event are appropriately described within the county's plan, as well as the location and extent of potential hazards. Previous occurrences are well-documented within the county's plan. Aurora is very unlikely to experience anything more than volcanic ash during a volcanic event. When Mt. Saint Helens erupted in 1980, the city was impacted only by falling ash.

Please review the Risk Assessment (Volume I, Section 2) for additional information on this hazard.

Severe Weather

Table AR-11: Severe Weather Summary

Hazard	Severe Weather/Storm
Type	Climatic
Speed of Onset	Slow to moderate
Location	Countywide
Extent	Minor to severe
Prior Occurance	Minor events occur annually; ~30 moderate to severe events countywide over the past 130 years
Probability	100% for minor events, 23% for moderte to severe events

Sources: Marion County NHMP

Volume I, Section 2, *Risk Assessment*, adequately describes the causes and characteristics of windstorms and severe winter storms, as well as the location and extent of these hazards. Aurora's probability for windstorm and severe winter storms is highly likely (which is the same as the county's rating) and that their vulnerability is critical (which is lower than the county's rating).

Significant wind events occur in Aurora each year, sometimes interrupting services, downing trees, and causing power outages. Since 1957, five reported tornadoes have struck Marion County – one of which occurred near Aurora on August 26, 1984. The tornado destroyed a machine shop and scattered its pieces over a half-mile area. More recently, windstorms in April 2010, May 2014, and July 2015 toppled trees in the Aurora Municipal Park, with one tree causing damage to a nearby house.

Severe winter storms can consist of rain, freezing rain, ice, snow, cold temperatures, and wind. They originate from troughs of low pressure offshore that ride along the jet stream during fall, winter, and early spring months. Severe winter storms affecting Aurora typically originate in the Gulf of Alaska or in the central Pacific Ocean. These storms are most common from November through March.

Major winter storms can and have occurred in the Aurora area, and while they typically do not cause significant damage, they are frequent and have the potential to impact economic activity. During a storm in April 2009, snow and ice caused City Hall to lose power for one day and debilitated the City's water tanks. During the winter of 2012-13, the steering committee reported that residents experienced power outages. These power outages also affected the pump stations used to transfer water to customers. The most recent winter storms (December 2016 – January 2017) included snow and ice and resulted in transportation and power interruptions combined with government office and school closures. A state of emergency was declared on January 11 and a Presidential Disaster was declared for the State of Oregon on January 25, 2017.

Please review the Risk Assessment (Volume I, Section 2) for additional information on this hazard.

Wildfire

Table AR-12: Wildfire Summary

Hazard	Wildfire
Type	Climatic, Human Caused
Speed of Onset	Moderate to rapid
Location	Outside city limit
Extent	Minor to moderate
Prior Occurance	No history inside city limit
Probability	<1% annual

Sources: Marion County NHMP

Volume I, Section 2, *Risk Assessment*, adequately describes the causes and characteristics of wildfires, as well as the county and city's history of wildfire events. The City's probability for wildfire is unlikely and the vulnerability to wildfire is limited (lower probability and vulnerability ratings than for the county). Due to Aurora's isolation from the majority of at-risk areas, Aurora is unlikely to be affected directly by wildfires. Should they occur nearby, however, the city could be affected by smoke, impacting people with respiratory problems, and potentially the elderly or very young. Although there is no history of wildfire events in Aurora, the steering committee identified the hillside above the Pudding River at the end of 4th St. as a potential issue. As part of the action items for this plan, the committee wanted to reach out to the property owner to encourage fuel-reduction projects.

The County updated the Community Wildfire Protection Plan in 2016 and Aurora is not listed as a "Community at Risk."

Please review the Risk Assessment (Volume I, Section 2) for additional information on this hazard.

CITY OF DETROIT ADDENDUM

Purpose

This document serves as Detroit 's Addendum to the Marion County Multi-Jurisdictional Natural Hazards Mitigation Plan (MNHMP, NHMP). This addendum seeks to supplement information contained in Volume I (Basic Plan) of this multi-jurisdictional NHMP which serves as the foundation for this jurisdiction's addendum and Volume III (Appendices) which provides additional information (particularly regarding participation and mitigation strategy). This addendum meets the following requirements:

- Multi-jurisdictional **Plan Adoption** §201.6(c)(5),
- Multi-jurisdictional **Participation** §201.6(a)(3),
- Multi-jurisdictional **Mitigation Strategy** §201.6(c)(3)(iv), and
- Multi-Jurisdictional **Risk Assessment** §201.6(c)(2)(iii).

Plan Process, Participation, and Adoption

This section of the NHMP addendum addresses 44 CFR 201.6(c)(5), *Plan Adoption*, and 44 CFR 201.6(a)(3), *Participation.*

In the summer of 2016, the Oregon Partnership for Disaster Resilience (OPDR) at the University of Oregon's Community Service Center (CSC) partnered with Marion County and Santiam Canyon cities, including Detroit, to create the first region-specific NHMP. Part of the Santiam Canyon Regional Hazard Mitigation Plan (RHMP) required the creation of city addenda which would be adopted into the 2016 Marion County NHMP. This project is funded through the Federal Emergency Management Agency's (FEMA) FY14 Pre-Disaster Mitigation Competitive Grant Program (PDMC-PL-10-OR-2014-002).

By developing this addendum to the Marion County NHMP, locally adopting it, and having it approved by FEMA, Detroit will gain eligibility for FEMA Hazard Mitigation, Pre-Disaster Mitigation, and Flood Mitigation Assistance grant program funds.

The Marion County NHMP, and Detroit addendum, are the result of a collaborative effort between citizens, public agencies, non-profit organizations, the private sector, and regional organizations. A project steering committee guided the process of developing this addendum, and was composed of city staff, county representatives, and emergency service management.

The Detroit city recorder is the designated convener of the NHMP and will take the lead in implementing, maintaining, and updating the addendum to the Marion NHMP in collaboration with the Santiam Canyon liaison for Marion County Emergency Management.

Representatives from the City of Detroit steering committee, along with Marion County Emergency Manager Ed Flick, had a formal discussion on one occasion: October 14, 2016, but

also communicated electronically throughout the creation of this document. The city's addendum reflects decisions decided upon at the plan update meeting and during subsequent work and communication with OPDR.

The Detroit Steering Committee was comprised of the following representatives:

- Christine Pavoni; City Recorder, Detroit
- Robert Bruce; Certified Water Technician, Detroit
- Kathleen Silva; Santiam Canyon Liaison, Marion County

Public participation was achieved with the establishment of the steering committee, which was comprised of city officials and county representatives.

The Steering Committee was closely involved throughout the development of the plan and served as the local oversight body for the plan's development. In addition, community members outside of the steering committee were provided an opportunity for comment via the plan review process.

The Marion County NHMP was approved by FEMA on [Month] [Day], 2017 and the Detroit addendum was adopted via resolution on [Month] [Day], 2017. This NHMP is effective through [Month] [Day], 2022.

Mitigation Strategy

This section of the NHMP addendum addresses 44 CFR 201.6(c)(3(iv), *Mitigation Strategy*.

During 2016, Marion County and OPDR evaluated the Action Items set by the county and their particular relevance to the Santiam Canyon region. Following the review, actions with relevance to the region were added into the RHMP, noting what accomplishments had been made, and whether the actions were still relevant; any new action items were identified at this time. Detroit developed a list of priority actions (Table A-1), any actions that were not prioritized were placed in the Action Item Pool (Table A-2) and will be considered during the semi-annual meetings.

Priority Actions

The city is listing a set of high priority actions in an effort to focus attention on an achievable set of high leverage activities over the next five-years. The city's priority actions are listed below in the following table. Detailed implementation information for each action is listed in within (Table A-1).

Action Item Pool

This expanded list of actions is available for local consideration as resources, capacity, technical expertise and/or political will become available.

Many actions carry forward from prior versions of the Marion County NHMP and other local planning documents including the Community Wildfire Protection Plan, Drought Contingency Plan, and Mid-Willamette Economic Development study.

(Table A-1) Detroit Priority Action Items

Action Item	Cost and Process of Implementation	Funding Options	Approximate Date of Completion
Planning & City Staff	*Update planning documents (comprehensive plan, development code) to reflect new hazard information.*	*General Fund*	*September 2017*
(e.g) *Multi-Hazard*	*City staff should assess the amount of KWH needed to run city facilities. City staff should purchase propane storage accordingly to run their generator*	*General Fund, MWCOG grants/loans,*	*December 2017*

-ONGOING-

(Table A-2) Detroit Action Item Pool

Action Item	Proposed Action Title	Coordinating Organization	Partner Organizations	Timeline	Alignment with Plan Goals						
					Public Awareness	Education	Risk Reduction	Funding and Implementation	Partnerships and Coordination	Natural Resource Utilization	Plan Integration
Earthquake #1	Promote Great Oregon Shakeout Awareness month in October. Participate in activities for schools, business, and industry. Participating with the Mid-Willamette Emergency Communications Collective on initiatives that are focused on household preparedness.	Marion County Emergency Management	Public Works, Safety Committee, Marion County Risk, Red Cross, OEM and Media	Ongoing every October	X	X			X		
Earthquake #2	Collaborate with GROW EDC to develop relevant public-private partnerships with businesses that can contribute to response and recovery. (Multi-Hazard 4)	Detroit , Marion County Emergency Management	GROW EDC	Ongoing	X	X	X	X	X		X
Multi-Hazard #1	Develop an Energy Assurance Plan. (Multi-Hazard 2)	Detroit , Marion County Emergency Management	Department of Energy, Whole Community	Ongoing revisions			X	X	X		X

Source: City of Detroit NHMP Steering Committee, 2015.

-SHORT TERM-

Action Item	Proposed Action Title	Coordinating Organization	Partner Organizations	Timeline	Alignment with Plan Goals						
					Public Awareness	Education	Risk Reduction	Funding and Implementation	Partnerships and Coordination	Natural Resource Utilization	Plan Integration
Multi-Hazard #2	Incentivize and assist local fueling stations to purchase diesel generators capable of pumping fuel from in-ground storage tanks.	Detroit , Marion County Emergency Management	Public Works	Short Term			X		X		
Multi-Hazard #3	Conduct an assessment of the short and long term needs for sheltering access and functional needs populations for all hazards.	Detroit , Marion County Emergency Management	Marion County Public Health, Red Cross, Cities, NGO's, Oregon Public Health	Short Term					X		X
Multi-Hazard #4	Develop a MOU with community fuel stations to utilize fuel resources found in below-ground tanks after a hazard event.	Detroit , Marion County Emergency Management	Santiam Quick Mart, RFPD	Short Term			X		X		
Multi-Hazard #5	Establish a Detroit CERT team.	Marion County Emergency Management, Detroit	CERT, Whole Community	Short Term	X	X			X		

Action Item	Proposed Action Title	Coordinating Organization	Partner Organizations	Timeline	Alignment with Plan Goals						
					Public Awareness	Education	Risk Reduction	Funding and Implementation	Partnerships and Coordination	Natural Resource Utilization	Plan Integration
Multi-Hazard #6	Develop a community education program - such as an all hazard community outreach forum for students and residents.*	Marion County Emergency Management, Detroit	Public Works and Whole Community	Short Term	X	X	X				X
Multi-Hazard #7	Expand auxiliary radio capabilities by developing a team of HAM Radio operators for EMS and interested public.	Marion County Emergency Management, Detroit	ARES, CERT, Private partners, Whole Community	Short Term	X	X	X		X		

*Identified in Marion County Community Wildfire Protection Plan (Action Plan & Priorities)

**Identified in North Santiam Watershed Drought Contingency Plan (Priority Drought Mitigation Actions)

***Identified in Mid-Willamette Valley Council of Governments Comprehensive Economic Development Study (Appendix C)

-LONG TERM-

Action Item	Proposed Action Title	Coordinating Organization	Partner Organizations	Timeline	Alignment with Plan Goals						
					Public Awareness	Education	Risk Reduction	Funding and Implementation	Partnerships and Coordination	Natural Resource Utilization	Plan Integration
Drought #1	Monitor economic impacts on recreation, tourism and agriculture communities.	Detroit, Marion County Emergency Management	Community Services	Long Term	X	X	X	X	X		X
Drought #2	Collaborate with NSWC to complete WMCP's and improve community understanding of water usage and opportunities to increase efficiencies.**	NSWC, Detroit	North Santiam Watershed DCP Partners	Long Term		X	X		X		X
Drought #3	Collaborate with Detroit Lake Recreation Area Business Association (DLRABA) to create a Detroit Lake Master Recreation Plan focused on economic drought resiliency.**	Detroit, DLRABA	USACE, USFS, Marion County Community Services/Board of Commissioners	Long Term	X		X		X	X	X
Drought #4	Collaborate with local Marina's and DLRABA to excavate marinas and allow for use at low water levels.**	Detroit, Kane's Marina, Detroit Lake Marina, DLRABA	USACE, USFS, Marion County Community Services/Board of Commissioners	Long Term			X	X	X	X	X

Action Item	Proposed Action Title	Coordinating Organization	Partner Organizations	Timeline	Alignment with Plan Goals						
					Public Awareness	Education	Risk Reduction	Funding and Implementation	Partnerships and Coordination	Natural Resource Utilization	Plan Integration
Drought #5	Collaborate with Detroit Ranger Station to extend boat ramps that are usable year-round.**	Detroit, Detroit Ranger Station	Marion County Community Services/Board of Commissioners	Long Term			X	X	X	X	X
Drought #6	Conduct leak detection surveys for the water system to increase efficiency and prevent further water loss.**	Detroit, Marion County Public Works	NSWC	Long Term			X		X	X	
Multi-Hazard #8	Designate evacuation routes outside of Hwy 22 for EMS.	Detroit , Marion County Emergency Management	RFPD	Long Term			X		X		
Multi-Hazard #9	Collaborate with Marion County to connect to a more resilient regional water/sewer system.***	Marion County Community Services Department/Board of Commissioners, Detroit	Marion County Emergency Management	Long Term			X	X	X		X
Multi-Hazard #10	Gather community support for the installation of resilient fiber communication infrastructure throughout the community.***	Detroit	Marion County Community Services Department/Board of Commissioners	Long Term	X		X		X		X
Wildfire #1	Collaborate with Detroit Ranger District, ODF, and BLM to conduct fuel hazard reduction along the Wildland	ODF, BLM, Detroit Ranger District, Idanha-Detroit RFD	Marion County Emergency Management	Long Term			X		X		X

Action Item	Proposed Action Title	Coordinating Organization	Partner Organizations	Timeline	Alignment with Plan Goals						
					Public Awareness	Education	Risk Reduction	Funding and Implementation	Partnerships and Coordination	Natural Resource Utilization	Plan Integration
	Urban interface and Hwy 22.*										
Wildfire #2	Collaborate with ODF and Detroit RFD to develop strategic community fuel breaks.*	ODF, BLM, Detroit Ranger District, Idanha-Detroit RFD	Marion County Emergency Management	Long Term			X		X		X
Wildfire #3	Collaborate with ODF and Idanha- Detroit RFD on the North Santiam River acres project to develop defensible space.*	ODF, BLM, Detroit Ranger District, Idanha-Detroit RFD	Marion County Emergency Management	Long Term			X		X		X
Landslide #1	Integrate new DOGAMI landslide hazard information into land use zoning/development codes.	Detroit	Environmental Services, Engineering, ODOT, DLCD	Long Term			X				X
Flood #1	Collaborate with Marion County to survey and assess current culvert infrastructure most susceptible to natural hazards	Detroit	Marion County Emergency Management/Public Works	Long Term			X		X	X	

Plan Implementation and Maintenance

The City Council will be responsible for adopting the City of Detroit addendum to the Marion County NHMP. This addendum designates a coordinating body and a convener to oversee the development and implementation of action items. Because the city addendum is part of the county's multi-jurisdictional NHMP, the city will look for opportunities to partner with the county. The city's steering committee will convene after re-adoption of the City of Detroit addendum on a semi-annual schedule; the county is also meeting on a semi-annual basis and will provide opportunities for the cities to report on NHMP implementation and maintenance during their meetings. The City Recorder will serve as the convener and will be responsible for assembling the steering committee (coordinating body). The steering committee will be responsible for identifying new risk assessment data, reviewing status of mitigation actions, identifying new actions, and seeking funding to implement the city's mitigation strategy (actions). The convener will also remain active in the county's implementation and maintenance process.

Implementation through Existing Programs

Many of the NHMP's recommendations are consistent with the goals and objectives of the city's existing plans and policies. Where possible, the City of Detroit will implement the NHMP's recommended actions through existing plans and policies. Plans and policies already in existence have support from local residents, businesses, and policy makers. Many land-use, comprehensive, and strategic plans get updated regularly, allowing them to adapt to changing conditions and needs. Implementing the NHMP's action items through such plans and policies increases their likelihood of being supported and implemented.

Detroit 's acknowledged comprehensive plan is the Detroit Comprehensive Plan. The Oregon Land Conservation and Development Commission first acknowledged the plan on July 11, 2002. The City last completed a transportation update to the plan on July 20, 2009, but no major update of the plan has occurred since. The City implements the plan through regulatory ordinances.

Detroit currently has the following plans that relate to natural hazard mitigation. For a complete list visit the city website for planning and public works:

- Comprehensive Plan
- Development Code
- Transportation System Plan

Continued Public Participation

Keeping the public informed of the city's efforts to reduce the city's risk to future natural hazards events is important for successful plan implementation and maintenance. The city is committed to involving the public in the plan review and updated process. This includes:

- Annual briefings to city council
- Articles and information in The Canyon Weekly
- Postings and media on social media/website.

Plan Maintenance

The Marion County Multi-Jurisdictional Natural Hazards Mitigation Plan and city addendum will be updated every five years in accordance with the update schedule outlined in the Disaster Mitigation Act of 2000. During the county plan update process, the city will also review and update its addendum. The convener will be responsible for convening the steering committee to address the questions outlined below.

- Are there new partners that should be brought to the table?
- Are there new local, regional, state, or federal policies influencing natural hazards that should be addressed?
- Has the community successfully implemented any mitigation activities since the plan was last updated?
- Have new issues or problems related to hazards been identified in the community?
- Are the actions still appropriate given current resources?
- Have there been any changes in development patterns that could influence the effects of hazards?
- Have there been any significant changes in the community's demographics that could influence the effects of hazards?
- Are there new studies or data available that would enhance the risk assessment?
- Has the community been affected by any disasters? Did the plan accurately address the impacts of this event?

These questions will help the steering committee determine what components of the mitigation plan need updating. The steering committee will be responsible for updating any deficiencies found in the plan.

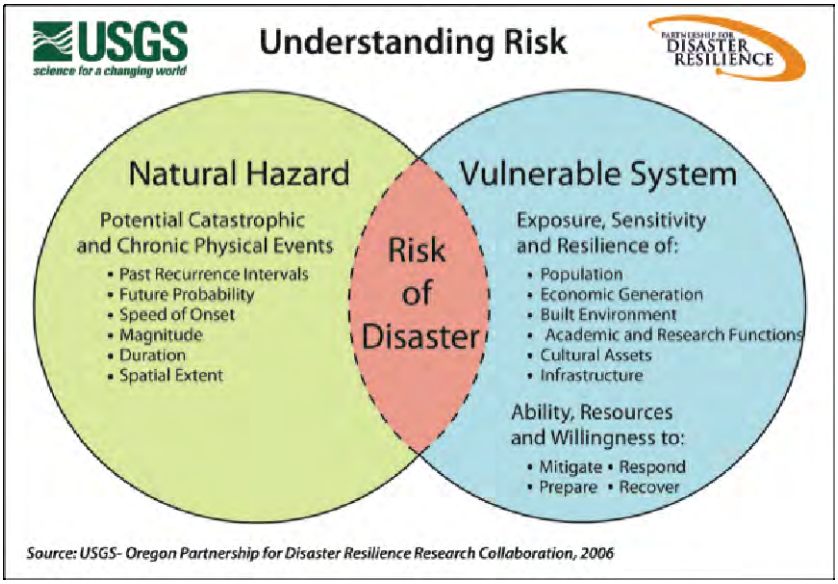
Risk Assessment

This section of the NHMP addendum addresses 44 CFR 201.6(b)(2) - Risk Assessment. In addition, this chapter can serve as the factual basis for addressing Oregon Statewide Planning Goal 7 – Areas Subject to Natural Hazards. Assessing natural hazard risk has three phases:

- **Phase 1:** Identify hazards that can impact the jurisdiction. This includes an evaluation of potential hazard impacts – type, location, extent, etc.
- **Phase 2:** Identify important community assets and system vulnerabilities. Example vulnerabilities include people, businesses, homes, roads, historic places and drinking water sources.
- **Phase 3:** Evaluate the extent to which the identified hazards overlap with, or have an impact on, the important assets identified by the community.

The local level rationale for the identified mitigation strategies (action items) is presented herein. The risk assessment process is graphically depicted in (Figure B-1) below. Ultimately, the goal of hazard mitigation is to reduce the area of risk, where hazards overlap vulnerable systems.

(Figure B-1) Understanding Risk



Hazard Analysis Methodology

This NHMP utilizes a Threat Hazard Identification and Risk Assessment methodology that is consistent with the Marion County Multi Jurisdictional Hazard Mitigation Plan. Mill City developed this assessment from historical data of events that have occurred in Marion County. The assessment uses the calculated priority risk index (CPRI) methodology to specifically examine:

1. Probability (frequency) of event
2. Magnitude of event
3. Expected warning time before event
4. Expected duration of event

Table (A-3) below shows the scoring values for each ranking category.

Table (A-3) Risk Assessment Hazard Ranking Scoring Values

Score	Probability	Warning Time	Magnitude/Severity	Duration
4	Highly Likely	Less than 6 hours	Catastrophic	More than 1 week
3	Likely	6-12 hours	Critical	Less than 1 week
2	Possible	12-24 hours	Limited	Less than 1 day
1	Unlikely	24+ hours	Negligible	Less than 6 hours

Source: Marion County Emergency Management; BOLD Planning

Hazard Analysis

For emergency management planning purposes, this critical analysis is an assessment of the consequences of each hazard, including potential areas of impact, population exposed and impacted, duration of the hazard, and potential economic consequences. These rankings utilize the criteria laid out in THIRA to weigh them proportionally between historic data as well as future projections based on economic, demographic, the critical infrastructure information.

These rankings were reviewed and revised by steering committee members to reflect specific community attributes and risks.

(Table A-4) Probability and Vulnerability Comparison

Hazard Profile Summary for Emergency Operations Plan						
Hazard	Probability	Magnitude	Warning Time	Duration	CPRI	Planning Significance
Earthquake	4	4	4	4	4.00	High
Severe Weather/Storm	4	4	2	3.5	3.65	High
Power Failure	3	4	3.5	3	3.38	High
Drought	3.5	4	1	4	3.33	High
Wildland Interface Fire	3.5	3.5	2	3	3.23	High
Extreme Weather - High Temperature	3.5	2.5	1	4	2.88	Moderate
Transportation Accident/Train Derailment	3	3	1	3	2.70	Moderate
School & Workplace Violence	1.5	4	4	2	2.68	Moderate
Epidemic	2	4	1	4	2.65	Moderate
Pandemic	2	4	1	4	2.65	Moderate
Volcanic Eruption	2	4	1	4	2.65	Moderate
Landslide	2	2.5	4	2.5	2.50	Moderate
Animal Disease Outbreak	2	3	2	4	2.50	Moderate
Dam or Levee Failure	2	1	4	4	2.20	Moderate
Biological Chemical, Sabotage and Cyber Incident and Explosives Radiological Attack-Terrorism	1	4	1	3	2.10	Moderate
Hazardous Materials Incident	1.5	3	1	3	2.03	Moderate
Civil Disorder / Terrorism	1	2	4	3	1.95	Low
Radiological Release	1	2	4	3	1.95	Low
Flood	1	2	2	2	1.55	Low
Tornado	1	1	1	1	1.00	Low

Source: Detroit NHMP Steering Committee and Marion County NHMP Steering Committee, 2016.

Hazard Characteristics

Drought

The steering committee determined that the city's probability for drought is **moderate** and their vulnerability to drought is **high**.

Although dryer conditions in the summer months have impacted the North Santiam Canyon as a whole, Detroit has experienced major impacts from drought. Detroit's economy relies heavily upon the recreation provided by the water levels of Detroit Lake, which can experience low levels during years of major drought.

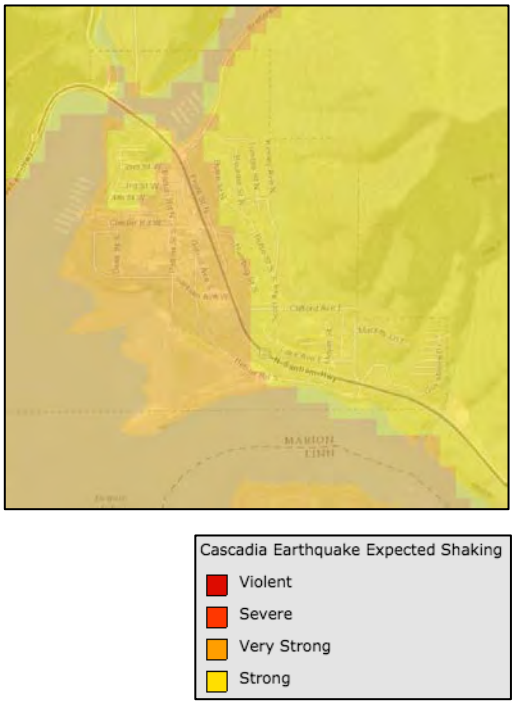
Dry conditions throughout 2001 caused Detroit Lake water levels to recede below 1,546 feet (min. elev. for moorage), contributing to a Detroit Area Economic loss of over $5 million dollars.[1] Recently during the 2015 drought, similar economic impacts were experienced with additional damage caused by tree and vegetation die off. This has created an increased risk of wildfire hazards. If dryer conditions become the new norm, Detroit could experience timber die-off, making them more susceptible to wildfires, as well as economic hardships if their current seasonal economy does not expand.

Earthquake

The steering committee determined that the city's probability for a Cascadia Subduction Zone (CSZ) Earthquake event is **high** and that their vulnerability to this event is **moderate**. The steering committee determined that the city's probability for a Crustal Earthquake event is **moderate** and that their vulnerability to this event is **moderate**.

Historically, Detroit has experienced one crustal earthquake on August 19, 1961. A 4.5 magnitude earthquake struck 6 miles from Mill City, with shaking felt throughout the Santiam Canyon, up to Detroit.

If another larger and more substantial earthquake occurs (Cascadia), Detroit could experience damage to buildings, utility (electric power, communication, water, wastewater, natural gas) and transportation systems (ex. bridges, and pipelines).

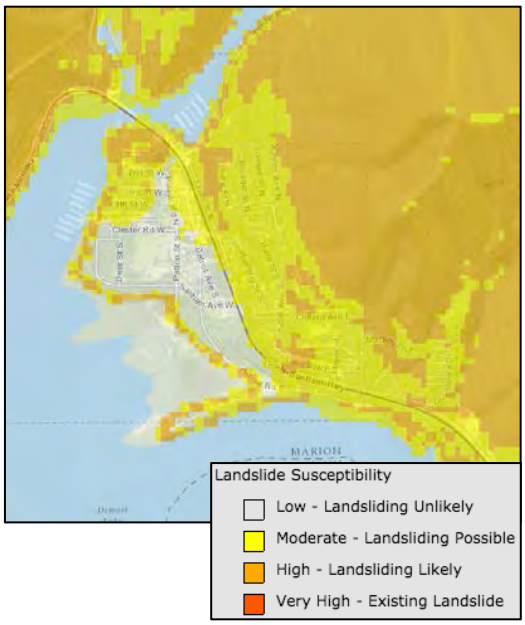


Flood

The steering committee determined that the city's probability for flooding is **low** and that their vulnerability to flooding is **low**.

[1] http://agsci.oregonstate.edu/sites/agsci.oregonstate.edu/files/ruralstudies/pub/pdf/detroitlake-sr1071.pdf (Table 5)

Historically, Detroit experienced one major flooding event in 2006. Heavy rains and high winds created a multitude of damage in the Detroit, Idanha, and Breitenbush area. Impacts included roofing damage, flooding of public facilities, sinkholes, erosion, and water facility intake-clogging due to turbidity.



Landslide

The steering committee determined that the city's probability for landslide is **moderate** and that their vulnerability to landslide is **moderate**.

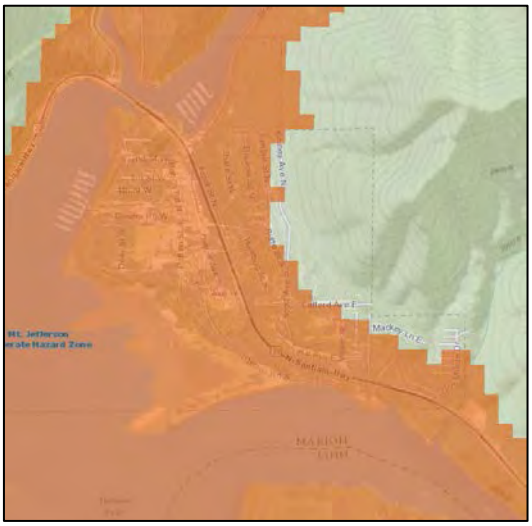
Historically, Detroit has not experienced major impacts from landslides within city limits. Areas in the east and northern portion of the city are susceptible because of steep mountainous terrain. The western portion and remainder that border Detroit Lake are also at higher risk.

Potential landslide-related impacts are adequately described within the county's plan, and include infrastructural damages, economic impacts (due to isolation and/or arterial road closures), property damages, and obstruction to evacuation routes. Rain-induced landslides and debris flows can potentially occur during any winter in Marion County; thoroughfares beyond city limits are susceptible to obstruction as well.

Volcano

The steering committee determined that the city's probability for volcanic event is **low** and that their vulnerability to volcanic event is **moderate**.

Detroit has not been impacted previously by volcanic activity, however Mount Jefferson is located east of the city into the cascade mountains, and could produce problems if an eruption occurs. The city sits in the Mount Jefferson Moderate Hazard Zone and could experience ash fall, debris avalanches, pyroclastic flows, lahars and slow-moving lava flows. City residents should be evacuated before an eruption begins in case of impassible roads and dangerous conditions.



Wildfire

The steering committee determined that the city's probability for wildfire is **high** and that their vulnerability to wildfire is **high**.

In 2001 the "breitenbush fire" threatened city residents creating road closures and hazardous conditions. In 2002 and 2004, Detroit was impacted by wildfire's which caused closure of Hwy 22. This impacted local residents, restricting travel, and negatively impacting the local economy.

In 2011, the "nasty fire" threated the Opal Creek Wilderness, while the 2014 "Bingham complex fire" restricted travel and required Detroit Ranger Station response.

Detroit could experience more fires as dryer conditions occur in the North Santiam Canyon. Less rainfall and snowpack can kill of tree's dependent on large amounts of water, which could ultimately lead to an increase of wild fire fuels.

Marion County updated the Community Wildfire Protection Plan (CWPP) in 2016, which mapped wildland urban interface (WUI) areas and developed actions to mitigate wildfire risk. The city is a participant in the CWPP, and has included hazard mitigation action items directly in line with the CWPP actions.

Windstorm

The steering committee determined that the city's probability for windstorms is **high** and that their vulnerability to windstorms is **high**.

In April of 1931, winds in the Santiam Canyon region felled hundreds of trees causing road closures between Mill City and Detroit. The winds also caused several devastating fires throughout the Santiam Canyon. On December of 1995, high wind gusts of up to 60mph downed trees and disrupted power and communication services in the lower Santiam. In 2002, a windstorm caused similar damages, blowing down trees onto roads and power lines.

About once or twice per year the city will experience a windstorm event that can interrupt services, down trees, and cause power outages. Typically, windstorms occur during winter months, they are sometimes accompanied by ice, freezing rain, flooding, and very rarely, snow.

Winter Storm (Snow/Ice)

The steering committee determined that the city's probability for winter storm is **moderate** and that their vulnerability to winter storm is **high**.

Major winter storms have occurred in the Detroit area; in January of 1937, heavy snowfall of over 2 feet caused property damage. Major roads were closed and residents of Detroit were stranded for five days as heavy snow and a landslide blocked Hwy 22. In 1950, A large snow event caused 54 inches of snow in Detroit, while 122 inches blanketed Detroit Dam. During that storm, the cities Rod-and-Gun Club's roof collapsed under the weight of 20 inches of snow.[2] In January of 1957, cold temperatures brought eleven inches of snow to Detroit, as well as icy roads throughout the Santiam Canyon. Cold temperatures also caused the Bonneville Power Authority to cut interruptible power to the regions' industrial customers because ice behind the dam slowed water flow and limited the ability to generate power.[3] In January of 1963, Detroit recorded 13 inches of snow, while cold temperatures created hazardous road conditions.[4]

During the last couple days of December 2003, the Detroit/Idanha area received an accumulation of 4-5 feet of snow. Both cities declared a State of Emergency as the City of Idanha lost power between December 29th and January 6th; Detroit lost power between January 1st and January 4th. In early 2008, Detroit received over 12 feet of snow in a two-month period. Three

[2] http://www.co.marion.or.us/PW/EmergencyManagement/Documents/14_severewinterstorm.pdf
[3] http://www.co.marion.or.us/PW/EmergencyManagement/Documents/14_severewinterstorm.pdf
[4] http://www.co.marion.or.us/PW/EmergencyManagement/Documents/14_severewinterstorm.pdf

dozen Oregon National Guard personnel were called in to help with snow removal. Damage included collapsed roofs and cracked walls, mostly impacting homeowners.[5]

Record and Near Record Snow, Landslides and Mudslides occurred in Oregon between December 20, 2008 and December 26, 2008. By December 22, Detroit already measured 4 feet of new snow and experienced power outages. Between December 18 and December 30, the City of Detroit spent $10,407 (or 129 hours) for contracted snow removal services, which created a financial hardship to the city's budget for the second time in one year.

Winter storm conditions starting late December 2016 and lasting into January, 2017 left Detroit and Idanha with approximately four feet of snow that quickly turned into ice due to low temperatures. Residents, especially the elderly, were unable to shovel the heavy snow to get in and out of their driveways. Large, heavy snow berms quickly became a hazard throughout both cities and also blocked hydrants, water meters and water pipes. The water supply in Idanha was at risk because of blocked access to water meters to detect multiple leaks. The two cities declared an emergency with Marion County, who sent crews up to remove and relocate the piles of snow, dig out water meters and hydrants, and help the elderly and sick where needed. Freres Lumber continued the snow removal work on a volunteer basis or an additional couple of days. A sudden temperature upswing started a slow melting process, but created pure ice conditions on steep city streets. On January 19, 2017 ODOT was approached to sand the most affected roads under a Mutual Service Agreement, which was accepted immediately. The sanding took place the same night.

Winter storms are more frequent hazards in Detroit and usually cause transportation issues and communication failures from downed trees and icy/snow filled roads. The ability to respond to these hazards quickly and effectively determines the potential impacts these regular occurrences will have in the community.

Community Asset Identification

This section provides information on city specific assets. Many of these community characteristics can affect how natural hazards impact communities and how communities choose to plan for all types of hazard mitigation. Considering the city specific assets during the planning process can assist in identifying appropriate measures for natural hazard mitigation.

Community Characteristics

Detroit is located approximately 50 miles east of Salem, bordering the Detroit Reservoir. It is the third largest community in the North Santiam River Canyon with a population of 210. With an elevation of 1630 feet, the climate of Detroit is moderate; the average monthly temperatures range from 51 – 79 degrees in July and August, and 31-42 degrees in December and January. Detroit receives approximately 68 inches of rain and 10 inches of snow each year. The city's topography is relatively flat, but does possess terrain attributed to Detroit Reservoir. Outside of city limits, steep slopes surround the city on all sides.

[5] http://www.co.marion.or.us/PW/EmergencyManagement/Documents/14_severewinterstorm.pdf

Economy

Detroit benefits from its location along Hwy 22, a major east-to-west transportation route connecting Salem to Bend. It serves as a recreation hub with two marinas, restaurants, and lodging, for residents of the North Santiam Canyon and the traveling public along the Hwy 22 corridor. Historically, Detroit prospered from the development of the railroad and dam, which helped spur growth in manufacturing and logging. Today, the economy relies upon the recreational opportunities available through state/federal lands, and Detroit Lake.

Critical and Important Facilities/Infrastructure

Communication/Information Technology

There is currently one communication provider in Detroit. Frontier provides phone service, and broadband internet with limited fiber infrastructure adjacent to Hwy 22.

Strengths:

- Limited fiber internet infrastructure already present along Hwy 22.
- Cellular Tower (AT&T/Verizon) east of Detroit, past the ranger station, with diesel generator backup.
- AT&T cellular tower at entrance of town.
- Public Works possesses low range walk-talkie access (>1/2) mile.

Weaknesses:

- Limited communication access including internet and phone.
- Currently no known HAM radio operators in the community.
- Main communication line runs down highway 22, and is susceptible to tree's and wind.
- Phone lines are both buried and overhead; which could prove difficult for maintenance.

Water

The City of Detroit has two water sources which include Mackie creek and the Breitenbush intake. Mackie Creek is Detroit's main water source in the winter months, located approximately 1/3 mile uphill from the water treatment plant. The Breitenbush intake, located approximately 1/3 mile up from Breitenbush Road, is utilized in the summer months.

Detroit's water treatment facility is located at the top of Gaymore, with a backup propane generator. The generator is accompanied by a 500-gallon propane storage tank, and can power water facilities for approximately one week.

Detroit has two treated water storage tanks equaling 440,000 gallons (200,000 and 240,000). The city also has one un-treated water storage tank which holds 35,000 gallons. This tanks water level is maintained from the Breitenbush intake and is gravity fed from the treatment plant.

Waste Water

Detroit does not have any municipal waste-water infrastructure. The city's residents and business owners rely on individual septic tanks. These septic tanks can be up to 60-years old and could be leaching hazardous material into the ground water/ Detroit Reservoir.

Dams

Two dams sit below Detroit, *Detroit Dam* and *Big Cliff Dam.* Previous steering committee's have concluded that the likelihood of Dam Failure is ***Low***[6]***.*** Current conditions still represent the previous decision. If Dam failure occurred in either dams, Detroit would most likely lose access to the western portion of Hwy 22.

Strengths:

- (2) water intake sources (Mackie & Breitenbush).
- (1) Backup propane generator on-site.
- (2) Above-ground storage tanks located near water treatment facility.
    - Equivalent to (440,000) gallons or 3-4 days of water storage in summer months or 4-8 days in winter months.

Weaknesses:

- Current backup generator runs on propane.
- Water intake sources are susceptible to wildfire damage.
- The city is losing approximately 40% of water distributed through leaky pipes. Roughly 40% of the water travelling through the water pipes is lost due to deficient infrastructure.
- Water usage estimates are 60,000 gallons in the Winter and 120,000 in the Summer.

Transportation Systems

Oregon Route 22 is the major transportation route for auto, public transit, and emergency vehicle access throughout the Santiam Canyon. Hwy 22 spans about 50 miles west, connecting Detroit to Salem and the remainder of the Willamette Valley. To the east, the highway connects to Idanha, and ends at the Santiam Pass interchange.

The Cherriots Canyon Connector is the only existing public transit service in the entire Santiam Canyon. This route has three total roundtrips with buses running approximately every (5) hours. Detroit residents are forced to drive to Gates to utilize these services, as the canyon connector does not reach Detroit or Idanha.

In case of a major Oregon Route 22 closure, Detroit residents will have to rely on alternate routes to reach supplies or safety. The cities alternate routes are limited with Breitenbush Road and French Creek Road. Depending on weather conditions, these roads may be unpassable.

6 http://www.co.marion.or.us/PW/EmergencyManagement/Documents/6_damfailure.pdf

Bridges

Structure Name	Year Built	Structural Condition
Tumble Creek	1949	Fair
Breitenbush River	1949	Fair

Strengths:

- Proximity to ODOT facility may increase access to public works services.
- Docked boats along Detroit Lake can be utilized to transport residents to safety during concentrated hazard events (ex. hazardous materials, and wildfire).
- Fuels reduction measures have been taken along Weber Street to minimize risk to water system infrastructure.

Weaknesses:

- Loss of Breitenbush river bridge would isolate Detroit from the remainder of the Santiam Canyon and the Willamette Valley.
- Alternate routes are long, and most likely impassible in winter months.
- Hwy 22 closures could make travel outside of North Santiam Canyon extremely difficult.
- Public transportation options are limited and only reach to the city of Gates.
- City's drain and culvert infrastructure is old and getting to the point where some won't flush a lot of water away anymore (street maintenance person keeps them in best shape and unclogs them at all times).

Energy & Utilities

Detroit receives energy and utility services from Consumer Power Inc. There are no substations located in Detroit. One main power line runs along Hwy 22, connecting to Gates and Mill City.

Strengths:

- Gas stations with fuel storage exist within Detroit and possess both gasoline and diesel fuel.
- An electric car powering station and a Tesla electric car powering station exists within city limits; the capability to utilize this infrastructure is unknown.

Weaknesses:

- Gas stations possess below ground tanks which cannot be pumped without electricity.
- Gas stations do not currently possess backup diesel generators to pump fuel from storage tanks.
- No alternate sources of energy (wind, solar) exist to power basic services.
- Citizen rely on propane and there is limited access to propane during a disaster.

Agriculture and Food

Although Detroit possesses the "Detroit Market" and "Mountain High Grocery" the closest large-scale grocery exists down Hwy 22 in Stayton, Oregon. While other restaurants and lounges exist on Detroit's Main street, the loss of Hwy 22 as a transportation route would cause serious concern for residents and food accessibility. The city is surrounded by steep slopes that are state and federal land. There is no agricultural capability other than small-scale "urban" farms within city limits.

Strengths:

- Private sector entities possess limited (1-2 days) food supplies.

Weaknesses:

- No major (full service) grocery store inside of city limits.
- Surrounding land not suitable for agricultural purposes.

Banking and finance

Detroit's nearest option for banking services is located in Mill City. This one-story structure sits along Hwy 22 and could be utilized for emergency financial services during a hazard event. Detroit does not have any financial services within city-limits.

Strengths:

- Cash flow from nearby businesses could possibly be utilized.

Weaknesses:

- Lack of banking/financing institutions within city limits.
- Full "urban" financial services unavailable.

Hazardous Materials

The cities reliance on propane as a backup fuel source can be hazardous in certain conditions. These above ground propane tanks can be susceptible to leaking after an earthquake, or explode during a wildfire.

Detroit does not possess any large manufacturing firms that possess hazardous materials. The city has identified current brownfields which may be susceptible to leaching or are unsuitable for development. The Kanes Marina, Detroit Lake, and Detroit School Tank brownfields currently require no further action.

Brownfields

DEQ ID	Facility Name	Location
2267	Kanes Marina	530 Clester Road

771	Breitenbush Hot Springs	4688 Forest Road
1204	Detroit Forest Service	Hwy 22
3770	Detroit Lake	MP 46, Hwy 22
5652	Detroit School Tank	110 Patton
1094	Heidgerken Property	Forest Road 46

Strengths:

- There are currently not enough known hazardous materials to cause major concern.
- Brownfield sites could be utilized and attract privates sector development.

Weaknesses:

- Current brownfields maybe susceptible to leaching of unknown materials.
- Propane tanks within city limits can be extremely hazardous.

Emergency Services

Detroit receives emergency service support from Marion County Sheriffs and the Idanha-Detroit Rural Fire Protection District.

- Detroit Police Department (Marion County Sheriffs), 160 Detroit Ave
- Idanha-Detroit Rural Fire Protection District, 160 Detroit Ave

Strengths:

- Detroit possesses emergency services for fire and law enforcement.
- An emergency propane generator with 70-gallons of storage exists inside City Hall; utilized by both fire and law enforcement.

Weaknesses:

- Fire and law enforcement rely on City Hall facilities to operate.
- Ambulance services must travel from the City of Lyons.
- First responders are very limited to basic life monitoring services.
- Currently, emergency services do not have trained HAM radio operators.

Government Facilities

Detroit City Hall contains the office space for all city services as well as the headquarters for the Detroit Fire Department and Marion County Sheriffs. The city has a generator that assures continuance of city business, and also provides power to the meeting hall (emergency center). This includes outlets for electric heaters and lights only.

- Detroit City Hall, 160 Detroit Ave
- Post Office, 170 Detroit Ave

Strengths:

- City Hall facility has (1) kitchen, (2) bathrooms, and (1) emergency generator with (2) 25-gallon propane storage tanks that work in unison.

Weaknesses:

- City Hall is small with space already utilized by other emergency services.
- Propane fuel maybe limited, and could only power City Hall for a couple of days.

Environmental/Historical Preservation Sites

Detroit is surrounded by environmental preservation sites including federal land, state parks and designated wilderness areas. The housing stock in Detroit was built after the 1950s and does not contain any sites of historical significance. The city does possess the Detroit Ranger Station, Detroit State Park, and Detroit Lake, which help to bring in a high volume of recreational tourism in the summer months.

Strengths:

- Proximity to pristine state and federal land could attract residents or business.
- Some remnants remain of the old Detroit location (now at the bottom of Detroit Lake)

Weaknesses:

- Detroit lacks buildings with historical “timber”.

Education

Detroit is part of the Santiam School District. This district encompasses all cities in the Santiam Canyon including Mill City, Gates, and Idanha. This district includes the Santiam Elementary School, and the Santiam Junior/Senior High School.

- Santiam School District
    - Santiam Elementary School, 450 SW Evergreen St.
    - Santiam Junior/Senior High School, 265 SW Evergreen St.

Strengths:

- School facilities could be utilized to shelter a large amount of community residents including Access and Functional Needs populations.
- School facilities possess needed infrastructure for a shelter which includes restrooms, showers and a kitchen.
- School buses could be utilized for transportation after an emergency or disaster.

Weaknesses:

- Detroit is over 20 miles from school services.
- There are no current agreements or MOU’s between the City and School District to utilize facilities after an emergency or disaster.

Healthcare & Public Health

Detroit's nearest medical services are located in Mill City which possesses one clinic with limited services. The nearest hospital and full service health clinic is located in Stayton, Oregon.

- Santiam Medical Clinic, 280 S 1st Ave.
- Emergency Medical Technician (EMT) services are located in the City of Lyons.

Strengths:

- A clinic with minor services exists within the North Santiam Canyon.

Weaknesses:

- Closest health services are located over 20 miles.
- No facilities with major life-saving equipment currently exist within city limits.
- Emergency health supplies are limited to what exists within the community.

Access and Functional Needs

Detroit's vulnerable population consists of the elderly and those that may have mobility issues. About 5% of Detroit's population is characterized as being elderly, and over 20% of full-time residents are considered low-income. The City is quickly turning into a 2nd home community, increasing actual population to 1000+ (210 full-time, 790+ part-time).

Strengths:

- Over 65% of full-time residents are over the age of 45, this older populous can volunteer and promote social cohesion in the community.

Weaknesses:

- No medical services exist for aging population.

CITY OF GATES ADDENDUM

Purpose

This document serves as Gates's Addendum to the Marion County Multi-Jurisdictional Natural Hazards Mitigation Plan (MNHMP, NHMP). This addendum seeks to supplement information contained in Volume I (Basic Plan) of this multi-jurisdictional NHMP which serves as the foundation for this jurisdiction's addendum and Volume III (Appendices) which provides additional information (particularly regarding participation and mitigation strategy). This addendum meets the following requirements:

- Multi-jurisdictional **Plan Adoption** §201.6(c)(5),
- Multi-jurisdictional **Participation** §201.6(a)(3),
- Multi-jurisdictional **Mitigation Strategy** §201.6(c)(3)(iv), and
- Multi-Jurisdictional **Risk Assessment** §201.6(c)(2)(iii).

Plan Process, Participation, and Adoption

This section of the NHMP addendum addresses 44 CFR 201.6(c)(5), *Plan Adoption*, and 44 CFR 201.6(a)(3), *Participation.*

In the summer of 2016, the Oregon Partnership for Disaster Resilience (OPDR) at the University of Oregon's Community Service Center (CSC) partnered with Marion County and Santiam Canyon cities, including Gates, to create the first region-specific NHMP. Part of the Santiam Canyon Regional Hazard Mitigation Plan (RHMP) required the creation of city addenda which would be adopted into the 2016 Marion County NHMP. This project is funded through the Federal Emergency Management Agency's (FEMA) FY14 Pre-Disaster Mitigation Competitive Grant Program (PDMC-PL-10-OR-2014-002).

By developing this addendum to the Marion County NHMP, locally adopting it, and having it approved by FEMA, Gates will gain eligibility for FEMA Hazard Mitigation, Pre-Disaster Mitigation, and Flood Mitigation Assistance grant program funds.

The Marion County NHMP, and Gates addendum, are the result of a collaborative effort between citizens, public agencies, non-profit organizations, the private sector, and regional organizations. A project steering committee guided the process of developing this addendum, and was composed of city staff, county representatives, and emergency service management.

The Gates city recorder is the designated convener of the NHMP and will take the lead in implementing, maintaining, and updating the addendum to the Marion NHMP in collaboration with the Santiam Canyon liaison for Marion County Emergency Management.

Representatives from the City of Gates steering committee met formally on one occasion: September 22, 2016, but communicated electronically throughout the creation of this

document. The city's addendum reflects decisions decided upon at the plan update meeting and during subsequent work and communication with OPDR.

The Gates Steering Committee was comprised of the following representatives:

- Leroy Davis; Community Member, Gates
- Greg Benthin, Public Works Superintendent, Gates
- Jerry Marr; Mayor, Gates
- Traci Archer; City Recorder, Gates
- Kathleen Silva; Santiam Canyon Liaison, Marion County
- Gates City Council

Public participation was achieved with the establishment of the steering committee, which was comprised of city officials, county representatives, and the general public.

The Steering Committee was closely involved throughout the development of the plan and served as the local oversight body for the plan's development. In addition, community members outside of the steering committee were provided an opportunity for comment via the plan review process.

The Marion County NHMP was approved by FEMA on [Month] [Day], 2017 and the Gates addendum was adopted via resolution on [Month] [Day], 2017. This NHMP is effective through [Month] [Day], 2022.

Mitigation Strategy

This section of the NHMP addendum addresses 44 CFR 201.6(c)(3(iv), *Mitigation Strategy*.

During 2016, Marion County and OPDR evaluated the Action Items set by the county and their particular relevance to the Santiam Canyon region. Following the review, actions with relevance to the region were added into the RHMP, noting what accomplishments had been made, and whether the actions were still relevant; any new action items were identified at this time. Gates developed a list of priority actions (Table A-1), any actions that were not prioritized were placed in the Action Item Pool (Table A-2) and will be considered during the semi-annual meetings.

Priority Actions

The city is listing a set of high priority actions in an effort to focus attention on an achievable set of high leverage activities over the next five-years. The city's priority actions are listed below in the following table. Detailed implementation information for each action is listed in within (Table A-1).

Action Item Pool

This expanded list of actions is available for local consideration as resources, capacity, technical expertise and/or political will become available.

Many actions carry forward from prior versions of the Marion County NHMP and other local planning documents including the Community Wildfire Protection Plan, Drought Contingency Plan, and Mid-Willamette Economic Development study.

(Table A-1) Gates Priority Action Items

Action Item	Cost and Process of Implementation	Funding Options	Approximate Date of Completion
Planning & City Staff	*Update planning documents (comprehensive plan, development code) to reflect new hazard information.*	*General Fund*	*September 2017*
(e.g) *Multi-Hazard*	*City staff should assess the amount of KWH needed to run city facilities. City staff should purchase propane storage accordingly.*	*General Fund, MWCOG grants/loans,*	*December 2017*

-ONGOING-

(Table A-2) Gates Action Item Pool

Action Item	Proposed Action Title	Coordinating Organization	Partner Organizations	Timeline	Alignment with Plan Goals						
					Public Awareness	Education	Risk Reduction	Funding and Implementation	Partnerships and Coordination	Natural Resource Utilization	Plan Integration
Earthquake #1	Promote Great Oregon Shakeout Awareness month in October. Participate in activities for schools, business, and industry. Participating with the Mid-Willamette Emergency Communications Collective on initiatives that are focused on household preparedness.	Marion County Emergency Management	Public Works, Safety Committee, Marion County Risk, Red Cross, OEM and Media	Ongoing every October	X	X			X		
Earthquake #2	Collaborate with GROW EDC to develop relevant public-private partnerships with businesses that can contribute to response and recovery. (Multi-Hazard 6-9)	Gates, Marion County Emergency Management	GROW EDC	Ongoing	X	X	X	X	X		X
Multi-Hazard #1	Develop an Energy Assurance Plan. (Multi-Hazard 2-4)	Gates, Marion County Emergency Management	Department of Energy, Whole Community	Ongoing revisions			X	X	X		X

Source: City of Gates NHMP Steering Committee, 2015.

-SHORT TERM-

Action Item	Proposed Action Title	Coordinating Organization	Partner Organizations	Timeline	Alignment with Plan Goals						
					Public Awareness	Education	Risk Reduction	Funding and Implementation	Partnerships and Coordination	Natural Resource Utilization	Plan Integration
Multi-Hazard #2	Conduct an assessment of the short and long term needs for sheltering access and functional needs populations for all hazards.	Gates, Marion County Emergency Management	Marion County Public Health, Red Cross, Cities, NGO's, Oregon Public Health	Short Term					X		X
Multi-Hazard #3	Develop a MOU with the Santiam School District to utilize facilities for sheltering residents.	Gates, Marion County Emergency Management	Santiam School District, RFPD	Short Term			X		X		
Multi-Hazard #4	Develop a MOU with First Student to utilize buses during/after hazard events	Gates, Marion County Emergency Management	First Student	Short Term			X		X		
Multi-Hazard #5	Develop a MOU with Frank & Ferris Lumber to share fuel resources after a hazard event.	Gates, Marion County Emergency Management	Franks Lumber, RFPD	Short Term			X		X		

Action Item	Proposed Action Title	Coordinating Organization	Partner Organizations	Timeline	Alignment with Plan Goals						
					Public Awareness	Education	Risk Reduction	Funding and Implementation	Partnerships and Coordination	Natural Resource Utilization	Plan Integration
Multi-Hazard #6	Purchase and store emergency rescue rafts for EMS to allow for the use of the North Santiam River as an emergency transportation option.	Gates, Marion County Emergency Management	RFPD	Short Term					X	X	
Multi-Hazard #7	Continue to train and expand Gates CERT team.	Marion County Emergency Management, Gates	CERT, Whole Community	Short Term	X	X			X		
Multi-Hazard #8	Develop a community education program - such as an all hazard community outreach forum for students and residents.*	Marion County Emergency Management, Gates	Public Works Whole Community	Short Term	X	X	X				X
Multi-Hazard #9	Expand auxiliary radio capabilities by developing a team of HAM Radio operators for EMS and interested public.	Marion County Emergency Management, Gates	ARES, CERT, Private partners, Whole Community	Short Term	X	X	X		X		

*Identified in Marion County Community Wildfire Protection Plan (Action Plan & Priorities)

**Identified in North Santiam Watershed Drought Contingency Plan (Priority Drought Mitigation Actions)

***Identified in Mid-Willamette Valley Council of Governments Comprehensive Economic Development Study (Appendix C)

-LONG TERM-

Action Item	Proposed Action Title	Coordinating Organization	Partner Organizations	Timeline	Alignment with Plan Goals						
					Public Awareness	Education	Risk Reduction	Funding and Implementation	Partnerships and Coordination	Natural Resource Utilization	Plan Integration
Drought #1	Monitor economic impacts on recreation, tourism and agriculture communities.	Gates, Marion County Emergency Management	Community Services	Long Term	X	X	X	X	X		X
Drought #2	Collaborate with NSWC to complete WMCP's and improve community understanding of water usage and opportunities to increase efficiencies.**	NSWC, Gates	North Santiam Watershed DCP Partners	Long Term		X	X		X		X
Flood #1	Create partnerships and strategic plans with NSWC to conduct leak detection surveys.**	Marion County Environmental Services, Gates	Marion County Parks Department, Oregon Department of Fish and Wildlife,	Long Term			X		X	X	X

Action Item	Proposed Action Title	Coordinating Organization	Partner Organizations	Timeline	Alignment with Plan Goals						
					Public Awareness	Education	Risk Reduction	Funding and Implementation	Partnerships and Coordination	Natural Resource Utilization	Plan Integration
Flood #2	Create partnerships and strategic plans with NSWC to explore alternative water supply sources.**	Marion County Environmental Services, Gates	Marion County Parks Department, Oregon Department of Fish and Wildlife,	Long Term			X		X	X	X
Multi-Hazard #10	Conduct road improvements on Gates Hill Road and Hudel Road as identified in the CWPP*	RFPD, Gates, Marion County Public Works	Marion County Emergency Management	Long Term			X		X		
Multi-Hazard #11	Collaborate with Marion County to connect to a more resilient regional water/sewer system.***	Marion County Community Services Department/Emergency Management, Gates	Marion County Emergency Management	Long Term			X	X	X		X
Multi-Hazard #12	Gather community support for the installation of resilient fiber communication infrastructure throughout the community.***	Gates	Marion County Community Services Department/Board of Commissioners	Long Term	X		X		X		X
Wildfire #1	Collaborate with Detroit Ranger District, ODF, and BLM to conduct fuel hazard reduction along the Wildland Urban interface.*	ODF, BLM, Detroit Ranger District	Marion County Emergency Management	Long Term			X		X		X

Action Item	Proposed Action Title	Coordinating Organization	Partner Organizations	Timeline	Alignment with Plan Goals						
					Public Awareness	Education	Risk Reduction	Funding and Implementation	Partnerships and Coordination	Natural Resource Utilization	Plan Integration
Landslide #1	Integrate new DOGAMI landslide hazard information into land use zoning/development codes.	Gates	Environmental Services, Engineering, ODOT, DLCD	Long Term			X				X

Plan Implementation and Maintenance

The City Council will be responsible for adopting the City of Gates addendum to the Marion County NHMP. This addendum designates a coordinating body and a convener to oversee the development and implementation of action items. Because the city addendum is part of the county's multi-jurisdictional NHMP, the city will look for opportunities to partner with the county. The city's steering committee will convene after re-adoption of the City of Gates addendum on a semi-annual schedule; the county is also meeting on a semi-annual basis and will provide opportunities for the cities to report on NHMP implementation and maintenance during their meetings. The City Recorder will serve as the convener and will be responsible for assembling the steering committee (coordinating body). The steering committee will be responsible for identifying new risk assessment data, reviewing status of mitigation actions, identifying new actions, and seeking funding to implement the city's mitigation strategy (actions). The convener will also remain active in the county's implementation and maintenance process.

Implementation through Existing Programs

Many of the NHMP's recommendations are consistent with the goals and objectives of the city's existing plans and policies. Where possible, the City of Gates will implement the NHMP's recommended actions through existing plans and policies. Plans and policies already in existence have support from local residents, businesses, and policy makers. Many land-use, comprehensive, and strategic plans get updated regularly, allowing them to adapt to changing conditions and needs. Implementing the NHMP's action items through such plans and policies increases their likelihood of being supported and implemented.

Gates's acknowledged comprehensive plan is the Gates Comprehensive Plan. The Oregon Land Conservation and Development Commission first acknowledged the plan in 1977. The City last completed a major update of the plan in 2009. The City implements the plan through Gates regulatory ordinances.

Gates currently has the following plans that relate to natural hazard mitigation.

- Comprehensive Plan
- Zoning Ordinance
- Water Master Plan

Continued Public Participation

Keeping the public informed of the city's efforts to reduce the city's risk to future natural hazards events is important for successful plan implementation and maintenance. The city is committed to involving the public in the plan review and updated process. This includes:

- Annual briefings to City Council
- Articles and information in The Canyon Weekly
- Postings and media on social media/website.

Plan Maintenance

The Marion County Multi-Jurisdictional Natural Hazards Mitigation Plan and city addendum will be updated every five years in accordance with the update schedule outlined in the Disaster Mitigation Act of 2000. During the county plan update process, the city will also review and update its addendum. The convener will be responsible for convening the steering committee to address the questions outlined below.

- Are there new partners that should be brought to the table?
- Are there new local, regional, state, or federal policies influencing natural hazards that should be addressed?
- Has the community successfully implemented any mitigation activities since the plan was last updated?
- Have new issues or problems related to hazards been identified in the community?
- Are the actions still appropriate given current resources?
- Have there been any changes in development patterns that could influence the effects of hazards?
- Have there been any significant changes in the community's demographics that could influence the effects of hazards?
- Are there new studies or data available that would enhance the risk assessment?
- Has the community been affected by any disasters? Did the plan accurately address the impacts of this event?

These questions will help the steering committee determine what components of the mitigation plan need updating. The steering committee will be responsible for updating any deficiencies found in the plan.

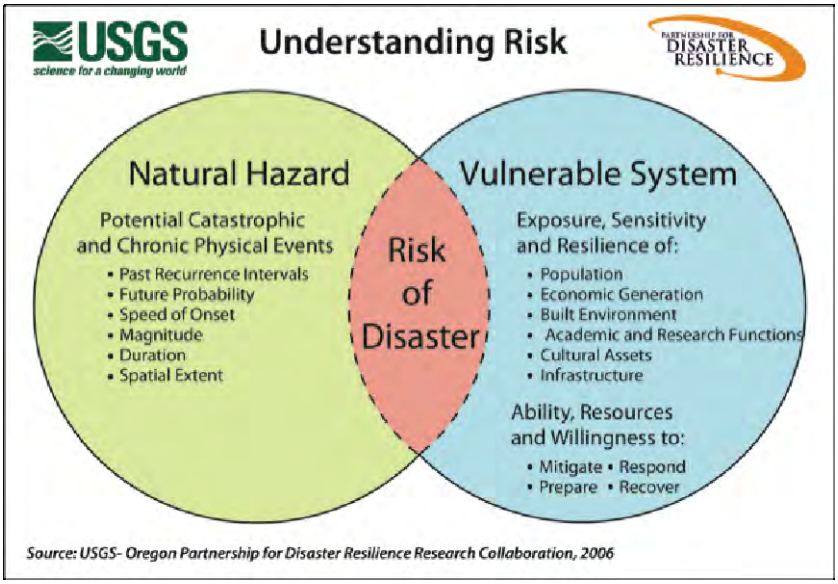
Risk Assessment

This section of the NHMP addendum addresses 44 CFR 201.6(b)(2) - Risk Assessment. In addition, this chapter can serve as the factual basis for addressing Oregon Statewide Planning Goal 7 – Areas Subject to Natural Hazards. Assessing natural hazard risk has three phases:

- **Phase 1:** Identify hazards that can impact the jurisdiction. This includes an evaluation of potential hazard impacts – type, location, extent, etc.
- **Phase 2:** Identify important community assets and system vulnerabilities. Example vulnerabilities include people, businesses, homes, roads, historic places and drinking water sources.
- **Phase 3:** Evaluate the extent to which the identified hazards overlap with, or have an impact on, the important assets identified by the community.

The local level rationale for the identified mitigation strategies (action items) is presented herein. The risk assessment process is graphically depicted in (Figure B-1) below. Ultimately, the goal of hazard mitigation is to reduce the area of risk, where hazards overlap vulnerable systems.

(Figure B-1) Understanding Risk



Hazard Analysis Methodology

This NHMP utilizes a Threat Hazard Identification and Risk Assessment methodology that is consistent with the Marion County Multi Jurisdictional Hazard Mitigation Plan. Mill City developed this assessment from historical data of events that have occurred in Marion County. The assessment uses the calculated priority risk index (CPRI) methodology to specifically examine:

1. Probability (frequency) of event
2. Magnitude of event
3. Expected warning time before event
4. Expected duration of event

Table (A-3) below shows the scoring values for each ranking category.

Table (A-3) Risk Assessment Hazard Ranking Scoring Values

Score	Probability	Warning Time	Magnitude/Severity	Duration
4	Highly Likely	Less than 6 hours	Catastrophic	More than 1 week
3	Likely	6-12 hours	Critical	Less than 1 week
2	Possible	12-24 hours	Limited	Less than 1 day
1	Unlikely	24+ hours	Negligible	Less than 6 hours

Source: Marion County Emergency Management; BOLD Planning

Hazard Analysis

For emergency management planning purposes, this critical analysis is an assessment of the consequences of each hazard, including potential areas of impact, population exposed and impacted, duration of the hazard, and potential economic consequences. These rankings utilize the criteria laid out in THIRA to weigh them proportionally between historic data as well as future projections based on economic, demographic, the critical infrastructure information.

These rankings were reviewed and revised by steering committee members to reflect specific community attributes and risks.

(Table A-4) Probability and Vulnerability Comparison

Hazard Profile Summary for Emergency Operations Plan						
Hazard	Probability	Magnitude	Warning Time	Duration	CPRI	Planning Significance
Earthquake	4	4	4	4	4.00	**High**
Severe Weather/Storm	4	4	2	3.5	3.65	**High**
Landslide	3	3	4	3	3.15	**High**
Power Failure	2.5	4	3.5	3	3.15	**High**
Wildland Interface Fire	3.5	3	2	3	3.08	**High**
Drought	3	3	1	4	2.80	**Moderate**
Flood	2	4	2.5	3	2.78	**Moderate**
Extreme Weather - High Temperature	3.5	2	1	4	2.73	**Moderate**
Transportation Accident/Train Derailment	3	3	1	3	2.70	**Moderate**
School & Workplace Violence	1.5	4	4	2	2.68	**Moderate**
Epidemic	2	4	1	4	2.65	**Moderate**
Pandemic	2	4	1	4	2.65	**Moderate**
Dam or Levee Failure	1	4	4	4	2.65	**Moderate**
Animal Disease Outbreak	2	3	2	4	2.50	**Moderate**
Biological Chemical, Sabotage and Cyber Incident and Explosives Radiological Attack-Terrorism	1	4	1	3	2.10	**Moderate**
Hazardous Materials Incident	1.5	3	1	3	2.03	**Moderate**
Civil Disorder / Terrorism	1	2	4	3	1.95	**Low**
Radiological Release	1	2	4	3	1.95	**Low**
Volcanic Eruption	1	2.5	1	4	1.75	**Low**
Tornado	1	1.5	1	1	1.15	**Low**

Source: Gates NHMP Steering Committee and Marion County NHMP Steering Committee, 2016.

Hazard Characteristics

Drought

The steering committee determined that the city's probability for drought is **moderate** and their vulnerability to drought is **low**.

Although dryer conditions in the summer months have impacted the North Santiam Canyon as a whole, Gates has not experienced major impacts from drought. Recently during the 2015 drought, many tree's and vegetation died off which has created increased risk of wildfire hazards. If dryer conditions become the new norm, Gates could experience timber die-off, making them more susceptible to wildfires.

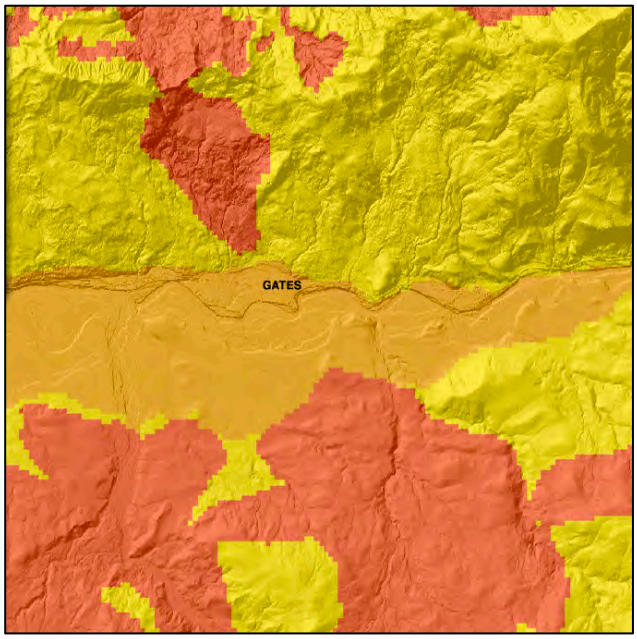
While the Detroit and Big Cliff dams control the flow of water into the North Santiam river, (required to meet minimum cubic-feet-per-second standards for salmon/steelhead populations) years of substantial drought can lower water levels, threatening the water intake system.

Earthquake

The steering committee determined that the city's probability for a Cascadia Subduction Zone (CSZ) Earthquake event is **high** and that their vulnerability to this event is **moderate**. The steering committee determined that the city's probability for a Crustal Earthquake event is **moderate** and that their vulnerability to this event is **moderate**.

Historically, Gates has experienced one crustal earthquake on August 19, 1961. A 4.5 magnitude earthquake struck 6 miles from Mill City, with shaking felt throughout the Santiam Canyon, up to Detroit.

If another larger and more substantial earthquake occurs (Cascadia), Gates could experience damage to buildings, utility (electric power, water, wastewater, and natural gas) and transportation systems (bridges and pipelines).



Flood

The steering committee determined that the city's probability for flooding is **low** and that their vulnerability to flooding is **high**.

Historically, Gates experienced minor flooding events in 1964 and 1996. This was due to a specific weather pattern named "Pineapple Express", which blows warm, most air from the southwest into the Pacific Northwest. In February 1996, A combination of snowpack, warm temperatures, and record-breaking rain caused streams including the North Santiam to rise near

or above all-time flood record levels. Gates experienced significant impacts as high/dirty water levels prevented their water facility from operating properly. Gates had no water from February 7-12. With assistance from the National Guard, Gates used a portable generator and pump to transfer water from a pond outside of city limits until February 27th

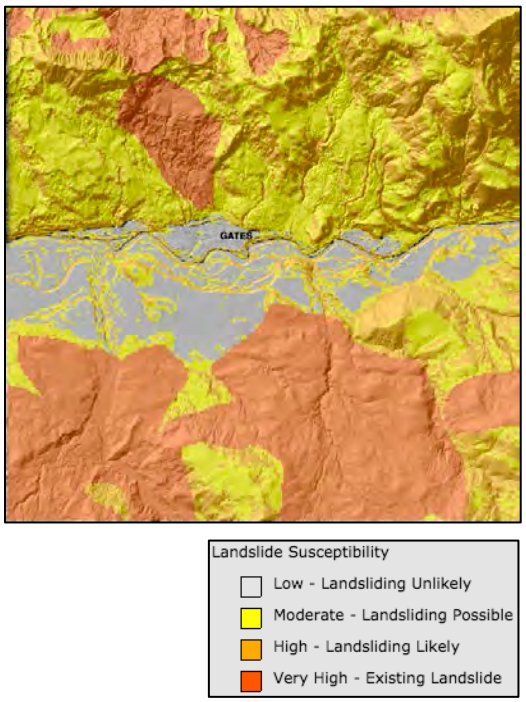
In December of 2007, heavy rain hits the Santiam Canyon with 6.39 inches of rain recorded by the Detroit Dam monitoring station.[1] In January of 2011, heavy rain combined with snowmelt runoff in Eastern Marion County produced flooding on the North Santiam River. The North Santiam River near Mehama crested at 11.7 feet, and flooded homes in Lyons and Mehama.[2]

Landslide

The steering committee determined that the city's probability for landslide is **moderate** and that their vulnerability to landslide is **moderate**.

Historically, Gates has not experienced major impacts from landslides within city limits. Areas near Hwy 22 and the northern edge of the city are more susceptible to this hazard because of steep slopes.

Potential landslide-related impacts are adequately described within the county's plan, and include infrastructural damages, economic impacts (due to isolation and/or arterial road closures), property damages, and obstruction to evacuation routes. Rain-induced landslides and debris flows can potentially occur during any winter in Marion County, and thoroughfares beyond city limits are susceptible to obstruction as well.



Volcano

The steering committee determined that the city's probability for volcanic event is **low** and that their vulnerability to volcanic event is **moderate**.

Gates has not been impacted previously by volcanic activity, however Mount Jefferson is located east of the city, further into the cascade mountains, and could produce problems if an eruption occurs.

Wildfire

The steering committee determined that the city's probability for wildfire is **high** and that their vulnerability to wildfire is **high**.

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[1] http://www.ncdc.noaa.gov/stormevents/eventdetails.jsp?id=72206

[2] http://www.ncdc.noaa.gov/stormevents/eventdetails.jsp?id=278644

In 2002 and 2004, Gates was impacted by wildfire's which caused closure of Hwy 22. This impacted local residents, restricting travel, and negatively impacting the local economy. Gates could experience more fires as dryer conditions occur in the North Santiam Canyon. Less rainfall and snowpack can kill of tree's dependent on large amounts of water, which could ultimately lead to an increase of fuels and wild fire ignition probability.

Marion County updated the Community Wildfire Protection Plan (CWPP) in 2016, which mapped wildland urban interface (WUI) areas and developed actions to mitigate wildfire risk. The city is a participant in the CWPP, and has included hazard mitigation action items directly in line with the CWPP actions.

Windstorm

The steering committee determined that the city's probability for windstorms is **high** and that their vulnerability to windstorms is **high**.

In April of 1931, winds in the Santiam Canyon region felled hundreds of trees causing road closures between Mill City and Detroit. The winds also caused several devastating fires. In December of 1995, high wind gusts of up to 60mph downed tree's and disrupted power and communication services in the lower Santiam. Gates residents reported power and phone outages. In 2002, gusts of up to 70mph caused similar damages, blowing down tree's onto roads and power lines.

About once or twice per year the city will experience a windstorm event that can interrupt services, down trees, and cause power outages. Because windstorms typically occur during winter months, they are sometimes accompanied by ice, freezing rain, flooding, and very rarely, snow.

Winter Storm (Snow/Ice)

The steering committee determined that the city's probability for winter storm is **moderate** and that their vulnerability to winter storm is **high**.

Major winter storms have occurred in the Gates area; in January of 1937, heavy snowfall of over 2 feet caused property damage. Major roads were closed and residents of Detroit and Gates were stranded for five days as heavy snow and a landslide blocked Hwy 22. In the winter of 2006-07 ice storms caused the city to lose power for 2-3 days. In 2012, a winter storm accompanied by flooding and landslides left Gates residents without electricity for 3-5 days. Downed trees and power lines obstructed Hwy 22, requiring emergency vehicles to restore regular access. In 2014, a similar storm knocked down tree's and caused hazardous road conditions. These types of storms are more frequent and usually cause transportation issues and communication failures from downed trees and icy/snow filled roads.

Community Asset Identification

This section provides information on city specific assets. Many of these community characteristics can affect how natural hazards impact communities and how communities

choose to plan for all types of hazard mitigation. Considering the city specific assets during the planning process can assist in identifying appropriate measures for natural hazard mitigation.

Community Characteristics

Gates is nestled along the North Santiam River bordering both Marion and Linn Counties. With a population of 474, it is the second largest city in the Santiam Canyon. Its elevation, at 945', creates a moderate climate. Summer temperatures hover between 51-76 degrees, while winter brings near freezing temperatures usually ranging from 32-44 degrees. Gates receives approximately 64 inches of rain and 10 inches of snow each year. The city's topography is relatively flat, but does possess terrain attributed to the North Santiam River. Outside of city limits, steep slopes surround the city on the North and South sides.

Economy

Gates benefits from its location along Hwy 22, a major east-to-west transportation route connecting Salem to Bend. Existing businesses types include hospitality, restaurants, and service stations. Most residents in the community still rely on resource extraction employment which includes agriculture, forestry, fishing, or hunting. Gates economy is limited because of its small population size and lack of infrastructure capacity, which has caused the regression of non Hwy 22 frontage development.

Critical and Important Facilities/Infrastructure

Communication/Information Technology

There are currently two communication providers in Gates. Wave provides broadband internet and phone services, while Frontier provides phone services and broadband internet with limited fiber infrastructure adjacent to Hwy 22.

Strengths:

- Fiber internet infrastructure already present along Hwy 22
- Cellular Tower 1 mile east of Gates

Weaknesses:

- Unknown extent and availability of fiber infrastructure
- Currently limited/none certified HAM radio operators

Water

The City of Gates has a membrane water treatment facility located on the North Santiam River at 117 Riverview Street. The facility has a diesel generator with a 400-gallon storage tank. Although the city replaced its main water lines in 2015, 40% of the water distributed is being lost through leaky pipes. Two intake lines exist on the North Santiam as well as an intake wet well. The city has two storage tanks that total 500,000 gallons (150,000 and 350,000 tanks). This above ground storage can last the city and its residents for approximately 4-5 days.

The city continues to invest in the water system to date one mile of waterlines were upgraded and in October 2016 a study was conducted on the water system to assess the vulnerable infrastructure. The city also maintains a Water Conservation Plan and is updated by the Water Resource Department; last updated in 2015.

There are currently no alternative water sources available. If power is lost, propane powered generators are available for fire lines, and submersible pumps are available for municipal water.

Waste Water

Gates does not have a municipal wastewater treatment system. Residents and commercial businesses utilize individual septic tanks. Many residential septic tanks have never been replaced and could be over 50 years old. City staff believes that many of these tanks may be leaching biohazardous waste into the surrounding soil.

Dams

Two dams sit above Gates, *Detroit Dam* and *Big Cliff Dam.* Previous steering committee's have concluded that the likelihood of Dam Failure is ***Low***[3]***.*** Current conditions still represent the previous decision. If Dam failure occurred in either dams, Gates would experience catastrophic impacts from a surge of water expelled from either Detroit or Big Cliff lake.

Strengths:

- (1) Backup diesel generator with 400-gallon storage tank
- (2) Above-ground storage tanks
    - Equivalent to (500,000) gallons or 4-5 days of water storage

Weaknesses:

- Inefficient water lines and leaks equate to higher stress on water system components
- Propane powered generators for fire lines
- Water system is susceptible to North Santiam water turbidity and flooding.
- North Santiam PH has risen to 8, and Blue-Green Algae has been spotted.

Transportation Systems

Oregon Route 22 is the major transportation route for auto, public transit, and emergency vehicle access throughout the Santiam Canyon. Hwy 22 spans about 32 miles west, connecting Gates to Salem and the remainder of the Willamette Valley. To the east, the highway connects to Mill City, Gates, Detroit, Idanha, and ends at the Santiam Pass interchange.

The Cherriots Canyon Connector is the only existing public transit service in the entire Santiam Canyon. This route has three total roundtrips with buses running approximately every (5) hours.

In case of a major Oregon Route 22 closure, Gates residents will have to rely on alternate routes to reach supplies or safety in the Willamette Valley. In case of a catastrophic event, Gates could utilize the North Santiam River as an alternate transportation option.

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3 http://www.co.marion.or.us/PW/EmergencyManagement/Documents/6_damfailure.pdf

Bridges

Structure Name	Year Built	Structural Condition
East Sorbin Street Bridge	1994	Good

Strengths:

- Bridge is in good condition and was built relatively recently.
- Lyons/Gates Drive serves as an additional evacuation route

Weaknesses:

- Hwy 22 closures could make travel outside of North Santiam Canyon extremely difficult.

Energy & Utilities

Gates receives energy and utility services from Pacific Power. There is one main power line that runs south of Gates, connecting to the main substation in Lyons.

Strengths:

- Gas stations with fuel storage exist near Gates within Mill City.
- Businesses including Ferris & Frank Lumber possess fuel storage that could be shared with Mill City and Gates.
- City Hall propane generators?

Weaknesses:

- Mill City gas stations possess below ground tanks which cannot be pumped without electricity.
- Mill City gas stations do not currently possess backup diesel generators to pump fuel from storage tanks.
- No alternate sources of energy (wind, solar) exist to power basic services.

Agriculture and Food

Although Gates is near Mill City which possesses the "Mill City MarketPlace" and "J&S Deli & Pub" the closest large-scale grocery exists down Hwy 22 in Stayton, Oregon. While other restaurants and cafés exist on the north side of the river in Gates, the loss of Hwy 22 as a transportation route would cause serious concern for residents and food accessibility. Although some farm land exists outside of city limits, a large majority is not used for substantial food production.

Strengths:

- Private sector entities which possess limited (>1 days) food supplies.
- Agricultural land availability near Gates.

Weaknesses:

- No major (full service) grocery store inside of city limits.

- Surrounding agriculture currently not used for food production.

Banking and finance

The closest banking services exist in Mill City, where a U.S Bank exists on the north side of the North Santiam river. This one-story structure sits along Hwy 22 and could be utilized for emergency financial services during a hazard event.

Strengths:

- Presence of a banking/financing institution within nearby in Mill City

Weaknesses:

- Full "urban" financial services unavailable.

Hazardous Materials

Gates does not possess any large manufacturing firms that possess hazardous materials. The city has identified current brownfields which may be susceptible to leaching. DEQ has recently discovered items from the Detroit and Big Cliff Damn builds, none of which are currently a large concern.

Brownfields

DEQ - ID	Facility Name	Location
5820	Detroit Lake (Remedial Action)	MP 42; Hwy 22

Strengths:

- There are currently not enough known hazardous materials to cause major concern.
- Brownfield sites could be utilized and attract privates sector development.

Weaknesses:

- Current brownfields maybe susceptible to leaching of unknown materials.

Emergency Services

Gates does not receive any police support. Emergency service support relies heavily on the Gates Rural Fire Protection District and the local Marion County CERT team.

- Gates Rural Fire Protection District, 101 E. Sorbin St

Strengths:

- Gates possess community specific emergency services for fire enforcement.
- The community possesses a trained CERT team.

Weaknesses:

- Lack of any police presence or services.
- Emergency services do not have trained HAM radio operators.
- Emergency services do not possess rescue rafts for North Santiam River access.

Government Facilities

Gates Hall contains the office space for the administration, finance, permits, planning, public works, municipal court. A Marion County owned antenna is located on top of the building. The building possess a backup propane generator with a capacity of 250 gallons.

- Gates City Hall, 101 W. Sorbin St.

Strengths:

- Marion County owned antenna on top of City Hall.
- Propane Generator with 250 gallons of storage capacity.

Weaknesses:

- Generator relies on propane instead of readily available diesel fuel.
- Backup storage of propane does not exist.

Environmental/Historical Preservation Sites

Gates is surrounded by environmental preservation sites including state parks and designated wilderness areas. The housing stock in Gates was built between the 1940s-1950s and may contain some residential home sites of historical significance.

Strengths:

- Proximity to pristine state and federal land could attract residents or business.

Weaknesses:

- No major buildings of historical significance that could attract economic development/preservation dollars.

Education

Just like the remainder of the Santiam Canyon cities, Gates utilizes the Santiam School District. This district encompasses all cities in the Santiam Canyon including Gates, Detroit, and Idanha. This district includes the Santiam Elementary School, and the Santiam Jr/Sr High school located in Mill City.

- Santiam School District
    - Santiam Elementary School, 450 SW Evergreen St. Mill City
    - Santiam Jr/Sr High School, 265 SW Evergreen St. Mill City

Strengths:

- School facilities could be utilized to shelter a large amount of community residents including functional needs populations.
- School facilities already possess needed infrastructure for a shelter which includes restrooms, showers and a kitchen.
- School buses could be utilized for transportation after a hazard event.

Weaknesses:

- There are no current agreements or MOU's between the Gates, Mill City and school district to utilize facilities after a hazard event
- School buildings exist outside of Gates city limits.

Healthcare & Public Health

Gates does not currently possess any health services. The nearest clinic is located in Mill City with limited services. The nearest hospital and full service health clinic is located in Stayton, Oregon.

- Santiam Medical Clinic, 280 S 1st Ave.

Strengths:

- A clinic with minor services exists near Gates in Mill City.

Weaknesses:

- No facilities with major life-saving equipment currently exist within city limits.
- Emergency health supplies are limited to what exists within the community.

Access and Functional Needs

Gates vulnerable population consists of the elderly and those that are medically dependent and require life safety equipment. About 50% of Gates population is characterized as being elderly, 15 children utilize school buses to Mill City, and 2 residents require life safety equipment.

Strengths:

- Over 60% of residents are over the age of 45, this older populous can volunteer and promote social cohesion in the community.

Weaknesses:

- Full medical services do not exist nearby for aging population.

CITY OF IDANHA ADDENDUM

Purpose

This document serves as Idanha's Addendum to the Marion County Multi-Jurisdictional Natural Hazards Mitigation Plan (MNHMP, NHMP). This addendum seeks to supplement information contained in Volume I (Basic Plan) of this multi-jurisdictional NHMP which serves as the foundation for this jurisdiction's addendum and Volume III (Appendices) which provides additional information (particularly regarding participation and mitigation strategy). This addendum meets the following requirements:

- Multi-jurisdictional **Plan Adoption** §201.6(c)(5),
- Multi-jurisdictional **Participation** §201.6(a)(3),
- Multi-jurisdictional **Mitigation Strategy** §201.6(c)(3)(iv), and
- Multi-Jurisdictional **Risk Assessment** §201.6(c)(2)(iii).

Plan Process, Participation, and Adoption

This section of the NHMP addendum addresses 44 CFR 201.6(c)(5), *Plan Adoption*, and 44 CFR 201.6(a)(3), *Participation.*

In the summer of 2016, the Oregon Partnership for Disaster Resilience (OPDR) at the University of Oregon's Community Service Center (CSC) partnered with Marion County and Santiam Canyon cities, including Idanha, to create the first region-specific NHMP. Part of the Santiam Canyon Regional Hazard Mitigation Plan (RHMP) required the creation of city addenda which would be adopted into the 2016 Marion County NHMP. This project is funded through the Federal Emergency Management Agency's (FEMA) FY14 Pre-Disaster Mitigation Competitive Grant Program (PDMC-PL-10-OR-2014-002).

By developing this addendum to the Marion County NHMP, locally adopting it, and having it approved by FEMA, Idanha will gain eligibility for FEMA Hazard Mitigation, Pre-Disaster Mitigation, and Flood Mitigation Assistance grant program funds.

The Marion County NHMP, and Idanha addendum, are the result of a collaborative effort between citizens, public agencies, non-profit organizations, the private sector, and regional organizations. A project steering committee guided the process of developing this addendum, and was composed of city staff, county representatives, and emergency service management.

The Idanha city recorder is the designated convener of the NHMP and will take the lead in implementing, maintaining, and updating the addendum to the Marion NHMP in collaboration with the Santiam Canyon liaison for Marion County Emergency Management.

Representatives from the City of Idanha steering committee met formally on one occasion: September 22, 2016, but communicated electronically throughout the creation of this

document. The city's addendum reflects decisions decided upon at the plan update meeting and during subsequent work and communication with OPDR.

The Idanha Steering Committee was comprised of the following representatives:

- Karen Clark; Resident, Idanha
- Mr. Clark; Resident, Idanha
- Kathleen Silva; Santiam Canyon Liaison, Marion County
- Idanha City Council

Public participation was achieved with the establishment of the steering committee, which was comprised of city officials and county representatives.

The Steering Committee was closely involved throughout the development of the plan and served as the local oversight body for the plan's development. In addition, community members outside of the steering committee were provided an opportunity for comment via the plan review process.

The Marion County NHMP was approved by FEMA on [Month] [Day], 2017 and the Idanha addendum was adopted via resolution on [Month] [Day], 2017. This NHMP is effective through [Month] [Day], 2022.

Mitigation Strategy

This section of the NHMP addendum addresses 44 CFR 201.6(c)(3(iv), *Mitigation Strategy*.

During 2016, Marion County and OPDR evaluated the Action Items set by the county and their particular relevance to the Santiam Canyon region. Following the review, actions with relevance to the region were added into the RHMP, noting what accomplishments had been made, and whether the actions were still relevant; any new action items were identified at this time. Idanha developed a list of priority actions (Table A-1); any actions that were not prioritized were placed in the Action Item Pool (Table A-2) and will be considered during the semi-annual meetings.

Priority Actions

The city is listing a set of high priority actions in an effort to focus attention on an achievable set of high leverage activities over the next five-years. The city's priority actions are listed below in the following table. Detailed implementation information for each action is listed in within (Table A-1).

Action Item Pool

This expanded list of actions is available for local consideration as resources, capacity, technical expertise and/or political will become available.

Many actions carry forward from prior versions of the Marion County NHMP and other local planning documents including the Community Wildfire Protection Plan, Drought Contingency Plan, and Mid-Willamette Economic Development study.

(Table A-1) Idanha Priority Action Items

Action Item	Cost and Process of Implementation	Funding Options	Approximate Date of Completion
Planning & City Staff	*Update planning documents (comprehensive plan, development code) to reflect new hazard information.*	*General Fund*	*September 2017*
(e.g) *Multi-Hazard*	*City staff should assess the amount of KWH needed to run city facilities. City staff should purchase a diesel generator with additional storage accordingly.*	*General Fund, MWCOG grants/loans,*	*December 2017*

-ONGOING-

(Table A-2) Idanha Action Item Pool

Action Item	Proposed Action Title	Coordinating Organization	Partner Organizations	Timeline	Alignment with Plan Goals						
					Public Awareness	Education	Risk Reduction	Funding and Implementation	Partnerships and Coordination	Natural Resource Utilization	Plan Integration
Earthquake #1	Promote Great Oregon Shakeout Awareness month in October. Participate in activities for schools, business, and industry. Participating with the Mid-Willamette Emergency Communications Collective on initiatives that are focused on household preparedness.	Marion County Emergency Management	Public Works, Safety Committee, Marion County Risk, Red Cross, OEM and Media	Ongoing every October	X	X			X		
Earthquake #2	Collaborate with GROW EDC to develop relevant public-private partnerships with businesses that can contribute to response and recovery. (Multi-Hazard 4)	Idanha, Marion County Emergency Management	GROW EDC	Ongoing	X	X	X	X	X		X
Multi-Hazard #1	Develop an Energy Assurance Plan.	Idanha, Marion County Emergency Management	Department of Energy, Whole Community	Ongoing revisions			X	X	X		X

Source: City of Idanha NHMP Steering Committee, 2015.

-SHORT TERM-

Action Item	Proposed Action Title	Coordinating Organization	Partner Organizations	Timeline	Alignment with Plan Goals						
					Public Awareness	Education	Risk Reduction	Funding and Implementation	Partnerships and Coordination	Natural Resource Utilization	Plan Integration
Multi-Hazard #2	Conduct an assessment of the short and long term needs for sheltering access and functional needs populations for all hazards.	Idanha, Marion County Emergency Management	Marion County Public Health, Red Cross, Cities, NGO's, Oregon Public Health	Short Term					X		X
Multi-Hazard #3	Establish a strategic plan to utilize community resident amenities. (Hill brothers) – Kubota Tractor, Skidder	Idanha	Marion County Emergency Management	Short Term	X	X	X		X		
Multi-Hazard #4	Establish an Idanha CERT team.	Marion County Emergency Management, Idanha	CERT, Whole Community	Short Term	X	X			X		
Multi-Hazard #5	Develop a community education program, such as an all hazard community outreach forum for students and residents.*	Marion County Emergency Management, Idanha	Public Works Whole Community	Short Term	X	X	X				X

Action Item	Proposed Action Title	Coordinating Organization	Partner Organizations	Timeline	Alignment with Plan Goals						
					Public Awareness	Education	Risk Reduction	Funding and Implementation	Partnerships and Coordination	Natural Resource Utilization	Plan Integration
Multi-Hazard #6	Expand auxiliary radio capabilities by developing a team of HAM Radio operators for EMS and interested public.	Marion County Emergency Management, Idanha	ARES, CERT, Private partners, Whole Community	Short Term	X	X	X		X		

*Identified in Marion County Community Wildfire Protection Plan (Action Plan & Priorities)

**Identified in North Santiam Watershed Drought Contingency Plan (Priority Drought Mitigation Actions)

***Identified in Mid-Willamette Valley Council of Governments Comprehensive Economic Development Study (Appendix C)

-LONG TERM-

Action Item	Proposed Action Title	Coordinating Organization	Partner Organizations	Timeline	Alignment with Plan Goals						
					Public Awareness	Education	Risk Reduction	Funding and Implementation	Partnerships and Coordination	Natural Resource Utilization	Plan Integration
Drought #1	Monitor economic impacts on recreation, tourism and agriculture communities.	Idanha, Marion County Emergency Management	Community Services	Long Term	X	X	X	X	X		X
Drought #2	Collaborate with NSWC to complete WMCP's and improve community understanding of water usage and opportunities to increase efficiencies.**	NSWC, Idanha	North Santiam Watershed DCP Partners	Long Term		X	X		X		X
Drought #3	Conduct leak detection surveys for the water system to increase efficiency and prevent further water loss.**	Idanha, Marion County Public Works	NSWC	Long Term			X		X	X	

Action Item	Proposed Action Title	Coordinating Organization	Partner Organizations	Timeline	Alignment with Plan Goals						
					Public Awareness	Education	Risk Reduction	Funding and Implementation	Partnerships and Coordination	Natural Resource Utilization	Plan Integration
Drought #4	Develop water storage tanks to hold treated water for municipal use.	Idanha, Marion County Public Works	NSWC, Marion County Emergency Management	Long Term			X	X	X	X	
Multi-Hazard #7	Collaborate with local residents and NSWC to mitigate risks from the Idanha revetment/floodplain project.	Idanha, NSWC	USFS, FEMA, NRCS, Marion County Emergency Management		X		X	X	X	X	
Multi-Hazard #8	Conduct a fatigue test on Church St. bridge to ensure its structural integrity in case of a hazard event	Idanha, Marion County Public Works	Marion County Emergency Management				X	X	X		
Multi-Hazard #9	Designate evacuation routes outside of Hwy 22 for EMS.	Idanha, Marion County Emergency Management	RFPD	Long Term			X		X		
Multi-Hazard #10	Collaborate with Marion County to connect to a more resilient regional water/sewer system.***	Marion County Community Services Department/Board of Commissioners, Idanha	Marion County Emergency Management	Long Term			X	X	X		X
Multi-Hazard #11	Gather community support for the installation of resilient fiber communication infrastructure throughout the community.***	Idanha	Marion County Community Services Department/Board of Commissioners	Long Term	X		X		X		X

Action Item	Proposed Action Title	Coordinating Organization	Partner Organizations	Timeline	Alignment with Plan Goals						
					Public Awareness	Education	Risk Reduction	Funding and Implementation	Partnerships and Coordination	Natural Resource Utilization	Plan Integration
Wildfire #1	Collaborate with Detroit Ranger District, ODF, and BLM to conduct fuel hazard reduction along the Wildland Urban interface and Hwy 22.*	ODF, BLM, Idanha Ranger District, Idanha RFD	Marion County Emergency Management	Long Term			X		X		X
Wildfire #2	Collaborate with ODF and Idanha-Detroit RFD to develop strategic community fuel breaks.*	ODF, BLM, Idanha Ranger District, Idanha-Detroit RFD	Marion County Emergency Management	Long Term			X		X		X
Landslide #1	Integrate new DOGAMI landslide hazard information into land use zoning/development codes.	Idanha	Environmental Services, Engineering, ODOT, DLCD	Long Term			X				X
Flood #1	Widen the North Santiam River and reassess the dike and jetty to minimize flooding within the North Santiam River Project	Idanha, NSWC	Marion County Emergency Management	Long Term			X		X	X	

Plan Implementation and Maintenance

The City Council will be responsible for adopting the City of Idanha addendum to the Marion County NHMP. This addendum designates a coordinating body and a convener to oversee the development and implementation of action items. Because the city addendum is part of the county's multi-jurisdictional NHMP, the city will look for opportunities to partner with the county. The city's steering committee will convene after re-adoption of the City of Idanha addendum on a semi-annual schedule; the county is also meeting on a semi-annual basis and will provide opportunities for the cities to report on NHMP implementation and maintenance during their meetings. The City Recorder will serve as the convener and will be responsible for assembling the steering committee (coordinating body). The steering committee will be responsible for identifying new risk assessment data, reviewing status of mitigation actions, identifying new actions, and seeking funding to implement the city's mitigation strategy (actions). The convener will also remain active in the county's implementation and maintenance process.

Implementation through Existing Programs

Many of the NHMP's recommendations are consistent with the goals and objectives of the city's existing plans and policies. Where possible, the City of Idanha will implement the NHMP's recommended actions through existing plans and policies. Plans and policies already in existence have support from local residents, businesses, and policy makers. Many land-use, comprehensive, and strategic plans get updated regularly, allowing them to adapt to changing conditions and needs. Implementing the NHMP's action items through such plans and policies increases their likelihood of being supported and implemented.

Idanha 's acknowledged comprehensive plan is the Idanha Comprehensive Plan. The Oregon Land Conservation and Development Commission first acknowledged the plan in XXX. The City last completed a major update of the plan in XXX. The City implements the plan through regulatory ordinances.

Idanha currently has the following plans that relate to natural hazard mitigation. For a complete list visit the city website for planning and Public works:

- Comprehensive Plan
- Development Code
- Transportation System Plan

Continued Public Participation

Keeping the public informed of the city's efforts to reduce the city's risk to future natural hazards events is important for successful plan implementation and maintenance. The city is committed to involving the public in the plan review and updated process. This includes:

- Annual briefings to city council
- Articles and information in The Canyon Weekly
- Postings and media on social media/website.

Plan Maintenance

The Marion County Multi-Jurisdictional Natural Hazards Mitigation Plan and city addendum will be updated every five years in accordance with the update schedule outlined in the Disaster Mitigation Act of 2000. During the county plan update process, the city will also review and update its addendum. The convener will be responsible for convening the steering committee to address the questions outlined below.

- Are there new partners that should be brought to the table?
- Are there new local, regional, state, or federal policies influencing natural hazards that should be addressed?
- Has the community successfully implemented any mitigation activities since the plan was last updated?
- Have new issues or problems related to hazards been identified in the community?
- Are the actions still appropriate given current resources?
- Have there been any changes in development patterns that could influence the effects of hazards?
- Have there been any significant changes in the community's demographics that could influence the effects of hazards?
- Are there new studies or data available that would enhance the risk assessment?
- Has the community been affected by any disasters? Did the plan accurately address the impacts of this event?

These questions will help the steering committee determine what components of the mitigation plan need updating. The steering committee will be responsible for updating any deficiencies found in the plan.

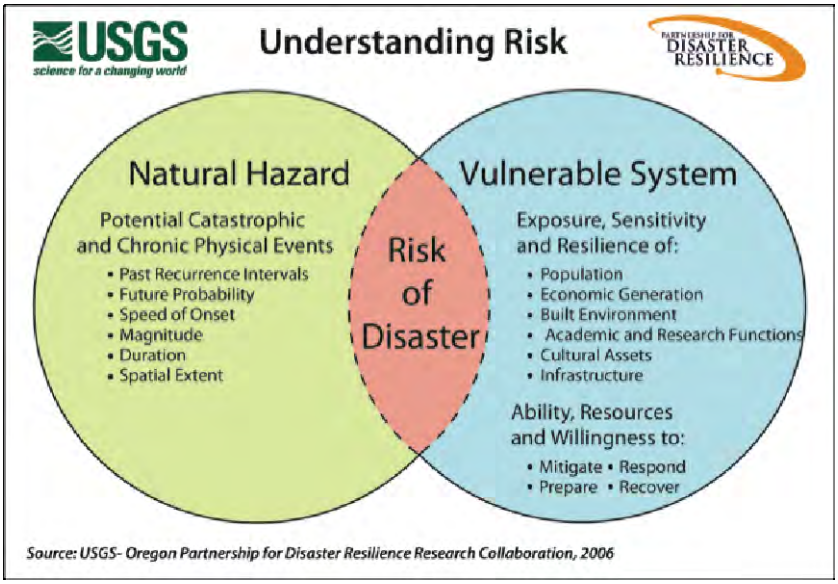
Risk Assessment

This section of the NHMP addendum addresses 44 CFR 201.6(b)(2) - Risk Assessment. In addition, this chapter can serve as the factual basis for addressing Oregon Statewide Planning Goal 7 – Areas Subject to Natural Hazards. Assessing natural hazard risk has three phases:

- **Phase 1:** Identify hazards that can impact the jurisdiction. This includes an evaluation of potential hazard impacts – type, location, extent, etc.
- **Phase 2:** Identify important community assets and system vulnerabilities. Example vulnerabilities include people, businesses, homes, roads, historic places and drinking water sources.
- **Phase 3:** Evaluate the extent to which the identified hazards overlap with, or have an impact on, the important assets identified by the community.

The local level rationale for the identified mitigation strategies (action items) is presented herein. The risk assessment process is graphically depicted in (Figure B-1) below. Ultimately, the goal of hazard mitigation is to reduce the area of risk, where hazards overlap vulnerable systems.

(Figure B-1) Understanding Risk



Hazard Analysis Methodology

This NHMP utilizes a Threat Hazard Identification and Risk Assessment methodology that is consistent with the Marion County Multi Jurisdictional Hazard Mitigation Plan. Mill City developed this assessment from historical data of events that have occurred in Marion County. The assessment uses the calculated priority risk index (CPRI) methodology to specifically examine:

1. Probability (frequency) of event
2. Magnitude of event
3. Expected warning time before event
4. Expected duration of event

Table (A-3) below shows the scoring values for each ranking category.

Table (A-3) Risk Assessment Hazard Ranking Scoring Values

Score	Probability	Warning Time	Magnitude/Severity	Duration
4	Highly Likely	Less than 6 hours	Catastrophic	More than 1 week
3	Likely	6-12 hours	Critical	Less than 1 week
2	Possible	12-24 hours	Limited	Less than 1 day
1	Unlikely	24+ hours	Negligible	Less than 6 hours

Source: Marion County Emergency Management; BOLD Planning

Hazard Analysis

For emergency management planning purposes, this critical analysis is an assessment of the consequences of each hazard, including potential areas of impact, population exposed and impacted, duration of the hazard, and potential economic consequences. These rankings utilize the criteria laid out in THIRA to weigh them proportionally between historic data as well as future projections based on economic, demographic, the critical infrastructure information.

These rankings were reviewed and revised by steering committee members to reflect specific community attributes and risks.

(Table A-4) Probability and Vulnerability Comparison

Hazard Profile Summary for Emergency Operations Plan						
Hazard	Probability	Magnitude	Warning Time	Duration	CPRI	Planning Significance
Earthquake	4	4	4	4	4.00	**High**
Severe Weather/Storm	4	4	2	3.5	3.65	**High**
Power Failure	3	4	3.5	3	3.38	**High**
Wildland Interface Fire	3.5	3.5	2	3	3.23	**High**
Transportation Accident/Train Derailment	3	3.5	1	3	2.85	**Moderate**
Drought	3.5	2	1	4	2.73	**Moderate**
Extreme Weather - High Temperature	3.5	2	1	4	2.73	**Moderate**
School & Workplace Violence	1.5	4	4	2	2.68	**Moderate**
Epidemic	2	4	1	4	2.65	**Moderate**
Pandemic	2	4	1	4	2.65	**Moderate**
Landslide	2	2.5	4	2.5	2.50	**Moderate**
Animal Disease Outbreak	2	3	2	4	2.50	**Moderate**
Volcanic Eruption	1	4	1	4	2.20	**Moderate**
Hazardous Materials Incident	1.5	3.5	1	3	2.18	**Moderate**
Biological Chemical, Sabotage and Cyber Incident and Explosives Radiological Attack-Terrorism	1	4	1	3	2.10	**Moderate**
Civil Disorder / Terrorism	1	2	4	3	1.95	**Low**
Radiological Release	1	2	4	3	1.95	**Low**
Dam or Levee Failure	1	1	4	4	1.75	**Low**
Flood	1	2	2	2	1.55	**Low**
Tornado	1	1	1	1	1.00	**Low**

Source: Gates NHMP Steering Committee and Marion County NHMP Steering Committee, 2016.

Hazard Characteristics

Drought

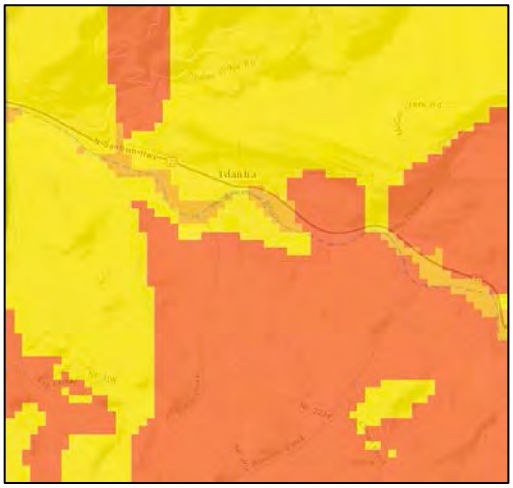
The steering committee determined that the city's probability for drought is **moderate** and their vulnerability to drought is **moderate**.

Although dryer conditions in the summer months have impacted the North Santiam Canyon as a whole, Idanha has experienced major impacts from drought. Idanha's economy relies heavily upon the recreation provided by the water levels of Detroit Lake, which can experience low levels during years of major drought.

Dry conditions throughout 2001 caused Detroit Lake water levels to recede below 1,546 feet (min. elev. for moorage), contributing to a Detroit area (including Idanha) economic loss of over $5 million dollars.[1] Recently during the 2015 drought, similar economic impacts were experienced with additional damage caused by tree and vegetation die off which has created an increased risk of wildfire hazards. If dryer conditions become the new norm, Idanha could experience timber die-off, making them more susceptible to wildfires, as well as economic hardships if their current seasonal economy does not expand.

Earthquake

The steering committee determined that the city's probability for a Cascadia Subduction Zone (CSZ) Earthquake event is **high** and that their vulnerability to this event is **moderate**. The steering committee determined that the city's probability for a Crustal Earthquake event is **moderate** and that their vulnerability to this event is **moderate**.



Historically, Idanha has experienced one crustal earthquake on August 19, 1961. A 4.5 magnitude earthquake struck 6 miles from Mill City, with shaking felt throughout the Santiam Canyon, up to Idanha.

If another larger and more substantial earthquake occurs (Cascadia), Idanha could experience damage to buildings, utility (electric power, communication, water, wastewater, and natural gas) and transportation systems (bridges and pipelines).

Flood

The steering committee determined that the city's probability for flooding is **low** and that their vulnerability to flooding is **low**.

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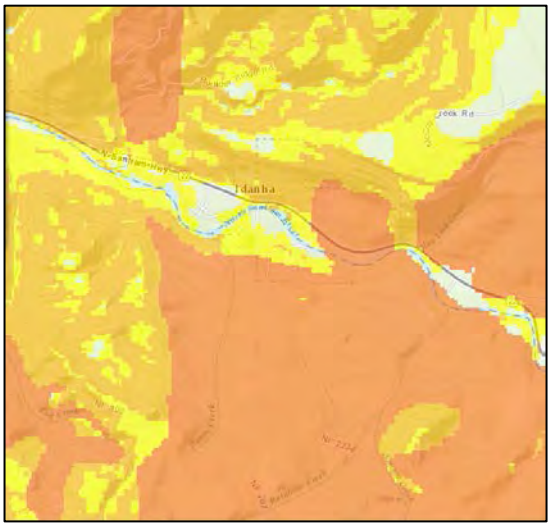
[1] http://agsci.oregonstate.edu/sites/agsci.oregonstate.edu/files/ruralstudies/pub/pdf/detroitlake-sr1071.pdf (Table 5)

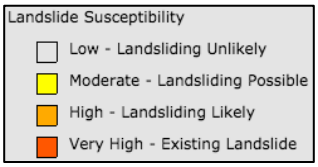
Historically, Idanha experienced one major flooding event in 2006. Heavy rains and high winds created a multitude of damage in the Detroit, Idanha, and Breitenbush area. Impacts included roofing damage, flooding of public facilities, sinkholes, erosion, and water facility intake-clogging due to turbidity.



