Section 14 of Ordinance 2271

Exhibit N

Bend Zoning Map

Juniper Ridge Overlay Zone

Lava Ridge Refinement Area

COCC Special Planned District

Medical District Overlay Zone

Northwest Crossing Overlay Zone

Bend Central District Overlay Zone

Dean Swift Refinement Area

Wildflower Planned Development

Murphy Crossing Refinement Area

Farmington Reserve Master Plan Area

Stone Creek Master Plan Area

R11E R12E

T17S T18S

BB BA AB AA

BC BD AC AD

CB CA DB DA

CC CD DC DD

The map is a graphical representation of the zoning boundaries. Please verify exact boundary locations with the City of Bend's Planning Division.

This map is for reference purposes only. The information was derived from Deschutes County GIS and City of Bend land records. Care was taken in the creation of this map, but it is provided "AS IS." Please contact the City of Bend to verify map information or to report any errors.

Map prepared by City of Bend
Print Date: July 2016
S:\GMD Public\UGB\General Plan\maps\amended_zoning map

CITY OF BEND

Bend Zoning Map

0 0.25 0.5 1 1.5 2 Miles

- City Limits
- Urban Growth Boundary
- Township Lines
- Section Lines
- Railroads
- Upland Areas of Special Interest
- River Corridor A.S.I.
- Special Planned Districts
- Manufactured Home Park Overlay

- CB - CENTRAL BUSINESS DISTRICT
- CC - COMMERCIAL CONVENIENCE
- CG - COMMERCIAL GENERAL
- CL - COMMERCIAL LIMITED
- CN - COMMERCIAL NEIGHBORHOOD*
- IG - INDUSTRIAL GENERAL
- IL - INDUSTRIAL LIGHT
- IP - INDUSTRIAL PARK
- ME - MIXED EMPLOYMENT
- MR - MIXED RIVERFRONT
- MR - MIXED URBAN
- PF - PUBLIC FACILITIES
- PO - PROFESSIONAL OFFICE
- PO/RM/RS
- RH - RESIDENTIAL URBAN HIGH DENSITY
- RL - RESIDENTIAL URBAN LOW DENSITY
- RM - RESIDENTIAL URBAN MEDIUM DENSITY
- RS - RESIDENTIAL URBAN STANDARD DENSITY
- SM - SURFACE MINING
- SR2-1/2 - RESIDENTIAL SUBURBAN LOW DENSITY
- UAR - URBAN AREA RESERVE
- DESCHUTES COUNTY ZONING INSIDE UGB

* Mapped prior to the August 2006 adoption of the Bend Development Code

11148

Section 15 of Ordinance 2271

Exhibit O

Amendments to the text of the following chapters of the Bend Development Code:

Chapter 1.2, Definitions

Chapter 2.1, Residential Zoning Districts

Chapter 2.2, Commercial Zoning Districts

Chapter 2.3, Mixed-Use Zoning Districts

Chapter 3.3, Vehicle Parking, Loading, and Bicycle Parking

Chapter 3.6, Special Standards and Regulations for Certain Uses

Chapter 4.5, Master Planning and Development Alternatives

Chapter 4.6, Land Use District Map and Text Amendments

Development Code Update
July 20, 2016
Prepared by:
Angelo Planning Group &
City of Bend Growth Management Department

Chapter 1.2

DEFINITIONS

***

Affordable housing means housing with a sales price or rental amount that is within the means of a household that may occupy moderate- and low-income housing. Unless otherwise specified, affordable housing must meet one of the thresholds defined below in section 1 and 2.

1. In the case of dwelling units for sale, affordable means housing in which the mortgage, amortized interest, taxes, insurance, and condominium or association fees, if any, constitute no more than 30 percent of such gross annual household income for a for a family at 80% of the area median income, based upon most recent HUD Income Limits for the Bend Metropolitan Statistical Area (Bend MSA).

2. In the case of dwelling units for rent, affordable means housing for which the rent and utilities constitute no more than 30 percent of such gross annual household income for a family at 60% of the area median income, based upon most recent HUD Income Limits for the Bend MSA.

***

Infill, residential means the development of up to three dwellings on land that is zoned for residential use where at least 75 percent of the abutting parcels have a structure but not counting any abutting parcel that is too small for a residence or any parcel that is large enough that it can be divided into four or more lots or developed with multifamily residential as an outright use. “Residential infill” also refers to a situation in which a home is removed to make way for up to three new dwellings (e.g., a house, manufactured home, duplex, or attached house). “Residential infill” shall not refer to the development of one dwelling on land that is large enough that it can be divided into four or more lots.

Step-back means a portion of a building’s facade in which the upper story(ies) are set further from the property line(s) than the lower story(ies), forming a flat shelf or step between them.

Small scale alternative energy system means those energy systems that provide a limited amount of energy directly to the user from renewable sources such as solar, wind and water (hydro systems). Typically, a small scale system would have a capacity of no more than 10kW for solar or wind and 100kW for hydro.

Chapter 2.1

RESIDENTIAL DISTRICTS (UAR, SR 2 1/2, RL, RS, RM-10, RM, RH)

Sections:

2.1.100 Purpose, Applicability and Location.

***

Table 2.1.100
Zone District Characteristics

Zone District	Location and Characteristics
Urban Area Reserve (UAR)	The Urban Area Reserve District is a holding zone for urban development. The maximum residential density for the district is 1 dwelling unit per 10 gross acres.
Suburban Low Density Residential (SR 2 1/2)	Areas with the Suburban Low Density Residential zoning reflect the existing development patterns and the presence of community water systems located on the perimeter of the City intended for urban redevelopment. The maximum density in the district is 1 unit per 2.5 gross acres.
Low Density Residential (RL)	The Low Density Residential District consists of large urban residential lots that are served with a community water system and DEQ permitted community or municipal sewer systems. The residential density range in this district is 1.1 to 4.0 dwelling units per gross acre.
Standard Density Residential (RS)	The Standard Density Residential District is intended to provide opportunities for a wide variety of residential housing types at the most common residential densities in places where community sewer and water services are available. The residential density range in this district is 4.0 to 7.3 dwelling units per gross acre.
Medium-10 Density Residential (RM-10)	The Medium-10 Density Residential District is intended to provide opportunities for manufactured home park development and a variety of single and multifamily residential housing types. The density range in this district is 6.0 to 10.0 dwelling units per gross acre.
Medium Density Residential (RM)	The Medium Density Residential District is intended to provide primarily for the development of multifamily residential in areas where sewer and water service are available. The residential density range in the district is 7.3 to 21.7 units per gross acre and shall provide a transitional use area between other Residential Districts and other less restrictive areas.
High Density Residential (RH)	The High Density Residential District is intended to provide land for primarily high density residential multifamily residential in locations close to shopping and services, transportation and public open space. The density range of the district is 21.7 to 43.0 units per gross acre and shall provide a transitional use area between other Residential Districts and other less restrictive areas.

2.1.200 Permitted Land Use.

***

C. Exceptions. Existing uses and buildings lawfully established under previously effective land use regulations are allowed to continue subject to BDC Chapter 5.2, except as otherwise specified in this section.

1. Existing single-family detached housing, single family courtyard housing, and manufactured home parks that were lawfully established in their current location prior to the adoption of this code shall be

treated as permitted uses in the RH zone unless originally approved through a conditional use permit, in which case they shall remain subject to any applicable conditions of approval. Such uses are not subject to BDC Chapter 5.2 unless otherwise non-conforming.

Table 2.1.200 – Permitted and Conditional Uses

Land Use	SR 2 1/2	RL	RS	RM-10	RM	RH	UAR
Residential							
Single-family detached housing	P	P	P	P	P	N	P
*Single-family courtyard housing	N	C/P**	P	P	P	N	C
*Accessory dwelling units (ADUs)	P	P	P	P	P	P	P
*Manufactured homes on individual lots	P	P	P	P	P	N	P
*Manufactured home park	N	C	C	P	P	N	N
*Attached single-family townhomes	N	N/P**	P	P	P	P	N
*Two- and three-family housing							
• Duplex when located on a corner lot	N	P	P	P	P	P	N
• Duplex on other lot or parcel	N	C/P**	P	P	P	P	N
• Triplex	N	C/P**	P	P	P	P	N
Residential care home (5 or fewer residents)	P	P	P	P	P	P	P
Adult day care	P	P	P	P	P	P	P
Residential care facility (6 or more residents)	N	N	N	C	P	P	N
Family childcare home (16 or fewer children)	P	P	P	P	P	P	P
*Multifamily residential (more than 3 units)	N	N/P**	N/P**	P	P	P	N
*Temporary housing	N	C	C	C	C	C	N
*Accessory uses and structures	P	P	P	P	P	P	P

***

Key to Districts:

UAR = Urban Area Reserve

RL = Low Density Residential

RS = Standard Density Residential

RM = Medium Density Residential

RM-10 = Medium-10 Density Residential

RH = High Density Residential

Key to Permitted Uses

P = Permitted, subject to BDC Chapter 4.1, Development Review and Procedures

N = Not Permitted

C = Conditional Use, subject to permit standards in BDC Chapter 4.4.

* Subject to special standards as described in BDC 2.1.900, Architectural Design Standards, and/or BDC Chapter 3.6, Special Standards for Certain Uses.
** Permitted as part of a Neighborhood Master Plan subject to BDC Chapter 4.5.
Note: Existing Neighborhood Commercial (CN) zoned properties will remain as mapped recognizing neighborhood commercial properties established prior to the adoption of this code. The development of these sites shall conform to the standards outlined in BDC Chapter 3.6, Special Standards for Certain Uses, for the uses described above.
[Ord. NS-2251, 2015; Ord. NS-2241, 2015; Ord. NS-2240, 2015; Ord. NS-2158, 2011; Ord. NS-2016, 2006]

2.1.400 Building Mass and Scale.

A. Applicability. Floor area ratio (FAR) shall apply to all new residential development in the RL, RS, and RM Zones, except as otherwise specified in subsection (C) of this section.

Floor area Ratio. The floor area ratio as defined in Chapter 1.2 Definitions, shall not exceed 0.55 for all buildings on site, cumulatively.

C. Exceptions to FAR.

1. Accessory structures less than 10 feet in height and 200 square feet in area.

2. Lots and parcels subject to BDC 2.1.300(G), Residential Compatibility Standards.

3. Large-scale Multifamily Developments subject to 2.1.1000(B).

***

2.1.500 Lot Area and Dimensions.

Lot areas and lot dimension standards for residential uses are listed in Table 2.1.500. Exceptions to these standards may be approved subject to Master Planned Development approval (see BDC Chapter 4.5). For other residential uses listed in Table 2.1.200, the lot area and dimensions are subject to the type of residential structure being occupied. Lot development and the total number of dwelling units permitted shall be in conformance with BDC 2.1.600, Residential Density.

Table 2.1.500
Lot Areas and Dimensions in the Residential Districts By Housing Type and Zone

Residential Use	Zone	Lot Area	Lot Width/Depth
Single-Family Detached Housing; Manufactured Homes on Lots; Residential Care Homes and Facilities	RL	Minimum area: 10,000 sq. ft. with approved septic or sewer system	Minimum width: 100 ft. min. average lot width with a min. street frontage of 50 ft. except on approved cul-de-sac lot frontage may be reduced to 30 ft; flag lots and lots served by private lanes are subject to BDC 4.5.200. Minimum lot depth: 100 ft, except in conformance with BDC 4.5.200.
	RS	Minimum area: 4,000 sq. ft.	Minimum width: 40 ft. at front property line, except for flag lots and lots served by private lanes (see BDC 4.5.200) Minimum lot depth: 80 ft, except in conformance with BDC 4.5.200.
	RM-10	Minimum area: 4,000 sq. ft.	
	RM	Minimum area: 2,500 sq. ft.	Minimum width: 30 ft, except for flag lots and lots served by private lanes (see BDC 4.5.200). Minimum lot depth: 80 ft, except in conformance with BDC 4.5.200.
	RH	Not Applicable	Not Applicable

Residential Use	Zone	Lot Area	Lot Width/Depth
Two- and Three-Family Housing (duplex/triplex)	UAR	Not Applicable	Not Applicable
	RL	Minimum area: 20,000 sq. ft. with approved septic or sewer system	Minimum lot width: 100 ft. average Minimum lot depth: 100 ft.
	RS	Minimum area – duplex: 8,000 sq. ft. Minimum area – triplex: 10,000 sq. ft.	Minimum width: 40 ft. at front property line, except for flag lots and lots served by private lanes. (see BDC 4.5.200) Minimum lot depth: 80 ft.
	RM-10	Minimum area – duplex: 7,000 sq. ft. Minimum area – triplex: 9,000 sq. ft.	
	RM	None	Minimum width: 30 ft. Minimum lot depth: 80 ft.
	RH	None	Minimum width: 30 ft. Minimum lot depth: 60 ft.
Single-Family Attached Housing (townhomes)	UAR	Not Applicable	Not Applicable
	RL*, RS, RM-10	Minimum area: 2,000 sq. ft. for each unit	Minimum width: 20 ft. at front property line, except for flag lots and lots served by private lanes (see BDC 4.5.200) Minimum lot depth: 80 ft.
	RM	Minimum area: 1,600 sq. ft. for each unit	Minimum width: 20 ft. at front property line, Minimum lot depth: 80 ft.
	RH	Minimum area: 1,200 sq. ft. for each unit	Minimum width: 20 ft. at front property line, Minimum lot depth: 60 ft.
Multifamily Housing (more than 3 units)	UAR	Not Applicable	Not Applicable
	RL*, RS*, RM-10	Minimum area: 4,000 sq. ft. for each unit	Minimum width: 30 ft. at front property line. Minimum lot depth: 80 ft.
	RM, RH	None	

* When permitted as part of a Neighborhood Master Plan subject to BDC Chapter 4.5.

2.1.600 Residential Density.

A. Residential Density Standard. The following density standards apply to all new development in all of the Residential Districts, except as specified in Section (B). The density standards shown in Table 2.1.600 are intended to ensure efficient use of buildable lands and provide for a range of needed housing, in conformance with the Comprehensive Plan.

1. The density standards may be averaged over more than one development phase (i.e., as in a Master Planned Development). Duplex and triplex lots used to comply with the density standard shall be so designated on the final partition or subdivision plat.

Table 2.1.600
Residential Densities

Residential Zone	Density Range	
Urban Area Reserve (UAR10)	1 unit/10 gross acres	
Suburban Low Density Residential (SR 2 1/2)	1 unit/2.5 gross acres	
Low Density Residential (RL)	1.1 – 4.0 units/gross acre	
Standard Density Residential (RS)	4.0 – 7.3 units/gross acre	

Residential Zone	Density Range	
Medium Density Residential (RM-10)	6.0 – 10.0 units/gross acre	
Medium Density Residential (RM)	7.3 – 21.7 units/gross acre	
High Density Residential (RH)	21.7 – 43 units/gross acre	

B. Exemptions. The following are exempt from the density standards in subsection (A) of this section:

1. Residential care homes/facilities.

2. Accessory dwelling units (ADUs).

3. Bed and breakfast inns.

4. Non-residential uses, including Neighborhood Commercial uses, Public and Institutional Uses, and Miscellaneous uses that do not include a dwelling unit.

5. Buildings that are listed in the Inventory of Historic Sites within the Bend Area Comprehensive Plan Exhibit "A" or buildings designated on the Historic National Landmarks Register.

6. Manufactured home parks within the RS Zone are exempt from the maximum density standards of the zone, provided that the standards of BDC 3.6.200(G) are met.

7. Replacement, renovation, or expansion of existing dwelling unit(s) in any zone provided the number of dwelling units does not change.

8. Development on a vacant lot or parcel consistent with an approved land division, except tracts identified for future phases.

9. Residential infill, as defined in BDC Chapter 1.2, is exempt from minimum, but not maximum, density standards.

10. Partitions on properties that are large enough to be divided into four or more lots are exempt from minimum density standards provided that the size of the resulting parcels and siting of dwellings allow future development on these parcels at minimum densities. C. Density Calculation.

1. Maximum housing densities are calculated as follows:

a. The area subject to maximum housing density is the total site area excluding any land to be developed with or dedicated for Neighborhood Commercial uses, Public and Institutional Uses, and Miscellaneous uses that do not include a dwelling unit.

b. The area for future streets is included in the area subject to maximum housing density.

c. Where no new streets will be created, the area of up to 30 feet of the abutting right-of-way width multiplied by the site frontage shall be added to the area subject to maximum housing density.

d. Sensitive lands, fire breaks, and canals and their associated easements on the site are included in the area subject to maximum housing density.

e. For purposes of calculating maximum density, fractional units are rounded down to the next whole unit.

f. As an illustrative example, if the total site area is five acres, of which a half-acre is sensitive lands, and another acre will be developed with Neighborhood Commercial uses, and new streets

will be created, the area subject to maximum housing density is four acres (total site area minus one acre of Neighborhood Commercial uses, but including the sensitive lands). If the maximum allowable density is 7.3 dwelling units per acre, then a maximum number of 29 units are allowed on the site.

2. Minimum housing densities are calculated as follows:

a. The area subject to minimum housing density is the total site area excluding any land to be developed with or dedicated for Neighborhood Commercial uses, Public and Institutional Uses, and Miscellaneous uses that do not include a dwelling unit; sensitive lands; fire breaks; and canals and their associated easements.

b. The area for future streets is included in the area subject to minimum housing density.

c. For purposes of calculating minimum density, fractional units are rounded up to the next whole unit.

d. As an illustrative example, if the total site area is five acres, of which a half-acre is sensitive lands, and another acre will be developed with Neighborhood Commercial uses, and new streets will be created, the area subject to minimum housing density is three and a half acres (total site area minus one acre of Neighborhood Commercial uses, minus a half-acre of sensitive lands). If the minimum density is 4.0 dwelling units per acre, then a minimum number of 14 units are required on the site.

3. Where a property is within multiple zoning districts, the minimum and maximum number of units are calculated based on the acreage in each residential zone that is subject to the density standard as specified above multiplied by the applicable minimum and maximum density standards. Areas with non-residential zones are excluded from the density calculation.

D. Density Bonus for Affordable Housing. As an incentive to create affordable housing, the maximum densities provided in Table 2.1.600 may be increased when a developer provides "affordable housing" as part of a proposed development in conformance with BDC 3.6.200(C). The density increase is based on the percentage of affordable housing units within the proposed development. Any development that receives the density bonus shall be deemed an "affordable housing development." The table below provides the corresponding percent of increase. In no case may the density bonus exceed 1.5 percent of the existing residential zone.

Table 2.1.600A - Density Bonus

Percentage of Units That Are Affordable:	Maximum Density for Development, as a Percentage of Existing Maximum Density:
10%	110%
20%	120%
30%	130%
40%	140%
50%	150%

When calculating the number of additional units, fractional units are rounded up to the next whole unit.

2.1.700 Maximum Lot Coverage.
BDC 2.1.700 deleted in its entirety.

***

2.1.800 Building Height.

***

B. Exceptions to Maximum Building Height Standard.

***

3. An increase in building height not to exceed 10 feet above the height of the underlying zone may be allowed for multifamily housing when the additional units gained by the height increase are affordable housing units in conformance with BDC 3.6.200(C).

***

2.1.900 Architectural Design Standards.

A. Purpose. The architectural standards are intended to provide detailed, human-scaled design, while affording flexibility to use a variety of building styles for certain types of residential development.

B. Applicability. This section applies to all of the following types of buildings:

1. Duplexes and triplexes;

2. Multifamily residential;

3. Public and institutional buildings in residential zones;

4. Neighborhood commercial;

5. Mixed-use buildings in residential zones; and

6. All other types of permitted/conditional nonresidential use buildings listed in Table 2.1.200 when built in a residential zone.

***

2.1.1000 Multifamily Residential Districts (RM, RH).

A. Purpose/Intent Statement. The Medium and High Density Residential Districts are intended to provide land for a mix of attached and multifamily housing types in locations that are convenient to service commercial uses and future transit opportunities.

B. Development Standards for Large-Scale Multifamily Developments in the RM and RH Districts. In addition to the site development standards in BDC Chapter 4.2, the following standards shall apply to multifamily developments of 20 units or more:

***

C. Housing Mix Standards in the RM District. In order to ensure a mix of housing types that meets the city's overall housing needs, in addition to minimum and maximum density standards in BDC 2.1.600, at least 50 percent of the total housing units in residential developments on any property or combination of properties between three acres and 20 acres in the RM District shall be two- and three-family housing, attached single-family townhomes, and/or multifamily residential housing units. The standards of BDC 4.5.400(C) apply to properties of 20 acres in size and greater.

***

2.1.1100 Urban Holding Districts, UH-10 and UH-2 1/2.

BDC 2.1.1100 deleted in its entirety.

Chapter 2.2

COMMERCIAL ZONING DISTRICTS (CB, CC, CL, CG)

Sections:

2.2.400 Development Standards.

The following table provides the general numerical development standards within the Commercial Districts. Additional standards are contained in subsections (A), (B) and (C) of this section.

Table 2.2.400
Commercial Zoning District Development Standards

***

STANDARD	CB	CC	CL	CG
Maximum Building Footprint, see note (2) below	None	50,000 sq. ft.	None	None

(1) Subject to the special setback standards of BDC Chapter 3.4 and the site layout and building orientation standards of BDC 2.2.500.
(2) See subsection (C) of this section.

***

C. Convenience Commercial Development Standards. The purpose of this subsection is to provide special development standards for the development of new uses within the CC Zone. The zone is intended to provide locations for a wide range of small and medium sized businesses and services as a convenience to surrounding residents. The CC Zone has the following limitation on uses:

1. Maximum Building Size. The maximum building size is 50,000 square feet per building, unless a larger area is approved through a Conditional Use Permit.

2.2.600 Commercial Design Review Standards.

...

C. Standards. For developments subject to site plan or design review, the following standards shall be met. A design feature used to comply with one standard may be used to comply with another standard.

1. Residential Building Design Review. All residential buildings subject to site plan or design review shall comply with the Residential District design guidelines, as listed in BDC 2.1.900, Architectural Design Standards, and not the Commercial Design Review standards of this section.

2. Commercial Design Review. The following standards apply to all commercial and mixed use buildings:

a. Buildings with exterior walls greater than 50 feet in horizontal length shall be constructed using the installation of a combination of architectural features and a variety of building materials. Landscaping should be planted adjacent to the walls. Walls that can be viewed from public streets shall be designed with windows totaling a minimum of 10 percent of the wall area and using architectural features and landscaping (abutting the building) for at least 50 percent of the wall length. Other walls shall incorporate architectural features and landscaping for at least 30 percent of the wall length.

b. Architectural features include, but are not limited to, the following: recesses, projections, wall insets, arcades, window display areas, awnings, balconies, window projections, landscape structures or other features that complement the design intent of the structure and are acceptable to the Review Authority.

c. In addition, a portion of the on-site landscaping shall be planted adjacent to the walls of a building so that the vegetation combined with the architectural features significantly reduces the visual impact of the building mass as viewed from the street. Additional landscaping requirements are in BDC Chapter 3.2, Landscaping, Street Trees, Fences and Walls.

d. The predominant building materials should be characteristic of Central Oregon such as brick, wood, native stone and tinted/textured concrete masonry units and/or glass products. Other materials such as smooth-faced concrete block, undecorated tilt-up concrete panels, or pre-fabricated steel panels should only be used as accents and not dominate the building exterior of the structure. Metal roofs may be allowed if compatible with the overall architectural design of the building.

e. Roofs should be designed to reduce the apparent exterior mass of a building, add visual interest and be appropriate to the architectural style of the building. Variations within one architectural style are highly encouraged. Visible rooflines and roofs that project over the exterior wall of a building enough to cast a shadow on the ground are highly encouraged. Architectural methods shall be used to conceal flat rooftops; however, a maximum of 30 percent of the building elevations visible from the adjacent right-of-way may include flat roof components. Overhanging eaves, sloped roofs, parapet walls that have variations vertically and horizontally with decorative features, and multiple roof elements are highly encouraged. Mansard style roofs are discouraged.

f. Clearly defined, highly visible customer entrances using features such as canopies, porticos, arcades, arches, wing walls, and/or integral planters are required.

g. Community amenities such as patio/seating areas, water features, art work or sculpture, clock towers, pedestrian plazas with park benches or other features located in areas accessible to the public are encouraged and may be calculated as part of the landscaping requirements of BDC Chapter 3.2.

h. Exterior colors shall be of low reflectance, subtle, neutral or earth tone colors. The use of high intensity colors such as black, neon, metallic or fluorescent for the facade and/or roof of the building is prohibited except as approved for building trim. The City of Bend color guide provides samples of acceptable and unacceptable colors. The use of trademark colors requires City approval.

i. Exterior lighting shall comply with the outdoor lighting provisions of BDC 3.5.200. Light poles and/or fixtures and flag poles shall not exceed 25 feet in height.

j. Outdoor and rooftop mechanical equipment as well as trash cans/dumpsters shall be architecturally screened from view. Heating, ventilation and air conditioning units shall have a noise attenuating barrier to protect adjacent Residential Districts from mechanical noise.

3. Large-Scale Buildings and Developments. For the purpose of this section, “large-scale buildings and developments” are defined as:

a. Individual buildings with more than 20,000 square feet of enclosed ground-floor space. Multi-tenant buildings shall be counted as the sum of all tenant spaces within the same building shell; and

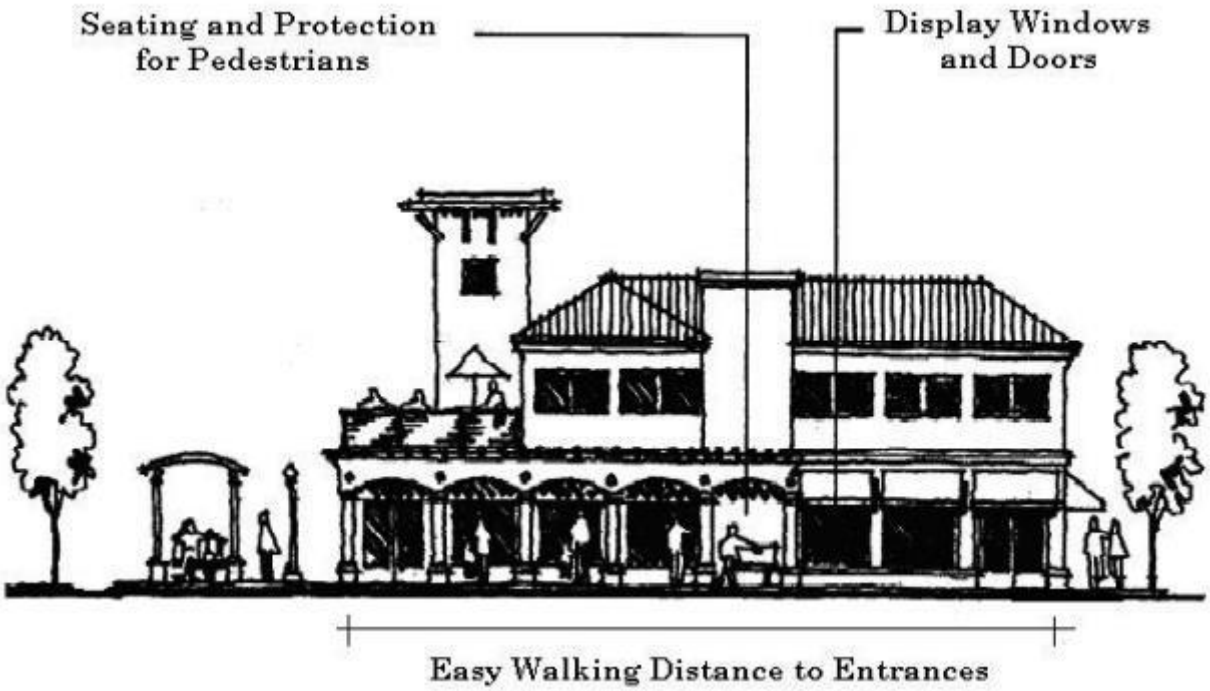
b. Multiple-building developments with a combined enclosed ground-floor space more than 40,000 square feet (e.g., shopping centers, public/institutional campuses, and similar developments).

4. Design Standards for Large-Scale Buildings and Developments. All large-scale buildings and developments, as defined above, shall provide human-scale design by conforming to all of the following standards:

a. Incorporate changes in building wall direction and divide large masses into varying heights and sizes, as shown in Figure 2.2.600. Such changes may include building offsets; projections; changes in elevation or horizontal direction; sheltering roofs; terraces; a distinct pattern of divisions in surface materials; windows; screening trees; small-scale lighting (e.g., wall-mounted lighting, or up-lighting as described in BDC 3.5.200 (Other Design Standards)); and similar features.

Figure 2.2.600

Design of Large-Scale Buildings and Developments (Typical)



Note: the example shown above is meant to illustrate examples of these building design elements, and should not be interpreted as a required design style.

5. Exceptions to Commercial Design Review Standards. An exception to the design standards of this section may be approved by the Planning Commission through a Type III Process if the Commission finds that the proposed development complies with the purpose and intent of the Commercial Design Review standards. The applicant shall pay a fee specified by the City for Planning Commission review.

Chapter 2.3

MIXED-USE ZONING DISTRICTS (ME, MR, PO, MU, and MN)

Sections:

2.3.100 Purpose and Applicability.

A. The Mixed-Use Districts are intended to provide a balanced mix of residential and employment opportunities to create focal points of activity in the form of mixed use centers, nodes, or corridors. The Mixed-Use Districts support service commercial, employment, and housing needs of a growing community. The Mixed-Use District standards are based on the following principles:

- Ensure efficient use of land and public services.
- Create a mix of housing and employment opportunities.
- Provide transportation options for employees and customers and reduce reliance on the automobile.
- Provide business services close to major employment centers.
- Ensure compatibility of mixed-use developments with the surrounding area and minimize off-site impacts associated with development.
- Create economically successful mixed use centers and transit corridors.

The Mixed-Use Districts: Mixed Employment (ME), Mixed-Use Riverfront (MR), Professional Office (PO), Mixed-Use Urban (MU), and Mixed-Use Neighborhood (MN) are identified on the City's official Zoning Map. The districts serve distinctly different purposes as described below.

Zone District	Location and Characteristics
Mixed Employment District (ME)	The Mixed Employment Zone is intended to provide a broad mix of uses that offer a variety of employment opportunities. Where Mixed Employment Districts occur on the edge of the City, their function is more transitional in nature providing service commercial businesses and supporting residential uses in an aesthetic mixed environment. In this instance, when residential units are provided, the units shall be within easy walking distance to the commercial and employment uses.
Mixed-Use Riverfront District (MR)	The Mixed-Use Riverfront District is intended to implement the Comprehensive Plan policies for the creative redevelopment of mill site properties adjacent to the Deschutes River. It is intended to allow for a mix of uses that: • Provide a variety of employment opportunities and housing types; • Foster pedestrian and other non-motor vehicle activity; • Ensure functionally coordinated, aesthetically pleasing and cohesive site planning and design; • Ensure compatibility of mixed-use development with the surrounding area and minimize off-site impacts associated with the development; and • Encourage access to, and enjoyment of, the Deschutes River.
Professional Office District (PO)	The Professional Office Zone is intended to provide for professional offices in locations near arterial or collector streets and to provide a transition of uses between residential areas and other more intensive zones. Through design standards, the Professional Office Zone is intended to create a mix of high

Zone District	Location and Characteristics
	density residential housing, office and service commercial developments that are pedestrian-oriented and provide a positive contribution to the streetscape.
Mixed-Use Urban (MU)	The Mixed Use – Urban Zone is intended to provide opportunities for vibrant mixed use centers and districts in areas with high-quality connectivity to and within the area. It is intended to allow for a denser level of development of a variety of commercial and residential uses than in surrounding areas with an emphasis on retail and entertainment uses at the street level. It is intended to provide for development that is supportive of transit by encouraging a pedestrian-friendly environment.
Mixed-Use Neighborhood (MN)	The Mixed Use – Neighborhood Zone is intended to provide neighborhood-scaled, pedestrian-oriented mixed use centers and corridors with a range of residential, retail, service, and office uses that are compatible with adjacent development.

B. Applicability. The standards of this chapter apply to all development in the Mixed-Use Zoning Districts.

2.3.200 Permitted and Conditional Uses.

***

B. Exceptions. Existing uses and buildings lawfully established under previously effective land use regulations are allowed to continue subject to BDC Chapter 5.2, except as otherwise specified in this section.

1. Existing lawfully established residential uses are permitted in all mixed use zones and are not subject to BDC Chapter 5.2 unless otherwise non-conforming.

2. Uses in the MU and MN zones that are not in conformance with the provisions in this section but that were lawfully established in their current location prior to the adoption of this code shall be treated as permitted uses. Expansion or enlargement 25 percent or less of the above-referenced uses or structures that are nonresidential shall be subject to the provisions of BDC Chapter 4.2, Site Plan Review and Design Review. For expansion or enlargement greater than 25 percent, the conditional use criteria, standards and conditions within BDC Chapter 4.4, Conditional Use Permits, shall also apply. Conditions of prior approvals shall continue to apply unless modified in conformance with BDC 4.1.1000, Reconsideration.