Landslide

The steering committee determined that the city's probability for landslide is **moderate** and that their vulnerability to landslide is **moderate**.

Historically, Idanha has not experienced major impacts from landslides within city limits. Areas in the east and northern portion of the city are susceptible because of steep mountainous terrain.

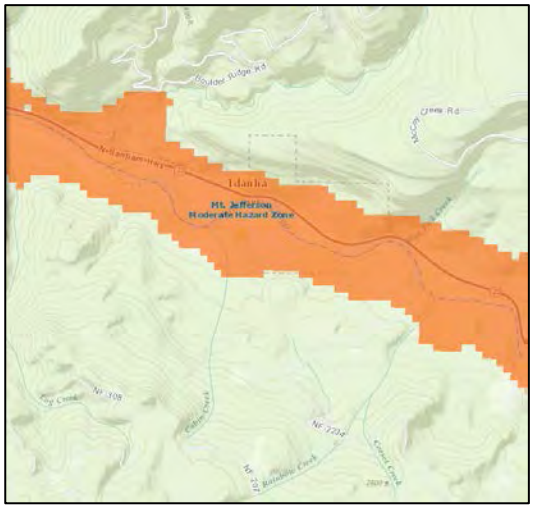


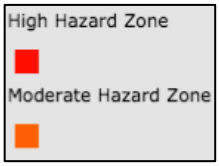
Potential landslide-related impacts are adequately described within the county's plan, and include infrastructural damages, economic impacts (due to isolation and/or arterial road closures), property damages, and obstruction to evacuation routes. Rain-induced landslides and debris flows can potentially occur during any winter in Marion County, with evacuation routes beyond city limits susceptible to obstruction as well.

Volcano

The steering committee determined that the city's probability for volcanic event is **low** and that their vulnerability to volcanic event is **moderate**.

Idanha has not been impacted previously by volcanic activity, however Mount Jefferson is located east of the city into the Cascade Mountains, and could produce problems if an eruption occurs. The city sits in the Mount Jefferson Moderate Hazard Zone and could experience ash fall, debris avalanches, pyroclastic flows, lahars and slow-moving lava flows. City residents should be evacuated before an eruption begins in case of impassible roads and dangerous conditions.





Wildfire

The steering committee determined that the city's probability for wildfire is **high** and that their vulnerability to wildfire is **high**.

In 2001 the "Breitenbush fire" threatened city residents creating road closures and hazardous conditions. In 2002 and 2004, Idanha was impacted by wildfire's which caused closure of Hwy 22. This impacted local residents, restricting travel, and negatively impacting the local economy. In 2011, the "Nasty Fire" threatened the Opal Creek Wilderness, while the 2014 "Bingham Complex Fire" restricted travel and required Detroit Ranger Station response.

Idanha could experience more fires as dryer conditions occur in the North Santiam Canyon. Less rainfall and snowpack can kill of tree's dependent on large amounts of water, which could ultimately lead to an increase of fuels and wild fire ignition probability.

Marion County updated the Community Wildfire Protection Plan (CWPP) in 2016, which mapped wild land urban interface areas and developed actions to mitigate wildfire risk. The city is a participant in the CWPP, and has included hazard mitigation action items directly in line with the CWPP actions.

Windstorm

The steering committee determined that the city's probability for windstorms is **high** and that their vulnerability to windstorms is **high**.

In April of 1931, winds in the Santiam Canyon region felled hundreds of trees causing road closures between Mill City and Idanha. The winds also caused several devastating fires throughout the Santiam Canyon. On December of 1995, high wind gusts of up to 60mph downed tree's and disrupted power and communication services in the lower Santiam. In 2002, a windstorm caused similar damages, blowing down tree's onto roads and power lines.

About once or twice per year the city will experience a windstorm event that can interrupt services, down trees, and cause power outages. Because windstorms typically occur during winter months, they are sometimes accompanied by ice, freezing rain, flooding, and very rarely, snow.

Winter Storm (Snow/Ice)

The steering committee determined that the city's probability for winter storm is **moderate** and that their vulnerability to winter storm is **high**.

Major winter storms have occurred in the Idanha area; in January of 1937, heavy snowfall of over 2 feet caused property damage. Major roads were closed and residents of Detroit/Idanha area were stranded for five days as heavy snow and a landslide blocked Hwy 22. In 1950, a large snow event caused 54 inches of snow in Detroit/Idanha area, while 122 inches blanketed Detroit Dam. In January of 1957, Cold temperatures brought over half a foot of snow to Idanha, as well as icy roads throughout the Santiam Canyon. Cold temperatures also caused the Bonneville Power Authority to cut interruptible power to the regions' industrial customers because ice behind the dam slowed water flow and limited the ability to generate power.[2] In January of 1963, Idanha recorded almost a foot, while cold temperatures created hazardous road

[2] http://www.co.marion.or.us/PW/EmergencyManagement/Documents/14_severewinterstorm.pdf

conditions.[3] In 1964, a flood impacted 21 houses, and 2 bridges, while a winter storm in 1990 resulted in downed tree's and a loss of power.

During the last couple days of December 2003, the Detroit/Idanha area received an accumulation of 4-5 feet of snow. Both cities declared a State of Emergency as the City of Idanha lost power between December 29th and January 6th; Idanha lost power between January 1st and January 4th. In early 2008, Idanha received over 12 feet of snow in a two-month period. Three dozen Oregon National Guard personnel were called in to help with snow removal. Damage included collapsed roofs and cracked walls, mostly impacting homeowners.[4]

In 2012, a winter storm event accompanied by flooding, landslides, and mudslides left Santiam Canyon residents with no electricity for 3-5 days. Downed trees and power lines obstructed Hwy 22, requiring emergency vehicles to restore regular traffic flows.[5]

Winter storms are more frequent hazards and usually cause transportation issues and communication failures from downed trees and icy/snow filled roads.

Community Asset Identification

This section provides information on city specific assets. Many of these community characteristics can affect how natural hazards impact communities and how communities choose to plan for natural hazard mitigation. Considering the city specific assets during the planning process can assist in identifying appropriate measures for natural hazard mitigation.

Community Characteristics

Idanha is located approximately 57 miles east of Salem, bordering the North Santiam River. It is the smallest community in the North Santiam River Canyon with a population of 136. With an elevation of 1718 feet, the climate of Idanha is moderate; the average monthly temperatures range from 50 – 80 degrees in July and August, and 29-41 degrees in December and January. Idanha receives approximately 66 inches of rain and 35 inches of snow each year. The city's topography is relatively flat with steep slopes surrounding the area along Hwy 22.

Economy

Idanha benefits from its location along Hwy 22, a major east-to-west transportation route connecting Salem to Bend. But due to its small population size and lack of development, the city lacks many commercial amenities. The city has one retail storefront along Hwy 22, but most of the manufacturing and timber related employment has left the city. Historically, Idanha prospered from the development of the railroad and dam, which helped spur growth in

[3] http://www.co.marion.or.us/PW/EmergencyManagement/Documents/14_severewinterstorm.pdf

[4] http://www.co.marion.or.us/PW/EmergencyManagement/Documents/14_severewinterstorm.pdf

[5] http://www.fema.gov/media-library-data/20130726-1831-250457682/dhs_ocfo_pda_report_fema_4055_dr_or.pdf

manufacturing, logging, and fishing. Today, the economy relies upon the recreational opportunities available through state/federal lands, and the North Santiam River.

Critical and Important Facilities/Infrastructure

Communication/Information Technology

There is currently one communication provider in Idanha. Frontier provides phone service, and various satellite businesses provide broadband speed internet.

Strengths:

- Most residents utilize scanners or citizen band (CB) radio's.
- A phone substation is located in nearby Detroit.

Weaknesses:

- Limited internet speeds and provider access.
- Poor phone services and reception.
- Main communication line runs down highway 22, and is susceptible to from trees and wind.

Water

The City of Idanha has two water sources from the Chittum Creek, and Mud Puppy Creek fed by a natural spring named rainbow creek. This system currently utilizes a surface water intake to pull water from these sources. The city also contains dike and jetty infrastructure along the North Santiam River, however the town is still vulnerable due to the geographic topography of the river.

Waste Water

Idanha does not have any municipal waste-water infrastructure. The city's residents and business owners rely on individual septic tanks. These septic tanks can be up to 60-years old and could be leaching biohazardous waste into the ground water/ North Santiam River. The city recently conducted tests (10-15 years ago) and found no leaching or hazardous material issues.

Dams

Two dams sit below Idanha, *Detroit Dam* and *Big Cliff Dam.* Previous steering committees have concluded that the likelihood of Dam Failure is ***Low***[6]***.*** Current conditions still represent the previous decision. If Dam failure occurred in either dams, Idanha would most likely lose access to the western portion of Hwy 22.

6 http://www.co.marion.or.us/PW/EmergencyManagement/Documents/6_damfailure.pdf

Strengths:

- (2) water intake sources (Chittum & Mud Puppy Creek).
- (1) backup diesel generator on-site, near water intake sources.

Weaknesses:

- Limited diesel fuel available inside of city limits.
- Water intake sources are susceptible to wildfire damage.
- The city is losing large amounts of water distributed through leaky pipes.

Transportation Systems

Oregon Route 22 is the major transportation route for auto, public transit, and emergency vehicle access throughout the Santiam Canyon. Hwy 22 spans about 57 miles west, connecting Idanha to Salem and the remainder of the Willamette Valley. To the east, the highway connects Idanha to the Santiam Pass interchange.

The Cherriots Canyon Connector is the only existing public transit service in the entire Santiam Canyon. This route has three total round trips with buses running approximately every (5) hours. Idanha residents are forced to drive to Gates to utilize these services, as the canyon connector does not reach Detroit or Idanha.

In case of a major Oregon Route 22 closure, Idanha residents will have to rely on alternate routes to reach supplies or safety. The cities alternate routes are limited with NF-2231, NF-2233, and NF-2234. Depending on weather conditions, these roads may be unpassable.

The city is home to one bridge that crosses over the North Santiam River. Water lines that serve the population in "New Idanha" are co-located on this bridge. Bridge failure could disrupt water services to these residents.

Bridges

Structure Name	Year Built	Structural Condition
Church St. Bridge	n/a	Fair

Strengths:

- Proximity to ODOT facility may increase access to public works services.
- The Idanha-Detroit RFD location is in city limits and could be utilized in a hazard event.
- National Forest Roads exist outside of Idanha and could be utilized as emergency evacuation routes.

Weaknesses:

- Loss of Church St. bridge would isolate a large percentage of Idanha residents.
- Loss of Church St. bridge could disrupt drinking water services.
- Alternate routes are long, and most likely impassible in winter months.
- Hwy 22 closures could make travel outside of North Santiam Canyon extremely difficult.
- Public transportation options are limited and only reach to the city of Gates.
- The lack of a pedestrian sidewalk along Hwy 22 created safety hazards for pedestrians.

Energy & Utilities

Idanha receives energy and utility services from Consumer Power Inc. There are no substations located in Idanha. One main power line runs along Hwy 22, connecting to Detroit, Gates and Mill City.

Strengths:

- Many residents have their own generators and are able to power basic home amenities during power outages.
- Most residents utilize firewood as a heating source, making them more resilient in case of a power outage.

Weaknesses:

- No fueling stations exist within city limits.
- Nearby gas stations in Detroit do not currently possess backup diesel generators to pump fuel from storage tanks.
- No alternate sources of energy (wind, solar) exist to power basic services.
- Downed power lines are a reoccurring issue around Hoover Campground (Santiam Park).
- Power lines are co-located on the bridge
- Residents rely on wood burning stoves for heat.

Agriculture and Food

Although Idanha possesses the "Idanha County Store" the closest large-scale grocery exists down Hwy 22 in Stayton, Oregon. The loss of Hwy 22 as a transportation route would cause serious concern for residents and food accessibility. The city is surrounded by steep slopes that are state and federal land. There is no agricultural capability other than small-scale "urban" farms within city limits.

Strengths:

- Country store within city limits provides limited amenities and food supplies.
- Many residents have food storage already in place because of the lack of availability.

Weaknesses:

- No major (full service) grocery store inside of city limits.
- Surrounding land not suitable for agricultural purposes.

Banking and finance

Idanha's nearest option for banking services is located in Mill City. This one-story structure sits along Hwy 22 and could be utilized for emergency financial services during a hazard event. Idanha does not have any financial services within city-limits.

Strengths:

- Cash flow from nearby business and residents could possibly be utilized.

Weaknesses:

- Lack of banking/financing institutions within city limits.
- Full "urban" financial services unavailable.

Hazardous Materials

The city's history of manufacturing and logging activities have created concerns around hazardous materials found on abandoned lots. Although only one lot has been identified as a brownfield, many lots contain underground storage tanks that most likely need to be removed for any further development to occur. These tanks could be leeching hazardous materials previously used by local businesses.

Brownfields

DEQ ID	Facility Name	Location
2479	Green Veneer & Lumber Mill (assessment recommended)	886 Hwy 22

Strengths:

- There are currently not enough known hazardous materials to cause major concern.
- Brownfield sites could be utilized and attract privates sector development.

Weaknesses:

- Current brownfields maybe susceptible to leaching of unknown materials.
- Many lots still contain underground storage tanks that are even more susceptible to leaching of hazardous materials.

Emergency Services

Idanha receives emergency service support from the Idanha-Detroit Rural Fire Protection District.

- Idanha-Idanha Rural Fire Protection District, 107 Hwy 22 NW

Strengths:

- Idanha possesses emergency services provided by the Idanha-Detroit RFD within city limits.

Weaknesses:

- Idanha lacks any police or medical services.
- Ambulance services must travel from Lyons.
- First responders are very limited to basic life monitoring services.
- Emergency services do not have trained HAM radio operators.

Government Facilities

Idanha City Hall contains the office space for all city services.

- Idanha City Hall, 111 Hwy 22
- Post Office, 103 Hwy 22

Strengths:

- City Hall facility has bathrooms, and could be utilized in an emergency event.

Weaknesses:

- City Hall is small with space already utilized by other services.
- The building lacks any backup generator to power the facility.

Environmental/Historical Preservation Sites

Idanha is surrounded by environmental preservation sites including federal land, state parks and designated wilderness areas. The city is also home to the beginning of the Oregon Pacific Railroad Linear Historic District. Designated in 1999 this 20-mile section of old railroad connects Idanha to the Cascade Range Summit.

Strengths:

- Proximity to pristine state and federal land could attract residents or business.
- Oregon Pacific Railroad Linear Historic District could be utilized to as an emergency trail system.

Weaknesses:

- Idanha lacks any buildings with character that exemplify the historical “timber” identity in the community.

Education

Idanha is part of the Santiam School District. This district encompasses all cities in the Santiam Canyon including Mill City, Gates, and Detroit. This district includes the Santiam Elementary School, and the Santiam Jr/Sr High School.

- Santiam School District
    - Santiam Elementary School, 450 SW Evergreen St.
    - Santiam Jr/Sr High School, 265 SW Evergreen St.

Strengths:

- School facilities could be utilized to shelter a large amount of community residents including functional needs populations.

- School facilities already possess needed infrastructure for a shelter which includes restrooms, showers and a kitchen.
- School buses could be utilized for transportation after a hazard event.

Weaknesses:

- Idanha is over 25 miles from these school services.
- There are no current agreements or MOU's between the city and school district to utilize facilities after a hazard event.

Healthcare & Public Health

Idanha's nearest medical services are located in Mill City which possesses one clinic with limited services. The nearest hospital and full service health clinic is located in Stayton, Oregon.

- Santiam Medical Clinic, 280 S 1st Ave.

Strengths:

- A clinic with minor services exists within the North Santiam Canyon

Weaknesses:

- Closest health services are located over 20 miles.
- No facilities with major life-saving equipment currently exist within city limits.
- Emergency health supplies are limited to what exists within the community.

Access and Functional Needs

Idanha's vulnerable population consists of the elderly and those that are medically dependent and require life safety equipment. About 22% of Idanha's population is characterized as being elderly, and one legally blind resident resides within city limits.

Strengths:

- Over 55% of residents are over the age of 45, this older populous can volunteer and promote social cohesion in the community.

Weaknesses:

- Full medical services do not exist nearby for aging population.

CITY OF KEIZER ADDENDUM

Purpose

This document serves as the City of Keizer's Addendum to the Marion County Multi-Jurisdictional Hazards Mitigation Plan (MHMP, HMP). This addendum supplements information contained in Volume I (Basic Plan) of this HMP. The Basic Plan serves as the foundation for this jurisdiction's addendum. Volume III (Appendices) provides additional information (particularly regarding participation and mitigation strategy). This addendum meets the following requirements:

- Multi-jurisdictional **Plan Adoption** §201.6(c)(5),
- Multi-jurisdictional **Participation** §201.6(a)(3),
- Multi-jurisdictional **Mitigation Strategy** §201.6(c)(3)(iv), and
- Multi-Jurisdictional **Risk Assessment** §201.6(c)(2)(iii).

Plan Process, Participation, and Adoption

This section of the HMP addendum addresses 44 CFR 201.6(c)(5), *Plan Adoption*, and 44 CFR 201.6(a)(3), *Participation.*

In the summer and fall of 2016, the Oregon Partnership for Disaster Resilience (OPDR) at the University of Oregon's Community Service Center (CSC) partnered with the Oregon Military Department's Office of Emergency Management (OEM), and Marion County cities, including Keizer, to update their addendum to the Marion County HMP, which expired July 8, 2016. This project is funded through the Federal Emergency Management Agency's (FEMA) FY14 Pre-Disaster Mitigation Competitive Grant Program (PDMC-PL-10-OR-2014-002).

By developing this addendum to the Marion County HMP, locally adopting it, and having it approved by FEMA, the City of Keizer will regain eligibility for FEMA Hazard Mitigation, Pre-Disaster Mitigation, and Flood Mitigation Assistance grant program funds.

The Marion County HMP, and Keizer addendum, are the result of a collaborative effort between citizens, public agencies, non-profit organizations, the private sector, and regional organizations. A project steering committee guided the process of developing the plan. For more information on the composition of the steering committee see the *Acknowledgements*, *Plan Summary*, and *Plan Process* (Volume III, Appendix B).

The Keizer Emergency Manager/Public Works Director is the designated local convener of this addendum. The Convener will take the lead in implementing, maintaining, and updating the addendum to the HMP in collaboration with Marion County Emergency Management.

Representatives from the City of Keizer steering committee met formally on one occasion: September 29, 2016 (see Appendix B for more information).

The city's addendum reflects decisions decided upon at the plan update meeting and during subsequent work and communication with OPDR.

The City of Keizer Steering Committee is comprised of representatives from the following departments:

- Convener, Keizer Emergency Manager/Public Works Director
- Police
- Planning/Community Development
- Public Works:
    - Water Division
    - Project Manager
    - Public Works Technician
    - Environmental and Technical Division
- Marion County Emergency Management (as needed)
- Keizer Fire District
- Marion County Fire District 1
- Salem-Keizer School District
- Chamber of Commerce (as needed)

Keizer used multiple approaches to engage the public. First, the City established steering committee representatives from across the city. Next, the City actively participated in countywide community engagement activities described in Volume I, Section 4 and in Appendix B. City staff also presented the draft plan to the City Council during an open public council session. The Steering Committee was closely involved throughout the development of the plan and served as the local oversight body for the plan's development. In addition, community members outside of the steering committee were provided an opportunity for comment via the plan review process (see Appendix B for more information).

The Marion County HMP was approved by FEMA on [Month] [Day], 2017 and the Keizer addendum was adopted via resolution on [Month] [Day], 2017. This HMP is effective through [Month] [Day], 2022.

Mitigation Strategy

This section of the HMP addendum addresses 44 CFR 201.6(c)(3(iv), *Mitigation Strategy*.

During the 2016 Marion County and Keizer update process, OPDR and a representative from Marion County Emergency Management assisted the steering committee with developing mitigations that will meet Keizer's unique situation. The proposed actions were then re-reviewed by the steering committee to finalize. Keizer developed a list of priority actions (Appendix A-1), any actions that were not prioritized were placed in the Action Item Pool (Appendix A-2) and will be considered during the annual meetings. For a status update on each of Keizer's 2009 mitigation actions, see Appendix A-2.

Priority Actions

The City is listing a set of high priority actions in an effort to focus attention on an achievable set of high leverage activities over the next five-years. The City's priority actions are listed in Table KZ-1 on the following pages.

Action Item Pool

Table KZ-2 on the following pages presents a pool of mitigation actions. This expanded list of actions is available for local consideration as resources, capacity, technical expertise and/or political will become available.

Table KZ-1. Keizer Priority Action Items

Action Item ID	Hazard	Action Item	Coordinating Organization	Partner Organizations	Timeline
Priority Actions					
P-1	Earthquake	Work with Cities of Salem and Turner to perform siesmic evaluation of wastewater transmission infrastructure and impact on drinking water supply.	City of Keizer Public Works	City of Turner; City of Salem	Short Term (1-2 years)
P-2	Earthquake	Conduct seismic evaluation of Keizer's drinking water well field.	City of Keizer Public Works		Mid Term (3-5 years)
P-3	Earthquake	Conduct seismic evaluation of Chemawa, Dearborn, and Alder Street bridges over Claggett Creek	City of Keizer Public Works		Short Term (1-2 years)
P-4	Earthquake	Assess the feasibility and cost to seismically retrofit Keizer's public works facilities (City shops).	City of Keizer Public Works		Long Term (5 years)

Source: City of Keizer HMP Steering Committee, 2016.

Table KZ-2. Keizer Action Item Pool

Action Item ID	Hazard	Action Item	Coordinating Organization	Partner Organizations	Timeline
Action Item Pool					
Multi-Hazard					
MH-1	Multi-Hazard	Create an emergency preparedness section on the City's website. Populate with resources and publicize.	Keizer Administration	Marion Co.	Ongoing
MH-2	Multi-Hazard	Maintain a regular presence at outreach events, especially neighborhood association events, and provide the public with preparedness resources.	Keizer Emergency Management	Marion Co., CERT	Ongoing
MH-3	Multi-Hazard	Make guest appearance on local radio shows to provide announcements and resources for preparedness.	Keizer Emergency Management	Marion Co., CERT	Ongoing
MH-4	Multi-Hazard	Add hazard awareness material into existing environmental education currently done in schools.	City of Keizer	Marion Co., CERT	Ongoing
MH-5	Multi-Hazard	Join Marion County's Everbridge communication system.	City emergency responders	Marion Co., CERT	Short Term (1-2 years)
MH-6	Multi-Hazard	Encourage residents to participate in Everbridge.	Keizer Emergency Management	City Council	Mid Term (3-5 years)
MH-7	Multi-Hazard	Meet with the City of Salem to discuss the Willow Lake Waste Water Treatment Plant: *How it can be reinforced to minimize damage in a hazard event. *How hazardous materials can be secured or removed to prevent groundwater contamination	City of Keizer Public Works	City of Salem	Short Term (1-2 years)
MH-8	Multi-Hazard	Further develop risk assessment maps to show areas at risk for all hazards.	FEMA Risk MAP	DOGAMI, DLCD	Short Term (1-2 years)
MH-9	Multi-Hazard	Develop mutual aid agreements with surrounding counties.	City Administration	Emergency Manager, Public Works	Short Term (1-2 years)
MH-10	Multi-Hazard	Expand on the information gathered for the internal public works operational manual to create a full registry of populations that may need particular assistance in an emergency situation.	Public Works	Emergency Manager	Mid Term (3-5 years)
MH-11	Multi-Hazard	Update the Continuity of Operations Plan.	Keizer Emergency Management	Marion Co.	Short Term (1-2 years)
MH-12	Multi-Hazard	Participate in Marion County's post-disaster recovery planning efforts.	City Administration	Marion Co.	Mid Term (3-5 years)
MH-13	Multi-Hazard	Continue development of CERT teams to ease the load on emergency services following a disaster.	Keizer Emergency Management	CERT	Ongoing
MH-14	Multi-Hazard	Develop memoranda of understanding with appropriate facilities specifying that they will function as emergency shelters during disruptive events with support from the City.	Keizer Emergency Management	Red Cross	Short Term (1-2 years)
MH-15	Multi-Hazard	Educate businesses and governmental organizations about the importance of developing continuity of operations plans.	Environmental	Marion Co.	Ongoing
MH-16	Multi-Hazard	Update the Keizer Comprehensive Plan to reflect statewide land use Goal 7 language surrounding natural hazards.	Planning	DLCD	Mid Term (3-5 years)

Source: City of Keizer HMP Steering Committee, 2016.

Table KZ-2. Keizer Action Item Pool (Continued)

Action Item ID	Hazard	Action Item	Coordinating Organization	Partner Organizations	Timeline
Action Item Pool					
Earthquake					
EQ-1	Earthquake	Participate in the Great Shakeout each year.	City Administration	OEM	Ongoing
EQ-2	Earthquake	School seismic retrofitting action - need to talk to school district representative.	School District	Business Oregon - IFA	Short Term (1-2 years)
EQ-3	Earthquake	Send city employees to the County's ATC 20 training.	Public Works	City Administration, Emergency Management	Ongoing
EQ-4	Earthquake	Perform a seismic analysis of box culverts in Keizer and repair or upgrade as resources become available.	City of Keizer Public Works	Marion Co. DOT	Mid Term (3-5 years)
EQ-5	Earthquake	Encourage residents to prepare and maintain 2-week survival kits.	Keizer Emergency Management	CERT	Ongoing
Flood					
FL-1	Flood	Continue compliance with the National Flood Insurance Program through the enforcement of local floodplain ordinances. Update enforcement based on changes to the NFIP (such as flood elevation level changes).	Planning	DLCD	Ongoing
FL-2	Flood	Improve water quality and water flow through wetland vegetation restoration and stream cleanup, especially along Claggett Creek.	Environmental	Salem-Keizer Urban Watershed Councils, Association	Ongoing
FL-3	Flood	Educate residents and business owners near Labish and Clagget creeks about how to manage flood risks.	Environmental	Salem-Keizer Urban Watershed Councils, Association	Ongoing
Wind Storm					
WS-1	Wind Storm	Educate the public about windstorm-resistant trees and landscaping practices and the role of proper tree pruning and care in preventing damage during windstorms.	Environmental	OSU Extension	Ongoing
WS-2	Wind Storm	Ensure that all critical facilities have backup power and/or emergency operations plans to deal with power outages.	City Administration	Emergency Management	Ongoing
WS-3	Wind Storm	Record instances of infrastructure failure and notify PGE of infrastructure that regularly fails.	Emergency Management	PGE	Ongoing

Source: City of Keizer HMP Steering Committee, 2016.

Plan Implementation and Maintenance

The City Council will be responsible for adopting the City of Keizer addendum to the Marion County HMP. This addendum designates a convener and a coordinating body to oversee the development and implementation of action items. Because the city addendum is part of the county's multi-jurisdictional HMP, the City will look for opportunities to partner with the county. The City's steering committee will convene after re-adoption of the City of Keizer addendum on an annual schedule; the county meets on a semi-annual basis. The City of Keizer Convener will participate in the Marion County HMP meetings and will report on city specific activities as appropriate. The steering committee will be responsible for identifying new risk assessment data, reviewing status of mitigation actions, identifying new actions, and seeking funding to implement the City's mitigation strategy (actions). The convener will also remain active in the county's implementation and maintenance process (see Volume I, Section 4 for more information).

The City will utilize the same prioritization process as the county (See Volume I, Section 4: Plan Implementation and Maintenance and Volume IV, Appendix D: Economic Analysis of Hazard Mitigation Projects for more information).

Implementation through Existing Programs

Many of the Hazard Mitigation Plan's recommendations are consistent with the goals and objectives of the City's existing plans and policies. Where possible, the City of Keizer will implement the HMP's recommended actions through existing plans and policies. Plans and policies already in existence have support from local residents, businesses, and policy makers. Many land-use, comprehensive, and strategic plans get updated regularly, allowing them to adapt to changing conditions and needs. Implementing the HMP's action items through such plans and policies increases their likelihood of being supported and implemented.

Keizer's Comprehensive Plan was first acknowledged by the Oregon Land Conservation and Development Commission in 1987.[1] The City most recently completed updates to the plan, including updates to the Natural Hazards section, in December of 2013 and August of 2014. The Keizer Comprehensive plan indicates that the flood and earthquake hazards are the "two major types of natural hazards" that are estimated to affect the city. There is no mention in the natural hazards section of landslide or wildfire (listed under Statewide Planning Goal 7). The plan does contain a general goal to "Protect life and property from natural disasters and hazards." In addition, the plan contains three specific policies related to the flood hazard. There are no other hazard-related policies listed. The City implements the plan through the Keizer Land Development Code, first adopted in 1998. The City has completed numerous updates since, with the most recent occurrence in November of 2016.

Keizer currently lists the following as attachments to the Comprehensive Plan:

- Master Sewer Plan Update 1992

[1] Note, LCDC acknowledged the Salem Area Comprehensive Plan in 1982. Keizer prepared and adopted the Keizer Comprehensive plan in January of 1987 with LCDC acknowledging it as an Amendment to the Salem Area Comprehensive Plan in February of 1987.

- Master Sewer Plan Update December 1993
- Dual Interest Area Agreement
- Master Sewer Plan Update January 30, 2003
- Parks & Recreation Master Plan dated January 2008
- City of Keizer Transportation System Plan (April 2009) Part 1
- City of Keizer Transportation System Plan (April 2009) Part 2

For more information, refer to http://www.keizer.org/Adopted-Plans-Studies/.

Continued Public Participation

Keeping the public informed of the City's efforts to reduce the city's risk to future hazard events is important for successful plan implementation and maintenance. The City is committed to involving the public in the plan review and updated process. See Volume I, Section 4, for more information.

Plan Maintenance

The Marion County Multi-Jurisdictional Hazards Mitigation Plan and city addendum will be updated every five years in accordance with the update schedule outlined in the Disaster Mitigation Act of 2000. During the county plan update process, the City will also review and update its addendum. The convener will be responsible for convening the steering committee to address the questions outlined below.

- Are there new partners that should be brought to the table?
- Are there new local, regional, state, or federal policies influencing natural hazards that should be addressed?
- Has the community successfully implemented any mitigation activities since the plan was last updated?
- Have new issues or problems related to hazards been identified in the community?
- Are the actions still appropriate given current resources?
- Have there been any changes in development patterns that could influence the effects of hazards?
- Have there been any significant changes in the community's demographics that could influence the effects of hazards?
- Are there new studies or data available that would enhance the risk assessment?
- Has the community been affected by any disasters? Did the plan accurately address the impacts of this event?

These questions will help the steering committee determine what components of the mitigation plan need updating. The steering committee will be responsible for updating any deficiencies found in the plan.

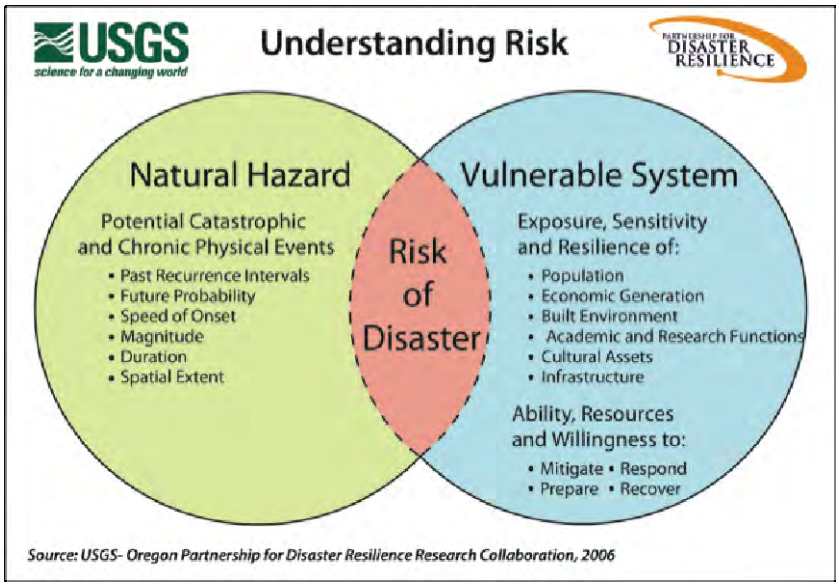
Risk Assessment

This section of the HMP addendum addresses 44 CFR 201.6(b)(2) - Risk Assessment. In addition, this chapter can serve as the factual basis for addressing Oregon Statewide Planning Goal 7 – Areas Subject to Natural Hazards. Assessing natural hazard risk has three phases:

- **Phase 1:** Identify hazards that can impact the jurisdiction. This includes an evaluation of potential hazard impacts – type, location, extent, etc.
- **Phase 2:** Identify important community assets and system vulnerabilities. Example vulnerabilities include people, businesses, homes, roads, historic places and drinking water sources.
- **Phase 3:** Evaluate the extent to which the identified hazards overlap with, or have an impact on, the important assets identified by the community.

The local level rationale for the identified mitigation strategies (action items) is presented herein, and within Section 2, *Risk Assessment*, and Appendix C, *Community Profile*. The risk assessment process is graphically depicted in Figure KZ-1 below. Ultimately, the goal of hazard mitigation is to reduce the area of risk, where hazards overlap vulnerable systems.

Figure KZ-1. Understanding Risk



Risk Assessment Approach

A risk assessment is intended to provide the, "factual basis for activities proposed in the strategy to reduce loses from identified hazards."[2] To complete the risk assessment, the HMP update team first updated the description, type, location and extent of each hazard. Next, the team updated the vulnerability information based on each hazard's potential impact on the community.

The Marion County Basic Plan (Volume I, Section II) Risk Assessment describes in detail the methods used to assess risk. In summary, Marion County has prepared a Threat Hazard Identification and Risk Assessment as a formal annex to the Marion County Emergency Operation Plan. The assessment uses a method developed by BOLD Planning.[3] This city

[2] 44 CFR 201.6(2)(i)

[3] BOLD Planning is a consulting firm specializing in the development of actionable emergency plans. For more information, visit: http://www.boldplanning.com/

addendum builds on the county level assessment to produce a similar assessment for the City of Keizer. The assessment specifically examines:

1. Probability (frequency) of event
2. Magnitude of event
3. Expected warning time before event
4. Expected duration of event

Refer to Page 2-4 of the Marion County Basic HMP for a description of the scoring values for each ranking category.

Hazard Analysis

The assessment identifies three levels of risk: High, Moderate and Low.

High - High probability of occurrence; at least 50 percent or more of population at risk from hazard; significant to catastrophic physical impacts to buildings and infrastructure; major loss or potential loss of functionality to all essential facilities (hospital, police, fire, EOC and shelters).

Moderate - Less than 50 percent of population at risk from hazard; moderate physical impacts to buildings and infrastructure; moderate potential for loss of functionality to essential facilities.

Low - Low probability of occurrence or low threat to population; minor physical impacts.

A summary of the risk assessment findings and rankings is presented below.

Table KZ-3. Hazard and Vulnerability Assessment Summary

Hazard Profile Summary for Keizer Usinging Bold Planning Analysis Scoring							
Natural Hazard	Probability	Warning Time	Magnitude	Duration	CPRI	Local Planning Significance	County Planning Significance
Weight Factor	0.45	0.3	0.15	0.1			
Earthquake*	4	4	4	4	4.00	High	High
Severe Weather/Storm**	4	1	3	3	2.85	Moderate	High
Flood	3	2	3	4	2.80	Moderate	High
Drought	3	1	3	4	2.50	Moderate	High
Extreme Weather - High Temperature	3	1	2	4	2.35	Moderate	Moderate
Wildland Interface Fire	1	4	2	2	2.15	Moderate	Moderate
Dam or Levee Failure	1	2	4	4	2.05	Moderate	Moderate
Landslide	1	2	2	2	1.55	Low	High
Volcanic Eruption	1	1	1	4	1.30	Low	Low
*Note: Earthquake probability listed to match county level analysis. See below for more detailed probability assessment. **Note: Includes tornado hazard							

Source: BOLD Planning Risk Assessment Method; Analysis by UO Community Service Center.

Community Asset Identification

This section provides information on city specific assets. For additional information on the characteristics of Keizer, in terms of geography, environment, population, demographics, employment and economics, as well as housing and transportation see Volume III, Appendix C, *Community Profile*. Many of these community characteristics can affect how natural hazards impact communities and how communities choose to plan for natural hazard mitigation. Considering the city specific assets during the planning process can assist in identifying appropriate measures for natural hazard mitigation.

Community Characteristics

The City of Keizer is located in Marion County, Oregon, immediately north of the City of Salem. The City is bordered to the west by the Willamette River and to the east by Highway 99 and Interstate 5. Keizer is located in Oregon's Willamette Valley, which experiences a moderate climate. In August, the average high temperature is 82 degrees and the average low temperature is 51 degrees. Wintertime temperatures in January range from an average high of 46 degrees to an average low of 33 degrees. The average annual precipitation is 39.9 inches. In addition to the Willamette River, other bodies of water that run through the city include Staats Lake, Claggettt Creek, and Labish Ditch. Keizer is located on a relatively flat area, with a few steep slopes bordering the Willamette River.

The US Census lists Keizer's 2015 population at 36,985. This represents a 13.2% increase from 2000. For more demographic information, refer to Appendix C.

Economy

Historically, Keizer was an agricultural community, but in the 1960s and 70s, the city grew rapidly into a residential suburb of Salem along North River Road. Today, Keizer's primary employment sectors are service, retail and public administration. Median household income in Keizer is $50, 897. For more economic information, refer to Appendix C.

Critical and Important Facilities

Critical and important facilities include the following:

Transportation

- Bridges and Culverts:
    - Three bridges over Claggettt Creek: Chemawa, Dearborn, and Alder
        - If damaged, evacuation of the eastern half of the community would be disrupted.
        - Alder Bridge is one of only two access points to Claggettt Creek Middle School and Weddle Elementary School.
        - Alder Bridge has water, and communications (maybe fiber).
    - Bridge over Labish Ditch at 35th (owned by Marion County)
        - If damaged, access to areas north of Keizer would be limited.
    - Keizer has two concrete box culverts located on River Road at Lockhaven Drive and at Wheatland Road
        - If they became non-functional, parts of town would be cut off.
- Major roads: I-5, the Salem Parkway, River Road, and Lockhaven Drive.
- Keizer Transit Center: 5860 Keizer Station Blvd.
- While not within Keizer, earthquake damage to the Detroit, Parkersville, and Lookout Point Dams could have significant impacts in Keizer, such as widespread flooding or road blockages.

Energy

- Bonneville Power Administration (BPA) – Chemawa Substation (Tepper Lane NE)

Water

- Drinking Water:
    - Water comes from the Troutdale Aquifer, pumped through 14 or 15 wells
    - Three water storage facilities with a storage capacity of 2.75 million gallons
      Note: Currently built to withstand earthquakes, however the water distribution system may not withstand a significant earthquake.
    - Emergency water agreement with the City of Salem is in place.
      Note: Chemical spills could potentially contaminate drinking water.
- Wastewater:
    - Willow Lake Wastewater Treatment Facility (5915 Windsor Island Rd. N)
      Note: The Willow Lake Wastewater Treatment Facility and main sewer lines are vulnerable to earthquakes and could potentially contaminate groundwater aquifers.
      Note: The Keizer Public Works building was built prior to earthquake standards.

Communication

- Qwest hub in the downtown area; several cell phone towers
    - One tower in Bear Park is leased out.
- City Hall (the Civic Center) has a communication tower – includes a cell carrier and the police radio.
    - This tower has a diesel-fueled generator.

  Note: City of Salem is currently mapping communication system locations.

Emergency services

- Fire:
    - Keizer Fire District Station 350 (661 Chemawa Rd. NE).
    - Marion County Fire District 1 (300 Cordon Rd. NE) – serves northern part of Keizer, starting at Centennial.
- Police:
    - 930 Chemawa Rd. NE co-located with Keizer Civic Center, City Hall, Human resources, Community Center and Public Works.
- Medical
    - Legacy Keizer Health Center (5685 Inland Shores Way N).
        - *Note: Might get cut off because it's across Claggettt Creek.
    - WVP Medical Group Keizer (5100 River Rd. N).
    - Kaiser Permanente (5940 Ulali Dr. NE) – Keizer Station.
    - Salem Clinic Center (5900 Inland Shores Way N).

Cultural/historical resources

- Keizer Heritage Community Center houses the Chamber of Commerce, the library, and the Keizer museum.
  Note: older building and may be vulnerable to earthquake.

Vulnerable populations – Functional and Access Needs

- Assisted living facilities:
    - Brookdale River Road (592 Bever Drive NE)
    - Avamere Court at Keizer (5210 River Road N)
    - Avamere – memory care (Claggettt Ct).

    - The Village at Keizer Ridge (1165 Mcgee Court NE)
    - Willamette Lutheran Retirement (7693 Wheatland Road N)
    - Sweet Bye N Bye Adult Foster Care Home (4072 Brooks Ave. NE)
    - Sherwood Park Nursing & Rehabilitation Center (4062 Arleta Ave. NE)
    - Bonaventure Senior Living Facility (1615 Brush College Rd. NW)
- Schools:
    - Keizer has 10 public schools: http://www.salkeiz.k12.or.us/files/salkeiz/Keizer_14-15.pdf
- Simonka Place (5119 River Rd. N) – women's shelter
- Large Spanish speaking population – might be language barriers

See hazard sections below and Section 2, *Risk Assessment*, for potential hazard vulnerabilities to these facilities.

Hazard Characteristics

Drought

The characteristics of drought in Keizer are the same for the county as a whole.

Table KZ-4. Drought Summary

Hazard	Drought
Type	Climatic
Speed of Onset	Slow
Location	Varies, County Wide
Extent	Moderate to Severe Drought*
Prior Occurance	Three > 6 months duration since 1982
Probability	~9%

*Defined as between -2 and -4 on the National Resource Conservation Service (NRCS) Surface Water Supply Index (SWSI)

Sources: Oregon NHMP; NRCS; analysis by OPDR

The probability of drought in Keizer is likely, the same as for the county as a whole. Given that the City's water supply is primarily subsurface, the Keizer's vulnerability is moderate. Overall, the planning significance of drought is moderate, slightly lower than the county.

Volume I, Section 2, *Risk Assessment*, adequately describes the characteristics of drought hazards, as well as the location and extent of a potential event. Due to a cool, wet climate, past and present weather conditions have generally spared Marion County communities from the effects of drought. Governor Kate Brown declared a drought emergency for all of Marion County in September 2015.

Keizer's primary water supply comes from the Troutdale Aquifer. Raw water is treated for consumption at the Willow Lake Water Treatment Facility. The City has three (3) storage reservoirs with storage capacity for 2.75 million gallons of treated water. In addition, Keizer maintains an emergency water agreement with the City of Salem.

Keizer recently completed the review and update Keizer's water management plan to include new information and revisit emergency water agreements with the City of Salem.

This action was listed in the previous Keizer NHMP. Keizer adopted the revised agreements and ordinance language in 2016. The ordinance includes a water curtailment plan.

Please review the Risk Assessment (Volume I, Section 2) for additional information on this hazard.

Earthquake

The characteristics of a crustal earthquake are similar to the county as a whole.

Table KZ-5. Earthquake Summary Crustal

Hazard	Earthquake - Crustal
Type	Geologic
Location	Multiple active faults; Willamette Valley
Speed of Onset	Rapid
Extent	Very Strong to Severe shaking ~ 500 yrs*
Prior Occurance	One over Magnitude 5 last 100 yrs**
Probability	Approximately 1% annual

*DOGAMI HazVu; ** PNSN - 1993 Scotts Mills just north of Marion County

Sources: DOGAMI - Oregon HazVu; Oregon NHMP; Pacific Northwest Seismic Network

The characteristics of a Cascadia Subduction Zone Earthquake (CSZ) are the same as the county.

Table KZ-6. Earthquake Summary Subduction

Hazard	Earthquake - Subduction
Type	Geologic
Location	Primarily west of the Cascades; CA - BC
Speed of Onset	Rapid
Extent	Catastrophic
Prior Occurance	One over Magnitude 9 last 500 yrs
Probability	Magnitude 9+ is 7% - 12% over 50 yrs**

*DOGAMI HazVu; **Oregon Natural Hazard Mitigation Plan, anlysis by Oregon Department of Geology and Mineral Industries.

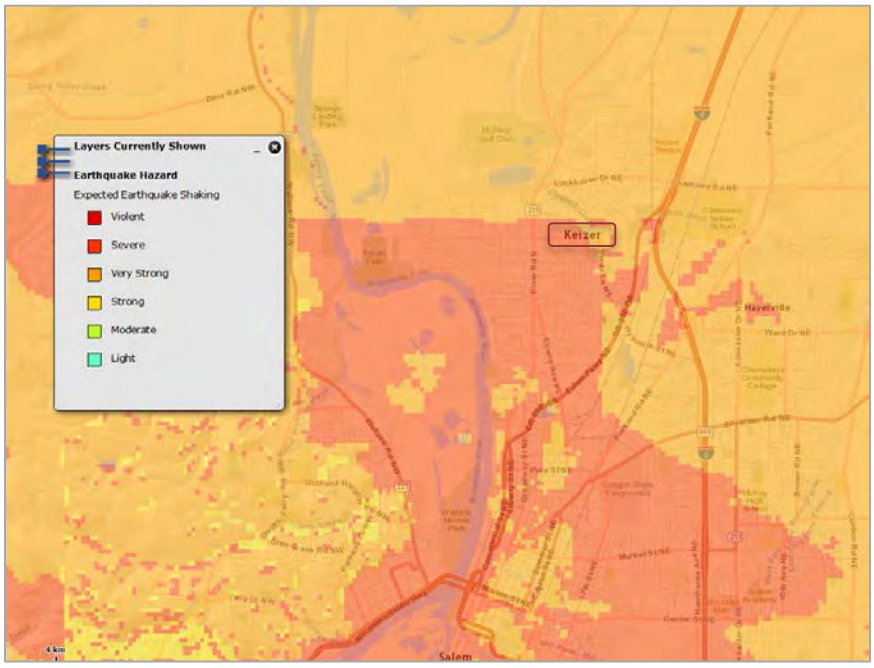
Sources: DOGAMI - Oregon HazVu; Oregon NHMP; Pacific Northwest Seismic Network

Keizer's probability for a Crustal Earthquake event is "possible" and that their vulnerability to a Crustal Earthquake event is "limited". The county steering committee determined that the probability for a CSZ Earthquake event is "highly likely" and that the vulnerability to a Cascadia Earthquake event is "catastrophic". This hazard was not rated as distinct CSZ and crustal events in the previous HMP. There are no locally active faults within the Keizer City Limit. Active faults do exist within five-miles to the west and south. The 1993 Scott Mills quake caused $28 million in damages to cities throughout Marion County. No damaging earthquake events occurred during the previous five years.

Volume I, Section 2, *Risk Assessment*, adequately describes the characteristics of earthquake hazards, history, as well as the location and extent of a potential event. Generally, an event that affects the county is likely to affect Keizer as well. Previous occurrences are well-documented within the county's plan, and the community impacts described by the county would generally be the same for Keizer as well.

Earthquake-induced damages are difficult to predict, and depend on the size, type, and location of the earthquake, as well as site-specific building and soil characteristics. Presently, it is not possible to accurately forecast the location or size of earthquakes, but it is possible to predict the behavior of soil at any particular site. In many major earthquakes, damages have primarily been caused by the behavior of the soil. Figure KZ-2 shows that ground shaking in Keizer for both crustal and subduction earthquakes are expected to be very strong to severe.

Figure KZ-2. Active Faults and Expected Shaking



Source: Oregon HazVu: Statewide Geohazards Viewer (DOGAMI)

The Keizer steering committee identified liquefaction as a primary concern related to the earthquake hazard. The committee suggested conducing analysis of the city's 16 wells and how they will be impacted by earthquake. Another concern identified is the potential impact to Claggett Creek from sanitary sewer infrastructure impacts. Broken wastewater infrastructure could result in contamination. The committee also noted that if culverts on River Road collapsed, significant portions of the City could be cut off from vehicle access.

In 2007, the Department of Geology and Mineral Industries (DOGAMI) conducted a seismic needs assessment for public school buildings, acute inpatient care facilities, fire stations, police stations, sheriffs' offices, and other law enforcement agency buildings. Buildings were ranked for the "probability of collapse" due to the maximum possible earthquake for any given area. Within the City of Keizer, the following buildings were given a "moderate" or "high" probability of collapse:

- Cummings Elementary School: *high (> 10%)*
- Gubser Elementary School: *high (> 10%)*
- Kennedy Elementary School: *high (> 10%)*
- McNary High School: *high (> 10%)*

- Whiteaker Middle School: *moderate (> 1%)*

Keizer participates in the Great Oregon Shakeout each year and posts "Living on Shaky Ground" education documents at city hall. In addition, the City's Community Emergency Response Team is actively engaged in the promotion of earthquake safety and community outreach actions. The City eliminated two actions from the previous HMP related to earthquake preparation due to these ongoing efforts.

Please review the Risk Assessment (Volume I, Section 2) for additional information on this hazard.

Flood

Table KZ-7. Flood Summary

Hazard	Flood
Type	Climatic
Speed of Onset	Slow to moderate
Location	Mapped flood zones, floodplain
Extent	Moderate to severe
Prior Occurance	Four significant events since 1964
Probability	1% annual within SFHA

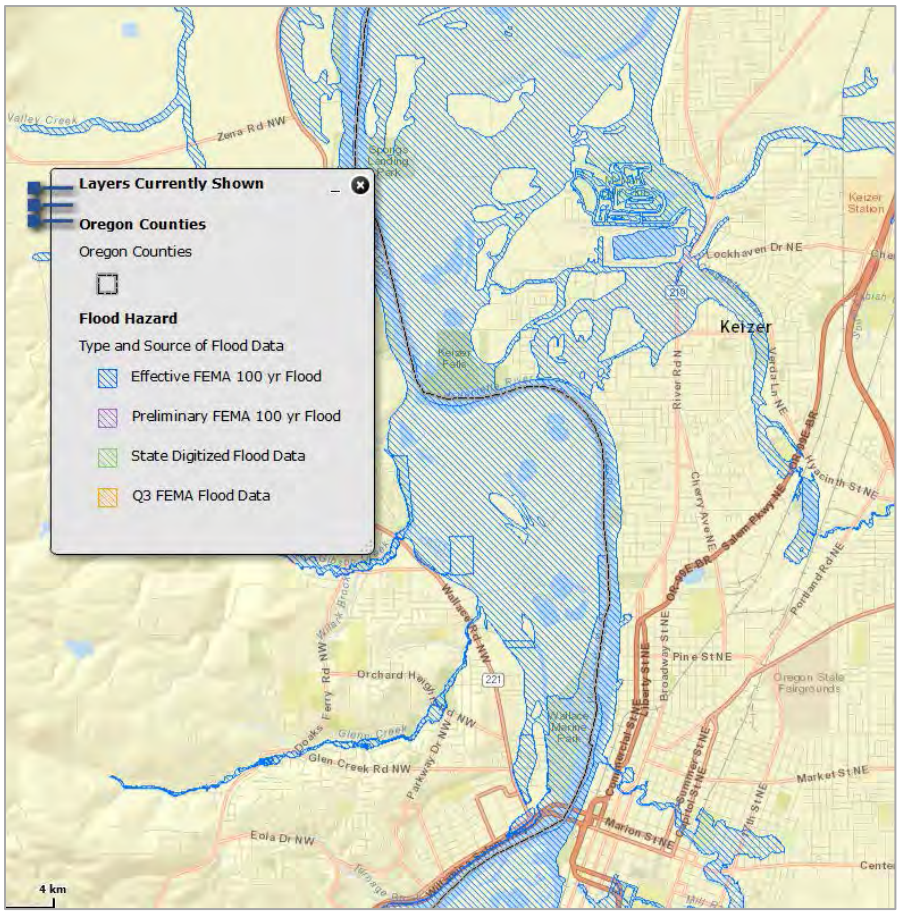
Sources: DOGAMI - Oregon HazVu; Oregon NHMP

Volume I, Section 2, Risk Assessment, describes the causes and characteristics of flooding hazards within the region. The city's probability for riverine flood is likely and their vulnerability to flood is critical. No new flood events have occurred since the 2010 HMP. Committee members noted that ongoing FEMA flood map updates may increase the base flood elevation by roughly three feet. This is primarily related to an existing earthen dike and flood wall constructed along the Willamette River after the 1996 flood event. If the flood elevation increases, the wall will no longer be certifiable. Any breaching of the dike or wall would result in the inundation of the western half of Keizer.

Some minor flooding does occur on Claggett Creek. However, the flooding is generally isolated. A related mitigation success is the ongoing retrofit and upgrade of Dearborn Bridge over Claggett Creek.

Portions of Keizer have areas of flood plains (special flood hazard areas). These include areas along the Marys River (see Figure KZ-3). Furthermore, other portions of Keizer, outside of the mapped floodplains, are also subject to significant, repetitive flooding from local storm water drainage.

Figure KZ-3. Special Flood Hazard Area



Source: [Oregon HazVu: Statewide Geohazards Viewer (DOGAMI)]

Figure KZ-4. Keizer Flood Insurance Rate Map

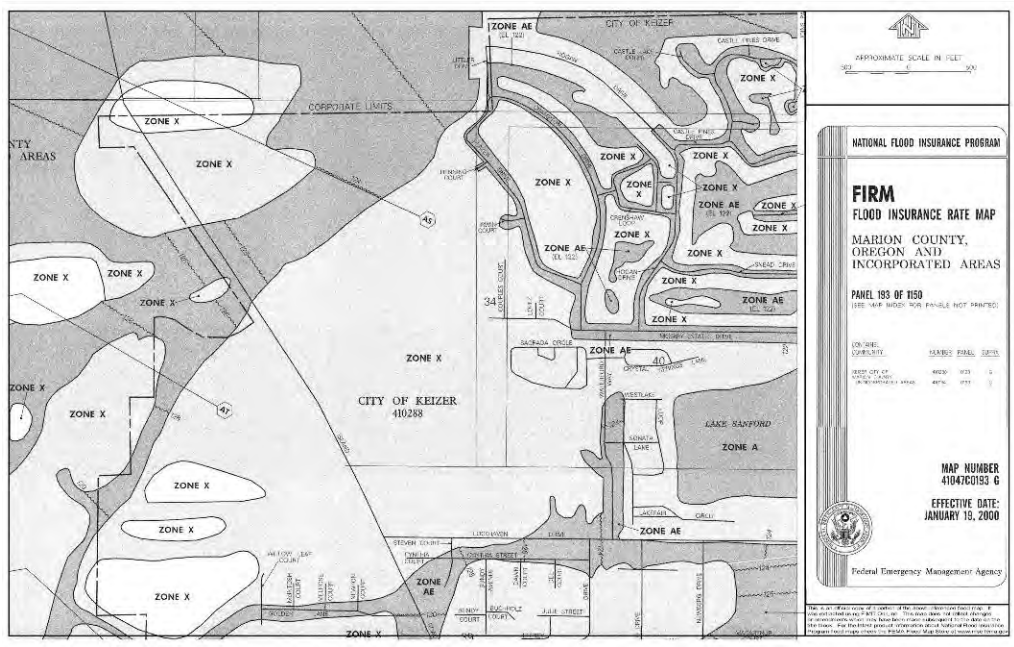
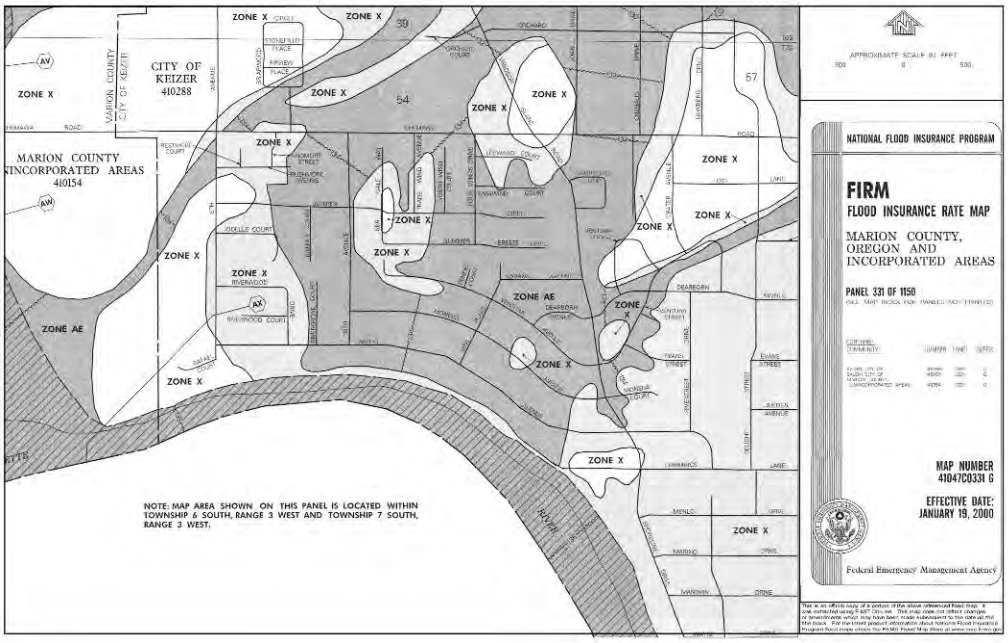


Figure KZ-5. Keizer Flood Insurance Rate Map



National Flood Insurance Program (NFIP)

FEMA modernized the Keizer Flood Insurance Rate Maps (FIRMs) in January of 2000. The table below shows that as of October 2016, Keizer has 440 National Flood Insurance Program (NFIP) policies in force. Of those, 215 are for properties that were developed before development of the initial FIRM. The last Community Assistance Visit (CAV) for Keizer was on July 17, 2006. Keizer is not a member of the Community Rating System (CRS). The table shows that the majority of flood insurance policies are for residential structures, primarily single-family homes. There have been 23 paid flood claims in Keizer totally $420,239.

The Community Repetitive Loss record for Keizer identifies no Repetitive Loss Properties[4] and no Severe Repetitive Loss Properties[5]. Notably, following flooding in 1996/1997, Keizer successfully used FEMA HMGP funds to relocate several homes out of the floodplain.

[4] A Repetitive Loss (RL) property is any insurable building for which two or more claims of more than $1,000 were paid by the National Flood Insurance Program (NFIP) within any rolling ten-year period, since 1978. A RL property may or may not be currently insured by the NFIP.

[5] A Severe Repetitive Loss (SRL) property is a single family property (consisting of 1 to 4 residences) that is covered under flood insurance by the NFIP and has incurred flood-related damage for which 4 or more separate claims payments have been paid under flood insurance coverage, with the amount of each claim payment exceeding $5,000 and with cumulative amount of such claims payments exceeding $20,000; or for which at least 2 separate claims payments have been made with the cumulative amount of such claims exceeding the reported value of the property.

Table KZ-8. Flood Insurance Detail

Jurisdiction	Effective FIRM and FIS	Initial FIRM Date	Total Policies	Pre-FIRM Policies	Policies by Building Type: Single Family	2 to 4 Family	Other Residential	Non-Residential	Minus Rated A Zone	Minus Rated V Zone
Marion County	-	-	2,067	1,239	1,614	115	105	232	97	0
Keizer	1/19/2000	5/1/1985	440	215	398	14	11	17	10	0

Jurisdiction	Insurance in Force	Total Paid Claims	Pre-FIRM Claims Paid	Substantial Damage Claims	Total Paid Amount	Repetitive Loss Structures	Severe Repetitive Loss	CRS Class Rating	Last Community Assistance
Marion County	$ 514,268,700	298	226	16	$ 5,732,543	11	2	-	-
Keizer	$ 131,321,300	23	11	1	$ 420,239	0	0	N/A	7/19/2006

Source: Information compiled by Department of Land Conservation and Development, October, 2016.

Please review the Risk Assessment (Volume I, Section 2) for additional information on this hazard.

Landslide

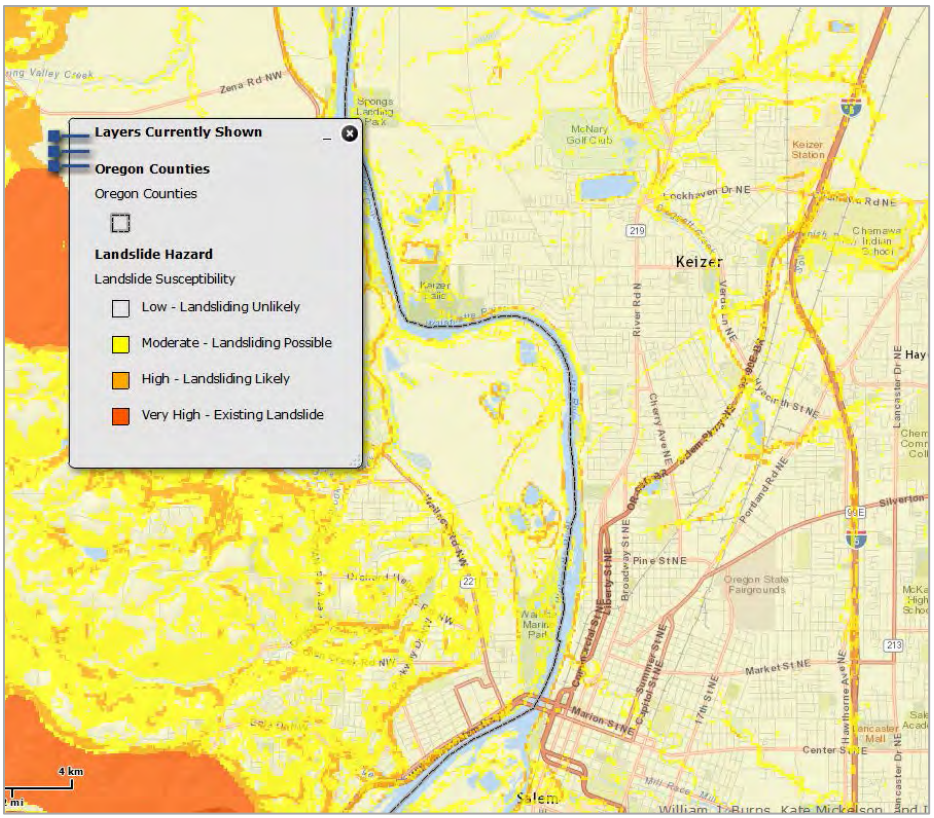
Table KZ-9. Landslide Summary

Hazard	Landslide
Type	Climatic/Geologic
Speed of Onset	Slow to rapid
Location	Waterways (banks) and transportation facilities
Extent	Minor
Prior Occurance	No major events
Probability	Low for minor events; less than 5% major events

Sources: DOGAMI - Oregon HazVu; Oregon NHMP

Volume I, Section 2, *Risk Assessment*, adequately describes the causes and characteristics of landslides, and appropriately identifies previous landslide occurrences within the region. Keizer has a relatively flat topography. Keizer's probability for landslide is unlikely (which is lower than the county's rating) and their vulnerability to landslide is negligible (which is also lower than the county's rating). Figure KZ-6 shows that landslide risk in Keizer is virtually nonexistent.

Figure KZ-6. Landslide Susceptibility Exposure



Source: [Oregon HazVu: Statewide Geohazards Viewer (DOGAMI)]

Please review the Risk Assessment (Volume I, Section 2) for additional information on this hazard.

Volcano

Table KZ-10. Volcano Summary

Hazard	Volcano
Type	Geologic
Speed of Onset	Slow to rapid
Location	Cascade Mountains
Extent	Minor
Prior Occurance	One significant event since 1916 (Mount St. Helens)
Probability	<1% annual

Sources: DOGAMI - Oregon HazVu; Oregon NHMP

Volume I, Section 2, *Risk Assessment*, adequately describes Keizer risk to volcanic events. The steering committee determined that the city's probability for volcanic event is unlikely and their vulnerability to volcano is negligible.

The causes and characteristics of a volcanic event are appropriately described within the county's plan, as well as the location and extent of potential hazards. Previous occurrences are well-documented within the county's plan. Keizer is very unlikely to experience anything more than volcanic ash during a volcanic event. When Mt. Saint Helens erupted in 1980, the city was not impacted.

Please review the Risk Assessment (Volume I, Section 2) for additional information on this hazard.

Wildfire

Table KZ-11. Wildfire Summary

Hazard	Wildfire
Type	Climatic, Human Caused
Speed of Onset	Moderate to rapid
Location	Outside city limit
Extent	Minor to moderate
Prior Occurance	No history inside city limit
Probability	<1% annual

Sources: Marion County HMP

Volume I, Section 2, *Risk Assessment*, adequately describes the causes and characteristics of wildfires, as well as the county and city's history of wildfire events. The city's probability for wildfire is unlikely and the vulnerability to wildfire is limited. Keizer is located on the far western side of Marion County, surrounded on all sides by open farmland, waterways, or urban development. There are no forests within the city limits, and the closest forested area is Keizer Rapids Park, located half a mile west of the city. Due to its location, Keizer faces minimal risk of experiencing wildfires. There is no history of wildfire events in Keizer.

The County updated the Community Wildfire Protection Plan in 2016 and Keizer is not listed as a "Community at Risk."

Please review the Risk Assessment (Volume I, Section 2) for additional information on this hazard.

Severe Weather

Table KZ-12. Severe Weather Summary

Hazard	Severe Weather/Storm
Type	Climatic
Speed of Onset	Slow to moderate
Location	Countywide
Extent	Minor to severe
Prior Occurance	Minor events occur annually; ~30 moderate to severe events countywide over the past 130 years
Probability	100% for minor events, 23% for moderte to severe events

Sources: Marion County HMP

Windstorm

Volume I, Section 2, *Risk Assessment*, adequately describes the causes and characteristics of windstorms, as well as the location and extent of windstorm hazards. The City's probability for windstorm is highly likely and that their vulnerability to windstorm is critical.

Significant wind events occur in Keizer each year. Damaging wind events are only slightly less common; once or twice per year the city will experience a windstorm event that will interrupt services, experience downed trees, and cause power outages.

Because windstorms typically occur during winter months, they are sometimes accompanied by ice, freezing rain, flooding, and very rarely, snow.

Winter Storm (Snow/ Ice)

Volume I, Section 2, *Risk Assessment*, adequately describes the causes and characteristics of winter storms, as well as the location and extent of winter storm hazards. The City's probability for windstorm is highly likely and that their vulnerability to windstorm is critical.

Severe winter storms can consist of rain, freezing rain, ice, snow, cold temperatures, and wind. They originate from troughs of low pressure offshore that ride along the jet stream during fall, winter, and early spring months. Severe winter storms affecting the city typically originate in the Gulf of Alaska or in the central Pacific Ocean. These storms are most common from November through March.

Major winter storms can and have occurred in the Keizer area, and while they typically do not cause significant damage, they are frequent and have the potential to impact economic activity. The most recent winter storms (December 2016 – January 207) included snow and ice. Transportation and power interruptions combined with government office and school closures. A disaster declaration is currently pending.

Please review the Risk Assessment (Volume I, Section 2) for additional information on this hazard.

CITY OF MILL CITY ADDENDUM

Purpose

This document serves as Mill City's Addendum to the Marion County Multi-Jurisdictional Natural Hazards Mitigation Plan (MNHMP, NHMP). This addendum seeks to supplement information contained in Volume I (Basic Plan) of this multi-jurisdictional NHMP which serves as the foundation for this jurisdiction's addendum and Volume III (Appendices) which provides additional information (particularly regarding participation and mitigation strategy). This addendum meets the following requirements:

- Multi-jurisdictional **Plan Adoption** §201.6(c)(5),
- Multi-jurisdictional **Participation** §201.6(a)(3),
- Multi-jurisdictional **Mitigation Strategy** §201.6(c)(3)(iv), and
- Multi-Jurisdictional **Risk Assessment** §201.6(c)(2)(iii).

Plan Process, Participation, and Adoption

This section of the NHMP addendum addresses 44 CFR 201.6(c)(5), *Plan Adoption*, and 44 CFR 201.6(a)(3), *Participation.*

In the summer of 2016, the Oregon Partnership for Disaster Resilience (OPDR) at the University of Oregon's Community Service Center (CSC) partnered with Marion County and Santiam Canyon cities, including Mill City, to create the first region-specific NHMP. Part of the Santiam Canyon Regional Hazard Mitigation Plan (RHMP) required the creation of city addenda which would be adopted into the 2016 Marion County NHMP. This project is funded through the Federal Emergency Management Agency's (FEMA) FY14 Pre-Disaster Mitigation Competitive Grant Program (PDMC-PL-10-OR-2014-002).

By developing this addendum to the Marion County NHMP, locally adopting it, and having it approved by FEMA, Mill City will gain eligibility for FEMA Hazard Mitigation, Pre-Disaster Mitigation, and Flood Mitigation Assistance grant program funds.

The Marion County NHMP, and Mill City addendum, are the result of a collaborative effort between citizens, public agencies, non-profit organizations, the private sector, and regional organizations. A project steering committee guided the process of developing this addendum, and was composed of city staff, county representatives, and emergency service management.

The Mill City city recorder is the designated convener of the NHMP and will take the lead in implementing, maintaining, and updating the addendum to the Marion NHMP in collaboration with the Santiam Canyon liaison for Marion County Emergency Management.

Potential representatives for the City of Mill City steering committee met formally on one occasion: September 22, 2016, but communicated electronically throughout the creation of this

document. The city's addendum reflects decisions decided upon at the plan update meeting and during subsequent work and communication with stakeholder and steering committee members.

The Mill City Steering Committee is currently comprised of the following representatives:

- David Kinney; City Planner, Mill City
- Stacie Cook; City Recorder, Mill City
- Kathleen Silva; Santiam Canyon Liaison, Marion County
- *VACANT;* MCRFPD representative
- *VACANT;* City Hall Staff
- *VACANT;* City Councilor
- *VACANT;* Planning commissioner
- *VACANT;* Marion County Public Works Staff
- *VACANT;* Linn County Sheriffs rep (emergency mtg.)

Public participation was achieved with the establishment of the steering committee, which was comprised of city officials and county representatives. The city is currently evaluating the following recommendation from the plan facilitator: I recommend the Marion County staff meet with representatives from the Mill City RFPD, Linn County Sheriff's office and city staff to discuss the draft. After that, I recommend Marion County rep attend a Mill City Planning Commission work session to discuss the DRAFT document before it is presented to the Mill City City Council.

The Steering Committee was closely involved throughout the development of the plan and served as the local oversight body for the plan's development. In addition, community members outside of the steering committee were provided an opportunity for comment via the plan review process.

The Marion County NHMP was approved by FEMA on [Month] [Day], 2017 and the Mill City addendum was adopted via resolution on [Month] [Day], 2017. This NHMP is effective through [Month] [Day], 2022.

Mitigation Strategy

This section of the NHMP addendum addresses 44 CFR 201.6(c)(3(iv), *Mitigation Strategy*.

During 2016, Marion County and OPDR evaluated the Action Items set by the county and their particular relevance to the Santiam Canyon region. Following the review, actions with relevance to the region were added into the RHMP, noting what accomplishments had been made, and whether the actions were still relevant; any new action items were identified at this time. Mill City developed a list of priority actions (Table A-1), any actions that were not prioritized were placed in the Action Item Pool (Table A-2) and will be considered during the semi-annual meetings.

Priority Actions

The city is listing a set of high priority actions in an effort to focus attention on an achievable set of high leverage activities over the next five-years. The city's priority actions are listed below in the following table. Detailed implementation information for each action is listed in within (Table A-1).

Action Item Pool

This expanded list of actions is available for local consideration as resources, capacity, technical expertise and/or political will become available. The action items are split into various categories including ongoing, short-term (>1 year), and long-term (<1 year)

Many actions carry forward from prior versions of the Marion County NHMP and other local planning documents including the Community Wildfire Protection Plan, Drought Contingency Plan, and Mid-Willamette Economic Development study. Notably, given the location of Mill City, collaboration with both Marion County and Linn County will be required during the implementation process.

(Table A-1) Mill City Priority Action Items

Action Item	Cost and Process of Implementation	Funding Options	Approximate Date of Completion
Planning & City Staff	*Review the Natural Resource Chapter of the Comprehensive plan document and modify policies to reflect new hazard information. [roughly 20 hours]*	*General Fund*	*September 2017*
e.g) *Multi-Hazard*	*Before purchase, city staff should first assess the amount of KWH needed to run city facilities. (100 KWH) diesel generators cost around $25,000.*	*General Fund, MWCOG grants/loans,*	*December 2017*

Action Item	Cost and Process of Implementation	Funding Options	Approximate Date of Completion

-ONGOING-

(Table A-2) Mill City Action Item Pool

Action Item	Proposed Action Title	Coordinating Organization	Partner Organizations	Timeline	Alignment with Plan Goals						
					Public Awareness	Education	Risk Reduction	Funding and Implementation	Partnerships and Coordination	Natural Resource Utilization	Plan Integration
Earthquake #1	Promote Great Oregon Shakeout Awareness month in October. Participate in activities for schools, business, and industry. Participating with the Mid-Willamette Emergency Communications Collective on initiatives that are focused on household preparedness.	Marion County Emergency Management	Public Works, Safety Committee, Marion County Risk, Red Cross, OEM and Media	Ongoing every October	X	X		I	X		
Earthquake #2	Collaborate with GROW EDC to develop relevant public-private partnerships with businesses that can contribute to response and recovery. (Multi-Hazard 6-9)	Marion County Emergency Management	Mill City, GROW EDC	Ongoing	X	X	X	X	X		X
Multi-Hazard #1	Develop an Energy Assurance Plan. (Multi-Hazard 2-4)	Marion County Emergency Management	Mill City, Department of Energy, Whole Community	Ongoing revisions			X	X	X		X

Source: City of Mill City NHMP Steering Committee, 2015.

-SHORT TERM-

Action Item	Proposed Action Title	Coordinating Organization	Partner Organizations	Timeline	Alignment with Plan Goals						
					Public Awareness	Education	Risk Reduction	Funding and Implementation	Partnerships and Coordination	Natural Resource Utilization	Plan Integration
Multi-Hazard #2	Evaluate the diesel generation power needed for critical city facilities. Acquire a backup diesel generator, capable of powering city facilities for a minimum of 3 days with private, state, and federal resources.	Marion County Emergency Management, Mill City,	Mill City Public Works	Short Term			X				
Multi-Hazard #3	Develop diesel storage near Kingwood Wells #1 & #2 to support the generator for a minimum of 3 days.	Marion County Emergency Management, Mill City,	Marion County Public Works	Short Term			X				
Multi-Hazard #4	Incentivize and assist local fueling stations to purchase diesel generators capable of pumping fuel from in-ground storage tanks.	Marion County Emergency Management	Mill City,	Short Term			X		X		
Multi-Hazard #5	Conduct an assessment of the short and long term needs for sheltering access and functional needs populations for all hazards.	Mill City, Marion County Emergency Management	Marion County Public Health, Red Cross, Cities, NGO's, Oregon Public Health	Short Term					X		X

Action Item	Proposed Action Title	Coordinating Organization	Partner Organizations	Timeline	Alignment with Plan Goals						
					Public Awareness	Education	Risk Reduction	Funding and Implementation	Partnerships and Coordination	Natural Resource Utilization	Plan Integration
Multi-Hazard #6	Develop a MOU with the Santiam School District to utilize facilities for sheltering residents.	~~Mill City,~~ Marion County Emergency Management	Santiam Canyon School District, Mill City RFPD, City of Mill City and Linn County Sheriff's Office, Red Cross	Short Term			X		X		
Multi-Hazard #7	Develop a MOU with First Student to utilize buses during/after hazard events	~~Mill City,~~ Marion County Emergency Management	Santiam Canyon School District, Linn County Sheriff's Office, City of Mill City and First Student	Short Term			X		X		
Multi-Hazard #8	Develop a MOU with Frank Lumber Company & Freres Lumber to share fuel resources after a hazard event.	~~Mill City,~~ Marion County Emergency Management	Linn County Sheriff's Office, Frank Lumber Co., Freres Lumber, Mill City RFPD, City of Mill City	Short Term			X		X		
Multi-Hazard #9	Develop a MOU with community fuel stations to utilize fuel resources found in below-ground tanks after a hazard event.	~~Mill City,~~ Marion County Emergency Management	Santiam Quick Mart, Mill City RFPD, Linn County Sheriff's Office and City of Mill City	Short Term			X		X		

Action Item	Proposed Action Title	Coordinating Organization	Partner Organizations	Timeline	Alignment with Plan Goals						
					Public Awareness	Education	Risk Reduction	Funding and Implementation	Partnerships and Coordination	Natural Resource Utilization	Plan Integration
Multi-Hazard #10	Establish a Mill City CERT team.	Marion County Public Works	Mill City, Marion County Emergency Management, CERT,	Short Term	X	X			X		
Multi-Hazard #11	Develop a community education program - such as an all hazard community outreach forum for students and residents.*	Marion County Emergency Management, Mill City	Linn County Sheriff's Office, ~~Public Works~~ Whole Community	Short Term	X	X	X				X
Multi-Hazard #12	Expand auxiliary radio capabilities by developing a team of HAM Radio operators for EMS and interested public.	Marion County Emergency Management, Linn County Sheriff's Office ~~Mill City~~	ARES, CERT, Private partners, Whole Community	Short Term	X	X	X		X		

*Identified in Marion County Community Wildfire Protection Plan (Action Plan & Priorities)

**Identified in North Santiam Watershed Drought Contingency Plan (Priority Drought Mitigation Actions)

***Identified in Mid-Willamette Valley Council of Governments Comprehensive Economic Development Study (Appendix C)

-LONG TERM-

Action Item	Proposed Action Title	Coordinating Organization	Partner Organizations	Timeline	Alignment with Plan Goals						
					Public Awareness	Education	Risk Reduction	Funding and Implementation	Partnerships and Coordination	Natural Resource Utilization	Plan Integration
Drought #1	Monitor economic impacts on recreation, tourism and agriculture communities.	Mill City, Marion County Emergency Management	GROW EDC, Community Services	Long Term	X	X	X	X	X		X
Flood #1	Create partnerships and strategic plans with NSWC to facilitate riparian habitat restoration projects in flooding or erosion prone areas (e.g. Areas subject to reoccurring flood events –Elizabeth, Cedar, DeFord, and Snake Creeks.)**	Marion County Environmental Services, NSWC	Mill City , Marion County Parks Department, Oregon Department of Fish and Wildlife,	Long Term			X		X	X	X
Drought #2	Collaborate with NSWC to complete WMCP's and improve community understanding of water usage and opportunities to increase efficiencies.**	NSWC, Mill City	North Santiam Watershed DCP Partners	Long Term		X	X		X		X

Action Item	Proposed Action Title	Coordinating Organization	Partner Organizations	Timeline	Alignment with Plan Goals						
					Public Awareness	Education	Risk Reduction	Funding and Implementation	Partnerships and Coordination	Natural Resource Utilization	Plan Integration
Multi-Hazard #14	Repair retaining wall on North Santiam River bank and develop recreational access dock to leverage retaining wall repair costs.**	Mill City , Marion County Emergency Management/Community Services Department	Marion County Board of Commissioners, Marine Board, DSL, Oregon River Experiences,	Long Term			X	X	X	X	X
Multi-Hazard #15	Designate evacuation routes outside of Hwy 22 for EMS.	Marion County Public Works, Linn County Public Works	RFPD, Mill City, Marion County Emergency Management	Long Term			X		X		
Multi-Hazard #16	Collaborate with Marion County to connect to a more resilient regional water/sewer system.***	Marion County Community Services Department/Board of Commissioners, Mill City	Marion County Emergency Management	Long Term			X	X	X		X
Multi-Hazard #17	Gather community support for the installation of resilient fiber communication infrastructure throughout the community.***	Marion County Community Services Department/Board of Commissioners	Mill City,	Long Term	X		X		X		X
Wildfire #1	Collaborate with Detroit Ranger District, ODF, and BLM to conduct fuel hazard reduction along the Wildland Urban interface.*	ODF, BLM, Detroit Ranger District	Marion County Emergency Management	Long Term			X		X		X

Action Item	Proposed Action Title	Coordinating Organization	Partner Organizations	Timeline	Alignment with Plan Goals						
					Public Awareness	Education	Risk Reduction	Funding and Implementation	Partnerships and Coordination	Natural Resource Utilization	Plan Integration
Wildfire #2	Collaborate with ODF and Mill City RFD to develop strategic community fuel breaks along Hwy 22, Sitcom road, and Bud Long.*	ODF, BLM, Detroit Ranger District	Marion County Emergency Management	Long Term			X		X		X
Landslide #1	Integrate new DOGAMI landslide hazard information into land use zoning/development codes.	Mill City	Environmental Services, Engineering, ODOT, DLCD	Long Term			X				X

Plan Implementation and Maintenance

The City Council will be responsible for adopting the City of Mill City addendum to the Marion County NHMP. This addendum designates a coordinating body and a convener consisting of MCRFPD, City Hall staff, PW staff, LC Sheriff's rep (Emergency Mgt), Planning Commissioner and a City Councilor to oversee the development and implementation of action items. Because the city addendum is part of the county's multi-jurisdictional NHMP, the city will look for opportunities to partner with the county. The city's steering committee will convene after re-adoption of the City of Mill City addendum on an annual schedule; the county meets on a semi-annual basis and will provide opportunities for the cities to report on NHMP implementation and maintenance during their meetings. The City Recorder will serve as the convener and will collaborate with the Santiam Canyon liaison for assembling the steering committee (coordinating body). The steering committee will be responsible for identifying new risk assessment data, reviewing status of mitigation actions, identifying new actions, and seeking funding to implement the city's mitigation strategy (actions) and will include support from Marion County and Linn County Emergency Management when possible. The convener will also remain active in the county's implementation and maintenance process.

Implementation through Existing Programs

Many of the NHMP's recommendations are consistent with the goals and objectives of the city's existing plans and policies. Where possible, the City of Mill City will implement the NHMP's recommended actions through existing plans and policies. Plans and policies already in existence have support from local residents, businesses, and policy makers. Many land-use, comprehensive, and strategic plans get updated regularly, allowing them to adapt to changing conditions and needs. Implementing the NHMP's action items through such plans and policies increases their likelihood of being supported and implemented.

Mill City's acknowledged comprehensive plan is the Mill City Comprehensive Plan. The Oregon Land Conservation and Development Commission first acknowledged the plan in 1982. The City last completed a major update of the plan in 2015. The City implements the plan through Mill City regulatory ordinances.

Mill City currently has the following plans that relate to natural hazard mitigation. For a complete list visit the city website for planning and public works:

- Comprehensive Plan
- Zoning Code
- Mill City Access Management Plan
- Water System Master Plan

Continued Public Participation

Keeping the public informed of the city's efforts to reduce the city's risk to future natural hazards events is important for successful plan implementation and maintenance. The city is committed to involving the public in the plan review and updated process. This includes:

- Annual briefings to city council
- Articles and information in The Canyon Weekly

- Postings and media on social media/website.

Plan Maintenance

The Marion County Multi-Jurisdictional Natural Hazards Mitigation Plan and city addendum will be updated every five years in accordance with the update schedule outlined in the Disaster Mitigation Act of 2000. During the county plan update process, the city will also review and update its addendum. The convener will be responsible for convening the steering committee to address the questions outlined below.

- Are there new partners that should be brought to the table?
- Are there new local, regional, state, or federal policies influencing natural hazards that should be addressed?
- Has the community successfully implemented any mitigation activities since the plan was last updated?
- Have new issues or problems related to hazards been identified in the community?
- Are the actions still appropriate given current resources?
- Have there been any changes in development patterns that could influence the effects of hazards?
- Have there been any significant changes in the community's demographics that could influence the effects of hazards?
- Are there new studies or data available that would enhance the risk assessment?
- Has the community been affected by any disasters? Did the plan accurately address the impacts of this event?

These questions will help the steering committee determine what components of the mitigation plan need updating. The steering committee will be responsible for updating any deficiencies found in the plan.

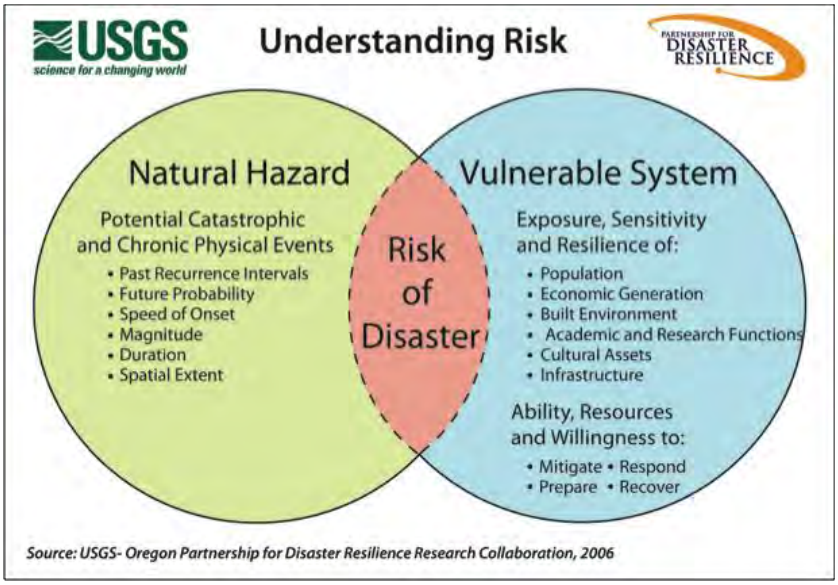
Risk Assessment

This section of the NHMP addendum addresses 44 CFR 201.6(b)(2) - Risk Assessment. In addition, this chapter can serve as the factual basis for addressing Oregon Statewide Planning Goal 7 – Areas Subject to Natural Hazards. Assessing natural hazard risk has three phases:

- **Phase 1:** Identify hazards that can impact the jurisdiction. This includes an evaluation of potential hazard impacts – type, location, extent, etc.
- **Phase 2:** Identify important community assets and system vulnerabilities. Example vulnerabilities include people, businesses, homes, roads, historic places and drinking water sources.
- **Phase 3:** Evaluate the extent to which the identified hazards overlap with, or have an impact on, the important assets identified by the community.

The local level rationale for the identified mitigation strategies (action items) is presented herein. The risk assessment process is graphically depicted in (Figure B-1) below. Ultimately, the goal of hazard mitigation is to reduce the area of risk, where hazards overlap vulnerable systems.

(Figure B-1) Understanding Risk



Hazard Analysis Methodology

This NHMP utilizes a Threat Hazard Identification and Risk Assessment (THIRA) methodology that is consistent with the Marion County Multi-Jurisdictional Hazard Mitigation Plan. Mill City developed this assessment from historical data of events that have occurred in Marion County. The assessment uses the calculated priority risk index (CPRI) methodology to specifically examine:

1. Probability (frequency) of event
2. Magnitude of event
3. Expected warning time before event
4. Expected duration of event

Table (A-3) below shows the scoring values for each ranking category.

Table (A-3) Risk Assessment Hazard Ranking Scoring Values

Score	Probability	Warning Time	Magnitude/Severity	Duration
4	Highly Likely	Less than 6 hours	Catastrophic	More than 1 week
3	Likely	6-12 hours	Critical	Less than 1 week
2	Possible	12-24 hours	Limited	Less than 1 day
1	Unlikely	24+ hours	Negligible	Less than 6 hours

Source: Marion County Emergency Management; BOLD Planning

Hazard Analysis

For emergency management planning purposes, this critical analysis is an assessment of the consequences of each hazard, including potential areas of impact, population exposed and impacted, duration of the hazard, and potential economic consequences. These rankings utilize the criteria laid out in THIRA to weigh them proportionally between historic data as well as future projections based on economic, demographic, the critical infrastructure information.

These rankings were reviewed and revised by Marion County Emergency Management staff and the local steering committee members to reflect specific community attributes and risks.

(Table A-4) Probability and Vulnerability Comparison

Hazard Profile Summary for Emergency Operations Plan						
Hazard	Probability	Magnitude	Warning Time	Duration	CPRI	Planning Significance
Earthquake	4	4	4	4	4.00	**High**
Severe Weather/Storm	4	3	1.5	3.5	3.28	**High**
Power Failure	2.5	4	4	3	3.23	**High**
Landslide	3	3	4	3	3.15	**High**
Wildland Interface Fire	3.5	3	2	3	3.08	**High**
Drought	3	3	1	4	2.80	**Moderate**
Extreme Weather - High Temperature	3.5	2	1	4	2.73	**Moderate**
Transportation Accident/Train Derailment	2	3	4	3	2.70	**Moderate**
School & Workplace Violence	1.5	4	4	2	2.68	**Moderate**
Epidemic	2	4	1	4	2.65	**Moderate**
Pandemic	2	4	1	4	2.65	**Moderate**
Dam or Levee Failure	1	4	4	4	2.65	**Moderate**
Animal Disease Outbreak	2	3	2	4	2.50	**Moderate**
Hazardous Materials Incident	2.5	3	1	3	2.48	**Moderate**
Biological Chemical, Sabotage and Cyber Incident and Explosives Radiological Attack-Terrorism	1	4	1	3	2.10	**Moderate**
Civil Disorder / Terrorism	1	2	4	3	1.95	**Low**
Radiological Release	1	2	4	3	1.95	**Low**
Volcanic Eruption	1	2.5	1	4	1.75	**Low**
Flood	1	1	2	3	1.35	**Low**
Tornado	1	1.5	1	1	1.15	**Low**

Source: Mill City NHMP Steering Committee and Marion County NHMP Steering Committee, 2016.

Hazard Characteristics

Drought

The steering committee determined that the city's probability for drought is **moderate** and their vulnerability to drought is **low**.

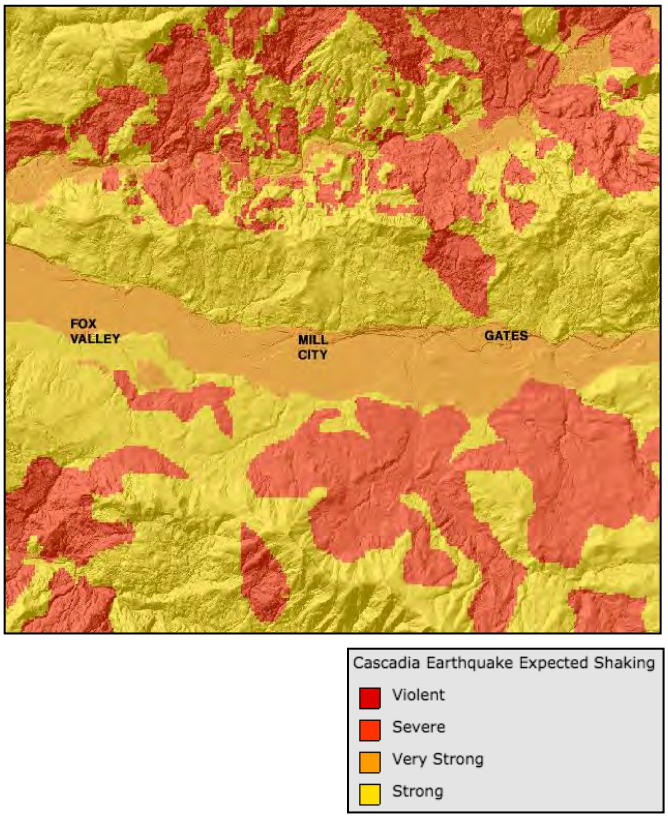
Although dryer conditions in the summer months have impacted the North Santiam Canyon as a whole, Mill City has not experienced major impacts from drought. Recently during the 2015 drought, many tree's and vegetation died off which has created increased risk of wildfire hazards. If dryer conditions become the new norm, Mill City could experience timber die-off, making the forest lands surrounding Mill City more susceptible to wildfires.

Earthquake

The steering committee determined that the city's probability for a Cascadia Subduction Zone (CSZ) Earthquake event is **high** and that their vulnerability to this event is **moderate**. The steering committee determined that the city's probability for a Crustal Earthquake event is **moderate** and that their vulnerability to this event is **moderate**.

Historically, Mill City has experienced one crustal earthquake on August 19, 1961. A 4.5 magnitude earthquake struck 6 miles from Mill City, with shaking felt throughout the Santiam Canyon, up to Detroit.

If another larger and more substantial earthquake occurs (Cascadia), Mill City is expected to experience damage to buildings, utility (electric power, communication, water, wastewater, natural gas) and transportation systems (roads, bridges, pipelines).



Flood

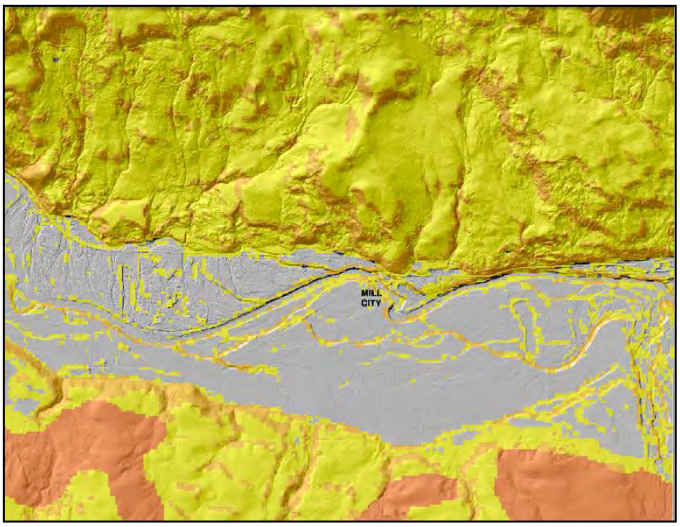
The steering committee determined that the city's probability for flooding is **low** and that their vulnerability to flooding is **low**. The City of Mill City is located approximately 10 miles downstream of the Big Cliff and Detroit dams. The U.S. Army Corps of Engineer regulates water levels behind the dams and manages discharges to prevent downstream flooding. Therefore, the N. Santiam River near Mill City rarely sees more than minor flooding.

Historically, Mill City experienced minor flooding events in 1964 and 1996. This was due to a specific weather pattern named "pineapple express", which blows warm, most air from the southwest into the pacific northwest. Most flooding is mitigated due to the Detroit and Big Cliff Dams that regulate the amount of cubic feet per second that flow out of Detroit Reservoir, into the North Santiam

River. During the 1964 and 1996 storms, the small tributaries entering the North Santiam River near Mill City did have minor flooding caused by the rapid runoff from low elevation snow melt and the heavy rain events. However, the cities drinking water is pulled from an aquifer, and thus, high and dirty river levels do not impact those facilities.

Landslide

The steering committee determined that the city's probability for landslide is **moderate** and that their vulnerability to landslide is **moderate**.



Historically, Mill City has not experienced major impacts from landslides within city limits. Areas near Hwy 22 and the northern edge of the city are more susceptible to this hazard because of steep slopes. The developed areas of the City of Mill City south of the North Santiam River have a "LOW" susceptibility to landslides, but debris flows can occur in the Snake/DeFord creek channels, as they did in the 1964 flood event.

Potential landslide-related impacts are adequately described within the county's plan, and include infrastructural damages, economic impacts (due to isolation and/or arterial road closures), property damages, and obstruction to evacuation routes. Rain-induced landslides and debris flows can potentially occur during any winter in Marion County, and thoroughfares beyond city limits are susceptible to obstruction as well.

Volcano

The steering committee determined that the city's probability for volcanic event is **low** and that their vulnerability to volcanic event is **moderate**.

Mill City has not been impacted previously by volcanic activity, however Mount Jefferson is located east of the city, further into the cascade mountains, and could produce problems if an eruption occurs.

Wildfire

The steering committee determined that the city's probability for wildfire is **high** and that their vulnerability to wildfire is **moderate**.

In 2002 and 2004, Mill City was impacted by wildfire's which caused closure of Hwy 22 east of Detroit Lake. This impacted local residents, restricting travel, and negatively impacting the local economy due to the closure of Hwy 22 for an extended period of time. Mill City and the forest areas east and north of the City may experience more fires as dryer conditions occur in the

North Santiam Canyon. Less rainfall and snowpack can kill of tree's dependent on large amounts of water, which could ultimately lead to an increase of fuels and wild fire ignition probability.

Marion County updated the Community Wildfire Protection Plan (CWPP) in 2016, which mapped wild land urban interface areas and developed actions to mitigate wildfire risk. The city is a participant in the CWPP, and has included hazard mitigation action items directly in line with the CWPP actions.

Windstorm

The steering committee determined that the city's probability for windstorms is **high** and that their vulnerability to windstorms is **high**.

In April of 1931, winds in the Santiam Canyon region felled hundreds of trees causing road closures between Mill City and Detroit. The winds also caused several devastating fires. On December 12, 1995, high wind gusts of up to 60mph downed trees and disrupted power and communication services in the lower Santiam. Mill City residents reported power and phone outages. In 2002, a windstorm caused similar damages, blowing down trees onto roads and power lines.

About once or twice per year the city will experience a windstorm event that can interrupt services, down trees, and cause power outages. Because windstorms typically occur during winter months, they are sometimes accompanied by ice, freezing rain, flooding, and very rarely, snow.

Winter Storm (Snow/Ice)

The steering committee determined that the city's probability for winter storm is **moderate** and that their vulnerability to winter storm is **high**.

Major winter storms have occurred in the Mill City area; in January of 1937, heavy snowfall of over 2 feet caused property damage. Major roads were closed and residents of Detroit and Mill City were stranded for five days as heavy snow and a landslide blocked Hwy 22. In the winter of 2006-07 ice storms caused the city to lose power for 2-3 days. In 2014, a similar storm knocked down tree's and caused hazardous road conditions. These types of storms are more frequent and usually cause transportation issues and communication failures from downed trees and icy/snow filled roads.

Community Asset Identification

This section provides information on city specific assets. Many of these community characteristics can affect how natural hazards impact communities and how communities choose to plan for natural hazard mitigation. Considering the city specific assets during the planning process can assist in identifying appropriate measures for natural hazard mitigation.

Community Characteristics

Mill City is nestled along the North Santiam River. The northern third of the City and the Hwy 22 corridor are located north of the river in Marion County. The remainder of the City,

including the majority of the residential areas, schools, fire station and city offices are located south of the N. Santiam River in Linn County. Mill City is the largest community in the North Santiam River Canyon with a population of 1,855.

With an elevation of 827 feet, the climate of Mill City is moderate; the average monthly temperatures range from 51 – 79 degrees in July and August, and 33-45 degrees in December and January. Mill city receives approximately 60-70 inches of rain, and 6-12 inches of snow each year. The city's topography is relatively flat, but does possess terrain attributed to the North Santiam River. Outside of city limits, steep slopes surround the city on the North and South sides.

Economy

Mill City benefits from its location along Oregon Hwy 22, a major east-to-west transportation route connecting Salem to Bend. The City serves as a local small business, education and service center for residents of the North Santiam Canyon and the traveling public along the Hwy 22 corridor. The existing businesses types include hospitality, restaurants, professional, financial, real estate, service stations, repair/service shops, and personal service businesses; primarily serving the daily needs of local residents.

Critical and Important Facilities/Infrastructure

Communication/Information Technology

There are currently three communication providers in Mill City. Wave provides broadband internet and phone services, Stayton Cooperative Telephone Company provides phone service, and Frontier provides broadband internet with limited fiber infrastructure adjacent to Hwy 22.

Strengths:

- Fiber internet infrastructure already present along Hwy 22
- Cellular Tower (T-Mobile) near 155 NE Santiam Blvd

Weaknesses:

- Phone/Fiber lines may cross over 1st Ave. bridge
- Currently limited certified HAM radio operators

Water

The City of Mill City has two municipal wells (Kingwood Wells 1 & 2) and a water pump station located at SE 4th and SE Kingwood Avenue. The two wells were drilled to a depth of 168 feet. Well 1 has the capacity to produce 800 gpm and Well 2 has the capacity to produce 450 gpm.[1] Both of these wells are in close proximity to each other, pulling water from depths of 45-158 feet deep from the same aquifer.

The city municipal water system currently depends on these wells to distribute water throughout the community. Unless other water facilities are created to pull water from the

[1] City of Mill City Comprehensive Plan Page 56

North Santiam, Mill City must preserve the well head protection area from any possible pollution attributed to encroaching development.

Waste Water

Mill City's has a municipal wastewater treatment facility and collection system. Individual homes are served by a STEP (Septic Tank Effluent Pumping) system. The building sewer from a home or business drains to an interceptor tank located on the property. Solids are collected in the interceptor tanks and the liquids are discharged into the city's sewer collection system. The liquid effluent flows to the City's wastewater treatment facility where it goes through a rock filtration system and is discharged into a large drainfield. The City contracts with a private firm to pump out the interceptor tanks at each home or business. Residential interceptor tanks are pumped on a 7-10-year cycle, with tanks serving businesses or heavy water users pump on a more frequent basis.

Dams

Two dams sit above Mill City, *Detroit Dam* and *Big Cliff Dam. Federal officials and Marion County's Emergency Managers have previously* concluded that the likelihood of Dam Failure is ***Low***[2]***.*** Current conditions still represent the previous decision. If Dam failure occurred in either dams, Mill City would experience catastrophic impacts from a surge of water expelled from either Detroit or Big Cliff lake.

Strengths:

- (2) Municipal wells (Kingwood 1 &2)
- (1) Backup diesel generator on-site
- (2) Above-ground water storage reservoirs at 155 NE Santiam Blvd (Marion County side of river) and SE 4th Avenue (Linn County side of river))
    - Equivalent to (1.5 million) gallons or 3-5 days of water storage
- Municipal wastewater treatment system
- (3) sewage pump stations

Weaknesses:

- No current storage supply of diesel fuel
- Main water lines cross highway & pedestrian bridge
- No backup generator at waste water pump stations
- Main waste water line crosses 1st Ave. bridge

Transportation Systems

Oregon Hwy 22 is the major transportation route for auto, public transit, and emergency vehicle access throughout the Santiam Canyon. Mill City is located along Hwy 22, 30 miles east of the Interstate-5, the City of Salem and the remainder of the Willamette Valley. To the east, Hwy 22 connects to Gates, Detroit, Idanha, and ends at the Santiam Pass interchange with U.S. Route

[2] http://www.co.marion.or.us/PW/EmergencyManagement/Documents/6_damfailure.pdf

20/Oregon Hwy 126, which continue east to the Central Oregon cities of Sisters, Redmond and Bend

The Cherriots Canyon Connector is the only existing public transit service serving communities in the North Santiam Canyon. The Canyon Connector route has three total round trips with buses running approximately every (5) hours.

In case of the closure of Oregon Hwy 22, Mill City residents will have to rely on alternate routes to reach supplies or safety in the Willamette Valley. Lyons-Mill City Drive runs from Mill City to Lyons, where it connects to OR 226 and Hwy 22.

Bridges

Structure Name	Location	Year Built	Structural Condition
Little North Fork Santiam River	Is this on Hwy 22 in Lyons?	1952	Fair
North Santiam River Railroad (Pedestrian) Bridge	Mill City	1919	Good
Mill City Bridge - 1st Ave.	Mill City	1960	Fair
Gates Bridge (over N. Santiam River)	Gates		
OR 226 Bridge (over N. Santiam River)	Lyons		

Strengths:

- Pedestrian Bridge owned by Mill City could be used by some light duty emergency vehicles
- Lyons/Mill City Drive serves as an additional evacuation route to Lyons (west).
- SE Kingwood Avenue serves as an additional evacuation route to Gates (east).
- Bridges over the N. Santiam River in Gates and Lyons provide an alternative route for Mill City traffic if problems occur on the 1st Avenue bridge in Mill City.

Weaknesses:

- 1st Ave Bridge has weight restrictions (owned by ODOT).
- Pedestrian Bridge needs restoration and contains more stringent weight restrictions.
- Hwy 22 closures could make travel outside of North Santiam Canyon extremely difficult.
- Bridges over N. San

Energy & Utilities

Mill City receives energy and utility services from Pacific Power and NW Natural Gas. The main power service line to Mill City comes from Lyons to Mill City, along Lyons-Mill City Drive. It was rebuilt in 2015-2016.

BPA transmission lines runs south of Mill City from the Detroit Dam generating turbines , connecting to the Lyons power station.

Strengths:

- Gas stations with fuel storage exist within Mill City.
- Businesses including Freres Lumber and Frank Lumber Co. possess fuel storage.

Weaknesses:

- Gas stations possess below ground tanks which cannot be pumped without electricity
- Gas stations do not currently possess backup diesel generators to pump fuel from storage tanks.
- No alternate sources of energy (wind, solar) exist to power basic services

Agriculture and Food

Mill City has a small 10,000 sf grocery store, the Mill City Marketplace, convenience stores and several restaurants to provide groceries and food services. The closest full-service grocery exists 17 miles west in Stayton. the closure of Hwy 22 as a transportation route would cause serious concern for residents and food accessibility. Although farms exist in the southern part of Mill City, most are farmed for grass seed/pasture and would not be readily available for food use.

Strengths:

- Private sector entities which possess limited (1-2 days) food supplies.
- Agricultural land availability near Mill City.

Weaknesses:

- No major (full service) grocery store inside of city limits.
- Surrounding agriculture currently not used for food production.

Banking and finance

A U.S Bank exists on the north side of the North Santiam river in Mill City. The bank is located along Hwy 22 and could be utilized for emergency financial services during a hazard event.

Strengths:

- Presence of a banking/financing institution within city limits.

Weaknesses:

- Full “urban” financial services unavailable.

Hazardous Materials

Mill City does not possess any large manufacturing firms that possess hazardous materials. The city has identified current brownfields which may be susceptible to leaching including the Texaco gas station and Remine mill site.

Brownfields

DEQ Site ID	Facility Name	Location
1061	Forester Equipment, Inc	SW 5th Ave. *Site Screening Recommended*
2107	Fred A. Moore Logging Co.	27860 NE Santiam Blvd *Site Screening Recommended*
1128	Hoover's Shop	SW 5th Ave. & Linn Place *Site Screening Recommended*
345	North Santiam Plywood	47983 Lyons Mill City Dr. *Site Screening Recommended*
1844	Mill City Railroad Bridge	At Hwy 22, N Santiam River, R.M. 47.2 *State Expanded Preliminary Assessment recommended*

Strengths:

- There are currently not enough known hazardous materials to cause major concern.
- Brownfield sites could be utilized and attract privates sector development.

Weaknesses:

- Current brownfields maybe susceptible to leaching of unknown materials.

Emergency Services

Mill City receives emergency service support from Linn County Sheriffs and the Mill City Rural Fire Protection District.