Table 2.3.200
Permitted and Conditional Uses

Land Use	ME	MR	PO	MU	MN
Residential					
Single family detached dwelling	N	P	L [see Subsection (C)(1)]	N	N
Attached single-family townhomes*	L [see Subsection (C)(1)]	P	L [see Subsection (C)(1)]	P	P
Two- and three-family housing*	L [see Subsection (C)(1)]	P	L [see Subsection (C)(1)]	P	P
Multifamily Residential*	L [see Subsection (C)(1)]	P	L [see Subsection (C)(1)]	P	P

Land Use	ME	MR	PO	MU	MN
Temporary Housing*	L [see Subsection (C)(1)]	N	L [see Subsection (C)(1)]	P	C
Commercial					
Retail Sales and Service	L [see Subsection (C)(2)]	L [see Subsection (C)(2)]	N	P	L [see Subsection (C)(2)]
Retail Sales and Service (auto dependent*)	C	N	N	N	N
Retail Sales and Service (auto oriented*)	P	N	N	N	N
Restaurants/Food and Beverage Services					
– with drive-through*	C	N	N	N	N
– without drive-through	P	P	P	P	P
Offices and Clinics	P	P	P	P	P
Lodging (e.g., *bed and breakfast inns, hostels, timeshare)	P	P	N	P	P
*Short-Term Rentals	P	P	N	P	P
Hotel/Motels	P	P	N	P	C
– with conference center	P	P	N	P	N
Commercial and Public Parking as primary use	P	P	C	P/C [see Subsection (C)(3)]	C
Commercial Storage					
– enclosed in building and on an upper story	P	P	N	L [see Subsection (C)(4)]	L [see Subsection (C)(4)]
– not enclosed in building	N	N	N	N	N
– enclosed in building on ground floor (i.e., mini-storage)	P	P	N	N	N
Entertainment and Recreation					
– enclosed in building (e.g., theater)	P	P	C	P	L/C [see Subsection (C)(5)]
– not enclosed (e.g., amusement)	P	C	C	C	N
Wholesale Sales (more than 75% of sales are wholesale)	P	P	N	N	N
Broadcasting Studios and Facilities	P	P	N	P	N
Hospital	P	C	C	C	N
Day Care	P	P	P	P	P
Production Offices	P	P	P	P	N
*Medical Marijuana Dispensary and Marijuana Recreational Retailer	L [see Subsection (C)(2)]	L [see Subsection (C)(2)]	N	P	L [see Subsection (C)(2)]
*Marijuana Wholesale (more than 75% of sales are wholesale)	P	P	N	N	N

Land Use	ME	MR	PO	MU	MN
*Marijuana Testing, Research and Development Facilities	P	P	N	P	C
Public and Institutional					
Government – point of service intended to serve the entire City (e.g., City Hall, main library, main post office, main Department of Motor Vehicles service center)	P	P	C	P	C
Government – branch service intended to serve a portion of the City	P	P	P	P	P
Government – limited point of service (e.g., public works yards, vehicle storage, etc.)	N	N	N	N	N
Parks and Open Space	P	P	P	P	P
Schools	P	P	C	L/C [see Subsection (C)(6)]	L/C [see Subsection (C)(6)]
Institutions for Higher Education	P	P	P	P	C
Clubs and Places of Worship	P	P	P	P	P
*Utilities (above ground)	P	P	P	P	P
Industrial					
Manufacturing and Production	P	P	N	L [see Subsection (C)(7)]	L [see Subsection (C)(7)]
Warehouse	P	P	N	N	N
Transportation, Freight and Distribution	C	C	N	N	N
Production businesses (e.g., IT support centers, biotechnology, software/hardware development, broadcast and production studios)	P	P	C	P	C
Industrial Service (e.g., cleaning, repair)	P	N	N	N	N
Miscellaneous Uses					
Wireless and Broadcast Communication Facilities	See BDC Chapter 3.7				

Key to Districts

ME = Mixed Employment

MR = Mixed-Use Riverfront

PO = Professional Office

MU = Mixed-Use Urban

MN = Mixed-Use Neighborhood

Key to Permitted Uses

P = Permitted

N = Not Permitted

C = Conditional Use

L = Limited as specified in subsection (C)

* Special standards for certain uses subject to BDC Chapter 3.6 and BDC 2.1.900.

C. Limitations. The following limitations apply to those uses identified as "L" in Table 2.3.200.

1. New residential uses. In order to ensure that the ME and PO zones retain a focus on employment uses, new residential uses in the ME and PO zones are limited as follows:

a. Residential uses that are part of a mixed use development in which non-residential uses occupy at least the floor area equivalent to the entire ground-floor area of the development are permitted.

b. Residential uses that are part of a mixed use development in which non-residential uses occupy less than the floor area equivalent to the entire ground-floor area of the development are conditional.

c. Residential uses that are not part of a mixed use development are prohibited.

2. Retail sales and service and Medical Marijuana Dispensary and Marijuana Recreational Retailer. Retail sales and service uses and Medical Marijuana Dispensary and Marijuana Recreational Retailer uses are limited in certain mixed use zones as follows:

a. In the MR and MN zones, retail sales and service uses and Medical Marijuana Dispensary and Marijuana Recreational Retailer uses shall not exceed 50,000 sq. ft. ground floor.

b. In the ME zone, retail sales and service uses and Medical Marijuana Dispensary and Marijuana Recreational Retailer uses shall not exceed 50,000 sq. ft. ground floor, except that on property five acres or greater retail sales and service uses shall not exceed 75,000 sq. ft.

3. Commercial and Public Parking. In the MU zone, commercial or public parking in a parking structure shall be permitted. Surface parking lots for Commercial and Public Parking as a stand-alone use (not accessory to another use on the site) shall require a conditional use permit.

4. Commercial Storage. Commercial storage is permitted in an enclosed building and on an upper story provided that active uses, such as retail sales and service or Restaurants/Food Services, are provided on at least 50% of the ground floor.

5. Entertainment and Recreation. Entertainment and Recreation uses in the MN zone that are enclosed in a building shall not exceed 50,000 square feet per building without a conditional use permit.

6. Schools. Schools in the MU and MN zones shall not exceed a total site size of two acres without a conditional use permit.

7. Manufacturing and Production. Manufacturing and production uses in the MU and MN zones are limited to uses less than 5,000 sq. ft. with a retail outlet.

2.3.300 Development Standards.

The following table provides the numerical development standards within the Mixed-Use Districts. Additional standards specific to each district follow within a separate section of this chapter.

Table 2.3.300
Mixed-Use District Development Standards

Standard	ME	MR	PO	MU	MN
Minimum Front Yard Setback	None	None**	10 feet	None	None
Maximum Front Yard Setback (See Section (A)(1))	10 feet / 80 feet* (see (A)(1)(e) below)	None**	10 feet	10 feet	10 feet

Standard	ME	MR	PO	MU	MN
Rear Yard Setback	None / 10 feet (see (A)(2) below)	None**	None / 10 feet (see (A)(2) below)	None / 10 feet (see (A)(2) below)	None / 10 feet (see (A)(2) below)
Side Yard Setback	None / 10 feet (see (A)(2) below)	None**	None / 10 feet (see (A)(2) below)	None / 10 feet (see (A)(2) below)	None / 10 feet (see (A)(2) below)
Lot Coverage	None	None**	50%	None	None
Building Height (See Section B)	45 feet	45 feet, except within 100 feet from the ordinary high water mark of the Deschutes River where the height is 35 feet **	45 feet	65 feet	45 feet
Minimum Residential Density	See Section C below	None	See Section C below	Subject to RM zone minimum density (see Section C below)	Subject to RM zone minimum density (see Section C below)
Maximum Residential Density	None	None	None	None	None

* Subject to special standards in BDC 2.3.400

** Subject to special standards in BDC 2.3.600

A. Setbacks. Building setback standards provide building separation for fire protection/security, building maintenance, sunlight and air circulation, noise buffering, and visual separation. Building setbacks are measured from the building footprint to the respective property line. The setback standards outlined in Table 2.3.300 apply to all new buildings and any building expansion, including primary structures and accessory structures.

1. Front Yard Setbacks. In some of the Mixed Use Districts, buildings are placed close to the street to create a vibrant pedestrian environment, to slow traffic, provide a storefront character to the street, support future transit service, and encourage walking. The setback standards are flexible to encourage public spaces between sidewalks and building entrances (e.g., extra-wide sidewalks, plazas, squares, outdoor dining areas, and pocket parks). The standards also encourage the formation of solid blocks of commercial and mixed-use buildings for walkable Mixed Use Districts.

a. General Standards. See Table 2.3.300, Mixed-Use District Development Standards.

b. Maximum Setback Calculation. Conformance with the maximum setback standard is achieved when one or both of the following is met:

i. At least 90 percent of the building elevation facing the street that is subject to the maximum setback standard is at or within the maximum setback.

ii. Where more than one building is proposed on a site, no less than 40 percent of the site's frontage on a public or private street is occupied by one or more buildings that conform to the building setback and orientation standards of this chapter.

c. The maximum setback standard may be increased as necessary when an approved usable public space with pedestrian amenities (e.g., extra-wide sidewalk, plaza, pocket park, outdoor dining area or a public square with seating) is provided between the building and front property line. (See also BDC 2.2.600, Commercial Design Review Standards, and 2.2.700, Pedestrian Amenities, for related building entrance standards.)

d. Multiple Frontage Lots. For buildings on sites with more than one frontage or through lots, the minimum front yard setback standards in Table 2.3.300 shall be applied as follows.

i. For corner lots with two frontages, the maximum setback standards indicated in Table 2.3.300 shall be applied to all street frontages.

ii. For through lots with two frontages, the maximum setback standards indicated in Table 2.3.300 shall be applied to only one of the frontages; provided, that where the abutting streets are of different street classification, the maximum setback standard shall be applied to the street with the higher classification.

iii. For properties with three or more frontages, the maximum setback must be met on two abutting frontages.

e. Exceptions to Front Yard Setbacks.

i. In the ME and PO zones, when the street fronting the development does not allow on-street parking, the maximum front yard setback of 80 feet applies. When on-street parking is permitted on the street fronting the development, the maximum front yard setback is 10 feet.

ii. The following items are allowed to encroach into setbacks:

- Canopies, marquees, and awnings.
- Uncovered stairways and wheelchair ramps that lead to the street-facing facade.
- Uncovered decks and stairways that are no more than two and one-half feet above ground.
- Mechanical structures such as heat pumps, air conditioners, and emergency generators are not allowed.

f. Other special setbacks in conformance with BDC 3.4.200(J) may apply.

2. Side and Rear Yard Setbacks.

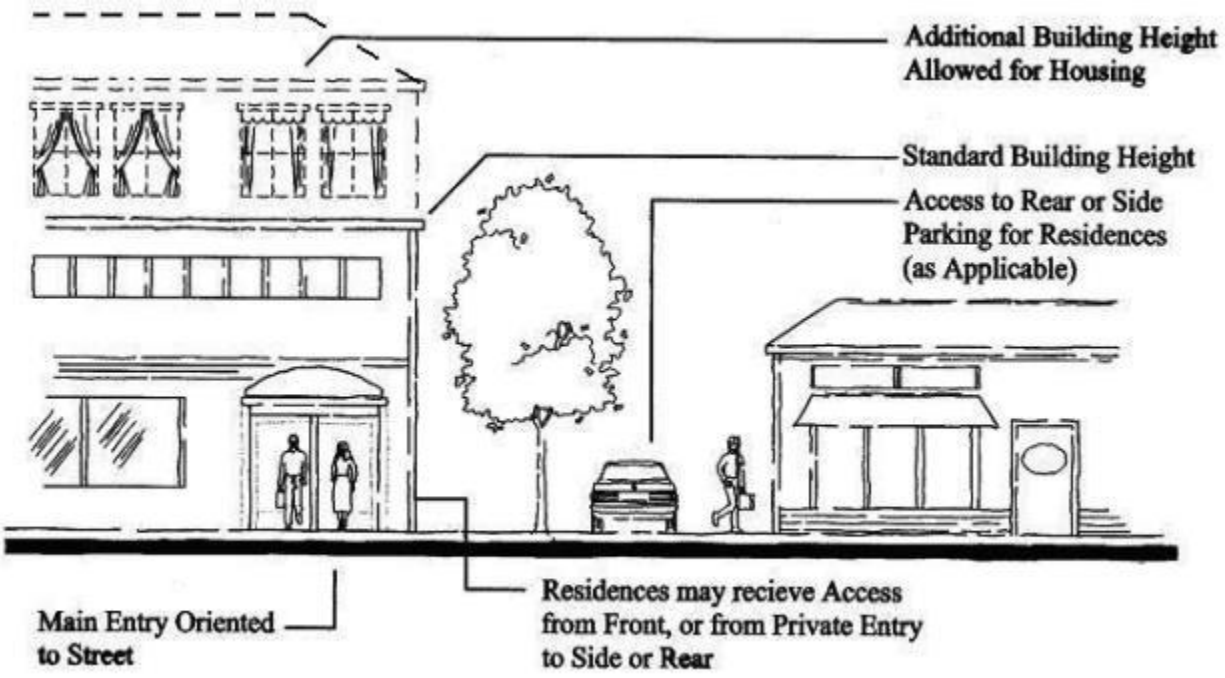
a. ME, MU and MN Zones. There is no rear or side yard setback required, except when abutting a Residential Zone. In such cases, the rear or side yard setback is 10 feet. Building step back standards in subsection (B)(4) of this section may also apply.

b. PO Zone. There is no rear or side yard setback required, except when abutting a Residential Zone. In such cases, the rear yard setback is 10 feet and shall increase by one foot for each one foot the building height exceeds 25 feet. c. When a public alley abuts a side or rear yard of property within the PO or ME Zones, only the required 10-foot building setback shall apply.

B. Height. All buildings in the Mixed Use Districts shall comply with the height standards contained in Table 2.2.400 except as described below or in compliance with a variance approval.

1. Height Bonus for Vertical Mixed Use. In the ME, MU and MN zones the maximum height may be increased by 10 feet above the maximum allowed height when residential uses are provided above the ground floor ("vertical mixed use"), except for properties abutting a residentially designated district. The building height increase for residential uses applies only if the top floor is residential and does not apply to buildings that have variance approval to exceed the permitted height.

Figure 2.3.300 – Building Height Diagram (Residential Exception)



2. Height Bonus for Affordable Housing. An increase in building height not to exceed 10 feet above the height of the zoning district may be allowed for multifamily housing when the additional units gained by the height increase are affordable housing units in conformance with BDC 3.6.200(C), except for properties abutting a residentially designated property. This shall not be combined with the increase in building height for vertical mixed use under subsection (1) above.

3. Building Height Step-backs in the MU Zoning District.

a. Where portions of a building's street-facing facade are higher than 45 feet, 60 percent of the street-facing facades higher than 45 feet must step back one foot from the street-facing property line for every one foot that the building exceeds 45 feet in height, with a minimum step-back of 10 feet and a maximum step-back of 15 feet. The required step-back may be reduced by one foot for each foot below the 45-foot height level that the step-back begins, e.g., for a building that begins its step-back at the 35-foot height level (10 feet below what is required) the required step-back can be reduced by 10 feet.

b. A reduction to the building height step-backs can be made for buildings that designate 25 percent of all residential units as affordable housing units (defined as 100% of the area median income). In those cases, where portions of a building are higher than 45 feet, 60 percent of the street-facing facades higher than 45 feet must step back one foot from the street-facing property line for every one foot that the building exceeds 45 feet in height, with a minimum step-back of 5 feet and a maximum step-back of 10 feet.

4. Building Height Step-backs abutting a residentially designated district. In the ME, MU, and MN Zoning Districts, portions of the building subject to subsection (B) of this section that exceed 35 feet in height or the height limit of the abutting residentially designated district, whichever is greater, shall step back one foot from side or rear lot lines abutting a residentially designated district for each foot the building height exceeds 35 feet or the height limit of the abutting residentially designated district.

C. Residential Density. The following density standards apply to all new developments for residential uses in the Mixed Use Districts. The density standards are intended to ensure efficient use of buildable lands and provide for a range of needed housing, in conformance with the Comprehensive Plan. In the mixed use zones, residential density standards apply to any portions of the development where ground-floor residential uses are proposed. Area used to calculate residential density includes all area dedicated to parking and landscaping required for the ground-floor residential uses. Where ground-floor residential uses are part of a mixed use development, area used to calculate residential density does not include land dedicated to right-of-way.

1. ME and PO Zoning Districts. The minimum residential density standard in the ME and PO zoning districts is as follows:

a. Where residential uses are part of a mixed use development in which non-residential uses occupy at least the floor area equivalent to the entire ground-floor area of the development, there is no minimum residential density standard except that for properties located within 660 feet of a transit route, the minimum residential density standards of the RM zone shall apply.

b. Where residential uses are part of a mixed use development in which non-residential uses occupy less than the floor area equivalent to the entire ground-floor area of the development, the minimum density standards of the RM zone apply.

2. MN and MU Zoning Districts. The minimum residential density standards of the RM zone apply.

3. There is no minimum residential density standard for “vertical” mixed use.

4. Maximum residential density is controlled by the applicable lot coverage and building height standards.

D. Other Requirements.

1. Buffering. A 10-foot-wide landscape buffer is required along the side and rear property lines between nonresidential uses and any adjacent residentially designated districts. The buffer is not in addition to (may overlap with) the side and rear setbacks required in subsection (C) of this section. The buffer shall provide landscaping to screen parking, service and delivery areas and walls without windows or entries. The buffer may contain pedestrian seating but shall not contain trash receptacles or storage of equipment, materials, vehicles, etc. The landscaping standards in BDC Chapter 3.2, Landscaping, Street Trees, Fences and Walls, provide other buffering requirements where applicable.

2. Outdoor and rooftop mechanical equipment as well as trash cans/dumpsters shall be architecturally screened from view. Heating, ventilation and air conditioning units shall have a noise attenuating barrier to protect adjacent Residential Districts from mechanical noise.

3. Building and Fire Codes. All developments shall meet applicable fire and building code standards. Larger setbacks than those listed above may be required due to the proposed use and/or storage of combustible materials. [Ord. NS-2251, 2015; Ord. NS-2195, 2013; Ord. NS-2016, 2006]

E. Landscaping. Development in the MU and MN zones is exempt from the minimum landscaping area requirements of BDC 3.2.300(C). All other standards of BDC Chapter 3.2 are applicable.

2.3.400 Site Layout and Building Orientation.

In addition to the site layout and building orientation standards of BDC 2.2.500, all of the following standards shall apply to new and expanded development within the Mixed-Use Districts, unless otherwise specified in this code, in order to reinforce streets as public spaces and encourage alternative modes of transportation, such as walking, bicycling and transit.

A. Walkway Connections. Walkways may be installed in setbacks as necessary to provide direct and convenient pedestrian circulation between developments and neighborhoods. Walkways shall conform to the standards in BDC Chapter 3.1, Lot, Parcel and Block Design, Access and Circulation.

B. Parking.

1. In the MU and MN zones, parking and maneuvering areas shall be prohibited between the street and the building.

2. In the ME and PO zones, parking and maneuvering areas are prohibited between the street and the building when on-street parking is allowed on the street fronting the development property. Parking shall be provided in conformance with BDC Chapter 3.3. [Ord. NS-2195, 2013; Ord. NS-2016, 2006]

2.3.500 Architectural Standards.

All developments in the Mixed-Use Districts are subject to Commercial Design Review, BDC 2.2.600, or BDC 2.1.900, Architectural Design Standards for multifamily residential uses, as applicable, and shall be reviewed for conformance with the standards in this section unless otherwise specified in this code.

A. In the MU and MN Districts, building facades that are oriented to the street and are within the maximum front setback standard under BDC 2.3.300 (referred to as "Street Walls") shall be designed to provide visual interest for pedestrians as follows:

1. Ground-floor windows must be installed for at least 50 percent of the length of the Street Wall and have an area equal to 60 percent of the ground-floor wall area of the Street Wall. Ground-floor wall area includes all wall areas up to 10 feet above finished grade. Windows are required to be transparent to foster both a physical and visual connection between activities in the building and pedestrian activities on the street.

2. Weather protection shall be provided along 50 percent of the Street Wall and at all street-facing entrances. Weather protection projections may include but are not limited to awnings, marquees, balconies, overhangs, or building appendages. Weather projections are required to extend five feet over the sidewalk in order to meet this standard and must not obstruct or prevent the placement of street trees, tree canopies or other improvements within the public right-of-way.

Chapter 2.7

SPECIAL PLANNED DISTRICTS

***

Article XIV. Bend Central District

***

2.7.3200 Bend Central District (BCD)

The Bend Central District is intended to implement the goals and objectives for the creative redevelopment of the central Third Street Corridor and surrounding areas west to the Parkway and east to and including 4th Street as indicated below:

- Provide for a wide range of mixed residential, commercial and office uses throughout the area and, depending on the parcel and its surroundings, vertical mixed use (i.e., a mix of uses within the same building), with an emphasis on retail and entertainment uses at the street level.
- Provide a variety of residential development types and greater density of development, with a transition area adjacent to the existing residential neighborhood east of 4th Street.
- Provide for development that is supportive of transit by encouraging a pedestrian-friendly environment.
- Provide development and design standards that support the goals of the Plan
- Limit development of low-intensity uses while allowing continuation of existing industrial and manufacturing uses.
- Provide reduced parking standards and encourage alternative parking arrangements.

The Bend Central District has distinctly different characteristics within the Bend Central District boundary. Subdistricts that recognize and support these characteristics are established as follows:

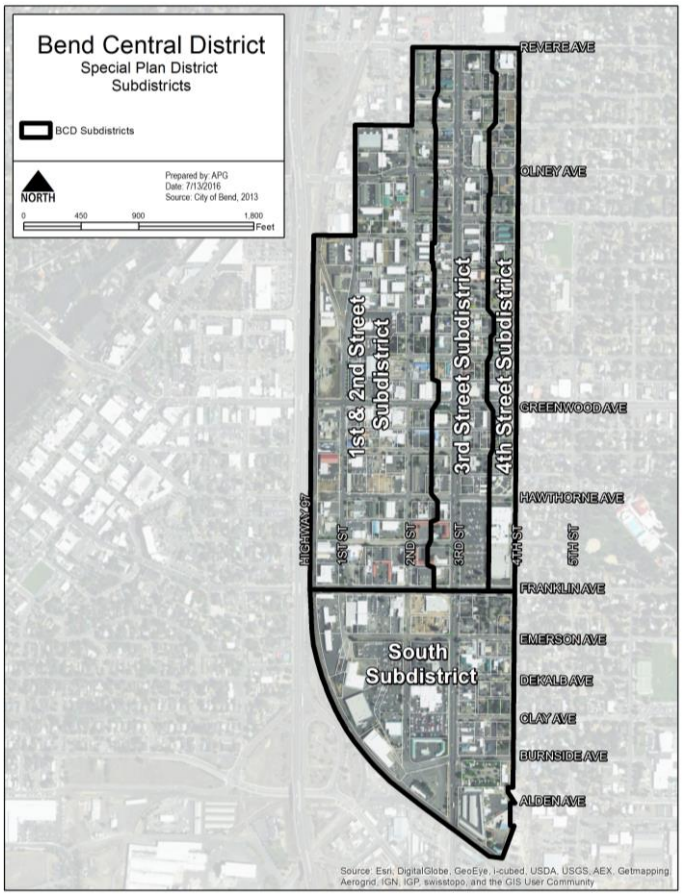
1. 1st/2nd Street Subdistrict. Applies to properties in the vicinity of 1st and 2nd Streets within the BCD and is intended to provide for a mix of office, higher density residential, live/work and small-scale retail uses while also allowing for continuation of existing light industrial/manufacturing uses in the area.

2. 3rd Street Subdistrict. Applies to properties in the vicinity of 3rd Street between Revere and Franklin Streets and is intended to provide a range of mixed uses including large-scale commercial, retail and limited residential uses.

3. 4th Street Subdistrict. Applies to properties in the vicinity of 4th Street within the BCD and is intended to provide a transition between the more intense central area and existing residential neighborhoods to the east.

4. South Subdistrict. Applies to properties south of Franklin Avenue along and between 2nd and 3rd Streets and is intended to provide a range of mixed uses including high density multifamily and office space above ground floor retail/service uses.

Figure 2.7.3210 Sub-district Map



2.7.3210 Applicability.

A. Applicability. In addition to the provisions of the underlying zone, the standards and requirements of this section apply to lands within the BCD boundary as depicted on Figure 2.7.3210. These provisions modify existing standards of the Bend Development Code by applying requirements, limiting allowable uses, or allowing exceptions to general regulations. Where there is a conflict between the provisions of the Bend Central District and those of the underlying zone or other portions of the Development Code, the provisions of this refinement plan shall control.

2.7.3220 Land Uses.

A. Permitted and Conditional Uses. The land uses listed in Table 2.7.3220 are allowed in BCD sub-districts, subject to the provisions of this chapter. Only land uses that are listed in Table 2.7.3220 and land uses that are approved as "similar" to those in Table 2.7.3220 may be permitted or conditionally allowed. The land uses identified with a "C" in Table 2.7.3220 require Conditional Use Permit approval prior to development, in accordance with BDC Chapter 4.4. Land uses identified with an "L" in Table 2.7.3220 are allowed with limitations in accordance with Subsection (D).

B. Existing Uses. Uses and structures that are not in conformance with the provisions in this section but that were lawfully established within the BCD prior to the adoption of this code are considered a permitted use. Expansion or enlargement 25 percent or less of the above referenced uses or structures that are nonresidential will be subject to the provisions of BDC Chapter 4.2, Minimum Development Standards Review, Site Plan Review and Design Review. For expansion or enlargement greater than 25

percent, the conditional use criteria, standards and conditions within BDC Chapter 4.4, Conditional Use Permits, will also apply. Conditions of prior approvals will continue to apply unless modified in conformance with BDC 4.1.1325, Modification of Approval.

C. Determination of Similar Land Use. Similar land use determinations shall be made in conformance with the procedures in BDC 4.1.1400, Declaratory Ruling.

Table 2.7.3220
Permitted Uses in the Bend Central District by Subdistrict

Land Use	1st/2nd Street	3rd Street	4th Street	South
Residential				
Single-Family Detached Dwelling	N	N	N	N
Attached Single Family Townhomes	N	L (see Subsection D1 below)	P	P
Multifamily Residential	L (see Subsection D1 below)	L (see Subsection D1 below)	P	P
Residential as part of mixed use development		P	P	P
Commercial				
Retail Sales and Service	L (see Subsection D2 below)	P	L (see Subsection D2 below)	P
Retail Sales and Service (auto dependent*)	N	N	N	N
Retail Sales and Service (auto oriented*)	N	C	N	N
*Medical Marijuana Dispensary and Marijuana Retailer	L (see Subsection D2 below)	P	L (see Subsection D2 below)	P
*Marijuana Wholesale (more than 75% of sales are wholesale)	P	P	C	C
*Marijuana Testing, Research and Development Facilities	P	P	L (see Subsection D3 below)	P
Restaurants/Food Services				
– with drive-through*	N	C	N	N
– without drive-through	P	P	P	P
Offices and Clinics	P	P	L (see Subsection D3 below)	P
Conference Centers/Meeting facility associated with a hotel/motel	C	P	N	C
Lodging (bed and breakfast inns, vacation rentals, boarding houses, timeshare)	P	P	P	P

Land Use	1st/2nd Street	3rd Street	4th Street	South
Hotel/Motels	C	P	C	C
Commercial and Public Parking, structure	C	C	C	C
Commercial and Public Parking, surface lot	N	N	N	N
Commercial Storage				
– enclosed in building and on an upper story	P	C	P	N
– not enclosed in building	N	N	N	N
– enclosed in building on ground floor (i.e., mini-storage)	N	N	N	N
Entertainment and Recreation				
– enclosed in building (e.g., theater)	L/C (See subsection D6 below)	P	N	L/C (See subsection D6 below)
– not enclosed (e.g., amusement)	C	C	N	C
Wholesale Sales (more than 75% of sales are wholesale)	P	P	C	C
Hospital	C	C	C	C
Public and Institutional				
Government – point of service intended to serve the entire City (e.g., City Hall, main library, main post office, main Department of Motor Vehicles service center)	P	P	P	P
Government – branch service intended to serve a portion of the City	P	P	P	P
Government – limited point of service (e.g., public works yards, vehicle storage, etc.)	N	N	N	N
Parks and Open Space	P	P	P	P
Schools	P	P	P	P
Institutions of Higher Education	P	P	P	P
Child Care Facility	P	P	P	P
Clubs and Places of Worship	P	P	P	P
*Utilities (above ground)	P	P	P	P
Industrial				
Manufacturing and Production	L (see Subsection E3 below)	N	N	N
Warehouse	L (see Subsection E4 below)	N	N	N

Land Use	1st/2nd Street	3rd Street	4th Street	South
Transportation, Freight and Distribution	C	N	N	N
Production businesses (e.g., IT support centers, biotechnology, software/hardware development, broadcast and production studios)	P	C	C	C
Industrial Service (e.g., cleaning, repair)	L (see Subsection D3 below)	N	N	N
Marijuana Grow Sites and Marijuana Producing when designated as Mixed-Employment, Industrial General or Industrial Light on the Bend Area General Plan on the Bend Area General Plan	L(see Subsection D4 below)	L (see Subsection D4 below)	N	L (see Subsection D4 below)
*Marijuana Processing of Cannabinoid Concentrates and Cannabinoid Products when designated as Mixed-Employment, Industrial General or Industrial Light on the Bend Area General Plan on the Bend Area General Plan	L (see Subsection D4 below)	L (see Subsection D4 below)	N	L (see Subsection D4 below)
*Marijuana Processing of Cannabinoid Extracts when designated as Mixed-Employment, Industrial General or Industrial Light on the Bend Area General Plan on the Bend Area General Plan	L (see Subsection D4 below)	L (see Subsection D4 below)	N	L (see Subsection D4 below)
Miscellaneous				
Small scale alternative energy systems (i.e., rooftop wind turbine or solar panels)	P	P	P	P

Key to Permitted Uses

P = Permitted
N = Not Permitted
C = Conditional Use
L = Permitted with limitations, subject to Subsection (D) below

D. Limitations. The following limitations apply to those uses identified as "L" in Table 2.7.3220.

1. New residential uses. In order to ensure that the subdistricts retain their established employment focused character, new residential uses in the 1st/2nd St and 3rd St subdistricts are limited as follows:

a. Residential uses that are part of a mixed use development in which non-residential uses occupy at least the floor area equivalent to the entire ground floor area of the development area permitted.

b. Residential uses that are part of a mixed use development in which non-residential uses occupy less than the floor area equivalent to the entire ground floor area of the development area are conditional.

c. Residential uses that are not part of a mixed use development are prohibited.

2. Retail sales and service. Retail sales and service uses must not exceed 30,000 square feet per business. Total area of retail sales and service uses combined must not exceed 50,000 square feet per building.

3. Offices and clinics. Offices and clinics must not exceed 15,000 square feet per business.

4. Manufacturing, production and industrial services. Uses must not exceed 20,000 square feet per business and must minimize potential external effects as follows:

a. All operations must be conducted entirely within an enclosed building.

b. Potential nuisances such as noise, odor, electrical disturbances and other public health nuisances are subject to Chapter 13.45

c. Roof-mounted mechanical equipment, such as ventilators and ducts, must be contained within a completely enclosed structure that may include louvers, latticework, or other similar features. This screening requirement does not apply to roof-mounted solar energy systems or wind energy systems.

5. Warehousing. Warehousing must be accessory/secondary to a primary permitted use (it may not be a single use) and must not exceed 15,000 square feet per building.

6. Entertainment and Recreation. Entertainment and Recreation uses in all subzones of the BCD that are enclosed in a building shall not exceed 50,000 square feet without a conditional use permit.

2.7.3230 Development Standards.

A. The following table provides numerical development standards within the BCD.

Building setback standards apply to any new buildings and any building expansion, including primary structures and accessory structures. Setbacks provide opportunity for pedestrian amenities; building separation for fire protection and building maintenance; sunlight and air circulation; noise buffering; and visual separation. Building setbacks are measured from the building foundation to the respective property line.

Table 2.7.3230
Development Standards in the Bend Central District by Sub-District

Standards	1st /2nd Street	3rd Street	4th Street	South
Minimum Lot area	No minimum	No minimum	No minimum	No minimum
Lot width	30 feet	30 feet	30 feet	30 feet
Minimum front yard setback	5 feet[1]	10 feet[2]	5 feet[1]	5 feet[1]
Maximum front yard setback	10 feet	15 feet	10 feet	10 feet
Rear and side yard setback	10 feet	None or 10 feet (see Section C below)	None or 10 feet (see Section C below)	None or 10 feet (see Section C below)
Maximum building height[3]	65 feet to 85 feet (see Sections B and E below)	65 feet (see Section E below)	45 feet	65 feet to 85 feet (see Sections B and E below)

Notes:

1. In the 1st/2nd Street, 4th Street and South Subdistricts, the required 5-foot front setback will be a dedicated pedestrian easement and will be developed according to the applicable cross section for the fronting street.

2. In the 3rd Street Subdistrict, the first 5 feet of setback (measured from the street) will be a dedicated pedestrian easement and will be developed according to the applicable cross section for the fronting street. The remaining 5 feet of setback shall be landscaped according to Chapter 3.2.300.