- Linn County Sheriffs Office substation at City Hall, 444 S. 1st Avenue
- Mill City Rural Fire Protection District, Main Fire Station, 400 S. 1st Avenue

Strengths:

- Mill City possess community specific emergency services for fire and law enforcement.
- The RFPD building possesses a backup generator.

Weaknesses:

- Emergency services do not have trained HAM radio operators.
- Emergency services do not possess rescue rafts for North Santiam River access.

Government Facilities

Mill City Hall contains the office space for the administration, finance, permits, planning, public works, municipal court, and also serves as the Mill City Sherriff substation

- Mill City City Hall, 444 S. 1st Ave.
- Mill City Post Office, 101 SE Kingwood Avenue

Strengths:

- New city hall facility could be utilized for a shelter or emergency response center.

Weaknesses:

- City Hall does not possess a backup diesel generator to power facility in the event of a power outage.

Environmental/Historical Preservation Sites

Mill City is surrounded by environmental preservation sites including state parks and designated wilderness areas. 50% of the housing stock in Mill City was built before 1950. The Hinkle-Reid house located at 525 NE Alder St. was built in 1916. It is the only structure in Mill City listed on the National Register of Historic Places. There are four other structures listed on the City's local historic resource inventory, including a wrought iron Phoenix column railroad bridge on timber trusses that crosses the North Santiam River at 1st Avenue in Mill City. The railroad bridge was originally constructed in 1888, and then moved up to Mill City in 1919. The bridge remained in railroad use until 1967 and was refurbished for pedestrian use in the mid-1990's. The City of Mill City has created a recreational trail on the abandoned railroad right of way through the City, with the refurbished railroad bridge as its focal point. The community plans to repaint and refurbish the bridge to celebrate its centennial in 2019.

Strengths:

- Proximity to pristine state and federal land could attract residents or business.
- Buildings of historical significance located within city limits.
- History and "timber" character provided by Mill City pedestrian bridge.

Weaknesses:

- Mill City bridge needs funding for restoration.

Education

Mill City is home to the Santiam Canyon School District. This district encompasses all cities in the Santiam Canyon including Mill City, Gates, Detroit and Idanha. This district includes the Santiam Elementary School, and the Santiam Jr/Sr High school.

- Santiam School District
    - Santiam Elementary School, 450 SW Evergreen St.
    - Santiam Jr/Sr High School, 265 SW Evergreen St.

Strengths:

- School facilities could be utilized to shelter a large amount of community residents including functional needs populations.

- School facilities already possess needed infrastructure for a shelter which includes restrooms, showers and a kitchen.
- School buses could be utilized for transportation after a hazard event.

Weaknesses:

- There are no current agreements or MOU's between the counties, city and school district to utilize facilities after a hazard event

Healthcare & Public Health

Santiam Memorial Hospital operates a satellite medical clinic in Mill City. The clinic provides outpatient services for local residents. The Mill City Pharmacy enables residents to fill prescriptions and purchase in-home medical supplies. The Santiam Memorial Hospital in Stayton and its adjacent medical clinics provide outpatient, surgery center, birthing services and in-patient medical care.

- Santiam Medical Clinic, 280 S 1st Ave.

Strengths:

- A clinic with out-patient services exists within the community.

Weaknesses:

- No facilities with major life-saving equipment currently exist within city limits.
- Emergency health supplies are limited to what exists within the community.

Access and Functional Needs

Mill City's vulnerable population consists of the elderly and those that are medically dependent and require life safety equipment. In 2010, 13.5% of Mill City's residents were elderly, 65 years of age or older.

Strengths:

- Over 39% of residents are over the age of 45, this older populous can volunteer and promote social cohesion in the community.

Weaknesses:

- There are no assisted living or full-service medical care facilities to serve the aging population.

CITY OF SILVERTON ADDENDUM

Purpose

This document serves as the City of Silverton's Addendum to the Marion County Multi-Jurisdictional Hazards Mitigation Plan (MHMP, HMP). This addendum supplements information contained in Volume I (Basic Plan) of this HMP. The Basic Plan serves as the foundation for this jurisdiction's addendum. Volume III (Appendices) provides additional information (particularly regarding participation and mitigation strategy). This addendum meets the following requirements:

- Multi-jurisdictional **Plan Adoption** §201.6(c)(5),
- Multi-jurisdictional **Participation** §201.6(a)(3),
- Multi-jurisdictional **Mitigation Strategy** §201.6(c)(3)(iv), and
- Multi-Jurisdictional **Risk Assessment** §201.6(c)(2)(iii).

Plan Process, Participation, and Adoption

This section of the HMP addendum addresses 44 CFR 201.6(c)(5), *Plan Adoption*, and 44 CFR 201.6(a)(3), *Participation.*

In the summer and fall of 2016, the Oregon Partnership for Disaster Resilience (OPDR) at the University of Oregon's Community Service Center (CSC) partnered with the Oregon Military Department's Office of Emergency Management (OEM), and Marion County cities, including Silverton, to update their addendum to the Marion County HMP, which expired July 8, 2016. This project is funded through the Federal Emergency Management Agency's (FEMA) FY14 Pre-Disaster Mitigation Competitive Grant Program (PDMC-PL-10-OR-2014-002).

By developing this addendum to the Marion County HMP, locally adopting it, and having it approved by FEMA, the City of Silverton will regain eligibility for FEMA Hazard Mitigation, Pre-Disaster Mitigation, and Flood Mitigation Assistance grant program funds.

The Marion County HMP, and Silverton addendum, are the result of a collaborative effort between citizens, public agencies, non-profit organizations, the private sector, and regional organizations. A project steering committee guided the process of developing the plan. For more information on the composition of the steering committee see the *Acknowledgements*, *Plan Summary*, and *Plan Process* (Volume III, Appendix B).

The Silverton City Manager (who also serves as Silverton's Emergency Manager) is the designated local convener of this addendum. The Convener will take the lead in implementing, maintaining, and updating the addendum to the HMP in collaboration with Marion County Emergency Management.

Representatives from the City of Silverton steering committee met formally on one occasion: October 11, 2016 (see Appendix B for more information).

The city's addendum reflects decisions decided upon at the plan update meeting and during subsequent work and communication with OPDR.

The City of Silverton Steering Committee is comprised of representatives from the following departments:

- Convener, City Manager (Emergency Manager)
- Police Department
- Public Works Department
- Community Development Department
- Silverton Fire Department
- Silverton Local Business Representative (2)
- Community Nonprofit Representative

Silverton used multiple approaches to engage the public. First, the City established steering committee representatives from across the city. Next, the City actively participated in countywide community engagement activities described in Volume I, Section 4 and in Appendix B. City staff also presented the draft plan to the City Council during an open public council session. The Steering Committee was closely involved throughout the development of the plan and served as the local oversight body for the plan's development. In addition, community members outside of the steering committee were provided an opportunity for comment via the plan review process (see Appendix B for more information).

The Marion County HMP was approved by FEMA on [Month] [Day], 2017 and the Silverton addendum was adopted via resolution on [Month] [Day], 2017. This HMP is effective through [Month] [Day], 2022.

Mitigation Strategy

This section of the HMP addendum addresses 44 CFR 201.6(c)(3(iv), *Mitigation Strategy*.

During the 2016 Marion County and Silverton update process, OPDR and a representative from Marion County Emergency Management assisted the steering committee with developing mitigations that will meet Silverton's unique situation. The proposed actions were then re-reviewed by the steering committee to finalize. Silverton developed a list of priority actions (Appendix A-1), any actions that were not prioritized were placed in the Action Item Pool (Appendix A-2) and will be considered during the annual meetings. For a status update on each of Silverton's 2009 mitigation actions, see Appendix A-2.

Priority Actions

The City is listing a set of high priority actions in an effort to focus attention on an achievable set of high leverage activities over the next five-years. The City's priority actions are listed in Table SV-1 on the following page.

Action Item Pool

Table SV-2 on the following pages presents a pool of mitigation actions. This expanded list of actions is available for local consideration as resources, capacity, technical expertise and/or political will become available.

Table SV-1. Silverton Priority Action Items

Action Item ID	Hazard	Action Item	Coordinating Organization	Partner Organizations	Timeline
Priority Actions					
P-1	Flood	Update Silverton Flood Insurance Rate Maps (FIRMS).	Silverton Flood Plain Coordinator	Oregon Risk MAP; Silver Jackets; DOGAMI	Mid Term (3-5 years)
P-2	Dam Failure	Update the dam breech inundation scenario map.	Public works, Engineering	Marion Co.; UASCE	Short Term (1-2 years)
P-3	Dam Failure	Conduct seismic evaluation of Silver Creek Dam and Silverton water supply reservoir.	Public Works Director, Water Quality Supervisor	USACE	Short Term (1-2 years)
P-4	Dam Failure	Develop evacuation strategy for both local and regional dam failure scenarios.	Silverton Emergency Management	USACE	Mid Term (3-5 years)
P-5	Earthquake	Conduct seismic evaluation of West C and Main Street bridges over Silver Creek	Silverton Public Works	Marion Co., ODOT	Short Term (1-2 years)

Source: City of Silverton HMP Steering Committee, 2016.

Table SV-2. Silverton Action Item Pool

Action Item ID	Hazard	Action Item	Coordinating Organization	Partner Organizations	Timeline
Action Item Pool					
Multi-Hazard					
MH-1	Multi-Hazard	Assess options for a new City Hall building a structure that will withstand flood.	Administrative Services Director	City Council	Mid Term (3-5 years)
MH-2	Multi-Hazard	Create a Facilities Master Plan that assesses the need for new or updated facilities, and incorporates natural hazard vulnerabilities and mitigation measures for reducing vulnerability. Consider hazards in future facilities master plan updates.	Public Works	Administrative Services Director	Mid Term (3-5 years)
MH-3	Multi-Hazard	Create memoranda of understanding with fuel stations that allows emergency responders first access to fuel.	Public Works	Administrative Services Director	Short Term (1-2 years)
MH-4	Multi-Hazard	Create mutual aid agreement with sister cities.	Administrative Services Director	Emergency Management; Marion Co.	Short Term (1-2 years)
MH-5	Multi-Hazard	Educate businesses and governmental organizations about the importance of continuity of operations plans to make them more resilient to natural hazards.	Administrative Services Director	Chamber of Commerce	Ongoing
MH-6	Multi-Hazard	Participate in the COAD.	Emergency Management	Marion Co.; CERT	Ongoing
MH-7	Multi-Hazard	Improve coordination and evaluation of technical and engineering gaps in communications capabilities for natural hazards event response. (METCOM is currently doing an assessment.)	Emergency Management	City Administration; METCOM 911	Short Term (1-2 years)
MH-8	Multi-Hazard	Review, and if necessary, revise emergency management and business continuity plans, policies, and ordinances to ensure effective response, business continuity, and post-disaster recovery efforts. (Next update in 2018.)	Emergency Management	City Administration; City Council	Short Term (1-2 years)
MH-9	Multi-Hazard	Identify larger equipment that needs to be purchased that would support response during a disaster.	Emergency Management	City Administration; City Council	Short Term (1-2 years)
MH-10	Multi-Hazard	Secure memoranda of understanding for alternative sites that could be used for essential city functions if city buildings are not usable.	Administrative Services Director	City Council	Short Term (1-2 years)

Source: City of Silverton HMP Steering Committee, 2016.

Table SV-2. Silverton Action Item Pool (Continued)

Action Item ID	Hazard	Action Item	Coordinating Organization	Partner Organizations	Timeline
Action Item Pool					
Drought					
DR-1	Drought	Participate in implementing the Marion County Drought Contingency Plan	Water Quality Supervisor - Public Works	Marion County; North Santiam Drought Contingency Committee	Ongoing
Earthquake					
EQ-1	Earthquake	Seek voter approval for construction of City of Silverton Police Facility/Emergency Operations Center.	City Manager and Council	Fire Marshal; Police Chief	Mid Term (3-5 years)
EQ-2	Earthquake	Following seismic evaluation of the West C and Main Street over Silver Creek, seek funding to reinforce or replace as needed.	Public Works Director	Marion C.; ODOT	Mid Term (3-5 years)
EQ-3	Earthquake	Assess the seismic strength of Silverton's sewage treatment system and develop improvements accordingly as part of the sewage system's current update efforts.	Public Works Director, Water Quality Supervisor	City Council	Short Term (1-2 years)
EQ-4	Earthquake	Coordinate with Silverton School District to seek funding to assess and seismically retrofit school buildings that are vulnerable to collapse, including Mark Twain Middle School and the Robert Frost Elementary School.	Administrative Services Director	Silverton School District; Business Orgon IFA (seismic grant program); City Council	Mid Term (3-5 years)
EQ-5	Earthquake	Encourage reduction of nonstructural and structural earthquake hazards in homes, schools, businesses, and government offices through public education and the Map My Neighborhood program.	Administrative Services Director	Marion Co.	Short Term (1-2 years)
EQ-6	Earthquake	Update comprehensive plan to reflect the latest information on seismic hazards.	Community Development	Planning Commission; DLCD	Mid Term (3-5 years)
EQ-7	Earthquake	Evaluate the installation of automatic shut-off valves in all city facilities that use natural gas.	Engineering	Northwest Natural	Ongoing
EQ-8	Earthquake	Send city employees to the County's ATC 20 training.	Administrative Services Director	City/County Emergency Management	Ongoing
EQ-9	Earthquake/ Multi-Hazard	Encourage residents to prepare and maintain at minimum two-week survival kits.	Emergency Management	CERT	Ongoing

Source: City of Silverton HMP Steering Committee, 2016.

Table SV-2. Silverton Action Item Pool (Continued)

Action Item ID	Hazard	Action Item	Coordinating Organization	Partner Organizations	Timeline
Action Item Pool					
Flood					
FL-1	Flood	Educate residents and business owners near Silver Creeks about how to manage flood risks.	City floodplain coordinator	DLCD; FEMA; Risk MAP	Ongoing
FL-2	Flood	Mitigate flood issues at the wastewater treatment facility though riverbank reconstruction and other flood mitigation measures.	Public Works Director, Water Quality Supervisor	City Council	Short Term (1-2 years)
FL-3	Flood	Continue compliance with the National Flood Insurance Program (NFIP) through the enforcement of local floodplain ordinances.	City floodplain coordinator	Administrative Services Director	Ongoing
Landslide					
LS-1	Landslide	Based on the new LIDAR information obtained from DOGAMI, create a list of at-risk infrastructure and develop a public infrastructure landslide mitigation program to address the landslide hazard.	Public Works Director	DOGAM; Marion Co.	Short Term (1-2 years)
Wildfire					
WF-1	Wildfire	Implement the wildfire mitigation actions for Silverton found in the Marion County Community Wildfire Protection Plan when an updated plan becomes available.	Fire Marshall	Marion Co.	Ongoing
WF-2	Wildfire	Review Marion County's development codes together with the Marion County Planning Department to develop ways to mitigate wildfires near Silverton.	Fire Marshall	Community Development	Short Term (1-2 years)
Severe Weather					
SW-1	Severe Winter Storm	Continue to educate citizens about ways to weatherize their homes, as well as safe emergency heating equipment. [This could be improved]	Emergency Management	PGE	Ongoing
SW-2	Windstorm	Continue to support/encourage electrical utilities to use underground construction methods where possible to reduce power outages from windstorms.	Community Development	PGE	Ongoing
SW-3	Windstorm	Regularly assess the health of trees in Coolidge McClaine Park to prevent damage to buildings and utilities from falling trees.	Parks and Recreation	Public Works Maintenance	Ongoing

Source: City of Silverton HMP Steering Committee, 2016.

Plan Implementation and Maintenance

The City Council will be responsible for adopting the City of Silverton addendum to the Marion County HMP. This addendum designates a convener and a coordinating body to oversee the development and implementation of action items. Because the city addendum is part of the county's multi-jurisdictional HMP, the City will look for opportunities to partner with the county. The City's steering committee will convene after re-adoption of the City of Silverton addendum on an annual schedule; the county meets on a semi-annual basis. The City of Silverton Convener will participate in the Marion County HMP meetings and will report on city specific activities as appropriate. The steering committee will be responsible for identifying new risk assessment data, reviewing status of mitigation actions, identifying new actions, and seeking funding to implement the City's mitigation strategy (actions). The convener will also remain active in the county's implementation and maintenance process (see Volume I, Section 4 for more information).

The City will utilize the same prioritization process as the county (See Volume I, Section 4: Plan Implementation and Maintenance and Volume IV, Appendix D: Economic Analysis of Hazard Mitigation Projects for more information).

Implementation through Existing Programs

Many of the Hazards Mitigation Plan's recommendations are consistent with the goals and objectives of the City's existing plans and policies. Where possible, the City of Silverton will implement the HMP's recommended actions through existing plans and policies. Plans and policies already in existence have support from local residents, businesses, and policy makers. Many land-use, comprehensive, and strategic plans get updated regularly, allowing them to adapt to changing conditions and needs. Implementing the HMP's action items through such plans and policies increases their likelihood of being supported and implemented.

Silverton's Comprehensive Plan was first acknowledged by the Oregon Land Conservation and Development Commission in 1987.[1] The City most recently completed updates to the plan, including updates to the Natural Hazards section, in December of 2013 and August of 2014. The Silverton Comprehensive plan indicates that the flood and earthquake hazards are the "two major types of natural hazards" that are estimated to affect the city. There is no mention in the natural hazards section of landslide or wildfire (listed under Statewide Planning Goal 7). The plan does contain a general goal to "Protect life and property from natural disasters and hazards." In addition, the plan contains three specific policies related to the flood hazard. There are no other hazard related policies listed. The City implements the plan through the Silverton Land Development Code, first adopted in 1998. The City has completed numerous updates since, with the most recent occurrence in November of 2016.

Silverton currently lists the following as attachments to the Comprehensive Plan:

- Master Sewer Plan Update 1992

[1] Note, LCDC acknowledged the Salem Area Comprehensive Plan in 1982. Silverton prepared and adopted the Silverton Comprehensive plan in January of 1987 with LCDC acknowledging it as an Amendment to the Salem Area Comprehensive Plan in February of 1987.

- Master Sewer Plan Update December 1993
- Dual Interest Area Agreement
- Master Sewer Plan Update January 30, 2003
- Parks & Recreation Master Plan dated January 2008
- City of Silverton Transportation System Plan (April 2009) Part 1
- City of Silverton Transportation System Plan (April 2009) Part 2

For more information, refer to http://www.Silverton.org/Adopted-Plans-Studies/.

Continued Public Participation

Keeping the public informed of the City's efforts to reduce the city's risk to future hazard events is important for successful plan implementation and maintenance. The City is committed to involving the public in the plan review and updated process. See Volume I, Section 4, for more information.

Plan Maintenance

The Marion County Multi-Jurisdictional Hazards Mitigation Plan and city addendum will be updated every five years in accordance with the update schedule outlined in the Disaster Mitigation Act of 2000. During the county plan update process, the City will also review and update its addendum. The convener will be responsible for convening the steering committee to address the questions outlined below.

- Are there new partners that should be brought to the table?
- Are there new local, regional, state, or federal policies influencing natural hazards that should be addressed?
- Has the community successfully implemented any mitigation activities since the plan was last updated?
- Have new issues or problems related to hazards been identified in the community?
- Are the actions still appropriate given current resources?
- Have there been any changes in development patterns that could influence the effects of hazards?
- Have there been any significant changes in the community's demographics that could influence the effects of hazards?
- Are there new studies or data available that would enhance the risk assessment?
- Has the community been affected by any disasters? Did the plan accurately address the impacts of this event?

These questions will help the steering committee determine what components of the mitigation plan need updating. The steering committee will be responsible for updating any deficiencies found in the plan.

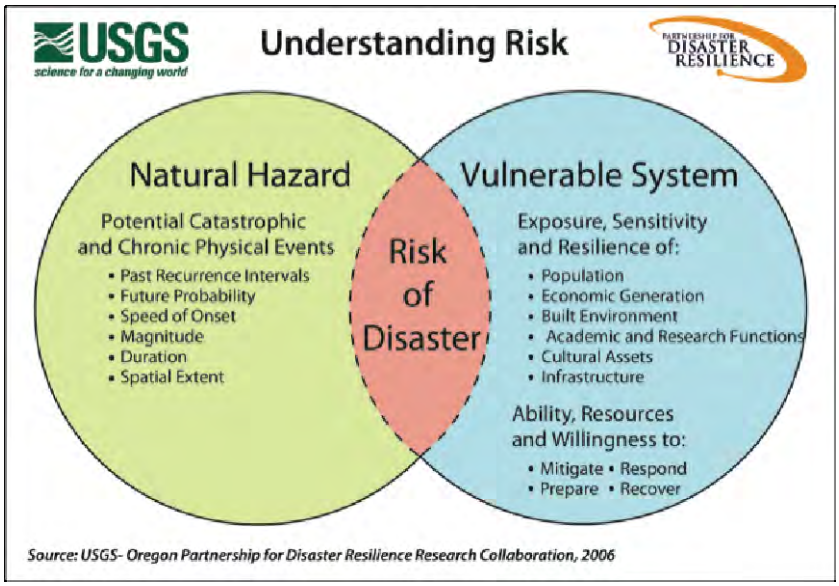
Risk Assessment

This section of the HMP addendum addresses 44 CFR 201.6(b)(2) - Risk Assessment. In addition, this chapter can serve as the factual basis for addressing Oregon Statewide Planning Goal 7 – Areas Subject to Natural Hazards. Assessing natural hazard risk has three phases:

- **Phase 1:** Identify hazards that can impact the jurisdiction. This includes an evaluation of potential hazard impacts – type, location, extent, etc.
- **Phase 2:** Identify important community assets and system vulnerabilities. Example vulnerabilities include people, businesses, homes, roads, historic places and drinking water sources.
- **Phase 3:** Evaluate the extent to which the identified hazards overlap with, or have an impact on, the important assets identified by the community.

The local level rationale for the identified mitigation strategies (action items) is presented herein, and within Section 2, *Risk Assessment*, and Appendix C, *Community Profile*. The risk assessment process is graphically depicted in Figure SV-1 below. Ultimately, the goal of hazard mitigation is to reduce the area of risk, where hazards overlap vulnerable systems.

Figure SV-1. Understanding Risk



Risk Assessment Approach

A risk assessment is intended to provide the, "factual basis for activities proposed in the strategy to reduce loses from identified hazards."[2] To complete the risk assessment, the HMP update team first updated the description, type, location and extent of each hazard. Next, the team updated the vulnerability information based on each hazard's potential impact on the community.

The Marion County Basic Plan (Volume I, Section II) Risk Assessment describes in detail the methods used to assess risk. In summary, Marion County has prepared a Threat Hazard Identification and Risk Assessment as a formal annex to the Marion County Emergency Operation Plan. The assessment uses a method developed by BOLD Planning.[3] This city

[2] 44 CFR 201.6(2)(i)

[3] BOLD Planning is a consulting firm specializing in the development of actionable emergency plans. For more information, visit: http://www.boldplanning.com/

addendum builds on the county level assessment to produce a similar assessment for the City of Silverton. The assessment specifically examines:

1. Probability (frequency) of event
2. Magnitude of event
3. Expected warning time before event
4. Expected duration of event

Refer to Page 2-4 of the Marion County Basic HMP for a description of the scoring values for each ranking category.

Hazard Analysis

The assessment identifies three levels of risk: High, Moderate and Low.

High - High probability of occurrence; at least 50 percent or more of population at risk from hazard; significant to catastrophic physical impacts to buildings and infrastructure; major loss or potential loss of functionality to all essential facilities (hospital, police, fire, EOC and shelters).

Moderate - Less than 50 percent of population at risk from hazard; moderate physical impacts to buildings and infrastructure; moderate potential for loss of functionality to essential facilities.

Low - Low probability of occurrence or low threat to population; minor physical impacts.

A summary of the risk assessment findings and rankings is presented below.

Table SV-3. Hazard and Vulnerability Assessment Summary

Hazard Profile Summary for Silverton Usinging Bold Planning Analysis Scoring							
Natural Hazard	Probability	Warning Time	Magnitude	Duration	CPRI	Local Planning Significance	County Planning Significance
Weight Factor	0.45	0.3	0.15	0.1			
Earthquake*	4	4	4	4	4.00	High	High
Severe Weather/Storm**	4	1	3	3	2.85	Moderate	High
Flood	3	2	3	4	2.80	Moderate	High
Drought	3	1	2	4	2.35	Moderate	High
Extreme Weather - High Temperature	3	1	2	4	2.35	Moderate	Moderate
Wildland Interface Fire	1	4	2	2	2.15	Moderate	Moderate
Dam or Levee Failure	1	2	4	4	2.05	Moderate	Moderate
Landslide	2	2	2	2	2.00	Moderate	High
Volcanic Eruption	1	1	1	4	1.30	Low	Low
*Note: Earthquake probability listed to match county level analysis. See below for more detailed probability assessment.							
**Note: Includes tornado hazard							

Source: BOLD Planning Risk Assessment Method; Analysis by UO Community Service Center.

Community Asset Identification

This section provides information on city-specific assets. For additional information on the characteristics of Silverton, in terms of geography, environment, population, demographics, employment and economics, as well as housing and transportation see Volume III, Appendix C, *Community Profile*. Many of these community characteristics can affect how hazards impact communities and how communities choose to plan for natural hazard mitigation. Considering the city-specific assets during the planning process can assist in identifying appropriate measures for natural hazard mitigation.

Community Characteristics

The City of Silverton is located in Marion County, Oregon, straddling the banks of Silver Creek. The city is bisected by Highway 214 running roughly north-south and Highway 213 running roughly northeast-southwest. The city is approximately 15-miles west of the Salem-Keizer metro area. Silverton is located in Oregon's Willamette Valley, which experiences a moderate climate. In August, the average high temperature is 82 degrees and the average low temperature is 51 degrees. Wintertime temperatures in January range from an average high of 46 degrees to an average low of 33 degrees. The average annual precipitation is 39.9 inches.

The US Census lists Silverton's 2015 population at 9,590. This represents a 22.5% increase from 2000. For more demographic information, refer to Appendix C.

Economy

As with other early settlements throughout Marion County, proximity to water fueled early industry. Today, Silverton is home to the Oregon Garden, a private botanical wonderland attracting visitors from throughout the region. The city serves as a bedroom community to Salem and Portland. Its strong service economy caters to locals and tourists alike. Today, Silverton's primary employment sectors are health, manufacturing, retail, education and leisure, and hospitality. Median household income in Silverton is $53,929. For more economic information, refer to Appendix C.

Critical and Important Facilities

Critical and important facilities include the following:

Transportation

- Bridges:
    - Main St Bridge (ODOT bridge) – 12" waterline, forced sewer main, gas line, phone lines (this is the main switch into the Frontier station), fiber
    - C St Bridge (ODOT) – nothing attached
    - James Ave (City owned) – 8" waterline
- Highway 213 is the main east-west highway that connects Silverton with Salem to the west, and Oregon City to the northeast.
- Highway 214 is the major north-south highway that connects Silverton with Mount Angel and Woodburn to the north and Silver Creek Falls State Park and Highway 22 to the south.
- Highways 213 and 214 intersect in Silverton's commercial downtown.
  Note: Every route into town requires crossing a bridge – how will they get to the Aurora airport if bridges are out?
  Note: Silver Creek earthen dam and spillway – there isn't great access to the earthen dam (easy to get there from SW, but not NE)

Energy

- Portland General Electric is the only power supplier
  Note: Only one substation, and if it goes down, the entire town is affected.

Note: It is unlikely PGE will immediately provide assistance to Silverton in the event of a large-scale disaster.

- Fuel:
  - City Hall/Police – natural gas generator
  - Early warning dam building (monitoring building) – propane generator (150 gallons of propane stored, which will probably last 2 weeks)
  - City Shops – Generac propane generator (300 gallons of propane stored)
  - Edison pump station – propane generator
  - The City also has two very small emergency generators that run on gasoline

Water

- Drinking Water:
  - Abiqua Creek (primary) and Silver Creek are the main water supply sources for the city.
  - Abiqua diversion dam and 7-mile supply pipeline into town.

  Note: Pipeline was replaced in 1995, but there's a section that might fail in an earthquake. If water isn't available from Abiqua Creek (due to this issue), it would be possible to pull from Silver Creek.
  - Two water treatment plants on Ames Street, with a combined treatment capacity of 5.5 million gallons per day. (Need to find out about generators at each plant).
  - Three booster pump stations (Edison pump station, at the plant, Main St. pump station).
  - Three treated water storage tanks totaling 4.5 million gallons.
  - Reservoir (420 million gallons of storage) contained by the Silver Creek Dam (this is the earthen dam) southeast of the city.
- Wastewater:
  - Schemmel Lane Wastewater Treatment Plant treats the entire city.

Communication

- Communication towers:
  - Eastview Lane – tower with a repeater owned by Verizon, backup propane generator
  - Tower on top of City Hall
  - Tower on water plant on Ames
  - Tower off of Commerce owned by Wave Broadband
- Police, Fire, and Public Works can all communicate through radio.
  Note: All police cars connected to communication through cell towers – if cell towers aren't functional, police cars won't have computer access (just radio).
  Note: If Metcom goes down, 819 Railway Avenue becomes the dispatch center.

Emergency services

- Fire (Silverton Rural Fire District):
  - Station 1 (Main Station) (819 Rail Way NE, Silverton 97381)
  - Station 2 (13404 Riches Rd SE, Silverton 97381)
  - Station 3 (17447 Abiqua Rd NE, Silverton 97381)
  - Station 8 (490 3rd St., Scotts Mills 97375)
  - Station 9 (4724 Crooked Finger Rd NE, Scotts Mills 97375)

- Police:
    - Silverton Police Department (306 S. Water St.)
- Medical
    - Woodburn Ambulance substation (316 Phelps)
    - Silverton Hospital (342 Fairview St.) – 48-bed medical facility

Cultural/historical resources

- On the National Register of Historic Places:
    - Calvary Lutheran Church and Parsonage "White Steeple Church" (314 Jersey St.)
    - Downtown Silverton Commercial Historic District
    - Seven or eight homes listed around town
- Silverton Country Museum (428 South Water St.)
- Oregon Garden, containing the Gordon House, the only house designed by Frank Lloyd Wright in Oregon (879 W Main St.)

Functional and Access Needs (Vulnerable Populations)

- Silver Falls School District contains five public schools in the city. In 2010, 8.45% were in an ESL program.
- Assisted living facilities:
    - Davenport House/Davenport Place (930 Oak St.)
    - Wisdom Keepers Senior Care Home (171, 173 Steelhammer Rd.)
    - Marquis Silver Gardens (115 S. James St.)
    - Lone Oaks Care Homes (331 Lone Oaks Loop)
    - Silverton Senior Center (115 Westfield St.)
- Home for mentally challenged adults (1118 Florida Dr.)
- Silvertown 1 & 2 with senior and disabled adults (1 – 1000 N 2nd St.; 2 – 1115 mills St.)
- Silverton Mobile Estates (1307 S Water St.)
- Twilight Ct. (811 S Water) – low-income housing

Hazard Characteristics

Drought

The characteristics of drought in Silverton are the same for the county as a whole.

Table SV-4. Drought Summary

Hazard	Drought
Type	Climatic
Speed of Onset	Slow
Location	Varies, County Wide
Extent	Moderate to Severe Drought*
Prior Occurance	Three > 6 months duration since 1982
Probability	~9%

*Defined as between -2 and -4 on the National Resource Conservation Service (NRCS) Surface Water Supply Index (SWSI)

Sources: Oregon NHMP; NRCS; analysis by OPDR

The probability of drought in Silverton is likely, the same as for the county as a whole. Silverton relies on surface water and reservoir storage for its water supply source and historically drought has not been an issue. The City has a water curtailment plan that they have tested in the past even though conditions did not require it. Therefore, Silverton's vulnerability is low. Overall, the planning significance of drought in Silverton is moderate.

Volume I, Section 2, *Risk Assessment*, adequately describes the characteristics of drought hazards, as well as the location and extent of a potential event. Due to a cool, wet climate, past and present weather conditions have generally spared Marion County communities from the effects of drought. Governor Kate Brown declared a drought emergency for all of Marion County in September 2015.

As noted above, Silverton's primary water supply comes from Abiqua Creek via the Abiqua diversion dam and transmission pipeline. The transmission line, replaced in 1995, runs seven miles into town. The Silverton steering committee noted that there is a section that could fail in an earthquake. However, the City has a secondary source of water in Silver Creek. Silver Creek supplies 420 million gallons of raw water storage capacity provided by the Silverton Reservoir. Raw water from these two sources is treated for consumption at two treatment facilities located on Ames Street. The City is capable of treating up to 5.5. million gallons of water per day and has 4.5 million gallons of treated water storage capacity. The City maintains three (3) pump stations (Edison pump station, Main Street pump station, and the treatment plant pump).

Please review the Risk Assessment (Volume I, Section 2) for additional information on this hazard.

Earthquake

The characteristics of a crustal earthquake are similar to the county as a whole.

Table SV-5. Earthquake Summary Crustal

Hazard	Earthquake - Crustal
Type	Geologic
Location	Multiple active faults; Willamette Valley
Speed of Onset	Rapid
Extent	Very Strong to Severe shaking ~ 500 yrs*
Prior Occurance	One over Magnitude 5 last 100 yrs**
Probability	Approximately 1% annual

*DOGAMI HazVu; ** PNSN - 1993 Scotts Mills just north of Marion County

Sources: DOGAMI - Oregon HazVu; Oregon NHMP; Pacific Northwest Seismic Network

The characteristics of a Cascadia subduction zone earthquake are the same as the county.

Table SV-6. Earthquake Summary Subduction

Hazard	Earthquake - Subduction
Type	Geologic
Location	Primarily west of the Cascades; CA - BC
Speed of Onset	Rapid
Extent	Catastrophic
Prior Occurance	One over Magnitude 9 last 500 yrs
Probability	Magnitude 9+ is 7% - 12% over 50 yrs**

*DOGAMI HazVu; **Oregon Natural Hazard Mitigation Plan, anlysis by Oregon Department of Geology and Mineral Industries.

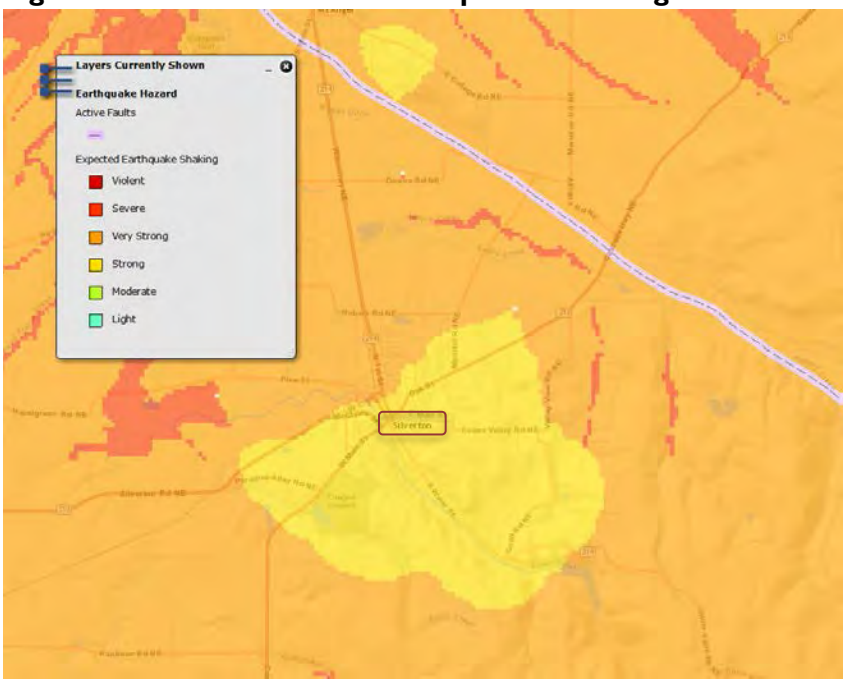
Sources: DOGAMI - Oregon HazVu; Oregon NHMP; Pacific Northwest Seismic Network

Silverton's probability for a Crustal Earthquake event is "possible" and their vulnerability to a Crustal Earthquake event is "limited". The county steering committee determined that the probability for a Cascadia Subduction Zone (CSZ) Earthquake event is "highly likely" and that the vulnerability to a Cascadia Earthquake event is "catastrophic". This hazard was not rated as distinct CSZ and crustal events in the previous HMP. An active earthquake fault located north of the city exists within two miles of the Silverton City Limit. Other active faults exist within five-miles to the northeast and southwest. The 1993 Scott Mills quake caused $28 million in damages to cities throughout Marion County. No damaging earthquake events occurred during the previous five years.

Volume I, Section 2, *Risk Assessment*, adequately describes the characteristics of earthquake hazards, history, as well as the location and extent of a potential event. Generally, an event that affects the county is likely to affect Silverton as well. Previous occurrences are well-documented within the county's plan, and the community impacts described by the county would generally be the same for Silverton as well.

Earthquake-induced damages are difficult to predict, and depend on the size, type, and location of the earthquake, as well as site-specific building and soil characteristics. Presently, it is not possible to accurately forecast the location or size of earthquakes, but it is possible to predict the behavior of soil at any particular site. In many major earthquakes, damages have primarily been caused by the behavior of the soil. Figure SV-2 shows that ground shaking in Silverton for both crustal and subduction earthquakes are expected to be strong and very strong, with some outlying areas experiencing severe shaking.

Figure SV-2. Active Faults and Expected Shaking



Source: Oregon HazVu: Statewide Geohazards Viewer (DOGAMI)

The Silverton steering committee identified earthquake damage to bridges and nearby dams as a primary concern. Transportation isolation and inundation due to dam failure could both have significant impacts on the city. The City's priority actions reflect these concerns.

In 2007, the Department of Geology and Mineral Industries (DOGAMI) conducted a seismic needs assessment for public school buildings, acute inpatient care facilities, fire stations, police stations, sheriffs' offices, and other law enforcement agency buildings. Buildings were ranked for the "probability of collapse" due to the maximum possible earthquake for any given area. Within the city of Silverton, the following buildings were given a "moderate" or "high" probability of collapse:

- Mark Twain Middle School: *high (> 10%)*
- Robert Frost Elementary School: *high (> 10%)*
- Eugene Field Elementary School: *high (> 10%)*
- Silverton High School (Schlador St. Campus): *very high (100%)*

The Silver Falls School District has completed several important school seismic mitigation projects since the last HMP. As a significant mitigation success, Silverton completed construction of the second phase of the Pine Street High School Campus in 2009. All high school students are now enrolled at the new high school. Further, in 2016, the district completed conversion of the Schlador Street Campus for use as a new middle school. The original multi-story (1938) portions of the old high school building remain intact, however they are no longer used for student instruction. Completion of the Silverton Middle School project resulted in the following school changes:

- Robert Frost School (currently grades 4,5,6) now houses grades 3, 4 and 5
- Mark Twain School (currently grades 7,8) now houses grades K, 1 and 2

- Eugene Field Elementary School has been liquidated by the district

Silverton is also in the process of seeking voter approval to construct a new police and emergency operations center.

Please review the Risk Assessment (Volume I, Section 2) for additional information on this hazard.

Flood

Table SV-7. Flood Summary

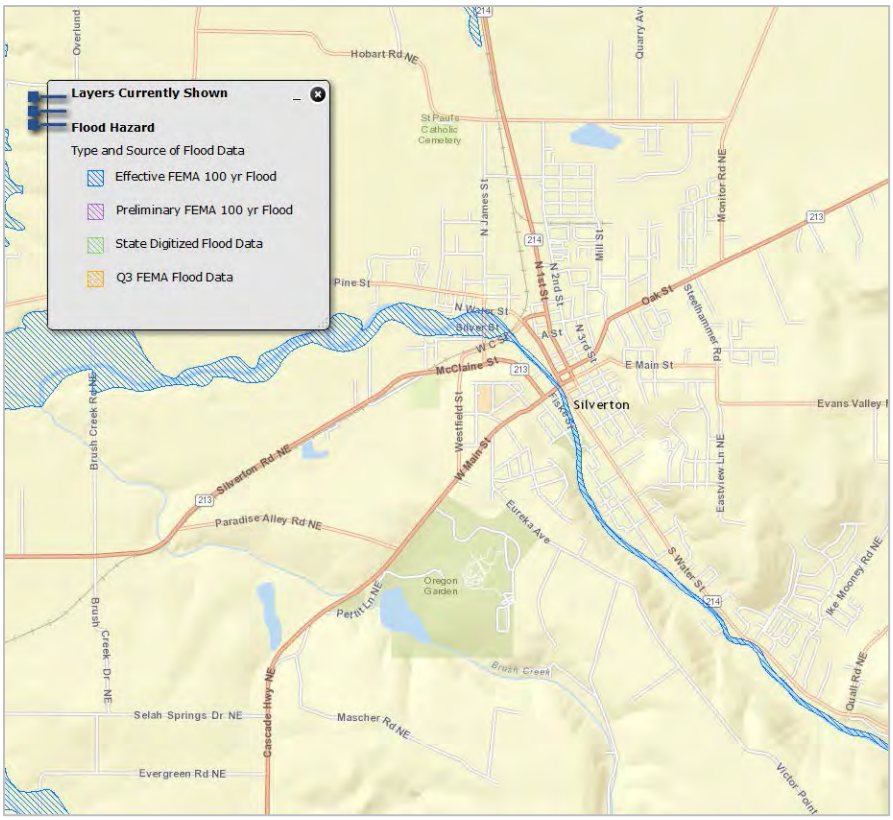
Hazard	Flood
Type	Climatic
Speed of Onset	Slow to moderate
Location	Mapped flood zones, floodplain
Extent	Moderate to severe
Prior Occurance	Four significant events since 1964
Probability	1% annual within SFHA

Sources: DOGAMI - Oregon HazVu; Oregon NHMP

Volume I, Section 2, Risk Assessment, describes the causes and characteristics of flooding hazards within the region. The city's probability for riverine flood is likely and their vulnerability to flood is critical. In January of 2013 the City activated the Emergency Operations Center in response flood impacts. During the event the City activated its dam early warning system and monitored property impacts along Silver Creek. The adult care center on James Avenue sustained flooding impacts. Additionally, a tree the fell into the creek resulted in water backing up behind with localized flooding impacts as a result.

Portions of Silverton have areas of flood plains (special flood hazard areas). These include areas along the Silver Creek. However, flood impacts are largely limited to the within the banks or Silver Creek where it passes through the city.

Figure SV-3. Special Flood Hazard Area



Source: [Oregon HazVu: Statewide Geohazards Viewer (DOGAMI)]

National Flood Insurance Program (NFIP)

FEMA modernized the Silverton Flood Insurance Rate Maps (FIRMs) in January of 2000. Table SV-1 shows that as of October 2016, Silverton has 81 National Flood Insurance Program (NFIP) policies in force. Of those, 37 are for properties that were developed before development of the initial FIRM. The last Community Assistance Visit (CAV) for Silverton was on March 31, 1995. Silverton is not a member of the Community Rating System (CRS). The table shows that roughly two-thirds of the flood insurance policies are for single-family residential homes with the bulk of the other one-third being other residential. There have been 12 paid flood claims in Silverton totaling $70,080.

The Community Repetitive Loss record for Silverton identifies no Repetitive Loss Properties[4] and no Severe Repetitive Loss Properties[5].

[4] A Repetitive Loss (RL) property is any insurable building for which two or more claims of more than $1,000 were paid by the National Flood Insurance Program (NFIP) within any rolling ten-year period, since 1978. A RL property may or may not be currently insured by the NFIP.

[5] A Severe Repetitive Loss (SRL) property is a single family property (consisting of 1 to 4 residences) that is covered under flood insurance by the NFIP and has incurred flood-related damage for which 4 or more separate claims payments have been paid under flood insurance coverage, with the amount of each claim payment exceeding $5,000 and with cumulative amount of such claims payments exceeding

Table SV-8. Flood Insurance Detail

Jurisdiction	Effective FIRM and FIS	Initial FIRM Date	Total Policies	Pre-FIRM Policies	Policies by Building Type: Single Family	2 to 4 Family	Other Residential	Non-Residential	Minus Rated A Zone	Minus Rated V Zone
Marion County	-	-	2,067	1,239	1,614	115	105	232	97	0
Silverton	1/19/2000	3/1/1979	81	37	51	4	21	5	22	0

Jurisdiction	Insurance in Force	Total Paid Claims	Pre-FIRM Claims Paid	Substantial Damage Claims	Total Paid Amount	Repetitive Loss Structures	Severe Repetitive Loss	CRS Class Rating	Last Community Assistance
Marion County	$ 514,268,700	298	226	16	$ 5,732,543	11	2	-	-
Silverton	$ 19,421,300	12	8	0	$ 70,080	0	0	N/A	3/31/1995

Source: Information compiled by Department of Land Conservation and Development, October, 2016.

Please review the Risk Assessment (Volume I, Section 2) for additional information on this hazard.

Landslide

Table SV-9. Landslide Summary

Hazard	Landslide
Type	Climatic/Geologic
Speed of Onset	Slow to rapid
Location	Silver Creek Reservoir; west side Silver Creek south of Main St.; east of Water St. south of Main St.
Extent	Moderate to Very High
Prior Occurance	Evidence of old landslides; none in recent history
Probability	Possible

Sources: DOGAMI - Oregon HazVu; Oregon NHMP

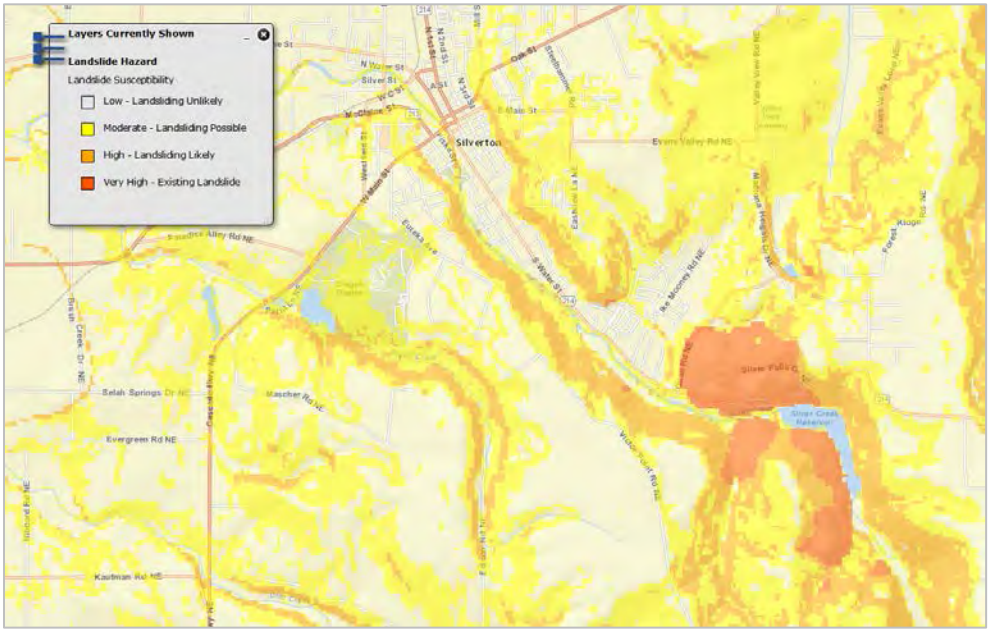
Volume I, Section 2, *Risk Assessment*, adequately describes the causes and characteristics of landslides, and appropriately identifies previous landslide occurrences within the region. Silverton has a relatively flat topography, except for the area along Silver Creek southeast of Main Street and near the Silver Creek Dam. Silverton's probability for landslide is possible and their vulnerability to landslide is limited. Figure SV-4 shows the inventory of known historical landslides. Figure SV-5 shows the susceptibility and exposure to future landslides in Silverton.

$20,000; or for which at least 2 separate claims payments have been made with the cumulative amount of such claims exceeding the reported value of the property.

Figure SV-4. Landslide Inventory

Source: [Oregon HazVu: Statewide Geohazards Viewer (DOGAMI)]

Figure SV-5. Landslide Susceptibility Exposure



Source: [Oregon HazVu: Statewide Geohazards Viewer (DOGAMI)]

Please review the Risk Assessment (Volume I, Section 2) for additional information on this hazard.

Volcano

Table SV-10. Volcano Summary

Hazard	Volcano
Type	Geologic
Speed of Onset	Slow to rapid
Location	Cascade Mountains
Extent	Minor
Prior Occurance	One significant event since 1916 (Mount St. Helens)
Probability	<1% annual

Sources: DOGAMI - Oregon HazVu; Oregon NHMP

Volume I, Section 2, *Risk Assessment*, adequately describes Silverton risk to volcanic events. The steering committee determined that the city's probability for volcanic event is unlikely and their vulnerability to volcano is negligible.

The causes and characteristics of a volcanic event are appropriately described within the county's plan, as well as the location and extent of potential hazards. Previous occurrences are well-documented within the county's plan. Silverton is very unlikely to experience anything more than volcanic ash during a volcanic event. When Mt. Saint Helens erupted in 1980, the city was not impacted.

Please review the Risk Assessment (Volume I, Section 2) for additional information on this hazard.

Severe Weather

Table SV-11. Severe Weather Summary

Hazard	Severe Weather/Storm
Type	Climatic
Speed of Onset	Slow to moderate
Location	Countywide
Extent	Minor to severe
Prior Occurance	Minor events occur annually; ~30 moderate to severe events over the past 130 years
Probability	100% for minor events, 23% for moderate to severe events

Sources: Marion County HMP

Windstorm

Volume I, Section 2, *Risk Assessment*, adequately describes the causes and characteristics of windstorms, as well as the location and extent of windstorm hazards. The city's probability for windstorm is highly likely and their vulnerability to windstorm is critical.

Significant wind events occur in Silverton each year. Damaging wind events are only slightly less common; once or twice per year the city will experience a windstorm event that will interrupt services, down trees, and cause power outages.

Because windstorms typically occur during winter months, they are sometimes accompanied by ice, freezing rain, flooding, and very rarely, snow.

Winter Storm (Snow/Ice)

Volume I, Section 2, *Risk Assessment*, adequately describes the causes and characteristics of winter storms, as well as the location and extent of winter storm hazards. The City's probability for winter storms is highly likely and that their vulnerability to winter storms is critical.

Severe winter storms can consist of rain, freezing rain, ice, snow, cold temperatures, and wind. They originate from troughs of low pressure offshore that ride along the jet stream during fall, winter, and early spring months. Severe winter storms affecting the city typically originate in the Gulf of Alaska or in the central Pacific Ocean. These storms are most common from November through March.

Major winter storms can and have occurred in the Silverton area, and while they typically do not cause significant damage, they are frequent and have the potential to impact economic activity. The most recent winter storms (December 2016 – January 207) included snow and ice, transportation and power interruptions, and government office and school closures. A disaster declaration is currently pending.

Please review the Risk Assessment (Volume I, Section 2) for additional information on this hazard.

Wildfire

Table SV-12. Wildfire Summary

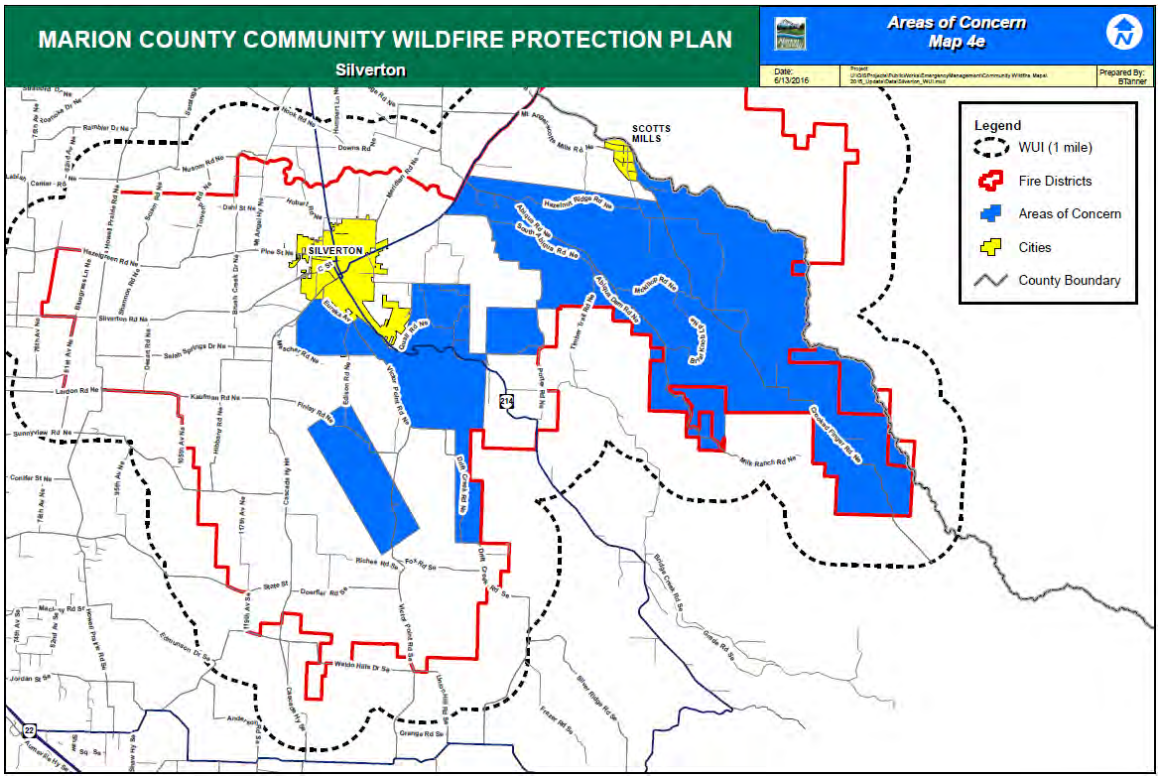
Hazard	Wildfire
Type	Climatic, Human Caused
Speed of Onset	Moderate to rapid
Location	Outside city limit
Extent	Minor to moderate
Prior Occurance	No history inside city limit
Probability	<1% annual

Sources: Marion County HMP

Volume I, Section 2, *Risk Assessment*, adequately describes the causes and characteristics of wildfires, as well as the county and city's history of wildfire events. The city's probability for wildfire is unlikely and the vulnerability to wildfire is limited. Silverton is located on the far western side of Marion County, surrounded on all sides by open farmland, waterways, or urban development. There are no forests within the city limits, and the closest forested area is Silverton Rapids Park, located half a mile west of the city. Due to its location, Silverton faces minimal risk of experiencing wildfires. There is no history of wildfire events in Silverton.

The County updated the Community Wildfire Protection Plan (CWPP) in 2016 and portions of Silverton are listed as having wildland urban interface (WUI) with areas of concern. Figure SV-6 depicts the areas near Silverton that the CWPP identifies as areas of concern. These areas should be targeted for fire suppression activities.

Figure SV-6. Areas of concern near Silverton.



Source: Marion County Community Wildfire Protection Plan (2016).

Please review the Risk Assessment (Volume I, Section 2) for additional information on this hazard.

CITY OF STAYTON ADDENDUM

Purpose

This document serves as the City of Stayton's Addendum to the Marion County Multi-Jurisdictional Hazards Mitigation Plan (MHMP, HMP). This addendum supplements information contained in Volume I (Basic Plan) of this HMP. The Basic Plan serves as the foundation for this jurisdiction's addendum. Volume III (Appendices) provides additional information (particularly regarding participation and mitigation strategy). This addendum meets the following requirements:

- Multi-jurisdictional **Plan Adoption** §201.6(c)(5),
- Multi-jurisdictional **Participation** §201.6(a)(3),
- Multi-jurisdictional **Mitigation Strategy** §201.6(c)(3)(iv), and
- Multi-Jurisdictional **Risk Assessment** §201.6(c)(2)(iii).

Plan Process, Participation, and Adoption

This section of the HMP addendum addresses 44 CFR 201.6(c)(5), *Plan Adoption*, and 44 CFR 201.6(a)(3), *Participation.*

In the summer and fall of 2016, the Oregon Partnership for Disaster Resilience (OPDR) at the University of Oregon's Community Service Center (CSC) partnered with the Oregon Military Department's Office of Emergency Management (OEM), and Marion County cities, including Stayton, to develop an addendum to the Marion County HMP, which expired July 8, 2016. This project is funded through the Federal Emergency Management Agency's (FEMA) FY14 Pre-Disaster Mitigation Competitive Grant Program (PDMC-PL-10-OR-2014-002).

By developing this addendum to the Marion County HMP, locally adopting it, and having it approved by FEMA, the City of Stayton will become eligible for FEMA Hazard Mitigation, Pre-Disaster Mitigation, and Flood Mitigation Assistance grant program funds.

The Marion County HMP, and Stayton addendum, are the result of a collaborative effort between citizens, public agencies, non-profit organizations, the private sector, and regional organizations. A project steering committee guided the process of developing the plan. For more information on the composition of the steering committee see the *Acknowledgements*, *Plan Summary*, and *Plan Process* (Volume III, Appendix B).

The Stayton Emergency Manager is the designated local convener of this addendum. The Convener will take the lead in implementing, maintaining, and updating the addendum to the HMP in collaboration with Marion County Emergency Management.

Representatives from the City of Stayton steering committee met formally on one occasion: October 13, 2016 (see Appendix B for more information).

The city's addendum reflects decisions agreed upon at the plan update meeting and during subsequent work and communication with OPDR.

The City of Stayton Steering Committee is comprised of representatives from the following departments:

- Convener, Emergency Manager
- Public Works
- Stayton Fire District
- North Santiam School District
- Santiam Hospital
- Pacific Power and NW Natural
- EMS
- Norpac
- Jeld-Wen

Stayton used multiple approaches to engage the public. First, the City established steering committee representatives from across the city. Next, the City actively participated in countywide community engagement activities described in Volume I, Section 4 and in Appendix B. City staff also presented the draft plan to the City Council during an open public council session. The steering committee was closely involved throughout the development of the plan and served as the local oversight body for the plan's development. In addition, community members outside of the steering committee were provided an opportunity for comment via the plan review process (see Appendix B for more information).

The Marion County HMP was approved by FEMA on [Month] [Day], 2017 and the Stayton addendum was adopted via resolution on [Month] [Day], 2017. This HMP is effective through [Month] [Day], 2022.

Mitigation Strategy

This section of the HMP addendum addresses 44 CFR 201.6(c)(3(iv), *Mitigation Strategy*.

During the 2016 Stayton HMP development process, OPDR evaluated the risk assessment and presented a set of potential action items. In addition, the Stayton Steering committee presented additional action items and assisted with project prioritization. The proposed actions were re-reviewed by the steering committee to finalize. Stayton developed a list of priority actions (Appendix A-1), any actions that were not prioritized were placed in the Action Item Pool (Appendix A-2) and will be considered during the annual meetings.

Priority Actions

The City is listing a set of high priority actions in an effort to focus attention on an achievable set of high advantage activities over the next five-years. The City's priority actions are listed in Table ST-1 on the following page.

Action Item Pool

Table ST-2 on the following pages presents a pool of mitigation actions. This expanded list of actions is available for local consideration as resources, capacity, technical expertise and/or political will become available.

Table ST-1. Stayton Priority Action Items

Action Item ID	Hazard	Action Item	Coordinating Organization	Partner Organizations	Timeline
Priority Actions					
P-1	Flood	Upsize stormwater pipes at 6th and Pine, north end of Silvan Springs, and other streeets with chronic localized flooding issues.	Public Works	City Administrator; Finance; City Council	Short Term (1-2 years)
P-2	Multi-Hazard	Assess the wastewater and water treatment plants' ability to function during different hazard scenarios and begin to mitigate issues. This could include assessing and gathering supplies that will allow the plants to operate under emergency conditions and upgrading the facilities so they are more resilient.	Public Works	City Administrator; Finance; City Council	Short Term (1-2 years)
P-3	Earthquake	Purchase two portable temporary bridges to facilitate redundant transportion access to the wastewater treatment plan (via Wilco Rd. and Jetters Way) and downtown (via N. First Ave.).	Public Works	City Administrator; Finance; City Council	Short Term (1-2 years)
P-4	Earthquake	Acquire portable water filtration system(s) to improve water redundancy.	Public Works	City Administrator	Short Term (1-2 years)
P-5	Multi-Hazard	Purchase a satellite phone to improve communication redundancy.	Emergency Manager (Police Chief)	City Administrator	Short Term (1-2 years)

Source: City of Stayton HMP Steering Committee, 2016.

Table ST-2. Stayton Action Item Pool

Action Item ID	Hazard	Action Item	Coordinating Organization	Partner Organizations	Timeline
Action Item Pool					
Multi-Hazard					
MH-1	Multi-Hazard	Create memoranda of understanding with fuel stations that allows emergency responders first access to fuel.	Public Works, Police, Fire	City Administrator; Finance; City Council	Short Term (1-2 years)
MH-2	Multi-Hazard	Work with fuel stations to understand their storage capacity and backup power capabilities.	Public Works, Police, Fire	City Administrator	Short Term (1-2 years)
MH-3	Multi-Hazard	Develop an agreement with the City's fuel distributor around providing fuel to backup generators during a disaster event.	Public Works, Police, Fire	City Administrator; Finance; City Council	Short Term (1-2 years)
MH-4	Multi-Hazard	Implement 2006-2007 water, wastewater, and stormwater master plan facility improvement recommendations. Include hazard vulnerabilities and mitigation measures for reducing infrastructure vulnerability. Consider hazards in all future facilities master plan updates.	Public Works	Administrative Services Director	Mid Term (3-5 years)
MH-5	Multi-Hazard	Acquire multi-band radios for public works.	Public Works	City Administrator; Finance	Short Term (1-2 years)
MH-6	Multi-Hazard	Develop memoranda of understanding with a port-o-potty company to establish "relief stations" throughout town post-event.	City Administrator	Finance; City Council	Short Term (1-2 years)
MH-7	Multi-Hazard	Update the City's Emergency Operations Plan. Invite more critical partners to participate in the plan update, including the hospital and private sector representatives. Update should cover: *Formalizing emergency shelter locations *What supplies to acquire for shelters *How to acquire supplies for shelters *Stronger relationship with the Red Cross - more official shelters and a Red Cross wagon	Emergency Manager	Marion Co.; City Administrator; City Council	Mid-Term (3-5 years)
MH-8	Multi-Hazard	Update the City's Continuity of Operations Plan.	Emergency Manager	Marion Co.; City Administrator; City Council	Mid-Term (3-5 years)
MH-9	Multi-Hazard	Provide mitigation and preparedness information and resources to residents via schools, faith organizations, and utility billings.	Police Chief	Marion Co.; CERT	Ongoing
MH-10	Multi-Hazard	Educate businesses about the importance of continuity of operations plans to make them more resilient to hazards.	Emergency Manager	Chamber of Commerce; CERT	Ongoing
MH-11	Multi-Hazard	Create a hazard resilience section on the City's website that provides mitigation and preparedness resources.	City Administrator	Marion Co.	Short Term (1-2 years)
MH-12	Multi-Hazard	Outreach to residents to increase participation in the Everbridge communication system.	Emergency Manager	City Council	Ongoing
MH-13	Multi-Hazard	Develop a list of medically dependent individuals.	Policy, Fire, Ambulance, Hospital	Marion Co.	Ongoing
MH-14	Multi-Hazard	Partner with Marion Co. to provide city staff with emergency management and response training.	Emergency Manager	Marion Co.	Ongoing
MH-15	Multi-Hazard	Host one emergency response exercize each year.	Emergency Manager	Marion Co.	Ongoing
MH-16	Multi-Hazard	Develop a list of individuals with medical training who could potentially assist during an event.	Emergency Manager	City Administraanr; City Council	Ongoing

Source: City of Stayton HMP Steering Committee, 2016.

Table ST-2. Stayton Action Item Pool (Continued)

Action Item ID	Hazard	Action Item	Coordinating Organization	Partner Organizations	Timeline
Action Item Pool					
Drought					
DR-1	Drought	Participate in the Marion Co. Drought Contingency Plan.	Public Works	Marion Co.	Ongoing
Earthquake					
EQ-1	Earthquake	Host outreach events aimed at teaching residents how to turn off their gas and water valves.	Fire Chief	Northwest Natural Gas; Emergency Manager	Ongoing
EQ-2	Earthquake	Following seismic evaluation of West C and Main Street over Silver Creek, seek funding to reinforce or replace as needed.	Public Works Director	Marion C.; ODOT	Mid Term (3-5 years)
EQ-3	Earthquake/ Multi-Hazard	Encourage residents to prepare and maintain two-week (at minimum) survival kits.	Emergency Manager	CERT	Ongoing
Flood					
FL-1	Flood	Work with Marion Co. public works to clear and maintain ditches on county roads.	Public Works	Marion Co. Public Works	Ongoing
FL-2	Flood	Create a memorandum of understanding with Knife River so they will supply sandbags during a flood.	Floodplain Coordinator	City Administrator; Finance; City Council	Short Term (1-2 years)
FL-3	Flood	Identify residents with pumps who might share their equipment during a flood. Create equipment-sharing agreements with interested residents.	Public Works	City Administrator; Finance; City Council	Ongoing
Severe Weather					
SW-1	Severe Storm/Wind storm	Meet with utility companies to build relationships. Outcome should be an understanding of where infrastructure is located, who to contact in an emergency, and strategies for doing more outreach to the community.	Public Works, Police	Marion Co.	Short Term (1-2 years)
SW-2	Severe Storm/Wind storm	Work with Pacific Power to encourage them to upgrade old infrastucture.	Planning	Pacific Power	Short Term (1-2 years)

Source: City of Stayton HMP Steering Committee, 2016.

Plan Implementation and Maintenance

The City Council will be responsible for adopting the City of Stayton addendum to the Marion County Multi-Jurisdictional HMP. This addendum designates a convener and a coordinating body to oversee the development and implementation of action items. Because the city addendum is part of the county's multi-jurisdictional HMP, the City will look for opportunities to partner with the county. The City's steering committee will convene after re-adoption of the City of Stayton addendum on an annual schedule for plan maintenance purposes; the county meets on a semi-annual basis. The City of Stayton Convener will participate in the Marion County HMP meetings and will report on city-specific activities as appropriate. The steering committee will be responsible for identifying new risk assessment data, reviewing status of mitigation actions, identifying new actions, and seeking funding to implement the city's mitigation strategy (actions). The convener will also remain active in the county's implementation and maintenance process (see Volume I, Section 4 for more information).

Regarding implementation, the City currently holds weekly management team meetings. Stayton intends to use those weekly meetings to perform ongoing work on mitigation action priorities.

The City will utilize the same prioritization process as the county (See Volume I, Section 4: Plan Implementation and Maintenance and Volume IV, Appendix E: Economic Analysis of Hazard Mitigation Projects for more information).

Implementation through Existing Programs

Many of the Hazard Mitigation Plan's recommendations are consistent with the goals and objectives of the City's existing plans and policies. Where possible, the City of Stayton will implement the HMP's recommended actions through existing plans and policies. Plans and policies already in existence have support from local residents, businesses, and policy makers. Many land-use, comprehensive, and strategic plans get updated regularly, allowing them to adapt to changing conditions and needs. Implementing the HMP's action items through such plans and policies increases their likelihood of being supported and implemented.

Stayton's acknowledged comprehensive plan is the City of Stayton Comprehensive Plan. The City most recently completed updates to the plan in 2013. The Stayton Comprehensive plan indicates that the flooding is the "significant natural hazard in the Stayton Area." Stayton plans for the flood hazard, including implementation of a flood plain overlay district. The City also acknowledges potential catastrophic flooding associated with failure of Detroit Dam. The plan also references steep slope and landslides as another potential threat. The Comp Plan includes maps for each of the referenced hazards. Notably, the only hazards related goal in the plan is related to development on steep slopes. There is one hazard related policy in the comprehensive plan related to development on steep slopes.

Stayton currently lists the following documents related to the Comprehensive Plan:

- Local Wetland and Riparian Inventory (1999)
- Transportation System Plan (2004)

- Park and Recreation Master Plan (2005)
- Sublimity Interchange Area Management Plan (2006)
- Water Master Plan (2006)
- Wastewater Master Plan (2006)
- Downtown Transportation and Revitalization Plan (2007, amended 2010)
- Storm Water Master Plan (2009)

For more information, refer to http://www.staytonoregon.gov/page/planning_master_plans.

Continued Public Participation

Keeping the public informed of the City's efforts to reduce the city's risk to future hazards events is important for successful plan implementation and maintenance. The City is committed to involving the public in the plan review and updated process. See Volume I, Section 4, for more information.

Plan Maintenance

The Marion County Multi-Jurisdictional Hazards Mitigation Plan and city addendum will be updated every five years in accordance with the update schedule outlined in the Disaster Mitigation Act of 2000. During the county plan update process, the City will also review and update its addendum. The convener will be responsible for convening the steering committee to address the questions outlined below.

- Are there new partners that should be brought to the table?
- Are there new local, regional, state, or federal policies influencing natural hazards that should be addressed?
- Has the community successfully implemented any mitigation activities since the plan was last updated?
- Have new issues or problems related to hazards been identified in the community?
- Are the actions still appropriate given current resources?
- Have there been any changes in development patterns that could influence the effects of hazards?
- Have there been any significant changes in the community's demographics that could influence the effects of hazards?
- Are there new studies or data available that would enhance the risk assessment?
- Has the community been affected by any disasters? Did the plan accurately address the impacts of this event?

These questions will help the steering committee determine what components of the mitigation plan need updating. The steering committee will be responsible for updating any deficiencies found in the plan.

Risk Assessment

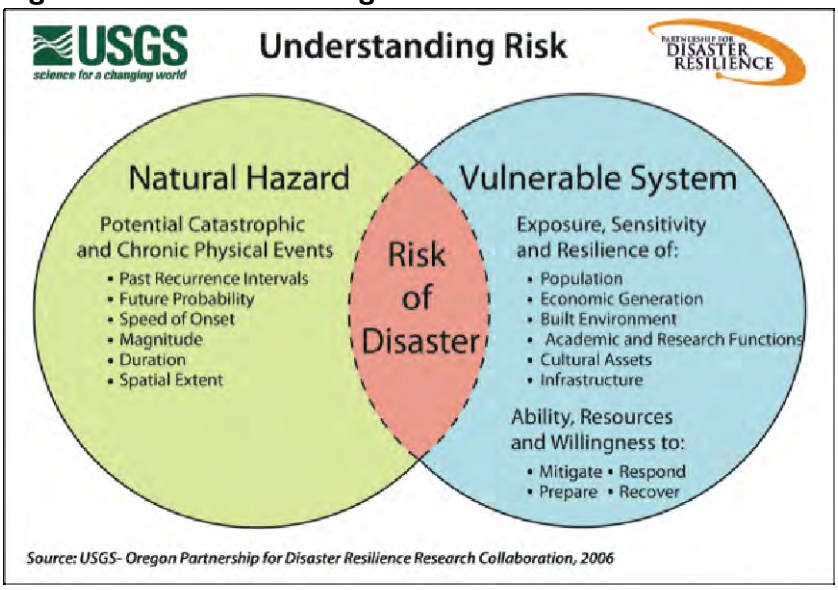
This section of the HMP addendum addresses 44 CFR 201.6(b)(2) - Risk Assessment. In addition, this chapter can serve as the factual basis for addressing Oregon Statewide

Planning Goal 7 – Areas Subject to Natural Hazards. Assessing natural hazard risk has three phases:

- **Phase 1:** Identify hazards that can impact the jurisdiction. This includes an evaluation of potential hazard impacts – type, location, extent, etc.
- **Phase 2:** Identify important community assets and system vulnerabilities. Example vulnerabilities include people, businesses, homes, roads, historic places and drinking water sources.
- **Phase 3:** Evaluate the extent to which the identified hazards overlap with, or have an impact on, the important assets identified by the community.

The local level rationale for the identified mitigation strategies (action items) is presented herein, and within Section 2, *Risk Assessment*, and Appendix C, *Community Profile*. The risk assessment process is graphically depicted in Figure ST-1 below. Ultimately, the goal of hazard mitigation is to reduce the area of risk, where hazards overlap vulnerable systems.

Figure ST-1.Understanding Risk



Risk Assessment Approach

A risk assessment is intended to provide the, "factual basis for activities proposed in the strategy to reduce loses from identified hazards."[1] To complete the risk assessment, the HMP update team first updated the description, type, location and extent of each hazard. Next, the team updated the vulnerability information based on each hazard's potential impact on the community.

The Marion County Basic Plan (Volume I, Section II) Risk Assessment describes in detail the methods used to assess risk. In summary, Marion County has prepared a Threat Hazard Identification and Risk Assessment as a formal annex to the Marion County Emergency

[1] 44 CFR 201.6(2)(i)

Operation Plan. The assessment uses a method developed by BOLD Planning.[2] This city addendum builds on the county level assessment to produce a similar assessment for the City of Stayton. The assessment specifically examines:

1. Probability (frequency) of event
2. Magnitude of event
3. Expected warning time before event
4. Expected duration of event

Refer to Page 2-4 of the Marion County Basic HMP for a description of the scoring values for each ranking category.

Hazard Analysis

The assessment identifies three levels of risk: High, Moderate and Low.

High - High probability of occurrence; at least 50 percent or more of population at risk from hazard; significant to catastrophic physical impacts to buildings and infrastructure; major loss or potential loss of functionality to all essential facilities (hospital, police, fire, EOC and shelters).

Moderate - Less than 50 percent of population at risk from hazard; moderate physical impacts to buildings and infrastructure; moderate potential for loss of functionality to essential facilities.

Low - Low probability of occurrence or low threat to population; minor physical impacts.

A summary of the risk assessment findings and rankings is presented below.

Table ST-3. Hazard and Vulnerability Assessment Summary

Hazard Profile Summary for Stayton Usinging Bold Planning Analysis Scoring							
Natural Hazard	Probability	Warning Time	Magnitude	Duration	CPRI	Local Planning Significance	County Planning Significance
Weight Factor	0.45	0.3	0.15	0.1			
Earthquake*	4	4	4	4	4.00	High	High
Severe Weather/Storm**	4	1	3	3	2.85	Moderate	High
Flood	3	2	3	4	2.80	Moderate	High
Drought	3	1	3	4	2.50	Moderate	High
Extreme Weather - High Temperature	3	1	2	4	2.35	Moderate	Moderate
Wildland Interface Fire	1	4	2	2	2.15	Moderate	Moderate
Dam or Levee Failure	1	2	4	4	2.05	Moderate	Moderate
Landslide	1	2	2	2	1.55	Low	High
Volcanic Eruption	1	1	1	4	1.30	Low	Low
*Note: Earthquake probability listed to match county level analysis. See below for more detailed probability assessment.							
**Note: Includes tornado hazard							

Source: BOLD Planning Risk Assessment Method; Analysis by UO Community Service Center.

Community Asset Identification

This section provides information on city-specific assets. For additional information on the characteristics of Stayton, in terms of geography, environment, population, demographics,

[2] BOLD Planning is a consulting firm specializing in the development of actionable emergency plans. For more information, visit: http://www.boldplanning.com/

employment and economics, as well as housing and transportation see Volume III, Appendix C, *Community Profile*. Many of these community characteristics can affect how natural hazards impact communities and how communities choose to plan for natural hazard mitigation. Considering the city-specific assets during the planning process can assist in identifying appropriate measures for hazard mitigation.

Community Characteristics

The City of Stayton is located in Marion County, Oregon, at the confluence of the Santiam Canyon and Willamette Valley. Located roughly 15-miles east of Salem, the city is bordered to the north and east by Highway 22, the south and east by the Santiam River, and the west by agricultural lands. Stayton is located in Oregon's Willamette Valley, which experiences a moderate climate. In August, the average high temperature is 82 degrees and the average low temperature is 51 degrees. Wintertime temperatures in January range from an average high of 46 degrees to an average low of 33 degrees. The average annual precipitation is 39.9 inches. Stayton is relatively flat, except at the terminus of Santiam canyon in the northeast portion of the city.

The US Census lists Stayton's 2015 population at 7,725. This represents a 11.6% increase from 2000. For more demographic information, refer to Appendix C.

Economy

Stayton was founded as a mill city. Its location near a plentiful water source made it attractive for water-powered industry. Several mills, from timber to flour, operated in Stayton following its establishment. In the early part of the 20th century, Stayton transitioned to an emphasis on agricultural – the Norpac Foods, Inc. processing plant is currently the city's largest employer. Today, Stayton benefits from a relatively diverse local economy. Median household income in Stayton is $41,432. For more economic information, refer to Appendix C.

Critical and Important Facilities

Critical and important facilities include the following:

<u>Transportation</u>

- Bridges:

Table ST-4.Stayton Bridge Inventory

Water Body	Street	Owner	Inspection Date	Co-Located Utility				
				Sewer	Water	Electricity	Natural Gas	Telecomm
SALEM DITCH	N FIRST AVE	STAYTON	8/10/2016	YES	YES	YES	NO	YES
SALEM DITCH	N SECOND AVE	STAYTON	8/10/2016	NO	NO	NO	NO	NO
SALEM DITCH	N THIRD AVE	STAYTON	8/10/2016	NO	YES	NO	NO	NO
SALEM DITCH	W WASHINGTON ST	STAYTON	8/10/2016	YES	YES	NO	NO	NO
STAYTON DITCH	N HOLLY AVE	STAYTON	8/10/2016	NO	YES	NO	NO	NO
STAYTON DITCH	JETTERS WAY	STAYTON	8/10/2016	YES	YES	NO	NO	NO
STAYTON DITCH	E WATER ST	STAYTON	8/10/2016	NO	NO	NO	NO	NO
STAYTON DITCH	N FOURTH AVE	STAYTON	8/10/2016	NO	NO	NO	NO	NO
STAYTON DITCH	N FIRST AVE	MARION	N/A	NO	YES	NO	NO	NO
SALEM DITCH	N FOURTH AVE	STAYTON	N/A	NO	NO	NO	NO	NO
SALEM DITCH	N EVERGREEN AVE	STAYTON	N/A	YES	YES	NO	NO	NO
SALEM DITCH	WILCO RD	MARION	N/A	YES	YES	NO	NO	NO
SALEM DITCH	UPRR	UPRR	N/A	NO	NO	NO	NO	NO
SALEM DITCH	SHAFF RD	MARION	N/A	NO	NO	NO	NO	NO
MILL CREEK	GOLF CLUB RD	MARION	N/A	NO	NO	NO	NO	NO
MILL CREEK	CASCADE HIGHWAY	MARION	N/A	NO	NO	NO	NO	NO

Source: City of Stayton

Note: The water treatment plan lies across two bridges: 1 over the N Santiam R, 1 over the Stayton Canal. This could cause problems in the event of an earthquake that disables the bridges.
Note: The wastewater treatment plant lies across two bridges: 1 bridge on Jetters Way and 1 bridge over Salem Ditch on Wilco Rd. This could cause problems in the event of an earthquake that disables the bridges.
Note: Pacific Power employees would have to cross three bridges to reach the Pacific Power plant.

- Main roads through town:
    - State Highway 22 (North Santiam Highway)
    - Golf Club Rd/Wilco Rd.
    - Stayton Rd.
    - 1st St (Cascade Hwy) – leads to water treatment plant
- Public Transit: Cherriots bus system

Energy

- Pacific Power
- NW Natural
- The City gets all its fuel from Pacific Pride
- There are 3 commercial gas stations and one other fuel supplier (MNOP – Marc Nelson Oil Products)
- Police have a natural gas generator that won't run on any other fuel
- Public Works has several generators
- The Fire District has a generator

Water

- Drinking Water:
    - Source: N Santiam River via the Stayton Power canal

    - One shallow well – just supplemental
    - There are a very small number of residents on wells
    - Water treatment plant off of 1st Ave.
    - Water storage:
        - Pine St. = 1m gal
        - Regis St. = .5m gal
        - Old decommissioned storage tank on Holly

    Note: Stayton has access Salem's system and can buy from Salem if necessary, but there is no other water back-up source.

    Note: There are pump stations throughout the City, the pump station lines would likely not survive an earthquake.
- Wastewater:
    - Wastewater treatment plant located on Jetters Way.
    - Most of the sewer system is 50-year-old concrete pipe
    - Very, very few residents are on septic systems (in theory everyone connected to the city sewer system when it was installed).
    - Norpac has its own wastewater treatment ponds – on Jetters Way

Communication

- Communications towers:
    - Regis St. Reservoir – Police, Sprint
    - Pine St. Reservoir has cell antennas – Fire, T-Mobile
    - High school athletic field cell tower – Verizon (with a generator)
    - Cell tower south of Shaff and west of Wilco
    - Backup tower on the Police Department
- The City relies on cell phones to communicate
- Auxiliary radio access for Police (portable)
- Land line – SCTC (Stayton Cooperative Telephone Company)
- CERT has a radio system

Emergency services

- Fire:
    - Stayton Fire District, 1988 W. Ida St.
- Police:
    - Police Department, 386 N. 3rd Ave.
- Medical
    - Santiam Memorial Hospital, 1401 N. 10th Ave.

Cultural/historical resources

- Properties on the National Registry of Historic Places:
    - Deitrich Building (3rd and Florence)
    - Gehlens-Sims Building (2nd)
    - The City has a preliminary listing of downtown buildings that would qualify for the national registry.
- "The Brown House" Santiam Heritage Foundation (425 N. 1st Ave.)
- Library (515 N 1st Ave.)
- Community Center and City Swimming Pool (all next to library)

- Events that may have large crowds:
    - June: Summerfest and Car show– maybe between 2,000-5,000 visitors (last Saturday of June)
    - July: 4th of July – maybe 5,000 visitors
    - July: Stampede – at Sublimity fair grounds (slight impact to traffic in town)
    - September: Harvest Festival –at Sublimity fair grounds (slight impact to traffic in town)

Vulnerable populations

- Schools – enrollment ~2,400:
    - Stayton High School (757 W. Locust St.)
    - Stayton Middle School (1021 Shaff Rd. SE)
    - St. Mary's Catholic School (1066 N. 6th Ave.)
    - Regis High School (550 W. Regis St.)
    - Stayton Elementary School (875 N. 3rd Ave.)
- Daycares/preschools
    - Rise and Shine Day Care (2350 Martin Dr.)
    - Tree House Day Care (287 E Washington St.)
    - Tiny Hands Day Care (451 Hobson St.)
    - Highland Pre-school (1450 Fern Ridge Rd.) – First United Methodist Church
    - All Star Pre-school (975 Fern Ridge Rd.) – Foothills Church
- Assisted living
    - Brookdale Senior Living Solutions (2201 3rd Ave.)
- Santiam Senior Center (41818 Kingston Jordan Rd.)
- Apartment complexes for seniors:
    - Elder Manor (900 W Ida)
    - Stayton Manor (3rd and Washington)
    - Oak Apartment (10th and Santiam)
- Some Spanish-speaking residents, but most also speak English
- Stayton has a small Somali population, but most also speak English
- Low-income:
    - 47% of Stayton's housing stock is rental properties

Table ST-5. Government Subsidized Housing Developments from Stayton's Comprehensive Plan

Name	Location	# of Units	Type
Hollister Apartments	315 W Hollister St	20	family
Northridge Apartments	1633 N. 3rd Ave	24	family
Oak Park Village	1011-1087 N. 10th Ave	32	elderly
Stayton Elder Manor	660 N Ida St	32	elderly
Stayton Manor	820 N 3rd Ave	16	elderly
Westside Apartments	965 Gardner Ave	24	family
Wolf Ridge	1301-1371 E Santiam St	51	family

Source: Oregon Dept of Housing and Community Services

Hazard Characteristics

Drought

The characteristics of drought in Stayton are roughly the same for the county as a whole.

Table ST-6. Drought Summary

Hazard	Drought
Type	Climatic
Speed of Onset	Slow
Location	Varies, County Wide
Extent	Moderate to Severe Drought*
Prior Occurance	Three > 6 months duration since 1982
Probability	~9%

*Defined as between -2 and -4 on the National Resource Conservation Service (NRCS) Surface Water Supply Index (SWSI)

Sources: Oregon NHMP; NRCS; analysis by OPDR

The probability of drought in Stayton is likely, the same as for the county as a whole. Stayton relies on surface water from the North Santiam River via the Stayton Power canal. Raw water is directed into the City's slow sand filtration system. Once treated, finished potable water is delivered to residential, commercial, and industrial customers through 44 miles of water distribution pipes. Stayton also maintains a shallow well for supplemental water supply. Finally, Stayton maintains an intertie with the City of Salem and can purchase water from Salem if needed. The City has a water curtailment plan that they never had to use.

Volume I, Section 2, *Risk Assessment*, adequately describes the characteristics of drought hazards, as well as the location and extent of a potential event. Due to a cool, wet climate, past and present weather conditions have generally spared Marion County communities from the effects of drought. Governor Kate Brown declared a drought emergency for all of Marion County in September 2015. Stayton was close to local drought conditions during that event.

Please review the Risk Assessment (Volume I, Section 2) for additional information on this hazard.

Earthquake

The characteristics of a crustal earthquake are similar to the county as a whole.

Table ST-7. Earthquake Summary Crustal

Hazard	Earthquake - Crustal
Type	Geologic
Location	Multiple active faults; Willamette Valley
Speed of Onset	Rapid
Extent	Very Strong to Severe shaking ~ 500 yrs*
Prior Occurance	One over Magnitude 5 last 100 yrs**
Probability	Approximately 1% annual

*DOGAMI HazVu; ** PNSN - 1993 Scotts Mills just north of Marion County

Sources: DOGAMI - Oregon HazVu; Oregon NHMP; Pacific Northwest Seismic Network

The characteristics of a Cascadia subduction zone earthquake are the same as the county.

Table ST-8. Earthquake Summary Subduction

Hazard	Earthquake - Subduction
Type	Geologic
Location	Primarily west of the Cascades; CA - BC
Speed of Onset	Rapid
Extent	Catastrophic
Prior Occurance	One over Magnitude 9 last 500 yrs
Probability	Magnitude 9+ is 7% - 12% over 50 yrs**

*DOGAMI HazVu; **Oregon Natural Hazard Mitigation Plan, anlysis by Oregon Department of Geology and Mineral Industries.

Sources: DOGAMI - Oregon HazVu; Oregon NHMP; Pacific Northwest Seismic Network

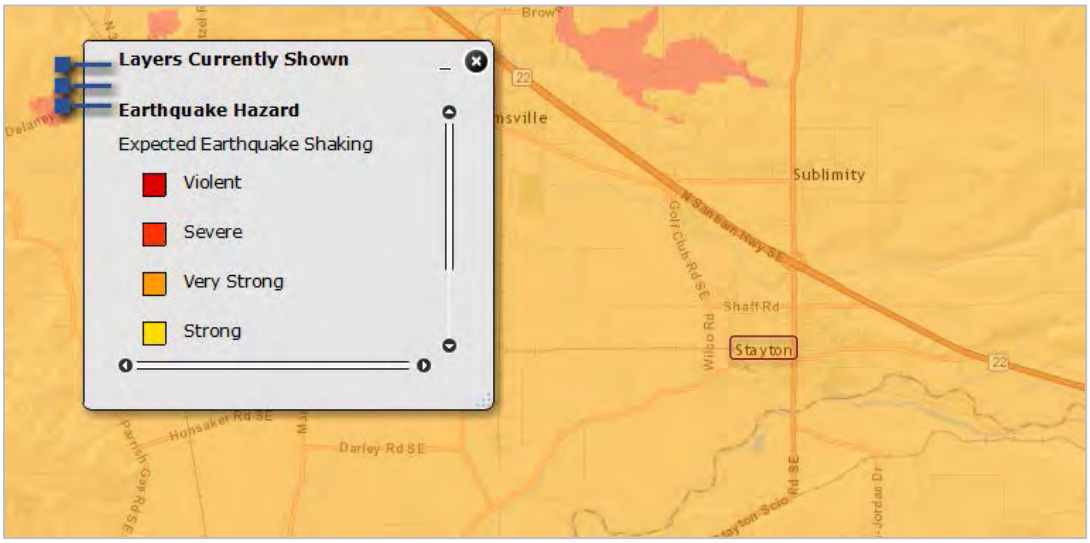
Stayton's probability for a Crustal Earthquake event is possible and their vulnerability to a Crustal Earthquake event is limited. The county steering committee determined that the probability for a Cascadia Subduction Zone (CSZ) Earthquake event is highly likely and that the vulnerability to a Cascadia Earthquake event is catastrophic. An active earthquake fault located northwest of the city exists within five miles of the Stayton City Limit. Other active faults exist within ten-miles to the west. The 1993 Scott Mills quake caused $28 million in damages to cities throughout Marion County. No damaging earthquake events occurred during the previous five years.

The City is working with Marion County to complete a seismic retrofit project on the North First Avenue (Stayton-Scio Road) bridge over the Santiam River. Stayton expects that this project will increase transportation redundancy, allowing travel north and south post-earthquake.

Volume I, Section 2, *Risk Assessment*, adequately describes the characteristics of earthquake hazards, history, as well as the location and extent of a potential event. Generally, an event that affects the county is likely to affect Stayton as well. Previous occurrences are well-documented within the county's plan, and the community impacts described by the county would generally be the same for Stayton as well.

Earthquake-induced damages are difficult to predict, and depend on the size, type, and location of the earthquake, as well as site-specific building and soil characteristics. Presently, it is not possible to accurately forecast the location or size of earthquakes, but it is possible to predict the behavior of soil at any particular site. In many major earthquakes, damages have primarily been caused by the behavior of the soil. Figure ST-2 shows that ground shaking in Stayton for both crustal and subduction earthquakes are expected to be very strong. According to DOGAMI HazVu maps, there is little to no liquefaction potential in Stayton.

Figure ST-2. Active Faults and Expected Shaking



Source: Oregon HazVu: Statewide Geohazards Viewer (DOGAMI)

The Stayton steering committee identified earthquake damage to the downtown central business district as a primary concern. Most of the buildings are old and constructed of masonry. The City's police department is also at risk of collapse during an earthquake. The City's priority actions reflect these concerns.

Additional local concerns include:

- Questions about the hospital's seismic condition. Historically, the City and hospital have had limited communication or coordination related the earthquake vulnerability.
- Police department is the highest priority critical facility for retrofit. Notably, it houses all of the city's computers.
- Stayton Community Center is the primary EOC (400 Virginia); secondary location is at the old 911 dispatch center.
- Pacific Power building will probably be standing (Wilco Rd. south end, across from Circle K) – this is their back up center for what operates the whole northwest.

In 2007, the Department of Geology and Mineral Industries (DOGAMI) conducted a seismic needs assessment for public school buildings, acute inpatient care facilities, fire stations, police stations, sheriffs' offices, and other law enforcement agency buildings. Buildings were ranked for the "probability of collapse" due to the maximum possible earthquake for any

given area. Within the City of Stayton, the following buildings received a "high" or "very high" probability of collapse:

- Stayton Elementary: *high (> 10%)*
- Stayton Middle School: *very high (100%)*
- Stayton High School: *very high (100%)*
- Stayton Police Department: *very high (100%)*
- Stayton Memorial Hospital: *high (> 10%)*
- Stayton Fire (west Ida): *very high (100%)*
- Stayton Fire (Ferry): *low (<1%)*

Please review the Risk Assessment (Volume I, Section 2) for additional information on this hazard.

Flood

Table ST-9. Flood Summary

Hazard	Flood
Type	Climatic
Speed of Onset	Slow to moderate
Location	Mapped flood zones, floodplain
Extent	Moderate to severe
Prior Occurance	Several minor events since 1964
Probability	1% annual within SFHA

Sources: DOGAMI - Oregon HazVu; Oregon NHMP

Volume I, Section 2, Risk Assessment, describes the causes and characteristics of flooding hazards within the region. The city's probability for riverine flood is likely and their vulnerability to flood is limited.

Portions of Stayton have areas of flood plains (special flood hazard areas). These include areas along the Santiam River in the south and Mill Creek in the north. Overall, Stayton has relatively limited development in the mapped 100-year flood plain. However, the City's water and wastewater treatment plants are located adjacent to the Santiam River. Past flood events have threatened those critical facilities. As an additional note, Stayton has two irrigation canals that go through town. Those canals have head gates that can be closed. However, those gates have been breached at least once during historical flood events (e.g. 1996).

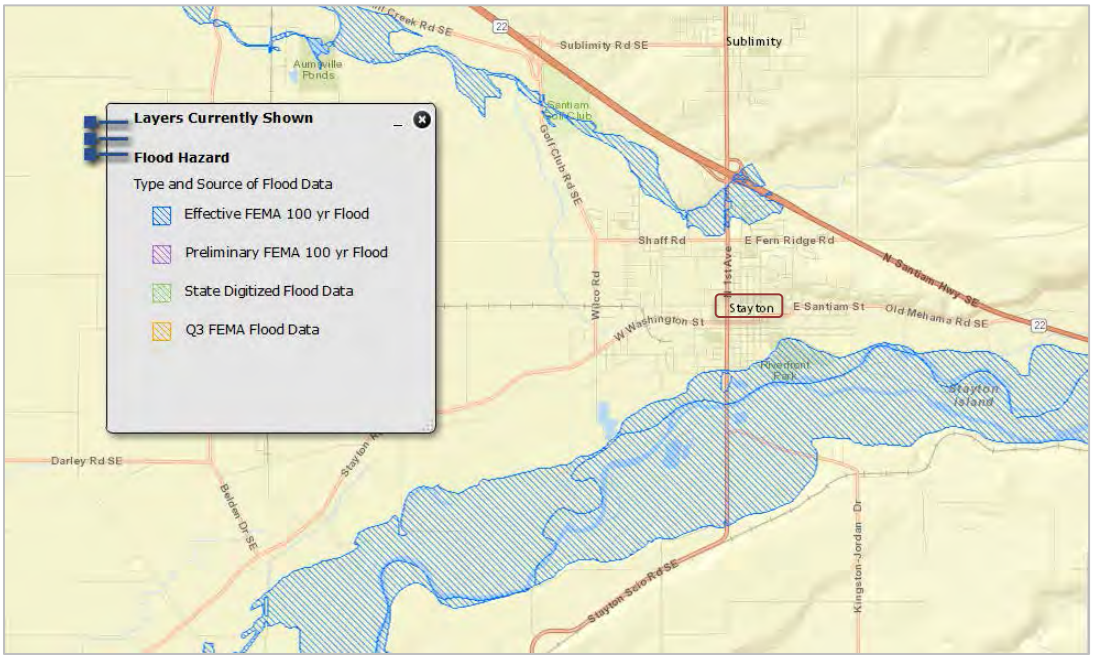
In 2006, the north portion of Santiam experienced significant flooding. The Santiam water treatment plant almost flooded during that event. In January of 2012, a warming trend corresponded with a rain on snow event that resulted in minor flooding in Stayton.

The City has successfully worked with the county to clear ditches along Shaff Road. This mitigation effort has reduced localized nuisance flooding through that corridor.

The Steering Committee specifically identified the following areas as subject to nuisance urban flooding:

- Silvan Springs subdivision has a small area of street that floods periodically, but the homes have not been impacted
- Undersized storm pipes cause localized flooding issues throughout town
    - Intersection of 6th and Pine is notable

Figure ST-3. Special Flood Hazard Area



Source: [Oregon HazVu: Statewide Geohazards Viewer (DOGAMI)]

National Flood Insurance Program (NFIP)

FEMA modernized the Stayton Flood Insurance Rate Maps (FIRMs) in January of 2000. The table below shows that as of October 2016, Stayton has 27 National Flood Insurance Program (NFIP) policies in force. Of those, zero are for properties that were developed before development of the initial FIRM. The last Community Assistance Visit (CAV) for Stayton was on August 9, 2006. Stayton is not a member of the Community Rating System (CRS). The table shows that almost all of the flood insurance policies are for single-family residential homes, with two being for "other residential" uses. There has been 1 paid flood claims in Stayton totaling $8,200.

The Community Repetitive Loss record for Stayton identifies no Repetitive Loss Properties[3] and no Severe Repetitive Loss Properties[4].

[3] A Repetitive Loss (RL) property is any insurable building for which two or more claims of more than $1,000 were paid by the National Flood Insurance Program (NFIP) within any rolling ten-year period, since 1978. A RL property may or may not be currently insured by the NFIP.

[4] A Severe Repetitive Loss (SRL) property is a single family property (consisting of 1 to 4 residences) that is covered under flood insurance by the NFIP and has incurred flood-related damage for which 4 or more separate claims payments have been paid under flood insurance coverage, with the amount of each claim payment exceeding $5,000 and with cumulative amount of such claims payments exceeding

Table ST-10. Flood Insurance Detail

Jurisdiction	Effective FIRM and FIS	Initial FIRM Date	Total Policies	Pre-FIRM Policies	Policies by Building Type: Single Family	2 to 4 Family	Other Residential	Non-Residential	Minus Rated A Zone	Minus Rated V Zone
Marion County	-	-	2,067	1,239	1,614	115	105	232	97	0
Stayton	1/19/2000	3/1/1979	27		25	0	0	2	1	0

Jurisdiction	Insurance in Force	Total Paid Claims	Pre-FIRM Claims Paid	Substantial Damage Claims	Total Paid Amount	Repetitive Loss Structures	Severe Repetitive Loss	CRS Class Rating	Last Community Assistance
Marion County	$ 514,268,700	298	226	16	$ 5,732,543	11	2	-	-
Stayton	$ 8,510,300	1	0	0	$ 8,200	0	0	N/A	8/9/2006

Source: Information compiled by Department of Land Conservation and Development, October, 2016.

Please review the Risk Assessment (Volume I, Section 2) for additional information on this hazard.

Landslide

Table ST-11. Landslide Summary

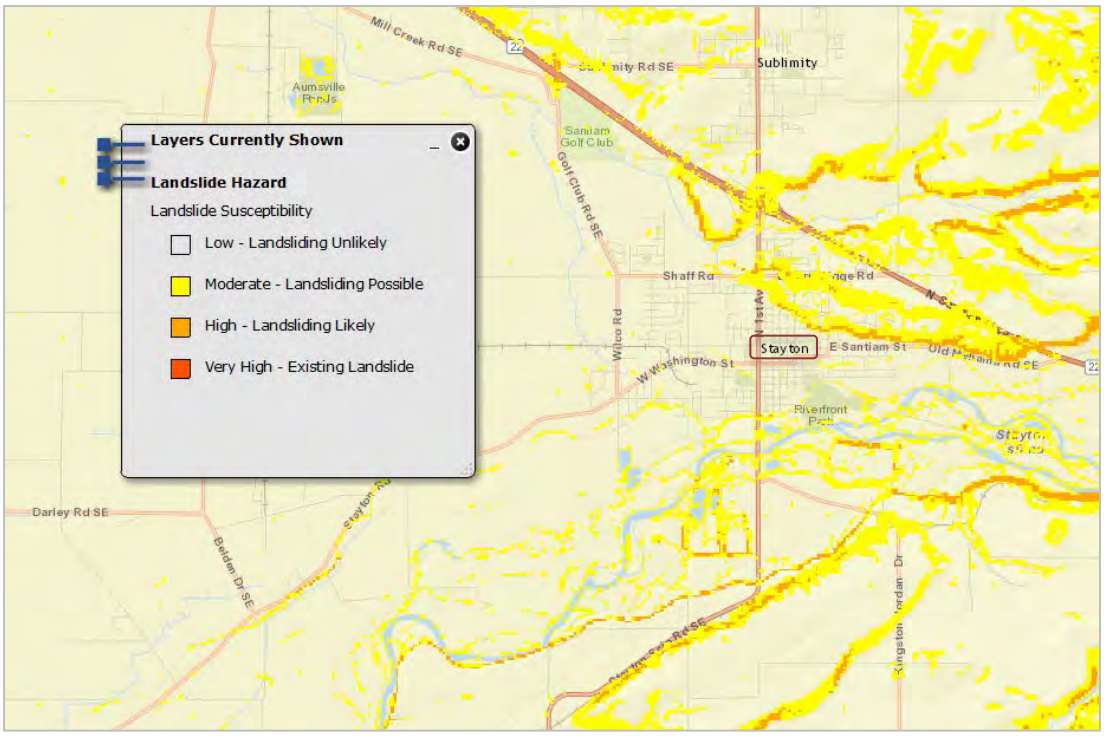
Hazard	Landslide
Type	Climatic/Geologic
Speed of Onset	Slow to rapid
Location	North of East Santiam Road
Extent	Minor to severe, but localized
Prior Occurance	Landslides occur annyally in Marion County
Probability	Possible to likely

Sources: DOGAMI - Oregon HazVu; Oregon NHMP

Volume I, Section 2, *Risk Assessment*, adequately describes the causes and characteristics of landslides. DOGAMI does not currently identify existing landslides on the statewide inventory in Stayton. Stayton has a relatively flat topography, except for the area north of East Santiam Road at the terminus of Santiam Canyon. Figure ST-4 shows the susceptibility and exposure to future landslides in Stayton.

$20,000; or for which at least 2 separate claims payments have been made with the cumulative amount of such claims exceeding the reported value of the property.

Figure ST-4. Susceptibility and Exposure



Source: [Oregon HazVu: Statewide Geohazards Viewer (DOGAMI)]

Please review the Risk Assessment (Volume I, Section 2) for additional information on this hazard.

Volcano

Table ST-12. Volcano Summary

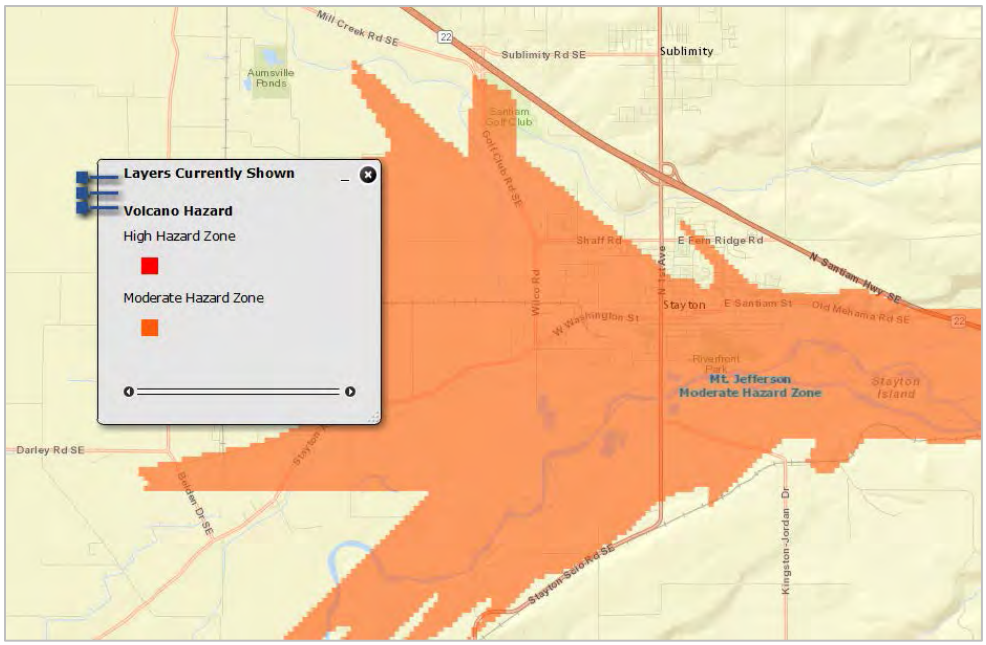
Hazard	Volcano
Type	Geologic
Speed of Onset	Slow to rapid
Location	Lahar flow impacts possible throughout Stayton
Extent	Critical to catastrophic
Prior Occurance	One significant event since 1916 (Mount St. Helens)
Probability	<1% annual

Sources: DOGAMI - Oregon HazVu; Oregon NHMP

Volume I, Section 2, *Risk Assessment*, adequately describes Stayton risk to volcanic events. The steering committee determined that the city's probability for volcanic event is unlikely and their vulnerability to volcano is critical to catastrophic.

The causes and characteristics of a volcanic event are appropriately described within the county's plan, as well as the location and extent of potential hazards. Previous occurrences are well-documented within the county's plan. When Mt. Saint Helens erupted in 1980, the city was not impacted. Notably, Stayton's location at the terminus of Santiam Canyon makes it susceptible to impacts from lahar flows originating at Mount Jefferson.

Figure ST-5. Susceptibility and Exposure



Source: Oregon HazVu: Statewide Geohazards Viewer (DOGAMI)

Please review the Risk Assessment (Volume I, Section 2) for additional information on this hazard.

Severe Weather

Table ST-13. Severe Weather Summary

Hazard	Severe Weather/Storm
Type	Climatic
Speed of Onset	Slow to moderate
Location	Countywide
Extent	Minor to severe
Prior Occurance	Minor events occur annually; ~30 moderate to severe events over the past 130 years
Probability	100% for minor events, 23% for moderate to severe events

Sources: Marion County NHMP

Windstorm

Volume I, Section 2, *Risk Assessment*, adequately describes the causes and characteristics of windstorms, as well as the location and extent of windstorm hazards. The City's probability for windstorm is highly likely and that their vulnerability to windstorm is critical.

Significant wind events occur in Stayton each year. Damaging wind events are only slightly less common; once or twice per year the city will experience a windstorm event that will interrupt services, experience downed trees, or cause power outages.

Because windstorms typically occur during winter months, they are sometimes accompanied by ice, freezing rain, flooding, and very rarely, snow.

Winter Storm (Snow/ Ice)

Volume I, Section 2, *Risk Assessment*, adequately describes the causes and characteristics of winter storms, as well as the location and extent of winter storm hazards. The City's probability for windstorm is highly likely and that their vulnerability to windstorm is critical.

Severe winter storms can consist of rain, freezing rain, ice, snow, cold temperatures, and wind. They originate from troughs of low pressure offshore that ride along the jet stream during fall, winter, and early spring months. Severe winter storms affecting the city typically originate in the Gulf of Alaska or in the central Pacific Ocean. These storms are most common from November through March.

Major winter storms can and have occurred in the Stayton area, most recently in 2006, 2013, and 2016. While these events do not typically cause significant damage, they are frequent and have the potential to impact economic activity. The most recent winter storms (December 2016 – January 2017) included snow and ice. Transportation and power interruptions combined with government office and school closures. A disaster declaration is currently pending.

Please review the Risk Assessment (Volume I, Section 2) for additional information on this hazard.