3. Equipment used for small scale alternative energy production does not count towards maximum building heights.

B. In the 1st/2nd Street and South Subdistricts, buildings that provide at least 75% percent of required parking within the building footprint of structures, such as in rooftop parking or under-structure parking may be a maximum of 85 feet in height. Parking on the ground floor shall have a retail façade facing the primary street.

C. Rear and side yard setback.

1. There is no rear or side yard setback required, except when abutting a Residential Zone. In such cases, the rear or side yard setback is 10 feet for all portions of the building 35 feet in height or less. Step-backs are required for portions of a building that exceeds 35 feet in height or the height limit of the abutting residentially designated district, whichever is greater.

2. When a public alley abuts a side or rear yard of property, the width of the alley can be included in the additional setback calculation as described in subsections (1) and (2) of this section for the purpose of offsetting the impacts of the building height over 35 feet. The alley does not eliminate the required 10-foot building setback.

D. Multiple Frontage Lots. For buildings on sites with more than one frontage or through lots, the minimum front yard setback standards in Table 2.7.3230 shall be applied as follows.

1. For corner lots with two frontages, the maximum setback standards indicated in Table 2.7.3230 shall be applied to all street frontages.

2. For through lots with two frontages, the maximum setback standards indicated in Table 2.7.3230 shall be applied to only one of the frontages; provided that where the abutting streets are of different street classification, the maximum setback standard shall be applied to the street with the higher classification.

3. For properties with three or more frontages, the maximum setback must be met on two abutting frontages.

E. Building height step-backs in the 1st/2nd Street, 3rd Street and South Subdistricts. Where portions of a building are higher than 45 feet, 60 percent of the street-facing facades higher than 45 feet must be set back one foot from the street-facing property line for every one foot that the building exceeds 45 feet in height, with a minimum step-back of 10 feet and a maximum step-back of 15 feet. The required step-back may be reduced by one foot for each foot below the 45-foot height level that the step-back begins, e.g., for a building that begins its step-back at the 35-foot height level (10 feet below what is required) the required step-back can be reduced by 10 feet.

1. Affordable housing developments in conformance with BDC 3.6.200(C) are exempt from the street-facing facade step-back standards of subsection E provided:

a. Buildings with exterior walls greater than 50 feet in horizontal length shall be constructed using the installation of a combination of architectural features and a variety of building materials. Landscaping should be planted adjacent to the walls. Walls that can be viewed from public streets shall be designed with windows totaling a minimum of 10 percent of the wall area and using architectural features and landscaping (abutting the building) for at least 50 percent of the wall length.

b. Architectural features include, but are not limited to, the following: recesses, projections, wall insets, arcades, window display areas, awnings, balconies, window projections, landscape structures or other features that complement the design intent of the structure and are acceptable to the Review Authority.

Figure 2.2.3230
Illustration of Step-Backs and Use of Architectural Features

F. Buffering. A 10-foot-wide landscape buffer is required along the side and rear property lines between nonresidential uses and any adjacent Residential Districts. The buffer is not in addition to (may overlap with) the side and rear setbacks required in subsection (B) of this section. The buffer shall provide landscaping to screen parking, service and delivery areas and walls without windows or entries. The buffer may contain passive outdoor seating but must not contain trash receptacles or storage of equipment, materials, vehicles, etc. The landscaping standards in BDC Chapter 3.2, Landscaping, Street Trees, Fences and Walls, provide other buffering requirements where applicable.

2.7.3240 Design Standards

A. All development. Development in the BCD is subject to the design guidelines in BDC Chapter 2.2.800, Subsection (I) except as established below. The standards of this section are in addition to the regulations of BDC Chapter 4.2, Minimum Development Standards Review, Site Plan Review and Design Review Standards. The standards of this section are in lieu of the BDC 2.2.600, Commercial Design Review Standards.

1. Section 2.2.800(I)(3) - Physical, Visual and Experiential Connections. The intent and general approach of this section apply. However, the language referring to traditional business zones and traditional storefront buildings does not apply here.

2. Section 2.2.800(I)(5) - Integrate Building Parapets and Rooftops. The intent and general approach of this section apply. However, the language referring to ornamentation on traditional CB Zone buildings does not apply here. In addition, rooftop solar panels and wind turbines are exempt from the screening requirement.

3. Section 2.2.800(I)(10) - Urban Materials. Does not apply.

B. Single use residential buildings. Single use residential buildings including duplexes, triplexes and multifamily are also subject to the provisions in Sections 2.1.900 and 2.1.1000, with the following exception:

1. The common open space requirement in 2.1.1000(B)(1) does not apply to any property with a residential building located within one-quarter mile of a public park.

2.7.3250 Parking

A. In the BCD, the following parking requirements supersede parking requirements in BDC Table 3.3.300, Required Off-Street Vehicle Parking Spaces. Unless otherwise noted here, other sections of BDC Chapter 3.3, Vehicle Parking, Loading and Bicycle Parking apply.

1. The number of required off-street vehicle parking spaces is established below. Off-street parking spaces may include spaces in garages, carports, parking lots, and/or driveways if vehicles are not parked in a vehicle travel lane (including emergency or fire access lanes).

a. Residential uses: 1 space per unit

b. Commercial uses:

i. Commercial uses smaller than 1,000 square feet of floor area: none

ii. Commercial uses 1,000 square feet or more of floor area: 1 space per 1,000 square feet of gross floor area

c. Entertainment uses: Determined by conditional use

d. Hotel/motel: 1 space per room

e. Office uses: 1.5 spaces per 1,000 square feet of floor area

f. Light industrial/manufacturing uses: 0.7 spaces per 1,000 square feet of floor area

g. Public and institutional uses, government uses: 1.5 spaces per 1,000 square feet of floor area

2. Credit for On-Street Parking. If retail or other active commercial use is provided on the street-facing ground floor, the amount of off-street parking required may be reduced by one off-street parking space for every on-street parking space abutting the development, consistent with BDC 3.3.300(B)(2).

3. Mixed-Use Developments. If more than one type of land use occupies a single structure or parcel of land, the total requirements for off-street automobile parking shall be 75 percent of the sum of the requirements for all uses.

4. The total number of required vehicle parking spaces for an industrial, commercial, or office use may be reduced by up to 10 percent in exchange for providing on-site public open space/green space at the following ratio: one vehicle parking space per 500 square feet of public open space/green space. This reduction is in addition to any reductions taken under Chapter 3.3.300.D.

2.7.3260 Special Street Standards

A. The BCD considered special street standards for streets inside the refinement plan area. The intent of the special street standards is to develop complete streets that enable safe travel for all modes of travel including transit, motorists, pedestrians, cyclists and freight users. On street parking, bicycle lanes and wider sidewalks were identified as elements necessary for safe travel. Below is a typical concept cross section.

Figure 2.7.3260
Street Design Concept for 2nd/4th Streets

These special street standards will be developed as part of the City's Transportation System Plan (TSP). Until the special standards are available, the Transportation Improvement Standards of Chapter 3.4 must apply in the BCD.

B. To accomplish new streets, additional street widths and street improvements envisioned for the BCD the following requirements shall apply.

1. The required 5-foot front yard setback along all street frontages must be dedicated as a public easement with site plan approval. This is in addition to any additional right of way that may be required by Chapter 3.4.

2.7.3270 Low Impact Stormwater Management

A. The use of low impact development (LID) techniques to manage stormwater on site is encouraged consistent with the City's Central Oregon Stormwater Manual. Techniques can include, but are not limited to, the following:

1. Use of on-site pervious paving materials to minimize impervious surfaces allowed within off-street and on-street parking areas and other areas within a development site.

2. Provision of an eco-roof or rooftop garden

3. Use of drought tolerant species in landscaping

4. Provision of parking integrated into building footprint (above or below grade)

5. Provision of rain gardens and bioretention areas on site to filter stormwater runoff

6. Shared stormwater facilities between adjacent properties

2.7.3280 Landscaping

A. The landscaping standards of Chapter 3.2 apply to the BCD except as noted in this section.

B. The minimum required landscaping shall equal 10 percent of the gross lot area for the following uses:

1. Residential – duplex and triplex units and multiple-family developments

2. Commercial and office developments

3. Industrial developments. Seventy-five percent of the required 10 percent site landscaping shall be located within the front yard setbacks and parking areas or other areas visible to the public, unless otherwise required as a condition of approval

4. Mixed-use developments

C. Green roofs and rooftop gardens may be counted toward meeting up to 50 percent of the landscaping requirement.

D. Landscaping in the public right-of-way (for example, street trees and bioswales) may be counted toward meeting the landscaping requirement.

Chapter 3.3

VEHICLE PARKING, LOADING AND BICYCLE PARKING

3.3.300 Vehicle Parking Standards for On-Site Requirements.

The minimum number of required off-street vehicle parking spaces (i.e., parking that is located in parking lots and garages and not in the street right-of-way) shall be determined based on the standards in this section.

A. Off-Street Parking Requirements. The number of required off-street vehicle parking spaces shall be determined in accordance with the following standards. Off-street parking spaces may include spaces in garages, carports, parking lots, and/or driveways if vehicles are not parked in a vehicle travel lane (including emergency or fire access lanes). In applying the exceptions and reductions listed in Sections (B), (C), and (D), reductions and exceptions may be combined except where otherwise specified. Where a fractional number of spaces results, the required number of spaces shall be rounded down to the nearest whole number.

Table 3.3.300
Required Off-Street Vehicle Parking Spaces

Use	Minimum Requirement
Residential	
Accessory dwelling unit	1 space per unit
Residential care home	2 parking spaces per dwelling unit
All residential uses within the CB and MU Zoning Districts	1 space per dwelling unit
Bed and breakfast inns	1 space per bedroom, plus 1 space for the manager or proprietor
Short-term rentals	1 space per bedroom
Duplex and triplex	1-bedroom units – 1 space/unit
	2- or more bedroom units – 2 spaces per unit
Manufactured home parks	2 parking spaces per dwelling unit
Multifamily residential	Studio units or 1-bedroom units – 1 space/unit
	2-bedroom units – 1.5 spaces per unit
	3- or more bedroom units – 2 spaces per unit
	Retirement complexes for seniors 55 years or older – 1 space per unit
Single-family, attached or detached, including a manufactured home on individual lot.	2 parking spaces per dwelling unit
Commercial	
All commercial uses within the CB and MU Zoning Districts	1 space per 500 square feet of gross area
Banking services	1 space per 350 square feet floor area
Bulk and outdoor retail trade and services, including: auto, boat or trailer sales, retail nurseries, lumberyards, and similar bulk retail uses	1 space per 1,000 square feet of gross floor area

Use	Minimum Requirement
Commercial storage (e.g., ministorage, self-storage)	1 space per 6,000 square feet of net leasable square footage, with up to half the required spaces and associated driveway areas permitted to remain unmarked for trucks and other large vehicles.
Entertainment (e.g., theaters, clubs, and other completely enclosed amusement uses)	1 space per 4 seats
Hotels/motels	1 space for each guest room, plus 1 space for the manager
Laundromats and dry cleaners	1 space per 350 square feet of customer use area, plus 2 spaces per 3 employees on the largest shift
Office use (including medical and dental offices, clinics and laboratories, alternative health care)	1 space per 350 square feet of gross floor area
Restaurants and bars (subject to BDC 3.6.300(J)(10))	1 space per 200 square feet of gross leasable floor area
Retail trade and services • General trade • Bulky merchandise (appliance, furniture)	 • 1 space per 350 square feet of gross floor area • 1 space per 750 square feet of gross floor area
Industrial Uses	
Heavy industrial	1 space per 2 employees on the largest shift or for each 1,000 square feet of gross floor area, plus 1 space per company vehicle
Light manufacture and production businesses (e.g., electronic equipment, printing, bindery, furniture, bakery, crafts, call center and similar uses)	1 space per 2 employees on the largest shift or for each 700 square feet of gross floor area, plus 1 space per company vehicle
Public/private utilities (e.g., natural gas, electricity, telephone, cable, and similar facilities)	1 space per 2 employees on the largest shift, plus 1 space per company vehicle; a minimum of 2 spaces is required
Warehousing and distribution	1 space per 2,000 square feet of gross floor area
Public and Institutional Uses	
Adult day care	2 parking spaces per dwelling unit
Child care facility	1 space per 2 employees; a minimum of 2 spaces is required
Clubs, lodges, similar uses	1 space per 3 persons allowed by Building Code in the main assembly room or auditorium
Community and regional parks and recreational facilities	1 space per 10,000 square feet of gross area or 1 space per 1,000 square feet of building floor area, whichever is greater, or as required by a Conditional Use Permit
Golf courses, including miniature golf	2 spaces per hole, plus additional spaces for auxiliary uses as required elsewhere in this section
Government – limited point of service (e.g., public works yards, vehicle storage, etc.)	1 space per 2 employees on the largest shift or for each 500 square feet of gross floor area, plus 1 space per fleet vehicle
Government – point of service intended to serve the entire City	1 space per 350 square feet of gross floor area
Government – point of service intended to serve a portion of the City	1 space per 350 square feet of gross floor area
Hospitals	1.5 spaces per bed
Neighborhood parks and recreational facilities	None except as required for accessibility compliance or as required by a Conditional Use Permit
Places of worship	1 space per 4 seats in the main worship area
Residential care facility	1 space per 2 patient beds or 1 space per apartment unit

Use	Minimum Requirement
Registered or certified family child care home	2 parking spaces per dwelling unit
Schools (public and private) – elementary and middle	1 space per employee or 4 seats in the auditorium, whichever is greater
Schools (public and private) – high schools	1.5 spaces per classroom, plus 1 space per 10 students. If the school is designed to accommodate related uses such as auditoriums, stadiums, theatres, and gymnasiums, additional parking shall be provided at a rate of 1 space per 4 seats.
Schools (public and private) – college and university campuses and trade schools	Parking needs based on a Parking Management Plan for all uses contemplated for the entire campus
Unspecified uses	
For uses not specified in Table 3.3.300, the Review Authority shall determine the minimum number of required parking spaces as part of the development review process accompanying the proposed use, based upon similar uses listed in this table.	
The Review Authority may approve a Parking Management Plan for developments with multiple uses.	

B. Credit for On-Street Parking.

1. The amount of off-street parking required may be reduced by one off-street parking space for every on-street parking space abutting the development, up to 50 percent of the requirement, except as specified in subsections (a) and (b) below.

a. Uses within the CB zone shall not receive credit for on-street parking, but have the option to pay a fee in lieu of providing off-street parking per BDC 3.3.200.

b. For uses within the MU and MN zones, the amount of off-street parking required may be reduced by one off-street parking space for every on-street parking space abutting the development, up to 100 percent of the requirement.

2. On-street parking shall follow the established or approved configuration of existing on-street parking, except that angled parking may be allowed for some streets, where permitted by City, ODOT and/or County standards. One on-street parking space shall be defined as follows:

a. Parallel parking, each 24 feet of uninterrupted curb, where allowed;

b. Forty-five-degree diagonal, each with 14 feet of curb, where allowed;

c. Ninety-degree (perpendicular) parking, each with 12 feet of curb, where allowed;

d. Curb space must be connected to the lot that contains the use;

e. Parking spaces will not obstruct a required clear vision area or violate any law; and

f. On-street parking spaces credited for a specific use may not be used exclusively by that use, but shall be available for general public use at all times. No signs or action limiting general public use of on-street spaces is permitted.

***

C. Parking Location and Shared Parking.

1. Location. Vehicle parking is allowed only on approved streets, within garages, carports and other structures, or on driveways or parking lots that have been developed in conformance with this code. Specific locations for parking are indicated within the individual land use districts for some land uses (e.g., the requirement that parking be located to side or rear of buildings, with access from

alleys, for some uses). Required off-street parking shall not be located within the front yard setbacks except for single-family dwellings, ADUs, duplexes and triplexes.

2. Screening. Commercial or industrial off-street parking which adjoins a Residentially designated district shall be effectively screened by a fence and landscaping with a minimum width of 10 feet unless otherwise specified in this code.

3. Off-Site Parking. Except for single-family dwellings, the vehicle parking spaces required by this chapter may be located on another parcel of land when commercial off-site parking is permitted in the underlying zone, provided the parcel is within 1,000 feet of the use it serves and the amount of off-site parking does not exceed the minimum amount of parking required for the intended use. The distance from the parking area to the use shall be measured from the nearest parking space to a building entrance, following a sidewalk or other pedestrian route. The right to use the off-site parking must be evidenced by a recorded deed, lease, easement, or similar written instrument.

4. Mixed-Use Developments. If more than one type of land use occupies a single structure or parcel of land, the total requirements for off-street automobile parking shall be 95 percent of the sum of the requirements for all uses, unless it can be shown that the peak parking demands are actually less (i.e., the uses operate on different days or at different times of the day). In that case, the total requirements shall be reduced accordingly. (See subsection (C)(5) of this section, Shared Parking.)

***

D. Exceptions and Special Standards for Parking.

1. Exceptions for Required Parking.

***

c. The total number of required motor vehicle parking spaces for all uses except for single family detached dwellings may be reduced by up to 10 percent for developments within 660 feet of a transit route (as the crow flies). Where only a portion of the site lies within 660 feet of a transit route, the reduction shall be applied only to buildings that are fully or partially within 660 feet of a transit route.

d. The parking requirement for affordable housing units in conformance with BDC 3.6.200(C) is one on-site parking space per affordable housing unit.

Chapter 3.4

PUBLIC IMPROVEMENT STANDARDS

***

3.4.300 Public Use Areas.
Public open space and parks contribute to the livability of a growing community. They provide space for outdoor recreation and habitat for urban wildlife. These urban spaces are maintained and managed by the Bend Metro Park and Recreation District (BMPRD). Future public use areas are evaluated through the City's land use application process.

A. Neighborhood Parks. The following standards will be used to evaluate a proposed development to determine if the property includes an area that is suitable for a neighborhood park. Upon meeting these standards, the developer shall enter into negotiations with the Bend Metro Park and Recreation District regarding district purchase of land within the property proposed for development for construction of a neighborhood park.

1. The subject property is located within a service area identified on the Neighborhood Parks Plan Map adopted by the Bend Metro Park and Recreation District as needing neighborhood parks.

2. The property proposed for development is 10 acres or larger in area.

3. The Bend Metro Park and Recreation District has indicated that the subject property contains a sufficient area that is suitable for neighborhood park development based on the Bend Metro Park and Recreation District Neighborhood Park Classification and Development Standards.

B. Dedication Requirements.

1. Where a proposed park, playground or other public use shown in a plan adopted by the Bend Metro Parks and Recreation District is located in whole or in part in a proposed development, the City may require the dedication or reservation of this area.

2. If determined by the City Council to be in the public interest in accordance with adopted General Plan policies, and where an adopted plan of the City does not indicate proposed public use areas, the City may require the dedication or reservation of areas within the development of a character, extent and location suitable for the development of parks and other public uses.

3. All required dedications of public use areas shall conform to BDC 3.4.100(D), Conditions of Development Approval.

C. Acquisition by Public Agency. If the developer is required to reserve land area for a park, playground, or other public use, the land shall be transferred by deed to the appropriate public agency within six months following final approval, at a price agreed upon prior to approval of the development, or the reservation shall be released to the property owner.

D. Additional Considerations for Future Park Development.

1. All lots or parcels that are developed with residential structures shall pay an applicable system development charge for park development as provided for under BC Chapter 12.10 and ORS 223.297 through 223.314. The amount of the system development charge shall be pursuant to a Bend Metro Parks and Recreation District resolution. The system development charge shall be payable at the time of issuance of the building permit.

2. As a condition of approval, the land owner of a proposed development of land lying within the Bend Urban Growth Boundary, but outside the boundaries of the Bend Metro Park and Recreation District, shall be required to complete an annexation into the Bend Metro Park and Recreation District as a condition of approval for any development, building permit, land use or city annexation.

Chapter 3.6

SPECIAL STANDARDS AND REGULATIONS FOR CERTAIN USES

3.6.200 Residential Uses.

***

C. Affordable Housing Strategies. Through the adoption of two resolutions by the City Council (Resolutions 2423 and 2428), the City of Bend provides an incentive program to developers to assist in the development of affordable housing.

1. For the purposes of the incentive program, the City defines affordable housing as housing with a sales price or rental amount that is within the means of a household that may occupy moderate- and low-income housing, meeting one of the thresholds defined in subsections (C)(1)(a) and (b) of this section.

a. In the case of dwelling units for sale, "affordable" means housing in which the mortgage, amortized interest, taxes, insurance, and condominium or association fees, if any, constitute no more than 30 percent of such gross annual household income for a family at 80 percent of the area median income, based upon most recent HUD income limits for the Bend Metropolitan Statistical Area (Bend MSA).

b. In the case of dwelling units for rent, "affordable" means housing for which the rent and utilities constitute no more than 30 percent of such gross annual household income for a family at 60 percent of the area median income, based upon most recent HUD income limits for the Bend Metropolitan Statistical Area (Bend MSA).

3. In association with the land use review process, and prior to the issuance of a building permit for any units in an affordable housing development, the owner shall enter into an affordable housing development agreement with the City. The development agreement shall set forth the commitments and obligations of the City and the owner, including, as necessary, conditions to ensure the completion of affordable housing in the development.

4. The owner shall execute any and all documents deemed necessary by the City in a form to be established by the City Attorney, including, without limitation, restrictive covenants, deed restrictions, and related instruments (including requirements for income qualification for tenants of for-rent units) to ensure the continued affordability of the affordable housing units in accordance with this section.

5. The following are the developer incentives adopted by the City:

a. Expedited review and permitting processing.

b. Planning and building fee exemptions up to $10,000 per project.

c. System development charge (SDC) deferrals.

d. Allow a density bonus when developing affordable housing units. (See BDC 2.1.600.)

e. Allow a 10-foot building height bonus for multifamily housing when affordable housing units are gained. (See BDC 2.1.800.)

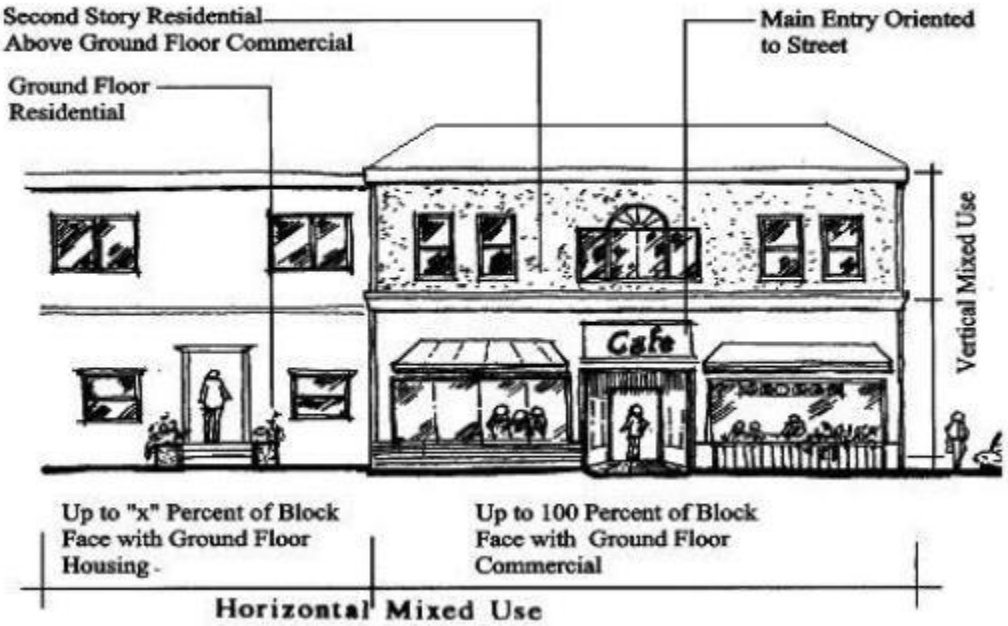
***

I. Residential Uses within Commercial Districts. Residential uses, such as multifamily housing, are encouraged adjacent to employment, shopping and services. All residential developments shall comply with subsections (I)(1) through (5) of this section, which are intended to guide mixed-use development;

allow limited residential uses within commercial districts while conserving the community's supply of commercial land for commercial uses; provide for designs which are compatible with a storefront character; avoid or minimize impacts associated with traffic and parking; and ensure proper management and maintenance of common areas. Residential uses that existed prior to the effective date of the ordinance codified in this chapter are considered permitted uses and not a nonconforming use.

Figure 3.6.200.I

Example of Vertical and Horizontal Mixed Use



Note: the example shown above is meant to illustrate required building design elements, and should not be interpreted as a required design style.

1. Mixed-Use Development. Residential uses shall be permitted in Commercial Districts only when part of a mixed-use development (residential with commercial or public/institutional use). Both "vertical" mixed-use (housing above the ground floor), and "horizontal" mixed-use (housing on the ground floor) developments are allowed, subject to the following standards in subsections (I)(2) through (5) of this section.

2. Limitation on Street-Level Housing.

   a. Central Business District. Ground-floor residential uses on street frontages are prohibited except ground-floor entrances or breezeways are permitted for housing located above or behind a nonresidential storefront use.

   b. Other Commercial Districts. On arterial and collector street frontages in other Commercial Zoning Districts, ground-floor residential uses are limited to 25% of the street frontage, except ground-floor entrances or breezeways for housing located above or behind a nonresidential use.

3. Density. The density standards are intended to ensure efficient use of buildable lands. Residential density standards apply to any portions of the development where ground-floor residential uses are proposed. Area used to calculate residential density includes all area dedicated to parking and landscaping required for the ground-floor residential uses, but does not include land dedicated to right-of-way.

a. There is no minimum residential density standard for “vertical” mixed use in a Commercial Zoning District.

b. Maximum residential density in a Commercial Zoning District shall be controlled by the applicable lot coverage and building height standards.

c. For “horizontal” mixed use in a Commercial Zoning District, where the site is located within 660 feet of a transit route, the minimum residential density standards of the RM zone shall apply for the portion of the site dedicated to housing on the ground floor.

***

5. The commercial or public/institutional uses shall occupy at least the floor area equivalent to the entire ground-floor area of the development. The commercial or public/institutional uses shall be constructed prior to or concurrently with the residential uses.

Chapter 4.5

MASTER PLANNING AND DEVELOPMENT ALTERNATIVES

4.5.300 Master Planned Developments.

A. Applicability.

1. A Master Planned Development in conformance with this section may be approved in any of the City's land use districts for any property or combination of properties three acres or greater in size.

2. For projects consisting of one or more properties under common ownership totaling 20 acres or larger at the date of adoption of this code, a Master Planned Development is required in conformance with this section.

B. Review and Approval Process.

1. Review Steps. There are three required steps for Master Planned Development approval:

a. Step 1 – the approval of a concept development plan. The concept development plan shall include an area plan that depicts the development site concept including the surrounding area within 500 feet, and a facilities plan for sewer, water and transportation, and park facilities;

b. Step 2 – the approval of a tentative development plan. A tentative development plan shall identify the final proposed location of all lots, tracts, parcels, open space, rights-of-way, building envelopes, zoning designations and other features; and

c. Step 3 – the approval of preliminary subdivision plat(s) and/or site development review application(s).

2. Approval Process.

a. Concept development plan approval. There are two "tracks" for concept development plan approval, depending on whether the Master Planned Development seeks to change one or more of the development standards contained in this code and/or the Bend Comprehensive Plan designations.

i. A Master Planned Development concept plan application in compliance with the development standards in this code and the General Plan designations may be reviewed under the Type II procedure in accordance with BDC Chapter 4.1, Development Review and Procedures.

ii. A Master Planned Development that seeks to change one or more of the development standards contained in this code is required to be reviewed under the Type III procedure in accordance with BDC Chapter 4.1, Development Review and Procedures. Modifications to the location and arrangement of zoning and/or Comprehensive Plan designations on the Master Planned Development site or sites that retain the same total acreage of each zone and Comprehensive Plan designation in order to achieve the planning objectives described in the General Submission Requirements may be processed through a Master Planned Development concept plan application. All other changes to plan designations and/or zones require a plan amendment and/or zone change in conformance with BDC Chapter 4.6, which may be processed prior to, or concurrently with, the Master Planned Development.

b. Tentative development plan approval. The tentative development plan may be reviewed using the Type II procedure in accordance with BDC Chapter 4.1, Development Review and

Procedures, and shall ensure substantial compliance with the approved/proposed MPD concept development plan. In order to expedite the process, the review steps, notification and hearings may be combined.

3. Submittal requirements. The applicant shall submit an application in conformance with the following provisions:

a. The Master Planned Development shall include, but not be limited to, the informational requirements of BDC 4.3.200, General Requirements, as well as the following elements:

i. Existing and planned major street network plans, including proposed arterial, collector and local street alignments within the master planned area and where the streets will connect with the existing street system.

ii. Existing and planned water and sewer facilities to serve the master planned area, including line sizes, general location or routes and how the lines will tie into adjacent areas and facilities.

iii. Existing and planned pedestrian, trail, and bicycle corridors within the master planned area and where these facilities will connect with existing facilities.

iv. Public and/or private parks, open space or common areas.

v. Planned densities and types of uses within the affected area.

vi. A written narrative that explains or describes:

(A) How the proposed water, sewer and street system will be adequate to serve the size and type of development and uses planned for the area;

(B) How the location and sizing of water and sewer facilities on site will be consistent with the existing and planned facilities;

(C) How adequate water flow volumes will be provided to meet fire flow and domestic demands; and

(D) The function and location of any private utility system.

vii. Draft Development Code text in a format prescribed by the City, which provides special development standards intended to implement the proposed MPD.

b. No application for a Master Planned Development shall be approved unless the applicant can explain in a written narrative how the following requirements are met:

i. The MPD contributes to orderly development and land use patterns in the area, will be compatible with adjacent developments and will not adversely affect the character of the area.

ii. The MPD will not create excessive demand on public facilities and services required to serve the development.

iii. The MPD contributes to the orderly development of the Bend area transportation network of roads, bikeways, and pedestrian facilities as required by the Transportation Systems Plan, and does not conflict with existing public access easements within or adjacent to the development.

iv. The MPD provides for the preservation of natural features and resources such as streams, lakes, natural vegetation, designated areas of special interest, and other natural

resources to the maximum degree practicable. Preservation shall be considered impracticable when it would prevent development of public streets, public utilities, needed housing or land uses permitted by the applicable land use district. The term **prevent** in this standard means that the development cannot be designed to avoid the significant tree(s). An inability to achieve maximum permitted density by complying with this subsection shall not in itself be considered to prevent development.

v. The MPD conforms to the Bend Area Comprehensive Plan Map, the amendments to the Comprehensive Plan Map retain the same total area of all general plan designations on the subject site, or amendments to the Comprehensive Plan Map, text or policies shall be proposed and approved as part of the Master Planned Development plan in conformance with BDC Chapter 4.6.

C. Applicability of BDC Title 3, Design Standards. The development standards of BDC Title 3 apply to all Master Planned Developments, unless otherwise specified as part of a MPD concept proposal.

1. Concept Development Plan Submission.

a. General Submission Requirements. The applicant shall submit an application containing all of the general information required for a Type II or III procedure, as governed by BDC Chapter 4.1, Development Review and Procedures. In addition, the applicant shall submit the following information:

i. A statement of planning objectives to be achieved by the Master Planned Development through the particular approach proposed by the applicant. This statement should include a description of the character of the proposed development and the rationale behind the assumptions and choices made by the applicant.

ii. A concept schedule indicating the approximate dates when construction of the Master Planned Development and its various phases are expected to be initiated and completed.

iii. Narrative report or letter documenting compliance with the applicable approval criteria contained in this code.

iv. Special studies or reports prepared by qualified professionals may be required by this code, the City Planning Director, Planning Commission or City Council to determine potential traffic, geologic, noise, environmental, natural resource and other impacts, and required mitigation.

b. Additional Information. In addition to the general information described above, the concept development plan application shall include the following exhibits and information:

i. Site analysis map, as defined in BDC 4.2.300, Design Review;

ii. Conceptual site plan (e.g., general land use, building envelopes, circulation, open space, utility connections, and other information necessary to convey the concept plan);

iii. Grading concept plan (for hillside or sloping properties, or where extensive grading is anticipated);

iv. Landscape concept plan and tree preservation plan in accordance with BDC Chapter 3.2;

v. Architectural concept plan (e.g., information sufficient to describe architectural styles, building heights, and general materials);

vi. Sign concept plan (e.g., locations, general size, style and materials of signs);

vii. Copies of all existing covenants and restrictions, and general description of proposed restrictions or covenants (e.g., for common areas, access, parking, etc.);

viii. Facilities plan showing how the planned development will be served by streets, sewer and water.

ix. Comprehensive Plan Map compliance analysis which explains how plan designation acreages in the Comprehensive Plan Map which exist on the subject site or sites prior to the Master Plan Development with their minimum and maximum residential density ranges are implemented through the Concept Development Plan, unless a plan amendment and zone change is being processed concurrently with the Concept Development Plan.