Wildfire

Table ST-14. Wildfire Summary

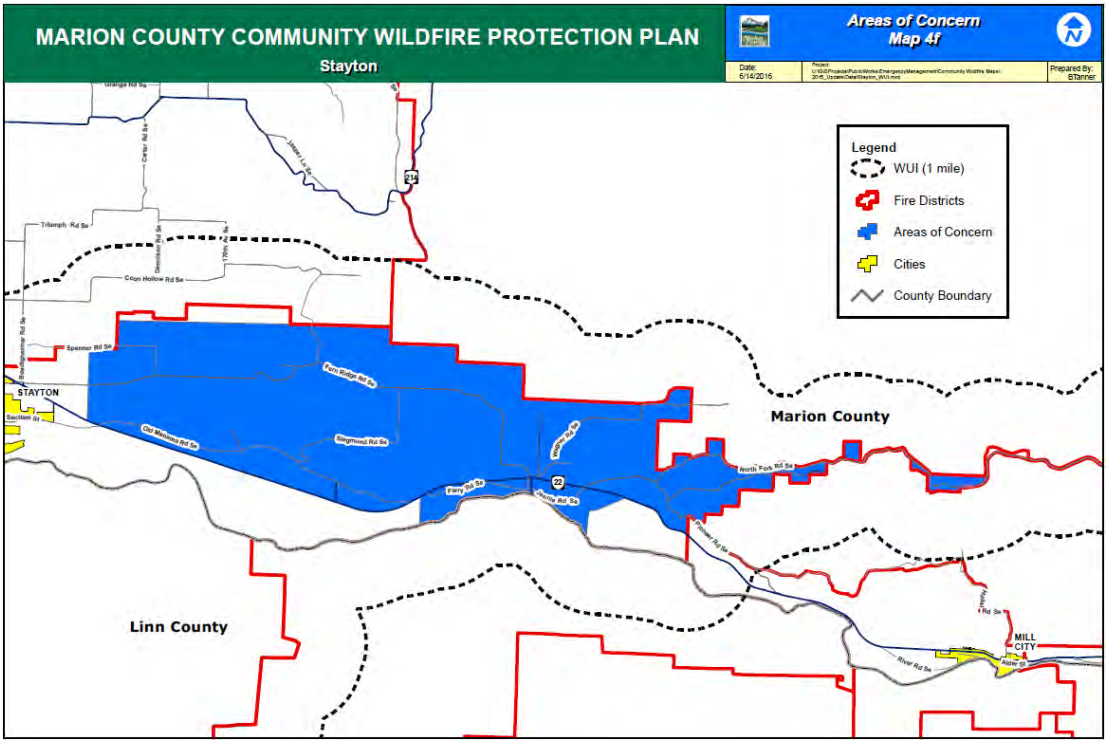
Hazard	Wildfire
Type	Climatic, Human Caused
Speed of Onset	Moderate to rapid
Location	Outside city limit
Extent	Minor to moderate
Prior Occurance	No history inside city limit
Probability	<1% annual

Sources: Marion County NHMP

Volume I, Section 2, *Risk Assessment*, adequately describes the causes and characteristics of wildfires, as well as the county and city's history of wildfire events. The city's probability for wildfire is unlikely and the vulnerability to wildfire is limited. Stayton has limited exposure to wildfire. Likely origination would be on agricultural lands outside the city limit or in wooded areas of Pioneer Park. Due to its location and limited fuels within the city, Stayton faces minimal risk of experiencing wildfires. There is no history of wildfire events in Stayton.

The County updated the Community Wildfire Protection Plan (CWPP) in 2016 and portions of Stayton are listed as having wildland urban interface (WUI) with areas of concern. Figure ST-6 depicts the areas near Stayton that the CWPP identifies as areas of concern. These areas should be targeted for fire suppression activities.

Figure ST-6. Areas of concern near Silverton.



Source: Marion County Community Wildfire Protection Plan (2016).

Please review the Risk Assessment (Volume I, Section 2) for additional information on this hazard.

Other Hazard or Concerns

The Stayton Steering Committee identified the following hazard issues or concerns during their meeting on October 13, 2016. While these hazards are non-natural, we've listed them here for reference.

- Cyber-attack in 2016 Ransom Ware/Bitcoinfiles were lost.
- Water and Wastewater only have fences w/barbed wire (low security) – potential vulnerability to domestic terrorism
- Industrial accident at Norpac
- Wilco fertilizer plant
- Pine Street reservoir: 1 million gallon reservoir could be a target
- Helena Chemical (agricultural chemicals)
- Migrant protesting (history of minor picketing in front of Norpac)
- Spill on 1st Street that could get into the water supply – they have a spill response for this
    - In the 80's diesel fuel spilled into one of the canals
    - More recently, a punctured fuel tank spilled fuel all through town.

CITY OF TURNER ADDENDUM

Purpose

This document serves as the City of Turner's Addendum to the Marion County Multi-Jurisdictional Hazards Mitigation Plan (MHMP, HMP). This addendum supplements information contained in Volume I (Basic Plan) of this HMP. The Basic Plan serves as the foundation for this jurisdiction's addendum. Volume III (Appendices) provides additional information (particularly regarding participation and mitigation strategy). This addendum meets the following requirements:

- Multi-jurisdictional **Plan Adoption** §201.6(c)(5),
- Multi-jurisdictional **Participation** §201.6(a)(3),
- Multi-jurisdictional **Mitigation Strategy** §201.6(c)(3)(iv), and
- Multi-Jurisdictional **Risk Assessment** §201.6(c)(2)(iii).

Plan Process, Participation, and Adoption

This section of the HMP addendum addresses 44 CFR 201.6(c)(5), *Plan Adoption*, and 44 CFR 201.6(a)(3), *Participation.*

In the summer and fall of 2016, the Oregon Partnership for Disaster Resilience (OPDR) at the University of Oregon's Community Service Center (CSC) partnered with the Oregon Military Department's Office of Emergency Management (OEM), Marion County and the City of Turner, to update the Turner NHMP and addend it to the Marion County HMP, which expired July 8, 2016. This project is funded through the Federal Emergency Management Agency's (FEMA) FY14 Pre-Disaster Mitigation Competitive Grant Program (PDMC-PL-10-OR-2014-002).

By developing this addendum to the Marion County HMP, locally adopting it, and having it approved by FEMA, the City of Turner will retain eligibility for FEMA Hazard Mitigation, Pre-Disaster Mitigation, and Flood Mitigation Assistance grant program funds.

The Marion County HMP, and Turner addendum, are the result of a collaborative effort between citizens, public agencies, non-profit organizations, the private sector, and regional organizations. A project steering committee guided the process of developing the plan. For more information on the composition of the steering committee see the *Acknowledgements*, *Plan Summary*, and *Plan Process* (Volume III, Appendix B).

The Turner City Administrator is the designated local convener of this addendum. The Convener will take the lead in implementing, maintaining, and updating the addendum to the HMP in collaboration with Marion County Emergency Management.

Representatives from the City of Turner steering committee met formally on one occasion: March 9, 2017 (see Appendix B for more information).

The city's addendum reflects decisions decided upon at the plan update meeting and during subsequent work and communication with OPDR.

The City of Turner Steering Committee is comprised of representatives from the following departments:

- Convener, City Administrator
- Mayor
- Police Department
- Turner Fire
- Community Emergency Response Team (CERT) Members
- Community Members

Turner used multiple approaches to engage the public. First, the City established steering committee representatives from across the city. Next, the City actively participated in countywide community engagement activities described in Volume I, Section 4 and in Appendix B. City staff also presented the draft plan to the City Council during an open public council session. The Steering Committee was closely involved throughout the development of the plan and served as the local oversight body for the plan's development. In addition, community members outside of the steering committee were provided an opportunity for comment via the plan review process (see Appendix B for more information).

The Marion County HMP was approved by FEMA on [Month] [Day], 2017 and the Turner addendum was adopted via resolution on [Month] [Day], 2017. This HMP is effective through [Month] [Day], 2022.

Mitigation Strategy

This section of the HMP addendum addresses 44 CFR 201.6(c)(3(iv), *Mitigation Strategy*.

During the 2016 Marion County and Turner update process, OPDR and a representative from Marion County Emergency Management assisted the steering committee with developing mitigation strategies that will meet Turner's unique situation. The proposed actions were then re-reviewed by the steering committee to finalize. Turner developed a list of priority actions (Appendix A-1); any actions that were not prioritized were placed in the Action Item Pool (Appendix A-2) and will be considered during the annual meetings. For a status update on each of Turner's 2012 mitigation actions, see Appendix A-2.

Priority Actions

The City is listing a set of high priority actions in an effort to focus attention on an achievable set of high leverage activities over the next five-years. The City's priority actions are listed in Table TR-1 on the following page.

Action Item Pool

Table TR-2 on the following pages presents a pool of mitigation actions. This expanded list of actions is available for local consideration as resources, capacity, technical expertise and/or political will become available.

Table TR-1. Turner Priority Action Items

Action Item ID	Hazard	Action Item	Coordinating Organization	Partner Organizations	Timeline	Priority
Priority						
P-1	Flood	Add water level monitoring equipment to the Marion Road Bridge, south of Mill Creek.	City Administrator (or designee)	CERT; Mill Creek Basin flood management agencies	Short Term	Top
P-2	Flood	Meet with City of Salem flood and emergency management staff on an annual basis to identify and implement collaborative flood mitigation project opportunities.	City Administrator (or designee)	Public Works, City of Salem, Marion Co., OEM, City of Aumsville, Beaver Creek Watershed Council, Santiam Watershed Council	Ongoing	Top
P-3	Multi-Hazard	Purchase a portable water filtration device.	Turner Public Works	City Administrator	Short Term	Top
P-4	Multi-Hazard	Provide public outreach and education to vulnerable populations (such as Turner Retirement Homes, the Christian Convention, Aldersgate, and others, as identified in this plan) regarding hazards.	City Administrator (or designee)	Turner Police, Turner Fire, Marion Co.	Ongoing	Top
P-5	Multi-Hazard	Partner with existing community organizations to disseminate hazard preparedness information.	City Administrator (or designee)	Turner Police Department, Turner Fire Department, Turner Christian Church, Cascade School District, Church of God, Turing Point	Ongoing	Top

Source: City of Turner HMP Steering Committee, 2017.

Table TR-2. Turner Action Item Pool

Action Item ID	Hazard	Action Item	Coordinating Organization	Partner Organizations	Timeline	Priority
Action Item Pool						
Multi-Hazard						
MH-1	Multi-Hazard	Use existing city public engagement tools (such as monthly utility bills, public reader boards, Facebook pages, etc.) as means of disseminating information to residents regarding hazard preparedness.	Turner Police	City Administrator; Public Works; Turner Fire;Turner Christian Church, Portland General Electric; School District; Marion County Emergency Management	Ongoing	High
MH-2	Multi-Hazard	Implement an automated notification system for disaster alerts and preparedness.	City Administrator (or designee)	Turner Police Department, Turner Fire, Community Emergency Response Team (CERT)	Short Term	High
MH-3	Multi-Hazard	Encourage documentation of the vulnerable populations listed in the Plan, including the creation and maintenance of a list of residents with special medical needs.	City Administrator (or designee)	Turner Police Department, Turner Fire Department	Ongoing	Medium
MH-4	Multi-Hazard	Retrofit the fire station to withstand flood and earthquakes or construct a new, seismically-sound fire station outside the flood zone in a location at minimal risk to natural and man-made hazards.	Turner Fire	City Administrator, OEM, Oregon Emergency Management Seismic Rehabilitation Grant Program Coordinator	Short Term	Medium
MH-5	Multi-Hazard	Conduct annual emergency management table top exercises that include hazardous material release scenarios (in addition to other hazard scenarios).	Turner Fire	Community Emergency Response Team, Marion County Emergency Management; Union Pacific	Ongoing	Low

Source: City of Turner HMP Steering Committee, 2017.

Table TR-2. Turner Action Item Pool (Continued)

Action Item ID	Hazard	Action Item	Coordinating Organization	Partner Organizations	Timeline	Priority
Action Item Pool						
Dam Failure						
DF-1	Dam Failure	Coordinate with Marion County Emergency Management to develop an evacuation plan for the City of Turner the event of dam failure.	City Administrator (or designee)	Turner Police , County Emergency Management, County Transit, Army Corps, State Water Services Division	Long Term	Low
DF-2	Dam Failure	Coordinate with Marion County Emergency Management and the Army Corps of Engineers to develop a dam failure notification procedure for the City of Turner.	City Administrator (or designee)	Turner Police, Marion County Sheriff's Office, Army Corps, Marion County Emergency Management	Long Term	Low
DF-3	Dam Failure	Meet with the City of Salem each year to receive updates on the Franzen Reservoir and notify the public of any changes to safety.	City Administrator (or designee)	City of Salem	Ongoing	Medium
DF-4	Dam Failure	Actively engage with the County's efforts to work with the Army Corps of Engineers to assess dam failure likelihood and risks.	Turner Police	Turner Fire, City Administrator, Army Corps of Engineers, Marion County Emergency Management	Long Term	Medium
Earthquake						
EQ-1	Earthquake	Perform seismic assessments of critical infrastructure as resources become available.	City Administrator (or designee)	Oregon Emergency Management Seismic Rehabilitation Grant Program Coordinator	Long Term	Low
EQ-2	Earthquake	Send city staff and other to the County's ATC 20 structural assessment training when the course is offered.	City Administrator (or designee)	Turner Police, Turner Fire, Marion Co.	Ongoing	Medium

Source: City of Turner HMP Steering Committee, 2017.

Table TR-2. Turner Action Item Pool (Continued)

Action Item ID	Hazard	Action Item	Coordinating Organization	Partner Organizations	Timeline	Priority
Action Item Pool						
Flood						
FL-1	Flood	Provide more training on flood insurance.	City Administrator (or designee)	Oregon Department of Land Conservation and Development (DLCD), Oregon Office of Emergency Management (OEM), Federal Emergency Management Agency (FEMA), FEMA trainers	Ongoing	Medium
FL-2	Flood	Identify and prioritize properties to be retrofitted against flood damage.	City Administrator (or designee)	DLCD	Short Term	Low
FL-3	Flood	Have City Council evaluate pursuing certifiaction in the Community Rating System (CRS).	City Administrator (or designee)	DLCD, FEMA, City of Salem, Marion County Public Works	Ongoing	Medium
FL-4	Flood	Implement annual flood vent inspection program for all residential properties in areas at risk of chronic flooding (inside and outside the mapped floodplain).	Planning / Building	CERT, DLCD	Ongoing	Low
FL-5	Flood	Work with the owners of repetitive flood loss buildings in the city to identify cost effective mitigation strategies including consideration of elevation or buy-out.	City Administrator (or designee)	DLCD, OEM	Long Term	Low
FL-6	Flood	Pursue and complete remapping of City floodplain.	City Administrator (or designee)	DLCD, OEM, FEMA	Short Term	High
FL-7	Flood	Provide annual public information materials to Turner residents regarding flood safety practices, including detailed information about sandbagging.	City Administrator (or designee)	City of Turner, CERT	Ongoing	High
FL-8	Flood	Maintain and cultivate partnerships with other government agencies, both local and regional, to plan for flood hazard events.	City Administrator (or designee)	Marion County, City of Salem, MWVCOG, Mill Creek Basin flood management agencies	Ongoing	High
FL-9	Flood	Pursue hiring of a flood coordinator to address flood-related action items.	City Administrator (or designee)	MWVCOG	Ongoing	Medium

Source: City of Turner HMP Steering Committee, 2017.

Table TR-2. Turner Action Item Pool (Continued)

Action Item ID	Hazard	Action Item	Coordinating Organization	Partner Organizations	Timeline	Priority
Action Item Pool						
Landslide						
LS-1	Landslide	Implement the Eastwood Drive Stabilization Plan and continue ongoing monitoring of conditions.	Public Works	City Administrator	Ongoing	Low
Severe Weather						
SW-1	Severe Weather	Develop MOUs with private businesses and citizens around equipment and resource sharing during severe weather events, particularly related to providing resources to residents who might be stranded up the hill in the Eastwood area during icy weather.	City Administrator (or designee)	Marion County Public Works, Turner Public Works, Police, Fire	Ongoing	Medium
SW-2	Severe Weather	Monitor the trees in the public right-of-way and maintain to minimize damage during wind or winter storms.	Public Works	Portland General Electric (PGE), Turner Fire Department	Ongoing	Medium
Wildfire						
WF-1	Wildfire	Conduct wildfire prevention outreach, as outlined in the Marion County Community Wildfire Protection Plan (CWPP), to residents in areas where wildfire is a potential concern (e.g. hillside neighborhoods in northeast Turner).	Turner Fire		Ongoing	Low
WF-2	Wildfire	Provide fire supression outreach throughout the Fire District.	Turner Fire		Ongoing	Low

Source: City of Turner HMP Steering Committee, 2017.

Plan Implementation and Maintenance

The City Council will be responsible for adopting the City of Turner addendum to the Marion County HMP. This addendum designates a convener and a coordinating body to oversee the development and implementation of action items. Because the city addendum is part of the county's multi-jurisdictional HMP, the City will look for opportunities to partner with the county. The City's steering committee will convene after adoption of the City of Turner addendum on an annual schedule (each October); the county meets on a semi-annual basis. The City of Turner Convener will participate in the Marion County HMP meetings and will report on city specific activities as appropriate. The steering committee will be responsible for identifying new risk assessment data, reviewing status of mitigation actions, identifying new actions, and seeking funding to implement the City's mitigation strategy (actions). The convener will also remain active in the county's implementation and maintenance process (see Volume I, Section 4 for more information).

The City will utilize the same prioritization process as the county (See Volume I, Section 4: Plan Implementation and Maintenance and Volume IV, Appendix D: Economic Analysis of Hazard Mitigation Projects for more information).

Implementation through Existing Programs

Many of the Hazard Mitigation Plan's recommendations are consistent with the goals and objectives of the City's existing plans and policies. Where possible, the City of Turner will implement the HMP's recommended actions through existing plans and policies. Plans and policies already in existence have support from local residents, businesses, and policy makers. Many land-use, comprehensive, and strategic plans get updated regularly, allowing them to adapt to changing conditions and needs. Implementing the HMP's action items through such plans and policies increases their likelihood of being supported and implemented.

Turner's Comprehensive Plan was first acknowledged by the Oregon Land Conservation and Development Commission in 1979.[1] The City most recently completed updates to the plan, including updates to the Environmental section(which includes discussion of natural hazards), in 2011. The Turner Comprehensive plan identifies floods and landslides as key hazards that are anticipated to affect the city. The plan also mentions sever weather conditions (including high winds, freezing rain, and lightening) as posing a threat to the city. There is no mention earthquakes or wildfires. Under "Water Resources," the plan contains three policies related directly to mitigating the flood hazard.[2] There are no other hazard related policies listed. The City implements the Comprehensive Plan through the Land Use Development Code.

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[1] City of Turner Comprehensive Plan (2011). http://www.cityofturner.org/index.asp?Type=B_BASIC&SEC={14CD4F13-7BF8-4260-8892-F5FD3284B384}

[2] City of Turner Comprehensive Plan (2011). Section 9.200: Environment. Policies 7-9. P. 9.200-17 and 9.200-18

In addition to the Comprehensive Plan, Turner currently has the following plans that relate to hazard mitigation:

- Water Systems Master Plan (updated in 2013)
- Turner Transportation System Plan (updated in 1999)
- Floodplain Ordinance

For more information, refer to http://www.cityofturner.org/index.asp?Type=B_BASIC&SEC={14CD4F13-7BF8-4260-8892-F5FD3284B384} and http://www.cityofturner.org/index.asp?Type=B_LIST&SEC={E94C3D5B-E9C7-4CD1-A30D-E3E4D4781E5D}

Continued Public Participation

Keeping the public informed of the City's efforts to reduce the city's risk to future hazard events is important for successful plan implementation and maintenance. The City is committed to involving the public in the plan review and updated process. See Volume I, Section 4, for more information.

Plan Maintenance

The Marion County Multi-Jurisdictional Hazards Mitigation Plan and city addendum will be updated every five years in accordance with the update schedule outlined in the Disaster Mitigation Act of 2000. During the county plan update process, the City will also review and update its addendum. The convener will be responsible for convening the steering committee to address the questions outlined below.

- Are there new partners that should be brought to the table?
- Are there new local, regional, state, or federal policies influencing natural hazards that should be addressed?
- Has the community successfully implemented any mitigation activities since the plan was last updated?
- Have new issues or problems related to hazards been identified in the community?
- Are the actions still appropriate given current resources?
- Have there been any changes in development patterns that could influence the effects of hazards?
- Have there been any significant changes in the community's demographics that could influence the effects of hazards?
- Are there new studies or data available that would enhance the risk assessment?
- Has the community been affected by any disasters? Did the plan accurately address the impacts of this event?

These questions will help the steering committee determine what components of the mitigation plan need updating. The steering committee will be responsible for updating any deficiencies found in the plan.

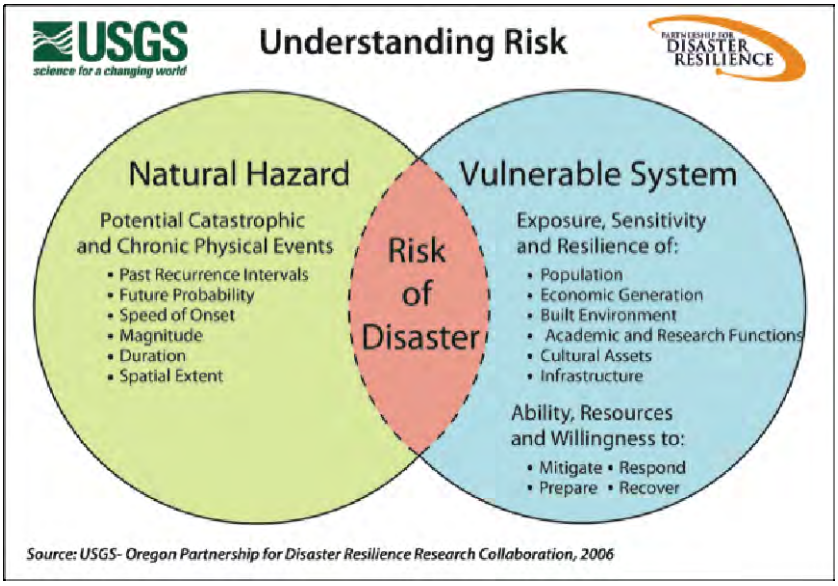
Risk Assessment

This section of the HMP addendum addresses 44 CFR 201.6(b)(2) - Risk Assessment. In addition, this chapter can serve as the factual basis for addressing Oregon Statewide Planning Goal 7 – Areas Subject to Natural Hazards. Assessing natural hazard risk has three phases:

- **Phase 1:** Identify hazards that can impact the jurisdiction. This includes an evaluation of potential hazard impacts – type, location, extent, etc.
- **Phase 2:** Identify important community assets and system vulnerabilities. Example vulnerabilities include people, businesses, homes, roads, historic places and drinking water sources.
- **Phase 3:** Evaluate the extent to which the identified hazards overlap with, or have an impact on, the important assets identified by the community.

The local level rationale for the identified mitigation strategies (action items) is presented herein, and within Section 2, *Risk Assessment*, and Appendix C, *Community Profile*. The risk assessment process is graphically depicted in Figure TR-1 below. Ultimately, the goal of hazard mitigation is to reduce the area of risk, where hazards overlap vulnerable systems.

Figure TR-1. Understanding Risk



Risk Assessment Approach

A risk assessment is intended to provide the, "factual basis for activities proposed in the strategy to reduce loses from identified hazards."[3] To complete the risk assessment, the HMP update team first updated the description, type, location and extent of each hazard. Next, the team updated the vulnerability information based on each hazard's potential impact on the community.

[3] 44 CFR 201.6(2)(i)

The Marion County Basic Plan (Volume I, Section II) Risk Assessment describes in detail the methods used to assess risk. In summary, Marion County has prepared a Threat Hazard Identification and Risk Assessment as a formal annex to the Marion County Emergency Operation Plan. The assessment uses a method developed by BOLD Planning.[4] This city addendum builds on the county level assessment to produce a similar assessment for the City of Turner. The assessment specifically examines:

1. Probability (frequency) of event
2. Magnitude of event
3. Expected warning time before event
4. Expected duration of event

Refer to Page 2-4 of the Marion County Basic HMP for a description of the scoring values for each ranking category.

Hazard Identification

The 2012 City of Turner HMP identified seven hazards that could have an impact on the city. These hazards include dam failure, earthquake, flood, hazardous materials, landslide, severe weather, and wildfire. Note that in this update of the HMP, the Turner steering committee decided to incorporate hazardous materials into its "multi-hazard" action items.

The City completed a review of the hazards and hazard rankings in March of 2017. The committee made no changes to the list of hazards or rankings. Because Turner is electing to update its HMP as an addendum to the county HMP, the city specific risk assessment includes a more detailed hazard analysis below.

Table TA-2 Previous Hazard Rankings

Hazard	Probability	Vulnerability
Dam Failure	Low	High
Earthquake	Moderate	Moderate
Flood	High	High
Landslide	Low	Low
Wildfire	Low	Moderate
Severe Weather	High	High
Hazardous Material	Moderate	High

Source: 2012 HMP; Review completed March 2017

Hazard Analysis

The assessment identifies three levels of risk: High, Moderate and Low.

High - High probability of occurrence; at least 50 percent or more of population at risk from hazard; significant to catastrophic physical impacts to buildings and infrastructure; major loss or potential loss of functionality to all essential facilities (hospital, police, fire, EOC and shelters).

[4] BOLD Planning is a consulting firm specializing in the development of actionable emergency plans. For more information, visit: http://www.boldplanning.com/

Moderate - Less than 50 percent of population at risk from hazard; moderate physical impacts to buildings and infrastructure; moderate potential for loss of functionality to essential facilities.

Low - Low probability of occurrence or low threat to population; minor physical impacts.

A summary of the risk assessment findings and rankings is presented below.

Table TA-2 Hazard and Vulnerability Assessment Summary

Hazard Profile Summary for Turner Usinging Bold Planning Analysis Scoring							
Natural Hazard	Probability	Warning Time	Magnitude	Duration	CPRI	Local Planning Significance	County Planning Significance
Weight Factor	0.45	0.3	0.15	0.1			
Earthquake*	4	4	4	4	4.00	High	**High**
Flood	4	2	3	4	3.25	High	**High**
Severe Weather/Storm**	4	1	3	3	2.85	Moderate	**High**
Drought	3	1	2	4	2.35	Moderate	**High**
Wildland Interface Fire	2	4	2	2	2.60	Moderate	Moderate
Dam or Levee Failure	1	2	4	4	2.05	Moderate	Moderate
Extreme Weather - High Temperature	2	1	2	4	1.90	Low	Moderate
Landslide	1	2	2	2	1.55	Low	**High**
Volcanic Eruption	1	1	1	4	1.30	Low	**Low**
*Note: Earthquake probability listed to match county level analysis. See below for more detailed probability assessment.							
**Note: Includes tornado hazard							

Source: BOLD Planning Risk Assessment Method; Analysis by UO Community Service Center.

Community Asset Identification

This section provides information on city-specific assets. For additional information on the characteristics of Turner, in terms of geography, environment, population, demographics, employment and economics, as well as housing and transportation see Volume III, Appendix C, *Community Profile*. Many of these community characteristics can affect how hazards impact communities and how communities choose to plan for natural hazard mitigation. Considering the city-specific assets during the planning process can assist in identifying appropriate measures for natural hazard mitigation.

Community Characteristics

The City of Turner is located in Marion County, about six miles south of Salem, and approximately 54 miles inland from the Pacific Ocean. The topography within the city is characterized by a fairly flat landscape, with the exceptions of two hills to the east and west of the City, which reach a maximum elevation of about 600 feet above sea level.

Turner is bisected by Mill Creek, which is the primary stream that runs through the city's limits. Mill Creek has an average annual flow rate of about 180 cubic feet per second and flows north through the city. The stream meanders through or adjacent to the city's limits for nearly three miles. Additional waterways within the city include the Mill Creek Bypass and the Perrin Lateral, both of which are significantly smaller than Mill Creek.

Like most of the Willamette Valley, Turner experiences a modified marine climate with cool and wet winters and moderately warm and dry summers. The average annual precipitation is approximately 39.28 inches with the heaviest rainfall in late fall and winter. While major

snow falls are rare, Turner experiences an average annual snowfall of approximately 7.1 inches.

Economy

Like the majority of cities in Oregon, industry in Turner has fluctuated greatly since the founding of the city in the mid-1800s. In the late 1800s the primary industries were a flour mill and granaries.[5] However, these industries eventually gave way to the more dominant lumber industry that arose in the late 1900s. These early industries owe their success in large part to the construction of the railroad, which runs through the middle of the city.

Due to Turner's small population and the city's proximity to Salem, many of Turner's residents commute to work outside of the city. According to the American Community Survey, these commuters represent 88% of the workforce.[6] Therefore, a large majority of the city's residents depend on other jurisdictions, such as Salem, for employment purposes. The dominant industries in the City of Turner are retail trade and education and health services.[7] The Turner Retirement Homes is the single largest employer in the city. However, the primary occupations of Turner residents (commuters included), are management, sales, and service occupations.[8]

Critical and Important Facilities

Critical facilities include buildings, their internal components and trained personnel, and may also include certain mobile units, such as those of first responders. For example, many vehicles of the police department, fire department (including ambulances), and public works department are key and essential components of the functions provided by these critical facilities. The interruption or destruction of any of these facilities would have a debilitating effect on incident management and long-term recovery. Not all critical facilities are of equal importance, and are therefore subject to prioritization of criticality. The steering committee identified key critical facilities, listed in Table TR-3.

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[5] City of Turner. "What would you like to know? History." http://www.cityofturner.org/index.asp?Type=B_BASIC&SEC={2E2C16BF-EEC7-4611-9DF4-7F6DE25C90F2}

[6] US Census Bureau. 2011-2015 American Community Survey 5-year Estimates. Table S0801: Commuting Characteristics by Sex. 2015.

[7] US Census Bureau. 2011-2015 American Community Survey 5-year Estimates. Table DP03: Selected Economic Characteristics - Industry. 2015.

[8] US Census Bureau. 2011-2015 American Community Survey 5-year Estimates. Table DP03: Selected Economic Characteristics - Occupation. 2015.

Table TR-3. Turner Critical Facilities

Facility Name	Type
Fire Department	Emergency Response
Turner City Hall	Governance
Police Department	Emergency Response
Public Works	Emergency Response
Turner Retirement Homes	Care Facility
CARTS Bus – Santiam Route #30	Transportation
Turner Christian Church Food Bank	Food Services
Turner Elementary School	Miscellaneous
Cascade School District Office	Miscellaneous
Post Office	Communication
Aldersgate	Youth Camp

Source: City of Turner. http://cityofturner.org/

This plan also documents important infrastructure and facilities by lifelines, including transportation, energy, water, communication, emergency services, and cultural/historical resources. We also include a preliminary list of populations/locations that may be particularly vulnerable to hazards.

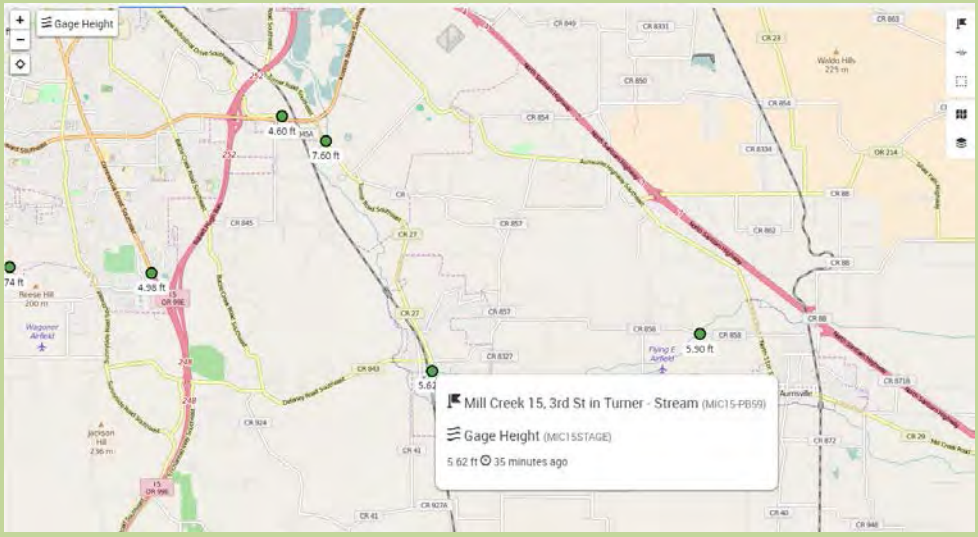
Transportation

- Delaney Rd is the link to I-5 – this would be under water in a major flood.
    - This road is the most vulnerable link – water on the road in particular would be very destructive and block access.
- Third St (Turner Rd.) is the link to Hwy 22 – this would be under water in a major flood.
- Witzle Rd. would become the exit if the other roads were blocked.
- There are a few backroad exists that don't involve bridges.
- CARTS Bus – Santiam Route #30 provides public transportation services for residents.
- Bridges:

Road	Over	Construction	Owner	Co-located infrastructure	Notes
Mill Creek Rd./Denver Street	Mill Cr.	Concrete continuous	Marion Co.	NW Natural gas line Water and sewer	Rebuilt in 2006
Delaney Rd. SE	Mill Cr.	Prestressed concrete	Marion Co.		
Wipper Rd.	Bypass canal	Prestressed concrete	Marion Co.		Rebuilt in 2014
55th Ave. SE	Bypass canal	Wood nail laminated	Marion Co.		
3rd St. SE	Mill Cr.	Prestressed concrete	Marion Co.	NW Natural gas line 8" water line	This bridge has a lower deck and debris collects on it during high water.
5th St.	Mill Cr.	Prestressed concrete	City of Turner	Water and sewer	Rebuilt around 2001 or 2002.

Mitigation Success Story: Flood Monitoring Infrastructure

After a 2012 storm caused a severe flood in Turner, the City partnered with State and Salem to implement a rain and stream gauge monitoring system to provide early warning for future floods. The jurisdictions used $200,000 from the Hazard Mitigation Grant Program to build the infrastructure and website that make up the early warning system. As pictured below, residents can visit the Mid-Willamette Valley High Water Watch website[1] and see real-time data about stream levels in and around Salem. The system also provides an alarm warning system for emergency managers, allowing them to alert residents to potential flood issues.



Energy

- PGE provides the city with power and has a sub-station on 5TH Street by Mill Creek.
- NW Natural provides the city with natural gas and has distribution mains connected to the Third street and Denver Street bridges.
- City gets fuel from Pacific Pride (by I-5).
    - Fuel access could be difficult if Delaney Road were not passable.
- Fuel storage: there are tanks at the gas station at 5235 Denver Street.
- Back-up power and fuel storage:
    - Fire has two 6kw diesel generators on engines E955 and E957 and keeps 15 gallons of gas and diesel at the fire station
    - City has a 2kw, 3kw and 7.5kw gas portable generators and keeps 15 gallons of gas stored.

Location	Owner	Fuel Type	Capacity
City Hall/Public Works – Fuel Storage	City	Above ground diesel tank	55 gal
Generators: Top of the hill pump station	City	Diesel	150 KW, 200 gallons
Generator: Lower Pump	City	Diesel	100KW, 150 gallons

Generator: main sewer pump station in 5th St. Park	Salem	Diesel	35KW, 50 gallon tank
Generator: 1952 station generator	Fire	Diesel	60 KW
Mobile generator	Fire	Gas	One 2000W portable on rescue965

Water and Wastewater

- Water storage and distribution:
  - Water is contracted to Salem.
  - City has a storage and distribution system – 100,000 gal water tank (redwood, but it's in great shape); 400,000 gal water tank (only 6 years old, so built with modern technology).
  - The city currently does not have back-up water sources.
  - Val View pump station can be accessed in two different ways
  - 3rd St pump station is on the main street so it should be accessible in an earthquake.
- Wastewater:
  - Wastewater this contracted to Salem.
  - Lift stations bring sewage to a forced main station on Kuebler Rd. – lift stations have emergency generators.
    - There are 2.5 miles of forced main sewer pipe that take wastewater to the intersection of Kuebler and Turner Roads – this pipe would probably not withstand an earthquake.
    - If this pipe broke, it would get into Mill Creek.
- Franzen Reservoir stores 100 million gallons of water for Salem. The reservoir is part natural, part constructed.
  - Salem was required by the Department of Water Resources to reevaluate the reservoir. As part of this, they had to do outreach about the inundation potential from the reservoir if it failed.

Mitigation Success Story: Stormwater Infrastructure Upgrades

Since Turner's 2012 Hazard Mitigation Plan, the City has invested about $15,000 in building and upgrading storm water systems where rain water has historically damaged property and threatened roadway stability. These projects have helped minimize localized flooding, improving the city's ability to remain functional during storm and high water events.

Communication

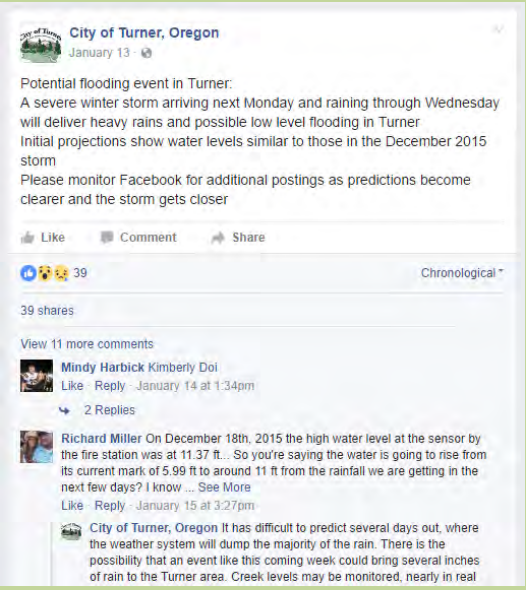
- The redwood water tank on Val View has some police radio equipment to connect with the Woodburn Dispatch Center.
- The police department has radio capabilities as a back-up if cell service is down.
- The water distribution system has its own radio system.

    - This system only requires a minimal amount of power, and it is possible to run the system without the radios.
- The City recently purchased a satellite phone (service provided by Global Star).
- Fire station has base radio, mobile in the trucks – dispatch connection infrastructure is outside the City – all of this is backed up
- Wave Broadband provides cable internet.
- Turner Elementary School has fiber, and the new subdivision at Crawford Lake may have fiber provided by Viser, a fiber company based in Aumsville.
- Fiber optic cable runs along the railroad (the Seattle to San Francisco line).
- Cell towers:
    - AT&T Tower on private property – this has a generator.
    - Verizon and T-Mobile on the tower in 5th Street Park – this has a generator.

Mitigation Success Story: Flood Early Warning System

To complement the flood monitoring system (see Mitigation Success Story: Flood Monitoring Infrastructure), Turner has also been actively working to improve communication with residents regarding floods and other hazard events. The City purchased a contract with Everbridge (an emergency mass communication tool) and has been collecting cell phone numbers for entire community. This "reverse 911" system allows the City to send out notifications about hazards. For example, the City can send a text alert about flood warnings when the flood monitoring systems indicates high water may be on the way.

In addition to the Everbridge system, the City actively uses Facebook for weather- and flood- related notices and advisories. Residents actively engage with the City's Facebook page, sharing notifications with their networks and quickly spreading the word about potential hazards that may affect the community. Additionally, the Facebook page helps the City advertise for upcoming preparedness events (see post below.)



Emergency services

- Fire:
  - Fire Department (7605 3rd St.) – they have a local ambulance dispatch.
- Police:
  - Police Department/City Hall (5255 Chicago St.).
- Public Works:
  - City shops (7250 3rd St.).
- CERT/EOC:
  - 7250 3rd St.; the backup location is Marion County Public Works
- Medical:
  - Aumsville has a health clinic.
  - Stayton hospital.

Cultural/historical resources

- Turner Memorial Tabernacle and Camp Meeting Grounds; Pioneer Lodge
- Masonic Hall
- Ball Brothers Grange and Dance Hall (old)
- Ball Brothers Grange (current)
- Davis Hall (at Turner Retirement Home)
- Events that may draw large crowds:
  - Lamb and Wool festival – 1st Saturday in June. This includes a parade with maybe 1,500 people passing through town.

Functional and Access Needs (Vulnerable Populations)

- Schools:
  - Turner Elementary School
  - Aldersgate (youth camp)
  - Cradle to Crayons (Daycare) at 7920 2nd St. – this is in the floodplain
- Assisted living:
  - Turner Retirement Homes
- Non-English speaking:
  - There is still only a small non-English speaking community
  - Many Spanish speakers work at the mill
- People who live up the hill (in the Eastwood area) might be hard to access in bad weather (for example, the roads were not passible during the last ice storm – too steep and slippery).
- Flooding impacts people in the low lands.

See hazard sections below and Section 2, *Risk Assessment*, for potential hazard vulnerabilities to these facilities.

Hazard Characteristics

Dam Failure

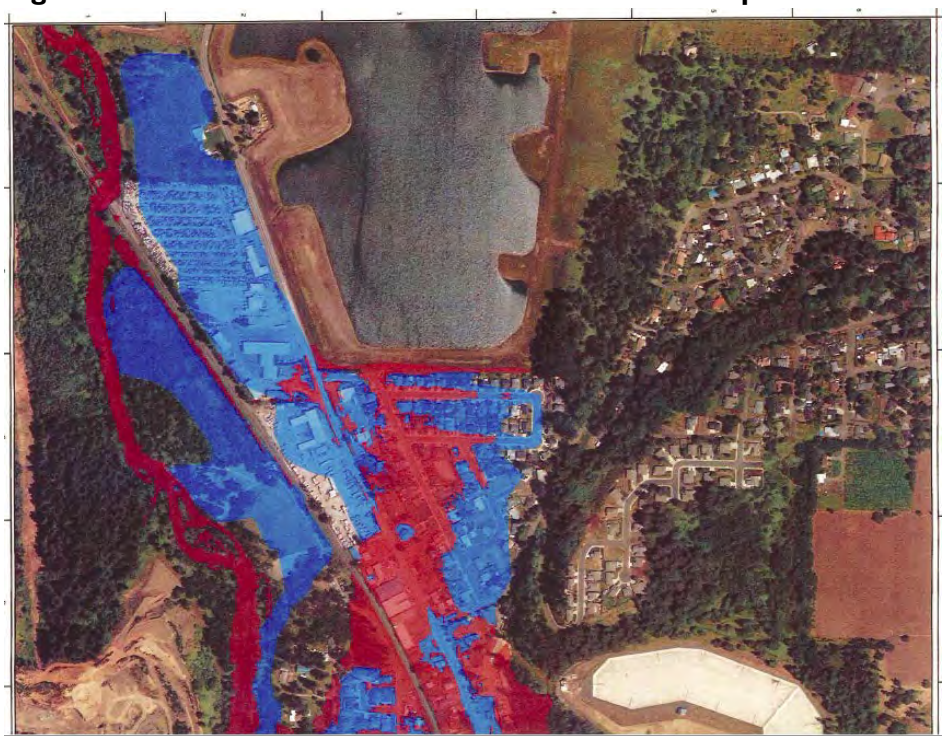
The steering committee confirmed that the city's probability for dam failure is low and that their vulnerability is high. Dams are impervious structures that block the flow of water in a

river or stream, capturing water behind the dam. Dams can fail for a variety of reasons, such as erosion, overtopping, structural failure, ground motion or unusual hydrodynamic forcing.

The primary Army Corps of Engineers controlled dam threat to the City of Turner is Detroit Dam. Contact the local Army Corps office for more information about specific dam failure and inundation impacts that could result from a failure at Detroit Dam.

In addition, the Franzen Reservoir poses a "high hazard" dam threat to the city of Turner.[9] Franzen Reservoir is located within the Turner city limits on the east side of town. The reservoir is 31-feet high and stores 300-acre feet of water. According to the Oregon Dam Safety Engineer, there are several dwelling located directly below the reservoir inundation area. In addition, the area of Delaney Road SE and North 3rd Street would be impacted by a reservoir breach. Notably, there is no history of dam failure in the City of Turner.

Figure TR-2. Franzen Reservoir Partial Inundation Map



Source: City of Turner

Drought

The characteristics of drought in Turner are the same for the county as a whole.

[9] In 2014, the Oregon Dam Safety Program Engineer reclassified Franzen Reservoir as a HIGH hazard dam following a review by a local hydraulic engineer and US Army Corps of Engineers.

Table TR-4. Drought Summary

Hazard	Drought
Type	Climatic
Speed of Onset	Slow
Location	Varies, County Wide
Extent	Moderate to Severe Drought*
Prior Occurance	Three > 6 months duration since 1982
Probability	~9%

*Defined as between -2 and -4 on the National Resource Conservation Service (NRCS) Surface Water Supply Index (SWSI)

Sources: Oregon NHMP; NRCS; analysis by OPDR

Using the BOLD methodology, the Turner steering committee determined that the city's probability for drought is moderate (which is lower than the county's rating) and that their vulnerability to drought is low (which is the same as the county's rating). Notably, the City did not assess the drought hazard in the previous version of their HMP.

Volume I, Section 2, *Risk Assessment*, adequately describes the characteristics of drought hazards, as well as the location and extent of a potential event. Due to a cool, wet climate, past and present weather conditions have generally spared Marion County communities from the effects of drought; however, Marion County was included in Presidential Drought Declarations in 1992 and 2015.

Turner receives water from the City of Salem under contract. Turner maintains two water tanks for local storage, with 100,000 and 400,000 gallon capacities respectively. The larger tank was constructed in 2011 using modern engineering and construction methods. The City also maintains a water distribution system. The City does not have a secondary water source. Additional, drought-related community impacts are described within the county's Drought Hazard Annex.

Please review the Risk Assessment (Volume I, Section 2) for additional information on this hazard.

Earthquake

The characteristics of a crustal earthquake are similar to the county as a whole.

Table TR-5. Earthquake Summary Crustal

Hazard	Earthquake - Crustal
Type	Geologic
Location	Multiple active faults; Willamette Valley
Speed of Onset	Rapid
Extent	Very Strong to Severe shaking ~ 500 yrs*
Prior Occurance	One over Magnitude 5 last 100 yrs**
Probability	Approximately 1% annual

*DOGAMI HazVu; ** PNSN - 1993 Scotts Mills just north of Marion County

Sources: DOGAMI - Oregon HazVu; Oregon NHMP; Pacific Northwest Seismic Network

The characteristics of a Cascadia subduction zone earthquake are the same as the county.

Table TR-6. Earthquake Summary Subduction

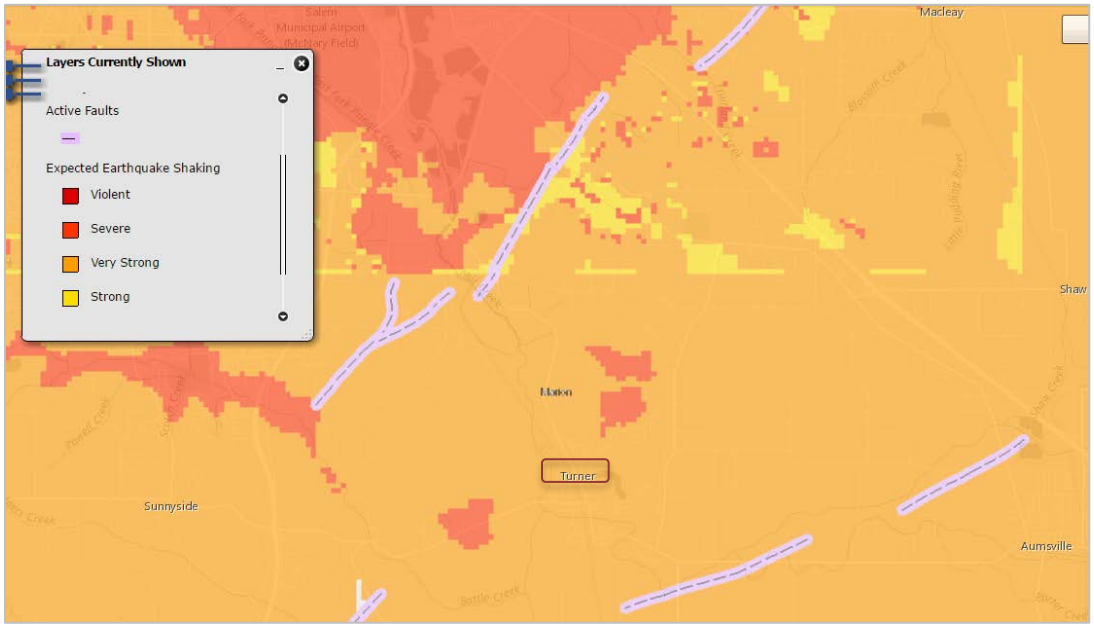
Hazard	Earthquake - Subduction
Type	Geologic
Location	Primarily west of the Cascades; CA - BC
Speed of Onset	Rapid
Extent	Catastrophic
Prior Occurance	One over Magnitude 9 last 500 yrs
Probability	Magnitude 9+ is 7% - 12% over 50 yrs**

*DOGAMI HazVu; **Oregon Natural Hazard Mitigation Plan, anlysis by Oregon Department of Geology and Mineral Industries.

Sources: DOGAMI - Oregon HazVu; Oregon NHMP; Pacific Northwest Seismic Network

Turner's probability for a Crustal Earthquake event is "possible" and their vulnerability to a Crustal Earthquake event is "limited". The county steering committee determined that the probability for a Cascadia Subduction Zone (CSZ) Earthquake event is "highly likely" and that the vulnerability to a Cascadia Earthquake event is "catastrophic". This hazard was not rated as distinct CSZ and crustal events in the previous HMP. Turner is about one mile from several active faults: a string of faults run to both the north and south of Turner The 1993 Scott Mills quake caused $28 million in damages to cities throughout Marion County. No damaging earthquake events occurred during the previous five years.

Figure TR-3. Active Faults and Expected Shaking



Source: Oregon HazVu: Statewide Geohazards Viewer (DOGAMI)

Volume I, Section 2, *Risk Assessment*, adequately describes the characteristics of earthquake hazards, history, as well as the location and extent of a potential event. Generally, an event that affects the county is likely to affect Turner as well. Previous occurrences are well-documented within the county's plan, and the community impacts described by the county would generally be the same for Turner as well.

Earthquake-induced damages are difficult to predict, and depend on the size, type, and location of the earthquake, as well as site-specific building and soil characteristics. Presently, it is not possible to accurately forecast the location or size of earthquakes, but it is possible to predict the behavior of soil at any particular site. In many major earthquakes, damages have primarily been caused by the behavior of the soil. Figure TR-3 shows that ground shaking in Turner for both crustal and subduction earthquakes are expected to be very strong, with some nearby areas experiencing severe shaking.

The Turner steering committee identified earthquake damage to bridges and nearby dams as a primary concern. Transportation isolation and inundation due to dam failure could both have significant impacts on the city. The City's priority actions reflect these concerns.

In 2007, the Department of Geology and Mineral Industries (DOGAMI) conducted a seismic needs assessment for public school buildings, acute inpatient care facilities, fire stations, police stations, sheriffs' offices, and other law enforcement agency buildings. Buildings were ranked for the "probability of collapse" due to the maximum possible earthquake for any given area. Within the city of Turner, the following buildings were given a "high" or "very high" probability of collapse:

- Turner Elementary School: *very high (100%)*
- Turner Fire Department: *high (> 10%)*

Turner Elementary School is scheduled to receive $1.2 million for seismic retrofits from the State.

Please review the Risk Assessment (Volume I, Section 2) for additional information on this hazard.

Flood

Table TR-7. Flood Summary

Hazard	Flood
Type	Climatic
Speed of Onset	Slow to moderate
Location	Mapped flood zones, floodplain
Extent	Moderate to severe
Prior Occurance	Four significant events since 1964
Probability	1% annual within SFHA

Sources: DOGAMI - Oregon HazVu; Oregon NHMP

Volume I, Section 2, Risk Assessment, describes the causes and characteristics of flooding hazards within the region. The city's probability for riverine flood is highly likely and their vulnerability to flood is critical. In January of 2012, heavy rains caused extensive flooding throughout the City, with an estimated $500,000 in overall damage.[10] During a five-day period starting on January 16th, the city received as much as 9.01 inches of rain. Runoff from

[10] Congressman Kurt Schrader. "Officials tour flood-damaged Turner to assess needs – Salem Statesman Journal, January". http://schrader.house.gov/schrader-in-the-news/officials-tour-flood-damages-turner-to-assess-needs-salem-statesman-journal-january-27-2012/

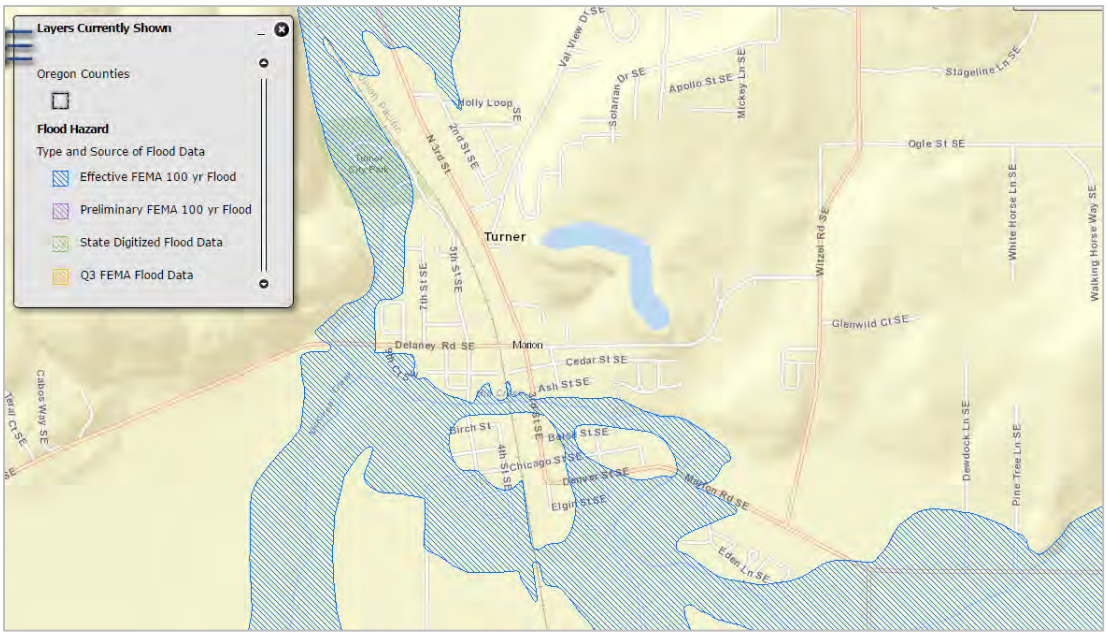
the heavy rainfall was intensified by the melting of three to six inches of snow that had fallen in higher elevations the previous week.[11] On March 2, 2012, the President issued a major disaster declaration (DR-4055).

The preliminary damage assessment from the January 2012 flood revealed 13 residences and three businesses with major damage, 14 residences and three businesses with minor damage, and two residences with other damage. Later, the City documented more than 80 homes that had suffered flood damage. In addition, damage from the sewer system resulted in more than 100 households using portable toilets set up in the street.

The flood event stretched local resources well beyond capacity, putting the entire town at risk. Issues confronted included: fire hydrants and water valve box piping were destabilized by the flood and ready to break; structural damage to bridges and road shoulders making use of narrow road corridors dangerous; all of the roads in and out of Turner were closed at one point with 75% remaining closed for multiple days; hundreds of individual evacuations; heavy flood waters directly impacted two businesses forcing one to close permanently; all downtown businesses were closed off to customers due to road closures, including the major mill complex in town; shut-off and later re-activation of the natural gas system created risk for potential explosions and fires.

Since the major flood in January 2012, Turner has experienced other near-floods and high water events. Mill Creek, which runs through the middle of town, presents the greatest flood risk to residents and travelers. Many residences and businesses are located within the 100-Year Floodplain.

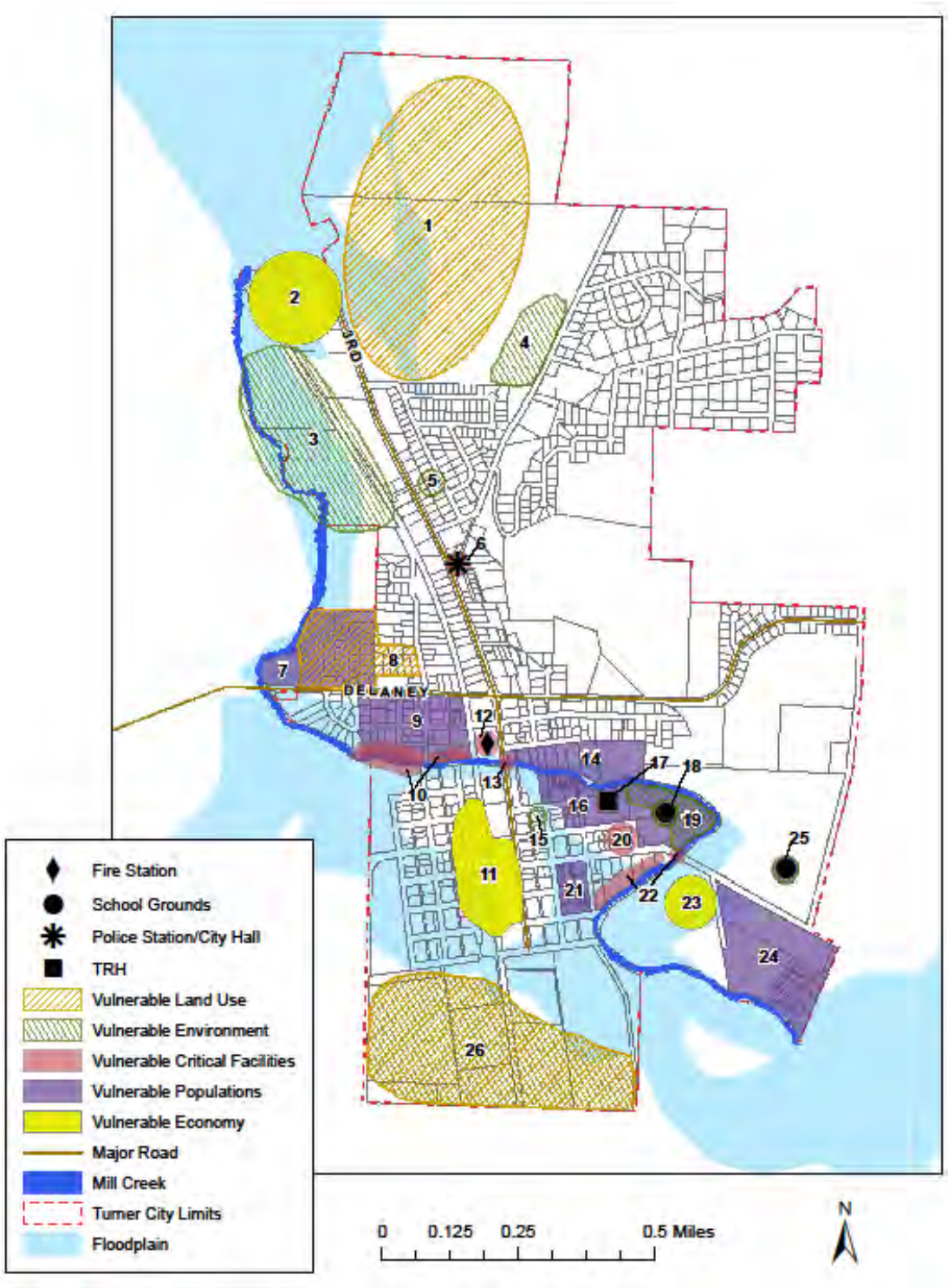
Figure TR-4. Special Flood Hazard Area



Source: [Oregon HazVu: Statewide Geohazards Viewer (DOGAMI)]

[11] Statesman Journal. “Salem Hosts Flood Meetings Starting Tonight”. March 19, 2012.

Figure TR-5. Turner's Flood Vulnerability



Source: City of Turner 2012 NHMP Steering Committee.

Mitigation Success Story: Regional Flood Mitigation Initiative

Starting with flood early warning system, the City of Turner has built a coalition of partners that are committed to implementing flood mitigation strategies. These partners include Marion County, the City of Salem, Aumsville, the Beaver Creek Watershed Board, the Santiam Water Control District, and the State of Oregon. In December, this coalition applied for a $400,000 grant to study flood detention possibilities in Mill Creek. In the future, these partners will continue working together to find and implement flood mitigation projects in the Middle Willamette watershed.

National Flood Insurance Program (NFIP)

FEMA modernized the Turner Flood Insurance Rate Maps (FIRMs) in January of 2003. Table TR-8 shows that as of October 2016, Turner has 71 National Flood Insurance Program (NFIP) policies in force. Of those, 26 are for properties that were developed before development of the initial FIRM. The last Community Assistance Visit (CAV) for Turner was on February 6, 2012. Turner is not a member of the Community Rating System (CRS). The table shows that the majority of the flood insurance policies are for single-family residential homes. There have been 21 paid flood claims in Turner totaling $588,084.

The Community Repetitive Loss record for Turner identifies one Repetitive Loss Property[12] (a residential parcel near Mill Creek) and no Severe Repetitive Loss Properties[13].

Table TR-8. Flood Insurance Detail

Jurisdiction	Effective FIRM and FIS	Initial FIRM Date	Total Policies	Pre-FIRM Policies	Policies by Building Type: Single Family	2 to 4 Family	Other Residential	Non-Residential	Minus Rated A Zone	Minus Rated V Zone
Marion County	-	-	2,067	1,239	1,614	115	105	232	97	0
Turner	1/2/2003	4/2/1979	71	26	65	3	0	3	1	0

Jurisdiction	Insurance in Force	Total Paid Claims	Pre-FIRM Claims Paid	Substantial Damage Claims	Total Paid Amount	Repetitive Loss Structures	Severe Repetitive Loss	CRS Class Rating	Last Community Assistance
Marion County	$ 514,268,700	298	226	16	$ 5,732,543	11	2	-	-
Turner	$ 17,010,300	21	18	3	$ 588,084	1	0	N/A	2/6/2012

Source: Information compiled by Department of Land Conservation and Development, October, 2016.

Please review the Risk Assessment (Volume I, Section 2) for additional information on this hazard.

[12] A Repetitive Loss (RL) property is any insurable building for which two or more claims of more than $1,000 were paid by the National Flood Insurance Program (NFIP) within any rolling ten-year period, since 1978. A RL property may or may not be currently insured by the NFIP.

[13] A Severe Repetitive Loss (SRL) property is a single family property (consisting of 1 to 4 residences) that is covered under flood insurance by the NFIP and has incurred flood-related damage for which 4 or more separate claims payments have been paid under flood insurance coverage, with the amount of each claim payment exceeding $5,000 and with cumulative amount of such claims payments exceeding $20,000; or for which at least 2 separate claims payments have been made with the cumulative amount of such claims exceeding the reported value of the property.

Mitigation Success Story: FEMA Flood Insurance Trainings

As part of their continued effort to provide good communication and resources for residents, the City of Turner hired professionally trained FEMA flood insurance experts to meet with residents interested in or concerned about flood insurance. The trainings were well-received and the City intends to continue offering this service regularly to ensure residents are well-educated about options for properties that are susceptible to floods.

Landslide

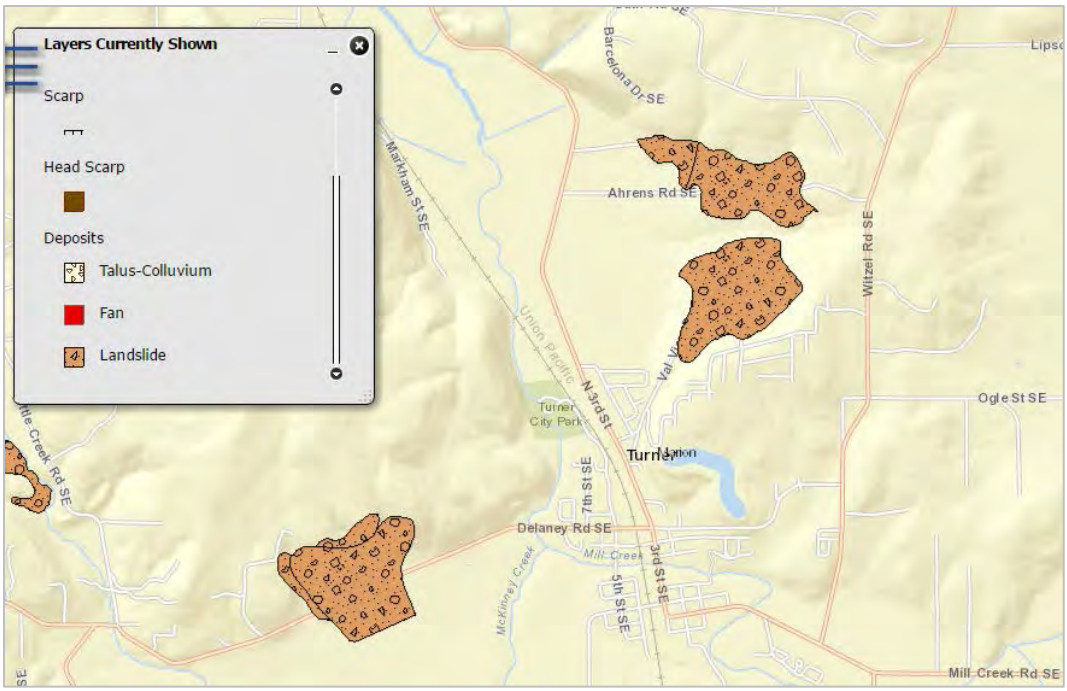
Table TR-9. Landslide Summary

Hazard	Landslide
Type	Climatic/Geologic
Speed of Onset	Slow to rapid
Location	Northeast Turner - Eastwood area; east of Turner city limits.
Extent	Moderate to High, but localized
Prior Occurance	Evidence of historic landslides; none in recent history
Probability	<1% annual

Sources: DOGAMI - Oregon HazVu; Oregon NHMP

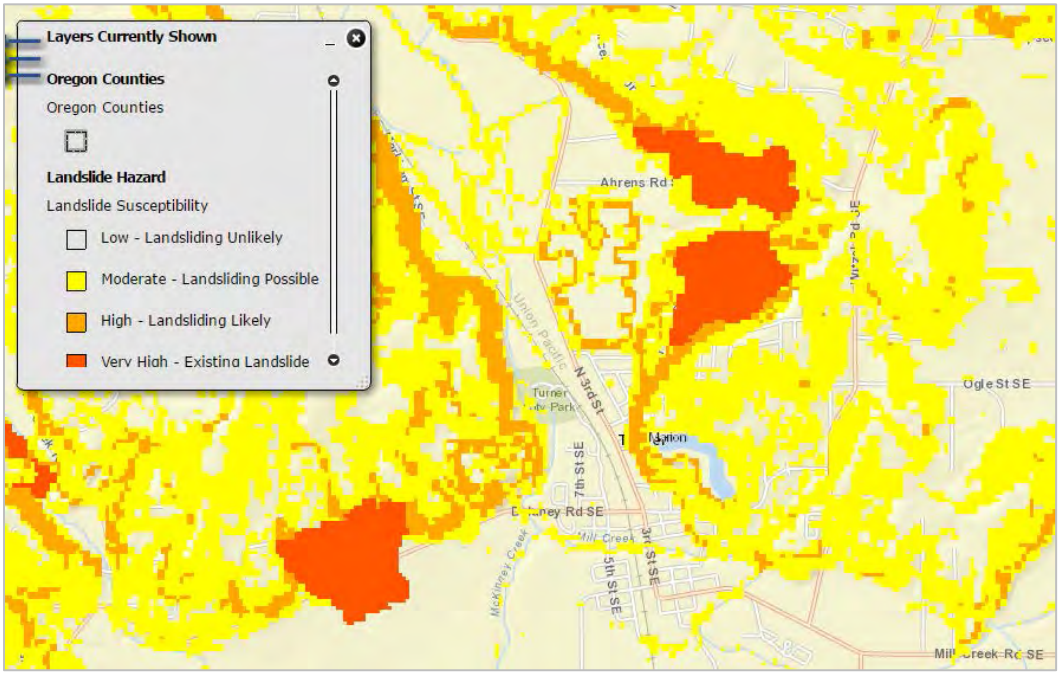
Volume I, Section 2, *Risk Assessment*, adequately describes the causes and characteristics of landslides, and appropriately identifies previous landslide occurrences within the region. Turner has a relatively flat topography, except for the Eastwood area in the northeastern part of the town, near the Franzen Reservoir, and directly to the east between Turner and I-5. Turner's probability for landslide is unlikely and their vulnerability to landslide is limited. Figure TR-6 shows the inventory of known historical landslides. Figure TR-7 shows the susceptibility and exposure to future landslides in Turner.

Figure TR-6. Landslide Inventory



Source: [Oregon HazVu: Statewide Geohazards Viewer (DOGAMI)]

Figure TR-7. Landslide Susceptibility Exposure



Source: [Oregon HazVu: Statewide Geohazards Viewer (DOGAMI)]

Please review the Risk Assessment (Volume I, Section 2) for additional information on this hazard.

Volcano

Table TR-10. Volcano Summary

Hazard	Volcano
Type	Geologic
Speed of Onset	Slow to rapid
Location	Cascade Mountains
Extent	Minor
Prior Occurance	One significant event since 1916 (Mount St. Helens)
Probability	<1% annual

Sources: DOGAMI - Oregon HazVu; Oregon NHMP

Volume I, Section 2, *Risk Assessment*, adequately describes Turner's risk to volcanic events. The steering committee determined that the city's probability for volcanic event is unlikely and their vulnerability to volcano is negligible.

The causes and characteristics of a volcanic event are appropriately described within the county's plan, as well as the location and extent of potential hazards. Previous occurrences are well-documented within the county's plan. Turner is very unlikely to experience anything more than volcanic ash during a volcanic event. When Mt. Saint Helens erupted in 1980, the city was not impacted.

Please review the Risk Assessment (Volume I, Section 2) for additional information on this hazard.

Severe Weather

Table TR-11. Severe Weather Summary

Hazard	Severe Weather/Storm
Type	Climatic
Speed of Onset	Slow to moderate
Location	Countywide
Extent	Minor to severe
Prior Occurance	Minor events occur annually; ~30 moderate to severe events over the past 130 years
Probability	100% for minor events, 23% for moderate to severe events

Sources: Marion County HMP

Windstorm

Volume I, Section 2, *Risk Assessment*, adequately describes the causes and characteristics of windstorms, as well as the location and extent of windstorm hazards. The city's probability for windstorm is highly likely and their vulnerability to windstorm is critical.

Significant wind events occur in Turner each year, usually between October and March. Damaging wind events are only slightly less common; once or twice per year the city will experience a windstorm event that will interrupt services, experience downed trees, and cause power outages. The F-2 tornado that touched down in Aumsville in December 2010, only four miles from Turner, did not cause damage to Turner.

Because windstorms typically occur during winter months, they are sometimes accompanied by ice, freezing rain, flooding, and very rarely, snow.

Winter Storm (Snow/Ice)

Volume I, Section 2, *Risk Assessment*, adequately describes the causes and characteristics of winter storms, as well as the location and extent of winter storm hazards. The City's probability for winter storms is highly likely and that their vulnerability to winter storms is critical.

Severe winter storms can consist of rain, freezing rain, ice, snow, cold temperatures, and wind. They originate from troughs of low pressure offshore that ride along the jet stream during fall, winter, and early spring months. Severe winter storms affecting the city typically originate in the Gulf of Alaska or in the central Pacific Ocean. These storms are most common from November through March.

Major winter storms can and have occurred in the Turner area, and while they typically do not cause significant damage, they are frequent and have the potential to impact economic activity. In particular, it becomes difficult to access the Eastwood area in the northeast of the city because ice can make the steep roads impassable. The most recent winter storms (December 2016 – January 207) included snow and ice, transportation and power interruptions, and government office and school closures. A disaster declaration is currently pending.

Please review the Risk Assessment (Volume I, Section 2) for additional information on this hazard.

Wildfire

Table TR-12. Wildfire Summary

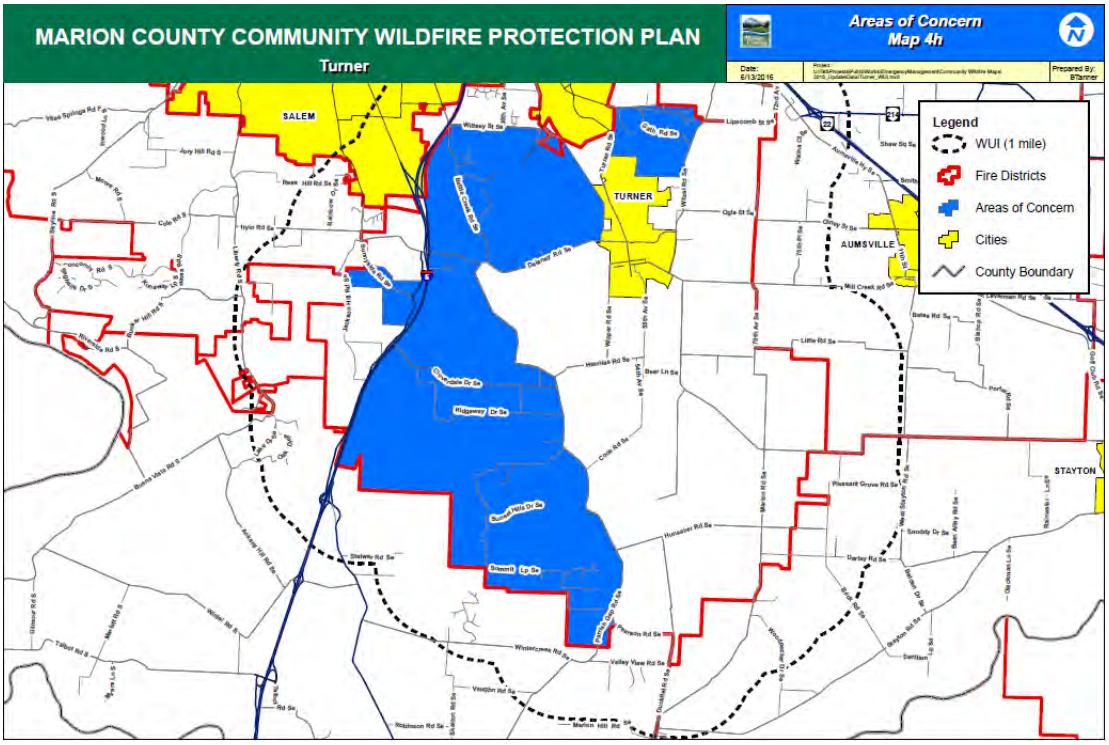
Hazard	Wildfire
Type	Climatic, Human Caused
Speed of Onset	Moderate to rapid
Location	Outside city limit
Extent	Minor to moderate
Prior Occurance	No history inside city limit
Probability	<1% annual

Sources: Marion County HMP

Volume I, Section 2, *Risk Assessment*, adequately describes the causes and characteristics of wildfires, as well as the county and city's history of wildfire events. The city's probability for wildfire is possible and the vulnerability to wildfire is limited. Turner is surrounded on all sides by open farmland, forests, or waterways. Although Turner has some forested areas within the city limits, there is no history of wildfire events in Turner.

The County updated the Community Wildfire Protection Plan (CWPP) in 2016 and portions of Turner are listed as having wildland urban interface (WUI) with areas of concern. Figure TR-8 depicts the areas near Turner that the CWPP identifies as areas of concern. These areas should be targeted for fire suppression activities.

Figure TR-8. Areas of concern near Turner.



Source: Marion County Community Wildfire Protection Plan (2016).

Please review the Risk Assessment (Volume I, Section 2) for additional information on this hazard.

CITY OF WOODBURN ADDENDUM

Purpose

This document serves as the City of Woodburn's Addendum to the Marion County Multi-Jurisdictional Hazards Mitigation Plan (MHMP, HMP). This addendum supplements information contained in Volume I (Basic Plan) of this HMP. The Basic Plan serves as the foundation for this jurisdiction's addendum. Volume III (Appendices) provides additional information (particularly regarding participation and mitigation strategy). This addendum meets the following requirements:

- Multi-jurisdictional **Plan Adoption** §201.6(c)(5),
- Multi-jurisdictional **Participation** §201.6(a)(3),
- Multi-jurisdictional **Mitigation Strategy** §201.6(c)(3)(iv), and
- Multi-Jurisdictional **Risk Assessment** §201.6(c)(2)(iii).

Plan Process, Participation, and Adoption

This section of the HMP addendum addresses 44 CFR 201.6(c)(5), *Plan Adoption*, and 44 CFR 201.6(a)(3), *Participation.*

In the summer and fall of 2016, the Oregon Partnership for Disaster Resilience (OPDR) at the University of Oregon's Community Service Center (CSC) partnered with the Oregon Military Department's Office of Emergency Management (OEM), and Marion County cities, including Woodburn, to update their addendum to the Marion County HMP, which expired July 8, 2016. This project is funded through the Federal Emergency Management Agency's (FEMA) FY14 Pre-Disaster Mitigation Competitive Grant Program (PDMC-PL-10-OR-2014-002).

By developing this addendum to the Marion County HMP, locally adopting it, and having it approved by FEMA, the City of Woodburn will gain eligibility for FEMA Hazard Mitigation, Pre-Disaster Mitigation, and Flood Mitigation Assistance grant program funds.

The Marion County HMP, and Woodburn addendum, are the result of a collaborative effort between citizens, public agencies, non-profit organizations, the private sector, and regional organizations. A project steering committee guided the process of developing the plan. For more information on the composition of the steering committee see the *Acknowledgements*, *Plan Summary*, and *Plan Process* (Volume III, Appendix B).

The City of Woodburn Public Works Director is the designated local convener of this addendum. The Convener will take the lead in implementing, maintaining, and updating the addendum to the HMP in collaboration with Marion County Emergency Management.

Representatives from the City of Woodburn steering committee met formally on one occasion: September 7, 2016 (see Appendix B for more information).

The city's addendum reflects decisions decided upon at the plan update meeting and during subsequent work and communication with OPDR.

The City of Woodburn Steering Committee is comprised of representatives from the following departments:

- Convener, City of Woodburn Public Works Director
- City of Woodburn Building Official
- City of Woodburn Community Development Director
- City of Woodburn Senior Planner
- City of Woodburn Associate Planner
- City of Woodburn Police Executive Assistant
- Woodburn Police Department Patrol Division
- Woodburn Fire District Fire Marshal

Woodburn used multiple approaches to engage the public. First, the City established steering committee representatives from across the city. Next, the city actively participated in countywide community engagement activities described in Volume I, Section 4 and in Appendix B. City staff also presented the draft plan to the City Council during an open public council session. The Steering Committee was closely involved throughout the development of the plan and served as the local oversight body for the plan's development. In addition, community members outside of the steering committee were provided an opportunity for comment via the plan review process (see Appendix B for more information).

The Marion County HMP was approved by FEMA on [Month] [Day], 2017 and the Aurora addendum was adopted via resolution on [Month] [Day], 2017. This HMP is effective through [Month] [Day], 2022.

Mitigation Strategy

This section of the HMP addendum addresses 44 CFR 201.6(c)(3(iv), *Mitigation Strategy*.

During the 2016 Marion County and Woodburn update process, OPDR and a representative from Marion County Emergency Management assisted the steering committee with developing mitigations that will meet Woodburn's unique situation. The proposed actions were then re-reviewed by the steering committee to finalize. Woodburn developed a list of priority actions (Appendix A-1), any actions that were not prioritized were placed in the Action Item Pool (Appendix A-2) and will be considered during the annual meetings. For a status update on each of Woodburn's 2010 mitigation actions, see Appendix A-2.

Priority Actions

The City is listing a set of high priority actions in an effort to focus attention on an achievable set of high leverage activities over the next five-years. The City's priority actions are listed in Table WB-1 on the following page.

Action Item Pool

Table WB-2 on the following pages presents a pool of mitigation actions. This expanded list of actions is available for local consideration as resources, capacity, technical expertise and/or political will become available.

Table WB-1. Woodburn Priority Action Items

Action Item ID	Hazard	Action Item	Coordinating Organization	Partner Organizations	Timeline
Priority Actions					
P-1	Flood	Include culvert widening projects for Wyffel Park and Gatch Street between Lincoln St. and Hardcastle Ave. in upcoming Capital Improvement Plans.	Public Works		Short Term
P-2	Flood	Update the Stormwater Master Plan to include important flood mitigation projects.	Public Works		Short Term
P-3	Multi-Hazard	Improve communication equipment in City Hall and in city vehicles, and identify additional radio operators to serve as communication backup in an emergency.	City, Police, Fire		Short Term
P-4	Multi-Hazard	Work to streamline the communication systems between all emergency responders. This might include purchasing additional equipment for some units.	City, Police, Fire		Short Term

Source: City of Woodburn HMP Steering Committee, 2016.

Table WB-2. Woodburn Action Item Pool

Action Item ID	Hazard	Action Item	Coordinating Organization	Partner Organizations	Timeline
Action Item Pool					
Multi-Hazard					
MH-1	Multi-Hazard	Develop a voluntary registry of populations that may need particular assistance in an emergency situation.	Emergency Manager	Dispatch, Adult Family Services, Hospitals	Short Term
MH-2	Multi-Hazard	Provide periodic first-aid and CPR classes to members of the public.	Marion County	Red Cross, CERT	Ongoing
MH-3	Multi-Hazard	Participate in Marion County's post-disaster recovery planning efforts.	City Staff	Marion County	Short Term/ Ongoing
MH-4	Multi-Hazard	Continue development of CERT teams to ease the load on emergency services following a disaster.	CERT Program Coordinator (Marion County)		Ongoing
MH-5	Multi-Hazard	Develop and equip emergency shelters to take care of residents and vulnerable populations such as the elderly, the medically fragile, children, people who speak English as a second language, low-income residents, etc.	City Staff	Red Cross, Marion County, School Districts	Short Term/ Ongoing
MH-6	Multi-Hazard	Educate businesses and governmental organizations about the importance of continuity of operations plans to make them more resilient to natural hazards.	Marion County	Emergency Manager, SEDCOR, Chamber of Commerce	Ongoing
MH-7	Multi-Hazard	Ensure that all critical facilities have backup power and emergency operations plans to deal with power outages.	PIO and Emergency Manager	Public Works	Short Term
MH-8	Multi-Hazard	Evaluate the city computer system, network, and website for the ability to function during an emergency.	IT Department		Long Term
MH-9	Multi-Hazard	Develop a traffic management plan for redirecting traffic in the event of a major incident that cuts off roads.	Public Works	Planning	Long Term
MH-10	Multi-Hazard	Work with Marion Co. to provide a series of trainings about dealing with hazardous material.	Emergency Manager	Marion County	Short Term
Drought					
DT-1	Drought	Partner with Marion County to support local agencies' training on water conservation measures.	Emergency Manager	Environmental Services	Short Term

Source: City of Woodburn HMP Steering Committee, 2016.

Table WB-2. Woodburn Action Item Pool (Continued)

Action Item ID	Hazard	Action Item	Coordinating Organization	Partner Organizations	Timeline
Action Item Pool					
Earthquake					
EQ-1	Earthquake	Encourage reduction of nonstructural and structural earthquake hazards in homes, schools, businesses, and government offices through public education.	PIO	Emergency Manager, CERT	Ongoing
EQ-2	Earthquake	Complete and maintain an inventory of high-risk buildings, critical facilities, and infrastructure that may be particularly vulnerable to earthquake damage.	Emergency Manager	Marion County	Short Term
EQ-3	Earthquake	Send city employees to the County's ATC 20 training.	Building and Engineering		Short Term/ Ongoing
EQ-4	Earthquake	Evaluate the structural integrity of city-owned buildings.	Building and Engineering (Building Official)		Long Term
EQ-5	Earthquake	Require new city facilities to exceed the minimum structural requirements for seismic loading.	Building Inspection and Permitting	City Council	Long Term
EQ-6	Earthquake	Seek funding to further assess the “probability of collapse” for Lincoln Elementary School, Washington Elementary School, French Prairie Middle School, Nellie Muir Elementary School, and Woodburn High School.	School District		Long Term
EQ-7	Earthquake	Update the city’s Comprehensive Plan to reflect the latest information on seismic hazards.	Planning		Short Term
EQ-8	Earthquake	Encourage residents and commercial businesses to purchase earthquake insurance.	Building and Engineering	PIO	Ongoing
EQ-9	Earthquake	Install automatic shut-off valves in all city facilities that use natural gas.	Building Official	City Council	Long Term
EQ-10	Earthquake	Encourage residents to prepare and maintain 2-week survival kits.	PIO	Marion County, CERT, Statesman Journal	Ongoing

Source: City of Woodburn HMP Steering Committee, 2016.

Table WB-2. Woodburn Action Item Pool (Continued)

Action Item ID	Hazard	Action Item	Coordinating Organization	Partner Organizations	Timeline
Action Item Pool					
Flood					
FL-1	Flood	Implement mitigation action items in the Public Facilities Plan	Public Works		Short Term/ Ongoing
FL-2	Flood	Partner with Marion County to conduct workshops for target audiences on National Flood Insurance Programs, mitigation activities, and potential assistance from FEMA's Flood Mitigation Assistance and Hazard Mitigation Grant Programs.	Emergency Manager	Marion County Public Works	Ongoing
FL-3	Flood	Continue compliance with the National Flood Insurance Program through the enforcement of local floodplain ordinances.	City Engineer		Ongoing
FL-4	Flood	Update the City's Flood Insurance Rage Maps (FIRMs) - FEMA should be relseasing updates soon.	FEMA		Short Term
Volcano					
VC-1	Volcano	Identify critical facilities and equipment that can be damaged by ashfall, and develop mitigation activities to prevent damage to these facilities.	Emergency Manager	Public Works	Long Term
Severe Weather					
SW-1	Wind Storm	Educate the public about the benefits of proper tree pruning and care in preventing damage during windstorms. Outreach outlets include Arbor Day and passing out tree maintenance brochures.	Emergency Manager	PIO, CERT	Ongoing
SW-2	Wind Storm	Educate the community about the risk of downed power lines, aerial power lines in the vicinity of trees, and preparedness measures to take in the event of a power outage.	PGE	PIO, CERT	Ongoing
SW-3	Wind Storm	Require new city facilities to exceed the minimum structural requirements for wind loading.	Building Department		Long Term
SW-4	Severe Winter Storm	Educate homeowners about choosing ice and windstorm-resistant trees and landscaping practices to reduce tree-related hazards in future ice storms.	Emergency Manager	PIO, CERT	Ongoing
SW-5	Severe Winter Storm	Educate citizens about ways to weatherize their homes, as well as safe emergency heating equipment.	Emergency Manager	Marion County, PGE, CERT	Ongoing

Source: City of Woodburn HMP Steering Committee, 2016.

Plan Implementation and Maintenance

The City Council will be responsible for adopting the City of Woodburn addendum to the Marion County HMP. This addendum designates a convener and a coordinating body to oversee the development and implementation of action items. Because the city addendum is part of the county's multi-jurisdictional HMP, the city will look for opportunities to partner with the county. The city's steering committee will convene after adoption of the City of Woodburn addendum on a semi-annual schedule; the county also meets on a semi-annual basis. The City of Woodburn convener will participate in the Marion County HMP meetings and will report on city specific activities as appropriate. The steering committee will be responsible for identifying new risk assessment data, reviewing status of mitigation actions, identifying new actions, and seeking funding to implement the city's mitigation strategy (actions). The convener will also remain active in the county's implementation and maintenance process (see Volume I, Section 4 for more information).

The city will utilize the same prioritization process as the county (See Volume I, Section 4: Plan Implementation and Maintenance and Volume IV, Appendix D: Economic Analysis of Hazard Mitigation Projects for more information).

Implementation through Existing Programs

Many of the Hazards Mitigation Plan's recommendations are consistent with the goals and objectives of the city's existing plans and policies. Where possible, the City of Woodburn will implement the HMP's recommended actions through existing plans and policies. Plans and policies already in existence have support from local residents, businesses, and policy makers. Many land-use, comprehensive, and strategic plans get updated regularly, allowing them to adapt to changing conditions and needs. Implementing the HMP's action items through such plans and policies increases their likelihood of being supported and implemented.

Woodburn's Comprehensive Plan was first acknowledged by the Oregon Land Conservation and Development Commission in 1978. The City most recently updated the entire plan, including updates to the Natural Hazards section, in October of 2005.[1] While policies in the Woodburn Comprehensive Plan mention floodplain requirements, the plan does not specifically call out any natural hazards and contains no goals directly related to natural hazards. One plan policy prohibits development within the 100-year floodplain and another seeks to preserve trees in designated floodplains. The City implements the plan through regulatory controls found in the Woodburn Development Ordinance.[2]

Woodburn also implements elements of the Comprehensive Plan related to natural hazards through the following Plans:

- Woodburn Transportation Systems Plan, updated 2005
- Woodburn Parks Master Plan, updated 2009

[1] Woodburn Comprehensive Plan (2009). Section J: Natural and Cultural Resources p. 42-45.

[2] "Section 2.1: Land Use Zoning." & "Section 3.1" & "Section 5.104"
http://www.ci.woodburn.or.us/sites/default/files/%2810-31%2909WDO.pdf

- Woodburn Public Facilities Plan, updated May 2005
- Woodburn Water Management and Conservation Plan, January 2010

Continued Public Participation

Keeping the public informed of the City's efforts to reduce the risk associated with future hazards events is important for successful plan implementation and maintenance. The city is committed to involving the public in the plan review and updated process. See Volume I, Section 4, for more information.

Plan Maintenance

The Marion County Multi-Jurisdictional Hazards Mitigation Plan and city addendum will be updated every five years in accordance with the update schedule outlined in the Disaster Mitigation Act of 2000. During the county plan update process, the City will also review and update its addendum. The convener will be responsible for convening the steering committee to address the questions outlined below.

- Are there new partners that should be brought to the table?
- Are there new local, regional, state, or federal policies influencing natural hazards that should be addressed?
- Has the community successfully implemented any mitigation activities since the plan was last updated?
- Have new issues or problems related to hazards been identified in the community?
- Are the actions still appropriate given current resources?
- Have there been any changes in development patterns that could influence the effects of hazards?
- Have there been any significant changes in the community's demographics that could influence the effects of hazards?
- Are there new studies or data available that would enhance the risk assessment?
- Has the community been affected by any disasters? Did the plan accurately address the impacts of this event?

These questions will help the steering committee determine what components of the mitigation plan need updating. The steering committee will be responsible for updating any deficiencies found in the plan.

Risk Assessment

This section of the HMP addendum addresses 44 CFR 201.6(b)(2) - Risk Assessment. In addition, this chapter can serve as the factual basis for addressing Oregon Statewide Planning Goal 7 – Areas Subject to Natural Hazards. Assessing hazard risk has three phases:

- **Phase 1:** Identify hazards that can impact the jurisdiction. This includes an evaluation of potential hazard impacts – type, location, extent, etc.
- **Phase 2:** Identify important community assets and system vulnerabilities. Example vulnerabilities include people, businesses, homes, roads, historic places and drinking water sources.

- **Phase 3:** Evaluate the extent to which the identified hazards overlap with, or have an impact on, the important assets identified by the community.

The local level rationale for the identified mitigation strategies (action items) is presented herein, and within Section 2, *Risk Assessment*, and Appendix C, *Community Profile*. The risk assessment process is graphically depicted in Figure WB-1 below. Ultimately, the goal of hazard mitigation is to reduce the area of risk, where hazards overlap vulnerable systems.

Figure WB-1. Understanding Risk

Risk Assessment Approach

A risk assessment is intended to provide the, "factual basis for activities proposed in the strategy to reduce loses from identified hazards."[3] To complete the risk assessment, the HMP update team first updated the description, type, location and extent of each hazard. Next, the team updated the vulnerability information based on each hazard's potential impact on the community.

The Marion County Basic Plan (Volume I, Section II) Risk Assessment describes in detail the methods used to assess risk. In summary, Marion County has prepared a Threat Hazard Identification and Risk Assessment as a formal annex to the Marion County Emergency Operation Plan. The assessment uses a method developed by BOLD Planning[4]. This city addendum builds on the county level assessment to produce a similar assessment for the City of Woodburn. The assessment specifically examines:

1. Probability (frequency) of event
2. Magnitude of event
3. Expected warning time before event

[3] 44 CFR 201.6(2)(i)

[4] BOLD Planning is a consulting firm specializing in the development of actionable emergency plans. For more information, visit: http://www.boldplanning.com/

4. Expected duration of event

Refer to Page 2-4 of the Marion County Basic HMP for a description of the scoring values for each ranking category.

Hazard Analysis

The assessment identifies three levels of risk: High, Moderate and Low.

High - High probability of occurrence; at least 50 percent or more of population at risk from hazard; significant to catastrophic physical impacts to buildings and infrastructure; major loss or potential loss of functionality to all essential facilities (hospital, police, fire, EOC and shelters).

Moderate - Less than 50 percent of population at risk from hazard; moderate physical impacts to buildings and infrastructure; moderate potential for loss of functionality to essential facilities.

Low - Low probability of occurrence or low threat to population; minor physical impacts.

A summary of the risk assessment findings and rankings is presented in Table WB-3.

Table WB-3. Hazard and Vulnerability Assessment Summary

Hazard Profile Summary for Woodburn Usinging Bold Planning Analysis Scoring							
Natural Hazard	Probability	Warning Time	Magnitude	Duration	CPRI	Local Planning Significance	County Planning Significance
Weight Factor	0.45	0.3	0.15	0.1			
Earthquake*	4	4	4	4	4.00	High	**High**
Severe Weather/Storm**	4	1	3	3	2.85	Moderate	**High**
Flood	3	2	2	4	2.65	Moderate	**High**
Drought	3	1	3	4	2.50	Moderate	**High**
Extreme Weather - High Temperature	3	1	2	4	2.35	Moderate	Moderate
Wildland Interface Fire	1	4	2	2	2.15	Moderate	Moderate
Dam or Levee Failure	1	2	4	4	2.05	Moderate	Moderate
Landslide	1	2	2	2	1.55	Low	**High**
Volcanic Eruption	1	1	1	4	1.30	Low	Low
*Note: Earthquake probability listed to match county level analysis. See below for more detailed probability assessment.							
**Note: Includes tornado hazard							

Source: BOLD Planning Risk Assessment Method; Analysis by UO Community Service Center.

Community Asset Identification

This section provides information on city specific assets. For additional information on the characteristics of Woodburn, in terms of geography, environment, population, demographics, employment and economics, as well as housing and transportation see Volume III, Appendix C, *Community Profile*. Many of these community characteristics can affect how hazards impact communities and how communities choose to plan for natural hazard mitigation. Considering the city specific assets during the planning process can assist in identifying appropriate measures for hazard mitigation.

Community Characteristics

The city of Woodburn is located in the Willamette Valley in Marion County, Oregon, approximately 31 miles south of the city of Portland. Woodburn experiences a moderate

climate with an average high temperature of 82 degrees and low of 54 degrees in August, and an average high temperature of 47 and low of 35 in January.[5] The city receives an average annual precipitation of 40.7 inches.[6] Major bodies of water in Woodburn include Senecal Creek and Mill Creek. Woodburn is located on a flat area, with farmland surrounding the city on all sides.

The Population Research Center at Portland State University lists Aurora's 2015 population at 24,670. This represents a 19.7% increase from 2000. For more demographic information, refer to Appendix C.

Economy

Historically, the city of Woodburn was a commercial, agricultural, and industrial community that grew around the railroad that currently runs through the center of town.[7] Today, Woodburn's economy is still largely based on manufacturing, agriculture, construction and retail trade. Woodburn's proximity to I-5 allows for an auto-oriented service economy to exist along the interstate corridor. The Woodburn Premium Outlets are a large shopping attraction for out-of-town visitors. Median household income in Woodburn in 2014 was $43,144. For more economic information, refer to Appendix C.

Critical and Important Facilities

Woodburn's critical and important facilities include the following:

Transportation

- Interstate-5 runs north-south through western Woodburn
- Highway 99E runs parallel to I-5 through eastern Woodburn
- Highway 214 runs east-west through Woodburn (Highway 211 also runs east-west and merges with Highway 214 when it reaches Woodburn)
- The Union Pacific Railroad runs parallel to I-5 through the middle of Woodburn
- The Burlington Northern Santa Fe railroad runs north-south just west of Woodburn
- Woodburn Transit Service
- Woodburn Amtrak Station

Energy

- PGE – electricity (2079 Progress Way)
    - PGE operates a maintenance facility and three sub-stations in or near Woodburn

Water

- Water:
    - Above-ground storage tank: 750,000 gallons

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[5] Weatherbase.com, "Aurora Oregon," http://www.weatherbase.com, accessed 2/21/17. (Note, the Aurora Airport is the closest weather station to Woodburn.)

[6] *Ibid.*

[7] Woodburn Comprehensive Plan (2009). "Woodburn's Historical Context." P. 4-6.

    - Underground storage reservoir: 4.7 million gallons
    - Seven active wells (according to the 2005 Public Facilities Plan)
    - Three water treatment plants (National Wy., Country Club Rd., and Parr Rd.)
- Wastewater Treatment Plant and Collection System (located off of Highway 211)
    - Approximately 140 acres of land
    - Ten lift stations for sanitary sewer services

Emergency Services

- Police Department (1060 Mount Hood Ave.)
- Fire:
    - Woodburn Fire District Station 21 (1776 Newberg Highway)
    - Woodburn Fire District Station 22 (1650 James Street)
    - (Waconda) Woodburn Fire District Station 24 (River Road, southwest of city)
    - (Broadacres) Woodburn Fire District Station 25 (Butteville Road, northwest of city)
- Medical:
    - Legacy Health / Woodburn Specialist Center (1475 Mount Hood Ave.)
    - Salud Medical Center (1175 Mount Hood Ave.)
    - Woodburn Pediatric Clinic (2050 Progress Way)
      Note: Major hospitals are in Silverton and Salem
- Woodburn City Hall (270 Montgomery St.) – contains the office space for the Administration, Finance and Community Development departments, and the Municipal Court.

Cultural/Historical Resources

- Buildings listed on the National Register of Historic Places:
    - Bank of Woodburn
    - Old Woodburn City Hall
    - Jesse H. Settlemier House
- Woodburn also has an Historic Downtown district
- Events/amenities that may have large crowds:
    - March and April: Woodburn Tulip Festival
    - Woodburn Premium Outlets (particularly around Black Friday and the holiday season)
    - Fiesta Mexicana in Legion Park
    - Relay for Life in July
    - Drag Racing NHRA (National Hot Rod Association) from March to November
    - Bauman's Fall Festival in Gervais (impacts traffic in Woodburn)
    - Oktober Fest in Mt. Angle (impacts traffic in Woodburn)
    - St. Paul Rodeo (impacts traffic in Woodburn)

Functional and Access Needs (Vulnerable Populations)

- Schools:
    - Heritage Elementary (440 Parr Rd.)
    - Lincoln Elementary (1041 N. Boones Ferry Rd.)
    - Nellie Muir Elementary (1800 W. Hayes St.)
    - Washington Elementary (777 E. Lincoln St.)
    - French Prairie Middle (1025 N. Boones Ferry Rd.)
    - Valor Middle (450 Parr Rd.)

- Academy of International Studies (1785 N. Front St.) – high school
- Success Alternative High School (610 Young Street)
- Wellness, Business and Sports School (1785 N. Front Street) – high school
- Woodburn Academy of Art, Science and Technology (1785 N. Front St.) – high school
- Woodburn Arts and Communications Academy (1785 N. Front St.) – high school
- St. Luke's Parochial School (529 Harrison St.)
- Headstart (950 N. Boones Ferry Rd.)
- Oregon Child Development Coalition (OCDC) (540 North Settlemier Avenue) – Infant services
- Chemeketa Community College (120 E. Lincoln Street) – community college
- Pacific University Campus (24 W Lincoln St) – college
- Woodburn Arthur Academy (575 Gatch St.) – K- 5th Grade

See hazard sections below and Section 2, *Risk Assessment*, for potential hazard vulnerabilities to these facilities.

Hazard Characteristics

Drought

The characteristics of drought in Woodburn are the same for the county as a whole.

Table WB-4. Drought Summary

Hazard	Drought
Type	Climatic
Speed of Onset	Slow
Location	Varies, County Wide
Extent	Moderate to Severe Drought*
Prior Occurance	Three > 6 months duration since 1982
Probability	~9%

*Defined as between -2 and -4 on the National Resource Conservation Service (NRCS) Surface Water Supply Index (SWSI)

Sources: Oregon NHMP; NRCS; analysis by OPDR

The probability of drought in Woodburn is likely, the same as for the county as a whole. The City's water supply comes exclusively from subsurface sources, making vulnerability to drought moderate. Overall, the planning significance of drought in Woodburn is moderate.

Volume I, Section 2, *Risk Assessment*, adequately describes the characteristics of drought hazards, as well as the location and extent of a potential event. Due to a cool, wet climate, past and present weather conditions have generally spared Marion County communities from the effects of drought. Governor Kate Brown declared a drought emergency for all of Marion County in September 2015, but according to the steering committee, Woodburn has not implemented water curtailment measures.

According to Woodburn's Public Facilities Plan, the City has seven active wells which pump water through three neighborhood treatment plants. This water is then pumped into two

storage facilities – an above ground tank and a larger underground storage reservoir. From here, water is distributed out to residential, commercial, and industrial customers.

Woodburn has a Water Management and Conservation Plan, released in January 2010. The Plan contains a "Water Curtailment Element."

Please review the Risk Assessment (Volume I, Section 2) for additional information on this hazard.

Earthquake

The characteristics of both a crustal earthquake and a Cascadia Subduction Zone (CSZ) earthquake are similar to the county as a whole.

Table WB-5. Earthquake Summary Crustal

Hazard	Earthquake - Crustal
Type	Geologic
Location	Multiple active faults; Willamette Valley
Speed of Onset	Rapid
Extent	Very Strong to Severe shaking ~ 500 yrs*
Prior Occurance	One over Magnitude 5 last 100 yrs**
Probability	Approximately 1% annual

*DOGAMI HazVu; ** PNSN - 1993 Scotts Mills just north of Marion County

Sources: DOGAMI - Oregon HazVu; Oregon NHMP; Pacific Northwest Seismic Network

Table WB-6. Earthquake Summary Subduction

Hazard	Earthquake - Subduction
Type	Geologic
Location	Primarily west of the Cascades; CA - BC
Speed of Onset	Rapid
Extent	Catastrophic
Prior Occurance	One over Magnitude 9 last 500 yrs
Probability	Magnitude 9+ is 7% - 12% over 50 yrs**

*DOGAMI HazVu; **Oregon Natural Hazard Mitigation Plan, anlysis by Oregon Department of Geology and Mineral Industries.

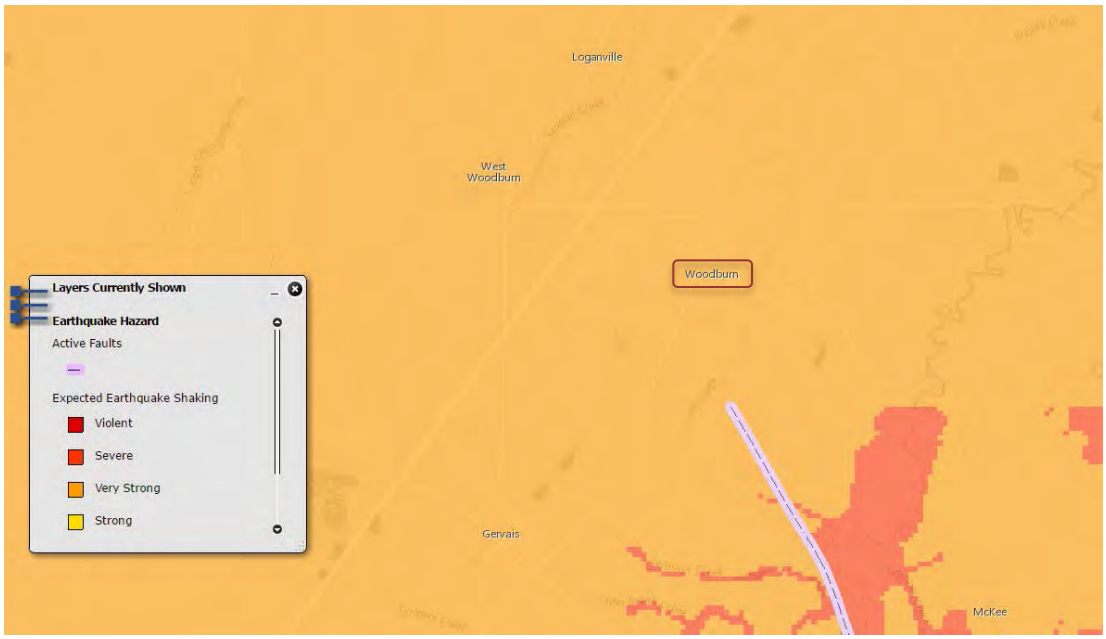
Sources: DOGAMI - Oregon HazVu; Oregon NHMP; Pacific Northwest Seismic Network

Woodburn's probability for a Crustal Earthquake event is "possible" and their vulnerability to a Crustal Earthquake event is "limited". The county steering committee determined that the probability for a Cascadia Subduction Zone (CSZ) Earthquake event is "highly likely" and that the vulnerability to a Cascadia Earthquake event is "catastrophic". This hazard was not rated as distinct CSZ and crustal events in the previous HMP. There are no locally active faults within the Woodburn city limits. The nearest active fault runs northwest to southeast just outside of Woodburn, ending just on the outskirts of the city. The 1993 Scott Mills quake caused $28 million in damages to cities throughout Marion County. In Woodburn, the 1993 quake caused damage to unreinforced masonry buildings in the downtown and the second story of Washington elementary school. Additionally, in a local store, pesticides, paints, and car batteries fell off shelves and mixed together causing hazardous fumes. No damaging earthquake events occurred during the previous five years.

Volume I, Section 2, *Risk Assessment*, adequately describes the characteristics of earthquake hazards, history, as well as the location and extent of a potential event. Generally, an event that affects the county is likely to affect Woodburn as well. Previous occurrences are well-documented within the county's plan, and the community impacts described by the county would generally be the same for Woodburn as well.

Earthquake-induced damages are difficult to predict, and depend on the size, type, and location of the earthquake, as well as site-specific building and soil characteristics. Presently, it is not possible to accurately forecast the location or size of earthquakes, but it is possible to predict the behavior of soil at any particular site. In many major earthquakes, damages have primarily been caused by the behavior of the soil. Figure WB-2 shows that ground shaking in Woodburn for both crustal and subduction earthquakes ~~is~~ are expected to be very strong.

Figure WB-2. Active Faults and Expected Shaking



Source: Oregon HazVu: Statewide Geohazards Viewer (DOGAMI)

The Woodburn steering committee identified several concerns related to the effects of an earthquake:

- The city has a large non-English speaking population. In emergency situations, these groups may need particular attention and assistance. Likewise, outreach strategies that inform residents of shelters or preventative activities should be distributed in multiple languages.
- The steering committee identified a need within the community to identify populations (i.e., senior or disabled populations) that may need particular assistance in pre-disaster evacuation protocols or after disaster events. This could be a voluntary registry or a preliminary assessment of current needs.