2. Concept Development Plan Approval Criteria. The applicant shall submit a narrative and plans detailing how the following criteria are satisfied. The City shall make findings demonstrating that all of the following criteria are satisfied when approving, or approving with conditions, the concept plan. The City shall make findings demonstrating that one or all of the criteria are not satisfied when denying an application:

a. Bend Comprehensive Plan. All relevant provisions of the Bend Area General Plan and Comprehensive Plan Map designations are met except as proposed to be modified by the applicant in conformance with the submittal requirements and criteria of subsection (B)(2) of this section.

b. Land Division Chapter. All of the requirements for land divisions, as applicable, shall be in conformance with BDC Chapter 4.3, Subdivisions, Partitions, Replats and Property Line Adjustments; except as proposed to be modified by the applicant in conformance with subsection (B)(2) of this section.

c. Applicability of BDC Chapters 2.0 and 3.0. All of the land use and design standards contained in BDC Chapters 2.0, Land Use District Administration, and 3.0, Development Standards Administration, are met, except as proposed to be modified by the applicant in conformance with subsection (C)(1) of this section.

d. Requirements for Open Space. Public and private open space within a development is highly encouraged as a public benefit. Open space in addition to that required under other sections of this code, consistent with the purpose of this chapter, shall be designated within a Master Planned Development when:

i. The Master Planned Development area is 40 acres or greater; or

ii. The applicant is seeking exceptions to Bend Area General Plan, zoning designations or the standard Development Code provisions and/or density.

e. Standards for Open Space Designation. The following standards shall apply:

i. The open space area shall be shown on the concept development plan and recorded with the final plat or separate instrument; and

ii. The open space shall be conveyed in accordance with one of the following methods:

(A) By dedication to the Park District or City as publicly owned and maintained open space. Open space proposed for dedication to the Park District or City must be acceptable with regard to the size, shape, location, improvement, environmental condition, and budgetary and maintenance abilities;

(B) By leasing or conveying title (including beneficial ownership) to a corporation, owners association or other legal entity. The terms of such lease or other instrument of

conveyance must include provisions (e.g., maintenance, property tax payment, etc.) suitable to the City.

f. Standards for Approval. In granting approval for a Master Planned Development concept development plan the applicant must demonstrate that the proposal is consistent with the criteria for land division approval in BDC 4.3.300, Tentative Plan.

g. Applicability of Master Planned Neighborhood Standards. For Master Planned Developments that include residential Comprehensive Plan designations, the standards of BDC 4.5.400 are met.

h. Additional Approval Criteria for Master Planned Development Applications. A recommendation or a decision to approve, approve with conditions or to deny an application for a MPD application shall be based on the criteria listed in BDC 4.6.300(B), Criteria for Quasi-Judicial Amendments.

D. Administrative Procedures.

1. Land Use District Map Designation. After a Master Planned Development concept development plan and tentative development plan have been approved, the approved Master Planned Development designation for the subject development site shall be shown on a map maintained by the City that illustrates the location of approved Master Planned Developments and the approved MPD overlay text will be added to BDC Chapter 2.7 as a new planned district.

As a condition of approval, the applicant shall record a deed restriction on the subject properties and all future lots and parcels created, noting inclusion in the approved Master Planned Development area.

2. Time Limit for Filing a Tentative Development Plan. Within three years after the date of approval of the concept plan, the applicant or his or her successor shall prepare and file with the City a tentative development plan, in conformance with the requirements of this chapter. If the tentative development plan is not submitted within three years, the Master Planned Development concept plan shall expire.

3. Extension. The City shall, upon written request by the applicant and payment of the required fee, grant a written extension of the approval period not to exceed one year; provided, that all of the following are satisfied:

a. No changes have been made on the original conceptual development plan as approved;

b. There have been no changes to the applicable Bend Area General Plan policies and ordinance provisions on which the approval was based.

4. Tentative Development Plan Submission Requirements. The applicant shall submit an application for a tentative development plan. The contents of the application information shall be determined by the conditions of approval for the concept development plan. At a minimum, the tentative development plan shall identify the final proposed location of all lots, tracts, parcels, open space, rights-of-way, building envelopes and other features, prior to approval of a development permit (e.g., Land Division, Development Review, Site Development Review, etc.). The tentative development plan shall be reviewed using a Type II procedure in conformance with BDC Chapter 4.1, Development Review and Procedures.

5. Tentative Development Plan Approval. The City shall approve the tentative development plan upon finding that the final plan conforms to the concept plan and all required conditions of approval. Minor changes to the approved concept development plan may be approved with the tentative development plan, if consistent with all of the site development review standards set forth in this code and the following criteria:

a. Increase or decrease of residential densities or lot coverage relative to that approved in the Concept Development Plan by no more than 15 percent, when such change conforms to the Bend Comprehensive Plan and its density ranges and the minimum density standards of BDC 4.5.400(C);

b. A reduction to the amount of open space or landscaping relative to that approved in the Concept Development Plan by no more than 10 percent, when such change conforms to the standards of this section and BDC 4.5.400(C);

c. An increase in lot coverage by buildings or changes in the amount of parking relative to that approved in the Concept Development Plan by no more than 15 percent. Greater changes require approval of a modification in conformance with BDC Chapter 4.1, Development Review and Procedures;

d. No change in land use shall be permitted without approving a modification to an approved concept development plan in conformance with BDC Chapter 4.1, Development Review and Procedures;

e. No change that places development within environmentally sensitive areas including ASIs or areas subject to a potential hazard shall be approved without approving a modification to an approved concept development plan in conformance with BDC Chapter 4.1, Development Review and Procedures;

f. The location of buildings, proposed streets, parking lot configuration, utility easements, landscaping or other site improvements shall be as proposed on the concept development plan, or as modified through conditions of approval. Changes in the location or alignment of these features by more than 50 feet shall require approval of a modification, in conformance with BDC Chapter 4.1, Development Review and Procedures; and

g. Other changes made to the approved concept development plan shall require approval of a modification, in conformance with BDC Chapter 4.1, Development Review and Procedures.

6. Development Review and Building Permit Approvals. Upon receiving tentative development plan approval, the applicant may apply for one or more development reviews (e.g., Land Division, Development Review, Site Development Review, etc.). Building permits shall not be issued until all required development permits have been issued and appeal periods have ended.

a. Development Review. BDC Chapter 4.2, Site Plan Review and Design Review, applies to developments requiring Site Development Review or Architectural Design Review. BDC Chapter 4.3, Subdivisions, Partitions, Replats and Property Line Adjustments, applies to land divisions (partitions and subdivisions). [Ord. NS-2229, 2014; Ord. NS-2016, 2006]

4.5.400 Master Planned Neighborhoods

The purpose of this section is to ensure the development of fully integrated, mixed-use, pedestrian-oriented neighborhoods. The intent is to minimize traffic congestion, urban and suburban sprawl, infrastructure costs, and environmental degradation, particularly as new development takes place on large parcels of land.

A. Applicability. This section applies to all properties comprised of one or more lots, parcels, and/or tracts under common ownership that total 20 acres or larger in any residential zoning district or Comprehensive Plan designation or any mixed use zoning district or Comprehensive Plan designation when residential uses are proposed .

B. Master Plan Required. Prior to land division approval, a master plan shall be prepared for all properties, lots, parcels and/or sites meeting the criteria in subsection (A) of this section. Master plans shall follow the procedures in BDC 4.5.300, Master Planned Developments. A master plan may not be required if a Special Planned District has been adopted for the subject area.

C. Land Use and Design Standards. Master Planned Neighborhoods shall include the following design elements:

1. Access to recreation. All lots have access to active or passive recreational areas or uses by walking or bicycling a distance not greater than one-half mile as measured along an existing or proposed trail or sidewalk route. Such areas or uses may include natural open space and developed and maintained park land located within adjacent neighborhoods. Trails or trail corridors are not to be considered as a recreational use/open space for the purpose of meeting this requirement.

2. Access to commercial services. All lots have access to neighborhood commercial services by walking or bicycling a distance not greater than one-half mile as measured along an existing or proposed sidewalk or pedestrian route. Such neighborhood commercial uses may be provided outside the boundaries of the proposed master planned neighborhood within adjacent neighborhoods or Commercial Districts.

3. Housing density and mix. The neighborhood shall provide a diverse mix of housing types and achieve efficient minimum housing densities in conformance with the standards of subsections (a) through (d) below, as applicable. Minimum and maximum densities shall be calculated in conformance with BDC 2.1.600(C).

a. RL Comprehensive Plan Designation/Zone: at least 50 percent of the maximum gross density of the RL Comprehensive Plan designation/zone (2.0 units per gross acre), with two- and three-family housing, attached single-family townhomes, and/or multifamily residential housing units comprising at least 10 percent of total housing units.

b. RS Comprehensive Plan Designation/Zone: at least 70 percent of the maximum gross density of the RS Comprehensive Plan designation/zone (5.11 units per gross acre), with two- and three-family housing, attached single-family townhomes, and/or multifamily residential housing units comprising at least 10 percent of total housing units.

c. RM Comprehensive Plan Designation/Zone: at least 60 percent of the maximum gross density of the RM Plan designation/zone (13.02 units per gross acre), with two- and three-family housing, attached single-family townhomes, and/or multifamily residential housing units comprising at least 67 percent of total housing units. This standard supersedes the housing mix standard for the RM zone in BDC 2.1.1000(C).

d. RH Comprehensive Plan Designation/Zone: the minimum density of the RH Comprehensive Plan designation/zone applies. Single family detached housing is not permitted in the RH zone.

4. Public facilities. Land needed for public use (e.g., schools, parks, fire stations, and other facilities) shall be designated on the master plan, in accordance with the City of Bend, Bend Metro Parks and Recreation District, Bend La Pine School District Sites and Facility Plans.

5. Open space. The neighborhood shall contain at least 10 percent of the gross area as public space such as parks, pavilions, squares and plazas to encourage public gatherings.

6. Multi-modal connections. The neighborhood shall provide convenient multi-modal connections to regional employment, shopping and service located outside of the proposed neighborhood by providing opportunities for multi-modal transportation (e.g., transit nodes, multi-use pathways and trails). Existing and planned trail systems adjoining the Master Planned Neighborhood shall be continued through the entire Master Planned Development based on the most recent adopted Bend Parks and Recreation District trails master plan and Bend Transportation System Plan.

7. The required neighborhood design elements shall be included in all Master Planned Neighborhoods unless it can be proven that the abutting and/or adjacent developed lands include the elements necessary to meet the intent of this section. Adequate proof shall include studies,

demographics, and other suitable information in order to provide the City with factual data to support findings for approval. The expense for supplying the proof shall be borne solely by the property owner or applicant. The proof shall provide reliable evidence that the adjacent and/or abutting properties contain the elements necessary to create or complement the proposed neighborhood.

D. Implementation. Upon approval of a Master Planned Neighborhood, the development shall follow the land division procedures in BDC Chapter 4.3, and the Site Design Review procedures in BDC Chapter 4.2, as applicable. Any modifications to the approved master plan shall be subject to the standards and procedures in BDC Chapter 4.1, Development Review and Procedures. [Ord. NS-2016, 2006]

4.5.500 Master Plan Development within the Urban Holding Districts.
BDC 4.5.500 deleted in its entirety.

Chapter 4.6

LAND USE DISTRICT MAP AND TEXT AMENDMENTS

4.6.300 Quasi-Judicial Amendments.

A. Applicability, Procedure and Authority. Quasi-judicial amendments generally refer to a plan amendment or zone change affecting a single or limited group of properties and that involves the application of existing policy to a specific factual setting. Quasi-judicial amendments shall follow the Type III procedure, as governed by BDC Chapter 4.1, Development Review and Procedures, using the standards of approval in subsection (B) and/or (C) of this section, as applicable. Based on the applicant's ability to satisfy the approval criteria, the applicant may be approved, approved with conditions, or denied.

B. Criteria for Quasi-Judicial Comprehensive Plan Map Amendments. The applicant shall submit a written narrative which explains how the approval criteria will be met. A recommendation or a decision to approve, approve with conditions or to deny an application for a quasi-judicial amendment shall be based on all of the following criteria:

1. Approval of the request is consistent with the relevant Statewide Planning Goals that are designated by the Planning Director or designee;

2. Approval of the request is consistent with the relevant policies of the Comprehensive Plan that are designated by the Planning Director or designee;

3. The property and affected area is presently provided with adequate public facilities, services and transportation networks to support the use, or such facilities, services and transportation networks are planned to be provided concurrently with the development of the property;

4. Evidence of change in the neighborhood or community or a mistake or inconsistency in the Comprehensive Plan or Land Use District Map regarding the property that is the subject of the application; and

5. Approval of the request is consistent with the provisions of BDC 4.6.600, Transportation Planning Rule Compliance.

C. Criteria for Quasi-Judicial Zone Changes. The applicant must submit a written narrative which explains how the approval criteria will be met. A recommendation or a decision to approve, approve with conditions or to deny an application for a quasi-judicial zone change must be based on meeting both of the following criteria:

1. The amendment will bring the zone map into conformance with the Comprehensive Plan map.

2. The property and affected area is presently provided with adequate public facilities, services and transportation networks to support the use, or such facilities, services and transportation networks are planned to be provided concurrently with the development of the property.

MSA
Murray, Smith & Associates, Inc.
Engineers/Planners
121 S.W. Salmon, Suite 900 ■ Portland, Oregon 97204-2919 ■ PHONE 503.225.9010 ■ FAX 503.225.9022

TECHNICAL MEMORANDUM

DATE: July 20, 2016

PROJECT: Bend UGB Expansion

TO: City of Bend, Oregon

FROM: Murray, Smith & Associates, Inc.

RE: UGB Expansion – Sanitary Sewer Analysis, Scenario 2.1G

Background

The City of Bend (City) is studying the potential expansion of their existing Urban Growth Boundary (UGB) to facilitate future growth. As a follow on to collection system planning work that was completed in 2014, Murray, Smith & Associates, Inc. (MSA) was contracted to evaluate the potential sanitary sewer infrastructure impacts associated with long-term and incremental UGB expansion. An initial analysis was performed to identify a long-term infrastructure plan within a two-mile buffer around the City's existing UGB. This allows the City to develop a much longer term view for infrastructure that has 100-year plus expected lifespan of modern pipe materials. The long-term infrastructure analysis was documented in a memorandum entitled "UGB Expansion – Sanitary Sewer Analysis – Long-term Optimization," [February 2016, MSA].

After understanding the infrastructure requirements for the two-mile buffer, the UGB analysis then considered various incremental expansions that focused on solutions consistent with the longer term infrastructure plan. Requirements were determined for two (2) generalized UGB expansion scenario packages (Scenarios 4A and 4B). The generalized UGB expansion scenario packages were analyzed to select the least cost improvements consistent with the long-term infrastructure plan and a select set of short-term improvement alternatives. Next, six (6) distinct UGB expansion scenarios (Scenario 1.2, 2.1, 3.1, and SAAM 1, 2, 3) were rated for relative cost and constancy with the long-term infrastructure analysis. The generalized and distinct expansion scenario analysis was documented in a memorandum entitled "UGB Expansion – Sanitary Sewer Analysis," [October 2015, MSA].

The UGB Technical Advisory Committee and City staff developed several composite incremental UGB expansion scenarios which implemented the most advantageous

components of the previous analysis for a wide range of parameters including sanitary sewer. This technical memorandum documents a summary of the previous analysis for the six (6) distinct UGB expansion scenarios and specifically highlights the recent analysis for the composite Scenario 2.1G including sanitary sewer infrastructure improvements and costs.

Executive Summary

A summary of conclusions related to each sub-area are highlighted below for Scenario 2.1G. Sub-area boundaries and improvements are shown in Figure 1 on page 13.

- The Shevlin area plus the northern portion of the West area require an increase to capacity of the Awbrey Glen lift station. The costs for this improvement are modest; however, this area continues to rely on pumping rather than gravity conveyance, which is less efficient than other gravity service areas. In addition, the northern portion of the West area requires lengthy new gravity piping (9,300 feet) to convey wastewater to the Awbrey Glen lift station.[1]

- The Anderson Ranch portion of the West area contributes to an upsizing to the force main serving the Shevlin Meadows lift station and and upsizing of the lift station, an improvement identified in City of Bend Collection System Master Plan (CSMP, 2014), but requiring a larger improvement than previously planned.

- The remainder of the west area is served by a lengthy gravity line extension and contributes to upsizing of existing trunk sewers, but does not rely on lift stations.

- The Southwest area requires extension of a new gravity line, which may also provide gravity service to adjacent areas inside the UGB that are on pressure sewers or septic currently. In addition, it requires up-sizing of existing gravity lines above the sizing recommended in the CSMP and a modification to the design of one segment of the Southeast Interceptor that has not yet been constructed immediately east of Highway

- The East Highway 20 area can be served by short connections to existing gravity sewer lines and does not require an interim lift station.