- The entire city may have disruptions in communication systems. This will be an issue for schools (i.e., contacting parents), businesses, and public services. Likewise, transportation systems are likely to be disrupted after a high-magnitude earthquake.
- The city draws a large tourist population to the Woodburn Premium Outlets. Sheltering and caring for tourists post-event may be a difficult endeavor. Logistics for sheltering or providing food and basic care for the entire population will also be a challenging task.
- The MacLaren Youth Facility may be seismically unstable. Additional assessment is required (although, this is a state facility and outside of the city's jurisdiction). The facility houses up to 500 people at a time.
- Generally, older buildings may require seismic retrofit. This includes businesses in unreinforced masonry buildings, and older homes and buildings including the old City Hall, Library, and the historic Settlemeir House. Likewise, utility systems, communication systems, transportation corridors, and business or industrial centers may be vulnerable to seismic activity. Figure WB-3 identifies buildings in Woodburn that are 60 years or older.
- The city's steering committee believes that there are fragile waterlines in downtown Woodburn. Seismic activity may disrupt the water lines and prevent distribution to residents. Emergency generators for the water system currently have only a 72-hour supply of fuel.
- The city's water tower was built in 1962 and may be vulnerable to seismic activity.
- The I-5 overpass, if damaged, could isolate Woodburn from neighboring communities – especially if Highway 99E is damaged as well.
- An important water main is supported by the Hazelnut Street Bridge, where foundation problems have been identified. If the bridge fails either by seismic action or storm erosion, this line will fail also.

In 2007, the Department of Geology and Mineral Industries (DOGAMI) conducted a seismic needs assessment for public school buildings, acute inpatient care facilities, fire stations, police stations, sheriffs' offices, and other law enforcement agency buildings.[8] Buildings were ranked for the "probability of collapse" due to the maximum possible earthquake for any given area. This report assigned the following ratings to public facilities in Woodburn:

<u>Very High (100%)</u>

- Lincoln Elementary School
- Washington Elementary School

<u>High (> 10%)</u>

- French Prairie Middle School
- Nellie Muir Elementary School
- Woodburn Police Department

[8] Lewis, Don (2007). "Statewide Seismic Needs Assessment: Implementation of Oregon 2005 Senate Bill 2 Relating to Public Safety, Earthquakes, and Seismic Rehabilitation of Public Buildings." Department of Geology and Mineral Industries, Open-File Report O-07-02.

Moderate (> 1%)

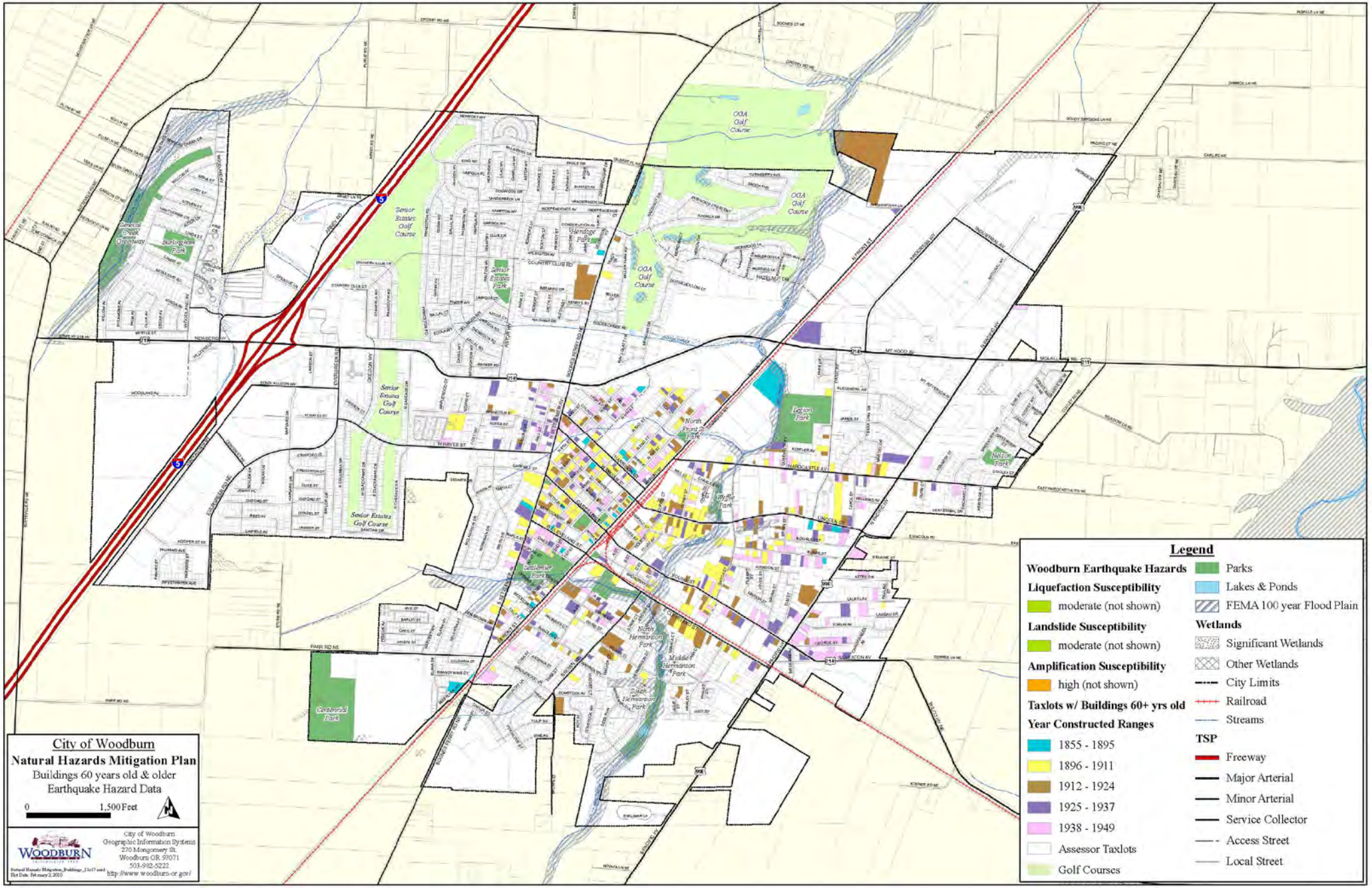
- Woodburn High School
- Woodburn RFPD
- Woodburn RFPD Station 21

Low (< 1%)

- Branch-Woodburn Center
- Heritage Elementary
- Valor Middle School

Please review the Risk Assessment (Volume I, Section 2) for additional information on this hazard.

Figure WB-3. Older Buildings.



Flood

Table WB-7. Flood Summary

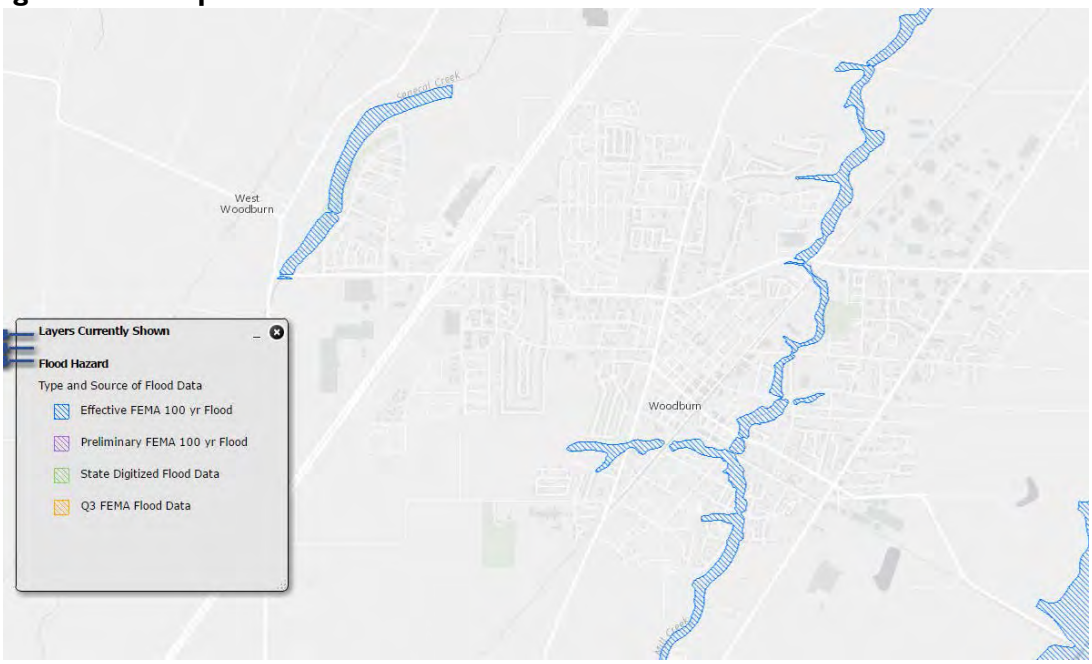
Hazard	Flood
Type	Climatic
Speed of Onset	Slow to moderate
Location	Mapped flood zones, floodplain
Extent	Moderate to severe
Prior Occurance	Four significant events since 1964
Probability	1% annual within SFHA

Sources: DOGAMI - Oregon HazVu; Oregon NHMP

Volume I, Section 2, Risk Assessment, describes the causes and characteristics of flooding hazards within the region. Woodburn's probability for riverine flood is likely and vulnerability to flood is limited.

Portions of Woodburn have areas of flood plains (special flood hazard areas). These include areas along Mill Creek and Senecal Creek (see Figure WB-4). The Pudding River, just to the east of Woodburn, is also a major source of flooding. Historically, Woodburn has experienced major floods in 1986 and 1996 on the Pudding River. Since then, no major floods have affected the population, but Woodburn continues to experience regular localized flooding during the wet season. According to the steering committee, localized flooding occurred in 2013 along several drainages. The steering committee also indicated that Boones Ferry Rd. regularly experiences localized flooding issues.

Figure WB-4. Special Flood Hazard Area



Source: Oregon HazVu: Statewide Geohazards Viewer (DOGAMI)

National Flood Insurance Program (NFIP)

FEMA modernized the Woodburn Flood Insurance Rate Maps (FIRMs) in January of 2000. The table below shows that as of October 2016, Woodburn had 53 National Flood Insurance Program (NFIP) policies in force. Of those, 16 were for properties that were developed before development of the initial FIRM. Woodburn's last Community Assistance Visit (CAV) occurred on June 24, 2004. Woodburn is not a member of the Community Rating System (CRS). Table WB-8 shows that 50 flood insurance policies are for single-family residential structures and with three serving non-residential structures. There have been two paid flood claims in Woodburn, totaling $14,781.

The Community Repetitive Loss record for Woodburn identifies no Repetitive Loss Properties[9] and no Severe Repetitive Loss Properties[10].

Table WB-8. Flood Insurance Detail

Jurisdiction	Effective FIRM and FIS	Initial FIRM Date	Total Policies	Pre-FIRM Policies	Policies by Building Type				Minus Rated A Zone	Minus Rated V Zone
					Single Family	2 to 4 Family	Other Residential	Non-Residential		
Marion County	-	-	2,067	1,239	1,614	115	105	232	97	0
Woodburn	1/19/2000	3/1/1979	53	16	50	0	0	3	6	0

Jurisdiction	Insurance in Force	Total Paid Claims	Pre-FIRM Claims Paid	Substantial Damage Claims	Total Paid Amount	Repetitive Loss Structures	Severe Repetitive Loss	CRS Class Rating	Last Community Assistance
Marion County	$ 514,268,700	298	226	16	$ 5,732,543	11	2	-	-
Woodburn	$ 12,711,100	2	2	0	$ 14,781	0	0	N/A	6/24/2004

Source: Information compiled by Department of Land Conservation and Development, October, 2016.

Please review the Risk Assessment (Volume I, Section 2) for additional information on this hazard.

Landslide

Table WB-9: Landslide Summary

Hazard	Landslide
Type	Climatic/Geologic
Speed of Onset	Slow to rapid
Location	Waterways (banks) and transportation facilities
Extent	Minor
Prior Occurance	No major events
Probability	Low for minor events; less than 5% major events

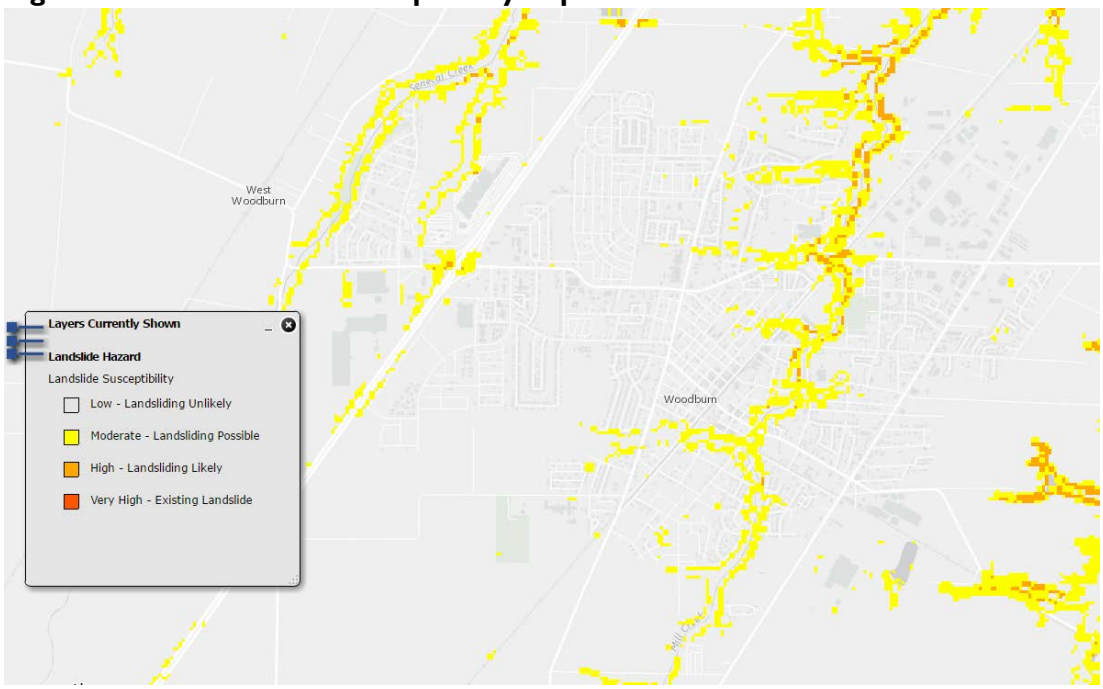
Sources: DOGAMI - Oregon HazVu; Oregon NHMP

[9] A Repetitive Loss (RL) property is any insurable building for which two or more claims of more than $1,000 were paid by the National Flood Insurance Program (NFIP) within any rolling ten-year period, since 1978. A RL property may or may not be currently insured by the NFIP.

[10] A Severe Repetitive Loss (SRL) property is a single family property (consisting of 1 to 4 residences) that is covered under flood insurance by the NFIP and has incurred flood-related damage for which 4 or more separate claims payments have been paid under flood insurance coverage, with the amount of each claim payment exceeding $5,000 and with cumulative amount of such claims payments exceeding $20,000; or for which at least 2 separate claims payments have been made with the cumulative amount of such claims exceeding the reported value of the property.

Volume I, Section 2, *Risk Assessment*, adequately describes the causes and characteristics of landslides, and appropriately identifies previous landslide occurrences within the region. Woodburn has a relatively flat topography. Woodburn's probability for landslide is possible (which is lower than the county's rating) and their vulnerability to landslide is limited (which is also lower than the county's rating). Figure WB-5 shows that landslide risk in Woodburn is low to moderate in most populated areas, with some small areas of high along Mill and Senecal Creeks.

Figure WB-5. Landslide Susceptibility Exposure



Source: Oregon HazVu: Statewide Geohazards Viewer (DOGAMI)

Please review the Risk Assessment (Volume I, Section 2) for additional information on this hazard.

Volcano

Table WB-10: Volcano Summary

Hazard	Volcano
Type	Geologic
Speed of Onset	Slow to rapid
Location	Cascade Mountains
Extent	Minor
Prior Occurance	One significant event since 1916 (Mount St. Helens)
Probability	<1% annual

Sources: DOGAMI - Oregon HazVu; Oregon NHMP

Volume I, Section 2, *Risk Assessment*, adequately describes Woodburn's risk to volcanic events. The steering committee determined that the city's probability for volcanic event is unlikely and their vulnerability to volcano is negligible.

The causes and characteristics of a volcanic event are appropriately described within the county's plan, as well as the location and extent of potential hazards. Previous occurrences are well-documented within the county's plan. Woodburn is very unlikely to experience anything more than volcanic ash during a volcanic event. When Mt. Saint Helens erupted in 1980, the city was impacted only by ashfall.

Please review the Risk Assessment (Volume I, Section 2) for additional information on this hazard.

Severe Weather

Table WB-11: Severe Weather Summary

Hazard	Severe Weather/Storm
Type	Climatic
Speed of Onset	Slow to moderate
Location	Countywide
Extent	Minor to severe
Prior Occurance	Minor events occur annually; ~30 moderate to severe events countywide over the past 130 years
Probability	100% for minor events, 23% for moderte to severe events

Sources: Marion County HMP

Volume I, Section 2, *Risk Assessment*, adequately describes the causes and characteristics of windstorms and severe winter storms, as well as the location and extent of these hazards. Woodburn's probability for windstorm and severe winter storms is highly likely (which is the same as the county's rating) and that their vulnerability is critical (which is lower than the county's rating).

Significant wind events occur in Woodburn each year, sometimes interrupting services, downing trees, and causing power outages. Since 1957, five reported tornadoes have struck Marion County, however none have touched down near Woodburn. More recently, two windstorms in 2015 toppled trees, with one tree causing damage to a house. According to the Woodburn steering committee, Woodburn experiences at least one severe wind event each year, often resulting in power outages.

Severe winter storms can consist of rain, freezing rain, ice, snow, cold temperatures, and wind. They originate from troughs of low pressure offshore that ride along the jet stream during fall, winter, and early spring months. Severe winter storms affecting Woodburn typically originate in the Gulf of Alaska or in the central Pacific Ocean. These storms are most common from November through March.

Major winter storms can and have occurred in the Woodburn area, and while they typically do not cause significant damage, they are frequent and have the potential to impact economic activity. During a storm in May 2014, lightening caused an estimated $75,000 in damage to property, including a house. The most recent winter storms (December 2016 – January 2017) included snow and ice and resulted in transportation and power interruptions combined with government office and school closures. A disaster declaration is currently pending.

Please review the Risk Assessment (Volume I, Section 2) for additional information on this hazard.

Wildfire

Table WB-12: Wildfire Summary

Hazard	Wildfire
Type	Climatic, Human Caused
Speed of Onset	Moderate to rapid
Location	Outside city limit
Extent	Minor to moderate
Prior Occurance	No history inside city limit
Probability	<1% annual

Sources: Marion County HMP

Volume I, Section 2, *Risk Assessment*, adequately describes the causes and characteristics of wildfires, as well as the county and city's history of wildfire events. The City's probability for wildfire is unlikely and the vulnerability to wildfire is limited (lower probability and vulnerability ratings than for the county). Due to Woodburn's isolation from the majority of at-risk areas, Woodburn is unlikely to be affected directly by wildfires. Should they occur nearby, however, the city could be affected by smoke, impacting people with respiratory problems, and potentially the elderly or very young.

The County updated the Community Wildfire Protection Plan in 2016 and Woodburn is not listed as a "Community at Risk."

Please review the Risk Assessment (Volume I, Section 2) for additional information on this hazard.

Other Hazard or Concerns

The Woodburn Steering Committee identified the following hazard issues or concerns during their meeting on September 7, 2016. While these hazards are non-natural, we've listed them here for reference.

- Hazardous Material Spills
- Transportation Accidents
- Active Shooter
- Cyber Terrorism
- Eco/Ag Terrorism

CITY COUNCIL MEETING: August 21, 2017

AGENDA ITEM NUMBER:

TO: **MAYOR CLARK AND CITY COUNCIL MEMBERS**

THROUGH: **CHRIS C. EPPLEY**
CITY MANAGER

FROM: **TRACY L. DAVIS, MMC**
CITY RECORDER/COMMUNITY CENTER MANAGER

SUBJECT: **KEIZER HERITAGE FOUNDATION – MANAGEMENT OF EVENT ROOM/GAZEBO**

BACKGROUND:

Earlier this year, the City was approached by Lyndon Zaitz, President of the Keizer Heritage Foundation to take over the management of the events rental room and gazebo located at the Keizer Heritage Building. The City completed a cost analysis of staff time associated with pre-event, event, and post event work based on a similar size room in the Community Center. Using this cost analysis, the Community Center rate structure and our policy and procedures, the City made a proposal to the Keizer Heritage Association to manage their event room and gazebo with the City retaining 45% of the rental fee and Keizer Heritage Association receiving 55% of the rental fee. Keizer Heritage Foundation will continue to be responsible for building maintenance, supplies, overhead, and marketing. The City and the Keizer Heritage Foundation have worked on the attached one-year agreement, which includes a six month review, to proceed with managing events at the Keizer Heritage Building.

Currently, staffing for the Keizer Community Center consists of an Event Center Coordinator, a portion of the Administrative Assistant and City Recorder duties plus temporary Event Hosts. The extra responsibility of managing the Keizer Heritage event room will be undertaken by our current staff. In order for this new assignment to be successful, it is essential we adhere to the same policies and procedures we currently use in the Community Center. This stipulation has been relayed to the Heritage Foundation Board and is written into the agreement.

FISCAL IMPACT:

There will be minimal fiscal impact to the City. We believe retaining 45% of the rental rate will cover the cost of our staffing. We do not anticipate any profit to the City from this agreement. We will update the Council on the arrangement after six months.

RECOMMENDATION:

It is recommended the City Council adopt the attached Resolution to Authorize the City Manager to enter into an Agreement for Management of Events Rental Room/Gazebo at the Keizer Heritage Foundation.

CITY COUNCIL, CITY OF KEIZER, STATE OF OREGON

Resolution R2017-_____

AUTHORIZING CITY MANAGER TO ENTER INTO AGREEMENT FOR MANAGEMENT OF EVENTS RENTAL ROOM/GAZEBO AT KEIZER HERITAGE FOUNDATION

WHEREAS, Keizer Heritage leases real property located at 980 Chemawa Road NE, Keizer, Oregon;

WHEREAS, on the leased property are improvements known as the events rental room/gazebo;

WHEREAS, Keizer Heritage has need of services to manage the events rental room/gazebo and wishes to have City manage the rental program;

WHEREAS, the City has personnel with the experience necessary to manage the events rental room/gazebo;

WHEREAS, Keizer Heritage and the City wish to establish a positive working relationship in an effort to provide a positive experience to Clients who desire to rent the events rental room/gazebo;

NOW, THEREFORE,

BE IT RESOLVED by the City Council of the City of Keizer that the City Manager is authorized to enter into the attached Agreement for Management of Events Rental Room/Gazebo at Keizer Heritage Foundation.

Keizer City Attorney
930 Chemawa Road NE
PO Box 21000
Keizer, Oregon 97307
503-856-3433

BE IT FURTHER RESOLVED that this Resolution shall take effect immediately upon the date of its passage.

PASSED this _____ day of _____, 2017.

SIGNED this _____ day of _____, 2017.

_____
Mayor

_____
City Recorder

Keizer City Attorney
930 Chemawa Road NE
PO Box 21000
Keizer, Oregon 97307
503-856-3433

AGREEMENT FOR MANAGEMENT OF EVENTS RENTAL ROOM/GAZEBO
AT KEIZER HERITAGE FOUNDATION

DATE: _____, 2017

PARTIES: KEIZER HERITAGE FOUNDATION, Inc., an Oregon nonprofit corporation (hereinafter "Keizer Heritage")
Attn: President
980 Chemawa Road NE
PO Box 20845
Keizer, OR 97307

CITY OF KEIZER, an Oregon Municipal corporation (hereinafter "City")
Attn: Tracy Davis
930 Chemawa Road NE
PO Box 21000
Keizer, OR 97307

RECITALS:

A. Keizer Heritage leases real property located at 980 Chemawa Road NE, Keizer, Oregon.

B. On the leased property are improvements known as the events rental room/gazebo (hereinafter "Facility"). Keizer Heritage has need of services to manage its Facility.

C. Keizer Heritage wishes to have City manage Facility rental program.

D. City has personnel with the experience necessary to manage Keizer Heritage's Facility.

E. Keizer Heritage and City wish to establish a positive working relationship between themselves in an effort to provide a positive experience to Clients who desire to rent Facility at Keizer Heritage.

NOW, THEREFORE, the parties hereby agree as follows:

AGREEMENT:

1. TERM OF AGREEMENT. Unless terminated as set forth herein, this Agreement shall be effective on the date of the last signature herein and shall remain in effect for one year. The parties shall meet six (6) months from the effective date to discuss the needs and/or expectations of both parties, and to review if any revisions need to be made to this Agreement or the compensation paid under this Agreement. Neither party is required to agree to revise any part of this Agreement.

2. IMPROVEMENTS. City agrees that all improvements (not including personal property owned by City) are the property of Keizer Heritage.

3. TERMS AND CONDITIONS. Subject to the terms and conditions set forth herein, City agrees to manage Keizer Heritage's Facility at 980 Chemawa Road NE, Keizer, Oregon for the term of this Agreement as follows:

A. Keizer Heritage shall make every effort to market the Facility. Keizer Heritage will retain use of the events portion of the Keizer Heritage website and Keizer Heritage will work with City on any revisions necessary to the marketing strategy. City may request that the Keizer Heritage marketing chair to use Keizer Heritage's Mail Chimp services and/or Facebook to advertise and announce Facility marketing. All Facility advertising shall inform potential Clients of the need to contact the City for scheduling.

B. City shall serve as point of contact via telephone and email to answer potential Facility rental inquiries. Keizer Heritage agrees that it will maintain one phone line for non-event room purposes and one line for Facility use upon City's request. In the alternative, at City's option, City may arrange for a City phone for Facility rentals. The number for Facility rentals shall be added to all Facility advertising, including the website, Facebook, Mail Chimp, flyers, and brochures.

Keizer Heritage has an established email for the Facility. Keizer Heritage shall provide City with access to the Facility email (events@keizerheritage.org). City agrees that any emails received at that email address relating to other Keizer Heritage business shall be immediately forwarded to Keizer Heritage's President.

C. City shall schedule and direct site tours with potential event clients and show property, making every effort to complete booking when appropriate.

D. City shall manage bookings/reservations and track schedule accordingly. Keizer Heritage agrees that City will have full control of the Facility calendar. City agrees that Keizer Heritage will have access to view and print the calendar on a "read only" basis. All events (including no-charge events) shall be scheduled through City. Keizer Heritage shall not schedule any events.

E. City shall secure the final executed Facility Use Agreement. The Facility Use Agreement shall be between the Client and Keizer Heritage. Keizer Heritage and City agrees that City shall use a form similar to the City's Facility Use Agreement in a form acceptable to Keizer Heritage and that Clients will be responsible to follow the City's regulations and policies outlined in such Agreement. Keizer Heritage authorizes City to sign the Facility Use Agreement(s) on behalf of Keizer Heritage. Keizer Heritage and City agree that City shall use City's regulations and policies, including but not limited to, alcoholic beverage and security policies. Keizer Heritage and City agree that City shall use City's regulations and policies. City agrees to provide notification of changes to Keizer Heritage within ten (10) days.

F. Event Clients shall pay all deposits, use fees and other charges directly to the City. Use fees shall be paid in full prior to the event. Keizer Heritage shall not collect any use fees or charges whatsoever relating to the Facility.

G. City shall schedule security and event hosts.

H. City shall oversee site during set-up, event and clean-up.

I. City shall use the same rate schedule that City uses for the Keizer Community Rooms (Iris "A" room), except for weekday weddings, City shall use the Keizer Heritage weekday wedding rate as set by Keizer Heritage and approved in writing by City. Keizer Heritage agrees that the rate schedule also includes the discount programs established by City.

J. City agrees that it will work with Keizer Heritage to establish use of the building by tenants. City understands that Keizer Heritage allows its tenants use of the Facility if it is not scheduled. City further understands that lease agreements between Keizer Heritage and its tenants affords each tenant one day per month free of charge to use the Facility. If tenants desire to use the Facility on a week-end, tenants must provide notice of such intent no later than November 1 of each year for the next calendar year. Keizer Heritage has notified its tenants that weekend use, particularly Saturdays, are discouraged. Keizer Heritage agrees to notify each tenant, within thirty (30) days of the effective date of this Agreement, that tenant must contact City to schedule use of the Facility. Keizer Heritage further agrees to provide a list of tenants to City within ten (10) days of the effective date of this Agreement and within ten (10) days of a change in tenants.

K. City agrees that event hosts shall remove garbage, vacuum, sweep, and restock paper products following an event held at the Facility. Keizer Heritage agrees, at its own expense, that it will purchase paper products and arrange for janitorial services, such as carpet cleaning, cleaning of restrooms, cleaning of kitchen, etc and that City is not responsible for these types of services. In the event that unusual janitorial services are necessary, City shall work with Keizer Heritage's building manager to arrange for the services under Keizer Heritage's contract with its vendor, at Keizer Heritage's expense.

L. City shall work with Keizer Heritage's building manager to have building access (keys and combination needs). Keizer Heritage shall instruct its building manager regarding this requirement immediately upon the effective date of this Agreement.

M. Keizer Heritage shall prepare a list of equipment available for use in Facility and where it is stored. Such list shall be provided to City no later than thirty (30) days after the effective date of this Agreement. Keizer Heritage agrees that City shall not be liable to Keizer Heritage or any third parties for any loss or damages caused by Clients. City shall attempt to collect the reasonable value of the cost of repairing or replacing damage to Facility and/or equipment as provided for in the current City regulations and policies. Keizer Heritage agrees to repair and/or replace any damage

to Facility and/or equipment within a reasonable amount of time following City's notice to Keizer Heritage.

N. Keizer Heritage shall be responsible to train City personnel on use of any specialized equipment (sound system, lighting system, etc.) upon the effective date of this Agreement. City shall be responsible to train the event hosts and Keizer Heritage shall not interfere with the training or supervising of the event hosts. If Keizer Heritage has concerns regarding event hosts, security or other City representatives, Keizer Heritage agrees to not confront those individuals, but to contact City directly.

O. No later than thirty (30) days after the effective date of this Agreement, Keizer Heritage will let the City use a desk in the Keizer Heritage's Building Managers office. Keizer Heritage will retain one desk for its use. Keizer Heritage will retain files and other storage in this office. The arrangement of office shall be mutually agreed upon by Keizer Heritage Building Manager and City. The City will provide their own computer to the Keizer Heritage office.

4. COMPENSATION/PAYMENT TERMS. On the tenth (10^{th}) of each month, City shall remit to Keizer Heritage fifty-five percent (55%) of all amounts collected on rentals actually held at the Facility the previous month. City shall retain the remaining amount as payment for services rendered. On the same date, City shall remit any amounts collected from Client for damage to the Facility or equipment to Keizer Heritage for the previous month. City shall provide Keizer Heritage an itemized accounting with each payment.

For events that were booked prior to the effective date of this Agreement, but will occur after such date, Keizer Heritage shall supply a list of events and an accounting of funds collected (deposits, pre-payments, etc) and remit such funds to the City within thirty (30) days of the date of this Agreement. City shall remit to Keizer Heritage the full amount due to Keizer Heritage after the event pursuant to the terms set forth above.

5. UTILITIES. Keizer Heritage shall provide water and sewer services to Facility. Keizer Heritage shall also provide electricity, natural gas and garbage collection to Facility. It is the responsibility of Keizer Heritage to provide these services without charge to City. Keizer Heritage agrees to provide garbage cans at Facility for use by Clients.

6. RELATIONSHIP OF THE PARTIES. Keizer Heritage and City have entered into this Agreement for the purpose of establishing an independent contractor relationship between Keizer Heritage and City. This Agreement is not, nor should it be construed as, a lease or an agreement in the nature of a lease. No covenant of quiet enjoyment shall be implied in this Agreement. It is further understood and agreed by and between the parties that nothing herein shall constitute or be construed to be an employment, partnership, joint venture, or joint employer relationship between Keizer Heritage, its successors or assigns on the one part, and City, its successors or assigns on the other part. Keizer Heritage is not entitled to, and expressly waives all claim to City benefits including, but not limited to health, life, and disability insurance, overtime pay, paid leave, and retirement. Keizer Heritage agrees that it will not present itself as

an agent of City. City agrees that it will not present itself as an agent of Keizer Heritage and will not act as a contract manager of Keizer Heritage other than for the authorized Facility.

Keizer Heritage shall not unilaterally cancel a planned event at the Facility without good cause. City has the right to manage the Facility pursuant to the terms in this Agreement.

7. ASSIGNMENTS. Neither Keizer Heritage nor City shall assign this Agreement without the written consent of the other. Either party may withhold consent for any or no cause, in their sole discretion.

8. CHANGES TO AGREEMENT. Except as provided herein, this Agreement may be modified only by a written agreement executed by City and Keizer Heritage.

9. KEIZER HERITAGE INSURANCE REQUIREMENTS. During the term of this Agreement, Keizer Heritage shall maintain, at a minimum, the following insurance:

a. General Liability. Keizer Heritage shall maintain commercial general liability insurance in the amount of $1,000,000, which protects it from claims for personal injury, bodily injury and property damage.

b. Property Damage. Keizer Heritage shall maintain property improvement insurance in the amount of $1,000,000 which protects all improvements and other property against loss or damage by fire or other hazard. Keizer Heritage will not be responsible to insure or replace personal property owned by City.

10. CITY INSURANCE REQUIREMENTS. During the term of this Agreement, City shall maintain, at a minimum, the following insurance:

a. General Liability. City shall maintain commercial general liability insurance in the amount of $2,000,000, which protects it from claims for personal injury, bodily injury and property damage.

b. Workers' Compensation Insurance. Prior to commencing services, and on an annual basis thereafter, City shall, if requested, provide Keizer Heritage with a certificate of insurance attesting to existence of workers' compensation insurance.

11. INDEMNIFICATION. Each party to this Agreement shall defend and indemnify each other party and such other parties' officers, employees and agents to the extent permitted by the Oregon Constitution, subject to the limitations of the Tort Claims Act (ORS 30.260-30.300) of any nature whatsoever resulting from, arising out of, or relating to the activities of the indemnifying party or its officers, employees, subcontractors or agents under this Agreement, provided that no party to this Agreement shall be required to indemnify any other party for any liability arising out of the wrongful acts of the employees or agents of the other party.

12. OWNERSHIP OF DOCUMENTATION. City shall retain all records which result from this Agreement until the scheduled event occurs and payments are finalized or until the scheduled event has been cancelled and Keizer Heritage shall have access to the records upon request. All records shall be released to Keizer Heritage upon the scheduled event occurring and payments being finalized or upon the event being cancelled and Keizer Heritage shall maintain all records which relate to this Agreement. Keizer Heritage shall give City access to the records upon request for a period of three (3) years from release of file from City to Keizer Heritage. City shall retain copies of all records pursuant to state archive requirements.

13. MEDIATION. Keizer Heritage and City agree to mediate claims or disputes arising out of or relating to this Agreement before initiating litigation. The mediation shall by conducted by a mediation service acceptable to the parties. A party shall make a demand for mediation within a reasonable time after a claim or dispute arises, and the parties agree to mediate in good faith. In no event shall any demand for mediation be made after such claim or dispute would be barred by applicable law. Mediation fees shall be shared equally.

14. SEVERABILITY. In the event that any term or provision of this Agreement is found to be unenforceable or invalid for any reason, the remainder of this Agreement shall continue in full force and effect, and the parties agree that any unenforceable or invalid term or provision shall be amended to the minimum extent required to make such term or provision enforceable and valid.

15. GOVERNING LAW. This Agreement shall be construed, interpreted and applied in accordance with the laws of the State of Oregon.

16. TERMINATION. Either party may terminate this Agreement upon thirty (30) days' written notice for any or no reason. If this Agreement is terminated, City agrees to remit any amounts due to Keizer Heritage no later than thirty (30) days after the termination. If the funds are for an event that occurs after the termination of the contract, 100% of the funds will be remitted to Keizer Heritage and Keizer Heritage will be responsible for all management or activity for such event after termination of this Agreement.

17. ENTIRE AGREEMENT. This Agreement represents the entire and integrated agreement between City and Keizer Heritage and supercedes all prior negotiations, statements or agreements, either written or oral relating to the Facility only. There are no conditions, agreements or representations relating to the Facility between the parties except as expressed herein. Nothing in this Agreement shall create a contractual relationship for the benefit of any third party.

18. NOTICES. All notices hereunder shall be given in writing and mailed postage prepaid, addressed to the parties as set forth above or such other address as either party may provide to the other by notice given in accordance with this provision, or hand delivered in person. Any notice delivered by personal delivery shall be deemed

to be given upon actual receipt. Any notice sent by mail shall be deemed to be given five (5) days after mailing.

19. PREVAILING PARTY. Should any legal proceeding be commenced between the parties to this Agreement seeking to enforce any of its provisions, including, but not limited to, fee provisions, the prevailing party in such proceeding shall be entitled, in addition to such other relief as may be granted, to a reasonable sum for attorneys' and expert witnesses' fees, which shall be determined by the court or forum in such proceeding. For purposes of this provision, "prevailing party" shall include a party that dismisses an action for recovery hereunder in exchange for payment of the sum allegedly due, performance of covenants allegedly breached, or consideration substantially equal to the relief sought in the action or proceeding.

IN WITNESS WHEREOF, the parties hereto have executed this Agreement as of the day and year first above written.

CITY OF KEIZER

By:_____
Christopher C. Eppley,
City Manager

Dated:_____

KEIZER HERITAGE FOUNDATION, INC.

By:_____
Lyndon Zaitz,
President

Dated:_____

APPROVED AS TO FORM:

_____
Keizer City Attorney

CITY COUNCIL MEETING: August 21, 2017

AGENDA ITEM NUMBER:_____

TO: **MAYOR CLARK AND COUNCIL MEMBERS**

THROUGH: **CHRISTOPHER C. EPPLEY, CITY MANAGER**

FROM: **E. SHANNON JOHNSON, CITY ATTORNEY**

SUBJECT: **ORDINANCE AMENDING KEIZER DEVELOPMENT CODE**

At the August 7, 2017 Council meeting, Council directed staff to prepare an Ordinance approving the Keizer Development Code text changes to revise the Code relating to the off-street parking and loading. Such Ordinance is attached for your review. Note that the highlighted portions of the table represent the only substantive changes to the required amount of parking.

RECOMMENDATION:

Adopt the attached Ordinance.

Please let me know if you have any questions. Thank you.

ESJ/tmh

A BILL ORDINANCE NO. 2017-_____

FOR

AN ORDINANCE

AMENDING KEIZER DEVELOPMENT CODE REGARDING SECTION 2.303 (OFF-STREET PARKING AND LOADING); **AMENDING ORDINANCE 98-389**

WHEREAS, the Keizer Planning Commission has recommended to the Keizer City Council amendments to the Keizer Development Code (Ordinance No. 98-389); and

WHEREAS, the City Council has held a hearing on this matter and considered the testimony given and the recommendation of the Keizer Planning Commission; and

WHEREAS, the Keizer City Council has determined that it is necessary and appropriate to amend the Keizer Development Code as set forth herein; and

WHEREAS, the Keizer City Council has determined that such amendments meet the criteria set forth in state law, the Keizer Comprehensive Plan, and the Keizer Development Code;

NOW, THEREFORE,

The City of Keizer ordains as follows:

Section 1. FINDINGS. The City of Keizer adopts the Findings set forth in Exhibit "A" attached hereto and by this reference incorporated herein.

Section 2. AMENDMENT TO THE KEIZER DEVELOPMENT CODE. The Keizer Development Code (Ordinance No. 98-389) is hereby amended by the

Keizer City Attorney
930 Chemawa Road NE
PO Box 21000
Keizer, Oregon 97307
503-856-3433

adoption of the changes to Section 2.303 (Off-Street Parking and Loading) as set forth in Exhibit "B" attached hereto, and by this reference incorporated herein.

Section 3. SEVERABILITY. If any section, subsection, sentence, clause, phrase, or portion of this Ordinance is for any reason held invalid or unconstitutional, or is denied acknowledgment by any court or board of competent jurisdiction, including, but not limited to the Land Use Board of Appeals, the Land Conservation and Development Commission and the Department of Land Conservation and Development, then such portion shall be deemed a separate, distinct, and independent provision and such holding shall not affect the validity of the remaining portions hereof.

Section 4. EFFECTIVE DATE. This Ordinance shall take effect thirty (30) days after its passage.

PASSED this _____ day of _____, 2017.

SIGNED this _____ day of _____, 2017.

_____
Mayor

_____
City Recorder

Keizer City Attorney
930 Chemawa Road NE
PO Box 21000
Keizer, Oregon 97307
503-856-3433

EXHIBIT "A"

Findings regarding the adoption of amendments to Section 2.303 (Off-Street Parking and Loading) of the Keizer Development Code (KDC).

The City of Keizer finds that:

1. General Findings.
The particulars of this case are found within Planning file Text Amendment 2017-08. Public hearings were held before the Planning Commission on June 14, 2017 and before the City Council on August 7, 2017. Both the Planning Commission and the City Council unanimously supported the proposed revisions.

2. Criteria for approval are found in Section 3.111.04 of the Keizer Development Code. Amendments to the Comprehensive Plan or Development Code shall be approved if the evidence can substantiate the following. Amendments to the map shall be reviewed for compliance with each of the following, while text amendments shall only be reviewed for compliance with Section 3.111.04 B, C, and D. Given that this is a text amendment Section 3.111.04 A is not applicable.

3. **Section 3.111.04.B - A demonstrated need exists for the product of the proposed amendment.**

Findings: The proposed revisions to the zone code reflect a demonstrated need. The existing language in the Keizer Development Code (KDC) had a discrepancy that listed two different parking requirements for a "theater" use. Additional modifications are proposed to clarify requirements on aisle widths and parking space size, as well as requirements for parking lot landscaping. The proposed changes will allow for the effective and accurate application and administration of the KDC standards. Therefore this text amendment is found to be necessary to provide the appropriate level of clarity for off-street parking and loading area development. Therefore, this proposal complies with this review criterion.

4. **Section 3.111.04.C- The proposed amendment to the Keizer Development Code complies with statewide land use goals and related administrative rules.**

FINDINGS: The proposed text amendments comply with the statewide land use planning goals as discussed below:

Goal 1 – Citizen Involvement: The adoption of this ordinance followed notice, a public process involving public hearings, and deliberation. Public notice was provided in the Keizertimes. Public hearings were held before the Planning Commission on June 14, 2017, and before the City Council on August 7, 2017. Citizens were afforded the opportunity to participate in the public process. This process is consistent with the provision for providing an opportunity for citizens to be involved in all phases of this proposed planning process as is required by

this goal and with implementing administrative rules within Oregon Administrative Rules.

Goal 2 – Land Use Planning: This ordinance amends the Keizer Development Code. The city has an adopted comprehensive plan acknowledged by the state. The adoption proceeding was conducted in a manner consistent with the Keizer Comprehensive Plan, Keizer Development Code, and applicable state law. The proposed revisions to the Keizer Development Code are consistent with this statewide planning goal and administrative rules.

Goal 3 – Farm Land: The purpose of this goal is to protect lands that are designated for agricultural uses. Within the city limits the Exclusive Farm Use (EFU), Special Agriculture (SA), Urban Transition (UT), and Public (P) allow commercial agricultural uses. However, only the city's SA zone is a state recognized EFU qualifying zone. The amendments involve regulations affecting off-street parking and loading areas and will not affect lands that are outside the city limits or any lawful uses occurring on those lands. The proposed amendments will comply with the Farm Land Goal and with implementing administrative rules.

Goal 4 – Forest Land: The intent of this goal is to protect lands designated for commercial forest uses. There are no zoning districts specifically designated within the city limits that will allow for commercial forestry. Also, there are no commercial forest lands near, or adjacent to the city limits of Keizer. The amendments to the KDC do not involve any land which is designated as forest land, nor will it impact the use of any forest lands. The proposed amendments will comply with this Goal and with implementing administrative rules.

Goal 5 – Natural Resources: The intent of the Natural Resources Goal is to protect various natural resources such as wetlands, waterways, big game habitat, etc. The city has a local wetland inventory of sites where wetland soils may be present. The city has an adopted Willamette River Greenway Overlay zone to protect resources along the Willamette River. There are no identified big game habitats within the city limits of Keizer. The city established a Resource Conservation overlay zone to maintain, preserve and protect the natural features adjacent to Claggett Creek. In addition, the city has been developing stormwater regulations to protect water quality of the local water ways. The proposed amendments to the landscaping requirements within parking lot areas will require trees to be planted near impervious surfaces in order to reduce "heat island" effects of large parking lot areas, provide shade to the site, and reduce stormwater runoff. The changes proposed will not affect or preclude any of the city's natural resources protection regulations nor the lawful use of any properties that are within this overlay zone. Therefore, the proposed text amendments will be consistent with this goal and with administrative rules which implement this goal.

Goal 6 – Air, Water and Land Quality: The intent of this goal is to protect the city's air, water and land qualities. The city provides its residents with city water from groundwater sources. The quality of the water is monitored to ensure that it complies with all state and federal water quality standards. New construction is required to be connected to the established sanitary sewer system thereby reducing the potential of groundwater contamination from failing on-site septic systems. The city has stormwater regulations which are to maintain water quality in the Willamette River and local streams. Land quality is preserved through the city's erosion control regulations and through zone code development regulations. Air quality is preserved through the city's development code regulations which limit certain types of uses and are enforced by appropriate state agencies which govern air emission standards. The revisions to the city's standards regarding off-street parking and loading areas will comply with this goal and with the administrative rules that implement this goal.

Goal 7 – Natural Hazards: The purpose of this goal is to protect life and property from hazards resulting from flooding, steep slopes or other natural occurrences. The city has floodplain regulations that govern the placement of structures within identified 100-year floodplains within the city limits. In Keizer, these are primarily located along the Willamette River and smaller streams such as Claggett Creek. The floodplains have been mapped by the federal government. The intent of the floodplain regulations is to minimize the loss of life and property damage by preventing development, elevating structures above the flood elevation, or flood proofing structures in the floodplain. While there are some steep slopes in the northwest quadrant of the city, there are no mapped areas of steep slopes in Keizer that might warrant any special engineering. The proposed text amendment will neither impact this goal nor any administrative rules.

Goal 8 – Recreation: This goal requires the city to identify and plan for the current and future recreation needs of the residents of the city. The city has an adopted Parks and Recreation Master Plan that inventories parks, playgrounds, and recreational opportunities within the city limits and plans for the city's future park and recreation needs. The proposed amendments will have no impact on the recreational activities that occur on any park land within the city and will not impact either this goal or any administrative rules that implement it.

Goal 9 – Economic Development: The intent of this goal is to ensure that the city plans for its overall economic vitality. The City has an adopted Economic Opportunities Analysis which addresses projected job needs based on both regional growth patterns and desired targeted industries. The growth forecast calls for a total of 3,774 new jobs over the next 20 years. The adopted Economic Opportunities Analysis identifies a net need for commercial and institutional lands amounting to 63.3 gross acres above and beyond what the City's remaining buildable employment lands can accommodate. The proposed text amendment will not have any adverse impact on the economic development activities or uses within the city. Therefore, the proposal is consistent with this goal.

Goal 10 – Housing: This goal requires the city to plan and provide for the housing needs of its residents. The adopted Housing Needs Analysis found that for the upcoming 20-year period that there will be a need for 4,513 new units to house the future population. The inventory of buildable residential lands contain a supply of 315.2 acres which are vacant, partially vacant or re-developable and can accommodate an estimated 2,422 units resulting in 2,090 units which must be accommodated beyond the City's existing capacity. When this remaining land need is apportioned to Keizer's residential zones, the HNA estimates a 20-year need of 267 gross acres of residential land. The revisions to the city's standards regarding off-street parking and loading areas will have no impact on this goal.

Goal 11- Public Facilities and Services: The intent of this goal is to develop a timely, orderly and efficient arrangement of public facilities and services necessary to serve the residents of Keizer. The city provides its residents with water, an established street system, administrative services and police services. Sanitary sewer service is provided by the city of Salem through an intergovernmental agreement. Fire protection services are provided by the Keizer Fire District or Marion County Fire District #1. There is sufficient capacity in the municipal water delivery system and also within the sanitary sewer treatment system to accommodate planned growth within the upcoming 20 year planning period. The proposed text amendments will not impact any of the city's public facilities and services. Therefore, the revisions will comply with this goal and all administrative rules.

Goal 12 – Transportation: The city has an adopted Transportation System Plan that describes the city's transportation systems. This system includes streets, transit, bike, and pedestrian systems. It inventories the existing systems and contains plans for improving these systems. The proposed text amendment to off-street parking and loading standards will not affect any transportation facility within the city limits and so is consistent with Section 3.111.05 regarding Transportation Planning Rule compliance. The proposed text amendment will have no adverse impact on the city's transportation systems and so will not affect this goal nor any implementing rules.

Goal 13 – Energy Conservation: This goal seeks to maximize the conservation of energy. All new construction requires compliance for review to applicable energy conservation standards. The proposed zone code text amendments will have no impact on this goal nor any of the implementing administrative rules.

Goal 14 – Urbanization: The intent of this goal to provide for an orderly and efficient transition from rural to urban land use. The city has an adopted Comprehensive Plan and zone code that complies with the goal. The proposed text amendments will affect only land that is within the city limits and will not impact the use of any land being transitioned from rural to urbanized uses and is therefore consistent with this goal.

Goal 15 – Willamette River: This goal seeks to protect, conserve, and maintain the natural, scenic, historical, agricultural, economic and recreational qualities of lands along the Willamette River. The revisions to the city's development code will have no impact on the ability of the city to regulate uses along the river or the Willamette River overlay zone regulations and so this goal is not applicable.

Goal 16 (Estuarine Resources), Goal 17 (Coastal Shorelands), Goal 18 (Beaches and Dunes), and Goal 19 (Ocean Resources) govern areas along the ocean. Since Keizer is not located along the coast these goals are not applicable.

In consideration of the above findings, the proposed zone code revisions comply with all applicable statewide land use goals and with all applicable administrative rules which implement the relevant goal.

5. **Section 3.111.04.D - The amendment is appropriate as measured by at least one of the following criteria:**
   a. It corrects identified error(s) in the previous plan.
   b. It represents a logical implementation of the plan.
   c. It is mandated by changes in federal, state, or local law.
   d. It is otherwise deemed by the council to be desirable, appropriate, and proper.

FINDINGS: The proposed text amendment will revise Section 2.303 (Off-Street Parking and Loading) of the Keizer Development Code. The proposed changes will correct an identified error in the number of parking spaces required to be provided for a "theater" use, and will clarify previously approved regulations governing off-street parking and loading areas. While there are no specific Comprehensive Plan goals or policies that offer guidance, it is determined that the proposed amendment to the zone code represents a logical implementation of the Keizer Comprehensive Plan. The City Council has, by this adoption, determined that the text revisions are desirable, appropriate, and proper. As such, the proposal complies with this criterion.

2.303 OFF-STREET PARKING AND LOADING

2.303.01 Purpose

The purpose of this Section is to provide standards to ensure adequate areas for the parking, maneuvering, loading and unloading of vehicles and bicycles for all land uses in the City of Keizer. (12/15)

2.303.02 Scope

The provisions of this Section shall apply to the following types of development: (5/98)

A. New Building. Any new building or structure erected after the effective date of this Ordinance. (5/98)

B. Expansion. The construction or provision of additional floor area, seating capacity, or other expansion of an existing building or structure. (5/98)

C. Change in Use. A change in the use of a building or structure which would require additional parking spaces or off-street loading areas under the provisions of this Section. (5/98)

2.303.03 General Provisions Off-Street Parking and Loading

A. Owner Responsibility. The provision and maintenance of off-street parking and loading space is a continuing obligation of the property owner. No building permit shall be issued until plans are presented that show property that is and will remain available for exclusive use as off-street parking and loading space. The subsequent use of property for which the building permit is issued shall be conditional upon the unqualified continuance and availability of the amount of parking and loading space required by this Ordinance. (5/98)

B. Additional Parking Required Prior to Occupancy. Should the owner or occupant of any lot or building change the use to which the lot or building is used, thereby increasing off-street parking and loading requirements, it shall be unlawful and a violation of this ordinance to begin or maintain such altered use until such time as the increased off-street parking and loading requirements are observed. (07/06)

C. Interpretation by Administrator. Requirements for types of buildings and uses not specifically listed herein shall be determined by the Zoning Administrator based upon the requirements of comparable uses listed and expectations of parking and loading need. The Zoning Administrator shall have the authority to make adjustments based on parking demand analysis prepared by an applicant. (07/06)

D. Combined Uses. In the event several uses occupy a single structure or parcel of land, the total requirements for off-street parking shall be the sum of the requirements of the several uses computed separately, unless a reduction is approved for shared parking pursuant to Subsection 2.303.05. (5/98)

E. Use of Parking Spaces. Required parking spaces shall be available for the parking of operable passenger automobiles of residents, customers, patrons or employees only, and shall not be used for storage of vehicles or materials including solid waste collection containers. Garages for single family and duplex dwelling units shall not be counted in determining required parking spaces. (5/98)

F. Drainage. All new parking areas and expansion of existing parking areas shall provide a storm drainage system to dispose of runoff generated by the impervious surface. Provisions shall be made for the appropriate on-site collection, storage, conveyance, and treatment of drainage water. All development shall be designed and constructed, to prevent sheet flow of such water onto sidewalks, public rights of way, and abutting properties. The drainage system shall be approved by Keizer Public Works Department prior to construction and shall be constructed in accordance with the city's storm water management regulations. (12/15)

2.303.04 Location and Use Provisions

Off-street parking and loading areas shall be provided on the same lot with the main building or structure or use except that: (5/98)

A. Residential Zone. In any residential zone, automobile parking areas may be located on another lot if the lot is within 200 feet of the lot containing the main building, structure or use and a parking agreement is recorded. A copy of such recorded agreement shall be provided to the city. Tandem parking (stacking no more than two cars end to end in a private drive way) shall be an acceptable method of meeting parking requirements. (12/15)

B. Non-residential Zone. In any non-residential zone, the parking area may be located off the site of the use if it is within 500 feet of such site and a parking agreement is recorded. A copy of such recorded agreement shall be provided to the city. (12/15)

C. Accessory Parking Use, Non-residential. Parking of vehicles in a structure, or outdoors, is a permitted accessory or secondary use in non-residential zones. (07/06)

D. Accessory Parking Use, Residential. Parking of vehicles in a structure or outdoors is a permitted accessory use in conjunction with a dwelling in any zone provided: (5/98)

1. All of the vehicles are owned by the owner or lessee of the lot. (5/98)

2. Vehicles parked outdoors in a residential zone may be parked in a ~~space~~ driveway, as regulated herein, and must be located within the front yard meeting the requirements for required parking in this Section. (12/15)

3. Vehicles parked on a lot in a residential zone shall be for the personal use of the occupants of the dwelling. One vehicle used in conjunction with a home occupation or other employment may be parked on the lot provided it complies with the provisions in Section 2.407.G. (12/11)

4. A parking plan must be approved for all development not served by a public street or for development served by any public street that does not include parking on both sides of the street. The parking plan shall illustrate how minimum parking requirements will be met for all newly created lots.

E. Yard Parking Restrictions. No parking of vehicles, trailers, boats, or recreational vehicles shall be allowed in a front yard except on a driveway. (12/15)

F. Storage Restrictions. Side and rear yards may be used for storage and parking of vehicles, trailers, boats, and recreational vehicles. Storage and parking areas shall be screened by a six foot high fence, wall, or hedge. Storage and parking areas shall be either durable hard surface or gravel surface consistent with the requirements in Section 2.413 (Recreational Vehicle Storage – Single Family Homes). The fence, wall, or hedge shall comply with the provisions regarding the location for fences and maintaining a vision clearance area. (12/15)

G. All vehicles are subject to the regulations prohibiting illicit discharge, as governed by applicable City regulations.

2.303.05 Joint Use

Parking area may be used for a loading area during those times when the parking area is not needed or used. Parking areas may be shared subject to Zoning Administrator's approval for commercial and industrial uses where hours of operation or use are staggered such that peak demand periods do not occur simultaneously. Such joint use shall not be approved unless satisfactory legal evidence is presented which demonstrates the access and parking rights of parties. (07/06)

2.303.06 Off-Street Automobile Parking Requirements

Off-street parking shall be provided in the amount not less than listed below. (5/98)

A. Parking Requirements

~~LAND USE ACTIVITY~~	~~SPACES**~~	~~HOW MEASURED*~~
~~Single Family and Duplex~~	~~2~~	~~per dwelling unit~~
~~Single family dwellings having their access via an access easement, on a street restricting on-street parking, or a flag lot shall provide three on-site parking spaces.~~	~~3~~	~~Per dwelling unit~~
~~All other multi-family types:~~ ~~1 bedroom unit~~ ~~2 or more bedroom unit~~	~~1+~~ ~~1.5+~~ ~~+ Plus 1 space per 10 units for visitor parking~~	
~~Hotel, motel, Bed and Breakfast~~	~~1~~	~~Per guest room~~
~~Club, lodge~~		~~Combination of heaviest uses being conducted: hotel, restaurant, etc.~~
~~Hospital~~	~~1~~	~~Per 2 beds~~
~~Nursing home, convalescent home, Memory care~~	~~1~~	~~Per 3 beds~~
~~Senior living facility, assisted living facility~~		~~To be determined through review process~~
~~Health service, medical or doctor's office, non-profit shelter providing emergency housing and associate services~~	~~1~~	~~Per 350 square feet~~
~~House of worship, auditorium, stadium, theater~~	~~1~~	~~Per 4 seats or every 8 feet of bench length~~

~~Park, special event~~		~~As determined through conditional use/master plan or city council review~~
~~Elementary, middle school~~	~~2 +1~~	~~Per classroom + per 350 sq ft of administrative office~~
~~High school~~	~~1 + 1 + 1~~	~~Per classroom + per 10 students + per 350 sq ft of administrative office~~
~~Family Daycare provider, Day care facility~~	~~In addition to required single family parking~~ ~~1~~ ~~2~~	 ~~Up to 12 children~~ ~~More than 12 children~~
~~Preschool, nursery~~	~~1~~	~~Per each employee plus 1 space per room~~
~~Bowling alley, skating rink, community center, recreation facility~~	~~1~~	~~Per 200 square feet~~
~~Golf Course~~	~~4~~	~~Per green~~
~~Theater for movies or plays~~	~~1~~	~~Per 3 seats~~
~~Tennis courts, racquetball courts~~	~~2~~	~~Per court~~
~~Retail store~~	~~1~~	~~Per 300 square feet~~
~~Personal Service~~	~~1~~	~~Per 350 square feet~~
~~Service repair center; retail store handling bulky merchandise (e.g. furniture, home furnishing, major equipment), home appliance, television, electronic equipment~~	~~1~~	~~Per 900 square feet~~
~~Dry cleaner~~	~~1~~	~~Per 1000 square feet~~
~~Laundromat~~	~~1~~	~~Per 300 square feet~~
~~Bank, credit union~~	~~1~~	~~Per 400 square feet~~
~~Office used for real estate, lawyer, insurance brokers~~	~~1~~	~~Per 500 square feet~~
~~General Office (non-medical)~~	~~1~~	~~Per 500 square feet~~
~~Eating and drinking establishment~~	~~1~~	~~Per 125 square feet~~

~~Wholesale establishment~~	~~1~~	~~Per 2,000 square feet~~
~~Government offices open to the public~~	~~1~~	~~Per 500 square feet~~
~~Wireless telecommunication facility~~	~~1~~	~~Per facility~~
~~Industrial, manufacturing, processing (0 - 24,999 sf)~~	~~1~~	~~Per 1,000 square feet~~
~~Industrial, manufacturing, processing (25,000 - 49,999 sf)~~	~~1~~	~~Per 1,000 square feet~~
~~Industrial, manufacturing, processing (50,000 - 79,999 sf)~~	~~1~~	~~Per 1,000 square feet~~
~~Industrial, manufacturing, processing (80,000 - 199,999 sf)~~	~~1~~	~~Per 2,000 square feet~~
~~Industrial, manufacturing, processing (200,000 sf and over)~~	~~1~~	~~Per 3,000 square feet~~
~~Warehousing and storage terminals 0 - 49,999 sf~~	~~1~~	~~Per 2,000 square feet~~
~~Warehousing and storage terminals 50,000 sf and over~~	~~1~~	~~Per 5,000 square feet~~

~~*Square footage = Gross floor area.~~ ~~(12/15)~~
~~**Totals shall be rounded up to the next whole number~~

LAND USE ACTIVITY	SPACES REQUIRED *Square footage = Gross floor area. (12/15) *Totals shall be rounded up to the next whole number
Single Family and Duplex	2 per dwelling unit
Single family dwellings having their access via an access easement, on a street restricting on-street parking, or a flag lot	3 per dwelling unit
Multi-family types	1 space per 1 bedroom unit + 1 additional space for every 10 units OR 1.5 spaces per 2 or more bedroom units + 1 additional space for every 10 units
Hotel, motel, Bed and Breakfast	1 space per guest room

Club, lodge	Combination of uses being conducted: hotel, restaurant, etc.
Hospital	1 space per 2 beds
Nursing home, convalescent home, Memory care	1 space per 3 beds
Senior living facility, assisted living facility	To be determined through review process
Health service, medical or doctor's office, non-profit shelter providing emergency housing and associate services	1 space per 350 square feet
House of worship, auditorium, stadium, theater	1 per 4 seats or every 8 feet of bench length
Park, special event	As determined through conditional use/master plan or city council review
Elementary, middle school	2 spaces per classroom – In addition, 1 space per 350 sq ft of administrative office
High school	1 space per classroom – In addition, 1 space per 10 students and 1 space per 350 sq ft of administrative office
Family Daycare provider, Day care facility	In addition to required single family parking: 1 space for up to 12 children 2 spaces for more than 12 children
Preschool, nursery	1 space per each employee plus 1 space per room
Bowling alley, skating rink, community center, recreation facility	1 space per 200 square feet
Golf Course	4 spaces per green
Tennis courts, racquetball courts	2 spaces per court
Retail store	1 space per 300 square feet
Personal Service	1 space per 350 square feet
Service repair center; retail store handling bulky merchandise (e.g. furniture, home furnishing, major equipment), home appliance, television, electronic equipment	1 space per 900 square feet

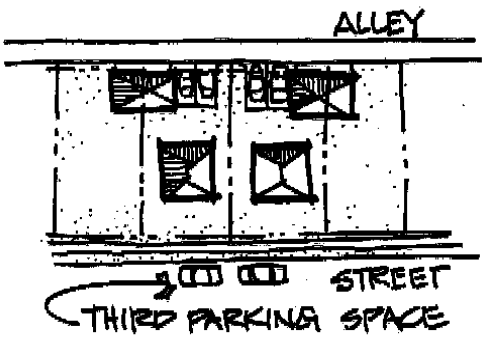
Dry cleaner	1 space per 1,000 square feet
Laundromat	1 space per 300 square feet
Bank, credit union	1 space per 400 square feet
Office used for real estate, lawyer, insurance brokers	1 space per 500 square feet
General Office (non-medical)	1 space per 500 square feet
Eating and drinking establishment	1 space per 125 square feet
Wholesale establishment	1 space per 2,000 square feet
Government offices open to the public	1 space per 500 square feet
Wireless telecommunication facility	1 space per facility
Industrial, manufacturing, processing	1 space per 1,000 square feet
Warehousing and storage terminals	1 space per 2,000 square feet

B. Parking Reduction

The number of minimum required parking spaces may be reduced by up to 10% if the site is served by transit and transit related amenities such as transit stops, pull-outs, shelters, park and ride lots, are provided or will be provided as part of the development of the site. (12/15)

C. Parking Increase

The number of minimum required parking spaces shall not be increased by more than 50% unless a property owner provides a parking demand analysis which documents that a greater amount is necessary to serve the needs of those who will use the parking facility and is accepted by the Community Development Director. (12/15)

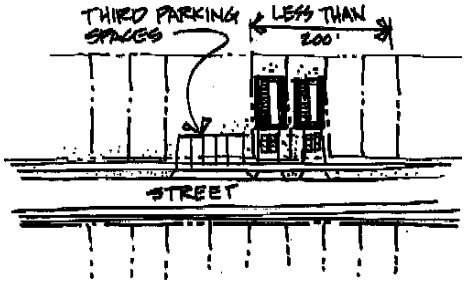


3rd Parking Space on Alley

ALLE

2.303.07 Standards for Disabled Person Parking Spaces

Disabled Person Parking Spaces shall comply with the requirements of the ~~Uniform B~~building ~~C~~code and ODOT standards. (5/98)



3rd Parking Space in Parking Bay

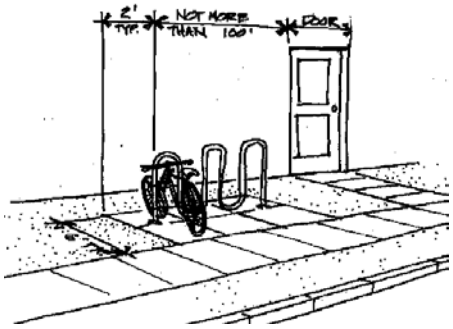
2.303.08 Bicycle Parking

A Bicycle Parking Required. Bicycle Parking shall be required in all public and semi-public, commercial, multi-family, and industrial development as well as park-and-ride lots. Bicycle parking shall be based on the amount of automobile parking required. In addition to a required one bicycle parking space, bicycle parking spaces shall be calculated at five percent of the amount of the automobile parking spaces which are required and all fractions are rounded up the next whole number. (12/15)

B. Bicycle Parking Development Requirements

1. Space Size. Each bicycle parking space shall be a minimum of six feet long and two feet wide and be accessible by a minimum four foot aisle. (5/98)

2. Location. All bicycle parking areas shall be within 50 feet of a building entrance and located within a well-lit area. Bicycle parking areas shall be separated by a physical barrier or sufficient distance to protect parked bicycles from damage by automobiles. (12/15)



Bicycle Parking Standards

3. Rack Design. Bicycle racks must be designed to secure the bicycle frame and at least one wheel, and, accommodate a locking device. Racks, lockers or other related facilities shall be securely anchored to the ground or to a structure. As an alternative, the bicycle spaces can be provided within a secured compound. Fixed objects which are intended to serve as bicycle parking facilities but which are not obviously designed for such purposes shall be clearly labeled as available for bicycle parking. (12/15)

4. Access. Access to a public right-of-way and pedestrian access from the bicycle parking area to the building entrance must be provided. (5/98)

C. Exemptions

The following uses are exempt from the bicycle parking requirements: (5/98)

1. Seasonal or temporary businesses. (5/98)

2. Wireless telecommunication facilities, and other utilities (12/15)

2.303.09 Carpool and Vanpool Parking

New office or industrial development with 100 or more parking spaces shall designate at least 5% of the parking spaces for carpool or vanpool parking. These designated spaces shall be the closest parking spaces to the building entrance normally used by employees, with the exception of handicapped parking spaces. The carpool/vanpool spaces shall be clearly marked "Reserved - Carpool/Vanpool Only" along with specific hours of use. Any other use establishing car and vanpool spaces may reduce the minimum parking requirement by 3 spaces for each carpool/vanpool space created. (5/98)

2.303.10 Off-Street Loading Requirements

Off-street loading space shall be provided as listed below: (5/98)

A. Commercial Office. Commercial office buildings shall require a minimum loading space size of 12 feet wide, 20 feet long and 14 feet high in the following amounts: for buildings over 5,000 square feet of gross floor area, 1 space; for each additional 40,000 square feet of gross floor area, or any portion thereof, 1 space. (5/98)

B. Commercial and Industrial. All other commercial or industrial buildings shall require a minimum loading space of 12 feet wide, 30 feet long, and 14 feet high in the following amount: for buildings containing over 5,000 square feet of gross floor area, 1 space; for each additional 40,000 square feet of gross floor area, or any portion thereof, 1 space. (5/98)

2.303.11 Parking and Loading Area Development Requirements

All Parking and loading areas shall be developed and maintained as follows:

A. Surfacing. All driveways, parking and loading areas shall have a durable, hard, dust free surface such as asphalt, concrete, or pavers (segmented bricks). Temporary or over-flow parking areas may be allowed on a case by case basis subject to Public Works and Community Development approval to be exempt from this requirement. Over-flow is defined as being on an infrequent or occasional basis and is in addition to parking that already exists on the site. Temporary is less than two years in duration. (12/15)

B. Parking Spaces

1. Dimensions. Head-in ~~P~~parking spaces shall be a minimum 9 feet wide and 18 feet in length. Parallel parking spaces shall be a minimum 9 feet wide and 22 feet in length.

2. Compact Spaces. Compact parking spaces, at a reduced width of 8.5 feet~~, -~~ and 16 feet in length, shall be permitted on sites with more than five (5) parking spaces. No more than 30% of the required parking shall be compact spaces and each space must be identified as a "Compact Space." (12/15)

C. Aisle Dimensions

The following minimum aisle dimensions shall apply: (5/98)

1. Without adjacent parking(drive aisle):

   a. Single family residence: 12 feet

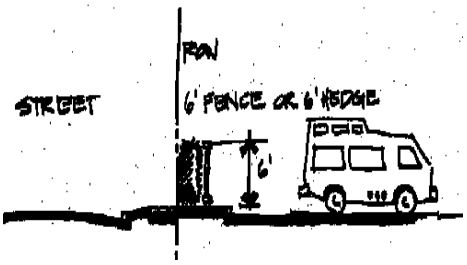
   b. One-way: 12 feet

   c. Two-way: 22 feet

2. With adjacent parking: (5/98)

PARKING ANGLE	AISLE WIDTH	
	One-way	Two-way
0 to 40	14 feet	24 feet
41 to ~~55~~70	~~15~~ 16 feet	24 feet
~~56 to 70~~	~~18 feet~~	
71 to 90	24 feet	24 feet

D. Screening. When any parking or loading area abuts a residential zone, the parking or loading area shall be screened or buffered as is required in Section 2.309.05. (07/06)



Parking Lot Screening

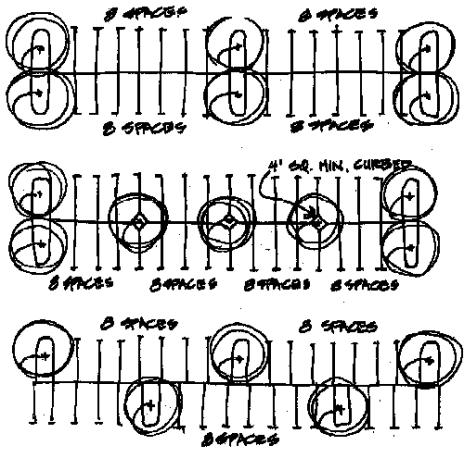
E. Lighting. All lighting shall be directed entirely onto the loading or parking area and away from any residential use. The lighting shall not cast a glare or reflection onto the public rights-of-way,and shall provide appropriate shielding

so the light source is not visible from any public right of way or adjacent residential property. (5/98)

F. Landscaping.

1. Parking lot landscaping should be designed to provide shade, reduce storm water runoff, and direct traffic. Incorporation of approved stormwater quality facilities in landscaped areas is encouraged.

2. ~~A~~One tree shall be planted for every eight lineal parking space~~s not located adjacent to a building~~. The planting space shall measure no less than 4 feet square and be contained by appropriate methods to ensure landscaping materials are kept in place, and vegetation is protected from vehicle maneuvering and parking areas. Trees may be planted in clusters to screen or buffer the development if approved in the Landscaping plan. ~~The planting space shall measure no less than 4 feet square and be surrounded by concrete curbing.~~



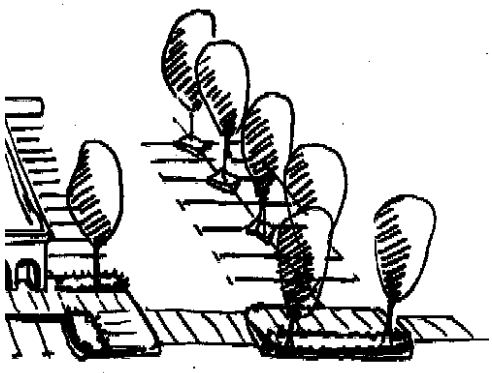
Parking Lot Tree Siting Alternatives

3. ~~The plant~~ Trees shall be of a species that the root system will not interfere with underground utilities or the parking surface, and must be ~~, is~~ capable of achieving a minimum 15 foot canopy radius.

4. All trees must be planted in proximity to proposed parking areas. At a minimum, 1/3 of the diameter of each~~the~~ proposed mature tree canopy shall provide shade and overlap the parking area.

5. Trees may be planted within a storm drainage area subject to Public Works review and approval, ~~and~~ provided ~~that~~ the selected tree species will not adversely impact the function of the storm drainage facility.

6. Trees shall be a minimum 2" caliper at the time of planting, of a suitable species, and be healthy with no visible damage. (12/15)


Parking Lot Landscaping

G. Traffic Flow. Service drives to off-street parking areas shall be designed and constructed to allow flow of traffic, provide maximum safety of traffic access and egress and the maximum safety of pedestrians and vehicular traffic on the site. (5/98)

H. Entrance/Exits. Service drive exits shall have a minimum vision clearance area of 15 feet from the intersection of the street and driveway. (5/98)

I. Bumper Rails. Parking spaces along the outer boundaries of a parking area shall be contained by a curb or a bumper rail to prevent a motor vehicle from extending over an adjacent property, a street, or a sidewalk. The bumper shall be at least 4" high and located a minimum of 3 feet from the property line. (5/98)

J. Existing development may redevelop a portion of existing parking areas in order to accommodate or provide transit-related amenities such as transit stops, pull-outs, shelters, and park and ride stations. The number of parking spaces may be reduced by up to 10% of the minimum required parking spaces for that use. (07/09)

CITY COUNCIL MEETING: August 21, 2017

AGENDA ITEM NUMBER:_____

TO: **MAYOR CLARK AND COUNCIL MEMBERS**

THROUGH: **CHRISTOPHER C. EPPLEY, CITY MANAGER**

FROM: **E. SHANNON JOHNSON, CITY ATTORNEY**

SUBJECT: **MASTER PLAN APPLICATION - KEIZER STATION - AREA B**

This matter came before Council for public hearing on July 17, 2017. Following the public hearing, it was discovered that the staff report to Council mentioned a revised Transportation Impact Analysis (TIA), but the actual revised TIA was not presented to Council. (The table in the executive summary at the beginning is the critical piece. It describes the recommended improvements.)

Staff recommends that the City Council reopen the record, accept the revised TIA, and then reclose the record.

RECOMMENDATION:

Make a motion to reopen the record, accept the revised TIA into the record, and keep the record open for written comments regarding the TIA only until August 31, 2017 at 5:00 p.m.

Please let me know if you have any questions. Thank you.

ESJ/tmh

Transportation Impact Analysis

Keizer Station Area B Master Plan

Keizer, Oregon

August 2010

Transportation Impact Analysis

Keizer Station Area B Master Plan

Keizer, Oregon

Prepared For:
City of Keizer

Prepared By:
Kittelson & Associates, Inc.
610 SW Alder, Suite 700
Portland, OR 97205
(503) 228-5230

Project Manager: Matt Hughart, AICP
Project Analyst: Ning Zhou
Project Principal: Hermanus Steyn, Pr. Eng., P.E.

Project No. 10745.00

August 2010

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Appendix E Trip Assignment Summary Worksheets

Appendix F Year 2020 Total Traffic Operations Worksheets

Appendix G Year 2020 Total Traffic (Mitigated) Operations Worksheets

Section 1
Executive Summary

Executive Summary

Per an intergovernmental agreement (IGA) with the Oregon Department of Transportation (ODOT), the City of Keizer (City) is preparing an updated master plan that focuses specifically on Area "B" in the larger Keizer Station development. Consistent with the previous Keizer Station master planning work, the following traffic study analyzed 2020 traffic conditions to ensure that the surrounding infrastructure will continue to operate acceptably in the long-term future.

Based on the results of this study, Area "B" can be developed while maintaining acceptable traffic operations and safety at the study intersections within the site vicinity assuming provision of the recommended mitigation measures as outlined in the table below. It should be noted these are mitigations to accommodate full development of the site and 2020 traffic volumes. The timing of development of the site and system traffic volume increases will determine when these improvements need to be implemented.

Intersection/Road Segment	Recommendations	Implementation
Improvements Associated with Area "B"		
Chemawa Road corridor	• Provide a right-in only driveway to serve Area "B" East.	• The right-in only driveway will be constructed when the non transit center component of Area "B" East is constructed.
Keizer Station Boulevard corridor	• Provide a full access driveway located off of Keizer Station Boulevard that would provide access to Area "B" East and West. This access would be located approximately 450 feet north of the Chemawa Road/Lockhaven Drive/Keizer Station Boulevard intersection. Signalize the intersection and coordinate it with the downstream Keizer Station Boulevard/Lockhaven Drive intersection. • Widen Keizer Station Boulevard west of the railroad underpass to include two southwest bound through lanes (with one lane being a shared through-right lane) and a separate left-turn lane at the above driveway access. • Reconfigure the southbound Keizer Station Boulevard approach at the Chemawa Road/Lockhaven Drive/Keizer Station Boulevard intersection to include dual left-turn lanes and a separate through lane. In addition to the lane reconfigurations, widen the approach to include a separate southbound right-turn lane with 200' of storage.	• The Area "B" West driveway connecting the parking area to Keizer Station Boulevard will be constructed when the first development component of Area "B" west takes place. The use of the driveway will be restricted until such time that the traffic signal serving the Keizer Transit Center is fully constructed /operational and all necessary signal modifications are in place. In the event that the Keizer Transit Center traffic signal construction is delayed, limited use of the driveway (such as right-in/right-out movements) may be allowed subject to City review and approval. • The Area "B" East driveway and traffic signal will be constructed when the first development component in Area "B" East takes place. • The Keizer Station Boulevard widening will be constructed when the first development component in Area "B" East takes place.
Lockhaven Drive corridor	• Provide a right-in/right-out driveway located off of Lockhaven Drive between the Keizer Station Boulevard and McLeod Lane intersections. This driveway would include a westbound right-turn deceleration lane.	• The right-in/right-out driveway and deceleration lane will be constructed when the first development component in Area "B" West occurs.
McLeod Lane	• Provide a full access driveway off of McLeod Lane to serve Area "B" West.	• The full access driveway will be constructed when the first development component in Area "B"

		West occurs.
Intersection Improvements Needed to Specifically Mitigate the Traffic Impacts of Areas "B" and "C"		
Lockhaven Drive / 14th Avenue	• Add a westbound right-turn lane on Lockhaven Drive	• The City of Keizer will construct the right-turn lane using fee-in-lieu-contributions from the proportionate share impacts of Areas "B" and "C" by the year ~~2014~~ 2020.
Improvements Needed to Mitigate the Traffic Impacts of Regional Growth and Areas "B" and "C"		
Lockhaven Drive / River Road	• Modify the westbound approach to provide dual westbound left-turn lanes, a single through lane, and a single right-turn lane. • Modify the east-west signal phasing from split phasing to protected phasing	• The City of Keizer will construct the improvements using, among others, an assessment of proportionate share contributions of Areas "B" and "C" by the year 2020.
Chemawa Road / I-5 NB ramp terminal	• Provide dual eastbound left-turn lanes (and the accompanying northbound on-ramp lane widening). • Add a separate westbound right-turn lane	• The City of Keizer will collect proportionate share contributions from Areas "B" and "C" so that improvements can be constructed when full funding is available.
Improvements Associated with Area "C"		
Chemawa Road corridor	• Provide a five-lane section (two northbound and southbound through lanes with a center left-turn lane) from Lockhaven Drive to approximately 400 feet south of the McLeod Lane intersection. • Install a raised median along Chemawa Road between Lockhaven Drive and McLeod lane. • Provide a northbound and southbound left-turn lane at McLeod Lane. • Provide a second northbound right-turn lane at Lockhaven Drive. • Provide a right-in/right-out driveways to serve the east and west sections of Area "C".	• All Chemawa Road corridor improvements will be constructed when the first development component of Area "C" occurs. • The right-in/right-out driveways will be constructed when the first development component in the respective sections occurs.
Chemawa Road / McLeod Lane	• Signalize the intersection • Provide a separate left-turn and shared through/right-turn lane on the east/west McLeod Lane approaches.	• All Chemawa Road/McLeod Lane intersection improvements will be constructed when the first development component of Area "C"occurs.
McLoed Lane corridor	• Widen McLeod Lane to a three-lane cross section from Lockhaven Drive to Chemawa Road. Extend McLeod Lane southeast of Chemawa Road and connect it to the existing Ridge Drive. This extension will include a full three-lane cross section with sidewalks and bike lanes. • At the McLeod Lane extension with Ridge Drive, reconstruct the intersection to provide a continuous flow movement between the two corridors. • Provide a full access driveway to serve the west section of Area "C".	• All McLeod Lane corridor improvements will be constructed when the first development component of Area "C" occurs.

Additional details of the study methodology, findings, and recommendations are provided within this report.

Section 2
Introduction

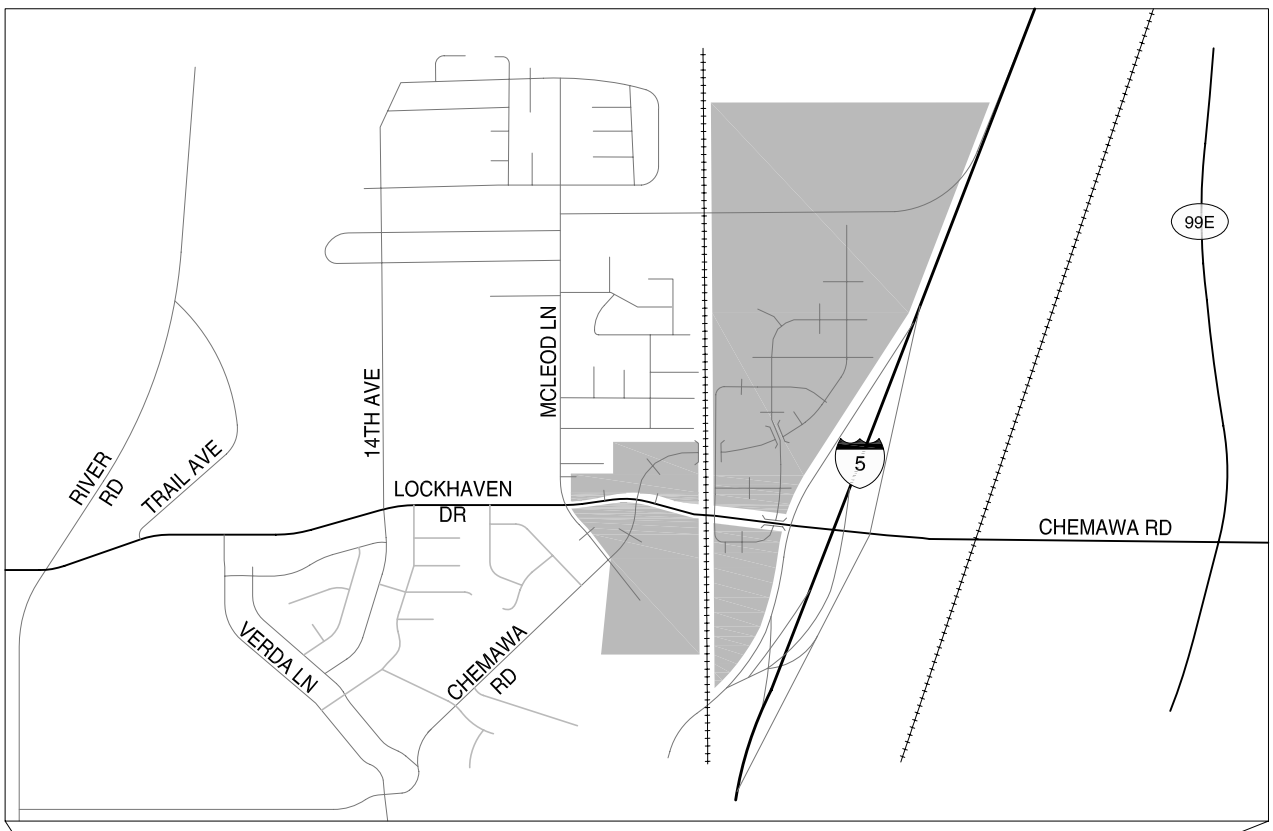
Introduction

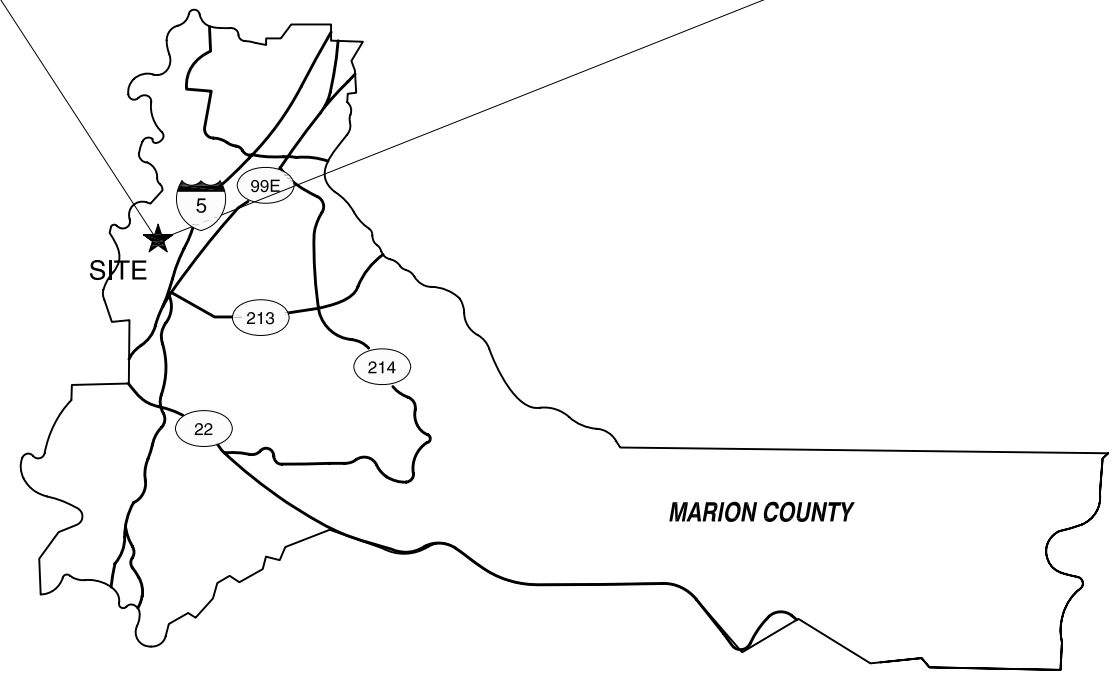
In 2004, a transportation impact analysis (*Keizer Station Master Plan, 2004, {Reference 1}*) was prepared for the entire Keizer Station development (Areas "A", "B", "C", and "D") in Keizer, Oregon. As a result of that study effort, Areas "A" and "D" were formally approved for development. Since that time, the City of Keizer has acquired the majority of land that constitutes Area "B". In order for future development to occur in Area "B", an updated master plan is required per an intergovernmental agreement (IGA) with the Oregon Department of Transportation (ODOT) (additional details of the IGA will be provided later in this report). This master plan will ensure that the land can be reasonably developed in a way that fits the constrained nature of the site and is consistent with the overall characteristics of the larger Keizer Station development. The master plan refinement for Area "B" will lay out the basic development characteristics and identify the necessary infrastructure improvements needed to ultimately support future development.

The general location of the larger Keizer Station development area is illustrated in Figure 1. Figure 2 illustrates Area "B" in relation to the other sub-areas that make up Keizer Station. As shown in Figure 2, Area "B" is bisected by Keizer Station Boulevard and divided into east and west halves. The east half is bordered by Chemawa Road to the south, Keizer Station Boulevard to the west and north, and the Portland & Western railroad line to the east. The west half if bordered by Lockhaven Drive to the south, Keizer Station Boulevard to the east, McLeod Lane to the west, and single family residential development to the north.

This report evaluates these transportation issues:

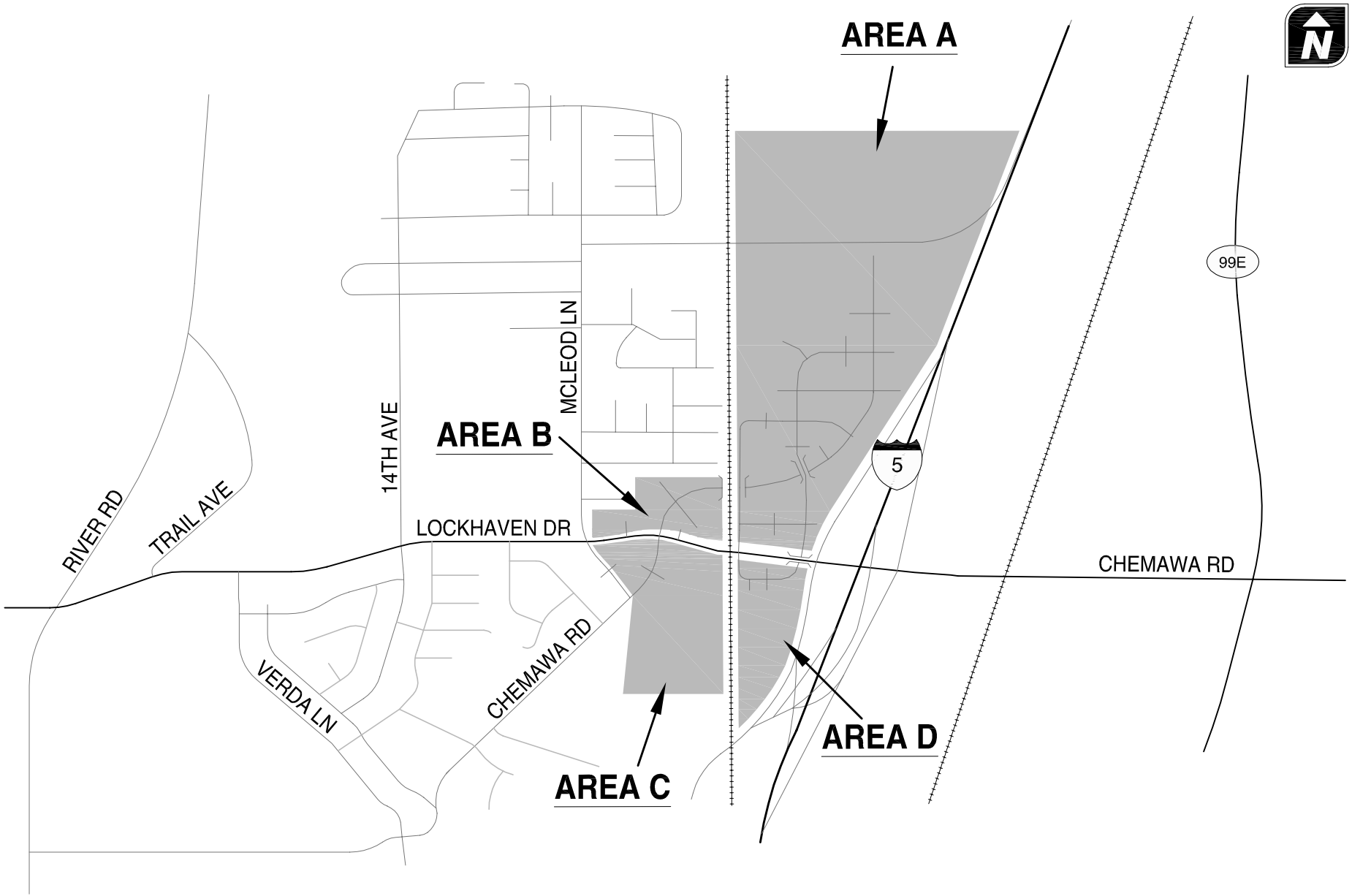
- Year 2010 existing land-use and transportation-system conditions within the site vicinity during the weekday p.m. peak period;
- Developments and transportation improvements planned in the study area;
- Assumptions and methodology of the traffic analysis;
- Forecast year 2020 background traffic conditions (without development of Area "B") during the weekday p.m. peak period;
- Trip generation and distribution estimates for the proposed development;
- Forecast year 2020 (with development of Area "B") total traffic conditions during the weekday p.m. peak period;
- On-site traffic operations and circulation.





SITE VICINITY MAP
KEIZER, OREGON

FIGURE 1



KEIZER STATION MASTER PLAN SUB-AREAS
KEIZER, OREGON

FIGURE 2

KITTELSON & ASSOCIATES, INC.
TRANSPORTATION ENGINEERING / PLANNING

Section 3
Existing Conditions

Existing Conditions

The existing conditions analysis identifies the site conditions and current operational and geometric characteristics of the roadways within the study area. These conditions will be compared with future conditions later in this report. Kittelson & Associates, Inc. (KAI) staff visited and inventoried the sub-area site and surrounding study area. At those times, KAI collected information regarding site conditions, adjacent land uses, existing traffic operations, and transportation facilities in the study area.

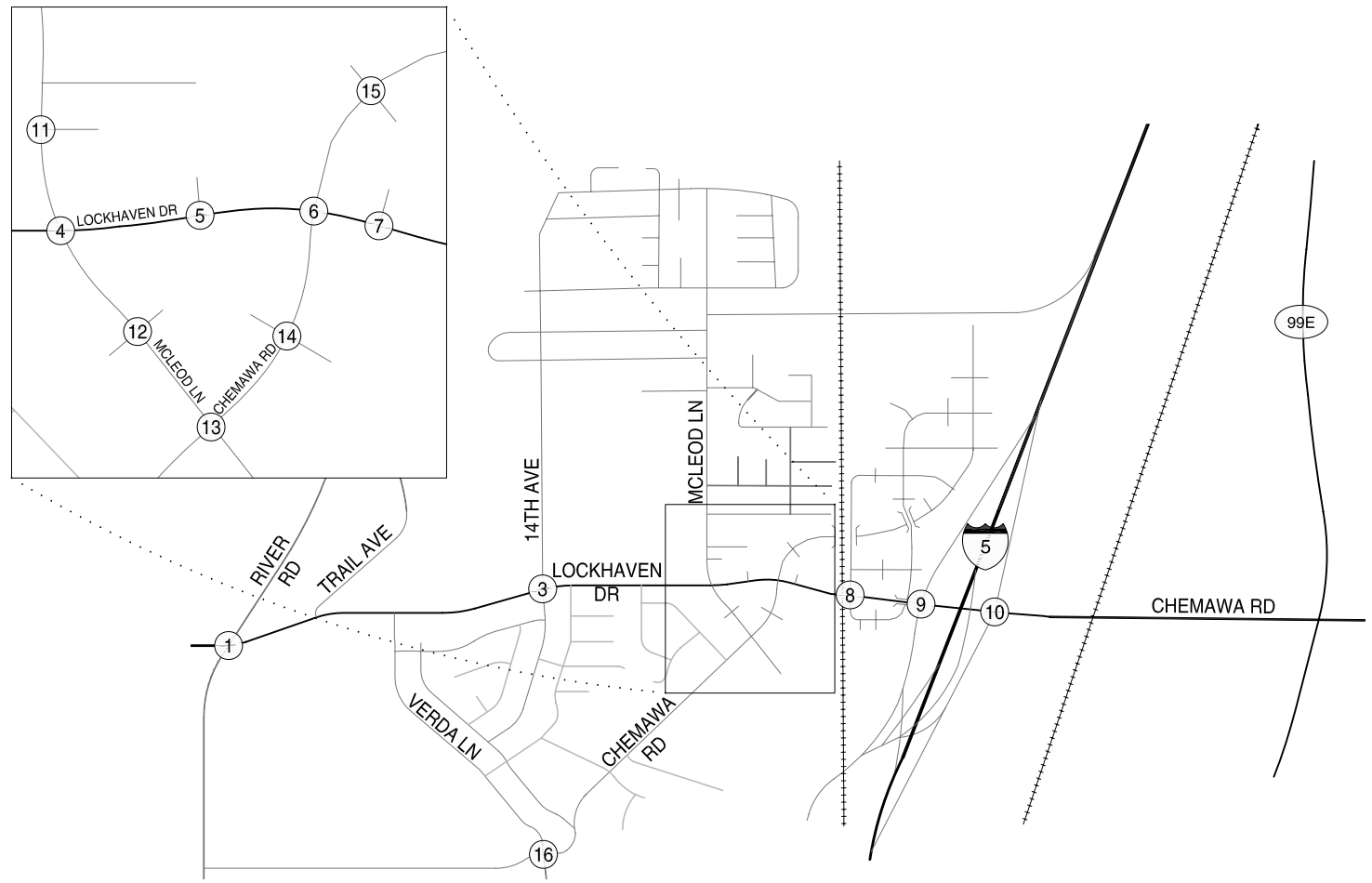
TRANSPORTATION FACILITIES

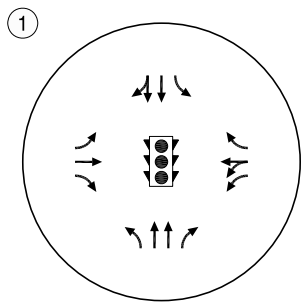
Table 1 summarizes the existing transportation facilities and roadways in the study area and Figure 3 identifies the existing lane configurations and traffic control devices at the study intersections.

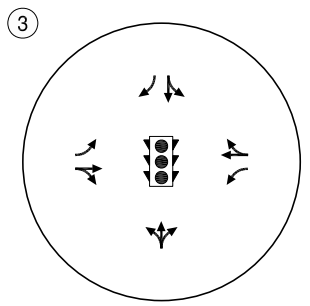
Table 1
Existing Transportation Facilities and Roadway Designations

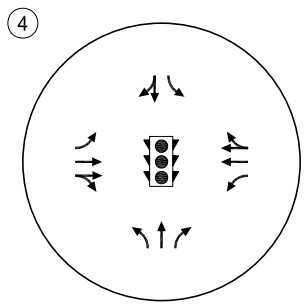
Roadway	Functional Classification	Number of Lanes	Posted Speed	Sidewalks	Bicycle Lanes	On-Street Parking
Lockhaven Drive	Major Arterial	West of McLeod: 3 lanes with a center turn lane East of McLeod: 5 lanes with a center turn lane	35 mph 45 mph	Both Sides	Yes Yes	No No
Chemawa Road	Minor Arterial	South of Lockhaven: 2-lanes East of Keizer Station Blvd.: 5 lanes with a center turn lane	35 mph 45 mph	No Yes	Yes Yes	No No
McLeod Lane	Collector	2-lanes	25 mph	Both Sides	Yes	No
14th Avenue	Local Street	2-lanes	25 mph	Both Sides	No	Yes
Verda Lane	Minor Arterial	2-lanes	35 mph	No	Yes	No
River Road	Major Arterial	North of Lockhaven: 5-lanes with center left-turn lane South of Lockhaven: 5-lanes with center left-turn lane	45 mph 35 mph	Both Sides	Yes	No
Keizer Station Boulevard	Minor Arterial	2/3-lanes	35 mph	North side	Yes	No

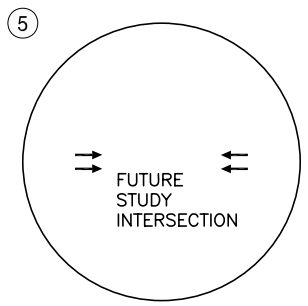
(NO SCALE)

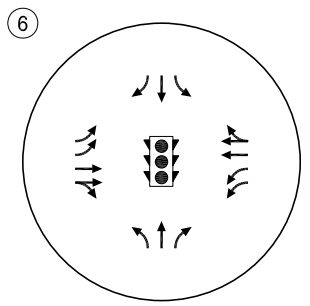


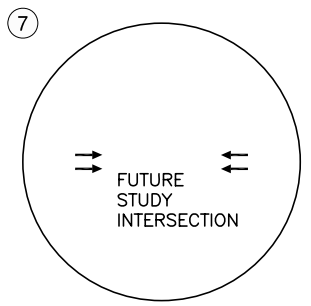


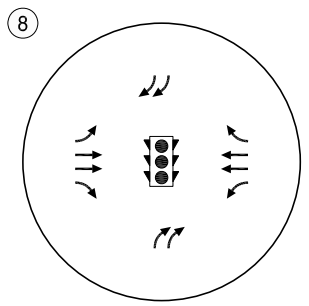


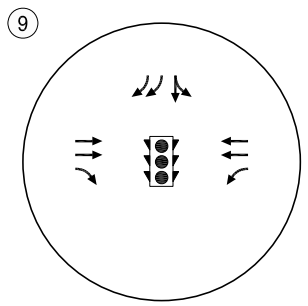


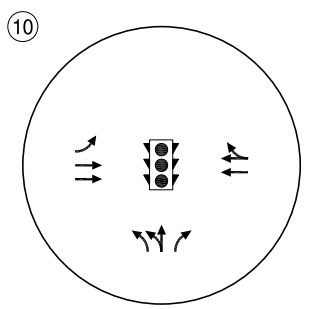


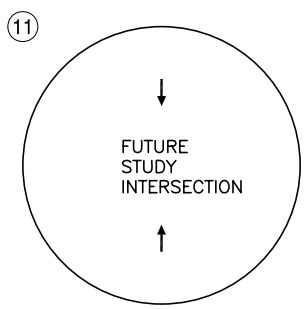


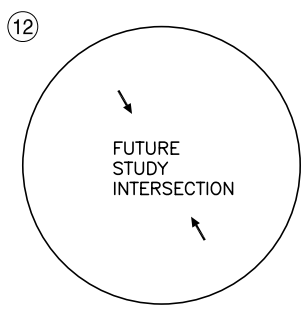


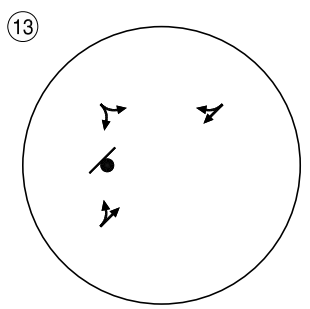


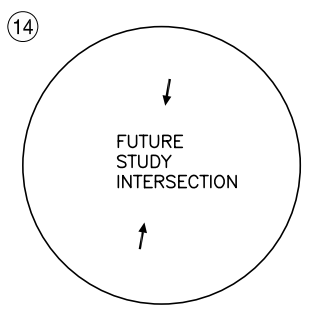


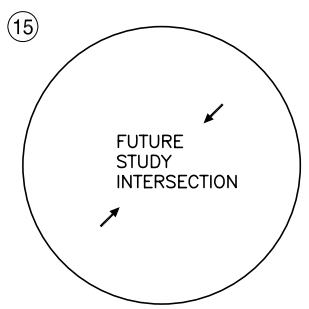


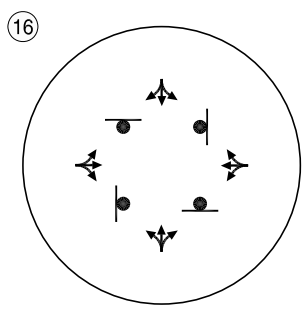












LEGEND

- STOP SIGN
- TRAFFIC SIGNAL

EXISTING LANE CONFIGURATIONS AND TRAFFIC CONTROL DEVICES KEIZER, OREGON

FIGURE 3

KITTELSON & ASSOCIATES, INC.
TRANSPORTATION ENGINEERING / PLANNING

EXISTING TRAFFIC VOLUMES AND PEAK HOUR OPERATIONS

Existing Traffic Volumes

Seasonally adjusted weekday p.m. peak hour turning movement volumes at all of the study intersections were conducted by ODOT as developed for the Chemawa Road Interchange Access Management Plan (IAMP) (Reference 2). Although the majority of these counts were conducted in 2008, it was determined that some of them were still appropriate for use as part of this study effort. However, given that there has been some development changes in Keizer Station Area "A" since 2008, it was also determined that updated traffic counts were necessary at the following intersections:

- Lockhaven Drive/Chemawa Road/Keizer Station Boulevard
- Chemawa Road/Stadium Drive/Ulali Drive
- Chemawa Road/Interstate 5 (I-5) Southbound (SB) Ramp Terminal
- Chemawa Road/I-5 Northbound (NB) Ramp Terminal

As such, new weekday p.m. peak hour turning movement counts were conducted at these intersections on a July weekday evening (4:00 p.m. - 6:00 p.m.).

Seasonal Adjustment

Per standard ODOT analysis procedures, the traffic counts were investigated for adjustment to 30th highest hour volumes. Since there are no Automatic Traffic Recorder (ATR) stations located in the study area, the ODOT Characteristic Table Method was used for this analysis. The Characteristics Table Method procedure involves matching study area roadways with other ATR roadways around Oregon that have similar characteristics and utilizing the seasonal adjustment factors for the matching ATR location. Consistent with the seasonal adjustment procedures used as part of the Chemawa Road IAMP, an average of ATR stations 26-003, 27-006, and 03-011 was used to calculate the 30th highest hour volume adjustment factor as summarized in Table 2. Given that the intersection turning movement counts were conducted in July during the peak travel season, a minimal season adjustment factor of 1.01 was applied to the turning movement volumes. As a result, the adjusted and balanced turning movement counts are shown in Figure 4. *Appendix A contains the updated traffic count sheets used in this study.*

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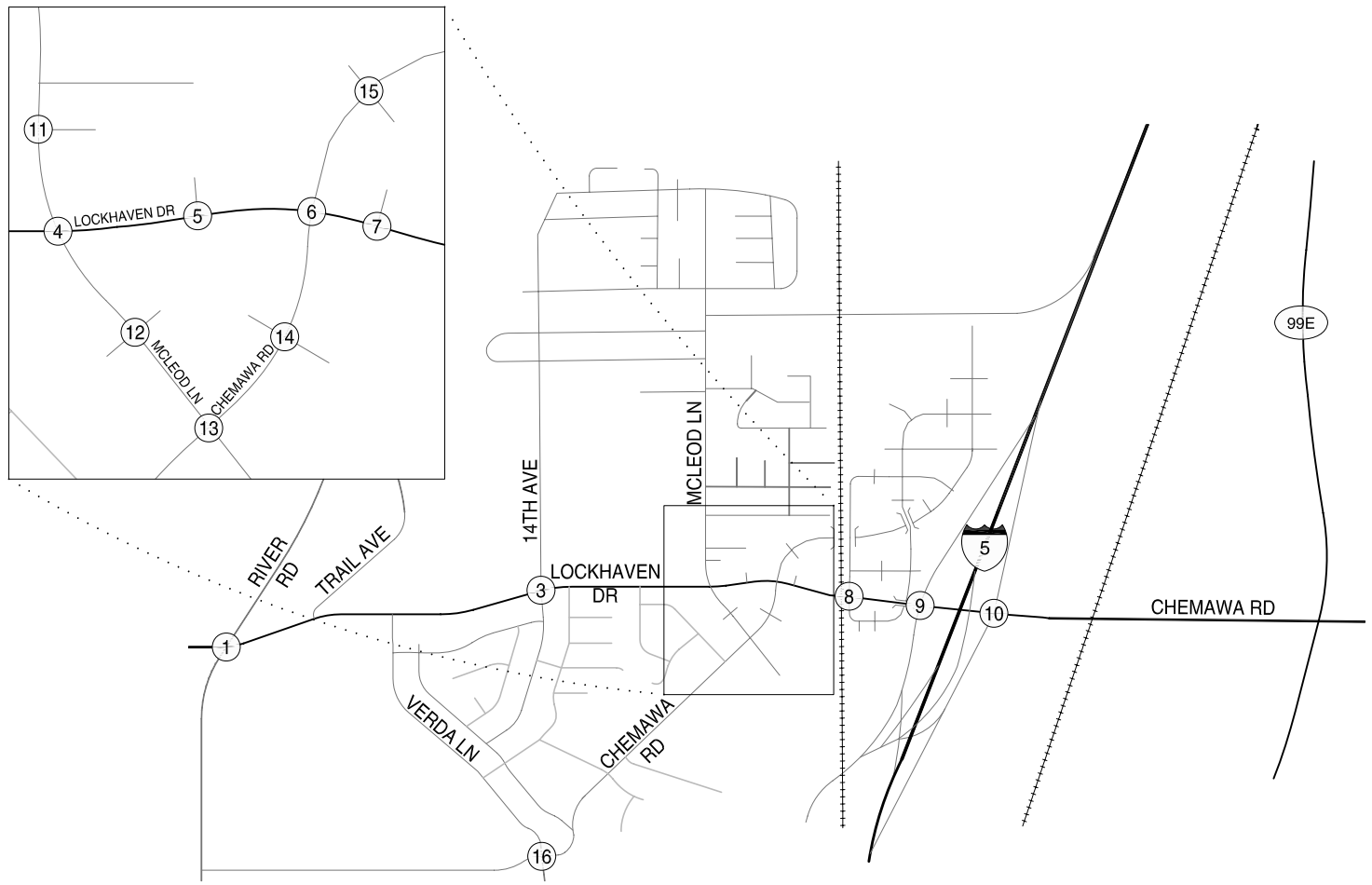

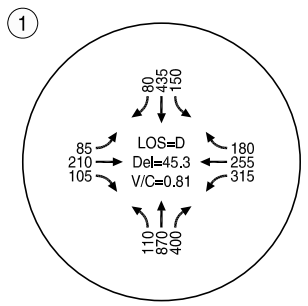

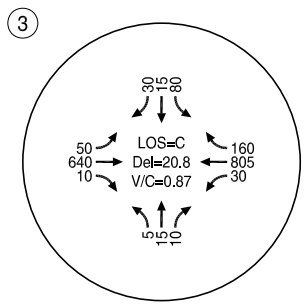

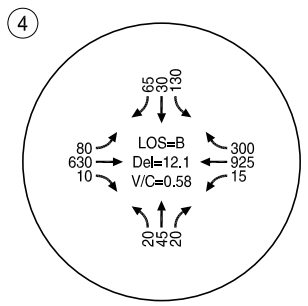

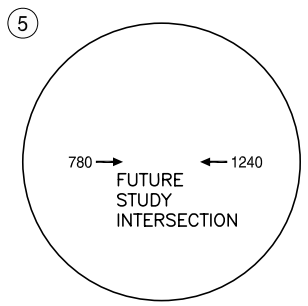

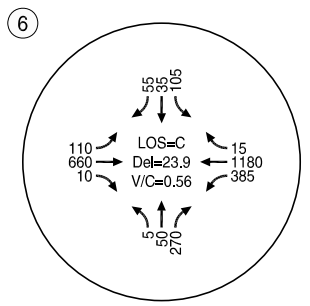

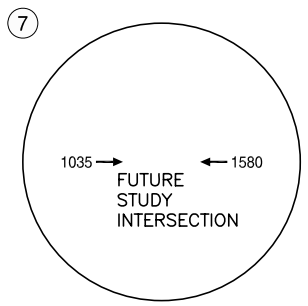

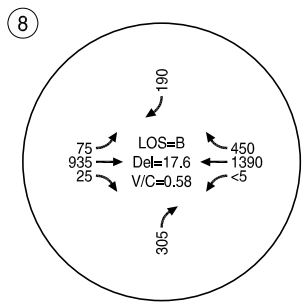

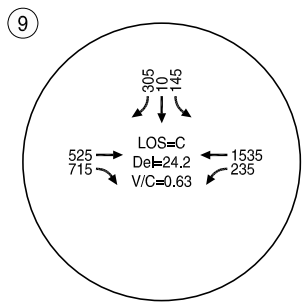

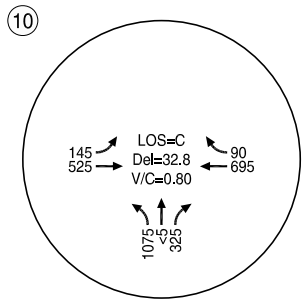

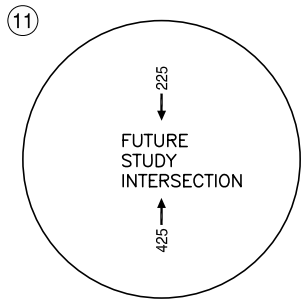

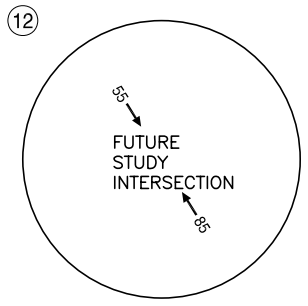

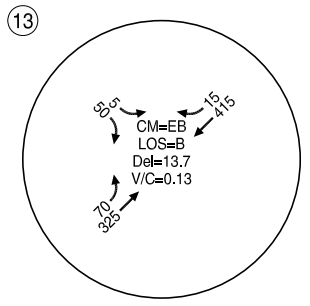

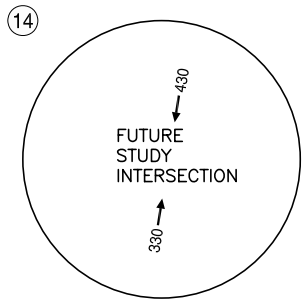

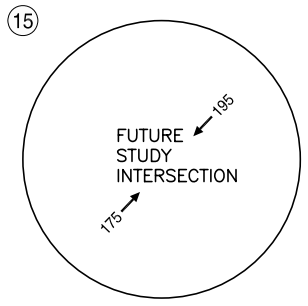

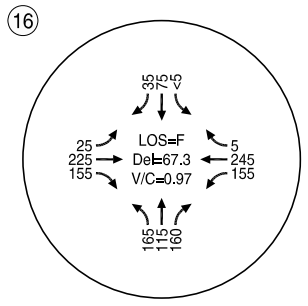

LEGEND

CM = CRITICAL MOVEMENT (TWSC)
LOS = INTERSECTION LEVEL OF SERVICE (SIGNALIZED/AWSC)/CRITICAL MOVEMENT LEVEL OF SERVICE (TWSC)
Del = INTERSECTION AVERAGE CONTROL DELAY (SIGNALIZED/AWSC) / CRITICAL MOVEMENT CONTROL DELAY (TWSC)
V/C = CRITICAL VOLUME-TO-CAPACITY RATIO
TWSC = TWO-WAY STOP CONTROL
AWSC = ALL-WAY STOP CONTROL

2010 EXISTING TRAFFIC CONDITIONS
WEEKDAY PM PEAK HOUR
KEIZER, OREGON

FIGURE **4**

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H:\proj\file\10745 - Keizer Station Area B-C Master Plan\dwgs\figs\10745_Fig01.dwg Aug 20, 2010 - 2:37pm - mhughart Layout Tab: 04 Synchro

Table 2 Percentage of AADT, ATR 26-003, 27-006, & 03-011

	2009	2008	2007	2006	2005	Average	Factor
ATR 26-003 Peak Month	124	122	121	119	119	120.67	1.00
Count Month (July)	124	122	121	119	119	120.67	
ATR 27-006 Peak Month	110	109	110	107	107	108.67	1.01
Count Month (July)	110	109	107	105	107	107.67	
ATR 03-011 Peak Month	110	111	117	111	110	110.67	1.02
Count Month (July)	109	110	110	106	106	108.33	
						Average of the three ATR Factors	**1.01**

Existing Intersection Operations

All level-of-service analyses described in this report were performed in accordance with the procedures stated in the 2000 Highway Capacity Manual using the traffic analysis program Synchro. *A description of level of service and the criteria by which they are determined is presented in Appendix "B"*. All intersection level-of-service evaluations are based on the peak 15-minute flow rate during the weekday p.m. peak hour. Using the peak 15-minute flow rate ensures that this analysis is based on a reasonable worst-case scenario. For this reason, the analysis reflects conditions that are only likely to occur for 15 minutes out of each average peak hour. The transportation system will likely operate under conditions better than those described in this study during all other time periods.

Level of service (LOS) represents ranges in the average amount of delay that motorists experience when passing through the intersection. LOS is measured on an "A" (best) to "F" (worst) scale. At signalized and all-way stop-controlled intersections LOS is based on the average delay experienced by all vehicles entering the intersection. At two-way stop-controlled intersections LOS is based on the average delay experienced by the worst movement at the intersection, typically a left-turn from the stop-controlled street. For signalized intersections in the City of Keizer, LOS "D" is considered to be the minimum acceptable operational level. For unsignalized intersections LOS "E" is considered to be the minimum acceptable level.

The volume-to-capacity (v/c) ratio is a measure of how close an intersection is operating to its theoretical capacity. The City of Keizer maintains a v/c standard for arterial/arterial intersections as the operation of these intersections is critical to the operation of the network as a whole. Therefore an intersection of two arterial roadways must have a v/c ratio of 0.95 or less to be operating acceptably. For all other intersection types, only the LOS is used for determining intersection operation.

Finally, the City of Keizer and ODOT have developed an IGA (Reference 3) as part of the 2004 Keizer Station master planning process that outlines that a volume-to-capacity threshold of 0.87 plus/minus 2-percent will be used as the mobility standard for determining the acceptable or unacceptable operation of signalized intersections within the vicinity of the I-5 interchange. This v/c standard applies to the Lockhaven Drive/Chemawa Road/Keizer Station Boulevard, Chemawa Road/Stadium Drive/Ulali Drive, Chemawa Road/I-5 SB ramp terminal, and Chemawa Road/I-5 NB ramp terminal intersections.

Figure 4 and Table 3 summarize the intersection operations analyses for the study intersections under the weekday p.m. peak hour existing traffic conditions. *Appendix "C" provides the existing conditions Synchro worksheets and can be referenced for detailed information related to lane configurations, levels of service, and volume-to-capacity ratios.*

As shown in Figure 4 and Table 3, only the Chemawa Road / Verda Lane intersection does not meet the applicable operational performance standards. This all-way stop-controlled intersection is currently operating a LOS "F" during the weekday p.m. peak hour. Recognizing the inadequacy of this intersection, the City of Keizer is in the process of securing funding to construct a roundabout per the long-term recommendations of the City's Transportation System Plan. Additional details of this future improvement project are provided in subsequent sections of this report.

Table 3 Existing Conditions Traffic Operations Analysis Summary

Intersection	Seasonally Adjusted Weekday PM Existing Conditions
Lockhaven Drive / River Road	LOS = D, v/c = 0.81
Lockhaven Drive / 14th Avenue	LOS = C
Lockhaven Drive / McLeod Lane	LOS = B
Lockhaven Drive / Chemawa Road / Keizer Station Blvd	v/c = 0.56
Chemawa Road / Stadium Drive / Ulali Road	v/c = 0.58
Chemawa Road / I-5 SB Ramp Terminal	v/c = 0.63
Chemawa Road / I-5 NB Ramp Terminal	v/c = 0.80
Chemawa Road / McLeod Lane	LOS = B (eastbound approach)
Chemawa Road / Verda Lane	LOS = F

LOS = Level of Service
v/c = volume to capacity ratio

Section 4
Planned Improvements

Planned Improvements

The documents listed below provide background on the planned road improvements within the site vicinity. This information is being presented to demonstrate that this study is being prepared consistent with previously identified/planned infrastructure improvements. A general description of the planned improvement is listed below in standard text followed by a remark in *italics* text on how it relates to the Area "B" study effort.

INTERGOVERNMENTAL AGREEMENT KEIZER STATION, JANUARY 2008

In 2008, the City and the ODOT entered into an IGA that outlined a number of transportation improvement projects within the I-5 interchange study area. Those projects that have not already been implemented include the following:

- Construct dual westbound left-turn lanes and dual eastbound right-turn lanes at the Chemawa Road/I-5 SB ramp terminal (*The City of Keizer is in the process of securing funding to implement these improvements. As will be noted later in this report, it is assumed that this project will be constructed within the next several years).*
- Install a 50-foot mast arm eastbound on Chemawa Road at the I-5 NB ramp terminal (*The City of Keizer is in the process of securing funding to implement this improvement. As will be noted later in this report, it is assumed that this project will be constructed within the next several years).*

KEIZER STATION MASTER PLAN, APRIL 2004

The April 2004 *Keizer Station Master Plan* identified a number of improvements to the study vicinity that have not yet been built. These improvements are associated with the unbuilt Area "B" and Area "C" components or the larger development vision.

Chemawa Road (south of Lockhaven Drive)

- Widen Chemawa Road to a five-lane cross section from Lockhaven Drive to approximately 400 feet south of McLeod Lane (*These improvements are currently identified in the Area "C" development plan*[1]*).*
- At the intersection of Lockhaven Drive:
    - Provide dual northbound right-turn lanes, a single through lane, and a single left-turn lane (*These improvements are currently identified in the Area "C" development plan).*
- At the intersection of McLeod Lane:

[1] Concurrent with this Area "B" study effort, a separate master plan for Area "C" is being developed. Additional details of this development and how it relates to the Area "B" study are provided in Section 7 of this report.

- Provide a left-turn lane, a single through lane, and a shared through/right-turn lane on both the north and southbound approaches (*These improvements are currently identified in the Area "C" development plan).*

McLeod Lane (south of Lockhaven Drive)

- Widen McLeod Lane to a three-lane cross section from Lockhaven Drive to Chemawa Road. Extend McLeod Lane southeast of Chemawa Road and connect it to the existing Ridge Drive (*These improvements are currently identified in the Area "C" development plan).*
- At the Chemawa Road intersection, provide separate left and shared through/right-turn lanes on the eastbound approach and provide separate left-, through, and right-turn lanes on the westbound approach (*These improvements are currently identified in the Area "C" development plan).*

CITY OF KEIZER TRANSPORTATION SYSTEM PLAN, APRIL 2009

The City of Keizer's Transportation System Plan (TSP) (*Reference 4*) has identified the following improvement needs in the site vicinity.

Lockhaven Drive / River Road

- Convert westbound approach to dual left-turn lanes, single through lane, and separate right-turn lane
- Convert the east-west split phasing to protected left-turn phasing.
- T*hese projects are identified as a long-term operational improvements, but they are not specifically associated with any existing or planned development project. According to City staff, there is no existing implementation timeframe for these improvements.*

Lockhaven Drive / 14th Avenue

- Construct a westbound right-turn lane.
- Modify northbound and southbound approaches to include separate left-turn lane and shared through and right-turn lanes.
- T*hese projects are identified as a long-term operational improvements, but they are not specifically associated with any existing or planned development project. According to City staff, there is no existing implementation timeframe for these improvements.*

Chemawa Road / Verda Lane

- Convert the all-way stop-controlled intersection to a single lane roundabout.
- *This project is identified as a long-term operational improvement. As identified in the existing conditions section of this report, this project is currently identified for funding in the STP-U project list. Given this funding source, City staff feels that is reasonably likely that construction of a roundabout at this intersection will occur within the 2015 time-frame.*

Section 5
Assumptions and Methodology

Assumptions and Methodology

This section outlines the study assumptions and methodologies used to complete the Area "B" master plan operations analysis.

ASSUMPTIONS

The purpose of the transportation impact analysis is to identify the impact of Area "B" development on the surrounding transportation system. As is common for phased developments of this magnitude, the actual land uses, tenants and size of buildings may vary over time as the marketplace demands during the build-out of the site. Therefore, this transportation facilities analysis has been prepared using reasonable worst-case assumptions to accommodate future market driven changes to the development plan. The trip generation identified in this study is intended to operate as a trip cap for the development with particular uses varying with development.

Land Use Assumptions

According to conversations with the City, Area "B" is likely to develop with a number of different land uses ranging from a Salem-Keizer Transit Center to office and retail uses. Based on this general guidance, Table 4 provides the land use assumptions for the master plan and the trip generation source that will be used for each of the typical land uses.

Table 4 Area "B" – Land Use Assumptions

	Land Use	Source
Area "B"	Transit Center	Keizer Transit
	Professional Medical Office	ITE 720
	Office	ITE 710
	Retail	ITE 820

Trip Type Assumptions

For the Area "B" trip generation development, the following trip types and assumptions will be utilized.

Internal Trips

A portion of trips generated by mixed-use developments will travel between the different uses internal to the site. Area "B" has a range of different land uses, which are served by internal road systems and motorists will not have to use the external transportation system (i.e., Keizer Station Boulevard and Lockhaven Drive) to move between the different land uses. The *ITE Trip Generation Handbook* (Reference 5) provides a summary of recent studies from around the country on trip internalization. These studies suggest a trip internalization rate in the range of 5 to 15 percent would be appropriate for a development like Keizer Station. On this basis, and internalization rate

of 10 percent was assumed for Area "B" of the Keizer Station Plan. This is conservative and consistent with previous traffic studies conducted in the area.

Pass-by Trips

Pass-by trips are trips that are passing directly by the generator. A visit to the generator is an intermediate stop on the way from an origin to a primary trip destination without requiring a diversion. Because no diversion is required, a pass-by trip adds only turning movements to the transportation system at the site-access driveway. Pass-by trips occur on the roadways adjacent to Area "B"; in this case the Lockhaven Drive and Keizer Station Boulevard corridors would be the primary roadways that serve pass-by trips. Based on the ITE data, the average pass-by rate for shopping centers is 34 percent. Typically the goal is to limit the pass-by trips along the adjacent facility not to exceed 20 percent of the traffic traveling along these corridors. *(Example: if 1,000 vehicles pass-by the site, a maximum of 20 percent [or 200] would stop at the retail center. The total pass-by trips would be 200 [100 in and 100 out].)* After a review of the current traffic volumes along the facilities during the current weekday p.m. peak hour, only **15 percent** of the commercial trips are assumed to be pass-by trips. Again, this is conservative and consistent with previous traffic studies conducted in the area.

Diverted Trips

Diverted linked trips are trips made by vehicles that are currently on the roadway system en route to a destination, but change paths and travel some distance out of direction to access the development. The trip to the site is not the primary trip for this vehicle. Diverted linked trips add traffic to streets adjacent to a site, but may not add traffic to the area's major travel routes. For this study, I-5 would be the primary roadway that serves diverted trips. There will be no distinction between diverted and primary (net new) trips through the study intersection; therefore diverted trips are not tracked separate in this study.

METHODOLOGY

Study Intersections

This analysis determines the transportation-related impacts associated with the development in Area "B" of the Keizer Station development and was prepared to be consistent with previous master planning efforts for Areas "A" and "D". As such, operational analyses were performed at the following intersections:

- Lockhaven Drive/River Road (City jurisdiction)
- Lockhaven Drive/14th Avenue (City jurisdiction)
- Lockhaven Drive/McLeod Lane (City jurisdiction)
- Lockhaven Drive/Chemawa Road/Keizer Station Boulevard (City jurisdiction)
- Chemawa Road/Stadium Drive/Ulali Drive (ODOT jurisdiction)
- Chemawa Road/I-5 Southbound ramp terminal (ODOT jurisdiction)

- Chemawa Road/I-5 Northbound ramp terminal (ODOT jurisdiction)
- Chemawa Road/McLeod Lane (City jurisdiction)
- Chemawa Road/Verda Lane (City jurisdiction)

Analysis Period

The weekday p.m. peak hour was identified as the critical time period. This is the time when the combination of site-generated traffic and surrounding traffic volumes is greatest. This time period is also consistent with City's TSP. In addition, ODOT is currently conducting an IAMP for the I-5/Chemawa Road interchange and analyzes only the weekday p.m. peak hour.

Analysis Scenarios

Based on conversations with the Keizer Station developers and City staff, it was concluded that a reasonable buildout year for Area "B" (as well as buildout of the rest of Keizer Station) is 2020. This time period is in tune with the current progression of development occurring in Area "A" and is consistent with previous master planning efforts for Keizer Station. As such, the study intersections will be analyzed under existing and 2020 build-out conditions with this long-term horizon year. Specific details and assumptions within these time periods are outlined below:

- 2010 Existing Traffic Conditions (discussed previously in Section 3)
- 2020 Background Traffic Conditions
    - This analysis assumes a moderate amount of regional traffic growth through the study area as well as the assumed buildout of the remaining segments of Area "A" and Area "D".
- 2020 Total Traffic Conditions
    - In addition to the 2020 background traffic growth, this analysis assumes buildout of Area "B" as well as Area "C".

Saturation Flow

The TPAU Analysis Procedures Manual (Reference 6) states that *inside the Salem MPO urban growth boundaries an unadjusted saturation flow rate of 1,900 pcphgl may be used unless one or more of the conditions listed below are present, in which case 1,750 pcphgl shall be used*. The City of Keizer falls within the Salem MPO.

- On-street parking
    a. Response: There are no study area roadways that have or allow on-street parking. Condition not present.
- Greater than 5% trucks
    b. Response: Truck percentages along the Chemawa Road/Lockhaven Drive corridor are less than 5%. Condition not present.

- Roadways intersect at severe skew angle

    c. Response: Condition not present.

- One or more driveway approaches within functional area

    d. Response: All of the roadways within the critical interchange area are public streets and there are no private driveways located between major study intersections. Therefore, condition not present.

- Poor signal spacing and observed queue spill back

    e. Response: The five signalized intersections along the Chemawa Road/Lockhaven Drive corridor are equally spaced at approximately 700-800 feet. The recent improvements associated with the Area "A" development provided significant additional capacity in the vicinity of the I-5/Chemawa Road interchange. Therefore, condition not present.

- Less than 12-foot travel lanes

    f. Response: There are 12-foot travel lanes along the Chemawa Road-Lockhaven Drive corridor with the exception of the approximately 600 feet over the existing I-5/Chemawa Road Bridge. The leftmost through travel lane in both directions is 11 feet, but the rightmost through and turn lanes are all 12 feet to ensure that slower vehicles, especially trucks have the standard lane width.

As part of the approval of the larger Keizer Station development, all parties agreed that the use of 1,900 pcphpl as the base saturation flow rate was appropriate to be used on all signalized approaches. This agreement is further supported by the fact that the *Highway Capacity Manual* and the Synchro and SimTraffic computer models all use 1,900 pcphpl as a recommended default value in the absence of better data.

Section 6
2020 Background Traffic Conditions

2020 Background Traffic Conditions

The 2020 background traffic conditions analyze the impacts of regional traffic growth and growth from previously approved but not yet constructed developments.

2020 BACKGROUND INFRASTRUCTURE IMPROVEMENTS

As previously stated, there are a number of roadway and intersection improvements planned for the general study area. Based on conversations with City staff, it is assumed for the purposes of this study that the following improvements will be constructed within the 2020 study horizon year: Figure 5 illustrates the future lane configurations and traffic control devices at the study intersections.

- Chemawa Road / Verda Lane
    - This all-way stop-controlled intersection will be converted to a single lane roundabout. Given this project has a funding source, City staff feels that is reasonably likely that construction of a roundabout at this intersection will occur within the 2015 time-frame.
- Chemawa Road / I-5 southbound ramp terminal
    - Implement dual westbound right-turn lanes and dual eastbound right-turn lanes. The City of Keizer is currently securing funding to implement these improvements within the next several years.

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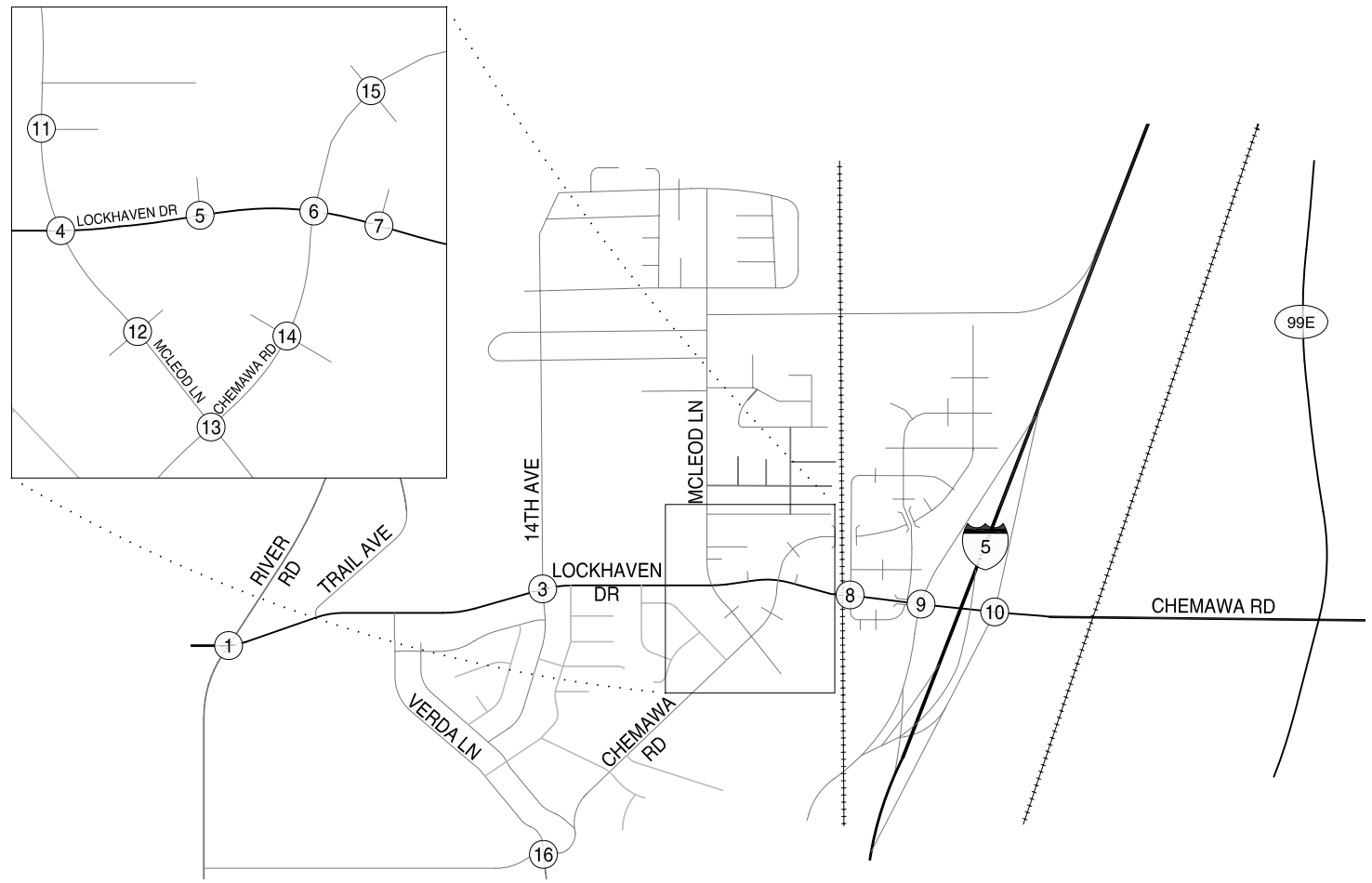

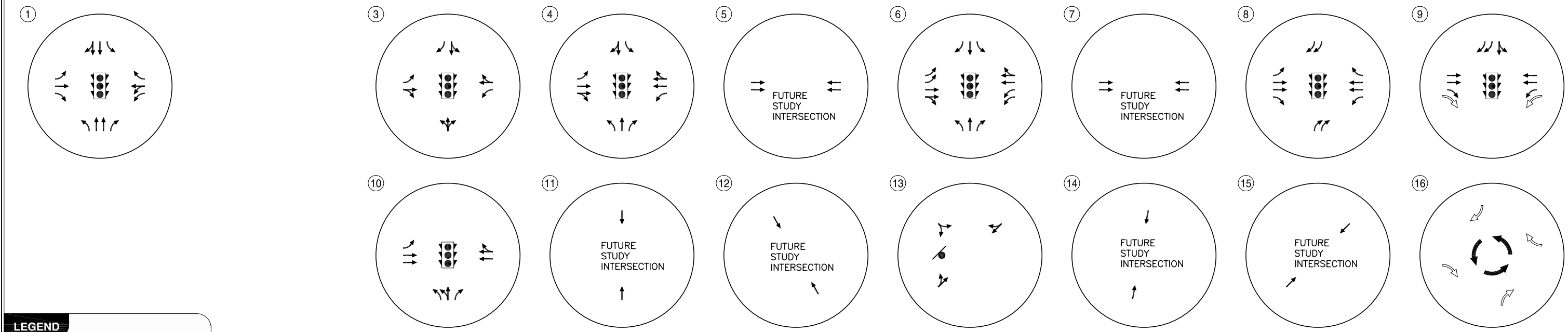

LEGEND

- STOP SIGN
- TRAFFIC SIGNAL

ASSUMED 2020 BACKGROUND LANE CONFIGURATIONS AND TRAFFIC CONTROL DEVICES KEIZER, OREGON

FIGURE 5

KITTELSON & ASSOCIATES, INC.
TRANSPORTATION ENGINEERING / PLANNING

H:\projfile\10745 - Keizer Station Area B-C Master Plan\dwgs\figs\10745_Fig01.dwg Aug 20, 2010 - 2:38pm - mhughart Layout Tab: 05 Synchro

YEAR 2020 BACKGROUND TRAFFIC VOLUMES

Regional Traffic Growth

The future traffic volumes are proposed to be developed by applying a per year linear growth rate to the existing traffic volumes (including the seasonal adjustment factor). This growth rate is consistent with that used to update to the City's TSP. The TSP based traffic growth, in part, on modeling conducted by the Salem/Keizer Area Transportation Study (SKATS), which identified future turning movement volumes for select intersections in the City. A summary of this analysis is presented in Table 5.

Table 5 Keizer Transportation Growth Calculations

Intersection		2007 Volume	2031 Volume	Growth Rate
Lockhaven Dr/River Rd	TEV[1]	3,345	4,595	1.56%
	Major Street[2]	1,165	1,555	1.39%
Lockhaven Dr/14th Ave	TEV	1,870	2,635	1.70%
	Major Street[2]	1,640	2,325	1.74%
Chemawa Rd/River Rd	TEV	3,670	4,825	1.31%
	Major Street[3]	1,270	1,620	1.15%
Total	TEV	8,885	12,055	1.49%
	Major Street	4,075	5,500	1.46%

[1] TEV – Total Entering Volume
[2] Major Street – Total volume for approaches on Lockhaven Drive
[3] Major Street – Total volume for approaches on Chemawa Road

As shown in Table 5, the growth calculations for nearby intersections are relatively consistent. The cumulative growth rate for total entering volume for the three intersections is approximately 1.49 percent per year, and 1.46 percent per year if only the major study roadways are considered. However, it should be noted that the 2031 SCATS volumes include model assumptions for the full buildout of Keizer Station. Although it is difficult to accurately backout the Keizer Station specific traffic volumes from the model output, the trip generation calculations outlined in subsequent sections of this report imply that the undeveloped portion of Keizer Station is likely attributing up to 300 trips along the Lockhaven Drive corridor. Accounting for this total, the actual regional growth rate that is not attributed to Keizer Station is likely less than one percent. However, for conservative reasons, this study effort has assumed a regional growth rate of 1.0 percent that will be applied to the existing traffic volumes.

Keizer Station In-Process Trip Generation

The April 2004, the *Keizer Station Master Plan Traffic Impact Analysis* included a formal trip generation assessment for Areas "A" and "D" that was subsequently approved by the City of Keizer. While Area "A" has since seen a significant amount of commercial development, it has yet to reach its full build-out potential. Furthermore, the formally approved development for Area "D"

has not undergone any development to date. Given that these Area "A" and "D" developments are already approved and the infrastructure to support them is in place, it was determined for the purposes of this study that the in-process/build-out trips should be included in the background traffic conditions. The methodology for determining these in-process/build-out trips is outlined in the following sections.

Area "A"

In 2010, new traffic counts were conducted during the weekday p.m. peak hour (4:30-5:30 p.m.) at all of the main intersections serving the built portion of Area "A". As such, these volumes indicate how much traffic is being generated by the portion of Area "A" that has been built to date.

The latest site plan for Area "A" shows 706,806 square feet of retail, 100,000 square feet of office, and a 70-room motel. At the time of the 2010 traffic counts, the retail component of Area "A" had 526,093 square feet constructed and occupied. Based on the traffic volumes entering and exiting the site at the intersections of Lockhaven Drive/Chemawa Road/Keizer Station Boulevard and Chemawa Road/Stadium Drive/Ulali Drive, 526,093 square feet of Area "A" generated approximately 1,415 (725 inbound; 690 outbound) weekday p.m. peak hour driveway trips. This equates to an observed trip generation rate of approximately 2.69 trips per 1,000 square feet. Applying this rate to the remaining 180,713 square feet of retail that has yet to develop, it is estimated the retail component of Area "A" will generate approximately 485 additional weekday p.m. peak hour trips (primary and pass-by trips). The office and motel components of Area "A" are estimated to add an additional 185 weekday p.m. peak hour trips.

Area "D"

As previously mentioned, Area "D" is formally approved, but has not yet undergone development. Therefore the previous trip generation (as developed in the 2004 *Keizer Station Master Plan Transportation Impact Analysis*) associated with Area "D" will be utilized for in-process development.

The assumed build-out/in-process development trips associated with Areas "A" and "D" are summarized in Table 6.

Table 6 Areas "A" and "D" In-Process/Build-Out Traffic Volumes

Land Use	Source	Size (sq. ft.)	Weekday PM Peak Hour Trips		
			Total	In	Out
Additional Trips of Area A					
Retail	Existing trip rate of the built portion of Area A	180,713	485	250	235
Office	ITE 710	100,000	150	25	125
Motel	ITE 320	70 rooms	35	20	15
Total Trips for Area A			670	295	375
Internal Trips			20	10	10
Pass-by & Diverted Trips			160	80	80
Primary Trips			490	205	285
Area D Buildout					
Motel	ITE 320	100 rooms	45	25	20
Restaurant	ITE 932	8,000	90	55	35
Fuel Station	ITE 946	12 fueling positions	165	85	80
Professional Offices	ITE 710	42,000	60	10	50
Retail Stores	ITE 820	13,000	160	80	80
Fast Food Outlets	ITE 834	6,000	205	105	100
Light Manufacturing	ITE 110	2 acres	15	5	10
Total Trips for Area D			740	365	375
Internal Trips			*80*	*40*	*40*
Pass-by & Diverted Trips			*250*	*125*	*125*
Primary Trips			*410*	*200*	*210*
Total Area A & B In-Process Trips			***900***	***405***	***495***

2020 Background Intersection Operations

With the assumed regional background growth and increased traffic volumes from Areas "A" and "D", Figure 6 and Table 7 summarize the intersection operations analyses for the study intersections under the weekday p.m. peak hour background traffic conditions. *Attachment "D" provides the 2020 background conditions Synchro worksheets and can be referenced for detailed information related to lane configurations, levels of service, and volume-to-capacity ratios.*

As shown in Figure 6 and Table 7, the following intersections are forecast to operate above capacity or at unacceptable levels-of-service:

- Lockhaven Drive / River Road
- Chemawa Road / I-5 NB ramp terminal

Table 7 2020 Background Conditions Traffic Operations Analysis Summary

Intersection	2020 Background Conditions
Lockhaven Drive / River Road	LOS = F, v/c = 1.02
Lockhaven Drive / 14th Avenue	LOS = D
Lockhaven Drive / McLeod Lane	LOS = B
Lockhaven Drive / Chemawa Road / Keizer Station Blvd	v/c = 0.68
Chemawa Road / Stadium Drive / Ulali Road	v/c = 0.70
Chemawa Road / I-5 SB Ramp Terminal	v/c = 0.76
Chemawa Road / I-5 NB Ramp Terminal	v/c = 0.94
Chemawa Road / McLeod Lane	LOS = C (eastbound approach)
Chemawa Road / Verda Lane	v/c = 0.70

LOS = Level of Service
v/c = volume to capacity ratio

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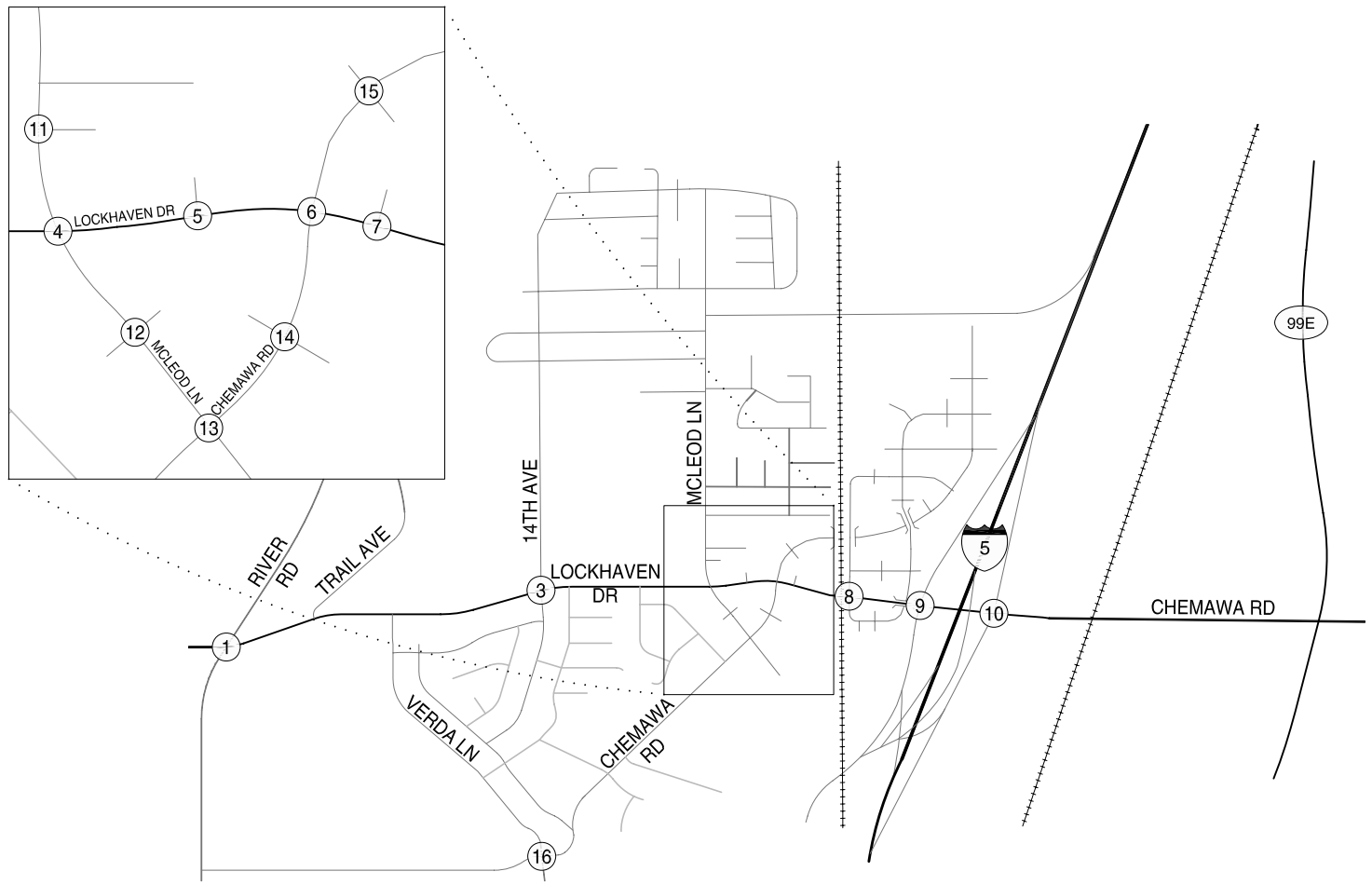
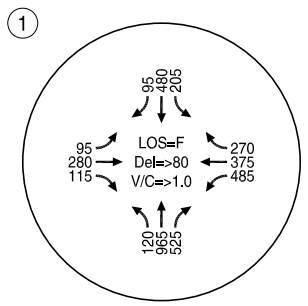
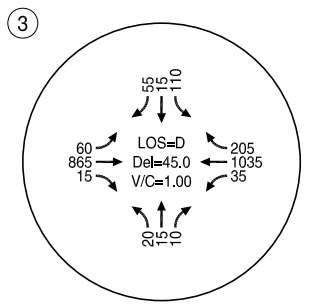
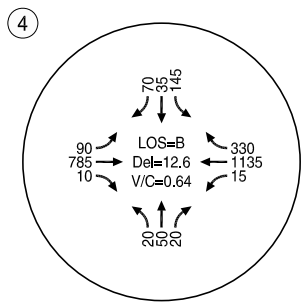
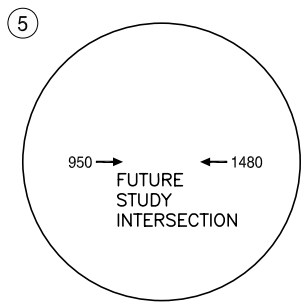
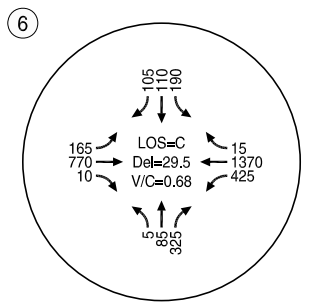


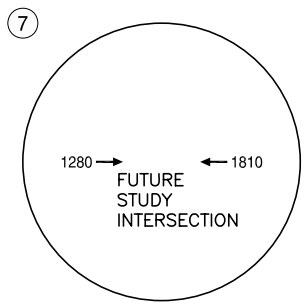


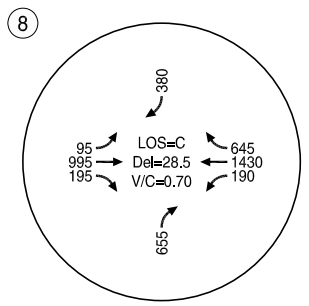


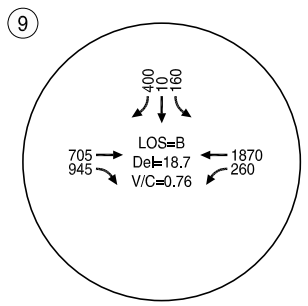


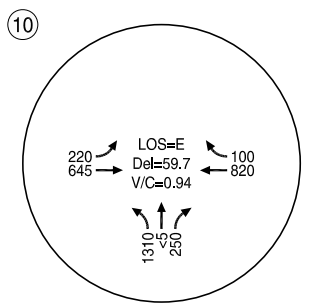


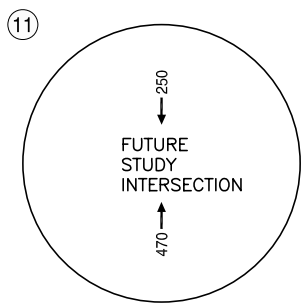


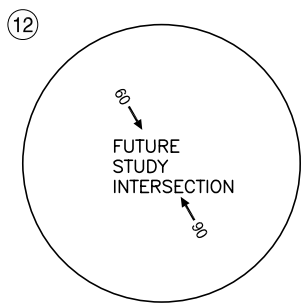


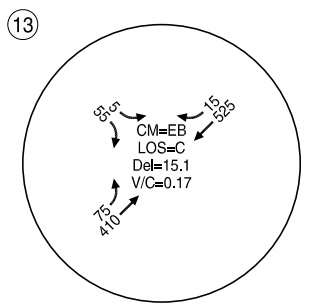


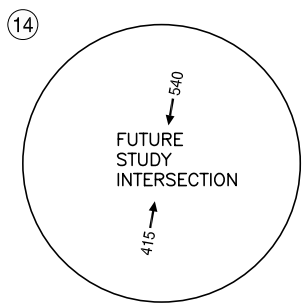


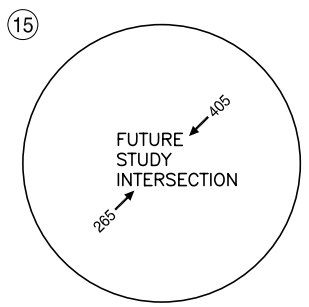


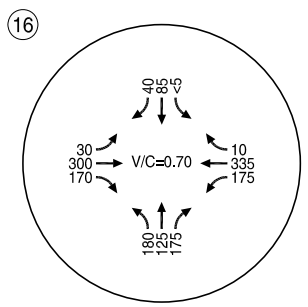












LEGEND

CM = CRITICAL MOVEMENT (TWSC)
LOS = INTERSECTION LEVEL OF SERVICE (SIGNALIZED/AWSC)/CRITICAL MOVEMENT LEVEL OF SERVICE (TWSC)
Del = INTERSECTION AVERAGE CONTROL DELAY (SIGNALIZED/AWSC) / CRITICAL MOVEMENT CONTROL DELAY (TWSC)
V/C = CRITICAL VOLUME-TO-CAPACITY RATIO
TWSC = TWO-WAY STOP CONTROL
AWSC = ALL-WAY STOP CONTROL

2020 BACKGROUND TRAFFIC CONDITIONS
WEEKDAY PM PEAK HOUR
KEIZER, OREGON

FIGURE 6

Section 7
Site Layout, Trip Generation, Distribution and Assignment

Site Layout, Trip Generation, Distribution, and Assignment

This section describes the general site layout for Area "B" and applies the assumptions outlined in the previous section to the general development plan for Area "B".

AREA "B" SITE LAYOUT

Figure 7 shows the general site layout for Area "B". The proposed site access layout includes the following provisions:

Area "B" East of Keizer Station Boulevard

- A right-in only driveway located off of Chemawa Road that would provide access to the office parking lot and cross-over access to the Keizer Transit Center access road.
- A full access driveway located off of Keizer Station Boulevard that would provide access to the Keizer Transit Center. This access would be located approximately 450 feet north of the Chemawa Road/Lockhaven Drive/Keizer Station Boulevard intersection. For the purposes of this analysis, it has been initially assumed that the access would be signalized and coordinated with the downstream Keizer Station Boulevard/Chemawa Road/Lockhaven Drive intersection.

Area "B" West of Keizer Station Boulevard

- A full access driveway located off of Keizer Station Boulevard opposite the Keizer Transit Center access road.
- A right-in/right-out driveway located off of Lockhaven Drive between the Keizer Station Boulevard and McLeod Lane intersections. This driveway would include a westbound right-turn deceleration lane.
- A full access driveway located off of McLeod Lane.

Lockhaven Drive

- A westbound right-turn deceleration lane to the Area "B" west right-in/right-out driveway.

Keizer Station Boulevard

- A widening of Keizer Station Boulevard west of the railroad underpass to accommodate two south/westbound travel lanes and a separate left-turn lane at the Area "B" access.
- A reconfiguration of the southbound Keizer Station Boulevard approach at the Chemawa Road/Lockhaven Drive/Keizer Station Boulevard intersection that includes dual left-turn lanes and a separate through lane. In addition to the lane reconfigurations, a widening of the approach to include a separate southbound right-turn lane with 200′ of storage.

AREA "B" TRIP GENERATION

As previously mentioned, Area "B" will consist of the Keizer Transit Center and a likely mix of medical/dental, general office, and retail uses. Outside of the transit center, the *ITE Trip Generation Manual* (Reference 7) was utilized to estimate the trip generation potential.

Trip generation during the weekday p.m. peak hour for the proposed transit center was estimated by performing a detailed examination of the bus routes that would use the transit center and the park-and-ride and drop-off/pick-up facilities. Local knowledge of the bus routes (as provided by Salem-Keizer Transit) and expected usage of the transit center was used instead of rates from the *ITE Trip Generation Manual*, as it was determined that a more accurate estimate of trips could be gained in this manner. Under full buildout conditions, the transit center is expected to have ten bus routes with 30 total buses entering the facility for a total of 60 weekday p.m. peak hour bus trips. For the park-and-ride and drop-off/pick-up facilities, 105 weekday p.m. peak hour trips are forecast under buildout conditions. Table 8 provides the estimated weekday p.m. peak hour bus and vehicle trips generated by the transit center and retail/office components under full buildout conditions.

Table 8 Estimated Trip Generation for Area "B"

Land Use	Source	Size (sq. ft.)	Weekday PM Peak Hour Trips		
			Total	In	Out
Bus Parking Area		10 bus bays	60	30	30
Drop-off/Pick-up		N/A	40	20	20
Park-and-Ride		70	65	5	60
Total Transit Trips for Area "B"			**165**	**55**	**110**
Medical-Dental Office Building	ITE 720	28,000	70	20	50
Office	ITE 710	20,000	30	5	25
Shopping Center	ITE 820	16,000	60	30	30
Office (east side of Area "B")	ITE 710	15,000	25	5	20
Total Trips for Non-Transit Portion of Area "B"			**185**	**60**	**125**
Internal Trips			*10*	*5*	*5*
Pass-by & Diverted Trips			*10*	*5*	*5*
Primary Trips			*165*	*50*	*115*
Total Net New Trips			***330***	***105***	***225***

AREA "C" SITE LAYOUT

It should be noted that a separate master plan is being prepared for Area "C" concurrent with this study of Area "B". Given the parallel course of the Area "C" submittal and the likelihood that it will develop within the same time parameters as Area "B", the trip generation for this section of Keizer Station is summarized and the trips included within this study.

Figure 8 shows the general site plan for Area "C". The proposed site access layout includes the following provisions:

Area "C" East of Chemawa Road

- A new roadway that would connect to Chemawa Road opposite the existing McLeod Lane intersection. The intersection with Chemawa Road/McLeod Lane would be full access and assumed to be signalized based on the previous 2004 master planning study effort.
- A right-in/right-out driveway off of Chemawa Road between the McLeod Lane and Lockhaven Drive intersections.

Area "C" West of Chemawa Road

- A full access unsignalized driveway located off of McLeod Lane between the Lockhaven Drive and Chemawa Road intersections.
- A right-in/right-out driveway located off of Chemawa Road between Lockhaven Drive and McLeod Lane.

In addition to the site access provisions, Area "C" is proposing to enhance the Chemawa Road corridor south of the Lockhaven Drive intersection as well as the McLeod Lane corridor between Lockhaven Road and Chemawa Road. These enhancements are based on the original guidance outlined in the 2004 master plan work and include the following:

Chemawa Road

- Widen Chemawa Road to a five-lane cross section from Lockhaven Drive to approximately 400 feet south of McLeod Lane.
- At the intersection of Lockhaven Drive:
    - Provide dual northbound right-turn lanes, a single through lane, and a single left-turn lane.
- At the intersection of McLeod Lane:
    - Provide a left-turn lane, a single through lane, and a shared through/right-turn lane on both the north and southbound approaches.

McLeod Lane

- Widen McLeod Lane to a three-lane cross section from Lockhaven Drive to Chemawa Road. Extend McLeod Lane southeast of Chemawa Road and connect it to the existing Ridge Drive.
- At the Chemawa Road intersection, provide separate left and shared through/right-turn lanes on the eastbound and westbound approaches.

AREA "C" TRIP GENERATION

Area "C" is located along the Lockhaven Drive/Chemawa Road corridor at the intersection with Keizer Station Boulevard/Chemawa Road. Although a precise development proposal for Area "C" has yet to be formally completed, E Village, LLC is proposing to develop Area "C" with a mix of commercial, office, and residential uses consistent with the current zoning of the respective parcels. For the purposes of this study, it is proposed that Area "C" be treated as in-process traffic given its significance and similar development timetable. A conservative estimate of uses has been assumed that reflects the projected types of tenants that are likely to occupy the development. A preliminary outline of the development potential is shown in Table 9 below. While this mix of uses and square footages may change, it is considered a conservative outline that will adequately represent the reasonable maximum trip generation capabilities.

Table 9 Estimated Trip Generation for Area "C"

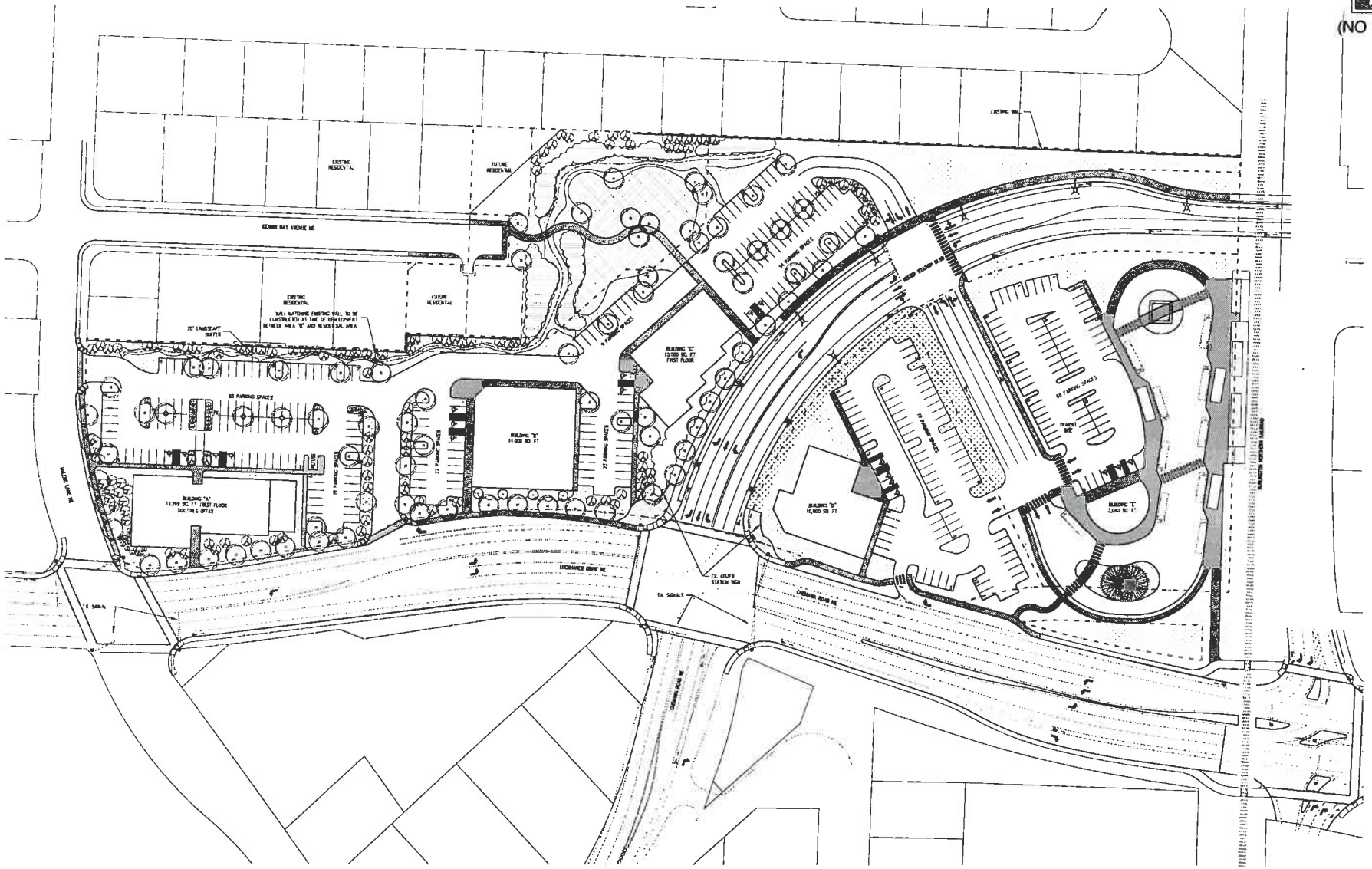
Land Use	Source	Size (sq. ft.)	Weekday PM Peak Hour Trips		
			Total	In	Out
General Office	ITE 710	18,486	30	5	25
High Turnover Sit-Down Restaurant	ITE 932	5,800	65	40	25
Shopping Center	ITE 820	33,090	130	60	70
Medical Dental Office Building	ITE 720	53,000	185	50	135
Free Standing Discount Superstore	ITE 813	116,882	540	265	275
Residential Condominium/Townhouse	ITE 230	60 units	30	20	10
Apartments	220	117 units	75	50	25
Total Trips for Area C			**1,055**	**490**	**565**
Internal Trips			*110*	*50*	*60*
Pass-by & Diverted Trips			*140*	*70*	*70*
Primary Trips			*805*	*370*	*435*

TRIP DISTRIBUTION

The distribution of the site-generated trips is based on a review of the surrounding transportation system, an economic study conducted as part of the previous Keizer Station master planning work, and model data provided by the Salem Keizer Area Transportation Study (SKATS). Figure 9 illustrates the trip distribution for the primary trips.

SUMMARY OF TRIPS

Figure 10 provides a summary of all trips reflecting the pass-by and primary/net new trips being generated by Area "B" and Area "C". Figures E-1 and E-2 in *Appendix E provides a detailed breakdown of trip types onto the study area network*.



AREA "B" CONCEPTUAL SITE LAYOUT
KEIZER, OREGON

FIGURE 7

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TRANSPORTATION ENGINEERING / PLANNING

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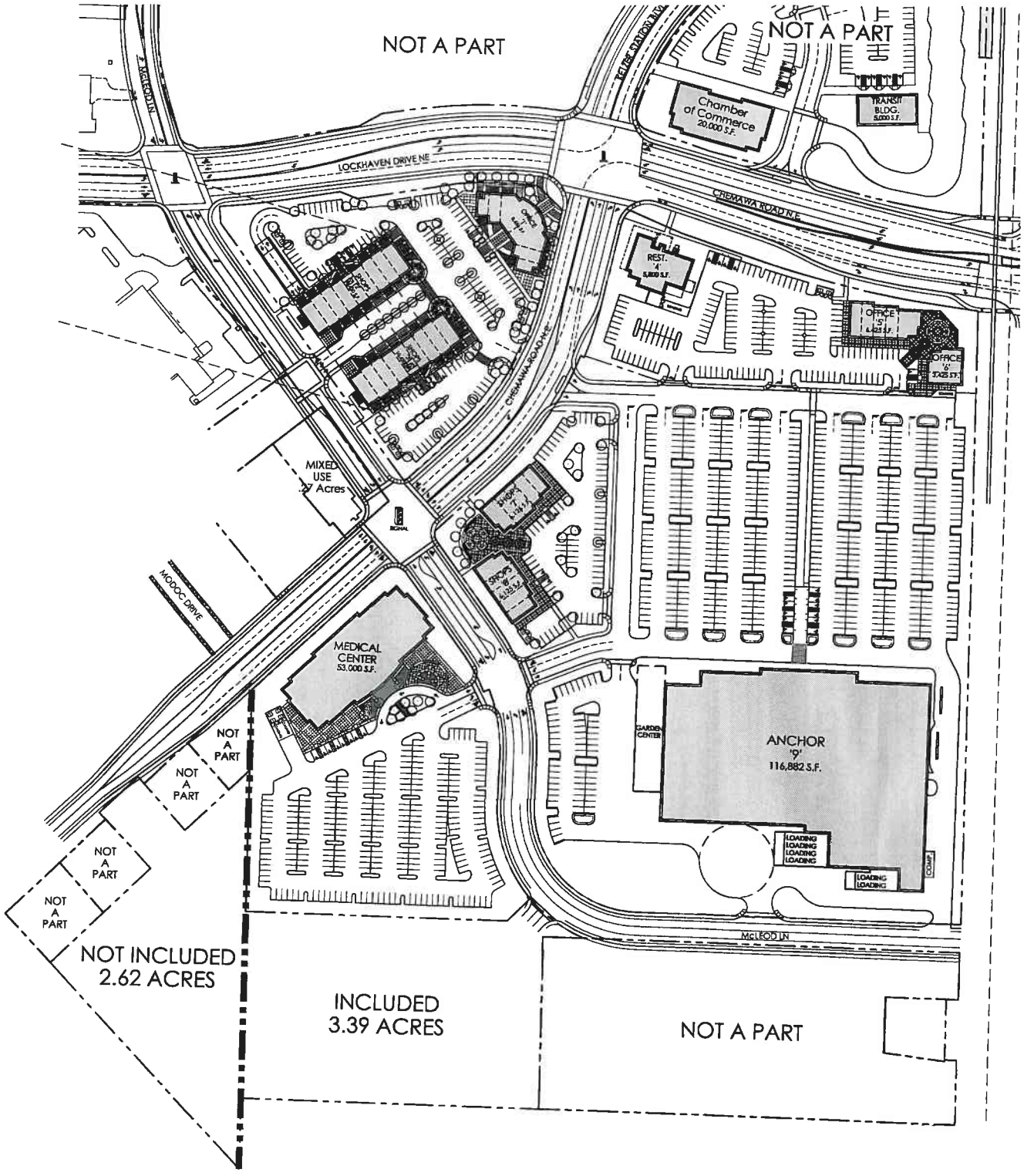

AREA "C" CONCEPTUAL SITE LAYOUT
KEIZER, OREGON

FIGURE **8**

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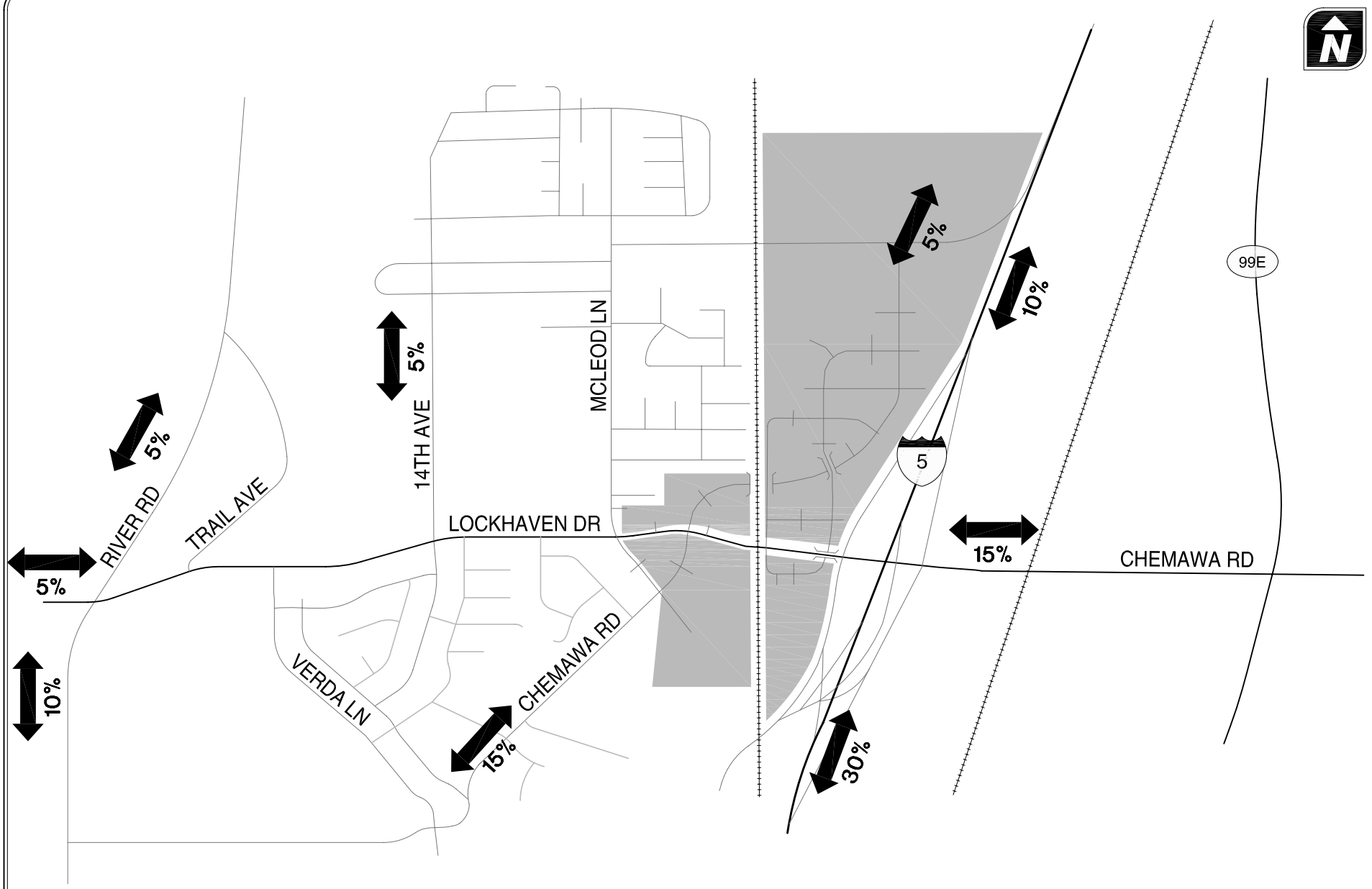

ESTIMATED TRIP DISTRIBUTION PATTERN (PRIMARY TRIPS)
KEIZER, OREGON

FIGURE 9

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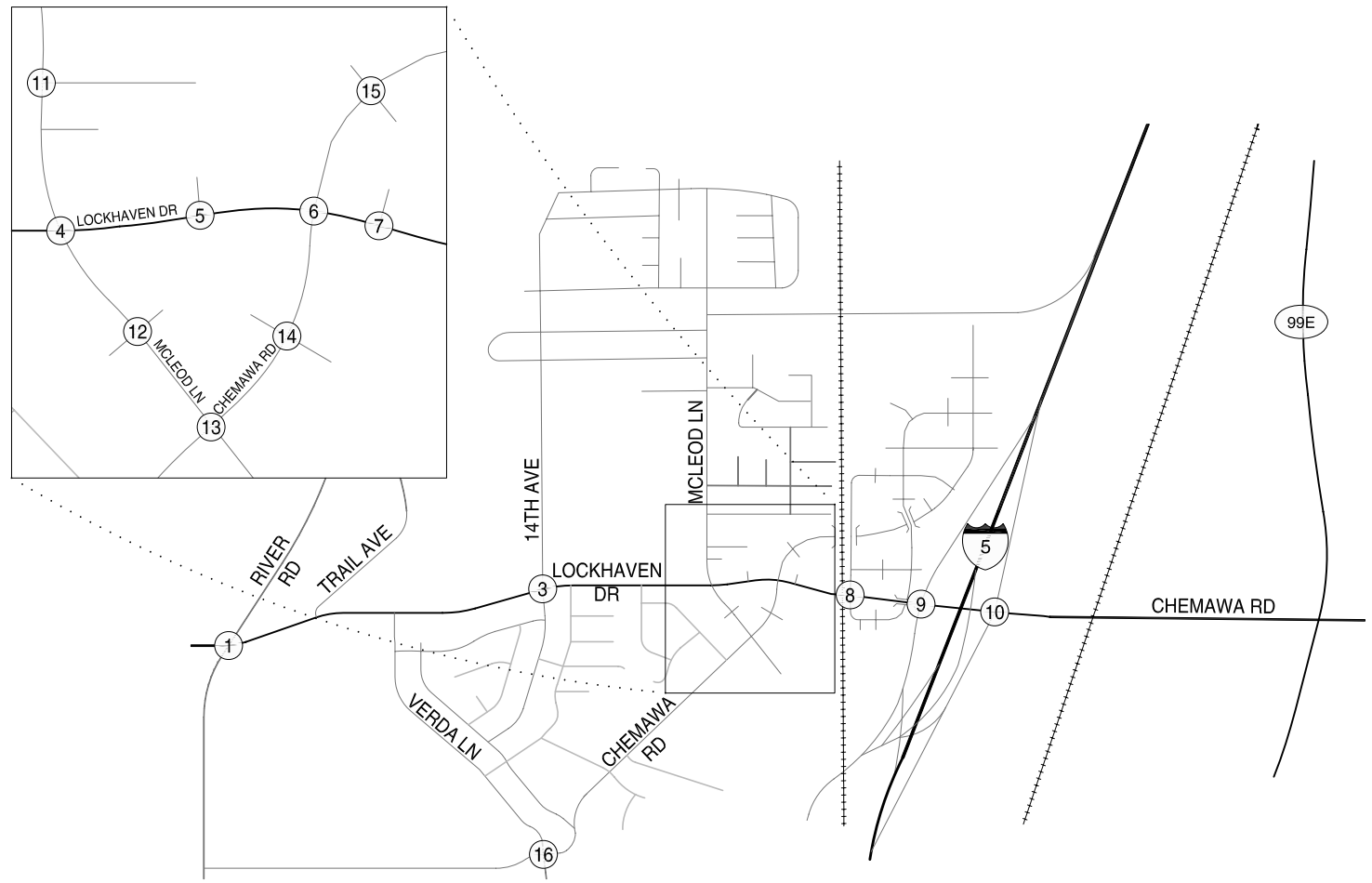

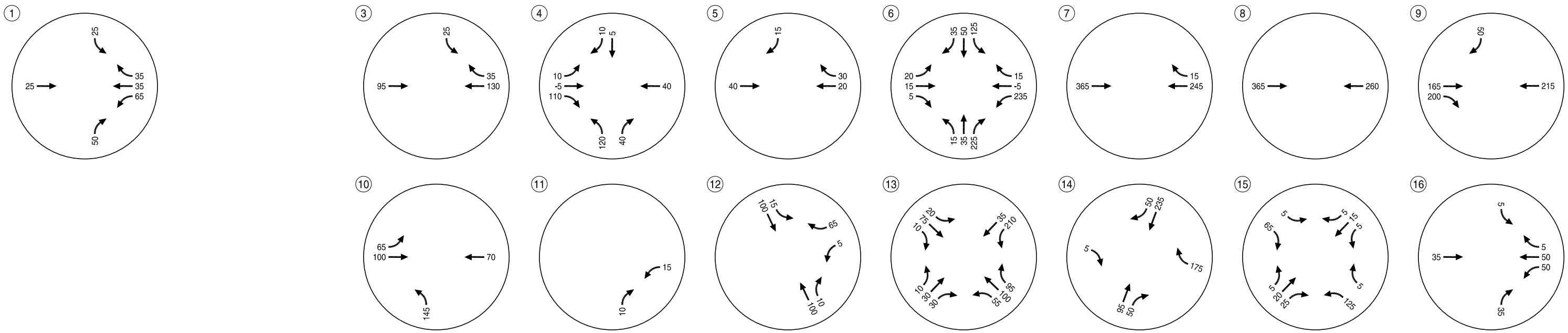

SUMMARY OF AREA "B" AND AREA "C" ADDED TRIPS
WEEKDAY PM PEAK HOUR
KEIZER, OREGON

FIGURE **10**

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Section 8
2020 Total Traffic Conditions

2020 Total Traffic Conditions

The 2020 traffic conditions analysis identifies site conditions and the expected operational and geometric characteristics of roadways within the study area. The total traffic conditions analysis forecasts how the study area's transportation system will operate with the inclusion of traffic from the eventual development of Area "B"[2].

2020 TOTAL TRAFFIC CONDITIONS

Year 2020 base traffic volumes were developed to compare the impact of the eventual development. Traffic volumes related to the development of Areas "B" and "C" (shown in Figure 10) were applied to the base 2020 traffic volumes (shown in Figure 6). Figure 11 illustrates the resulting forecast year 2020 total traffic volumes for Areas "B" and "C".

Operational Analysis

Figure 11 illustrates the 2020 total traffic volumes, level of service, and volume-to-capacity ratios during the weekday p.m. peak hour at the study intersections. *Attachment "F" provides the 2020 total traffic conditions Synchro worksheets and can be referenced for detailed information related to lane configurations, levels of service, and volume-to-capacity ratios.*

As shown in Figure 11 and summarized in Table 10, the following intersections are forecast to continue to operate above capacity or at unacceptable levels: In other words, these intersections were already forecast to operate poorly under 2020 background traffic conditions and are now forecast to experience a worsening under development in Areas "B" and "C".

- Lockhaven Drive / River Road
- Chemwaw Road / I-5 NB ramp terminal

The following intersections are forecast to operate above capacity or at unacceptable levels as a direct result of the additional traffic generated by Areas "B" and "C".

- Lockhaven Drive / 14th Avenue

[2] Given that a master plan for Area "C" is also being prepared at the same time, the total traffic analysis also includes the development impacts of Area "C".

Table 10 2020 Total Traffic Conditions Traffic Operations Analysis Summary

Intersection	2020 Background Conditions	2020 Total Traffic Conditions
Lockhaven Drive / River Road	LOS = F, v/c = 1.02	LOS = F, v/c = 1.09
Lockhaven Drive / 14th Avenue	LOS = D	LOS = F
Lockhaven Drive / McLeod Lane	LOS = B	LOS = B
Lockhaven Drive / Area "B" West RI/RO		LOS = A (southbound approach)
Lockhaven Drive / Chemawa Road / Keizer Station Blvd	v/c = 0.68	v/c = 0.82
Lockhaven Drive / Area "B" East RI/RO		LOS = B (westbound RI)
Chemawa Road / Stadium Drive / Ulali Road	LOS = C, v/c = 0.70	v/c = 0.82
Chemawa Road / I-5 SB Ramp Terminal	v/c = 0.76	v/c = 0.85
Chemawa Road / I-5 NB Ramp Terminal	v/c = 0.94	v/c = 1.06
Chemawa Road / McLeod Lane	LOS = C (eastbound approach)	LOS = A
Chemawa Road / Verda Lane	v/c = 0.77	v/c = 0.84
McLeod Lane / Area "B" Full Access		LOS = A
McLeod Lane / Area "C" Full Access		LOS B (westbpimd left-turn)
Chemawa Road / Area "C" RI/RO Access		LOS A (eastbound right-turn)
Keizer Station Boulevard Full Access		LOS = B, v/c = 0.42

LOS = Level of Service
v/c = volume to capacity ratio

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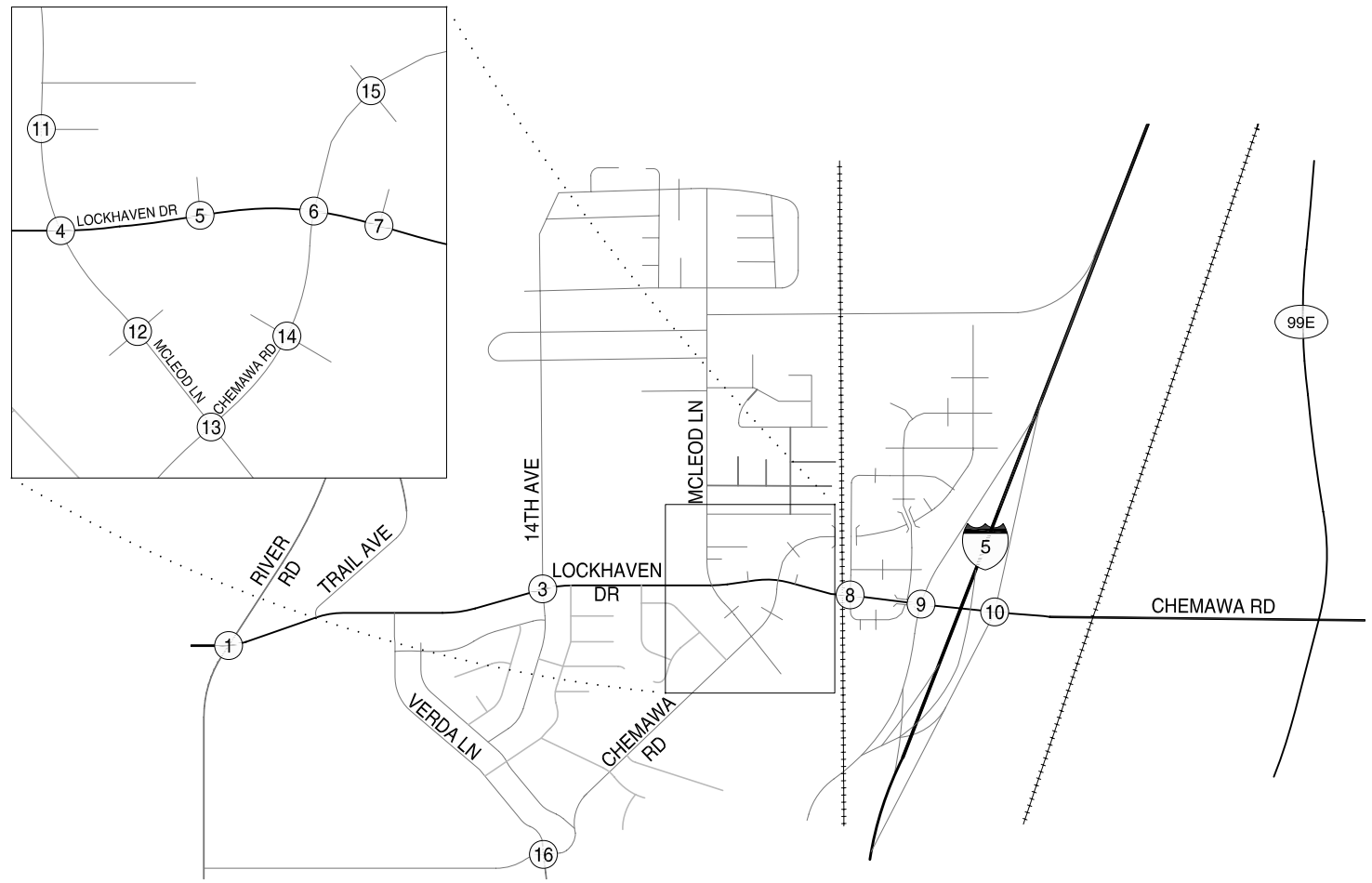

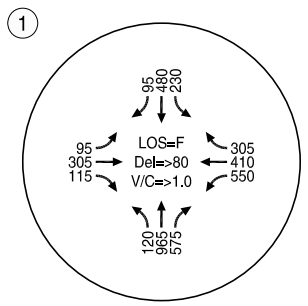

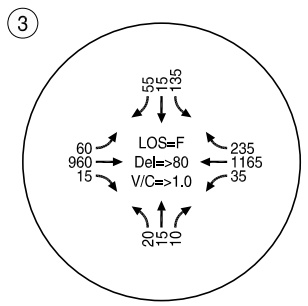

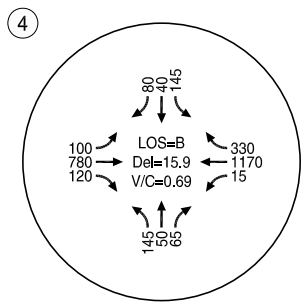

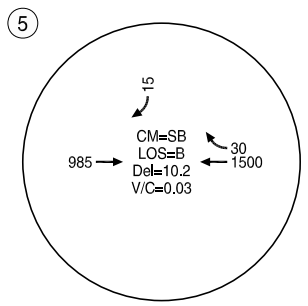

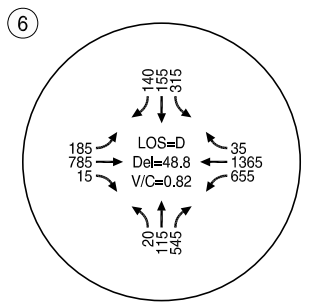

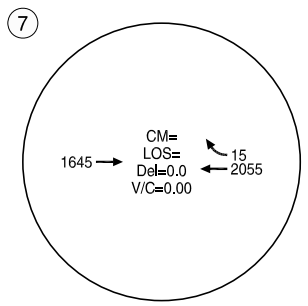

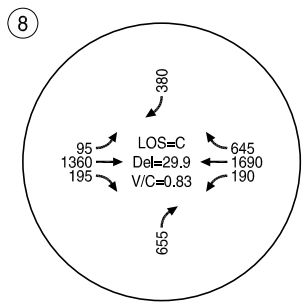

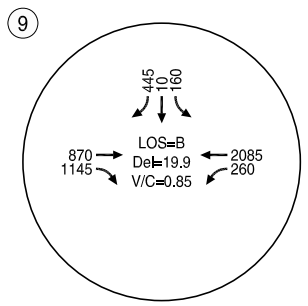

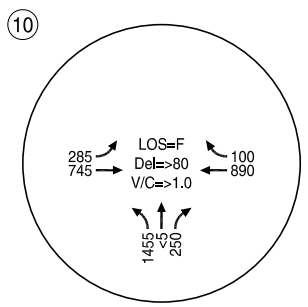

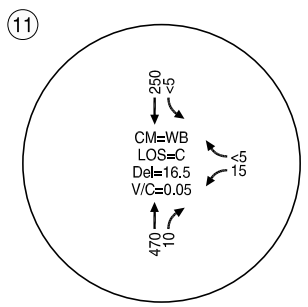

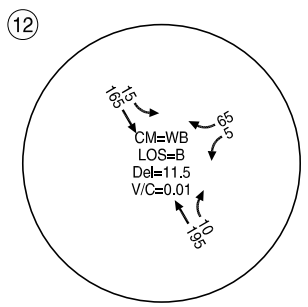

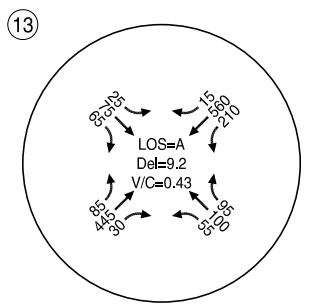

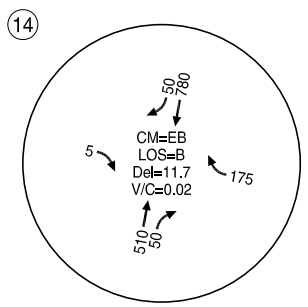

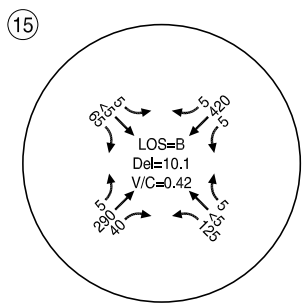

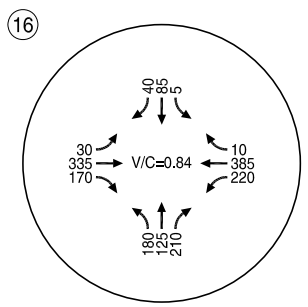

LEGEND

CM = CRITICAL MOVEMENT (UNSIGNALIZED)
LOS = INTERSECTION LEVEL OF SERVICE (SIGNALIZED)/CRITICAL MOVEMENT LEVEL OF SERVICE (UNSIGNALIZED)
Del = INTERSECTION AVERAGE CONTROL DELAY (SIGNALIZED)/CRITICAL MOVEMENT CONTROL DELAY (UNSIGNALIZED)
V/C = CRITICAL VOLUME-TO-CAPACITY RATIO

2020 TOTAL TRAFFIC CONDITIONS
WEEKDAY PM PEAK HOUR
KEIZER, OREGON

FIGURE **11**

Section 9
Mitigation Measures

Mitigation Measures

This section identifies the capacity improvements required to meet the operating threshold for the year 2020 traffic conditions.

PROPOSED MITIGATION MEASURES

Based on the results of the weekday p.m. peak hour operational analysis, the capacity improvements summarized in Table 11 are recommended in the study area to mitigate intersections that are either operating poorly/unacceptably as a result of background traffic conditions or as a result of additional traffic being generated by Areas "B" and "C".

Table 11 Recommended Capacity Improvements

Intersection / Road Segment	Recommended Improvements
To Mitigate Traffic from both Areas "B" and "C"	
Lockhaven Drive / River Road	• Provide dual westbound left-turn lanes • Modify the east-west signal phasing from split phasing to protected phasing
Lockhaven Drive / 14th Avenue	• Add a westbound right-turn lane on Lockhaven Drive
Chemawa Road / I-5 NB ramp terminal	• Modify the off-ramp approach to include dual northbound left-turn lanes, a separate through lane and a separate right-turn lane • Provide dual eastbound left-turn lanes • Add a separate westbound right-turn lane

Figure 12 illustrates the proposed lane configurations with the recommended intersection/corridor mitigation measures from Table 11.

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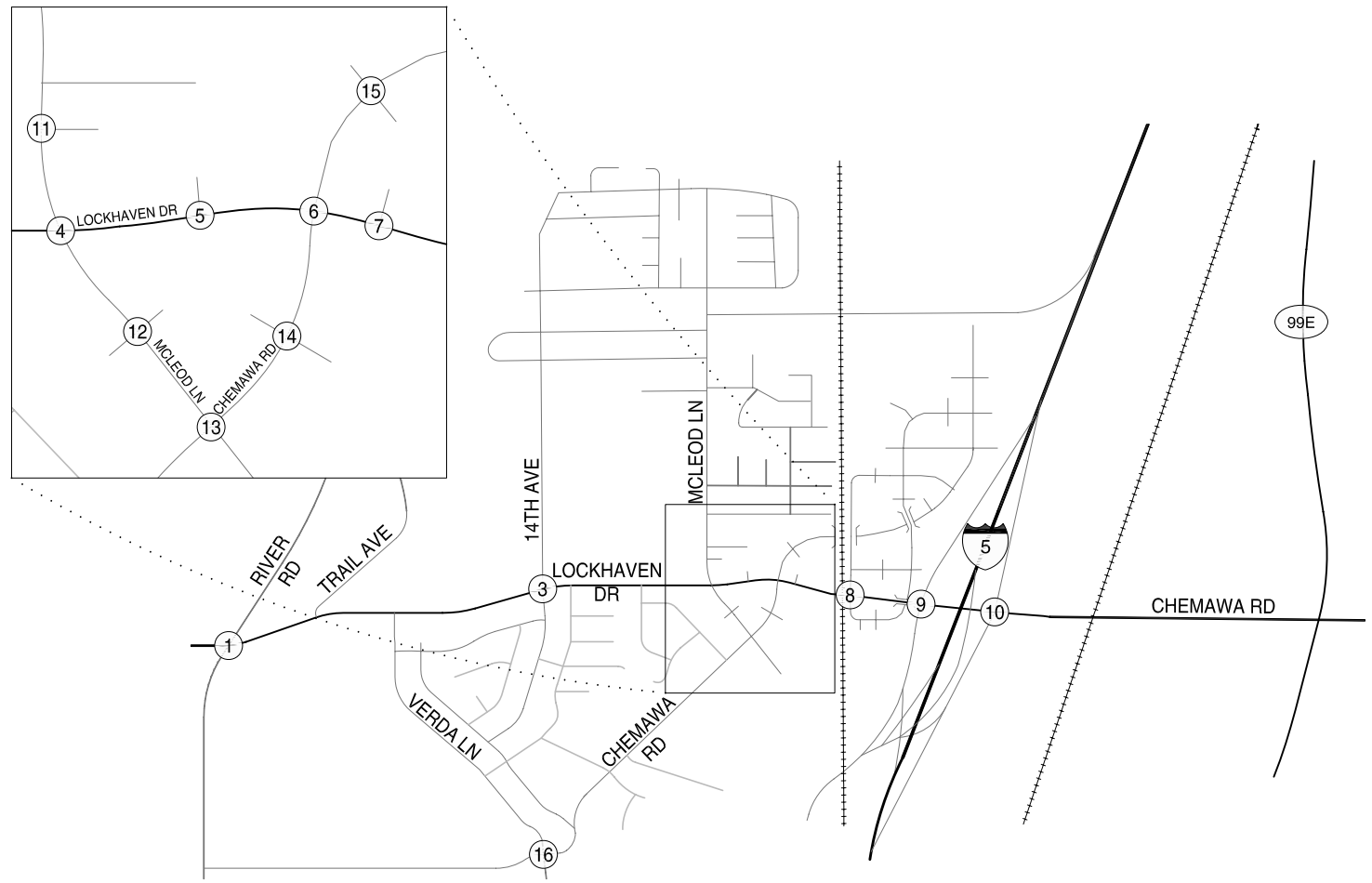

LEGEND

- STOP SIGN
- TRAFFIC SIGNAL

MITIGATED 2020 LANE CONFIGURATIONS AND TRAFFIC CONTROL DEVICES KEIZER, OREGON

FIGURE 12

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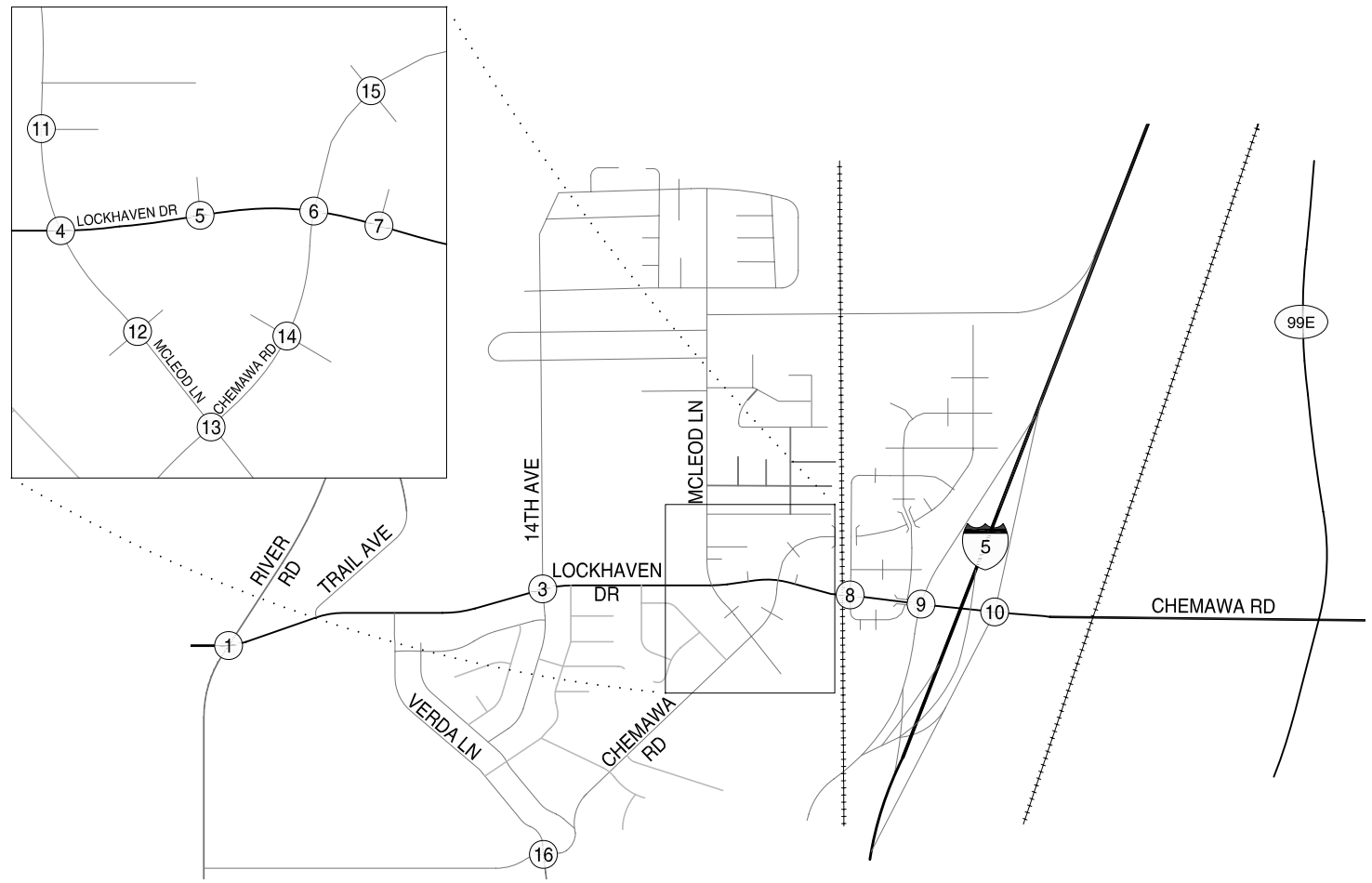
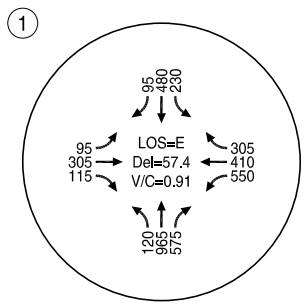
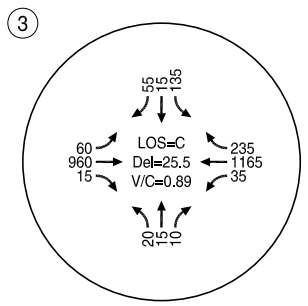
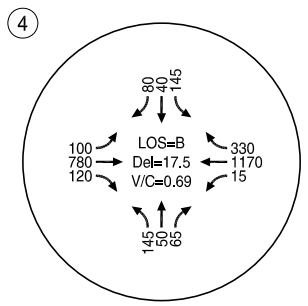
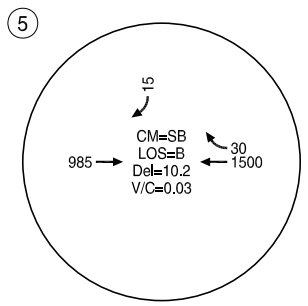
(NO SCALE)

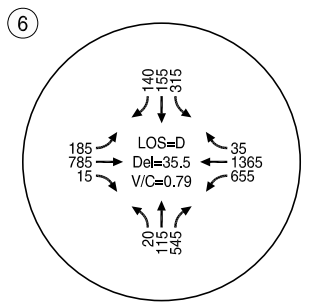


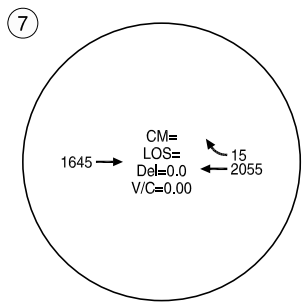


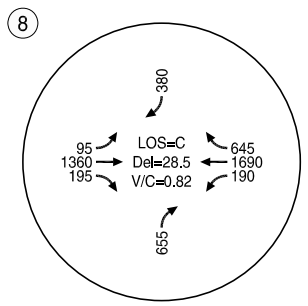


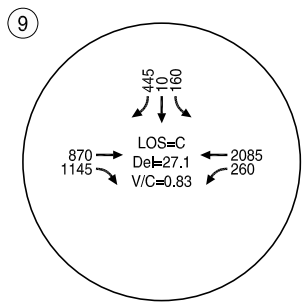


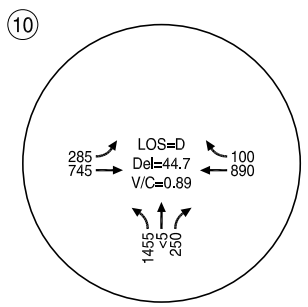


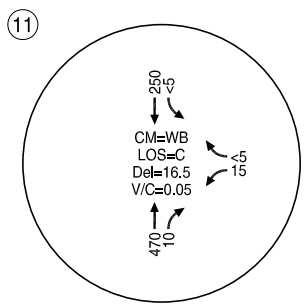


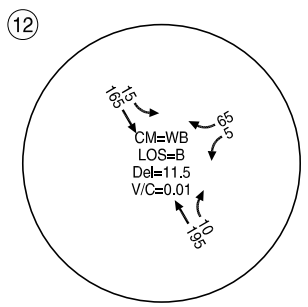


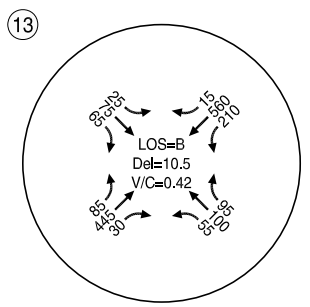


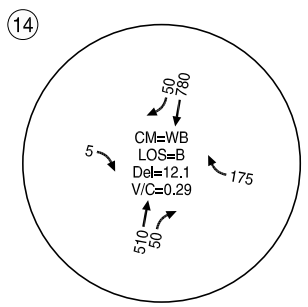


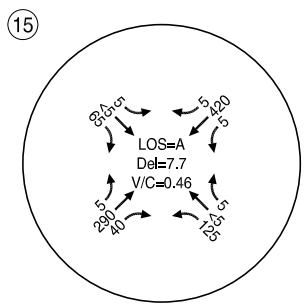


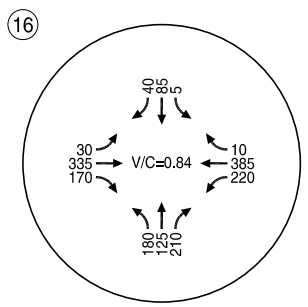












LEGEND

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LOS = INTERSECTION LEVEL OF SERVICE (SIGNALIZED)/CRITICAL MOVEMENT LEVEL OF SERVICE (UNSIGNALIZED)
Del = INTERSECTION AVERAGE CONTROL DELAY (SIGNALIZED)/CRITICAL MOVEMENT CONTROL DELAY (UNSIGNALIZED)
V/C = CRITICAL VOLUME-TO-CAPACITY RATIO

MITIGATED 2020 TOTAL TRAFFIC CONDITIONS
WEEKDAY PM PEAK HOUR
KEIZER, OREGON

FIGURE **13**

MITIGATED INTERSECTION OPERATIONS

The study intersections were analyzed with the recommended mitigation outlined in Table 12. Figure 13 provides the 2020 forecast traffic levels of service and volume to capacity analyses associated with the weekday p.m. peak hour of the mitigated transportation system. As summarized in Table 12, all of the study intersections will operate acceptably and within the outlined thresholds. *Appendix G includes the 2020 mitigated traffic conditions worksheets.*

Table 12 Mitigated 2020 Total Traffic Conditions

Intersection	2020 Background Conditions	2020 Total Traffic Conditions	Mitigated 2020 Total Traffic Conditions
Lockhaven Drive / River Road	LOS = F, v/c = 1.02	LOS = F, v/c = 1.09	LOS = E, v/c = 0.91
Lockhaven Drive / 14th Avenue	LOS = D	LOS = F	LOS = C
Lockhaven Drive / McLeod Lane	LOS = B	LOS = B	
Lockhaven Drive / Area "B" West RI/RO	N/A	LOS = A (southbound approach)	
Lockhaven Drive / Chemawa Road / Keizer Station Blvd	LOS = C, v/c = 0.68	LOS = D, v/c = 0.82	
Lockhaven Drive / Area "B" East RI/RO	N/A	LOS = B (westbound RI)	
Chemawa Road / Stadium Drive / Ulali Road	LOS = C, v/c = 0.70	v/c = 0.83	
Chemawa Road / I-5 SB Ramp Terminal	v/c = 0.76	v/c = 0.83	
Chemawa Road / I-5 NB Ramp Terminal	v/c = 0.94	v/c = 1.06	v/c = 0.89
Chemawa Road / McLeod Lane	LOS = C (eastbound approach)	LOS = A	
Chemawa Road / Verda Lane	v/c = 0.77	v/c = 0.84	
McLeod Lane / Area "B" Full Access	N/A	LOS = A	
McLeod Lane / Area "C" Full Access	N/A	LOS B (westbound left-turn)	
Chemawa Road / Area "C" RI/RO Access	N/A	LOS A (eastbound right-turn)	
Keizer Station Boulevard Full Access	N/A	LOS = B, v/c = 0.42	

LOS = Level of Service
v/c = volume to capacity ratio

Section 10
Conclusions and
Recommendations

Conclusions and Recommendations

Based on the results of the traffic impact analysis, development in Area "B" can occur with the proposed site access layout while maintaining acceptable levels of service and safety on the surrounding transportation system. The analysis developed the following conclusions and recommendations.

CONCLUSIONS

Existing Conditions

- During the weekday p.m. peak hour, all study intersections currently operate within acceptable standards with the exception of the Chemawa Road/Verda Lane intersection.

Year 2020 Background Traffic Conditions

- The annual background growth rate within the study area was assumed to 1.0 percent.
- Areas "A" and "D" are anticipated to buildout within the 2020 study horizon year. Traffic from this buildout is included in the 2020 background traffic conditions.
- The following planned infrastructure improvements are assumed to be completed by the City of Keizer by the year 2020.
    - Chemawa Road / Verda Lane - This all-way stop-controlled intersection will be converted to a single lane roundabout.
    - Chemawa Road / I-5 southbound ramp terminal - Dual westbound right-turn lanes and dual eastbound right-turn lanes will be implemented.
- The following intersections are forecast to operate above capacity or at unacceptable levels-of-service:
    - Lockhaven Drive / River Road
    - Chemawa Road / I-5 NB ramp terminal

Trip Generation

- Development in Area "B" is estimated to generate approximately 330 net new weekday p.m. peak hour trips.
- Development in Area "C" is estimated to generate approximately 805 net new weekday p.m. peak hour trips.
- As is common for developments of this nature, the specific uses are likely to change as the site develops. As long as the overall trip generation remains comparable or less, the traffic study will remain valid.

Year 2020 Total Traffic Conditions

- The following intersections are forecast to continue to operate above capacity or at unacceptable levels:
    - Lockhaven Drive / River Road
    - Chemwaw Road / I-5 NB ramp terminal
- The following intersections are forecast to operate above capacity or at unacceptable levels as a direct result of the additional traffic generated by Areas "B" and "C".
    - Lockhaven Drive / 14th Avenue

Mitigation Measures

- With the capacity improvements identified in Table 11, the study area intersections will operate within acceptable thresholds.

RECOMMENDATIONS

For the transportation system to operate acceptably, it is recommended that the following capacity improvements be implemented as a result of continued regional growth, buildout of Areas "B" and "C".

Intersection/Road Segment	Recommendations	Implementation
Improvements Associated with Area "B"		
Chemawa Road corridor	• Provide a right-in only driveway to serve Area "B" East.	• The right-in only driveway will be constructed when the non transit center component of Area "B" East is constructed.
Keizer Station Boulevard corridor	• Provide a full access driveway located off of Keizer Station Boulevard that would provide access to Area "B" East and West. This access would be located approximately 450 feet north of the Chemawa Road/Lockhaven Drive/Keizer Station Boulevard intersection. Signalize the intersection and coordinate it with the downstream Keizer Station Boulevard/Lockhaven Drive intersection. • Widen Keizer Station Boulevard west of the railroad underpass to include two southwest bound through lanes (with one lane being a shared through-right lane) and a separate left-turn lane at the above driveway access. • Reconfigure the southbound Keizer Station Boulevard approach at the Chemawa Road/Lockhaven Drive/Keizer Station Boulevard intersection to include dual left-turn lanes and a separate through lane. In addition to the lane reconfigurations, widen the approach to include a separate southbound right-turn lane with 200' of storage.	• The Area "B" West driveway connecting the parking area to Keizer Station Boulevard will be constructed when the first development component of Area "B" west takes place. The use of the driveway will be restricted until such time that the traffic signal serving the Keizer Transit Center is fully constructed /operational and all necessary signal modifications are in place. In the event that the Keizer Transit Center traffic signal construction is delayed, limited use of the driveway (such as right-in/right-out movements) may be allowed subject to City review and approval. • The Area "B" East driveway and traffic signal will be constructed when the first development component in Area "B" East takes place. • The Keizer Station Boulevard widening will be constructed when the first development component in Area "B" East takes place.

Lockhaven Drive corridor	• Provide a right-in/right-out driveway located off of Lockhaven Drive between the Keizer Station Boulevard and McLeod Lane intersections. This driveway would include a westbound right-turn deceleration lane.	• The right-in/right-out driveway and deceleration lane will be constructed when the first development component in Area "B" West occurs.
McLeod Lane	• Provide a full access driveway off of McLeod Lane to serve Area "B" West.	• The full access driveway will be constructed when the first development component in Area "B" West occurs.
Intersection Improvements Needed to Specifically Mitigate the Traffic Impacts of Areas "B" and "C"		
Lockhaven Drive / 14th Avenue	• Add a westbound right-turn lane on Lockhaven Drive	• The City of Keizer will construct the right-turn lane using fee-in-lieu-contributions from the proportionate share impacts of Areas "B" and "C" by the year ~~2014~~ 2020.
Improvements Needed to Mitigate the Traffic Impacts of Regional Growth and Areas "B" and "C"		
Lockhaven Drive / River Road	• Modify the westbound approach to provide dual westbound left-turn lanes, a single through lane, and a single right-turn lane. • Modify the east-west signal phasing from split phasing to protected phasing	• The City of Keizer will construct the improvements using, among others, an assessment of proportionate share contributions of Areas "B" and "C" by the year 2020.
Chemawa Road / I-5 NB ramp terminal	• Provide dual eastbound left-turn lanes (and the accompanying northbound on-ramp lane widening). • Add a separate westbound right-turn lane	• The City of Keizer will collect proportionate share contributions from Areas "B" and "C" so that improvements can be constructed when full funding is available.
Improvements Associated with Area "C"		
Chemawa Road corridor	• Provide a five-lane section (two northbound and southbound through lanes with a center left-turn lane) from Lockhaven Drive to approximately 400 feet south of the McLeod Lane intersection. • Install a raised median along Chemawa Road between Lockhaven Drive and McLeod lane. • Provide a northbound and southbound left-turn lane at McLeod Lane. • Provide a second northbound right-turn lane at Lockhaven Drive. • Provide a right-in/right-out driveways to serve the east and west sections of Area "C".	• All Chemawa Road corridor improvements will be constructed when the first development component of Area "C" occurs. • The right-in/right-out driveways will be constructed when the first development component in the respective sections occurs.
Chemawa Road / McLeod Lane	• Signalize the intersection • Provide a separate left-turn and shared through/right-turn lane on the east/west McLeod Lane approaches.	• All Chemawa Road/McLeod Lane intersection improvements will be constructed when the first development component of Area "C" occurs.
McLoed Lane corridor	• Widen McLeod Lane to a three-lane cross section from Lockhaven Drive to Chemawa Road. Extend McLeod Lane southeast of Chemawa Road and connect it to the existing Ridge Drive. This extension will include a full three-lane cross section with sidewalks and bike lanes. • At the McLeod Lane extension with Ridge Drive, reconstruct the intersection to provide a continuous flow movement between the two corridors. • Provide a full access driveway to serve the west section of Area "C".	• All McLeod Lane corridor improvements will be constructed when the first development component of Area "C" occurs.

Section 11
References

References

1. Kittelson & Associates, Inc. *Keizer Station Master Plan*. April 2004.

2. CH2M HILL. *Chemawa Road IAMP, Technical Memorandum 5.1, Existing Transportation Conditions*. July 2008.

3. City of Keizer/ODOT. *Intergovernmental Agreement Keizer Station*. January 2008.

4. City of Keizer and Kittelson & Associates, Inc. *City of Keizer Transportation System Plan.* April 2009.

5. Institute of Transportation Engineers. *Trip Generation Handbook*. 2001.

6. Oregon Department of Transportation. *Analysis Procedures Manual*. 2006.

7. Institute of Transportation Engineers. *8th Edition, Trip Generation Manual*. 2008.

Appendix A
Traffic Count Data

Type of peak hour being reported: System Peak

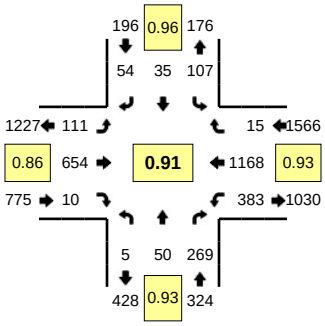
Method for determining peak hour: Total Entering Volume

LOCATION: Keizer Station Blvd -- Chemawa Rd/Lockhaven

QC JOB #: 10520904

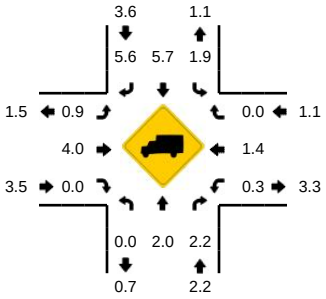
CITY/STATE: Keizer, OR

DATE: 7/20/2010

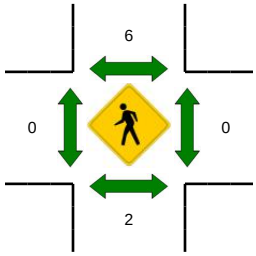


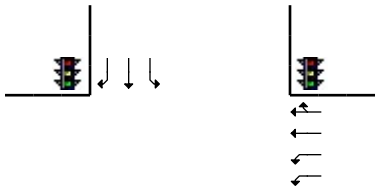
Peak-Hour: 4:35 PM -- 5:35 PM

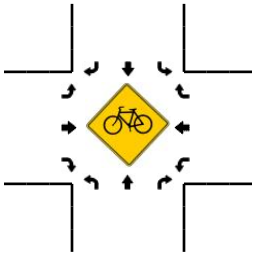
Peak 15-Min: 5:05 PM -- 5:20 PM

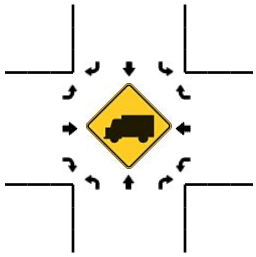


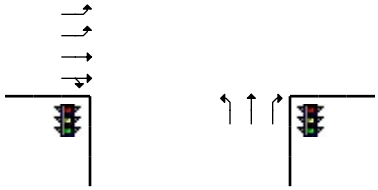
Quality Counts
TRANSPORTATION DATA COLLECTION SERVICES

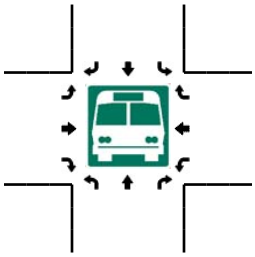












5-Min Count Period Beginning At	Keizer Station Blvd (Northbound)				Keizer Station Blvd (Southbound)				Chemawa Rd/Lockhaven (Eastbound)				Chemawa Rd/Lockhaven (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
4:00 PM	1	5	16	0	10	4	2	0	9	41	0	0	25	63	1	0	177	
4:05 PM	0	3	19	0	8	0	3	0	2	74	0	0	21	93	0	0	223	
4:10 PM	1	2	15	0	9	3	4	0	7	48	0	0	16	91	1	0	197	
4:15 PM	0	7	24	0	15	8	3	0	6	39	1	0	30	79	0	0	212	
4:20 PM	0	5	21	0	13	3	1	0	5	55	0	0	43	87	2	0	235	
4:25 PM	0	3	21	0	5	6	5	0	4	50	0	0	18	86	1	0	199	
4:30 PM	2	3	13	0	12	5	6	0	4	48	1	0	25	69	0	0	188	
4:35 PM	1	1	27	0	14	5	6	0	10	63	1	0	31	82	1	0	242	
4:40 PM	0	9	19	0	9	3	5	0	9	57	2	0	37	75	2	0	227	
4:45 PM	0	1	26	0	8	0	3	0	9	54	0	0	13	100	0	0	214	
4:50 PM	1	6	25	0	9	2	2	0	13	47	0	0	49	84	2	0	240	
4:55 PM	0	4	16	0	8	2	5	0	9	48	1	0	23	99	1	0	216	2570
5:00 PM	1	3	19	0	5	6	7	0	2	53	0	0	30	93	2	0	221	2614
5:05 PM	0	2	32	0	8	5	5	0	12	62	0	0	27	85	0	0	238	2629
5:10 PM	1	3	22	0	14	0	7	0	14	69	0	0	30	123	2	0	285	2717
5:15 PM	0	3	24	0	8	0	4	0	6	62	1	0	35	118	2	0	263	2768
5:20 PM	0	4	16	0	6	5	3	0	8	50	0	0	35	93	0	0	220	2753
5:25 PM	0	6	22	0	9	3	4	0	12	28	0	0	47	103	2	0	236	2790
5:30 PM	1	8	21	0	9	4	3	0	7	61	5	0	26	113	1	0	259	2861
5:35 PM	0	8	26	0	9	7	5	0	7	52	1	0	23	79	1	0	218	2837
5:40 PM	1	11	25	0	4	4	4	0	10	50	0	0	31	85	3	0	228	2838
5:45 PM	1	2	15	0	10	1	6	0	7	60	0	0	24	92	0	0	218	2842
5:50 PM	0	4	27	0	9	4	5	0	10	36	0	0	26	80	3	0	204	2806
5:55 PM	2	13	24	0	13	6	5	0	4	36	0	0	22	63	0	0	188	2778

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	4	32	312	0	120	20	64	0	128	772	4	0	368	1304	16	0	3144
Heavy Trucks	0	0	4		0	0	0		0	36	0		0	16	0		56
Pedestrians		4				0				0				0			4
Bicycles																	
Railroad																	
Stopped Buses																	

Comments:

Report generated on 7/25/2010 9:06 AM

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

Type of peak hour being reported: System Peak

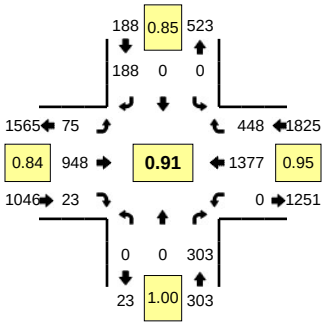
Method for determining peak hour: Total Entering Volume

LOCATION: Stadium Dr/Ulali Dr -- Chemawa Rd

QC JOB #: 10520903

CITY/STATE: Keizer, OR

DATE: 7/20/2010



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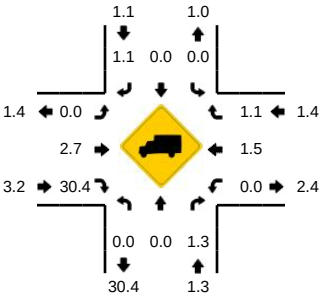
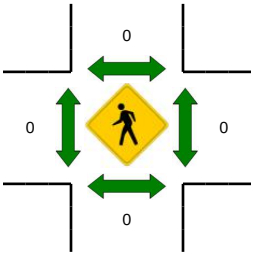
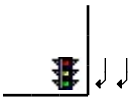
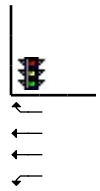
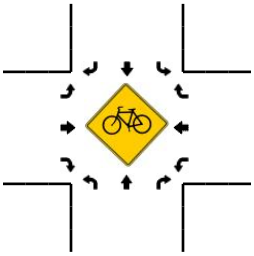
Peak 15-Min: 5:05 PM -- 5:20 PM

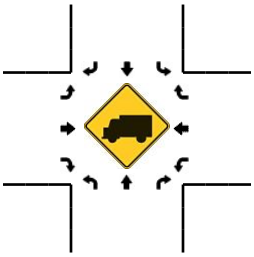


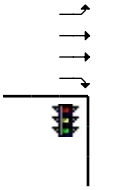


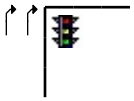


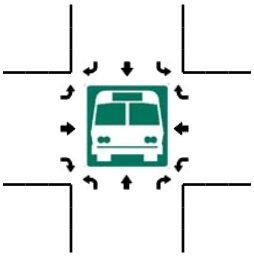












5-Min Count Period Beginning At	Stadium Dr/Ulali Dr (Northbound)				Stadium Dr/Ulali Dr (Southbound)				Chemawa Rd (Eastbound)				Chemawa Rd (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
4:00 PM	0	0	13	0	0	0	11	0	5	60	1	0	0	88	34	0	212	
4:05 PM	0	0	34	0	0	0	14	0	5	79	1	0	0	90	31	0	254	
4:10 PM	0	0	16	0	0	0	17	0	1	84	0	0	0	94	43	0	255	
4:15 PM	0	0	19	0	0	0	14	0	3	73	3	0	0	102	45	0	259	
4:20 PM	0	0	31	0	0	0	20	0	8	73	1	0	0	106	30	0	269	
4:25 PM	0	0	19	0	0	0	15	0	6	75	1	0	0	87	38	0	241	
4:30 PM	0	0	31	0	0	0	6	0	6	67	1	0	0	98	31	0	240	
4:35 PM	0	0	24	0	0	0	17	0	10	87	1	0	0	87	41	0	267	
4:40 PM	0	0	23	0	0	0	10	0	6	77	1	0	0	104	51	0	272	
4:45 PM	0	0	23	0	0	0	13	0	5	92	2	0	0	116	34	0	285	
4:50 PM	0	0	21	0	0	0	18	0	4	75	2	0	0	104	47	0	271	
4:55 PM	0	0	34	0	0	0	16	0	3	65	5	0	0	110	26	0	259	3084
5:00 PM	0	0	28	0	0	0	12	0	4	65	5	0	0	112	35	0	261	3133
5:05 PM	0	0	19	0	0	0	16	0	6	95	1	0	0	108	31	0	276	3155
5:10 PM	0	0	30	0	0	0	21	0	4	99	0	0	0	133	29	0	316	3216
5:15 PM	0	0	26	0	0	0	18	0	17	90	1	0	0	144	35	0	331	3288
5:20 PM	0	0	17	0	0	0	15	0	6	63	2	0	0	121	40	0	264	3283
5:25 PM	0	0	32	0	0	0	19	0	3	58	0	0	0	122	50	0	284	3326
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5:35 PM	0	0	24	0	0	0	12	0	5	78	0	0	0	101	28	0	248	3343
5:40 PM	0	0	19	0	0	0	10	0	7	72	1	0	0	104	37	0	250	3321
5:45 PM	0	0	23	0	0	0	11	0	5	83	3	0	0	99	28	0	252	3288
5:50 PM	0	0	16	0	0	0	16	0	0	63	5	0	0	99	27	0	226	3243
5:55 PM	0	0	28	0	0	0	11	0	6	69	0	0	0	88	31	0	233	3217

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	300	0	0	0	220	0	108	1136	8	0	0	1540	380	0	3692
Heavy Trucks	0	0	4		0	0	0		0	40	0		0	32	0		76
Pedestrians		0				0				0				0			0
Bicycles																	
Railroad																	
Stopped Buses																	

Comments:

Report generated on 7/25/2010 9:06 AM

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

Type of peak hour being reported: System Peak

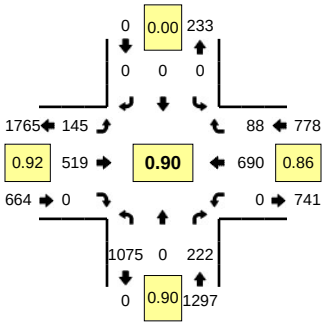
Method for determining peak hour: Total Entering Volume

LOCATION: I-5 NB Ramps -- Chemawa Rd

QC JOB #: 10520902

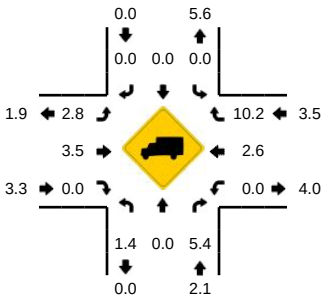
CITY/STATE: Keizer, OR

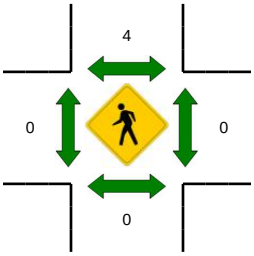
DATE: 7/20/2010

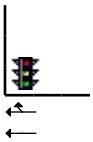


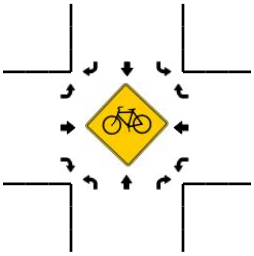
Peak-Hour: 4:35 PM -- 5:35 PM

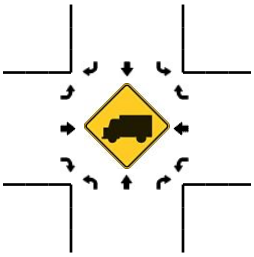
Peak 15-Min: 5:05 PM -- 5:20 PM

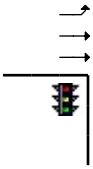


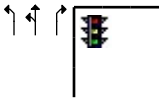


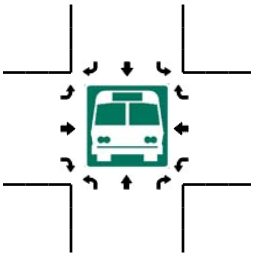












5-Min Count Period Beginning At	I-5 NB Ramps (Northbound)				I-5 NB Ramps (Southbound)				Chemawa Rd (Eastbound)				Chemawa Rd (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
4:00 PM	78	0	10	0	0	0	0	0	10	40	0	0	0	57	5	0	200	
4:05 PM	69	0	14	0	0	0	0	0	11	43	0	0	0	37	8	0	182	
4:10 PM	99	0	15	0	0	0	0	0	11	40	0	0	0	51	6	0	222	
4:15 PM	65	0	13	0	0	0	0	0	8	55	0	0	0	69	4	0	214	
4:20 PM	81	0	16	0	0	0	0	0	16	36	0	0	0	46	8	0	203	
4:25 PM	78	0	9	0	0	0	0	0	9	38	0	0	0	61	8	0	203	
4:30 PM	68	0	18	0	0	0	0	0	10	46	0	0	0	56	4	0	202	
4:35 PM	89	0	15	0	0	0	0	0	16	32	0	0	0	54	6	0	212	
4:40 PM	67	0	19	0	0	0	0	0	13	42	0	0	0	59	3	0	203	
4:45 PM	109	0	17	0	0	0	0	0	12	52	0	0	0	45	9	0	244	
4:50 PM	84	0	18	0	0	0	0	0	5	37	0	0	0	52	6	0	202	
4:55 PM	70	0	16	0	0	0	0	0	14	48	0	0	0	52	11	0	211	2498
5:00 PM	87	0	20	0	0	0	0	0	13	35	0	0	0	48	10	0	213	2511
5:05 PM	97	0	18	0	0	0	0	0	7	62	0	0	0	51	8	0	243	2572
5:10 PM	94	0	20	0	0	0	0	0	13	44	0	0	0	81	3	0	255	2605
5:15 PM	102	0	29	0	0	0	0	0	12	42	0	0	0	72	10	0	267	2658
5:20 PM	86	0	18	0	0	0	0	0	17	46	0	0	0	63	8	0	238	2693
5:25 PM	91	0	13	0	0	0	0	0	11	34	0	0	0	65	7	0	221	2711
5:30 PM	99	0	19	0	0	0	0	0	12	45	0	0	0	48	7	0	230	2739
5:35 PM	76	0	16	0	0	0	0	0	15	46	0	0	0	56	9	0	218	2745
5:40 PM	77	0	20	0	0	0	0	0	12	47	0	0	0	41	4	0	201	2743
5:45 PM	75	0	15	0	0	0	0	0	13	49	0	0	0	51	4	0	207	2706
5:50 PM	81	0	18	0	0	0	0	0	9	26	0	0	0	47	6	0	187	2691
5:55 PM	74	0	17	0	0	0	0	0	11	49	0	0	0	39	8	0	198	2678

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	1172	0	268	0	0	0	0	0	128	592	0	0	0	816	84	0	3060
Heavy Trucks	8	0	16		0	0	0		0	24	0		0	24	8		80
Pedestrians		0				4				0				0			4
Bicycles																	
Railroad																	
Stopped Buses																	

Comments:

Report generated on 7/25/2010 9:06 AM

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

Type of peak hour being reported: System Peak

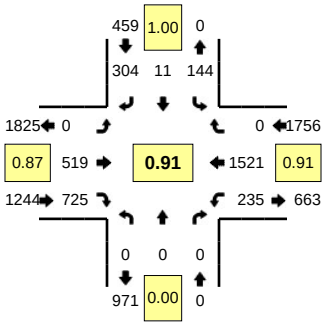
Method for determining peak hour: Total Entering Volume

LOCATION: I-5 SB Ramps -- Chemawa Rd

QC JOB #: 10520901

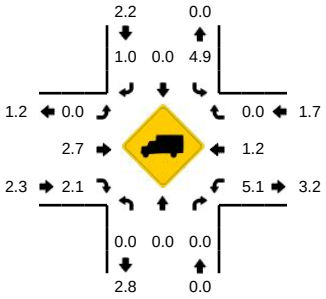
CITY/STATE: Keizer, OR

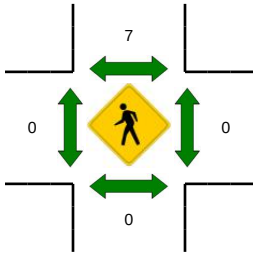
DATE: 7/20/2010

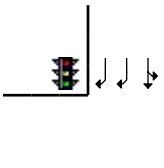


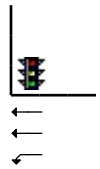
Peak-Hour: 4:35 PM -- 5:35 PM

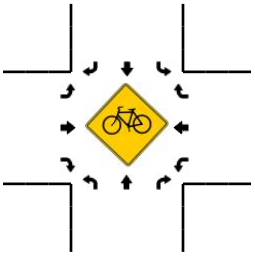
Peak 15-Min: 5:05 PM -- 5:20 PM

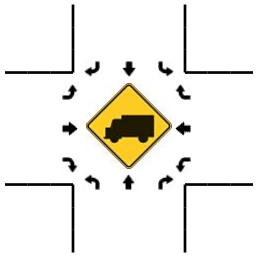


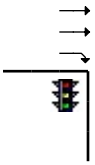


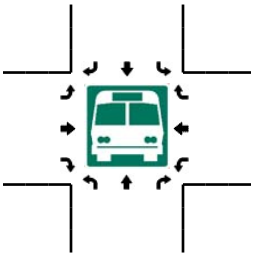












5-Min Count Period Beginning At	I-5 SB Ramps (Northbound)				I-5 SB Ramps (Southbound)				Chemawa Rd (Eastbound)				Chemawa Rd (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
4:00 PM	0	0	0	0	15	0	26	0	0	31	39	0	28	96	0	0	235	
4:05 PM	0	0	0	0	10	0	24	0	0	48	51	0	17	100	0	0	250	
4:10 PM	0	0	0	0	12	0	24	0	0	40	57	0	23	110	0	0	266	
4:15 PM	0	0	0	0	10	0	27	0	0	50	47	0	18	119	0	0	271	
4:20 PM	0	0	0	0	7	0	25	0	0	42	60	0	16	110	0	0	260	
4:25 PM	0	0	0	0	8	1	13	0	0	39	53	0	29	115	0	0	258	
4:30 PM	0	0	0	0	10	0	21	0	0	47	63	0	13	105	0	0	259	
4:35 PM	0	0	0	0	6	1	24	0	0	54	61	0	14	109	0	0	269	
4:40 PM	0	0	0	0	12	2	29	0	0	31	61	0	25	122	0	0	282	
4:45 PM	0	0	0	0	12	1	20	0	0	51	65	0	17	131	0	0	297	
4:50 PM	0	0	0	0	9	0	30	0	0	39	62	0	17	125	0	0	282	
4:55 PM	0	0	0	0	10	0	25	0	0	46	45	0	22	107	0	0	255	3184
5:00 PM	0	0	0	0	14	0	30	0	0	34	48	0	12	117	0	0	255	3204
5:05 PM	0	0	0	0	8	3	25	0	0	61	64	0	20	116	0	0	297	3251
5:10 PM	0	0	0	0	15	0	30	0	0	43	74	0	32	133	0	0	327	3312
5:15 PM	0	0	0	0	13	0	16	0	0	41	76	0	25	159	0	0	330	3371
5:20 PM	0	0	0	0	17	1	23	0	0	47	59	0	16	133	0	0	296	3407
5:25 PM	0	0	0	0	13	2	33	0	0	28	51	0	15	145	0	0	287	3436
5:30 PM	0	0	0	0	15	1	19	0	0	44	59	0	20	124	0	0	282	3459
5:35 PM	0	0	0	0	16	0	20	0	0	41	47	0	19	109	0	0	252	3442
5:40 PM	0	0	0	0	13	0	24	0	0	49	69	0	13	123	0	0	291	3451
5:45 PM	0	0	0	0	15	1	16	0	0	45	48	0	16	103	0	0	244	3398
5:50 PM	0	0	0	0	8	1	18	0	0	29	43	0	14	108	0	0	221	3337
5:55 PM	0	0	0	0	11	0	20	0	0	51	62	0	14	99	0	0	257	3339

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	144	12	284	0	0	580	856	0	308	1632	0	0	3816
Heavy Trucks	0	0	0		12	0	8		0	16	16		4	20	0		76
Pedestrians		0				0				0				0			0
Bicycles																	
Railroad																	
Stopped Buses																	

Comments:

Report generated on 7/25/2010 9:06 AM

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

Appendix B

Description of Level-of-Service Methods and Criteria

Appendix B Level-of-Service Concept

Level of service (LOS) is a concept developed to quantify the degree of comfort (including such elements as travel time, number of stops, total amount of stopped delay, and impediments caused by other vehicles) afforded to drivers as they travel through an intersection or roadway segment. Six grades are used to denote the various level of service from "A" to "F".1

SIGNALIZED INTERSECTIONS

The six level-of-service grades are described qualitatively for signalized intersections in Table B1. Additionally, Table B2 identifies the relationship between level of service and average control delay per vehicle. Control delay is defined to include initial deceleration delay, queue move-up time, stopped delay, and final acceleration delay. Using this definition, Level of Service "D" is generally considered to represent the minimum acceptable design standard.

Table B-1 Level-of-Service Definitions (Signalized Intersections)

Level of Service	Average Delay per Vehicle
A	Very low average control delay, less than 10 seconds per vehicle. This occurs when progression is extremely favorable, and most vehicles arrive during the green phase. Most vehicles do not stop at all. Short cycle lengths may also contribute to low delay.
B	Average control delay is greater than 10 seconds per vehicle and less than or equal to 20 seconds per vehicle. This generally occurs with good progression and/or short cycle lengths. More vehicles stop than for a level of service A, causing higher levels of average delay.
C	Average control delay is greater than 20 seconds per vehicle and less than or equal to 35 seconds per vehicle. These higher delays may result from fair progression and/or longer cycle lengths. Individual cycle failures may begin to appear at this level. The number of vehicles stopping is significant at this level, although many still pass through the intersection without stopping.
D	Average control delay is greater than 35 seconds per vehicle and less than or equal to 55 seconds per vehicle. The influence of congestion becomes more noticeable. Longer delays may result from some combination of unfavorable progression, long cycle length, or high volume/capacity ratios. Many vehicles stop, and the proportion of vehicles not stopping declines. Individual cycle failures are noticeable.
E	Average control delay is greater than 55 seconds per vehicle and less than or equal to 80 seconds per vehicle. This is usually considered to be the limit of acceptable delay. These high delay values generally (but not always) indicate poor progression, long cycle lengths, and high volume/capacity ratios. Individual cycle failures are frequent occurrences.
F	Average control delay is in excess of 80 seconds per vehicle. This is considered to be unacceptable to most drivers. This condition often occurs with oversaturation. It may also occur at high volume/capacity ratios below 1.0 with many individual cycle failures. Poor progression and long cycle lengths may also contribute to such high delay values.

1 Most of the material in this appendix is adapted from the Transportation Research Board, Highway Capacity Manual, (2000).

Table B2 Level-of-Service Criteria for Signalized Intersections

Level of Service	Average Control Delay per Vehicle (Seconds)
A	<10.0
B	>10 and ≤20
C	>20 and ≤35
D	>35 and ≤55
E	>55 and ≤80
F	>80

UNSIGNALIZED INTERSECTIONS

Unsignalized intersections include two-way stop-controlled (TWSC) and all-way stop-controlled (AWSC) intersections. The 2000 Highway Capacity Manual (HCM) provides models for estimating control delay at both TWSC and AWSC intersections. A qualitative description of the various service levels associated with an unsignalized intersection is presented in Table B3. A quantitative definition of level of service for unsignalized intersections is presented in Table B4. Using this definition, Level of Service "E" is generally considered to represent the minimum acceptable design standard.

Table B3 Level-of-Service Criteria for Unsignalized Intersections

Level of Service	Average Delay per Vehicle to Minor Street
A	• Nearly all drivers find freedom of operation. • Very seldom is there more than one vehicle in queue.
B	• Some drivers begin to consider the delay an inconvenience. • Occasionally there is more than one vehicle in queue.
C	• Many times there is more than one vehicle in queue. • Most drivers feel restricted, but not objectionably so.
D	• Often there is more than one vehicle in queue. • Drivers feel quite restricted.
E	• Represents a condition in which the demand is near or equal to the probable maximum number of vehicles that can be accommodated by the movement. • There is almost always more than one vehicle in queue. • Drivers find the delays approaching intolerable levels.
F	• Forced flow. • Represents an intersection failure condition that is caused by geometric and/or operational constraints external to the intersection.

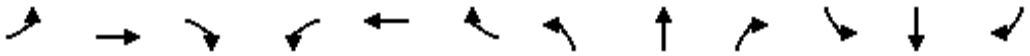
Table B4 Level-of-Service Criteria for Unsignalized Intersections

Level of Service	Average Control Delay per Vehicle (Seconds)
A	<10.0
B	>10.0 and ≤ 15.0
C	>15.0 and ≤ 25.0
D	>25.0 and ≤ 35.0
E	>35.0 and ≤ 50.0
F	>50.0

It should be noted that the level-of-service criteria for unsignalized intersections are somewhat different than the criteria used for signalized intersections. The primary reason for this difference is that drivers expect different levels of performance from different kinds of transportation facilities. The expectation is that a signalized intersection is designed to carry higher traffic volumes than an unsignalized intersection. Additionally, there are a number of driver behavior considerations that combine to make delays at signalized intersections less galling than at unsignalized intersections. For example, drivers at signalized intersections are able to relax during the red interval, while drivers on the minor street approaches to TWSC intersections must remain attentive to the task of identifying acceptable gaps and vehicle conflicts. Also, there is often much more variability in the amount of delay experienced by individual drivers at unsignalized intersections than signalized intersections. For these reasons, it is considered that the control delay threshold for any given level of service is less for an unsignalized intersection than for a signalized intersection. While overall intersection level of service is calculated for AWSC intersections, level of service is only calculated for the minor approaches and the major street left turn movements at TWSC intersections. No delay is assumed to the major street through movements. For TWSC intersections, the overall intersection level of service remains undefined: level of service is only calculated for each minor street lane.

In the performance evaluation of TWSC intersections, it is important to consider other measures of effectiveness (MOEs) in addition to delay, such as v/c ratios for individual movements, average queue lengths, and 95th-percentile queue lengths. By focusing on a single MOE for the worst movement only, such as delay for the minor-street left turn, users may make inappropriate traffic control decisions. The potential for making such inappropriate decisions is likely to be particularly pronounced when the HCM level-of-service thresholds are adopted as legal standards, as is the case in many public agencies.

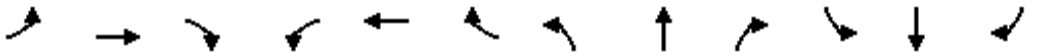
Appendix C
Existing Conditions
Operations Worksheets



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	86	211	105	313	255	179	109	872	399	152	434	81
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0	5.0	5.0	5.0	4.5	4.5	6.0	5.0	4.5	6.0	
Lane Util. Factor	1.00	1.00	1.00	0.95	0.95	1.00	1.00	0.95	1.00	1.00	0.95	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.98	
Flt Protected	0.95	1.00	1.00	0.95	0.99	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1719	1810	1538	1665	1742	1568	1787	3574	1599	1736	3389	
Flt Permitted	0.95	1.00	1.00	0.95	0.99	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (perm)	1719	1810	1538	1665	1742	1568	1787	3574	1599	1736	3389	
Peak-hour factor, PHF	0.90	0.90	0.90	0.88	0.88	0.88	0.91	0.91	0.91	0.90	0.90	0.90
Adj. Flow (vph)	96	234	117	356	290	203	120	958	438	169	482	90
RTOR Reduction (vph)	0	0	99	0	0	96	0	0	83	0	12	0
Lane Group Flow (vph)	96	234	18	317	329	107	120	958	355	169	560	0
Heavy Vehicles (%)	5%	5%	5%	3%	3%	3%	1%	1%	1%	4%	4%	4%
Turn Type	Split		Perm	Split		pm+ov	Prot		pm+ov	Prot		
Protected Phases	7	7		8	8	1	5	2	8	1	6	
Permitted Phases			7			8			2			
Actuated Green, G (s)	19.5	19.5	19.5	31.0	31.0	46.3	11.3	43.7	74.7	15.3	47.7	
Effective Green, g (s)	19.5	19.5	19.5	31.0	31.0	46.3	11.3	43.7	74.7	15.3	47.7	
Actuated g/C Ratio	0.15	0.15	0.15	0.24	0.24	0.36	0.09	0.34	0.57	0.12	0.37	
Clearance Time (s)	5.0	5.0	5.0	5.0	5.0	4.5	4.5	6.0	5.0	4.5	6.0	
Vehicle Extension (s)	1.0	1.0	1.0	1.0	1.0	0.5	0.5	0.5	1.0	0.5	0.5	
Lane Grp Cap (vph)	258	272	231	397	415	558	155	1201	980	204	1244	
v/s Ratio Prot	0.06	c0.13		c0.19	0.19	0.02	0.07	c0.27	0.09	c0.10	0.17	
v/s Ratio Perm			0.01			0.05			0.14			
v/c Ratio	0.37	0.86	0.08	0.80	0.79	0.19	0.77	0.80	0.36	0.83	0.45	
Uniform Delay, d1	49.7	53.9	47.5	46.6	46.5	28.9	58.1	39.1	14.8	56.1	31.2	
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	0.3	22.5	0.1	10.0	9.4	0.1	19.4	5.6	0.1	22.3	1.2	
Delay (s)	50.1	76.4	47.6	56.6	55.8	29.0	77.5	44.7	14.9	78.4	32.4	
Level of Service	D	E	D	E	E	C	E	D	B	E	C	
Approach Delay (s)		63.2			49.7			38.7			42.9	
Approach LOS		E			D			D			D	

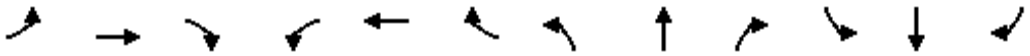
Intersection Summary			
HCM Average Control Delay	45.3	HCM Level of Service	D
HCM Volume to Capacity ratio	0.81		
Actuated Cycle Length (s)	130.0	Sum of lost time (s)	20.5
Intersection Capacity Utilization	76.1%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	49	642	12	29	805	159	6	14	8	81	15	29
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	15	13	12	14	12	12	12	16	12	12	12	12
Total Lost time (s)	4.0	5.0		4.0	5.0			4.0			4.0	4.0
Lane Util. Factor	1.00	1.00		1.00	1.00			1.00			1.00	1.00
Frt	1.00	1.00		1.00	0.98			0.96			1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00			0.99			0.96	1.00
Satd. Flow (prot)	1947	1920		1888	1817			1917			1787	1583
Flt Permitted	0.95	1.00		0.95	1.00			0.93			0.81	1.00
Satd. Flow (perm)	1947	1920		1888	1817			1801			1503	1583
Peak-hour factor, PHF	0.96	0.96	0.96	0.84	0.84	0.84	0.64	0.64	0.64	0.74	0.74	0.74
Adj. Flow (vph)	51	669	12	35	958	189	9	22	12	109	20	39
RTOR Reduction (vph)	0	0	0	0	5	0	0	10	0	0	0	34
Lane Group Flow (vph)	51	681	0	35	1142	0	0	33	0	0	129	5
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	7%	7%	7%	2%	2%	2%
Turn Type	Prot			Prot			Perm			Perm		Perm
Protected Phases	5	2		1	6			8			4	
Permitted Phases							8			4		4
Actuated Green, G (s)	3.7	58.1		3.2	57.6			10.7			10.7	10.7
Effective Green, g (s)	3.7	58.1		3.2	57.6			10.7			10.7	10.7
Actuated g/C Ratio	0.04	0.68		0.04	0.68			0.13			0.13	0.13
Clearance Time (s)	4.0	5.0		4.0	5.0			4.0			4.0	4.0
Vehicle Extension (s)	0.5	2.5		0.5	2.5			0.5			0.5	0.5
Lane Grp Cap (vph)	85	1312		71	1231			227			189	199
v/s Ratio Prot	c0.03	0.35		0.02	c0.63							
v/s Ratio Perm								0.02			c0.09	0.00
v/c Ratio	0.60	0.52		0.49	0.93			0.14			0.68	0.02
Uniform Delay, d1	39.9	6.6		40.1	11.9			33.1			35.5	32.6
Progression Factor	1.00	1.00		1.00	1.00			1.00			1.00	1.00
Incremental Delay, d2	7.9	0.3		2.0	12.0			0.1			7.8	0.0
Delay (s)	47.8	6.9		42.1	23.9			33.2			43.4	32.6
Level of Service	D	A		D	C			C			D	C
Approach Delay (s)		9.7			24.4			33.2			40.9	
Approach LOS		A			C			C			D	

Intersection Summary			
HCM Average Control Delay	20.8	HCM Level of Service	C
HCM Volume to Capacity ratio	0.87		
Actuated Cycle Length (s)	85.0	Sum of lost time (s)	13.0
Intersection Capacity Utilization	72.9%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			



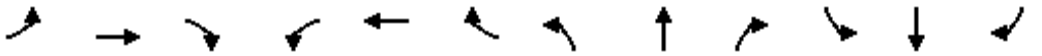
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	80	630	10	15	925	300	20	45	20	130	30	65
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	5.0		4.0	5.0		4.0	4.0	5.0	4.0	4.0	
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	1.00	1.00	1.00	1.00	
Frt	1.00	1.00		1.00	0.96		1.00	1.00	0.85	1.00	0.90	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1787	3566		1787	3443		1805	1900	1615	1787	1688	
Flt Permitted	0.15	1.00		0.37	1.00		0.68	1.00	1.00	0.46	1.00	
Satd. Flow (perm)	284	3566		692	3443		1284	1900	1615	860	1688	
Peak-hour factor, PHF	0.89	0.89	0.89	0.94	0.94	0.94	0.83	0.83	0.83	0.75	0.75	0.75
Adj. Flow (vph)	90	708	11	16	984	319	24	54	24	173	40	87
RTOR Reduction (vph)	0	1	0	0	18	0	0	0	8	0	61	0
Lane Group Flow (vph)	90	718	0	16	1285	0	24	54	16	173	66	0
Heavy Vehicles (%)	1%	1%	1%	1%	1%	1%	0%	0%	0%	1%	1%	1%
Turn Type	pm+pt			pm+pt			pm+pt		custom	pm+pt		
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases	2			6			8		2	4		
Actuated Green, G (s)	94.2	89.3		87.4	85.9		9.9	6.9	89.3	26.2	19.2	
Effective Green, g (s)	94.2	89.3		87.4	85.9		9.9	6.9	89.3	26.2	19.2	
Actuated g/C Ratio	0.72	0.69		0.67	0.66		0.08	0.05	0.69	0.20	0.15	
Clearance Time (s)	4.0	5.0		4.0	5.0		4.0	4.0	5.0	4.0	4.0	
Vehicle Extension (s)	0.5	0.5		0.5	0.5		0.5	0.5	0.5	0.5	0.5	
Lane Grp Cap (vph)	262	2450		478	2275		110	101	1109	282	249	
v/s Ratio Prot	c0.01	0.20		0.00	c0.37		0.01	0.03		c0.07	0.04	
v/s Ratio Perm	0.24			0.02			0.01		0.01	c0.05		
v/c Ratio	0.34	0.29		0.03	0.56		0.22	0.53	0.01	0.61	0.26	
Uniform Delay, d1	8.4	8.0		7.1	11.9		56.2	60.0	6.4	46.0	49.1	
Progression Factor	1.00	1.00		0.42	0.26		1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	0.3	0.3		0.0	0.2		0.4	2.7	0.0	2.8	0.2	
Delay (s)	8.7	8.3		3.0	3.2		56.6	62.7	6.5	48.7	49.3	
Level of Service	A	A		A	A		E	E	A	D	D	
Approach Delay (s)		8.3			3.2			48.0			49.0	
Approach LOS		A			A			D			D	

Intersection Summary			
HCM Average Control Delay	12.1	HCM Level of Service	B
HCM Volume to Capacity ratio	0.58		
Actuated Cycle Length (s)	130.0	Sum of lost time (s)	17.0
Intersection Capacity Utilization	64.3%	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)	110	660	10	385	1180	15	5	50	270	105	35	55
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	12	12	12	12	12	12	13	12	12
Total Lost time (s)	4.0	5.0		4.0	5.0		4.0	5.0	5.0	4.0	5.0	5.0
Lane Util. Factor	0.97	0.95		0.97	0.95		1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00		1.00	1.00		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	3367	3463		3467	3568		1770	1863	1583	1793	1827	1553
Flt Permitted	0.95	1.00		0.95	1.00		0.73	1.00	1.00	0.49	1.00	1.00
Satd. Flow (perm)	3367	3463		3467	3568		1367	1863	1583	923	1827	1553
Peak-hour factor, PHF	0.86	0.86	0.86	0.93	0.93	0.93	0.93	0.93	0.93	0.96	0.96	0.96
Adj. Flow (vph)	128	767	12	414	1269	16	5	54	290	109	36	57
RTOR Reduction (vph)	0	1	0	0	0	0	0	0	125	0	0	20
Lane Group Flow (vph)	128	778	0	414	1285	0	5	54	165	109	36	37
Heavy Vehicles (%)	4%	4%	4%	1%	1%	1%	2%	2%	2%	4%	4%	4%
Turn Type	Prot			Prot			pm+pt		custom	pm+pt		custom
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases							8		2	4		6
Actuated Green, G (s)	7.9	74.0		18.5	84.6		9.2	8.4	74.0	23.5	18.7	84.6
Effective Green, g (s)	7.9	74.0		18.5	84.6		9.2	8.4	74.0	23.5	18.7	84.6
Actuated g/C Ratio	0.06	0.57		0.14	0.65		0.07	0.06	0.57	0.18	0.14	0.65
Clearance Time (s)	4.0	5.0		4.0	5.0		4.0	5.0	5.0	4.0	5.0	5.0
Vehicle Extension (s)	0.5	0.5		0.5	0.5		0.5	0.5	0.5	0.5	0.5	0.5
Lane Grp Cap (vph)	205	1971		493	2322		99	120	901	241	263	1011
v/s Ratio Prot	0.04	0.22		c0.12	c0.36		0.00	0.03		c0.04	0.02	
v/s Ratio Perm							0.00		0.10	c0.04		0.02
v/c Ratio	0.62	0.39		0.84	0.55		0.05	0.45	0.18	0.45	0.14	0.04
Uniform Delay, d1	59.6	15.6		54.3	12.4		56.3	58.6	13.5	46.5	48.6	8.1
Progression Factor	1.10	0.87		1.01	0.85		1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	4.0	0.6		10.1	0.1		0.1	1.0	0.4	0.5	0.1	0.0
Delay (s)	69.7	14.1		65.0	10.7		56.4	59.6	13.9	47.0	48.7	8.1
Level of Service	E	B		E	B		E	E	B	D	D	A
Approach Delay (s)		21.9			23.9			21.6			36.3	
Approach LOS		C			C			C			D	

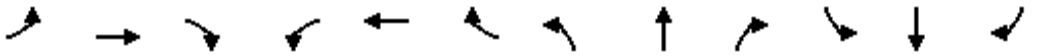
Intersection Summary			
HCM Average Control Delay	23.9	HCM Level of Service	C
HCM Volume to Capacity ratio	0.56		
Actuated Cycle Length (s)	130.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	60.6%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	75	935	25	0	1390	450	0	0	305	0	0	190
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0	5.0		5.0	5.0			4.0			4.0
Lane Util. Factor	1.00	0.95	1.00		0.95	1.00			0.88			0.88
Frt	1.00	1.00	0.85		1.00	0.85			0.85			0.85
Flt Protected	0.95	1.00	1.00		1.00	1.00			1.00			1.00
Satd. Flow (prot)	1752	3505	1568		3574	1599			2814			2814
Flt Permitted	0.95	1.00	1.00		1.00	1.00			1.00			1.00
Satd. Flow (perm)	1752	3505	1568		3574	1599			2814			2814
Peak-hour factor, PHF	0.91	0.91	0.91	0.95	0.95	0.95	1.00	1.00	1.00	0.85	0.85	0.85
Adj. Flow (vph)	82	1027	27	0	1463	474	0	0	305	0	0	224
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	82	1027	27	0	1463	474	0	0	305	0	0	224
Heavy Vehicles (%)	3%	3%	3%	1%	1%	1%	1%	1%	1%	1%	1%	1%
Turn Type	Prot		Perm	Prot		Perm			custom			custom
Protected Phases	5	2		1	6							7
Permitted Phases			2			6			1			5
Actuated Green, G (s)	9.1	89.4	89.4		96.3	96.3			17.0			19.7
Effective Green, g (s)	9.1	89.4	89.4		96.3	96.3			17.0			19.7
Actuated g/C Ratio	0.07	0.69	0.69		0.74	0.74			0.13			0.15
Clearance Time (s)	5.0	5.0	5.0		5.0	5.0			4.0			4.0
Vehicle Extension (s)	0.5	1.0	1.0		0.5	0.5			0.5			0.5
Lane Grp Cap (vph)	123	2410	1078		2648	1184			368			513
v/s Ratio Prot	0.05	0.29			c0.41							c0.04
v/s Ratio Perm			0.02			0.30			c0.11			0.04
v/c Ratio	0.67	0.43	0.03		0.55	0.40			0.83			0.44
Uniform Delay, d1	59.0	9.0	6.5		7.4	6.2			55.1			50.1
Progression Factor	1.41	0.97	0.43		1.00	1.00			1.00			1.00
Incremental Delay, d2	9.6	0.5	0.0		0.1	0.1			13.6			0.2
Delay (s)	93.0	9.2	2.8		7.5	6.3			68.7			50.3
Level of Service	F	A	A		A	A			E			D
Approach Delay (s)		15.1			7.2			68.7			50.3	
Approach LOS		B			A			E			D	

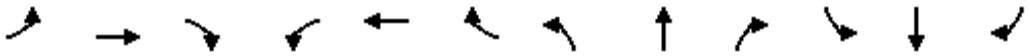
Intersection Summary			
HCM Average Control Delay	17.6	HCM Level of Service	B
HCM Volume to Capacity ratio	0.58		
Actuated Cycle Length (s)	130.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	52.6%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	525	715	235	1535	0	0	0	0	145	10	305
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	12	12	12	12	12	12	12	14	14
Total Lost time (s)		5.0	5.0	4.0	5.0						5.0	5.0
Lane Util. Factor		0.95	1.00	1.00	0.95						1.00	0.88
Frt		1.00	0.85	1.00	1.00						1.00	0.85
Flt Protected		1.00	1.00	0.95	1.00						0.96	1.00
Satd. Flow (prot)		3539	1583	1770	3539						1898	2972
Flt Permitted		1.00	1.00	0.95	1.00						0.96	1.00
Satd. Flow (perm)		3539	1583	1770	3539						1898	2972
Peak-hour factor, PHF	0.91	0.91	0.91	0.91	0.91	0.86	0.92	0.92	0.92	0.95	0.95	0.95
Adj. Flow (vph)	0	577	786	258	1687	0	0	0	0	153	11	321
RTOR Reduction (vph)	0	0	423	0	0	0	0	0	0	0	0	36
Lane Group Flow (vph)	0	577	363	258	1687	0	0	0	0	0	164	285
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	0%	0%	0%	2%	2%	2%
Turn Type			Perm	Prot						Prot		Perm
Protected Phases		2		1	6					7	4	
Permitted Phases			2									4
Actuated Green, G (s)		41.3	41.3	18.8	64.1						35.9	35.9
Effective Green, g (s)		41.3	41.3	18.8	64.1						35.9	35.9
Actuated g/C Ratio		0.38	0.38	0.17	0.58						0.33	0.33
Clearance Time (s)		5.0	5.0	4.0	5.0						5.0	5.0
Vehicle Extension (s)		2.0	2.0	0.5	2.0						0.5	0.5
Lane Grp Cap (vph)		1329	594	303	2062						619	970
v/s Ratio Prot		0.16		0.15	c0.48							
v/s Ratio Perm			0.23								0.09	c0.10
v/c Ratio		0.43	0.61	0.85	0.82						0.26	0.29
Uniform Delay, d1		25.6	27.8	44.2	18.3						27.3	27.6
Progression Factor		1.00	1.00	1.26	0.54						1.00	1.00
Incremental Delay, d2		1.0	4.6	11.6	2.1						0.1	0.1
Delay (s)		26.7	32.5	67.2	11.9						27.4	27.7
Level of Service		C	C	E	B						C	C
Approach Delay (s)		30.0			19.2			0.0			27.6	
Approach LOS		C			B			A			C	

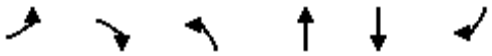
Intersection Summary			
HCM Average Control Delay	24.2	HCM Level of Service	C
HCM Volume to Capacity ratio	0.63		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	10.0
Intersection Capacity Utilization	77.5%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	145	525	0	0	695	90	1075	0	325	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	5.0			5.0		5.0	5.0	5.0			
Lane Util. Factor	1.00	0.95			0.95		0.95	0.95	1.00			
Frt	1.00	1.00			0.98		1.00	1.00	0.85			
Flt Protected	0.95	1.00			1.00		0.95	0.95	1.00			
Satd. Flow (prot)	1752	3505			3411		1681	1681	1583			
Flt Permitted	0.95	1.00			1.00		0.95	0.95	1.00			
Satd. Flow (perm)	1752	3505			3411		1681	1681	1583			
Peak-hour factor, PHF	0.92	0.92	0.92	0.90	0.90	0.90	0.90	0.90	0.90	0.92	0.92	0.92
Adj. Flow (vph)	158	571	0	0	772	100	1194	0	361	0	0	0
RTOR Reduction (vph)	0	0	0	0	9	0	0	0	133	0	0	0
Lane Group Flow (vph)	158	571	0	0	863	0	597	597	228	0	0	0
Heavy Vehicles (%)	3%	3%	3%	4%	4%	4%	2%	2%	2%	0%	0%	0%
Turn Type	Prot						Perm		Perm			
Protected Phases	5	2			6			8				
Permitted Phases							8		8			
Actuated Green, G (s)	12.9	56.4			39.5		43.6	43.6	43.6			
Effective Green, g (s)	12.9	56.4			39.5		43.6	43.6	43.6			
Actuated g/C Ratio	0.12	0.51			0.36		0.40	0.40	0.40			
Clearance Time (s)	4.0	5.0			5.0		5.0	5.0	5.0			
Vehicle Extension (s)	0.5	2.0			2.0		0.5	0.5	0.5			
Lane Grp Cap (vph)	205	1797			1225		666	666	627			
v/s Ratio Prot	c0.09	0.16			c0.25							
v/s Ratio Perm							c0.36	0.36	0.14			
v/c Ratio	0.77	0.32			0.70		0.90	0.90	0.36			
Uniform Delay, d1	47.1	15.6			30.2		31.1	31.1	23.4			
Progression Factor	0.64	0.72			1.00		1.00	1.00	1.00			
Incremental Delay, d2	1.5	0.0			3.4		14.3	14.3	0.1			
Delay (s)	31.8	11.2			33.7		45.4	45.4	23.5			
Level of Service	C	B			C		D	D	C			
Approach Delay (s)		15.7			33.7			40.3			0.0	
Approach LOS		B			C			D			A	

Intersection Summary			
HCM Average Control Delay	32.8	HCM Level of Service	C
HCM Volume to Capacity ratio	0.80		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	14.0
Intersection Capacity Utilization	77.5%	ICU Level of Service	D
Analysis Period (min)	15		

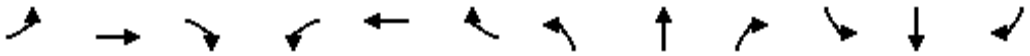
c Critical Lane Group



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (veh/h)	5	50	70	325	415	15
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.93	0.93	0.93	0.93
Hourly flow rate (vph)	5	54	75	349	446	16
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (ft)					898	
pX, platoon unblocked						
vC, conflicting volume	954	454	462			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	954	454	462			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	98	91	93			
cM capacity (veh/h)	267	606	1099			

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	60	425	462
Volume Left	5	75	0
Volume Right	54	0	16
cSH	543	1099	1700
Volume to Capacity	0.11	0.07	0.27
Queue Length 95th (ft)	9	6	0
Control Delay (s)	12.4	2.1	0.0
Lane LOS	B	A	
Approach Delay (s)	12.4	2.1	0.0
Approach LOS	B		

Intersection Summary			
Average Delay	1.7		
Intersection Capacity Utilization	57.1%	ICU Level of Service	B
Analysis Period (min)	15		

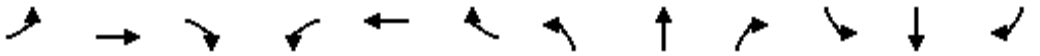


Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Volume (vph)	27	225	155	157	244	7	163	115	159	1	75	37
Peak Hour Factor	0.91	0.91	0.91	0.89	0.89	0.89	0.92	0.92	0.92	0.77	0.77	0.77
Hourly flow rate (vph)	30	247	170	176	274	8	177	125	173	1	97	48

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total (vph)	447	458	475	147
Volume Left (vph)	30	176	177	1
Volume Right (vph)	170	8	173	48
Hadj (s)	-0.16	0.10	-0.11	-0.18
Departure Headway (s)	7.8	8.0	7.8	9.3
Degree Utilization, x	0.97	1.02	1.03	0.38
Capacity (veh/h)	458	458	465	380
Control Delay (s)	62.6	76.5	78.0	17.9
Approach Delay (s)	62.6	76.5	78.0	17.9
Approach LOS	F	F	F	C

Intersection Summary				
Delay		67.3		
HCM Level of Service		F		
Intersection Capacity Utilization		86.2%	ICU Level of Service	E
Analysis Period (min)		15		

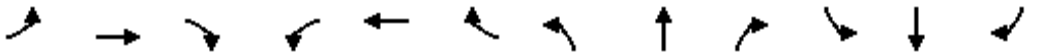
Appendix D
2020 Background Traffic Operations Worksheets



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	94	282	116	485	376	272	121	963	526	205	479	94
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0	5.0	5.0	5.0	4.5	4.5	6.0	5.0	4.5	6.0	
Lane Util. Factor	1.00	1.00	1.00	0.95	0.95	1.00	1.00	0.95	1.00	1.00	0.95	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.98	
Flt Protected	0.95	1.00	1.00	0.95	0.99	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1719	1810	1538	1665	1740	1568	1787	3574	1599	1736	3386	
Flt Permitted	0.95	1.00	1.00	0.95	0.99	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (perm)	1719	1810	1538	1665	1740	1568	1787	3574	1599	1736	3386	
Peak-hour factor, PHF	0.90	0.90	0.90	0.91	0.91	0.91	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	104	313	129	533	413	299	127	1014	554	216	504	99
RTOR Reduction (vph)	0	0	104	0	0	100	0	0	56	0	13	0
Lane Group Flow (vph)	104	313	25	464	482	199	127	1014	498	216	590	0
Heavy Vehicles (%)	5%	5%	5%	3%	3%	3%	1%	1%	1%	4%	4%	4%
Turn Type	Split		Perm	Split		pm+ov	Prot		pm+ov	Prot		
Protected Phases	7	7		8	8	1	5	2	8	1	6	
Permitted Phases			7			8			2			
Actuated Green, G (s)	25.2	25.2	25.2	24.9	24.9	43.5	11.6	40.8	65.7	18.6	47.8	
Effective Green, g (s)	25.2	25.2	25.2	24.9	24.9	43.5	11.6	40.8	65.7	18.6	47.8	
Actuated g/C Ratio	0.19	0.19	0.19	0.19	0.19	0.33	0.09	0.31	0.51	0.14	0.37	
Clearance Time (s)	5.0	5.0	5.0	5.0	5.0	4.5	4.5	6.0	5.0	4.5	6.0	
Vehicle Extension (s)	1.0	1.0	1.0	1.0	1.0	0.5	0.5	0.5	1.0	0.5	0.5	
Lane Grp Cap (vph)	333	351	298	319	333	525	159	1122	870	248	1245	
v/s Ratio Prot	0.06	c0.17		c0.28	0.28	0.05	0.07	c0.28	0.11	c0.12	0.17	
v/s Ratio Perm			0.02			0.07			0.20			
v/c Ratio	0.31	0.89	0.08	1.45	1.45	0.38	0.80	0.90	0.57	0.87	0.47	
Uniform Delay, d1	45.0	51.1	42.9	52.5	52.5	33.0	58.1	42.7	22.4	54.5	31.5	
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	0.2	23.0	0.0	221.2	217.5	0.2	22.3	11.8	0.6	25.9	1.3	
Delay (s)	45.2	74.1	43.0	273.8	270.1	33.1	80.4	54.6	22.9	80.5	32.8	
Level of Service	D	E	D	F	F	C	F	D	C	F	C	
Approach Delay (s)		61.2			214.6			46.2			45.3	
Approach LOS		E			F			D			D	

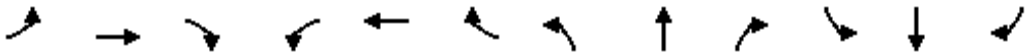
Intersection Summary			
HCM Average Control Delay	96.6	HCM Level of Service	F
HCM Volume to Capacity ratio	1.02		
Actuated Cycle Length (s)	130.0	Sum of lost time (s)	20.5
Intersection Capacity Utilization	93.2%	ICU Level of Service	F
Analysis Period (min)	15		

c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	61	864	17	33	1034	204	22	17	11	112	17	55
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	15	13	12	14	12	12	12	16	12	12	12	12
Total Lost time (s)	4.0	5.0		4.0	5.0			4.0			4.0	4.0
Lane Util. Factor	1.00	1.00		1.00	1.00			1.00			1.00	1.00
Frt	1.00	1.00		1.00	0.98			0.97			1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00			0.98			0.96	1.00
Satd. Flow (prot)	1947	1919		1888	1817			1911			1785	1583
Flt Permitted	0.95	1.00		0.95	1.00			0.80			0.77	1.00
Satd. Flow (perm)	1947	1919		1888	1817			1555			1433	1583
Peak-hour factor, PHF	0.96	0.96	0.96	0.95	0.95	0.95	0.85	0.85	0.85	0.85	0.85	0.85
Adj. Flow (vph)	64	900	18	35	1088	215	26	20	13	132	20	65
RTOR Reduction (vph)	0	1	0	0	5	0	0	11	0	0	0	56
Lane Group Flow (vph)	64	917	0	35	1298	0	0	48	0	0	152	9
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	7%	7%	7%	2%	2%	2%
Turn Type	Prot			Prot			Perm			Perm		Perm
Protected Phases	5	2		1	6			8			4	
Permitted Phases							8			4		4
Actuated Green, G (s)	5.2	60.1		3.3	58.2			12.5			12.5	12.5
Effective Green, g (s)	5.2	60.1		3.3	58.2			12.5			12.5	12.5
Actuated g/C Ratio	0.06	0.68		0.04	0.65			0.14			0.14	0.14
Clearance Time (s)	4.0	5.0		4.0	5.0			4.0			4.0	4.0
Vehicle Extension (s)	0.5	2.5		0.5	2.5			0.5			0.5	0.5
Lane Grp Cap (vph)	114	1297		70	1190			219			201	223
v/s Ratio Prot	c0.03	0.48		0.02	c0.71							
v/s Ratio Perm								0.03			c0.11	0.01
v/c Ratio	0.56	0.71		0.50	1.09			0.22			0.76	0.04
Uniform Delay, d1	40.7	8.9		42.0	15.4			33.9			36.7	33.0
Progression Factor	1.00	1.00		1.00	1.00			1.00			1.00	1.00
Incremental Delay, d2	3.7	1.7		2.0	54.4			0.2			13.4	0.0
Delay (s)	44.5	10.6		44.0	69.8			34.1			50.1	33.0
Level of Service	D	B		D	E			C			D	C
Approach Delay (s)		12.8			69.1			34.1			45.0	
Approach LOS		B			E			C			D	

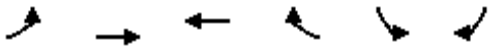
Intersection Summary			
HCM Average Control Delay	45.0	HCM Level of Service	D
HCM Volume to Capacity ratio	1.00		
Actuated Cycle Length (s)	88.9	Sum of lost time (s)	13.0
Intersection Capacity Utilization	87.6%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	88	783	11	17	1133	330	22	50	22	143	33	72
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	5.0		4.0	5.0		4.0	4.0	5.0	4.0	4.0	
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	1.00	1.00	1.00	1.00	
Frt	1.00	1.00		1.00	0.97		1.00	1.00	0.85	1.00	0.90	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1787	3567		1787	3453		1805	1900	1615	1787	1688	
Flt Permitted	0.10	1.00		0.32	1.00		0.68	1.00	1.00	0.45	1.00	
Satd. Flow (perm)	189	3567		604	3453		1287	1900	1615	849	1688	
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.85	0.85	0.85	0.85	0.85	0.85
Adj. Flow (vph)	93	824	12	18	1193	347	26	59	26	168	39	85
RTOR Reduction (vph)	0	1	0	0	16	0	0	0	8	0	62	0
Lane Group Flow (vph)	93	835	0	18	1524	0	26	59	18	168	62	0
Heavy Vehicles (%)	1%	1%	1%	1%	1%	1%	0%	0%	0%	1%	1%	1%
Turn Type	pm+pt			pm+pt			pm+pt		custom	pm+pt		
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases	2			6			8		2	4		
Actuated Green, G (s)	94.9	89.4		86.9	85.4		10.3	7.2	89.4	26.1	19.0	
Effective Green, g (s)	94.9	89.4		86.9	85.4		10.3	7.2	89.4	26.1	19.0	
Actuated g/C Ratio	0.73	0.69		0.67	0.66		0.08	0.06	0.69	0.20	0.15	
Clearance Time (s)	4.0	5.0		4.0	5.0		4.0	4.0	5.0	4.0	4.0	
Vehicle Extension (s)	0.5	0.5		0.5	0.5		0.5	0.5	0.5	0.5	0.5	
Lane Grp Cap (vph)	206	2453		417	2268		114	105	1111	278	247	
v/s Ratio Prot	c0.02	0.23		0.00	c0.44		0.01	0.03		c0.07	0.04	
v/s Ratio Perm	0.31			0.03			0.01		0.01	c0.05		
v/c Ratio	0.45	0.34		0.04	0.67		0.23	0.56	0.02	0.60	0.25	
Uniform Delay, d1	11.9	8.3		7.3	13.7		55.9	59.9	6.4	45.9	49.2	
Progression Factor	1.00	1.00		0.68	0.47		1.04	1.04	0.67	1.00	1.00	
Incremental Delay, d2	0.6	0.4		0.0	0.5		0.4	4.0	0.0	2.5	0.2	
Delay (s)	12.5	8.7		4.9	7.0		58.5	66.1	4.3	48.4	49.4	
Level of Service	B	A		A	A		E	E	A	D	D	
Approach Delay (s)		9.0			7.0			49.8			48.8	
Approach LOS		A			A			D			D	

Intersection Summary			
HCM Average Control Delay	13.5	HCM Level of Service	B
HCM Volume to Capacity ratio	0.64		
Actuated Cycle Length (s)	130.0	Sum of lost time (s)	13.0
Intersection Capacity Utilization	72.2%	ICU Level of Service	C
Analysis Period (min)	15		

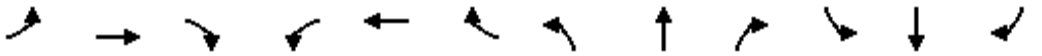
c Critical Lane Group



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↑↑	↑↑			
Volume (veh/h)	0	948	1479	0	0	0
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.85	0.85
Hourly flow rate (vph)	0	998	1557	0	0	0
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (ft)		320	348			
pX, platoon unblocked	0.70				0.74	0.70
vC, conflicting volume	1557				2056	778
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	928				1161	0
tC, single (s)	4.1				6.8	6.9
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	100				100	100
cM capacity (veh/h)	510				140	755

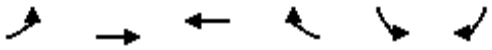
Direction, Lane #	EB 1	EB 2	WB 1	WB 2
Volume Total	499	499	778	778
Volume Left	0	0	0	0
Volume Right	0	0	0	0
cSH	1700	1700	1700	1700
Volume to Capacity	0.29	0.29	0.46	0.46
Queue Length 95th (ft)	0	0	0	0
Control Delay (s)	0.0	0.0	0.0	0.0
Lane LOS				
Approach Delay (s)	0.0		0.0	
Approach LOS				

Intersection Summary			
Average Delay	0.0		
Intersection Capacity Utilization	44.2%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	167	770	11	424	1368	17	6	83	323	189	108	106
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	12	12	12	12	12	12	13	12	12
Total Lost time (s)	4.0	5.0		4.0	5.0		4.0	5.0	5.0	4.0	5.0	5.0
Lane Util. Factor	0.97	0.95		0.97	0.95		1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00		1.00	1.00		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	3367	3464		3467	3568		1770	1863	1583	1793	1827	1553
Flt Permitted	0.95	1.00		0.95	1.00		0.68	1.00	1.00	0.49	1.00	1.00
Satd. Flow (perm)	3367	3464		3467	3568		1273	1863	1583	924	1827	1553
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)	176	811	12	446	1440	18	6	87	340	199	114	112
RTOR Reduction (vph)	0	1	0	0	0	0	0	0	171	0	0	48
Lane Group Flow (vph)	176	822	0	446	1458	0	6	87	169	199	114	64
Heavy Vehicles (%)	4%	4%	4%	1%	1%	1%	2%	2%	2%	4%	4%	4%
Turn Type	Prot			Prot			pm+pt		custom	pm+pt		custom
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases							8		2	4		6
Actuated Green, G (s)	9.8	64.6		20.0	74.8		13.4	12.5	64.6	31.4	26.5	74.8
Effective Green, g (s)	9.8	64.6		20.0	74.8		13.4	12.5	64.6	31.4	26.5	74.8
Actuated g/C Ratio	0.08	0.50		0.15	0.58		0.10	0.10	0.50	0.24	0.20	0.58
Clearance Time (s)	4.0	5.0		4.0	5.0		4.0	5.0	5.0	4.0	5.0	5.0
Vehicle Extension (s)	0.5	0.5		0.5	0.5		0.5	0.5	0.5	0.5	0.5	0.5
Lane Grp Cap (vph)	254	1721		533	2053		135	179	787	323	372	894
v/s Ratio Prot	0.05	0.24		c0.13	c0.41		0.00	0.05		c0.07	0.06	
v/s Ratio Perm							0.00		0.11	c0.08		0.04
v/c Ratio	0.69	0.48		0.84	0.71		0.04	0.49	0.21	0.62	0.31	0.07
Uniform Delay, d1	58.6	21.6		53.4	19.8		52.5	55.7	18.4	42.2	43.9	12.2
Progression Factor	1.19	0.91		1.01	1.09		1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	6.1	0.9		8.5	0.7		0.0	0.8	0.6	2.5	0.2	0.0
Delay (s)	76.1	20.5		62.5	22.4		52.5	56.5	19.0	44.6	44.1	12.2
Level of Service	E	C		E	C		D	E	B	D	D	B
Approach Delay (s)		30.3			31.8			27.0			36.0	
Approach LOS		C			C			C			D	

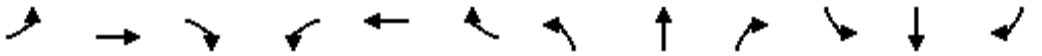
Intersection Summary			
HCM Average Control Delay	31.3	HCM Level of Service	C
HCM Volume to Capacity ratio	0.68		
Actuated Cycle Length (s)	130.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	71.9%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (veh/h)	0	1282	1808	0	0	0
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.85	0.85
Hourly flow rate (vph)	0	1349	1903	0	0	0
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (ft)		390	321			
pX, platoon unblocked	0.74				0.82	0.74
vC, conflicting volume	1903				2578	952
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1521				1636	238
tC, single (s)	4.1				6.8	6.9
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	100				100	100
cM capacity (veh/h)	322				75	566

Direction, Lane #	EB 1	EB 2	WB 1	WB 2
Volume Total	675	675	952	952
Volume Left	0	0	0	0
Volume Right	0	0	0	0
cSH	1700	1700	1700	1700
Volume to Capacity	0.40	0.40	0.56	0.56
Queue Length 95th (ft)	0	0	0	0
Control Delay (s)	0.0	0.0	0.0	0.0
Lane LOS				
Approach Delay (s)	0.0		0.0	
Approach LOS				

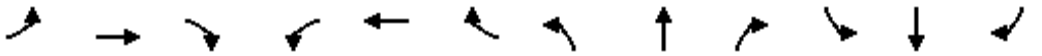
Intersection Summary			
Average Delay	0.0		
Intersection Capacity Utilization	53.3%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	93	997	193	190	1429	647	0	0	655	0	0	379
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0	5.0	4.0	5.0	5.0			4.0			4.0
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00			0.88			0.88
Frt	1.00	1.00	0.85	1.00	1.00	0.85			0.85			0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00			1.00			1.00
Satd. Flow (prot)	1752	3505	1568	1787	3574	1599			2814			2814
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00			1.00			1.00
Satd. Flow (perm)	1752	3505	1568	1787	3574	1599			2814			2814
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	1.00	1.00	1.00	0.85	0.85	0.85
Adj. Flow (vph)	98	1049	203	200	1504	681	0	0	655	0	0	446
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	98	1049	203	200	1504	681	0	0	655	0	0	446
Heavy Vehicles (%)	3%	3%	3%	1%	1%	1%	1%	1%	1%	1%	1%	1%
Turn Type	Prot		Perm	Prot		Perm			custom			custom
Protected Phases	5	2		1	6							7
Permitted Phases			2			6			1			5
Actuated Green, G (s)	10.6	63.5	63.5	33.6	85.5	85.5			33.6			30.5
Effective Green, g (s)	10.6	63.5	63.5	33.6	85.5	85.5			33.6			30.5
Actuated g/C Ratio	0.08	0.49	0.49	0.26	0.66	0.66			0.26			0.23
Clearance Time (s)	5.0	5.0	5.0	4.0	5.0	5.0			4.0			4.0
Vehicle Extension (s)	0.5	1.0	1.0	0.5	0.5	0.5			0.5			0.5
Lane Grp Cap (vph)	143	1712	766	462	2351	1052			727			747
v/s Ratio Prot	0.06	0.30		0.11	0.42							c0.09
v/s Ratio Perm			0.13			c0.43			c0.23			0.07
v/c Ratio	0.69	0.61	0.27	0.43	0.64	0.65			0.90			0.60
Uniform Delay, d1	58.1	24.3	19.5	40.2	13.1	13.3			46.6			44.3
Progression Factor	1.12	1.06	0.98	1.00	1.00	1.00			1.00			1.00
Incremental Delay, d2	9.4	1.5	0.8	0.2	0.4	1.0			14.0			0.9
Delay (s)	74.2	27.1	20.0	40.5	13.6	14.3			60.6			45.1
Level of Service	E	C	B	D	B	B			E			D
Approach Delay (s)		29.5			16.0			60.6			45.1	
Approach LOS		C			B			E			D	

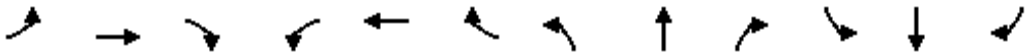
Intersection Summary			
HCM Average Control Delay	28.5	HCM Level of Service	C
HCM Volume to Capacity ratio	0.70		
Actuated Cycle Length (s)	130.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	60.3%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	707	945	259	1870	0	0	0	0	161	11	398
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	12	12	12	12	12	12	12	14	14
Total Lost time (s)		5.0	5.0	4.0	5.0						5.0	5.0
Lane Util. Factor		0.95	0.88	0.97	0.95						1.00	0.88
Frt		1.00	0.85	1.00	1.00						1.00	0.85
Flt Protected		1.00	1.00	0.95	1.00						0.96	1.00
Satd. Flow (prot)		3539	2787	3433	3539						1898	2972
Flt Permitted		1.00	1.00	0.95	1.00						0.96	1.00
Satd. Flow (perm)		3539	2787	3433	3539						1898	2972
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	744	995	273	1968	0	0	0	0	169	12	419
RTOR Reduction (vph)	0	0	512	0	0	0	0	0	0	0	0	19
Lane Group Flow (vph)	0	744	483	273	1968	0	0	0	0	0	181	400
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	0%	0%	0%	2%	2%	2%
Turn Type			Perm	Prot						Prot		Perm
Protected Phases		2		1	6					7	4	
Permitted Phases			2									4
Actuated Green, G (s)		53.4	53.4	11.1	68.5						31.5	31.5
Effective Green, g (s)		53.4	53.4	11.1	68.5						31.5	31.5
Actuated g/C Ratio		0.49	0.49	0.10	0.62						0.29	0.29
Clearance Time (s)		5.0	5.0	4.0	5.0						5.0	5.0
Vehicle Extension (s)		2.0	2.0	0.5	2.0						0.5	0.5
Lane Grp Cap (vph)		1718	1353	346	2204						544	851
v/s Ratio Prot		0.21		0.08	c0.56							
v/s Ratio Perm			0.17								0.10	c0.13
v/c Ratio		0.43	0.36	0.79	0.89						0.33	0.47
Uniform Delay, d1		18.4	17.6	48.3	17.6						31.0	32.4
Progression Factor		1.00	1.00	1.09	0.44						1.00	1.00
Incremental Delay, d2		0.8	0.7	2.8	1.6						0.1	0.2
Delay (s)		19.2	18.4	55.5	9.4						31.1	32.5
Level of Service		B	B	E	A						C	C
Approach Delay (s)		18.7			15.0			0.0			32.1	
Approach LOS		B			B			A			C	

Intersection Summary			
HCM Average Control Delay	18.7	HCM Level of Service	B
HCM Volume to Capacity ratio	0.76		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	10.0
Intersection Capacity Utilization	85.9%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	220	647	0	0	819	99	1310	0	248	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	5.0			5.0		5.0	5.0	5.0			
Lane Util. Factor	1.00	0.95			0.95		0.95	0.95	1.00			
Frt	1.00	1.00			0.98		1.00	1.00	0.85			
Flt Protected	0.95	1.00			1.00		0.95	0.95	1.00			
Satd. Flow (prot)	1752	3505			3415		1681	1681	1583			
Flt Permitted	0.95	1.00			1.00		0.95	0.95	1.00			
Satd. Flow (perm)	1752	3505			3415		1681	1681	1583			
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)	232	681	0	0	862	104	1379	0	261	0	0	0
RTOR Reduction (vph)	0	0	0	0	8	0	0	0	87	0	0	0
Lane Group Flow (vph)	232	681	0	0	958	0	689	690	174	0	0	0
Heavy Vehicles (%)	3%	3%	3%	4%	4%	4%	2%	2%	2%	0%	0%	0%
Turn Type	Prot						Perm		Perm			
Protected Phases	5	2			6			8				
Permitted Phases							8		8			
Actuated Green, G (s)	17.0	59.6			38.6		40.4	40.4	40.4			
Effective Green, g (s)	17.0	59.6			38.6		40.4	40.4	40.4			
Actuated g/C Ratio	0.15	0.54			0.35		0.37	0.37	0.37			
Clearance Time (s)	4.0	5.0			5.0		5.0	5.0	5.0			
Vehicle Extension (s)	0.5	2.0			2.0		0.5	0.5	0.5			
Lane Grp Cap (vph)	271	1899			1198		617	617	581			
v/s Ratio Prot	c0.13	0.19			c0.28							
v/s Ratio Perm							0.41	0.41	0.11			
v/c Ratio	0.86	0.36			0.80		1.12	1.12	0.30			
Uniform Delay, d1	45.3	14.3			32.2		34.8	34.8	24.7			
Progression Factor	0.73	1.02			1.00		1.00	1.00	1.00			
Incremental Delay, d2	2.5	0.0			5.6		72.7	73.3	0.1			
Delay (s)	35.8	14.7			37.8		107.5	108.1	24.8			
Level of Service	D	B			D		F	F	C			
Approach Delay (s)		20.1			37.8			94.6			0.0	
Approach LOS		C			D			F			A	

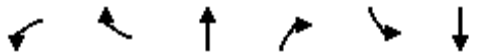
Intersection Summary			
HCM Average Control Delay	59.7	HCM Level of Service	E
HCM Volume to Capacity ratio	0.94		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	14.0
Intersection Capacity Utilization	85.9%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations			↑			↑
Volume (veh/h)	0	0	446	0	0	248
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.85	0.85	0.85	0.85	0.85	0.85
Hourly flow rate (vph)	0	0	525	0	0	292
Pedestrians	468					
Lane Width (ft)	0.0					
Walking Speed (ft/s)	4.0					
Percent Blockage	0					
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (ft)			356			
pX, platoon unblocked	0.98	0.98			0.98	
vC, conflicting volume	1284	993			993	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1280	983			983	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	100	100			100	
cM capacity (veh/h)	179	296			689	

Direction, Lane #	NB 1	SB 1
Volume Total	525	292
Volume Left	0	0
Volume Right	0	0
cSH	1700	1700
Volume to Capacity	0.31	0.17
Queue Length 95th (ft)	0	0
Control Delay (s)	0.0	0.0
Lane LOS		
Approach Delay (s)	0.0	0.0
Approach LOS		

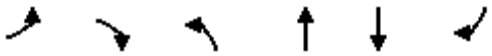
Intersection Summary			
Average Delay	0.0		
Intersection Capacity Utilization	26.8%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations			↑			↑
Volume (veh/h)	0	0	94	0	0	61
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.85	0.85	0.85	0.85	0.85	0.85
Hourly flow rate (vph)	0	0	111	0	0	72
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (ft)						259
pX, platoon unblocked						
vC, conflicting volume	182	111			111	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	182	111			111	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	100	100			100	
cM capacity (veh/h)	807	943			1479	

Direction, Lane #	NB 1	SB 1
Volume Total	111	72
Volume Left	0	0
Volume Right	0	0
cSH	1700	1700
Volume to Capacity	0.07	0.04
Queue Length 95th (ft)	0	0
Control Delay (s)	0.0	0.0
Lane LOS		
Approach Delay (s)	0.0	0.0
Approach LOS		

Intersection Summary			
Average Delay	0.0		
Intersection Capacity Utilization	8.3%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (veh/h)	6	55	77	412	526	17
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.85	0.85	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	7	65	86	458	584	19
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (ft)					777	
pX, platoon unblocked	0.98	0.98	0.98			
vC, conflicting volume	1223	594	603			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1217	574	584			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	96	87	91			
cM capacity (veh/h)	178	507	970			

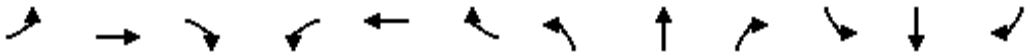
Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	72	543	603
Volume Left	7	86	0
Volume Right	65	0	19
cSH	429	970	1700
Volume to Capacity	0.17	0.09	0.35
Queue Length 95th (ft)	15	7	0
Control Delay (s)	15.1	2.4	0.0
Lane LOS	C	A	
Approach Delay (s)	15.1	2.4	0.0
Approach LOS	C		

Intersection Summary			
Average Delay	1.9		
Intersection Capacity Utilization	68.4%	ICU Level of Service	C
Analysis Period (min)	15		

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations			↑↑			↑↑
Volume (veh/h)	0	0	436	0	0	542
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.85	0.85	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	0	0	484	0	0	602
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (ft)						442
pX, platoon unblocked						
vC, conflicting volume	786	242			484	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	786	242			484	
tC, single (s)	6.8	6.9			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	100	100			100	
cM capacity (veh/h)	329	759			1075	

Direction, Lane #	NB 1	NB 2	SB 1	SB 2
Volume Total	242	242	301	301
Volume Left	0	0	0	0
Volume Right	0	0	0	0
cSH	1700	1700	1700	1700
Volume to Capacity	0.14	0.14	0.18	0.18
Queue Length 95th (ft)	0	0	0	0
Control Delay (s)	0.0	0.0	0.0	0.0
Lane LOS				
Approach Delay (s)	0.0		0.0	
Approach LOS				

Intersection Summary			
Average Delay	0.0		
Intersection Capacity Utilization	18.3%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	0	0	0	0	0	0	0	267	0	0	402	0
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	0	0	0	0	0	0	0	281	0	0	423	0
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)								859				
pX, platoon unblocked	1.00	1.00		1.00	1.00	1.00				1.00		
vC, conflicting volume	704	704	423	704	704	281	423			281		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	704	704	423	704	704	280	423			280		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	100	100	100	100	100	100	100			100		
cM capacity (veh/h)	352	361	631	352	361	758	1136			1282		

Direction, Lane #	NB 1	SB 1
Volume Total	281	423
Volume Left	0	0
Volume Right	0	0
cSH	1700	1700
Volume to Capacity	0.17	0.25
Queue Length 95th (ft)	0	0
Control Delay (s)	0.0	0.0
Lane LOS		
Approach Delay (s)	0.0	0.0
Approach LOS		

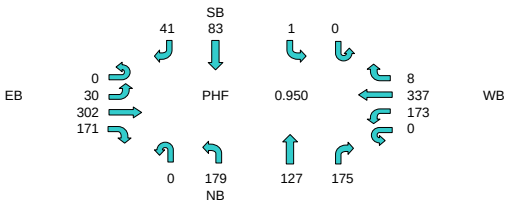
Intersection Summary				
Average Delay	0.0			
Intersection Capacity Utilization	24.5%	ICU Level of Service	A	
Analysis Period (min)	15			

Project	Keizer Station Area "B"
Location	Keizer, Oregon
Scenario	2020
Filename	H:\projfile\10745 - Keizer Station Area B-C Master Plan\Synchro\Outputs\[2020 Roundabout.xls]Summary
Analyst	KAI
Date	11-Aug-10

FHWA 2000 Urban Compact	1	A
FHWA 2000 Single Lane	2	B
FHWA 2000 Double Lane	3	C
British (Kimber)	4	D
HCM 2000 Upper	5	E
HCM 2000 Lower	6	F
NCHRP 3-65 1 circ lane	7	G
NCHRP 3-65 2 circ lane	8	H
EXISTING (2020 Back) (DEFAUL	1	E
FUTURE (2020 Total)	2	F
GROWTH ()	3	G
INTERPOLATED (2015)	4	I
PERIOD 1 (Thursday P.M.) (DEF.	1	
PERIOD 2 (Friday P.M.)	2	
METRIC (DEFAULT)	1	M
US CUSTOMARY	2	U
YES	Y	
NO	N	

Turning movement year/source: EXISTING (2020 Back) (DEFAULT)

Time period: PERIOD 1 (Thursday P.M.) (DEFAULT)



	NB	SB	EB	WB
Model	NCHRP 3-65 1 circ lane	NCHRP 3-65 1 circ lane	NCHRP 3-65 1 circ lane	NCHRP 3-65 1 circ lane
Fleet mix				
SU/bus	0%	0%	0%	0%
Combo	3%	4%	2%	3%
Bike/motorcycle	0%	0%	0%	0%
# Conflicting Peds (0=ignore)	0	0	0	0
RT bypass?	N	N	N	y
For FHWA Double only (ignored for all others):				
Single-lane or short-lane approach?	Y	Y	Y	Y
Length (veh) (0=single lane)	0	0	0	0

British Parameters (only used if B option selected above)

Units: US CUSTOMARY

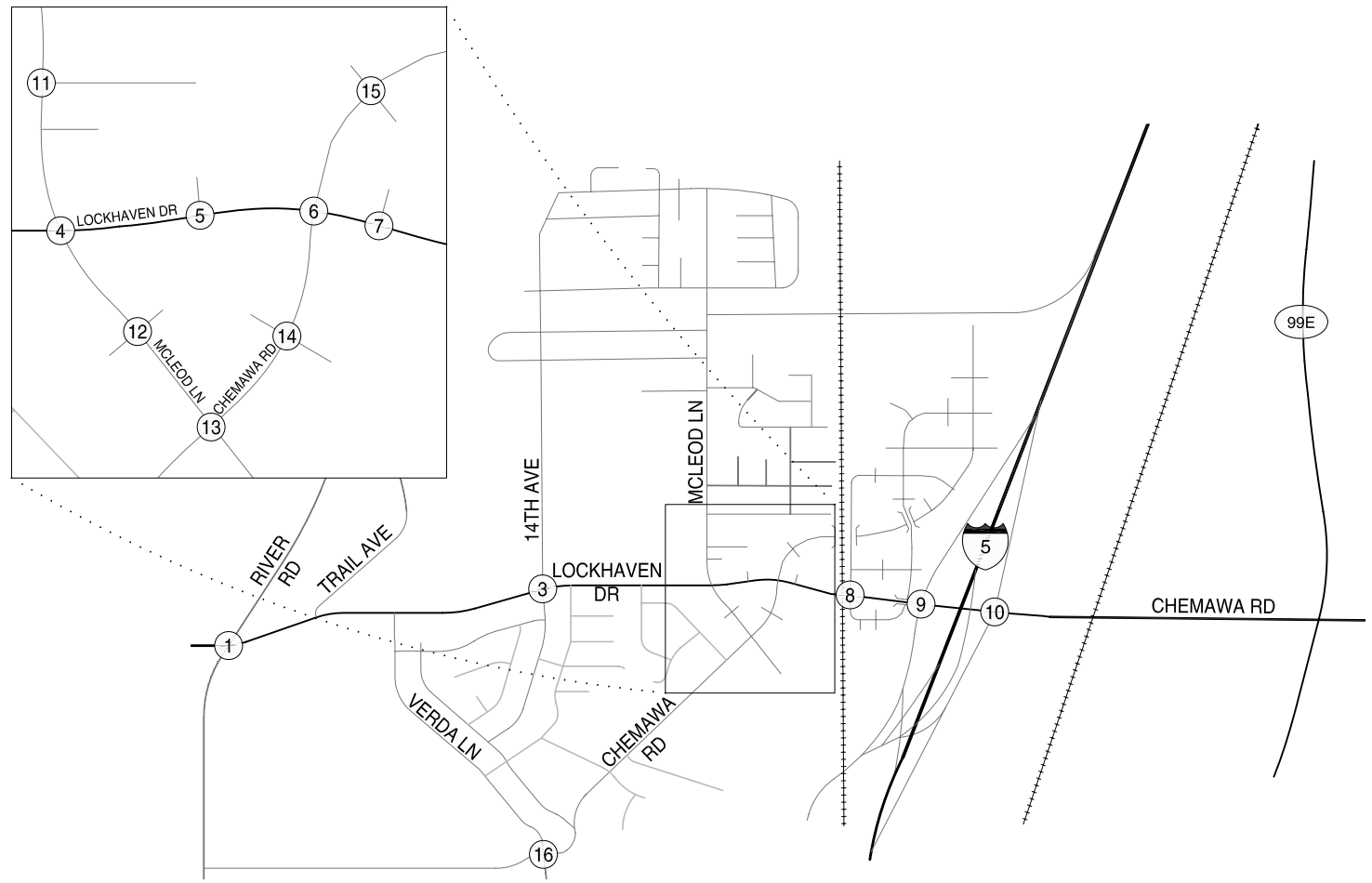
	NB	SB	EB	WB
Inscribed circle diameter, D (ft)	55	55	55	55
Entry radius, r (ft)	20	20	20	20
Entry angle, phi (deg)	30	30	30	30
Approach half width, v (ft)	8	8	8	8
Entry width, e (ft)	8	8	8	8
Effective flare length, l' (ft)	40	40	40	40

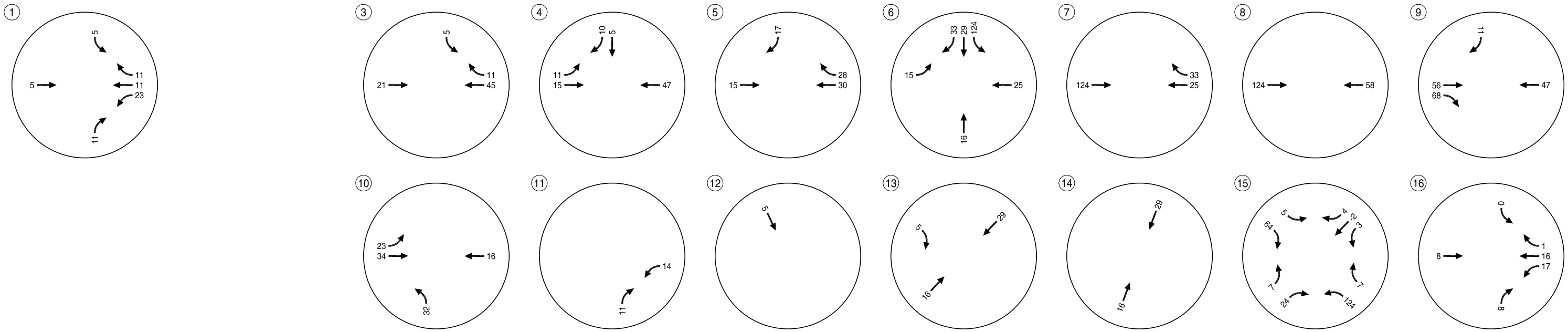
Summary of results:

Approach/entry	**NB**	**SB**	**EB**	**WB**	**Overall**
Entering volume (pce)	522	137	540	553	
Critical lane (pce)					
Non-critical lane (pce)					
Conflicting volume (pce)	358	747	280	364	
Adjusted capacity (pce)	790	535	854	785	
Adjusted capacity (veh)					
Volume-to-capacity ratio	0.66	0.26	0.63	0.70	
Control delay (sec/veh)	12.9	9.0	11.2	14.7	12.6
Approach average queue (veh)	1.9	0.3	1.7	2.3	
Approach 95%ile queue (veh)	5.1	1.0	4.6	5.9	
Adjacent exit	**(SB)**	**(NB)**	**(WB)**	**(EB)**	
Adjacent exit volume (pce)	462	170	604	515	
Assumed exit cap'y (pce/lane)	1200	1200	1200	1200	
Number of lanes required	1	1	1	1	

Appendix E
Trip Assignment Summary Worksheets

(NO SCALE)

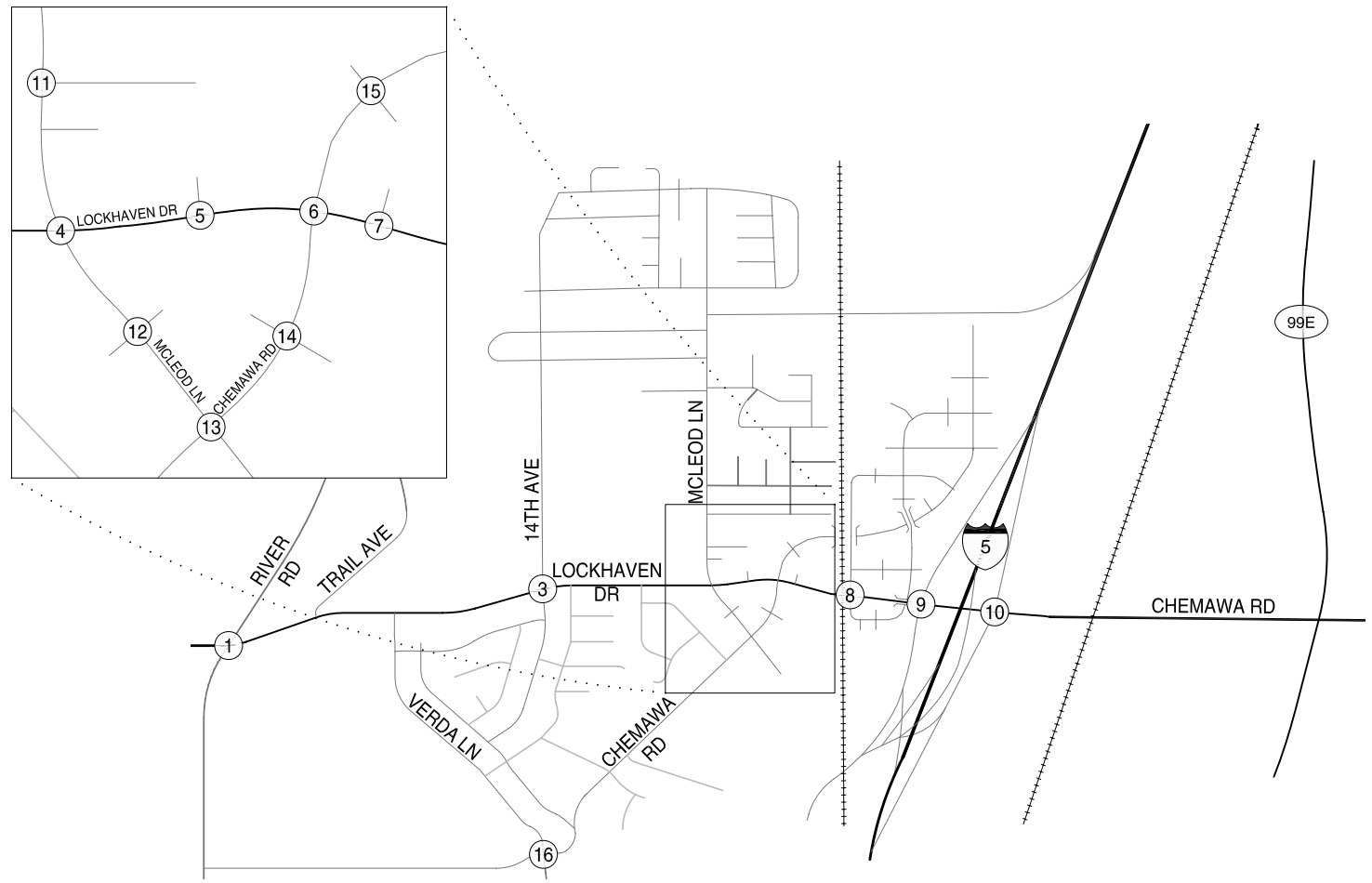


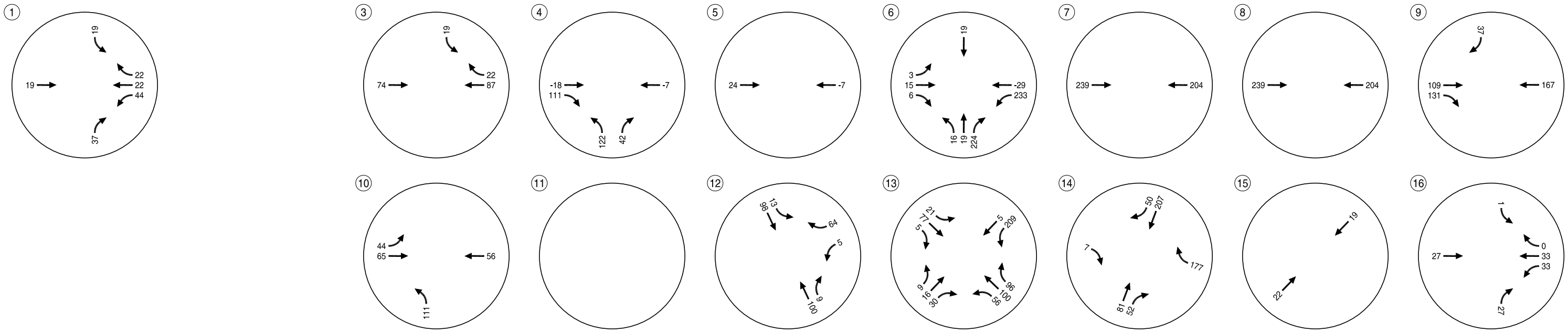


SUMMARY OF AREA "B" NET NEW TRIPS
WEEKDAY PM PEAK HOUR
KEIZER, OREGON

FIGURE
E-1

(NO SCALE)





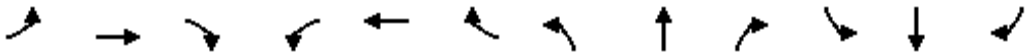
SUMMARY OF AREA "C" NET NEW TRIPS
WEEKDAY PM PEAK HOUR
KEIZER, OREGON

FIGURE
E-2

KITTELSON & ASSOCIATES, INC.
TRANSPORTATION ENGINEERING / PLANNING

Appendix F

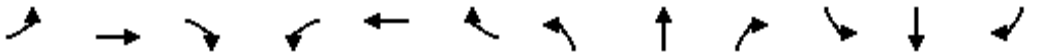
Year 2020 Total Traffic Operations Worksheets



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	94	306	116	551	409	305	121	963	574	229	479	94
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0	5.0	5.0	5.0	4.5	4.5	6.0	5.0	4.5	6.0	
Lane Util. Factor	1.00	1.00	1.00	0.95	0.95	1.00	1.00	0.95	1.00	1.00	0.95	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.98	
Flt Protected	0.95	1.00	1.00	0.95	0.99	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1719	1810	1538	1665	1738	1568	1787	3574	1599	1736	3386	
Flt Permitted	0.95	1.00	1.00	0.95	0.99	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (perm)	1719	1810	1538	1665	1738	1568	1787	3574	1599	1736	3386	
Peak-hour factor, PHF	0.90	0.90	0.90	0.91	0.91	0.91	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	104	340	129	605	449	335	127	1014	604	241	504	99
RTOR Reduction (vph)	0	0	104	0	0	100	0	0	46	0	13	0
Lane Group Flow (vph)	104	340	25	514	540	235	127	1014	558	241	590	0
Heavy Vehicles (%)	5%	5%	5%	3%	3%	3%	1%	1%	1%	4%	4%	4%
Turn Type	Split		Perm	Split		pm+ov	Prot		pm+ov	Prot		
Protected Phases	7	7		8	8	1	5	2	8	1	6	
Permitted Phases			7			8			2			
Actuated Green, G (s)	25.1	25.1	25.1	22.0	22.0	43.6	11.6	40.8	62.8	21.6	50.8	
Effective Green, g (s)	25.1	25.1	25.1	22.0	22.0	43.6	11.6	40.8	62.8	21.6	50.8	
Actuated g/C Ratio	0.19	0.19	0.19	0.17	0.17	0.34	0.09	0.31	0.48	0.17	0.39	
Clearance Time (s)	5.0	5.0	5.0	5.0	5.0	4.5	4.5	6.0	5.0	4.5	6.0	
Vehicle Extension (s)	1.0	1.0	1.0	1.0	1.0	0.5	0.5	0.5	1.0	0.5	0.5	
Lane Grp Cap (vph)	332	349	297	282	294	526	159	1122	834	288	1323	
v/s Ratio Prot	0.06	c0.19		0.31	c0.31	0.07	0.07	c0.28	0.11	c0.14	0.17	
v/s Ratio Perm			0.02			0.08			0.24			
v/c Ratio	0.31	0.97	0.08	1.82	1.84	0.45	0.80	0.90	0.67	0.84	0.45	
Uniform Delay, d1	45.0	52.1	43.0	54.0	54.0	33.8	58.1	42.7	25.7	52.5	29.2	
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	0.2	40.8	0.0	383.9	389.5	0.2	22.3	11.8	1.6	17.9	1.1	
Delay (s)	45.2	92.9	43.1	437.9	443.5	34.0	80.4	54.6	27.3	70.4	30.3	
Level of Service	D	F	D	F	F	C	F	D	C	E	C	
Approach Delay (s)		73.1			342.7			47.0			41.8	
Approach LOS		E			F			D			D	

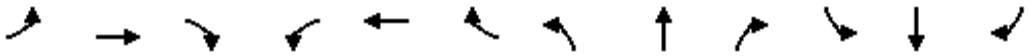
Intersection Summary			
HCM Average Control Delay	139.5	HCM Level of Service	F
HCM Volume to Capacity ratio	1.09		
Actuated Cycle Length (s)	130.0	Sum of lost time (s)	20.5
Intersection Capacity Utilization	98.5%	ICU Level of Service	F
Analysis Period (min)	15		

c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	61	959	17	33	1166	237	22	17	11	136	17	55
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	15	13	12	14	12	12	12	16	12	12	12	12
Total Lost time (s)	4.0	5.0		4.0	5.0			4.0			4.0	4.0
Lane Util. Factor	1.00	1.00		1.00	1.00			1.00			1.00	1.00
Frt	1.00	1.00		1.00	0.97			0.97			1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00			0.98			0.96	1.00
Satd. Flow (prot)	1947	1920		1888	1816			1911			1783	1583
Flt Permitted	0.95	1.00		0.95	1.00			0.77			0.76	1.00
Satd. Flow (perm)	1947	1920		1888	1816			1501			1414	1583
Peak-hour factor, PHF	0.96	0.96	0.96	0.95	0.95	0.95	0.85	0.85	0.85	0.85	0.85	0.85
Adj. Flow (vph)	64	999	18	35	1227	249	26	20	13	160	20	65
RTOR Reduction (vph)	0	0	0	0	6	0	0	11	0	0	0	55
Lane Group Flow (vph)	64	1017	0	35	1470	0	0	48	0	0	180	10
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	7%	7%	7%	2%	2%	2%
Turn Type	Prot			Prot			Perm			Perm		Perm
Protected Phases	5	2		1	6			8			4	
Permitted Phases							8			4		4
Actuated Green, G (s)	5.3	60.1		3.3	58.1			14.3			14.3	14.3
Effective Green, g (s)	5.3	60.1		3.3	58.1			14.3			14.3	14.3
Actuated g/C Ratio	0.06	0.66		0.04	0.64			0.16			0.16	0.16
Clearance Time (s)	4.0	5.0		4.0	5.0			4.0			4.0	4.0
Vehicle Extension (s)	0.5	2.5		0.5	2.5			0.5			0.5	0.5
Lane Grp Cap (vph)	114	1272		69	1163			237			223	250
v/s Ratio Prot	c0.03	0.53		0.02	c0.81							
v/s Ratio Perm								0.03			c0.13	0.01
v/c Ratio	0.56	0.80		0.51	1.26			0.20			0.81	0.04
Uniform Delay, d1	41.6	11.0		42.9	16.3			33.2			36.9	32.4
Progression Factor	1.00	1.00		1.00	1.00			1.00			1.00	1.00
Incremental Delay, d2	3.7	3.5		2.1	125.9			0.2			17.9	0.0
Delay (s)	45.3	14.5		45.0	142.2			33.4			54.8	32.4
Level of Service	D	B		D	F			C			D	C
Approach Delay (s)		16.3			139.9			33.4			48.9	
Approach LOS		B			F			C			D	

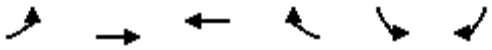
Intersection Summary			
HCM Average Control Delay	83.9	HCM Level of Service	F
HCM Volume to Capacity ratio	1.13		
Actuated Cycle Length (s)	90.7	Sum of lost time (s)	13.0
Intersection Capacity Utilization	98.4%	ICU Level of Service	F
Analysis Period (min)	15		
c Critical Lane Group			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	99	780	122	17	1172	330	144	50	64	143	38	82
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	5.0		4.0	5.0		4.0	4.0	5.0	4.0	4.0	
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	1.00	1.00	1.00	1.00	
Frt	1.00	0.98		1.00	0.97		1.00	1.00	0.85	1.00	0.90	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1787	3502		1787	3457		1805	1900	1615	1787	1689	
Flt Permitted	0.09	1.00		0.28	1.00		0.52	1.00	1.00	0.52	1.00	
Satd. Flow (perm)	168	3502		527	3457		987	1900	1615	982	1689	
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.85	0.85	0.85	0.85	0.85	0.85
Adj. Flow (vph)	104	821	128	18	1234	347	169	59	75	168	45	96
RTOR Reduction (vph)	0	7	0	0	16	0	0	0	24	0	65	0
Lane Group Flow (vph)	104	942	0	18	1565	0	169	59	51	168	76	0
Heavy Vehicles (%)	1%	1%	1%	1%	1%	1%	0%	0%	0%	1%	1%	1%
Turn Type	pm+pt			pm+pt			pm+pt		custom	pm+pt		
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases	2			6			8		2	4		
Actuated Green, G (s)	94.3	88.8		85.4	83.9		20.0	7.7	88.8	25.4	10.4	
Effective Green, g (s)	94.3	88.8		85.4	83.9		20.0	7.7	88.8	25.4	10.4	
Actuated g/C Ratio	0.73	0.68		0.66	0.65		0.15	0.06	0.68	0.20	0.08	
Clearance Time (s)	4.0	5.0		4.0	5.0		4.0	4.0	5.0	4.0	4.0	
Vehicle Extension (s)	0.5	0.5		0.5	0.5		0.5	0.5	0.5	0.5	0.5	
Lane Grp Cap (vph)	202	2392		361	2231		229	113	1103	285	135	
v/s Ratio Prot	c0.03	0.27		0.00	c0.45		c0.07	0.03		c0.07	0.04	
v/s Ratio Perm	0.35			0.03			0.04		0.03	c0.05		
v/c Ratio	0.51	0.39		0.05	0.70		0.74	0.52	0.05	0.59	0.56	
Uniform Delay, d1	14.0	8.9		7.9	14.9		51.4	59.4	6.7	46.5	57.6	
Progression Factor	1.00	1.00		0.43	0.38		1.02	1.02	0.97	1.00	1.00	
Incremental Delay, d2	0.9	0.5		0.0	0.6		10.0	2.0	0.1	2.0	3.1	
Delay (s)	14.9	9.4		3.4	6.3		62.3	62.8	6.6	48.5	60.7	
Level of Service	B	A		A	A		E	E	A	D	E	
Approach Delay (s)		10.0			6.2			48.6			54.1	
Approach LOS		A			A			D			D	

Intersection Summary			
HCM Average Control Delay	15.9	HCM Level of Service	B
HCM Volume to Capacity ratio	0.69		
Actuated Cycle Length (s)	130.0	Sum of lost time (s)	17.0
Intersection Capacity Utilization	73.9%	ICU Level of Service	D
Analysis Period (min)	15		

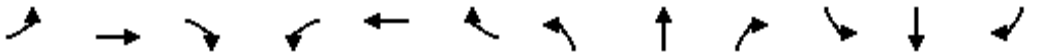
c Critical Lane Group



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (veh/h)	0	987	1501	28	0	17
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.85	0.85
Hourly flow rate (vph)	0	1039	1580	29	0	20
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (ft)		320	348			
pX, platoon unblocked	0.65				0.71	0.65
vC, conflicting volume	1609				2114	805
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	865				1059	0
tC, single (s)	4.1				6.8	6.9
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	100				100	97
cM capacity (veh/h)	504				155	706

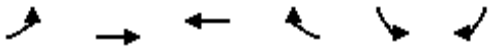
Direction, Lane #	EB 1	EB 2	WB 1	WB 2	SB 1
Volume Total	519	519	1053	556	20
Volume Left	0	0	0	0	0
Volume Right	0	0	0	29	20
cSH	1700	1700	1700	1700	706
Volume to Capacity	0.31	0.31	0.62	0.33	0.03
Queue Length 95th (ft)	0	0	0	0	2
Control Delay (s)	0.0	0.0	0.0	0.0	10.2
Lane LOS					B
Approach Delay (s)	0.0		0.0		10.2
Approach LOS					B

Intersection Summary			
Average Delay	0.1		
Intersection Capacity Utilization	52.4%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	185	785	17	657	1364	34	22	117	547	313	156	139
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	12	12	12	12	12	12	13	12	12
Total Lost time (s)	4.0	5.0		4.0	5.0		4.0	5.0	5.0	4.0	5.0	5.0
Lane Util. Factor	0.97	0.95		0.97	0.95		1.00	1.00	0.88	1.00	1.00	1.00
Frt	1.00	1.00		1.00	1.00		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	3367	3460		3467	3519		1770	1863	2787	1793	1827	1553
Flt Permitted	0.95	1.00		0.95	1.00		0.65	1.00	1.00	0.38	1.00	1.00
Satd. Flow (perm)	3367	3460		3467	3519		1217	1863	2787	717	1827	1553
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)	195	826	18	692	1436	36	23	123	576	329	164	146
RTOR Reduction (vph)	0	1	0	0	1	0	0	0	381	0	0	69
Lane Group Flow (vph)	195	843	0	692	1471	0	23	123	195	329	164	77
Heavy Vehicles (%)	4%	4%	4%	1%	1%	50%	2%	2%	2%	4%	4%	4%
Turn Type	Prot			Prot			pm+pt		custom	pm+pt		custom
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases							8		2	4		6
Actuated Green, G (s)	10.5	44.0		35.0	68.5		16.2	13.2	44.0	37.0	30.0	68.5
Effective Green, g (s)	10.5	44.0		35.0	68.5		16.2	13.2	44.0	37.0	30.0	68.5
Actuated g/C Ratio	0.08	0.34		0.27	0.53		0.12	0.10	0.34	0.28	0.23	0.53
Clearance Time (s)	4.0	5.0		4.0	5.0		4.0	5.0	5.0	4.0	5.0	5.0
Vehicle Extension (s)	0.5	0.5		0.5	0.5		0.5	0.5	0.5	0.5	0.5	0.5
Lane Grp Cap (vph)	272	1171		933	1854		164	189	943	368	422	818
v/s Ratio Prot	0.06	0.24		c0.20	c0.42		0.00	0.07		c0.14	0.09	
v/s Ratio Perm							0.01		0.07	c0.12		0.05
v/c Ratio	0.72	0.72		0.74	0.79		0.14	0.65	0.21	0.89	0.39	0.09
Uniform Delay, d1	58.3	37.6		43.4	25.0		50.5	56.2	30.6	41.4	42.3	15.3
Progression Factor	1.03	0.97		0.96	1.30		0.98	0.98	3.07	1.00	0.99	2.17
Incremental Delay, d2	6.8	3.6		1.9	1.5		0.1	5.9	0.5	21.7	0.2	0.0
Delay (s)	66.7	40.1		43.8	34.0		49.5	61.1	94.4	63.0	41.9	33.2
Level of Service	E	D		D	C		D	E	F	E	D	C
Approach Delay (s)		45.1			37.1			87.3			50.8	
Approach LOS		D			D			F			D	

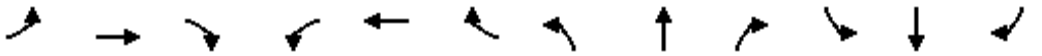
Intersection Summary			
HCM Average Control Delay	48.8	HCM Level of Service	D
HCM Volume to Capacity ratio	0.82		
Actuated Cycle Length (s)	130.0	Sum of lost time (s)	13.0
Intersection Capacity Utilization	79.7%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (veh/h)	0	1645	2053	16	0	0
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.85	0.85
Hourly flow rate (vph)	0	1732	2161	17	0	0
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (ft)		390	321			
pX, platoon unblocked	0.63				0.74	0.63
vC, conflicting volume	2178				3035	1089
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1696				1759	0
tC, single (s)	4.1				6.8	6.9
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	100				100	100
cM capacity (veh/h)	234				56	684

Direction, Lane #	EB 1	EB 2	WB 1	WB 2
Volume Total	866	866	1441	737
Volume Left	0	0	0	0
Volume Right	0	0	0	17
cSH	1700	1700	1700	1700
Volume to Capacity	0.51	0.51	0.85	0.43
Queue Length 95th (ft)	0	0	0	0
Control Delay (s)	0.0	0.0	0.0	0.0
Lane LOS				
Approach Delay (s)	0.0		0.0	
Approach LOS				

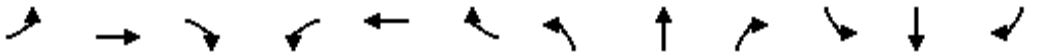
Intersection Summary			
Average Delay	0.0		
Intersection Capacity Utilization	60.6%	ICU Level of Service	B
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	93	1360	193	190	1690	647	0	0	655	0	0	379
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0	5.0	4.0	5.0	5.0			4.0			4.0
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00			0.88			0.88
Frt	1.00	1.00	0.85	1.00	1.00	0.85			0.85			0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00			1.00			1.00
Satd. Flow (prot)	1752	3505	1568	1787	3574	1599			2814			2814
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00			1.00			1.00
Satd. Flow (perm)	1752	3505	1568	1787	3574	1599			2814			2814
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	1.00	1.00	1.00	0.85	0.85	0.85
Adj. Flow (vph)	98	1432	203	200	1779	681	0	0	655	0	0	446
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	98	1432	203	200	1779	681	0	0	655	0	0	446
Heavy Vehicles (%)	3%	3%	3%	1%	1%	1%	1%	1%	1%	1%	1%	1%
Turn Type	Prot		Perm	Prot		Perm			custom			custom
Protected Phases	5	2		1	6							7
Permitted Phases			2			6			1			5
Actuated Green, G (s)	10.2	61.0	61.0	34.5	84.3	84.3			34.5			31.7
Effective Green, g (s)	10.2	61.0	61.0	34.5	84.3	84.3			34.5			31.7
Actuated g/C Ratio	0.08	0.47	0.47	0.27	0.65	0.65			0.27			0.24
Clearance Time (s)	5.0	5.0	5.0	4.0	5.0	5.0			4.0			4.0
Vehicle Extension (s)	0.5	1.0	1.0	0.5	0.5	0.5			0.5			0.5
Lane Grp Cap (vph)	137	1645	736	474	2318	1037			747			773
v/s Ratio Prot	0.06	c0.41		0.11	0.50							c0.10
v/s Ratio Perm			0.13			0.43			c0.23			0.06
v/c Ratio	0.72	0.87	0.28	0.42	0.77	0.66			0.88			0.58
Uniform Delay, d1	58.5	31.0	21.0	39.5	16.0	14.0			45.7			43.2
Progression Factor	1.31	0.87	0.74	1.00	1.00	1.00			1.00			1.00
Incremental Delay, d2	11.7	5.6	0.8	0.2	1.4	1.2			11.0			0.7
Delay (s)	88.5	32.4	16.3	39.7	17.4	15.1			56.7			43.9
Level of Service	F	C	B	D	B	B			E			D
Approach Delay (s)		33.7			18.5			56.7			43.9	
Approach LOS		C			B			E			D	

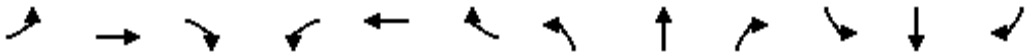
Intersection Summary			
HCM Average Control Delay	29.9	HCM Level of Service	C
HCM Volume to Capacity ratio	0.83		
Actuated Cycle Length (s)	130.0	Sum of lost time (s)	13.0
Intersection Capacity Utilization	68.0%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	872	1143	259	2084	0	0	0	0	160	11	446
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	12	12	12	12	12	12	12	14	14
Total Lost time (s)		5.0	5.0	4.0	5.0						5.0	5.0
Lane Util. Factor		0.95	0.88	0.97	0.95						1.00	0.88
Frt		1.00	0.85	1.00	1.00						1.00	0.85
Flt Protected		1.00	1.00	0.95	1.00						0.96	1.00
Satd. Flow (prot)		3539	2787	3433	3539						1898	2972
Flt Permitted		1.00	1.00	0.95	1.00						0.96	1.00
Satd. Flow (perm)		3539	2787	3433	3539						1898	2972
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	918	1203	273	2194	0	0	0	0	168	12	469
RTOR Reduction (vph)	0	0	570	0	0	0	0	0	0	0	0	16
Lane Group Flow (vph)	0	918	633	273	2194	0	0	0	0	0	180	453
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	0%	0%	0%	2%	2%	2%
Turn Type			Perm	Prot						Prot		Perm
Protected Phases		2		1	6					7	4	
Permitted Phases			2									4
Actuated Green, G (s)		57.9	57.9	11.1	73.0						27.0	27.0
Effective Green, g (s)		57.9	57.9	11.1	73.0						27.0	27.0
Actuated g/C Ratio		0.53	0.53	0.10	0.66						0.25	0.25
Clearance Time (s)		5.0	5.0	4.0	5.0						5.0	5.0
Vehicle Extension (s)		2.0	2.0	0.5	2.0						0.5	0.5
Lane Grp Cap (vph)		1863	1467	346	2349						466	729
v/s Ratio Prot		0.26		0.08	c0.62							
v/s Ratio Perm			0.23								0.09	c0.15
v/c Ratio		0.49	0.43	0.79	0.93						0.39	0.62
Uniform Delay, d1		16.7	16.0	48.3	16.4						34.6	37.0
Progression Factor		1.00	1.00	1.11	0.74						1.00	1.00
Incremental Delay, d2		0.9	0.9	1.0	0.9						0.2	1.2
Delay (s)		17.6	16.9	54.8	13.0						34.8	38.1
Level of Service		B	B	D	B						C	D
Approach Delay (s)		17.2			17.6			0.0			37.2	
Approach LOS		B			B			A			D	

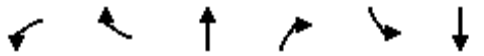
Intersection Summary			
HCM Average Control Delay	19.9	HCM Level of Service	B
HCM Volume to Capacity ratio	0.85		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	10.0
Intersection Capacity Utilization	95.5%	ICU Level of Service	F
Analysis Period (min)	15		
c Critical Lane Group			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	286	746	0	0	890	99	1453	0	248	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	5.0			5.0		5.0	5.0	5.0			
Lane Util. Factor	1.00	0.95			0.95		0.95	0.95	1.00			
Frt	1.00	1.00			0.99		1.00	1.00	0.85			
Flt Protected	0.95	1.00			1.00		0.95	0.95	1.00			
Satd. Flow (prot)	1752	3505			3419		1681	1681	1583			
Flt Permitted	0.95	1.00			1.00		0.95	0.95	1.00			
Satd. Flow (perm)	1752	3505			3419		1681	1681	1583			
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)	301	785	0	0	937	104	1529	0	261	0	0	0
RTOR Reduction (vph)	0	0	0	0	8	0	0	0	82	0	0	0
Lane Group Flow (vph)	301	785	0	0	1033	0	764	765	179	0	0	0
Heavy Vehicles (%)	3%	3%	3%	4%	4%	4%	2%	2%	2%	0%	0%	0%
Turn Type	Prot						Perm		Perm			
Protected Phases	5	2			6			8				
Permitted Phases							8		8			
Actuated Green, G (s)	20.4	62.4			38.0		37.6	37.6	37.6			
Effective Green, g (s)	20.4	62.4			38.0		37.6	37.6	37.6			
Actuated g/C Ratio	0.19	0.57			0.35		0.34	0.34	0.34			
Clearance Time (s)	4.0	5.0			5.0		5.0	5.0	5.0			
Vehicle Extension (s)	0.5	2.0			2.0		0.5	0.5	0.5			
Lane Grp Cap (vph)	325	1988			1181		575	575	541			
v/s Ratio Prot	c0.17	0.22			c0.30							
v/s Ratio Perm							0.45	0.46	0.11			
v/c Ratio	0.93	0.39			0.87		1.33	1.33	0.33			
Uniform Delay, d1	44.1	13.3			33.8		36.2	36.2	26.9			
Progression Factor	0.72	0.87			1.00		1.00	1.00	1.00			
Incremental Delay, d2	4.7	0.1			9.2		159.6	160.4	0.1			
Delay (s)	36.4	11.6			42.9		195.8	196.6	27.0			
Level of Service	D	B			D		F	F	C			
Approach Delay (s)		18.5			42.9			171.5			0.0	
Approach LOS		B			D			F			A	

Intersection Summary			
HCM Average Control Delay	94.9	HCM Level of Service	F
HCM Volume to Capacity ratio	1.06		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	14.0
Intersection Capacity Utilization	95.5%	ICU Level of Service	F
Analysis Period (min)	15		

c Critical Lane Group



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (veh/h)	14	0	468	11	0	248
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.85	0.85	0.85	0.85	0.85	0.85
Hourly flow rate (vph)	16	0	551	13	0	292
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (ft)			356			
pX, platoon unblocked	0.98	0.98			0.98	
vC, conflicting volume	849	557			564	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	837	540			546	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	95	100			100	
cM capacity (veh/h)	331	532			1004	

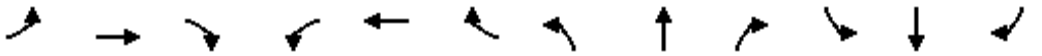
Direction, Lane #	WB 1	NB 1	SB 1
Volume Total	16	564	292
Volume Left	16	0	0
Volume Right	0	13	0
cSH	331	1700	1004
Volume to Capacity	0.05	0.33	0.00
Queue Length 95th (ft)	4	0	0
Control Delay (s)	16.5	0.0	0.0
Lane LOS	C		
Approach Delay (s)	16.5	0.0	0.0
Approach LOS	C		

Intersection Summary			
Average Delay	0.3		
Intersection Capacity Utilization	35.3%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (veh/h)	5	64	194	9	13	163
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.85	0.85	0.85	0.85	0.85	0.85
Hourly flow rate (vph)	6	75	228	11	15	192
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (ft)			891			402
pX, platoon unblocked						
vC, conflicting volume	456	234			239	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	456	234			239	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	99	91			99	
cM capacity (veh/h)	556	806			1328	

Direction, Lane #	WB 1	WB 2	NB 1	SB 1
Volume Total	6	75	239	207
Volume Left	6	0	0	15
Volume Right	0	75	11	0
cSH	556	806	1700	1328
Volume to Capacity	0.01	0.09	0.14	0.01
Queue Length 95th (ft)	1	8	0	1
Control Delay (s)	11.5	9.9	0.0	0.7
Lane LOS	B	A		A
Approach Delay (s)	10.0		0.0	0.7
Approach LOS	B			

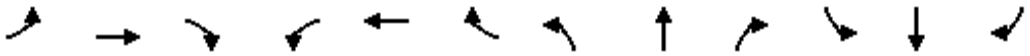
Intersection Summary			
Average Delay	1.8		
Intersection Capacity Utilization	29.3%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	27	77	65	56	100	96	86	444	29	209	560	17
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
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	0.95		1.00	0.95	
Frt	1.00	0.93		1.00	0.93		1.00	0.99		1.00	1.00	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	1736		1770	1726		1770	3507		1770	3523	
Flt Permitted	0.50	1.00		0.62	1.00		0.39	1.00		0.45	1.00	
Satd. Flow (perm)	938	1736		1149	1726		727	3507		841	3523	
Peak-hour factor, PHF	0.85	0.85	0.85	0.85	0.85	0.85	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	32	91	76	66	118	113	96	493	32	232	622	19
RTOR Reduction (vph)	0	47	0	0	53	0	0	7	0	0	3	0
Lane Group Flow (vph)	32	120	0	66	178	0	96	518	0	232	638	0
Turn Type	Perm			Perm			Perm			Perm		
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)	17.0	17.0		17.0	17.0		40.0	40.0		40.0	40.0	
Effective Green, g (s)	17.0	17.0		17.0	17.0		40.0	40.0		40.0	40.0	
Actuated g/C Ratio	0.26	0.26		0.26	0.26		0.62	0.62		0.62	0.62	
Clearance Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Lane Grp Cap (vph)	245	454		301	451		447	2158		518	2168	
v/s Ratio Prot		0.07			c0.10			0.15			0.18	
v/s Ratio Perm	0.03			0.06			0.13			c0.28		
v/c Ratio	0.13	0.27		0.22	0.39		0.21	0.24		0.45	0.29	
Uniform Delay, d1	18.3	19.0		18.8	19.8		5.5	5.6		6.6	5.9	
Progression Factor	0.99	1.03		1.00	1.00		1.00	1.00		0.98	0.47	
Incremental Delay, d2	1.1	1.4		1.7	2.6		1.1	0.3		2.2	0.3	
Delay (s)	19.2	21.0		20.5	22.3		6.6	5.9		8.7	3.0	
Level of Service	B	C		C	C		A	A		A	A	
Approach Delay (s)		20.7			21.9			6.0			4.5	
Approach LOS		C			C			A			A	

Intersection Summary			
HCM Average Control Delay	9.2	HCM Level of Service	A
HCM Volume to Capacity ratio	0.43		
Actuated Cycle Length (s)	65.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	52.6%	ICU Level of Service	A
Analysis Period (min)	15		

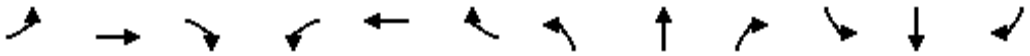
c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	0	0	7	0	0	177	0	509	52	0	780	50
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.85	0.85	0.85	0.85	0.85	0.85	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	0	0	8	0	0	208	0	566	58	0	867	56
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)								335			442	
pX, platoon unblocked	0.96	0.96		0.96	0.96	0.96				0.96		
vC, conflicting volume	1385	1518	461	1036	1517	312	922			623		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1326	1463	461	964	1462	213	922			536		
tC, single (s)	7.5	6.5	6.9	7.5	6.5	6.9	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	100	100	98	100	100	73	100			100		
cM capacity (veh/h)	80	123	547	199	123	764	736			992		

Direction, Lane #	EB 1	WB 1	NB 1	NB 2	SB 1	SB 2
Volume Total	8	208	377	246	578	344
Volume Left	0	0	0	0	0	0
Volume Right	8	208	0	58	0	56
cSH	547	764	1700	1700	1700	1700
Volume to Capacity	0.02	0.27	0.22	0.14	0.34	0.20
Queue Length 95th (ft)	1	28	0	0	0	0
Control Delay (s)	11.7	11.5	0.0	0.0	0.0	0.0
Lane LOS	B	B				
Approach Delay (s)	11.7	11.5	0.0		0.0	
Approach LOS	B	B				

Intersection Summary				
Average Delay	1.4			
Intersection Capacity Utilization	33.4%	ICU Level of Service	A	
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	5	0	64	124	0	7	7	289	41	3	419	4
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	0.85		1.00	0.85		1.00	0.98		1.00	1.00	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	1583		1421	1242		1770	1828		1770	1860	
Flt Permitted	0.75	1.00		0.71	1.00		0.48	1.00		0.55	1.00	
Satd. Flow (perm)	1402	1583		1063	1242		893	1828		1016	1860	
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	6	0	71	138	0	8	7	304	43	3	441	4
RTOR Reduction (vph)	0	59	0	0	7	0	0	6	0	0	0	0
Lane Group Flow (vph)	6	12	0	138	1	0	7	341	0	3	445	0
Heavy Vehicles (%)	2%	2%	2%	27%	2%	30%	2%	2%	2%	2%	2%	2%
Turn Type	Perm			Perm			Perm			Perm		
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)	11.3	11.3		11.3	11.3		45.7	45.7		45.7	45.7	
Effective Green, g (s)	11.3	11.3		11.3	11.3		45.7	45.7		45.7	45.7	
Actuated g/C Ratio	0.17	0.17		0.17	0.17		0.70	0.70		0.70	0.70	
Clearance Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	244	275		185	216		628	1285		714	1308	
v/s Ratio Prot		0.01			0.00			0.19			c0.24	
v/s Ratio Perm	0.00			c0.13			0.01			0.00		
v/c Ratio	0.02	0.04		0.75	0.01		0.01	0.27		0.00	0.34	
Uniform Delay, d1	22.3	22.4		25.5	22.2		2.9	3.5		2.9	3.8	
Progression Factor	1.00	1.00		1.00	1.00		0.12	0.56		1.00	1.00	
Incremental Delay, d2	0.0	0.1		15.0	0.0		0.0	0.5		0.0	0.7	
Delay (s)	22.3	22.4		40.5	22.2		0.4	2.4		2.9	4.5	
Level of Service	C	C		D	C		A	A		A	A	
Approach Delay (s)		22.4			39.5			2.4			4.5	
Approach LOS		C			D			A			A	

Intersection Summary			
HCM Average Control Delay	10.1	HCM Level of Service	B
HCM Volume to Capacity ratio	0.42		
Actuated Cycle Length (s)	65.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	42.5%	ICU Level of Service	A
Analysis Period (min)	15		

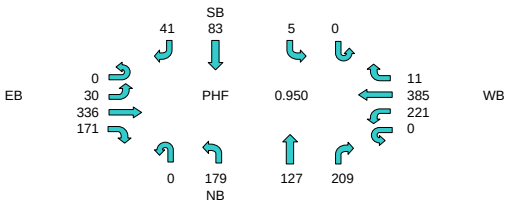
c Critical Lane Group

Project	Keizer Station Area "B"
Location	Keizer, Oregon
Scenario	2020
Filename	H:\projfile\10745 - Keizer Station Area B-C Master Plan\Synchro\Outputs\[2020 Roundabout.xls]Summary
Analyst	KAI
Date	11-Aug-10

FHWA 2000 Urban Compact	1	A
FHWA 2000 Single Lane	2	B
FHWA 2000 Double Lane	3	C
British (Kimber)	4	D
HCM 2000 Upper	5	E
HCM 2000 Lower	6	F
NCHRP 3-65 1 circ lane	7	G
NCHRP 3-65 2 circ lane	8	H
EXISTING (2020 Back) (DEFAUL	1	E
FUTURE (2020 Total)	2	F
GROWTH ()	3	G
INTERPOLATED (2015)	4	I
PERIOD 1 (Thursday P.M.) (DEF.	1	
PERIOD 2 (Friday P.M.)	2	
METRIC (DEFAULT)	1	M
US CUSTOMARY	2	U
YES	Y	
NO	N	

Turning movement year/source: FUTURE (2020 Total)

Time period: PERIOD 1 (Thursday P.M.) (DEFAULT)



	NB	SB	EB	WB
Model	NCHRP 3-65 1 circ lane	NCHRP 3-65 1 circ lane	NCHRP 3-65 1 circ lane	NCHRP 3-65 1 circ lane
Fleet mix				
SU/bus	0%	0%	0%	0%
Combo	3%	4%	2%	3%
Bike/motorcycle	0%	0%	0%	0%
# Conflicting Peds (0=ignore)	0	0	0	0
RT bypass?	N	N	N	y
For FHWA Double only (ignored for all others):				
Single-lane or short-lane approach?	Y	Y	Y	Y
Length (veh) (0=single lane)	0	0	0	0

British Parameters (only used if B option selected above)

Units: US CUSTOMARY

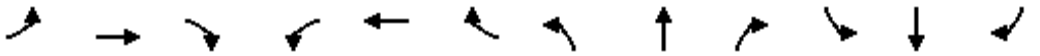
	NB	SB	EB	WB
Inscribed circle diameter, D (ft)	55	55	55	55
Entry radius, r (ft)	20	20	20	20
Entry angle, phi (deg)	30	30	30	30
Approach half width, v (ft)	8	8	8	8
Entry width, e (ft)	8	8	8	8
Effective flare length, l' (ft)	40	40	40	40

Summary of results:

Approach/entry	**NB**	**SB**	**EB**	**WB**	**Overall**
Entering volume (pce)	558	141	577	657	
Critical lane (pce)					
Non-critical lane (pce)					
Conflicting volume (pce)	398	851	336	364	
Adjusted capacity (pce)	759	482	808	785	
Adjusted capacity (veh)					
Volume-to-capacity ratio	0.74	0.29	0.71	0.84	
Control delay (sec/veh)	16.8	10.5	14.8	23.3	17.9
Approach average queue (veh)	2.6	0.4	2.4	4.3	
Approach 95%ile queue (veh)	6.6	1.2	6.2	9.6	
Adjacent exit	**(SB)**	**(NB)**	**(WB)**	**(EB)**	
Adjacent exit volume (pce)	514	170	656	593	
Assumed exit cap'y (pce/lane)	1200	1200	1200	1200	
Number of lanes required	1	1	1	1	

Appendix G

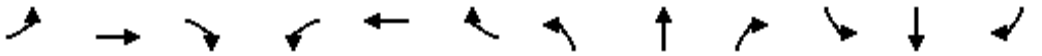
Year 2020 Total Traffic (Mitigated) Operations Worksheets



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	94	306	116	551	409	305	121	963	574	229	479	94
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0	5.0	5.0	5.0	4.5	4.5	6.0	5.0	4.5	6.0	
Lane Util. Factor	1.00	1.00	1.00	0.97	1.00	1.00	1.00	0.95	1.00	1.00	0.95	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.98	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1719	1810	1538	3400	1845	1568	1787	3574	1599	1736	3386	
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (perm)	1719	1810	1538	3400	1845	1568	1787	3574	1599	1736	3386	
Peak-hour factor, PHF	0.90	0.90	0.90	0.91	0.91	0.91	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	104	340	129	605	449	335	127	1014	604	241	504	99
RTOR Reduction (vph)	0	0	118	0	0	97	0	0	69	0	10	0
Lane Group Flow (vph)	104	340	11	605	449	238	127	1014	535	241	593	0
Heavy Vehicles (%)	5%	5%	5%	3%	3%	3%	1%	1%	1%	4%	4%	4%
Turn Type	Prot		custom	Prot		pm+ov	Prot		pm+ov	Prot		
Protected Phases	7	4		3	8	1	5	2	3	1	6	
Permitted Phases			7			8			2			
Actuated Green, G (s)	12.5	31.3	12.5	28.5	47.3	69.7	13.4	47.3	75.8	22.4	56.3	
Effective Green, g (s)	12.5	31.3	12.5	28.5	47.3	69.7	13.4	47.3	75.8	22.4	56.3	
Actuated g/C Ratio	0.08	0.21	0.08	0.19	0.32	0.46	0.09	0.32	0.51	0.15	0.38	
Clearance Time (s)	5.0	5.0	5.0	5.0	5.0	4.5	4.5	6.0	5.0	4.5	6.0	
Vehicle Extension (s)	1.0	1.0	1.0	1.0	1.0	0.5	0.5	0.5	1.0	0.5	0.5	
Lane Grp Cap (vph)	143	378	128	646	582	729	160	1127	808	259	1271	
v/s Ratio Prot	0.06	c0.19		c0.18	0.24	0.05	0.07	c0.28	0.13	c0.14	0.18	
v/s Ratio Perm			0.01			0.10			0.21			
v/c Ratio	0.73	0.90	0.08	0.94	0.77	0.33	0.79	0.90	0.66	0.93	0.47	
Uniform Delay, d1	67.1	57.8	63.5	59.9	46.5	25.3	66.9	49.1	27.6	63.0	35.5	
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	14.4	22.7	0.1	20.8	5.7	0.1	21.7	11.4	1.6	37.2	1.2	
Delay (s)	81.5	80.6	63.6	80.7	52.2	25.4	88.7	60.5	29.2	100.2	36.7	
Level of Service	F	F	E	F	D	C	F	E	C	F	D	
Approach Delay (s)		76.9			58.1			51.7			54.8	
Approach LOS		E			E			D			D	

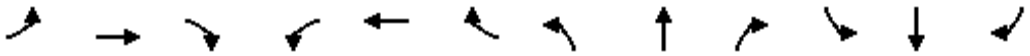
Intersection Summary			
HCM Average Control Delay	57.4	HCM Level of Service	E
HCM Volume to Capacity ratio	0.91		
Actuated Cycle Length (s)	150.0	Sum of lost time (s)	20.5
Intersection Capacity Utilization	88.2%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	61	959	17	33	1166	237	22	17	11	136	17	55
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	15	13	12	14	12	12	12	16	12	12	12	12
Total Lost time (s)	4.0	5.0		4.0	5.0	5.0	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	
Frt	1.00	1.00		1.00	1.00	0.85	1.00	0.94		1.00	0.89	
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1947	1920		1888	1863	1583	1687	1894		1770	1649	
Flt Permitted	0.95	1.00		0.95	1.00	1.00	0.64	1.00		0.74	1.00	
Satd. Flow (perm)	1947	1920		1888	1863	1583	1138	1894		1370	1649	
Peak-hour factor, PHF	0.96	0.96	0.96	0.95	0.95	0.95	0.85	0.85	0.85	0.85	0.85	0.85
Adj. Flow (vph)	64	999	18	35	1227	249	26	20	13	160	20	65
RTOR Reduction (vph)	0	1	0	0	0	53	0	11	0	0	56	0
Lane Group Flow (vph)	64	1016	0	35	1227	196	26	22	0	160	29	0
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	7%	7%	7%	2%	2%	2%
Turn Type	Prot			Prot		Perm	Perm			Perm		
Protected Phases	5	2		1	6			8			4	
Permitted Phases						6	8			4		
Actuated Green, G (s)	5.0	95.7		3.0	93.7	93.7	17.7	17.7		17.7	17.7	
Effective Green, g (s)	5.0	95.7		3.0	93.7	93.7	17.7	17.7		17.7	17.7	
Actuated g/C Ratio	0.04	0.74		0.02	0.72	0.72	0.14	0.14		0.14	0.14	
Clearance Time (s)	4.0	5.0		4.0	5.0	5.0	4.0	4.0		4.0	4.0	
Vehicle Extension (s)	0.5	2.5		0.5	2.5	2.5	0.5	0.5		0.5	0.5	
Lane Grp Cap (vph)	75	1420		44	1349	1146	156	259		187	226	
v/s Ratio Prot	c0.03	0.53		0.02	c0.66			0.01			0.02	
v/s Ratio Perm						0.12	0.02			c0.12		
v/c Ratio	0.85	0.72		0.80	0.91	0.17	0.17	0.08		0.86	0.13	
Uniform Delay, d1	61.8	9.3		62.9	14.4	5.6	49.3	48.8		54.6	49.1	
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2	55.4	1.6		59.8	9.2	0.1	0.2	0.1		28.8	0.1	
Delay (s)	117.2	11.0		122.7	23.6	5.7	49.5	48.8		83.4	49.2	
Level of Service	F	B		F	C	A	D	D		F	D	
Approach Delay (s)		17.2			23.0			49.1			71.5	
Approach LOS		B			C			D			E	

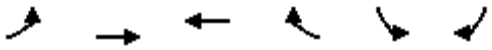
Intersection Summary			
HCM Average Control Delay	25.5	HCM Level of Service	C
HCM Volume to Capacity ratio	0.89		
Actuated Cycle Length (s)	129.4	Sum of lost time (s)	13.0
Intersection Capacity Utilization	83.1%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	99	780	122	17	1172	330	144	50	64	143	38	82
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	5.0		4.0	5.0		4.0	4.0	5.0	4.0	4.0	
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	1.00	1.00	1.00	1.00	
Frt	1.00	0.98		1.00	0.97		1.00	1.00	0.85	1.00	0.90	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1787	3502		1787	3457		1805	1900	1615	1787	1689	
Flt Permitted	0.09	1.00		0.28	1.00		0.52	1.00	1.00	0.52	1.00	
Satd. Flow (perm)	168	3502		527	3457		987	1900	1615	982	1689	
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.85	0.85	0.85	0.85	0.85	0.85
Adj. Flow (vph)	104	821	128	18	1234	347	169	59	75	168	45	96
RTOR Reduction (vph)	0	7	0	0	16	0	0	0	24	0	65	0
Lane Group Flow (vph)	104	942	0	18	1565	0	169	59	51	168	76	0
Heavy Vehicles (%)	1%	1%	1%	1%	1%	1%	0%	0%	0%	1%	1%	1%
Turn Type	pm+pt			pm+pt			pm+pt		custom	pm+pt		
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases	2			6			8		2	4		
Actuated Green, G (s)	94.3	88.8		85.4	83.9		20.0	7.7	88.8	25.4	10.4	
Effective Green, g (s)	94.3	88.8		85.4	83.9		20.0	7.7	88.8	25.4	10.4	
Actuated g/C Ratio	0.73	0.68		0.66	0.65		0.15	0.06	0.68	0.20	0.08	
Clearance Time (s)	4.0	5.0		4.0	5.0		4.0	4.0	5.0	4.0	4.0	
Vehicle Extension (s)	0.5	0.5		0.5	0.5		0.5	0.5	0.5	0.5	0.5	
Lane Grp Cap (vph)	202	2392		361	2231		229	113	1103	285	135	
v/s Ratio Prot	c0.03	0.27		0.00	c0.45		c0.07	0.03		c0.07	0.04	
v/s Ratio Perm	0.35			0.03			0.04		0.03	c0.05		
v/c Ratio	0.51	0.39		0.05	0.70		0.74	0.52	0.05	0.59	0.56	
Uniform Delay, d1	14.0	8.9		7.9	14.9		51.4	59.4	6.7	46.5	57.6	
Progression Factor	1.00	1.00		0.40	0.61		0.98	0.97	1.70	1.00	1.00	
Incremental Delay, d2	0.9	0.5		0.0	0.6		10.0	2.0	0.1	2.0	3.1	
Delay (s)	14.9	9.4		3.2	9.7		60.3	59.7	11.5	48.5	60.7	
Level of Service	B	A		A	A		E	E	B	D	E	
Approach Delay (s)		10.0			9.6			48.1			54.1	
Approach LOS		A			A			D			D	

Intersection Summary			
HCM Average Control Delay	17.5	HCM Level of Service	B
HCM Volume to Capacity ratio	0.69		
Actuated Cycle Length (s)	130.0	Sum of lost time (s)	17.0
Intersection Capacity Utilization	73.9%	ICU Level of Service	D
Analysis Period (min)	15		

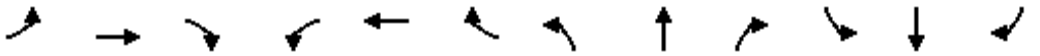
c Critical Lane Group



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (veh/h)	0	987	1501	28	0	17
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.85	0.85
Hourly flow rate (vph)	0	1039	1580	29	0	20
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (ft)		320	348			
pX, platoon unblocked	0.68				0.73	0.68
vC, conflicting volume	1609				2114	805
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	954				1134	0
tC, single (s)	4.1				6.8	6.9
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	100				100	97
cM capacity (veh/h)	487				144	737

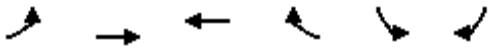
Direction, Lane #	EB 1	EB 2	WB 1	WB 2	SB 1
Volume Total	519	519	1053	556	20
Volume Left	0	0	0	0	0
Volume Right	0	0	0	29	20
cSH	1700	1700	1700	1700	737
Volume to Capacity	0.31	0.31	0.62	0.33	0.03
Queue Length 95th (ft)	0	0	0	0	2
Control Delay (s)	0.0	0.0	0.0	0.0	10.0
Lane LOS					B
Approach Delay (s)	0.0		0.0		10.0
Approach LOS					B

Intersection Summary			
Average Delay	0.1		
Intersection Capacity Utilization	52.4%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	185	785	17	657	1364	34	22	117	547	313	156	139
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	12	12	12	12	12	12	13	12	12
Total Lost time (s)	4.0	5.0		4.0	5.0		4.0	5.0	5.0	4.0	5.0	
Lane Util. Factor	0.97	0.95		0.97	0.95		1.00	1.00	0.88	0.97	1.00	
Frt	1.00	1.00		1.00	1.00		1.00	1.00	0.85	1.00	0.93	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	3367	3460		3467	3519		1770	1863	2787	3479	1698	
Flt Permitted	0.95	1.00		0.95	1.00		0.32	1.00	1.00	0.44	1.00	
Satd. Flow (perm)	3367	3460		3467	3519		605	1863	2787	1606	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)	195	826	18	692	1436	36	23	123	576	329	164	146
RTOR Reduction (vph)	0	1	0	0	1	0	0	0	335	0	26	0
Lane Group Flow (vph)	195	843	0	692	1471	0	23	123	241	329	284	0
Heavy Vehicles (%)	4%	4%	4%	1%	1%	50%	2%	2%	2%	4%	4%	4%
Turn Type	Prot			Prot			pm+pt		custom	pm+pt		
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases							8		2	4		
Actuated Green, G (s)	9.9	54.5		29.0	73.6		19.1	16.7	54.5	32.5	26.1	
Effective Green, g (s)	9.9	54.5		29.0	73.6		19.1	16.7	54.5	32.5	26.1	
Actuated g/C Ratio	0.08	0.42		0.22	0.57		0.15	0.13	0.42	0.25	0.20	
Clearance Time (s)	4.0	5.0		4.0	5.0		4.0	5.0	5.0	4.0	5.0	
Vehicle Extension (s)	0.5	0.5		0.5	0.5		0.5	0.5	0.5	0.5	0.5	
Lane Grp Cap (vph)	256	1451		773	1992		110	239	1168	572	341	
v/s Ratio Prot	0.06	0.24		c0.20	c0.42		0.00	0.07		c0.05	c0.17	
v/s Ratio Perm							0.03		0.09	0.09		
v/c Ratio	0.76	0.58		0.90	0.74		0.21	0.51	0.21	0.58	0.83	
Uniform Delay, d1	58.9	29.0		49.0	21.0		48.1	52.9	24.0	40.6	49.9	
Progression Factor	1.05	0.80		1.19	0.74		1.08	1.05	1.01	1.00	1.00	
Incremental Delay, d2	10.7	1.6		9.0	0.9		0.3	0.8	0.4	0.9	15.3	
Delay (s)	72.3	24.9		67.3	16.4		52.4	56.2	24.7	41.5	65.2	
Level of Service	E	C		E	B		D	E	C	D	E	
Approach Delay (s)		33.8			32.7			30.9			53.0	
Approach LOS		C			C			C			D	

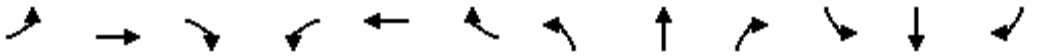
Intersection Summary			
HCM Average Control Delay	35.5	HCM Level of Service	D
HCM Volume to Capacity ratio	0.79		
Actuated Cycle Length (s)	130.0	Sum of lost time (s)	13.0
Intersection Capacity Utilization	74.0%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (veh/h)	0	1645	2053	16	0	0
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.85	0.85
Hourly flow rate (vph)	0	1732	2161	17	0	0
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (ft)		390	321			
pX, platoon unblocked	0.63				0.76	0.63
vC, conflicting volume	2178				3035	1089
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1687				1487	0
tC, single (s)	4.1				6.8	6.9
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	100				100	100
cM capacity (veh/h)	235				87	679

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	SB 1
Volume Total	866	866	1441	737	0
Volume Left	0	0	0	0	0
Volume Right	0	0	0	17	0
cSH	1700	1700	1700	1700	1700
Volume to Capacity	0.51	0.51	0.85	0.43	0.00
Queue Length 95th (ft)	0	0	0	0	0
Control Delay (s)	0.0	0.0	0.0	0.0	0.0
Lane LOS					A
Approach Delay (s)	0.0		0.0		0.0
Approach LOS					A

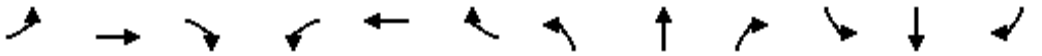
Intersection Summary			
Average Delay	0.0		
Intersection Capacity Utilization	60.6%	ICU Level of Service	B
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	93	1360	193	190	1690	647	0	0	655	0	0	379
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0	5.0	4.0	5.0	5.0			4.0			4.0
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00			0.88			0.88
Frt	1.00	1.00	0.85	1.00	1.00	0.85			0.85			0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00			1.00			1.00
Satd. Flow (prot)	1752	3505	1568	1787	3574	1599			2814			2814
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00			1.00			1.00
Satd. Flow (perm)	1752	3505	1568	1787	3574	1599			2814			2814
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	1.00	1.00	1.00	0.85	0.85	0.85
Adj. Flow (vph)	98	1432	203	200	1779	681	0	0	655	0	0	446
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	98	1432	203	200	1779	681	0	0	655	0	0	446
Heavy Vehicles (%)	3%	3%	3%	1%	1%	1%	1%	1%	1%	1%	1%	1%
Turn Type	Prot		Perm	Prot		Perm			custom			custom
Protected Phases	5	2		1	6							7
Permitted Phases			2			6			1			5
Actuated Green, G (s)	11.7	58.7	58.7	37.7	83.7	83.7			37.7			32.3
Effective Green, g (s)	11.7	58.7	58.7	37.7	83.7	83.7			37.7			32.3
Actuated g/C Ratio	0.09	0.45	0.45	0.29	0.64	0.64			0.29			0.25
Clearance Time (s)	5.0	5.0	5.0	4.0	5.0	5.0			4.0			4.0
Vehicle Extension (s)	0.5	1.0	1.0	0.5	0.5	0.5			0.5			0.5
Lane Grp Cap (vph)	158	1583	708	518	2301	1030			816			786
v/s Ratio Prot	0.06	c0.41		0.11	0.50							c0.09
v/s Ratio Perm			0.13			0.43			c0.23			0.07
v/c Ratio	0.62	0.90	0.29	0.39	0.77	0.66			0.80			0.57
Uniform Delay, d1	57.0	33.1	22.5	36.9	16.4	14.4			42.7			42.7
Progression Factor	1.02	0.73	0.72	1.00	1.00	1.00			1.00			1.00
Incremental Delay, d2	4.7	8.0	0.9	0.2	1.5	1.2			5.4			0.6
Delay (s)	62.8	32.2	17.0	37.1	17.9	15.6			48.1			43.3
Level of Service	E	C	B	D	B	B			D			D
Approach Delay (s)		32.1			18.8			48.1			43.3	
Approach LOS		C			B			D			D	

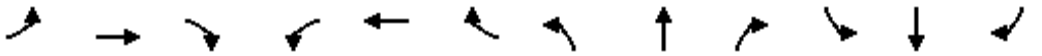
Intersection Summary			
HCM Average Control Delay	28.5	HCM Level of Service	C
HCM Volume to Capacity ratio	0.82		
Actuated Cycle Length (s)	130.0	Sum of lost time (s)	13.0
Intersection Capacity Utilization	68.0%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	872	1143	259	2084	0	0	0	0	160	11	446
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	12	12	12	12	12	12	12	14	14
Total Lost time (s)		5.0	5.0	4.0	5.0						5.0	5.0
Lane Util. Factor		0.95	0.88	0.97	0.95						1.00	0.88
Frt		1.00	0.85	1.00	1.00						1.00	0.85
Flt Protected		1.00	1.00	0.95	1.00						0.96	1.00
Satd. Flow (prot)		3539	2787	3433	3539						1898	2972
Flt Permitted		1.00	1.00	0.95	1.00						0.96	1.00
Satd. Flow (perm)		3539	2787	3433	3539						1898	2972
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	918	1203	273	2194	0	0	0	0	168	12	469
RTOR Reduction (vph)	0	0	549	0	0	0	0	0	0	0	0	15
Lane Group Flow (vph)	0	918	654	273	2194	0	0	0	0	0	180	454
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	0%	0%	0%	2%	2%	2%
Turn Type			Perm	Prot						Prot		Perm
Protected Phases		2		1	6					7	4	
Permitted Phases			2									4
Actuated Green, G (s)		81.6	81.6	14.4	100.0						40.0	40.0
Effective Green, g (s)		81.6	81.6	14.4	100.0						40.0	40.0
Actuated g/C Ratio		0.54	0.54	0.10	0.67						0.27	0.27
Clearance Time (s)		5.0	5.0	4.0	5.0						5.0	5.0
Vehicle Extension (s)		2.0	2.0	0.5	2.0						0.5	0.5
Lane Grp Cap (vph)		1925	1516	330	2359						506	793
v/s Ratio Prot		0.26		0.08	c0.62							
v/s Ratio Perm			0.23								0.09	c0.15
v/c Ratio		0.48	0.43	0.83	0.93						0.36	0.57
Uniform Delay, d1		21.1	20.4	66.6	21.9						44.6	47.6
Progression Factor		1.00	1.00	1.06	0.72						1.00	1.00
Incremental Delay, d2		0.8	0.9	7.5	4.2						0.2	0.6
Delay (s)		21.9	21.3	78.2	20.0						44.7	48.2
Level of Service		C	C	E	C						D	D
Approach Delay (s)		21.6			26.5			0.0			47.2	
Approach LOS		C			C			A			D	

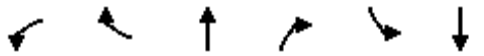
Intersection Summary			
HCM Average Control Delay	27.1	HCM Level of Service	C
HCM Volume to Capacity ratio	0.83		
Actuated Cycle Length (s)	150.0	Sum of lost time (s)	10.0
Intersection Capacity Utilization	85.9%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	286	746	0	0	890	99	1453	0	248	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	5.0			5.0	5.0	5.0		5.0			
Lane Util. Factor	0.97	0.95			0.95	1.00	0.97		1.00			
Frt	1.00	1.00			1.00	0.85	1.00		0.85			
Flt Protected	0.95	1.00			1.00	1.00	0.95		1.00			
Satd. Flow (prot)	3400	3505			3471	1553	3433		1583			
Flt Permitted	0.95	1.00			1.00	1.00	0.95		1.00			
Satd. Flow (perm)	3400	3505			3471	1553	3433		1583			
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)	301	785	0	0	937	104	1529	0	261	0	0	0
RTOR Reduction (vph)	0	0	0	0	0	53	0	0	54	0	0	0
Lane Group Flow (vph)	301	785	0	0	937	51	1529	0	207	0	0	0
Heavy Vehicles (%)	3%	3%	3%	4%	4%	4%	2%	2%	2%	0%	0%	0%
Turn Type	Prot					Perm	Perm		Perm			
Protected Phases	5	2			6			8				
Permitted Phases						6	8		8			
Actuated Green, G (s)	15.2	68.9			49.7	49.7	71.1		71.1			
Effective Green, g (s)	15.2	68.9			49.7	49.7	71.1		71.1			
Actuated g/C Ratio	0.10	0.46			0.33	0.33	0.47		0.47			
Clearance Time (s)	4.0	5.0			5.0	5.0	5.0		5.0			
Vehicle Extension (s)	0.5	2.0			2.0	2.0	0.5		0.5			
Lane Grp Cap (vph)	345	1610			1150	515	1627		750			
v/s Ratio Prot	c0.09	0.22			c0.27							
v/s Ratio Perm						0.03	c0.45		0.13			
v/c Ratio	0.87	0.49			0.81	0.10	0.94		0.28			
Uniform Delay, d1	66.4	28.3			45.9	34.7	37.4		23.9			
Progression Factor	0.80	1.15			1.00	1.00	1.00		1.00			
Incremental Delay, d2	2.4	0.1			6.4	0.4	10.8		0.1			
Delay (s)	55.5	32.6			52.3	35.0	48.2		23.9			
Level of Service	E	C			D	D	D		C			
Approach Delay (s)		38.9			50.6			44.7			0.0	
Approach LOS		D			D			D			A	

Intersection Summary			
HCM Average Control Delay	44.7	HCM Level of Service	D
HCM Volume to Capacity ratio	0.89		
Actuated Cycle Length (s)	150.0	Sum of lost time (s)	14.0
Intersection Capacity Utilization	85.9%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (veh/h)	14	0	468	11	0	248
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.85	0.85	0.85	0.85	0.85	0.85
Hourly flow rate (vph)	16	0	551	13	0	292
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (ft)			356			
pX, platoon unblocked	0.98	0.98			0.98	
vC, conflicting volume	849	557			564	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	837	540			546	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	95	100			100	
cM capacity (veh/h)	331	532			1004	

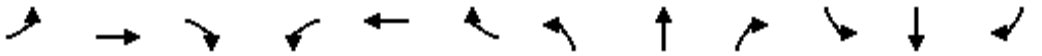
Direction, Lane #	WB 1	NB 1	SB 1
Volume Total	16	564	292
Volume Left	16	0	0
Volume Right	0	13	0
cSH	331	1700	1004
Volume to Capacity	0.05	0.33	0.00
Queue Length 95th (ft)	4	0	0
Control Delay (s)	16.5	0.0	0.0
Lane LOS	C		
Approach Delay (s)	16.5	0.0	0.0
Approach LOS	C		

Intersection Summary			
Average Delay	0.3		
Intersection Capacity Utilization	35.3%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (veh/h)	5	64	194	9	13	163
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.85	0.85	0.85	0.85	0.85	0.85
Hourly flow rate (vph)	6	75	228	11	15	192
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (ft)			891			402
pX, platoon unblocked						
vC, conflicting volume	456	234			239	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	456	234			239	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	99	91			99	
cM capacity (veh/h)	556	806			1328	

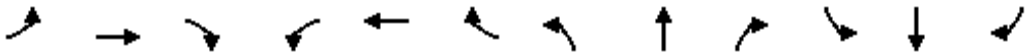
Direction, Lane #	WB 1	WB 2	NB 1	SB 1
Volume Total	6	75	239	207
Volume Left	6	0	0	15
Volume Right	0	75	11	0
cSH	556	806	1700	1328
Volume to Capacity	0.01	0.09	0.14	0.01
Queue Length 95th (ft)	1	8	0	1
Control Delay (s)	11.5	9.9	0.0	0.7
Lane LOS	B	A		A
Approach Delay (s)	10.0		0.0	0.7
Approach LOS	B			

Intersection Summary			
Average Delay	1.8		
Intersection Capacity Utilization	29.3%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	27	77	65	56	100	96	86	444	29	209	560	17
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
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	0.95		1.00	0.95	
Frt	1.00	0.93		1.00	0.93		1.00	0.99		1.00	1.00	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	1736		1770	1726		1770	3507		1770	3523	
Flt Permitted	0.41	1.00		0.57	1.00		0.40	1.00		0.46	1.00	
Satd. Flow (perm)	759	1736		1058	1726		752	3507		852	3523	
Peak-hour factor, PHF	0.85	0.85	0.85	0.85	0.85	0.85	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	32	91	76	66	118	113	96	493	32	232	622	19
RTOR Reduction (vph)	0	52	0	0	59	0	0	6	0	0	3	0
Lane Group Flow (vph)	32	115	0	66	172	0	96	519	0	232	638	0
Turn Type	Perm			Perm			Perm			Perm		
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)	11.5	11.5		11.5	11.5		45.5	45.5		45.5	45.5	
Effective Green, g (s)	11.5	11.5		11.5	11.5		45.5	45.5		45.5	45.5	
Actuated g/C Ratio	0.18	0.18		0.18	0.18		0.70	0.70		0.70	0.70	
Clearance Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	134	307		187	305		526	2455		596	2466	
v/s Ratio Prot		0.07			c0.10			0.15			0.18	
v/s Ratio Perm	0.04			0.06			0.13			c0.27		
v/c Ratio	0.24	0.38		0.35	0.56		0.18	0.21		0.39	0.26	
Uniform Delay, d1	23.0	23.6		23.5	24.5		3.4	3.4		4.0	3.6	
Progression Factor	1.01	1.00		1.00	1.00		1.00	1.00		1.94	1.60	
Incremental Delay, d2	0.9	0.7		1.2	2.4		0.8	0.2		1.4	0.2	
Delay (s)	24.1	24.3		24.6	26.8		4.1	3.6		9.2	5.9	
Level of Service	C	C		C	C		A	A		A	A	
Approach Delay (s)		24.3			26.3			3.7			6.8	
Approach LOS		C			C			A			A	

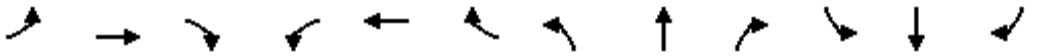
Intersection Summary			
HCM Average Control Delay	10.5	HCM Level of Service	B
HCM Volume to Capacity ratio	0.42		
Actuated Cycle Length (s)	65.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	52.6%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	0	0	7	0	0	177	0	509	52	0	780	50
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.85	0.85	0.85	0.85	0.85	0.85	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	0	0	8	0	0	208	0	566	58	0	867	56
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)								335			442	
pX, platoon unblocked	0.99	0.99		0.99	0.99	0.99				0.99		
vC, conflicting volume	1385	1518	461	1036	1517	312	922			623		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1363	1498	461	1009	1496	275	922			591		
tC, single (s)	7.5	6.5	6.9	7.5	6.5	6.9	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	100	100	98	100	100	71	100			100		
cM capacity (veh/h)	74	120	547	189	120	713	736			968		

Direction, Lane #	EB 1	WB 1	NB 1	NB 2	SB 1	SB 2
Volume Total	8	208	377	246	578	344
Volume Left	0	0	0	0	0	0
Volume Right	8	208	0	58	0	56
cSH	547	713	1700	1700	1700	1700
Volume to Capacity	0.02	0.29	0.22	0.14	0.34	0.20
Queue Length 95th (ft)	1	30	0	0	0	0
Control Delay (s)	11.7	12.1	0.0	0.0	0.0	0.0
Lane LOS	B	B				
Approach Delay (s)	11.7	12.1	0.0		0.0	
Approach LOS	B	B				

Intersection Summary				
Average Delay	1.5			
Intersection Capacity Utilization	33.4%	ICU Level of Service	A	
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	5	0	64	124	0	7	7	289	41	3	419	4
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	0.85		1.00	0.85		1.00	0.98		1.00	1.00	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	1583		1421	1242		1770	1828		1770	1860	
Flt Permitted	0.75	1.00		0.71	1.00		0.47	1.00		0.55	1.00	
Satd. Flow (perm)	1402	1583		1063	1242		871	1828		1024	1860	
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	6	0	71	138	0	8	7	304	43	3	441	4
RTOR Reduction (vph)	0	54	0	0	6	0	0	9	0	0	0	0
Lane Group Flow (vph)	6	17	0	138	2	0	7	338	0	3	445	0
Heavy Vehicles (%)	2%	2%	2%	27%	2%	30%	2%	2%	2%	2%	2%	2%
Turn Type	Perm			Perm			Perm			Perm		
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)	9.3	9.3		9.3	9.3		22.7	22.7		22.7	22.7	
Effective Green, g (s)	9.3	9.3		9.3	9.3		22.7	22.7		22.7	22.7	
Actuated g/C Ratio	0.23	0.23		0.23	0.23		0.57	0.57		0.57	0.57	
Clearance Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	326	368		247	289		494	1037		581	1056	
v/s Ratio Prot		0.01			0.00			0.18			c0.24	
v/s Ratio Perm	0.00			c0.13			0.01			0.00		
v/c Ratio	0.02	0.04		0.56	0.01		0.01	0.33		0.01	0.42	
Uniform Delay, d1	11.8	11.9		13.5	11.8		3.8	4.6		3.8	4.9	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.0	0.1		2.7	0.0		0.1	0.8		0.0	1.2	
Delay (s)	11.9	12.0		16.3	11.8		3.8	5.4		3.8	6.1	
Level of Service	B	B		B	B		A	A		A	A	
Approach Delay (s)		11.9			16.0			5.4			6.1	
Approach LOS		B			B			A			A	

Intersection Summary			
HCM Average Control Delay	7.7	HCM Level of Service	A
HCM Volume to Capacity ratio	0.46		
Actuated Cycle Length (s)	40.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	42.5%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

COUNCIL MEETING: August 21, 2017
AGENDA ITEM NUMBER: _____

TO: MAYOR CLARK AND CITY COUNCIL MEMBERS

THROUGH: CHRIS EPPLEY, CITY MANAGER
NATE BROWN, COMMUNITY DEVELOPMENT DIRECTOR

FROM: SHANE WITHAM, ASSOCIATE PLANNER

SUBJECT: AREA A MASTER PLAN AMENDMENT TO BE HEARD BY CITY COUNCIL

BACKGROUND:
Representatives of ACP Holdings LLC have submitted an application for an Amendment to the Keizer Station Area A Master Plan Approval to allow for the construction of a new 16,788 square foot dental office building, which will be a companion to the existing Kaiser Permanente medical office building. The original Area A Master Plan approval envisioned a singular office building that was allowed to be up to 100,000 square feet in area. Subsequently, the Kaiser Permanente medical office building was constructed at the proposed office building location, and is currently 20,132 square feet in area. Instead of expanding the existing medical office facility (which would be allowed under the current Master Plan Approval), the applicant wishes to construct a separate 16,788 square foot dental office building adjacent to the medical office building. The applicant has indicated the new dental office building's design, materials, landscaping and signage will be comparable to the adjacent Kaiser Permanente medical office building and that all requirements of the original master plan approval will be met.

To allow for the change in site plan configuration, the master plan must be amended. However, the Keizer Development Code does not make any specific provision for an amendment to an approved Keizer Station Master Plan. If this were a new application for a master plan, the process would require an additional hearing before the Planning Commission. Staff is recommending sending this directly to the Council for the following reasons:

- The original Master Plan Order has been developed after lengthy and arduous work and the proposed changes are minor.
- Council has background and familiarity with the issues regarding the current approval.
- The decisions and conditions will remain largely intact.
- The Council is the final decision body in Master Plan application.
- The proposed changes will not significantly change the overall plan, stormwater or transportation issues.

RECOMMENDATION:
Staff recommends passing a minute motion as follows: "Move that the proposed Area A Master Plan Amendment shall be heard directly by the City Council".

COUNCIL MEETING: August 21, 2017

AGENDA ITEM NUMBER:_____

TO: MAYOR CLARK AND CITY COUNCIL MEMBERS

THROUGH: Chris Eppley, City Manager

FROM: Tim Wood, Finance Director

SUBJECT: Surplus Property Report Fiscal Year 2016-17

BACKGROUND: City Ordinance No. 2008-579 provides that staff shall provide a Surplus Property Report to the City Council no later than August 31 each year for the previous fiscal year. Such report shall indicate the surplus items sold or otherwise disposed of, the method of sale and the revenue from sales.

ISSUE: The following items have been disposed of during Fiscal Year 2016-17:

1. 2008 Chevrolet Van - $2,000 trade in credit for a new van
2. 2000 Dodge Durango – sold for $1,676
3. 1990 Honda Accord EX - sold for $580
4. 2004 Honda – sold for $2,510
5. 2012 Dodge Charger – sold for $8,500
6. 2012 Dodge Charger – sold for $8,500
7. 2004 Ford Crown Victoria Police Interceptor – sold for $1,361
8. Coffee Pot and Warmer – recycled
9. Three televisions – recycled
10. Typewriter – recycled
11. Used Police File Folders - recycled
12. Greenlee Fairmont Hydraulic Unit – Traded
13. Dance Floor – sold for $150
14. Scrap metal – sold for $1,179.21
15. Police Unclaimed Personal Property
    a. Compressors (4) sold for $210
    b. ATV and Motorcycle Ramp – sold for $110
    c. Pressure Washers (3) – sold for $230
    d. Misc. Yard Tools – sold for $315
    e. Bicycles (10) – sold for $660

According to City Staff, there was no computer equipment, vehicles, real property, heavy equipment or other items disposed of in fiscal year 2016-17 other than those identified above.

RECOMMENDATION: This report is for information only. No action is required.

CITY COUNCIL MEETING: August 21, 2017

AGENDA ITEM NUMBER:_____

TO: **MAYOR CLARK AND CITY COUNCIL MEMBERS**

THROUGH: **CHRIS EPPLEY**
CITY MANAGER

FROM: **BILL LAWYER**
PUBLIC WORKS DIRECTOR

SUBJECT: **CARLSON SKATE PARK REPAIRS**

DATE: **August 15, 2017**

BACKGROUND:

Staff solicited bids through an informal bidding process for repairs to the Carlson Skate Park. The repair work consists of grinding, smoothing and polishing the transition areas and surface of portions of the facility to improve the safety to users of the park. A request for bids was sent to three companies and only one submitted a bid.

The bid was received from Dreamland Skateparks LLC. In the amount of $34,900.00.

FISCAL IMPACT:

Funds for this project are available in the City Council adopted FY 17-18 Park Operation Fund budget, line 60.

RECOMMENDATION:

Staff recommends the City Council adopt the attached Resolution authorizing the City Manager to enter into a contract with Dreamland Skateparks LLC. in the amount of $34,900.00 for the Carlson Skate Park Repairs.

Please contact me with any questions or concerns.

CITY COUNCIL, CITY OF KEIZER, STATE OF OREGON

Resolution R2017-_____

AUTHORIZING THE CITY MANAGER TO ENTER INTO AN AGREEMENT WITH DREAMLAND SKATEPARKS LLC FOR CARLSON SKATE PARK REPAIRS

WHEREAS, Carlson Skate Park requires repairs;

WHEREAS, the City solicited bids for the repair of a portion of Carlson Skate Park;

WHEREAS, one bid for this project was received. Dreamland Skateparks LLC submitted a bid of $34,900.00;

NOW, THEREFORE,

BE IT RESOLVED by the City Council of the City of Keizer that the City Manager is hereby authorized to enter into the attached contract with Dreamland Skateparks LLC for a total cost of $34,900.00 to repair a portion of Carlson Skate Park. Funding for this project is from the Park Operation Fund.

BE IT FURTHER RESOLVED that this Resolution shall take effect immediately upon the date of its passage.

PASSED this _____ day of _____, 2017.
SIGNED this _____ day of _____, 2017.

_____
Mayor

_____
City Recorder

Keizer City Attorney
930 Chemawa Road NE
PO Box 21000
Keizer, Oregon 97307
503-390-3700

CONTRACT
FOR
CARLSON SKATE PARK REPAIRS

THIS AGREEMENT, made this 14th day of August, 2017, by and between the City of Keizer, an Oregon municipal corporation, hereinafter called "Owner", and Dreamland Skateparks LLC, an Oregon limited liability company, hereinafter called "Contractor".

WITNESSETH THAT: In consideration of the mutual covenants and conditions hereinafter set forth, the Owner and Contractor hereby agree as follows:

1. WORK BY CONTRACTOR. The Contractor shall provide all labor and materials to provide the services described in Exhibit "A" (Scope of Services) attached hereto and by this reference incorporated herein.

2. TIME OF COMPLETION. The Contractor shall complete all aspects of the project no later than October 16, 2017.

3. BONDS. Performance and Payment Bonds are required of Contractor at Contractor's own expense. Such bonds shall be issued by a surety licensed in the State of Oregon and must be acceptable to Owner. The bonds must equal the sum of the contract price.

   The Contractor and all subcontractors must obtain or possess a valid Public Works Bond, filed with the Construction Contractors Board (CCB) before beginning any work on this project.

4. PRECONSTRUCTION CONFERENCE. Before any Work is started, a Preconstruction Conference attended by the Contractor, Public Works Director, and others as appropriate, will be held to establish a working understanding among the parties as to the Work and to discuss the procedures for handling submittals, processing applications for payment, and maintaining records. Contractor is required to request such Preconstruction Conference as soon as possible to prevent delays in the project.

5. CONTRACT SUM. The Contract Sum is Thirty-Four Thousand, Nine Hundred and no/100 ($34,900.00). See Exhibit "B" (Proposed Quote) attached hereto and by this reference incorporated herein.

6. PAYMENTS. Contractor may request partial payments as work progresses. Partial payment requests shall be submitted to the Public Works Director by the 10th calendar day of each month for processing. Payment requests shall accurately and completely detail all work completed since the last payment request up to the last day of the month. Any and all additional forms and documentation required by statute or this Agreement shall be submitted with the pay request.

When final completion and acceptance of the work has been achieved, Contractor shall prepare for Owner's acceptance a final application for payment stating that to the best of Contractor's knowledge, and based on Owner's inspections, the work has reached final completion in accordance with the Contract Documents. Payment of the Contract Sum shall be made to Contractor within twenty (20) days after acceptance of the work by Owner and Contractor's submittal of the final application for payment and the following submissions:

A. Any and all additional forms and documentation required by statute or this Agreement;
B. An affidavit declaring any indebtedness connected with the work, e.g. payrolls or invoices for materials or equipment, to have been paid, satisfied or to be paid with the proceeds of final payment, so as not to encumber the project property;
C. A statement, under oath, that it has complied with all provisions of State law governing contractors on a public contract and it has complied with the provisions governing fair employment practices;
D. A statement by each of Contractor's subcontractors, under oath, that each of the subcontractors has complied with all provisions of State law governing contractors on a public contract and has complied with the provisions governing fair employment practices;
E. Release of any liens, conditioned on final payment being received;
F. A report of any accidents or injuries experienced by Contractor or its Subcontractors at the worksite.

If the work has been substantially completed and full completion thereof is materially delayed through no fault of the Contractor and the Public Works Director so certifies, the Owner shall, upon the certificate of the Public Works Director, and without terminating the Contract, make payment for the balance due for that portion of the work fully complete and accepted, less a retained amount equal to five percent (5%) of the amount requested.

7. PAYMENTS WITHHELD. Owner may withhold, or on account of subsequently discovered evidence, nullify the whole or part of any estimate to such extent as may be necessary to protect the Owner from losses on account of:

a. Defective work not remedied within a reasonable time after written notice.
b. Claims filed or reasonable evidence indicating probable filing of claims.
c. Failure of the Contractor to make payments properly to subcontractors or for material or labor.
d. A reasonable doubt that the Contract can be completed for the balance then unpaid.
e. Damage to the site, adjacent public or private property, or to another contractor.
f. Failure of the Contractor to keep Contractor's work progressing in accordance with Contractor's time schedule.

When the above grounds are removed, payment shall be made for amounts withheld because of them.

8. CHANGES. Contractor may request and/or Owner may order changes in the work or the timing or sequencing of performance of the work that impacts the Contract Price or the Contract Time. All such changes in the work that affect Contract Time or Contract Price shall be formalized in a Change Order. Acceptance of the Change Order and any adjustment in the Contract Price and/or Contract Time must be signed by all parties.

9. NOTICES. Any written notices permitted or required by this Contract shall be deemed given when personally delivered, or three days after deposit in the United States mail, postage fully prepaid, addressed to the parties as set forth below or such other address as either party may provide to the other by notice given in accordance with this provision.

OWNER:	CONTRACTOR:
Bill Lawyer Public Works Director City of Keizer 930 Chemawa Road NE PO Box 21000 Keizer, OR 97307	Dreamland Skateparks LLC 2150 SE Hwy 101 PMB 384 Lincoln City, OR 97367

10. LICENSES AND PERMITS. The Contractor shall obtain and maintain all licenses required for public works contracts in the State of Oregon and shall secure and pay for all fees and permits required for the project, if any. Contractor shall comply with all laws, ordinances and regulations, (Federal, State, or local) which may be applicable to the project to be conducted hereunder.

11. RESPONSIBILITY OF PUBLIC WORKS DIRECTOR. The term "Public Works Director" herein shall be Bill Lawyer, or his duly authorized representative. The Public Works Director shall have full authority to interpret the plans and specifications and shall determine the amount, quality, and acceptance of the work and supplies to be paid for under this Contract. It shall be the duty of the Public Works Director to enforce the specifications in a fair and unbiased manner, although he has the right to waive any term of the specifications if that term is found to be unreasonable and inconsistent with the general spirit of the specifications.

12. WAIVER. It is expressly understood and agreed that any waiver granted by the Public Works Director or the Owner of any term, provision or covenant of this Contract shall not constitute a precedent nor breach of the same of any other terms, provisions, or covenants of this Contract. Neither the acceptance of the work by Owner nor the payment of all or any part of the sum due the Contractor

hereunder shall constitute a waiver, by the Owner, of any claim which the Owner may have against the Contractor.

13. LIABILITY INSURANCE. The Contractor shall procure and maintain ongoing and completed liability insurance as hereinafter specified at Contractor's own expense. All such insurance shall be subject to the approval of the Owner for adequacy of protection and shall include a provision preventing cancellation without ten (10) day's prior notice to the Owner in writing. Contractor must provide the Owner with a certificate of insurance and endorsement evidencing the insurance within five (5) days from Contractor's execution of this Contract. Contractor shall not commence work until the required evidence has been delivered to Owner. The endorsement must insure the City of Keizer as an additional insured. "The City of Keizer" includes its officers, agents, contractors, and employees. The insurance requirement is to be in effect during the life of this Contract. The liability insurance required is as follows:

    a. Contractor's General Public Liability and Property Damage Insurance issued to the Contractor and protecting him from all claims for personal injury including death, and all claims for destruction of or damage to property, arising out of or in connection with any operations under this Contract, whether such operations be by himself or by any subcontractor under him, or anyone directly or indirectly employed by the Contractor or by a subcontractor under him.

    All such insurance shall be written with a limit of liability of not less than $1,000,000 for all damages arising out of bodily injury, including death, at any time resulting therefrom, sustained by any one person in any one accident; a limit of liability of not less than $2,000,000 for any such damages sustained by two or more persons in any one accident; a limit of liability of not less than $1,000,000 for all damages arising out of injury or destruction of property, damages arising out of injury or destruction of property, (including property of the City) in any one accident; and a limit of liability of not less than $2,000,000 for all damage arising out of injury to or destruction of property, including property of City, during the policy period.

    b. Automobile Liability Insurance with a limit of liability of not less than $1,000,000 issued to Contractor and protecting him from all claims arising out of or in connection with any operations under this Contract, whether such operations be by himself or by any subcontractor under him, or anyone directly or indirectly employed by Contractor or by a subcontractor under him.

14. WORKERS COMPENSATION INSURANCE. The Contractor shall procure and maintain, at Contractor's own expense, during the life of this Contract, in accordance with the provision of the laws of the state of Oregon, Workman's Compensation Insurance for all of Contractor's employees at the site of the project and in case any work is sublet, the Contractor shall require such subcontractor similarly to provide Workman's Compensation Insurance for all of

its employees unless such employees are covered by the protection afforded by the Contractor. Certificates evidencing the issuance of such insurance shall be filed with the Owner within five (5) days after execution of this Contract.

15. INDEMNITY. The Contractor shall indemnify the Owner, the Owner's agents and employees from and against all losses and all claims, demands, payments, suit actions, recoveries, and judgment of every nature and description brought or recovered against them by reason of any act or omission of the said Contractor, Contractor's agents, or employees, in the execution of the work or in guarding the same.

16. SUBCONTRACTS. The Contractor shall have full responsibility under these conditions, general provisions, plans and specifications for any subcontracts which Contractor may let. Work not performed by Contractor with its own forces shall be performed by subcontractors. Contractor agrees to bind each subcontractor and material supplier (and require every subcontractor to so bind its subcontractors and material suppliers) to all the provisions of this Contract and the Contract Documents as they apply to the subcontractor's and material supplier's portions of the work. Contractor shall submit a certification to Owner that all subcontractors performing work will be registered with the Construction Contractors Board or licensed by the State Landscape Contractors Board in accordance with ORS 701.035 to 701.055 before the subcontractors commence work under the contract.

17. CONTRACTOR PAYMENTS. Contractor shall: (1) make payment promptly, as due, to all persons supplying to Contractor labor or materials for the prosecution of the Work provided for in this Contract; (2) pay all contributions or amounts due the State Industrial Accident Fund and the State Unemployment Compensation Trust Fund from such Contractor or Subcontractor incurred in the performance of the Contract; (3) not permit any lien or claim to be filed or prosecuted against the Owner because of any labor or material furnished; and (4) pay to the Department of Revenue all sums withheld from employees.

    If Contractor fails, neglects or refuses to make prompt payment of any claim for labor or services furnished to the Contractor or a Subcontractor by any person in connection with the Project as such claim becomes due, the proper officer(s) representing the Owner may pay the claim and charge the amount of the payment against funds due or to become due Contractor under this Contract.

18. PROTECTION OF WORK AND PROPERTY. The Contractor shall continuously maintain adequate protection of all Contractor's work and materials from damage or theft and shall protect the Owner's property and all adjacent property from injury or loss arising in connection with the activities under this Contract. The Contractor shall make good any such damage, injury, or loss, except such as may be due to errors in the Contract documents or such as may be caused by agents or employees of the Owner.

The Contractor shall take, use, provide, and maintain all necessary precautions, safeguards, and protection to prevent accidents, or injury to persons or property on, about, or adjacent to the work site, warning against any hazards created by the work being done under this Contract. Contractor shall designate a responsible member of Contractor's organization on the work, whose duty shall be the prevention of accidents, and the name of the person so designated shall be reported to the Owner in writing. In any emergency affecting the safety of life, or of the work or adjoin property, the Contractor, without special instruction or authorization from the Owner, is hereby permitted to act, at Contractor's discretion, to prevent such threatened loss or injury, and Contractor must take such action if so instructed or authorized by the Owner. The Contractor shall also protect adjacent property as required by law. SAFETY MEASURES. Contractor agrees that Contractor, Contractor's employees, and subcontractors will comply with all OSHA regulations applicable to the work being performed. Contractor agrees that all personnel must wear safety vests at all times.

19. INSPECTION. Owner and his representative shall at all times have access to the work during its construction, and shall be furnished with every reasonable facility for ascertaining that the stock and materials used and employed, and the workmanship are in accordance with the requirements and intentions of the specifications. All work done and all materials furnished shall be subject to inspection and approval.

    The inspection of the work shall not relieve the Contractor of any of Contractor's obligations to fulfill the Contract in full and as prescribed. Defective work shall be made good and unsuitable material shall be rejected, notwithstanding that such defective work and material may have been previously overlooked and accepted on estimates for payment. No work shall be done at night without the prior written approval of Owner.

20. DEFECTIVE WORK OR MATERIAL. The Contractor shall promptly remove from the premises all work and materials condemned by Owner as failing to conform to the Contract, whether incorporated or not, and the Contractor shall promptly replace and re-execute Contractor's own work in accordance with the Contract and without expense to the Owner and shall bear the expense of making good all work of other contractors destroyed or damaged by such removal or replacement.

21. LIENS. Contractor shall not permit any lien or claim to be filed or prosecuted against the City of Keizer, Oregon or the private property owner, in connection with this contract and agrees to assume responsibility should such lien or claim be filed. If at any time there shall be evidence of any lien or claim for which the Owner might become liable and which is chargeable to the Contractor, the Owner shall have the right to retain out of any payment then due or thereafter to become due, an amount sufficient to provide complete indemnification against such lien or claim. In the event the Owner has already paid to the Contractor all sums due under this Contract or the balance remaining unpaid is insufficient to

protect the Owner, the Contractor shall be liable to the Owner for any loss so sustained.

22. OWNER'S RIGHT TO TAKE OVER THE WORK. If the Contractor should be adjudged as bankrupt, or if it should make a general assignment for the benefit of its creditors, or if a receiver should be appointed to take over its affairs, or if it should fail to prosecute its work with due diligence and carry the work forward in accordance with its work schedule and the time limits set forth in the Contract documents, or if it should fail to substantially perform one or more of the provisions of the Contract documents to be performed by it, the Owner may serve written notice on the Contractor and the surety of its payment bond, stating its intention to exercise one of the remedies hereinafter set forth and the grounds upon which the Owner bases its right to exercise such remedy.

In any event, unless the matter complained of is satisfactorily corrected within ten (10) days after service of such notice, the Owner may, without prejudice to any other right or remedy, exercise one of the following such remedies, at once, having first obtained a certificate from the Public Works Director that sufficient cause exists to justify such action.

a. The Owner may terminate the services of the Contractor, which termination shall take effect immediately upon service of notice thereof on the Contractor, whereupon Owner may itself take over the work, take possession of and use all materials, tools, equipment and appliances on the premises and prosecute the work to completion by such means as it shall deem best. In the event of such termination of its service, the Contractor shall not be entitled to any further payment under this Contract until the work is completed and accepted. If the Owner takes over the work and if the unpaid balance of the Contract price when the Owner takes over the work exceeds the cost of completing the work, including compensation for any damages or expenses incurred by Owner through the default of the Contractor, such excess shall be paid to the Contractor. In such event, if such costs, expenses and damages shall exceed such unpaid balance of the Contract price, the Contractor shall pay the difference to the Owner. Such costs, expenses, and damages shall be certified by the Public Works Director.
b. The Owner may take control of the work and either make good the deficiencies of the Contractor itself or direct the activities of the Contractor in doing so, employing such additional help as the Owner deems advisable. In such event, the Owner shall be entitled to collect from the Contractor, or to deduct from any payment then or thereafter due the Contractor, the cost incurred by it through the default of the Contractor, provided the Public Works Director approves the amount thus charged to the Contractor.
c. The Owner may require the surety on the Contractor's bond to take control of the work at once and see to it that all of the deficiencies of the Contractor are made good with due diligence. As between the Owner and the surety, the cost of making good such deficiencies shall all be borne by

the surety. If the surety takes over the work, either upon instructions from the Owner to do so or based upon the surety's choice, all provisions of the Contract documents shall govern in respect to the work done by the surety, the surety being substituted for the Contractor as to such provisions as to payment for the work and provisions of this section as to the right of the Owner to do the work itself or to take control of the work.

The above remedies are in addition to any other remedies allowed by law or equity.

23. CONTRACTOR'S RIGHT TO STOP OR TERMINATE CONTRACT. If the work shall be stopped under an order of any court or other public authority for a period of no less than three (3) months through no act or fault of the Contractor or of any one employed by it, then the Contractor may on seven (7) days written notice to the Owner stop work or terminate this Contractor and recover from the Owner payment for all work executed to the date of stoppage, any losses sustained from any plant or material, and a reasonable profit. If the Public Works Director shall fail to issue any certificate for payment within ten (10) days after it is due, or if the Owner shall fail to pay the Contractor within fifteen (15) days after its maturity and presentation to the Owner any sum certified by the Public Works Director, then the Contractor may, on seven (7) days written notice to Owner, terminate the Contract and recover from the Owner payment for all work executed to date, any losses sustained upon any plant for material, and a reasonable profit.

24. DELAYS AND EXTENSION OF TIME. If the Contractor is delayed at any time in the progress of the work by an act or neglect of the Owner, or any employee of Owner, or by any separate contractor employed by the Owner, or by changes ordered in the work, or by strike, lockouts, fire, unusual delay in transportation, unavoidable casualties, or any cause beyond the Contractor's control, or by delay authorized by the Public Works Director, or by any cause which the Public Works Director shall decide to justify the delay, then the time of completion shall be extended for such reasonable time as the Public Works Director may decide.

No such extensions shall be made for a delay occurring more than seven (7) days before claim therefore is made in writing to the Public Works Director. In the case of a continued cause of delay, only one claim is necessary. This section does not exclude the recovery of damages for delays by either party under other provisions in the Contract documents.

25. ACCEPTANCE. Final inspection and acceptance of the work shall be made by the Owner and local appointed authority. Such inspection shall be made as soon as practical after the Contractor has notified the Owner in writing that the work is ready for such inspection.

26. GUARANTEE. Contractor agrees to guarantee all work under this Contract for a period of one (1) year from the date of final acceptance thereof. If any unsatisfactory condition or damage develops within the time of this guarantee due to materials or workmanship which were defective, inferior, or not in

accordance with the Contract, Contractors agrees, whenever notified by Owner, to immediately place such guaranteed work in a condition satisfactory to Owner and make repairs of all damage made necessary in the fulfillment of the guarantee. This provision shall survive termination of this Contract.

27. DISPUTE RESOLUTION.

(a) Any dispute arising out of or in connection with this Agreement, which is not settled by mutual agreement of the Contractor and the Owner within sixty (60) days of notification in writing by either party, shall be submitted to an arbitrator mutually agreed upon by the parties. In the event the parties cannot agree on the arbitrator, then the arbitrator shall be appointed by the Presiding Judge (Civil) of the Circuit Court of the State of Oregon for the County of Marion. The arbitrator shall be selected within thirty (30) days from the expiration of the sixty (60) day period following notification of the dispute. The arbitration, and any litigation arising out of or in connection with this Agreement, shall be conducted in Salem, Oregon, shall be governed by the laws of the State of Oregon, and shall be as speedy as reasonably possible. The applicable arbitration rules for the Marion County courts shall apply unless the parties agree in writing to other rules. The arbitrator shall render a decision within forty-five (45) days of the first meeting with the Contractor and the Owner. Insofar as the Contractor and the Owner legally may do so, they agree to be bound by the decision of the arbitrator.

(b) Notwithstanding any dispute under this Agreement, whether before or during arbitration, the Contractor shall continue to perform its work pending resolution of a dispute, and the Owner shall make payments as required by the Agreement for undisputed portions of work.

28. ASSIGNMENT. Neither Owner nor Contractor shall assign its interest in this Contract without the written consent of the other except as to the assignment of proceeds. The terms and conditions of this Contract shall be binding upon both parties, their partners, successors, assigns and legal representatives. Neither party to this Contract shall assign the Contract as a whole without written consent of the other.

29. INDEPENDENT CONTRACTOR STATUS. The service or services to be performed under this Contract are those of an independent contractor as defined in ORS 670.600. Contractor represents and warrants that it is not an officer, employee or agent of the Owner. Contractor is not entitled to, and expressly waives all claim to City benefits including, but not limited to health, life, and disability insurance, overtime pay, paid leave, and retirement.

30. GOVERNING LAW. This Contract shall be governed by the laws of the State of Oregon.

31. SEVERABILITY. Any provision or part of this Contract held to be void or unenforceable under any law or regulation shall be deemed stricken, and all remaining provisions shall continue to be valid and binding upon Owner and

Contractor. Owner and Contractor agree that this Contract shall be amended to replace such stricken provision or part thereof with a valid and enforceable provision that comes as close as possible to expressing the intention of the stricken provision.

32. COMPLIANCE. The Contractor shall comply with and require its subcontractors to comply with all applicable provisions of Federal, State and local statutes, ordinance, orders, rules, regulations, and all other specifications and provisions as contained within these Contract documents.

33. INCORPORATION; PRECEDENCE. The Exhibits, if any, attached to this Contract are incorporated herein as if fully set forth in this Contract. If any provision of any Exhibit conflicts with the provisions of this Contract, the terms of this Contract shall govern.

IN WITNESS WHEREOF, the parties hereto have caused these presents to be executed the day and year first above written.

CITY OF KEIZER

By:_____
Christopher C. Eppley,
City Manager

DREAMLAND SKATEPARKS LLC

By:_____
Danyel Scott,
Member

APPROVED AS TO FORM:

_____
Keizer City Attorney

Exhibit "A"

Carlson Skate Park Repairs
Scope of Services

1. Smooth the surface of the flat bottom of the park in the large open area and Pyramid (See area labeled #1 on attached drawing – approximately 4,250 sq ft) using grinder/polisher.

2. Polish smooth the key functioning quarter pipes of the four wall sections (See area labeled #2 on attached drawing – approximately 800 sq ft) using grinder.

3. Patch holes with a high strength Ardex concrete patch and honor cold joint (crack and seam) up through patch and apply polyurethane caulking in the large open area and ½ pipe area (large spalls and holes that are typically larger than 1") and where the flat meets the ramps (See area labeled #3 on attached drawing – approximately 300 sq ft).

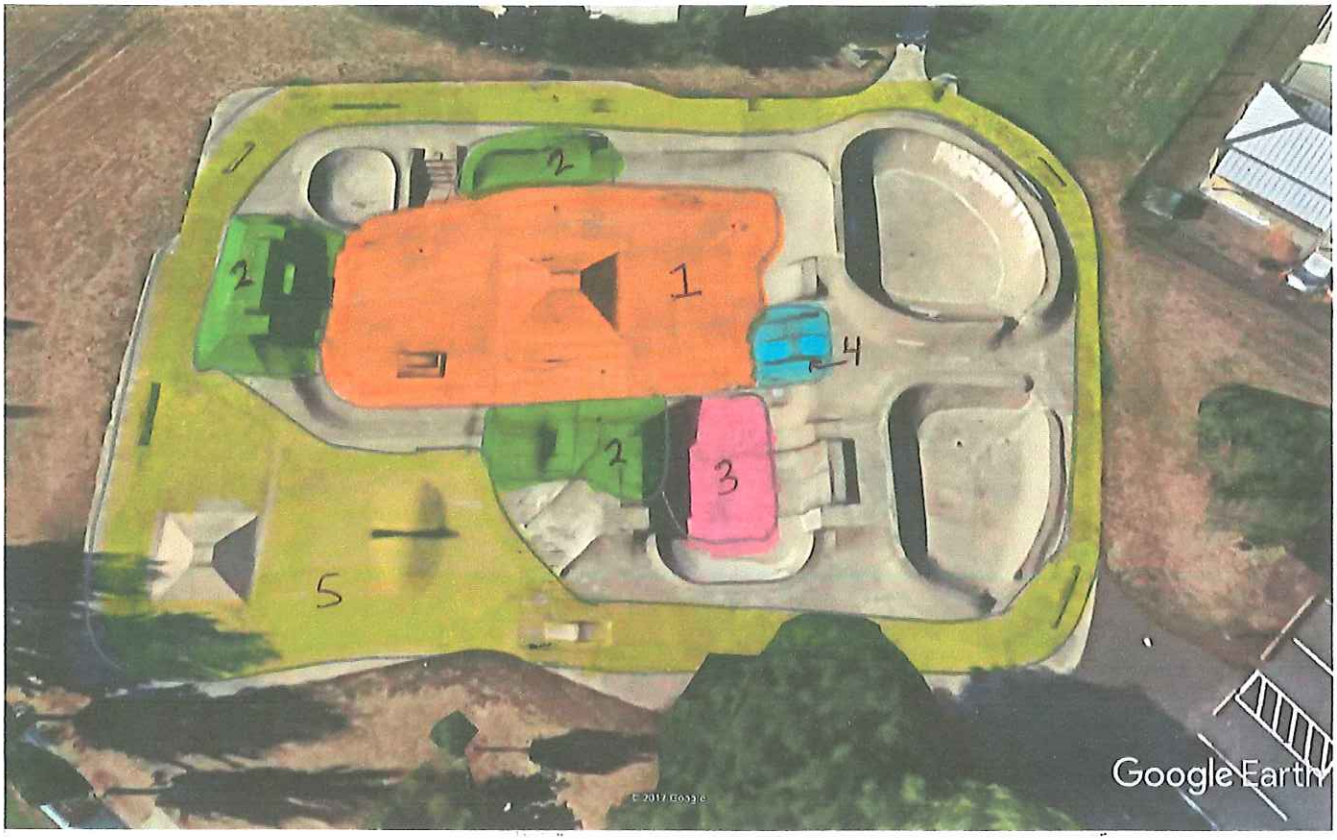
4. Cut, remove and replace the "DIY" style ramp, grind the rail on stairs and paint (See area labeled #4 on attached drawing).

5. Polish and patch key areas surrounding selected features on the deck (surrounding the perimeter of the park) and the entrance and landing (See area labeled #5 on the attached drawing – approximately 3,000 sq ft).

6. The project shall be completed pursuant to any and all standards and requirements required by federal, state, or local law, including, but not limited to, the American with Disabilities Act. The City is dependent on Contractor's expertise and experience in this regard.

7. Properly dispose of all waste material from project.

8. Comply with appropriate safety measures.



Google Earth

feet 0 100
meters 30

1

2

3

4

5

EXHIBIT "B"

QUOTE SHEET

PROJECT: CARLSON SKATE PARK REPAIRS
OWNER: CITY OF KEIZER

ITEM	DESCRIPTION			UNIT PRICE'	AMOUNT
1	Orange Section				11,000.00
2	Green section				4,000.00
3	Pink section				1,000.00
4	Blue section				1,000.00
5	Yellow section				15,900.00
	Performance & Payment Bonds				2,000.00

Total Quote includes all items, including, but not limited to, providing performance bond, payment bond, and disposal of all materials.

TOTAL BID 34,900.00

thirty four thousand nine hundred dollars 00/

Company Name: Dreamland Skateparks LLC
Company Address: 2150 SE Hwy 101 pmb 384
Lincoln City, OR 97367
Company Phone #: 503.577.9277
Company Fax #: 541.994-7010

Contact Name: Danyel Scott
Email Address: dreamlandskateparks@gmail.com

Signature

Danyel Scott
Printed Name

08/08/17
Dated

MINUTES
KEIZER CITY COUNCIL WORK SESSION
Monday, July 10, 2017
Keizer Civic Center, Council Chambers
Keizer, Oregon

CALL TO ORDER

Mayor Clark called the Work Session to order at 5:47 pm. Roll Call was taken as follows:

Present:	**Staff:**
Cathy Clark, Mayor	Chris Eppley, City Manager
Marlene Parsons, Councilor	Shannon Johnson, City Attorney
Roland Herrera, Councilor	Nate Brown, Community Development
Bruce Anderson, Councilor	Bill Lawyer, Public Works Director
Laura Reid, Councilor	John Teague, Police Chief
Amy Ryan, Councilor	Tracy Davis, City Recorder
Kim Freeman, Councilor (5:47)	

DISCUSSION
a. Inclusivity

City Manager Chris Eppley reviewed documents that had been provided to participants and provided a brief explanation of submissions by various City Departments that specifically addressed how social equity and justice are included in the daily operations of each department with the limited resources available to the City. He added that the purpose of this meeting was to decide if and/or how Councilors want to legislatively address this topic.

Mayor Clark noted that one of the Council goals is community engagement. She urged citizens to volunteer on city committees in order to participate in city government and be engaged with the community.

Cyndi Swaney, Keizer, explained that those who signed the letter met as a group to express their desires for the inclusivity resolution.

Levi Lopez, Executive Director for Mano a Mano Family Center, provided testimony for the resolution that Salem passed noting that the general sense was that residents of Keizer are concerned about incidents happening in the city and wanted to bring this to the attention of Council. The intent of the resolution is to make a statement promoting inclusivity at the highest level of city government and make sure that the effort is not simply departmental but is an overriding vision of inclusivity and equity. The resolution is meant to mirror resolutions that have been passed by other Oregon cities. He commended Chief Teague and his officers for their inclusivity efforts and urged that Keizer take be a leader in this effort.

Discussion followed regarding whether or not the proposed resolution

conflicts with any federal laws, follow-up efforts by cities that have passed these resolutions, communication with the public, and community engagement and involvement.

Christina Markus, Salem, from Causa Oregon, explained that the Resolution reaffirms values of dignity and respect for all people and states that the City is abiding with Oregon law. It is the first step to welcome everyone. She added that the Causa Oregon website (www.causaoregon.org) has information for all types of different situations.

Carol Doerfler, Keizer, shared her thoughts on how the inclusivity resolution information could be shared throughout the community.

Anna Sequeira da Silva, Keizer, reiterated the proposal noting that it includes members of the community who are consistently excluded.

Mayor Clark then focused on how to define and understand the context of inclusion and equity in every day practices. Many organizations have adopted an 'Equity Lens' which is a protocol or thought process that asks policy and decision makers to consider when they look at projects, programs or policies. She suggested that perhaps this decision making tool should be developed.

Councilors discussed the valid assumption that inclusivity is good and discrimination is bad, and that respect, equality and fighting against bullying are valued. Additional dialog included language in the resolution and the usefulness of the 'Equity Lens'.

Councilors discussed how to share information. Chief Teague noted that getting information to Pastor Jose or to Levi at Mano a Mano was an effective way to share information. Councilor Reid explained that McNary is piloting an advisory class and this may be something that would be a good forum for this.

Councilor Ryan noted that she felt like most of what is being considered is related to immigration and she did not feel it was the position of the City Council to create a false comfort level with this resolution when it is not in the City's power to enforce it. She urged caution noting that she felt Council was treading politically into immigration laws over which they have no control.

Mayor Clark explained that human beings are not always decent to each other in every situation and Council is looking at how to get the facts out and have a voice. When someone is excluded for any reason, where can they express their voice? How do we share information and become the ambassadors to connect people? She asked Council and the City Manager to think about how this connects with the community engagement goal noting that it will take some time to do but Council will find a way to do this.

Bill White, Keizer, urged that the piece written by Chief Teague be compared with the proposed resolution and the two combined to make one document. He suggested that NextDoor.com be used to share information.

Referring to those two documents, Mr. Eppley explained that to some extent the City has two functions going on side by side: the administrative function which manages the operations of the City and the legislative function which is the people elected to represent the interests of the community adopting laws and directing expenditures of resources. In the operational level staff pays attention to these kinds of issues because they are required to and it is good business. On the operational side the city has policies in place but not on the legislative side. Perhaps those should be compared to make sure the actions of the legislative branch match up with the administrative practices. He also questioned how action taken by the legislative branch gets to the people that need to know. Anything that comes out of this group needs to make it to everyone and not everyone has a phone or a computer.

Discussion followed regarding the need for continuing the discussion, getting the word out, creating a safe environment for everyone, making sure the community is inclusive and respectful, and conveying dignity to all regardless of background.

ADJOURNMENT Mayor Clark adjourned the meeting at 7:12 p.m.

MAYOR: APPROVED:

Cathy Clark

Debbie Lockhart, Deputy City Recorder

COUNCIL MEMBERS

Councilor #1 – Laura Reid

Councilor #4 – Roland Herrera

Councilor #2 – Kim Freeman

Councilor #5 – Amy Ryan

Councilor #3 – Marlene Parsons

Councilor #6 – Bruce Anderson

Minutes approved:_____

MINUTES
KEIZER CITY COUNCIL
Monday, July 17, 2017
Keizer Civic Center, Council Chambers
Keizer, Oregon

CALL TO ORDER

Mayor Clark called the meeting to order at 7:00 pm. Roll Call was taken as follows:

Present:	**Staff:**
Cathy Clark, Mayor	Chris Eppley, City Manager
Marlene Parsons, Councilor	Shannon Johnson, City Attorney
Roland Herrera, Councilor	Nate Brown, Community Development
Bruce Anderson, Councilor	Bill Lawyer, Public Works Director
Kim Freeman, Councilor	John Teague, Police Chief
Amy Ryan, Councilor	Tim Wood, Finance Director
Laura Reid, Councilor	Machell DePina, Human Resources

FLAG SALUTE

Mayor Clark led the pledge of allegiance.

SPECIAL ORDERS OF BUSINESS

Honoring Senior All Stars from Little League

Mayor Clark introduced State Champions Keizer Little League All Stars. Representatives from the team thanked the community for their support and noted that they are going to Western Regionals. Donations to help in this effort can be made through their Go Fund Me account.

COMMITTEE REPORTS

a. **Volunteer Coordinating Committee Recommendation for Appointments to Keizer Public Arts Commission and Keizer Points of Interest Committee**

City Manager, Chris Eppley, reported that following publication of notice of vacancies on the Keizer Points of Interest Committee and the Keizer Public Arts Commission and acceptance of testimony from applicants, the Volunteer Coordinating Committee recommended Crizalise Tamayo (KPIC) and Suesann Abdelrasul (Arts) to fill the vacancies.

Councilor Parsons moved that the Keizer City Council accept the Volunteer Coordinating Committee recommended appointments. Councilor Freeman seconded. Motion passed unanimously as follows:

AYES: Clark, Reid, Parsons, Ryan, Freeman, Herrera and Anderson (7)
NAYS: None (0)
ABSTENTIONS: None (0)
ABSENT: None (0)

Committee Reports

Jim Taylor, Keizer, reported that the Parks Advisory is considering putting a sign at the sand volleyball courts recognizing Hans Schneider for his contribution. The Board will not be applying for a HEAL grant this year.

Hersch Sangster, Keizer, reported on the **Traffic/Bikeways/Pedestrian Committee** helmet fittings, participation in the Wild Wild Rec bicycle module, installation of a bike repair/air station, and renewal of the Bicycle Friendly City Designation. Also following a Public Hearing and several amendments, the **Planning Commission** recommended Council approval of a text amendment for landscape design.

PUBLIC TESTIMONY

Danielle Bethell, Executive Director of the Keizer Chamber of Commerce, requested that fees be waived for rooms being used for Community Conversations meetings (4) and the Keizer First Citizen Banquet. Council asked that this decision be addressed at the next meeting. *Nathan Bauer* provided additional information regarding the Community Conversations.

David Gor, Salem, owner of Kush Dispensary in Keizer, requested that the hours of operation for marijuana retailers be adjusted from 10 am to 7 pm to 7 am to 10 pm. Staff was directed to come back with additional information. Chief Teague was asked to provide comments as well.

Laura Viegas, Salem, expressed support for Mr. Gor's request.

Ken Gierloff, Keizer, invited Keizer residents to a pot luck picnic at Ben Miller Park sponsored by the Southeast Keizer Neighborhood Association.

Chief Teague noted that the potluck is in conjunction to National Night Out. This year 25 neighborhoods have signed up; 40 are expected. Signups are available on the website.

PUBLIC HEARINGS

a. The Pour House Saloon Liquor License – Change of Ownership

Mayor Clark opened the Public Hearing.

City Manager Chris Eppley reported that an application was submitted for a Change of Ownership for The Pour House Saloon, Keizer, Oregon. A background check was done and calls for service are within the City recommended standards. Staff recommends that Council review the application and forward a recommendation to the OLCC for approval.

With no further testimony, Mayor Clark closed the Public Hearing.

Councilor Parsons moved that the Keizer City Council approve the application for a Change of Ownership for The Pour House Saloon under the guidelines established by ORS 471.178 and the Ordinances of the City of Keizer and forward this recommendation to the Oregon Liquor Control Commission for final approval. Councilor Freeman seconded. Motion passed unanimously as follows:

AYES: Clark, Reid, Parsons, Ryan, Freeman, Herrera and Anderson (7)
NAYS: None (0)
ABSTENTIONS: None (0)
ABSENT: None (0)

b. Keizer Development Code Text Amendment – Allowance of Gasoline Stations Within the Chemawa/River Road Restriction Area

Mayor Clark opened the Public Hearing.

Community Development Director Nate Brown explained that the overlay district was put in place before the Development Code was adopted. The proposed revisions would allow gasoline dispensing under certain circumstances within this area. Planning Commission approved the text amendment but did not allow the convenience store. Mr. Brown provided detailed information about staff recommended restrictions which included no street frontage and no convenience store. He added that the City has an ongoing grant program underway to review overlay and zoning districts to ensure that they are working cohesively and accomplishing their intent. Staff recommendation is to allow gasoline sales as a conditional use under certain restrictions and not allow the convenience store.

Councilor Ryan declared a possible conflict of interest because her son has applied for an internship with Perkins Coie which is one of the associated organizations.

Seth King, Land Use Attorney with Perkins Coie, voiced support for the Planning Commission recommendation but asked that the prohibition of merchandise sales be removed or that the square footage for the sales be limited to 450 square feet and that the merchandise be limited to the same sort of merchandise sold in the Safeway store. He then reviewed benefits that this establishment would provide to the city.

Todd Paradise, Real Estate Manager for Safeway/Albertsons, directed attention to some photographs he had provided to give Council an idea of what is being proposed and explained the concept.

Discussion followed regarding traffic impacts, developing a configuration that would limit congestion, previous traffic impact analyses, mitigations that could be developed, parking, and traffic counts.

Hersch Sangster, Keizer, representing the Planning Commission, noted that the Commission was 100% in agreement with the staff recommendation that the facility should be for fuel sales only.

Michael DeBlasi, Keizer, spoke in opposition of the proposed text amendment noting that the purpose of the overlay zone was to foster a city center in Keizer and this proposal will undermine that intent. There are four gas stations within one mile of the Safeway store, Safeway will develop this lot even if they don't get a gas station, the City should be looking to intensify business areas along River Road especially at intersections, and buildings are more adaptable than fueling stations

Clint Holland, Keizer, spoke in support of this proposal because he shops and Safeway and wants to use his rewards to buy gas in Keizer.

Jerry McGee, Keizer, explained that the overlay was established for traffic, aesthetics and safety concerns and unless that has changed, the zone should remain.

With no further testimony, Mayor Clark closed the Public Hearing.

Councilor Parsons moved that the Keizer City Council direct staff to come back with an ordinance to allow the text amendment pursuant to the Planning Commission recommendation except accepting Safeway's alternate proposal of 450 square foot limited sales. Councilor Freeman seconded.

Discussion followed regarding the lineal aspect of Keizer and the advantages of allowing change.

Motion passed unanimously as follows:

AYES: Clark, Reid, Parsons, Ryan, Freeman, Herrera and Anderson (7)
NAYS: None (0)
ABSTENTIONS: None (0)
ABSENT: None (0)

c. Major Amendment to Keizer Station Area B Master Plan

Mayor Clark opened the Public Hearing.

Community Development Director Nate Brown corrected the agenda noting that the amendment is a 'Minor' amendment. He provided background information about the Area B of Keizer Station Master Plan and explained that the amendment is very minor focusing on creating flexibility for the configuration of the 24000 square feet of space that was allocated in the plan. The amendment will allow for the building to be either one 24000 sf building or several smaller buildings with a total square footage of 24000. He noted that additional comments have come in since the publication of the packet and are on the dais as well as a revised site plan incorporating all the changes that staff is aware of. He also noted that the City is maintaining ownership of the property and will be the developer and will lease the property. He reviewed significant changes in the conditions for the Master Plan and fielded questions from Council regarding lighting, driveways, fencing and elevation.

Joel and Cindy Taylor, Keizer, voiced concern about the development effecting their neighborhood and the traffic impacts. Mr. Brown assured them that lighting would be directional and would not infiltrate the neighborhood and that traffic mitigation had been addressed through a traffic impact analysis which was based on general retail. The peak time for theaters is different from the normal peak period; the commercial area in question has been in place since Keizer was developed and all efforts have been made to limit the impact on neighbors.

City Manager Chris Eppley added that the proposed 7-foot wall was not intended to screen lights from the development but was intended to screen noise and light from vehicles.

With no further testimony, Mayor Clark closed the Public Hearing

Councilor Parsons moved that the Keizer City Council direct staff to prepare an Order adopting the proposed amendments to the Area B Master Plan Conditions of Approval. Councilor Freeman seconded. Motion passed unanimously as follows:

AYES: Clark, Reid, Parsons, Ryan, Freeman, Herrera and Anderson (7)
NAYS: None (0)
ABSTENTIONS: None (0)
ABSENT: None (0)

d. ORDINANCE – Imposing Police Services Fee

Mayor Clark opened the Public Hearing.

City Attorney Shannon Johnson reminded Council that they had directed staff to return with an ordinance and resolution to impose a Police Services fee. He reviewed attachments and fees and noted that City property would be exempt because it would be the General Fund paying the General Fund and an administrative burden. This is consistent with what is done with water. He explained that annual review would not be in the ordinance or resolution, but would be something that staff would calendar as directed by Council and that senior living facilities would be billed as a single unit rather than multiple residential units.

Discussion followed regarding the rising costs associated with PERS, annual review, current resources, replacing retired officers, collection, administration and the self-reporting aspect of the senior/low income discount.

Jerry McGee, Keizer, praised the ordinance writing but requested that: (1) annual council review be incorporated into both ordinances, (2) the $8 cap be removed, and (3) the senior or low income discounts for Police Services be removed. He voiced support for the Police Services Fee Ordinance but indicated that he thought tripling the Parks budget was not prudent and he did not support the Parks Fee Ordinance for this reason. Mr. Johnson explained that it was the intent of staff to keep both fees similar to some degree.

Dave Bauer, Keizer, voiced concern about funding Police and Parks through a fee and suggested that apartment dwellers pay a higher fee because they use both services more.

Bill Quinn, Keizer, voiced support for the Police Services Fee but suggested a $2 Parks fee rather than $4 with the idea that the Budget Committee and Council could raise it in the coming years.

With no further testimony, Mayor Clark closed the Public Hearing

Councilor Parsons moved that the Keizer City Council approve a Bill for an Ordinance Imposing a Police Services Fee. Councilor Freeman seconded. Motion passed unanimously as follows:

AYES: Clark, Reid, Parsons, Ryan, Freeman, Herrera and Anderson (7)
NAYS: None (0)
ABSTENTIONS: None (0)
ABSENT: None (0)

RESOLUTION – Establishing the City of Keizer Police Services Fee

Councilor Parsons moved that the Keizer City Council adopt a Resolution Establishing the City of Keizer Police Services Fee and add an annual review. Councilor Freeman seconded.

Mr. Johnson provided the annual review verbiage to be included in the resolution.

Motion passed unanimously as follows:

AYES: Clark, Reid, Parsons, Ryan, Freeman, Herrera and Anderson (7)
NAYS: None (0)
ABSTENTIONS: None (0)
ABSENT: None (0)

e. ORDINANCE – Imposing a Parks Services Fee

Mayor Clark opened the Public Hearing.

Mr. Johnson noted that many of the issues have already been reviewed. He noted that the $8 cap that is currently in the ordinance can be amended by a future councils as well as the current rate, discounts and administrative fees in the resolution. Debate about the amount should take place when discussing the resolution.

Jim Taylor, Keizer, voiced support for the $4 fee noting that it will make it possible to make necessary repairs to the skate park.

Discussion followed regarding the impact of the $4 fee on the budget, capital improvements in the Parks Master Plan, and deferred maintenance. Mayor Clark brought attention to a letter in opposition to the fee from David and Gretchen McCane.

With no further testimony, Mayor Clark closed the Public Hearing

Councilor Parsons moved that the Keizer City Council adopt a Bill for an Ordinance Imposing a Parks Services Fee. Councilor Ryan seconded.

Discussion followed regarding use of parks and the fact that just because a person does not use a service it does not mean that it is not essential for the benefit of the community,

Councilor Anderson offered a friendly amendment to delete Section 4 second sentence: "However, the amount shall not exceed $8 per month per unit." Councilor Parsons accepted the amendment. Councilor Ryan did not.

Councilor Anderson moved to amend the motion to delete Section 4 second sentence: "However, the amount shall not exceed $8 per month per unit." Councilor Herrera seconded.

Discussion took place regarding the regulating factor of the annual review,

the need for a cap and the effect of inflation in years to come.

Motion failed as follows:

AYES: Parsons, Herrera and Anderson (3)
NAYS: Clark, Reid, Freeman and Ryan (4)
ABSTENTIONS: None (0)
ABSENT: None (0)

Vote on main motion (not amended). Motion passed unanimously as follows:

AYES: Clark, Reid, Parsons, Ryan, Freeman, Herrera and Anderson (7)
NAYS: None (0)
ABSTENTIONS: None (0)
ABSENT: None (0)

RESOLUTION – Establishing the City of Keizer Parks Services Fee

Councilor Parsons moved that the Keizer City Council adopt a Resolution Establishing the City of Keizer Parks Services Fee with an Annual Review. Councilor Ryan seconded.

Discussion followed regarding the amount of the fee, being fiscally conservative vs. fiscally responsible, taking care of resources, the expense of park equipment, prioritization of maintenance/improvements, and the importance of providing a place outside for children to play.

Motion passed as follows:

AYES: Clark, Reid, Parsons, Ryan and Freeman (5)
NAYS: Hererra and Anderson (2)
ABSTENTIONS: None (0)
ABSENT: None (0)

ADMINISTRATIVE ACTION

a. **Request for Allowance of Additional Concerts at Keizer Rotary Amphitheatre**

Councilor Parsons explained that this request is to add concerts during the upcoming eclipse event. The Saturday concert has already been approved. Approval is requested for the Friday, Sunday and Monday (during the eclipse) concerts. Mr. Johnson noted that to be consistent Council would require only the application fee and deposit for the two non-eclipse events and would waive all fees for the four eclipse events.

Councilor Parsons moved that the Keizer City Council stay consistent with previous actions and allow the additional events to be added to the free concert series and require only the application fee and deposit for the two non-eclipse events and waive all fees for the four eclipse events. Councilor Freeman seconded. Motion passed unanimously as follows:

AYES: Clark, Reid, Parsons, Ryan, Freeman, Herrera and Anderson (7)
NAYS: None (0)
ABSTENTIONS: None (0)
ABSENT: None (0)

ADMINISTRATIVE ACTION (Postponed)

b. RESOLUTION – Approving 2017 Salary Survey and Implementing Changes
c. RESOLUTION – Authorization for Supplemental Budget – 2017 Salary Survey and Parks Matching Grant
d. RESOLUTION – Establishing the Amount of the Sewer System Development Charge for Wastewater Treatment Facilities; Repealing R2016-2701

Due to the late hour, the remaining Administrative Action items were moved to the August 7, 2017 meeting.

CONSENT CALENDAR

a. Report on Disbursement of Petty Cash Funds Fiscal Year 2017
b. Approval of June 12, 2017 Special Session Minutes
c. Approval of June 19, 2017 Regular Session Minutes

Councilor Parsons moved for approval of the Consent Calendar. Councilor Freeman seconded. Motion passed unanimously as follows:

AYES: Clark, Reid, Parsons, Ryan, Freeman, Herrera and Anderson (7)
NAYS: None (0)
ABSTENTIONS: None (0)
ABSENT: None (0)

COUNCIL LIAISON REPORTS

Councilor Reid announced that Romeo and Juliet is playing at Shakespeare in the Park.

All other Council Liaison reports were postponed due to the late hour.

OTHER BUSINESS

Delayed due to the late hour.

WRITTEN COMMUNICATIONS

Held until next meeting.

AGENDA INPUT

August 7, 2017
7:00 p.m. City Council Regular Session
August 14, 2017
5:45 p.m. – City Council Work Session
August 21, 2017
7:00 p.m. City Council Regular Session

ADJOURNMENT

Mayor Clark adjourned the meeting at 11:41 p.m.

MAYOR: APPROVED:

Cathy Clark

Debbie Lockhart, Deputy City Recorder

COUNCIL MEMBERS

Councilor #1 – Laura Reid	Councilor #4 – Roland Herrera
Councilor #2 – Kim Freeman	Councilor #5 – Amy Ryan
Councilor #3 – Marlene Parsons	Councilor #6 – Bruce Anderson

Minutes approved:_____