- The Thumb, Elbow, and DSL all require similar improvements to Scenario 2.1 – contributions to the Southeast Interceptor and the Hamby alignment as well as gravity line extensions to connect to the Southeast Interceptor.

- As in Scenario 2.1, the eastern portion of The Elbow requires an interim lift station and force main to connect to the Southeast Interceptor.

[1] The north portion of the West area was considered for service through an improved Shevlin Commons lift station; however, improvements to 6,300 feet of existing force main is prohibitive for significant service area expansion and does not align with the long-term improvement plan. Construction of the gravity sewer to serve the northern portion of the West area also allows for decommissioning of the Renaissance lift station.

- The North Triangle and OB Riley require the same improvements as Scenario 2.1 – contributions to the Northeast Interceptor east of Highway 97 (including increasing sizing relative to the CSMP) and extension of the Northeast Interceptor to the west to serve these areas.

- The Northeast Edge relies on the Hamby alignment, as in Scenario 2.1. Growth in this area is focused around Butler Market Road, so it does not need to contribute to the cost of the portion of the Hamby alignment south of Butler Market Road. This reduces the costs assigned to the sub-area; however, there is no change to the total cost of the Hamby alignment.

Analysis Assumptions

The primary objective of the improvement analysis is to determine the combination of system improvements that satisfy the specified hydraulic performance criteria while minimizing overall life-cycle costs for the potential UGB expansion scenarios. Optimization technology was used to identify the least cost improvement strategies. Additionally, the UGB expansion analysis builds on the optimization analysis performed for the (CSMP) completed in 2014.

Collection System Improvement Alternatives

Improvement alternatives to serve the existing UGB and UGB expansion include options considered in the City's CSMP and new alternatives consistent with the two-mile buffer long-term study area. The alternatives include:

- Gravity and force main improvements along existing alignments
- New gravity and force main alignment alternatives
- New lift stations, existing lift station upgrades, and existing lift station decommissioning alternatives
- Storage tank alternatives (restricted to wet-weather operation)
- Linear transport/storage alternatives (restricted to wet-weather operation)
- Satellite treatment alternatives

Design and Performance Criteria

The relevant design and performance criteria applied in the UGB expansion analysis are consistent with the criteria applied in the CSMP. These include; system surcharge, freeboard and overflow constraints, maximum and minimum velocity constraints, lift station firm capacity, and backup power. The criteria are summarized in Table 1 below and specific details are summarized in the CSMP Report Section 4 – "System Analysis."

Table 1| Summary of Design Criteria

Category	CSMP Standard
During peak dry weather flows, depth/Diameter (d/D)	≤ 0.8
During peak wet weather flows, d/D	Existing Pipe: Covered under freeboard requirements New Pipe: < 1.0
During peak wet weather flows, maximum surcharge (freeboard from water surface to manhole rim)	Existing Pipe: Minimum 2.0 feet of freeboard system wide for unsealed gravity pipes. Manholes with < 2.0 feet from crown to rim will be identified and evaluated individually as exceptions or required improvements. New Pipe: No manhole surcharging, piping will be sized to convey peak wet weather flows under full pipe conditions.
Shallow manhole (crown of pipe to rim < 2.5 ft), during peak wet weather flows, maximum surcharge (freeboard from water surface to manhole rim)	Existing Pipe: Covered under peak wet weather requirement New Pipe: No manhole surcharging, piping will be sized to convey peak wet weather flows under full pipe conditions.
Lift station firm capacity	Lift capacity to discharge the peak flow associated with the design wet weather event with largest unit out of service.
Maximum force main velocity	6 ft/s max under peak dry weather flows, 10 ft/s max under peak wet weather conditions with all pumps operating
Maximum gravity pipe velocity	10 ft/s to identify pipelines that may require anchoring and regular inspection
Minimum cleansing/scouring velocity, gravity pipe and force main	2 ft/s flow rate attained during peak dry weather flow to maintain cleansing or identify pipelines in need of flushing.
Minimum cleansing/scouring velocity, siphon	Existing: 3 ft/s (2 barrels required) New: No new siphons permitted
Backup power (response time)	Onsite backup power or backup diesel pumps should be provided for any large or regional lift stations. On case-by-case basis, other lift stations (excluding private pumps) should comply with ODEQ guidelines for onsite storage, auxiliary power, etc. Standby power required for new lift stations or existing lift stations that go through a "material modification."

General note: ft/s = feet per second. ODEQ – Oregon Department of Environmental Quality.

Table 2 presents the design standards that were followed to determine slope of new pipelines. These criteria are based on:

- *City of Bend Standards and Specifications*, 2011 for pipes less than or equal to 24 inches in diameter.
- *Recommended Standards for Wastewater Facilities (10 States Standards, www.10statesstandards.com)*, 2004 edition, for pipes greater than 24 inches in diameter.

For pipe diameters greater than or equal to 48 inches, slopes should be designed to produce mean velocities, when flowing full, of not less than 3.0 feet per second (ft/s) based on Manning's formula using an "n" value of 0.013.

Table 2| Pipe Design Standards: Grade and Slope

Recommended Minimum Slopes							
Nominal Pipe Size (inch)	**8**[1]	**12**[1]	**18**[1]	**24**[1]	**30**[2]	**36**[2]	**42**[2]
Minimum Slope (ft per 100 ft)	**0.4**	**0.19**	**0.11**	**0.08**	**0.058**	**0.046**	**0.037**

[1] *Minimum Grade (City of Bend Standards and Specifications, 2011).*
[2] *Recommended minimum slopes (Recommended Standards for Wastewater Facilities [10 States Standards, 2004]).*

The sanitary sewer system was analyzed for capacity based on peak dry weather and wet weather flow estimates as defined below:

- Peak dry weather flow: highest flow during dry weather conditions (sanitary flows), corresponding to the day of maximum sewer use (no rainfall is contributing).
- Peak wet weather flow: peak flow during wet weather conditions, corresponding to the rainfall contribution from the 10-year summer-time design storm (rainfall derived infiltration and inflow, RDII) and dry weather flow conditions of the day of maximum sewer use. Dry and wet flow peaks are aligned to ensure that the peak dry weather flow and the peak RDII contribution occur at the same time.

Unit Cost Rates

Unit cost rates used in the improvement analysis are planning-level estimates and are consistent with the approach used in the CSMP and have been updated to reflect 2015 conditions. The unit cost rates are summarized in the CSMP Report Section 5 – "Project Unit Costs and Cost Analysis" and Appendix 5A – "Supplemental Material for Unit Costs." The Engineering News Record Construction Cost Index (ENR CCI) basis is 9,430 (Seattle, April 2013) for the CSMP and 10,386 (Seattle, February 2015) for the UGB expansion study. All CSMP unit costs were multiplied by a factor of 1.10138 for the UGB Expansion study based on the ENR CCI ratio (10,386/9,430).

Project unit cost estimates were prepared in accordance with the guidelines of American Association of Cost Engineers (AACE) International, the Association for the Advancement of Cost Engineering. (*AACE International Recommended Practice No. 56R-08 Cost Estimate Classification System - As Applied for the Building and General Construction Industries - TCM Framework: 7.3 - Cost Estimating and Budgeting Rev. December 31, 2011*). AACE International's description of a Class 5 Estimate is quoted as follows:

> *Typical accuracy ranges for Class 5 estimates are -20% to -30% on the low side, and +30% to +50% on the high side, depending on the construction complexity of the project, appropriate reference information and other risks (after inclusion of an appropriate contingency determination). Ranges could exceed those shown if there are unusual risks.*

The project cost estimates have been prepared for the purpose of evaluating project alternatives and budgeting for master plan implementation. Project cost estimates were prepared from information available at the time of the estimate, and are based on a low level of project definition. Project costs developed herein produce "rough cost estimates" consistent with the definition of Oregon Administrative Rules 660-011-0005(2) and 660-011-035. The true cost and resulting feasibility of a planned project will depend on the actual labor and material costs, competitive market conditions, site conditions, final project scope, implementation schedule, continuity of personnel, and other variable factors. Therefore, the actual project costs will vary from the estimates presented here. Because of these factors, project feasibility, benefit-to-cost ratios, risks and funding must be carefully reviewed prior to making specific financial decisions or establishing project-specific budgets.

Flow Development

For all expansion alternatives in the UGB analysis, the existing UGB was assumed to be built-out based on model calibration and wastewater flow projections identified in the CSMP Report Section 3, "Wastewater Flow Projections" and Section 4, "System Analysis." The wastewater flow projections for the UGB expansion area applied the following flow development assumptions as described below.

As part of the recently completed CSMP, land use and loading rates (average dry weather flow) were attributed to all tax lots within the existing UGB based on available flow monitoring. Future loading within the existing UGB was extrapolated based on unit flow factors as presented in Table 3.

Table 3| Unit Loading Rates for Dry Weather Flow

Land Use Category	Units per Acre	Loading (gpad)[1, 2]
Very Low Density Residential	2	370
Low Density Residential	4	740
Medium Density Residential	6	1,110
High Density Residential	10	1,850
Non-Residential	-	490
Schools	-	347

Note 1. Gallons-per-acre-per-day (gpad)
Note 2. Residential loading based on 185 gallons-per-unit-per-day x number of units.

Dry weather loading was developed for the potential UGB expansion areas using the unit loading rates from the CSMP. Numbers of estimated units were applied to expansion areas where unit projections were available by land use. Based on the statistical analysis and input from City staff, a density of 4-units per acre was applied where unit projections or other land use data was unavailable. Additionally, a net acreage factor of 79% was applied to the buildable lands to account for future right-of-way (ROW) requirements. The justification for the 4 units per acre assumption is further documented in the technical memorandum entitled, "UGB Expansion – Sewer Loading Assumptions [July 2015]." The total and existing loading estimates are summarized in Table 5.

The UGB expansion areas were grouped into eight (8) geographic sub-areas. These sub-areas became the basis for comparative ratings of potential expansion areas. A summary of area and loading for the six (6) scenarios and Scenario 2.1G are provided in Table 4 by sub-area.

Table 4| Scenario Area and Loading by Sub-area

Sub-area	Buildable Area (net acres)[1]						
	Scenario 2.1G	**Scenario 1.2**	**Scenario 2.1**	**Scenario 3.1**	**SAAM-1**	**SAAM-2**	**SAAM-3**
DSL Property	258	173	284	151	99	149	101
Elbow	324	161	318	140	121	140	140
Thumb/Southwest	205	277	246	139	184	170	166
West	249	105	137	260	0	0	521
Shevlin	49	0	0	139	338	0	0
OB Riley/ Gopher Gulch	108	100	107	356	100	636	136
North Triangle	134	152	147	183	152	183	183
Northeast Edge/ East Highway 20	195	359	104	127	881	32	32
Total	1,522	1,327	1,343	1,495	1,874	1,309	1,279

Sub-area	Average Dry Weather Loading (gpm)[2]						
	Scenario 2.1G	**Scenario 1.2**	**Scenario 2.1**	**Scenario 3.1**	**SAAM-1**	**SAAM-2**	**SAAM-3**
DSL Property	172	93	154	73	34	83	118
Elbow	181	102	182	47	40	47	47
Thumb/Southwest	115	124	139	47	82	63	57
West	132	126	119	242	0	0	427
Shevlin	25	0	0	63	163	0	0
OB Riley/ Gopher Gulch	45	34	31	216	34	356	65
North Triangle	89	52	103	62	52	62	62
Northeast Edge/ East Highway 20	164	259	61	76	475	17	17
Total	923	789	790	825	879	628	792

Note 1. Net acreage excludes unbuildable lands, 21% of gross area for ROW, and area dedicated as "Parks"
Note 2. Gallons-per-minute (gpm)

Capital Improvements

The long-term solution for UGB expansion includes refinement of several major projects from the CSMP including the Southeast Interceptor Phase 2 (north of Neff Road), the Northeast Interceptor, and the Plant Interceptor. These refinements are described below and impacted the short-term expansion analysis of the six (6) distinct scenarios and Scenario 2.1G.

Southeast Interceptor

The optimal alignment of the Southeast Interceptor north of Neff Road changes from 27th Street in the CSMP to Hamby Road in the UGB expansion analysis. The primary drivers contributing to this change include the following.

1. The Hamby alignment allows for gravity service to be provided to properties east of 27th street. If the Southeast alignment was to be constructed along 27th Street, a second eastern gravity pipeline along an alignment such as Hamby would be required in the future. Alternately if the pipeline was constructed along 27th Street, lift stations would be required to serve any growth east of that alignment including the Northeast Edge.
2. The Hamby alignment parallels sections of the existing plant interceptor that would otherwise require significant capacity improvements to serve long-term growth.

West of South Village the proposed size of the Southeast Interceptor is amended to provide sufficient capacity for additional growth in the south expansion area.

Northeast Interceptor and Plant Interceptor

The size of the Northeast Interceptor is amended to provide sufficient capacity for additional growth in the north and west expansion areas. The alignment of the Northeast Interceptor is also amended to connect directly to the Wastewater Treatment Facility (WWTF). The amended alignment bypasses the existing Plant Interceptor and connects with the Hamby alignment of the Southeast Interceptor. The proposed Northeast Interceptor extension eliminates the need for capacity improvements to the existing Plant Interceptor and siphon structure upstream of the WWTF that would otherwise be required to serve future growth. The Northeast Interceptor extension is also proposed to include a diversion structure where flows from the existing Plant Interceptor can be diverted and conveyed directly to the WWTF providing valuable redundancy for existing poor condition and near capacity interceptor piping.

The short-term UGB expansion scenarios selected the least cost improvements from the long-term infrastructure plan and a select set of short-term improvement alternatives. The short-term improvements that were selected and that are different from the long-term infrastructure plan are discussed below.

Regional Gopher Gulch Lift Station vs Existing Awbrey Glen Lift Station

The long-term UGB expansion improvement analysis and Scenarios SAAM-1, 2, and 3 include a new regional lift station and force main (Gopher Gulch lift station) which conveys wastewater to the Northeast Interceptor for areas in the west including the Shevlin area, the northern portion of the West area, and the Awbrey Glen lift station service area. The Gopher Gulch lift station is more cost effective than upsizing the Awbrey Glen lift station, associated force main, and downstream gravity trunk sewer. The Awbrey Glen force main is approximately 1.7 miles long and represents the most significant alternative cost.

For Scenarios 2.1G and 3.1, the Shevlin area and the northern portion of the West area are served through the Awbrey Glen lift station. The Awbrey Glen pumps require upsizing for the limited UGB expansion; however, the existing force main upsizing is not required. The peak flow excess capacity (beyond build-out of the existing UGB) of the Awbrey Glen pumps and the downstream force main for UGB expansion are approximately 60 gpm (15 gpm average flow) and 300 gpm (75 gpm average flow) respectively. This equates to approximately 120 additional equivalent dwelling units (EDUs) for the pumps and 580 additional EDUs for the force main. Peak and average flow estimates at the Awbrey Glen lift station should be confirmed with flow metering and pump testing prior to serving future UGB customers.

Additionally, for Scenarios 2.1G and 3.1, the northern portion of the West area requires new gravity piping (9,300 feet) to convey wastewater to the Awbrey Glen lift station. This gravity piping route is part of the longer-term infrastructure solution to convey wastewater to the regional Gopher Gulch lift station for larger UGB expansion. Alternatively, the north portion of the West area was considered for service through an improved Shevlin Commons lift station; however, improvements to 6,300 feet of existing force main is prohibitive for significant service area expansion and does not align with the long-term improvement plan. Construction of the gravity sewer to serve the northern portion of the West area also allows for decommissioning of the Renaissance lift station.

When compared to gravity trunk sewer solutions serving other expansion areas, both the Awbrey Glen and Gopher Gulch lift stations present greater operational complexity and costs for the City.

Interim Lift Stations

In all short-term expansion scenarios including Scenario 2.1G, an interim lift station (#2) was selected in the optimization to serve a major portion of "The Elbow." The interim lift station

delays the extension of major trunk lines along Hamby Road to this area, which was the alternative selected to serve the large 2-mile buffer.

In Scenarios 1.2, 2.1, and 3.1, an interim lift station (#1) was selected to serve a small portion of the Northeast Edge adjacent to Bear Creek Road. Approximately 3 acres of infill development area between Highway 20 and Bear Creek Road was included in Scenario 2.1G. This infill development can be served by existing gravity piping and does not require the interim lift station.

Relative Capital Cost Summary by Sub-Area

The relative sewer infrastructure costs for the eight (8) sub-areas were compared for each of the short-term expansion scenarios including Scenario 2.1G. For the comparison, all sewer improvements are sized to serve the full 2-mile study area with the exception of the interim lift stations.

For the relative cost comparison, the costs associated with the CSMP improvements were assumed to be contributed by the current and future customers within the existing UGB. All other costs were assumed to be contributed by future development in UGB expansion areas. The incremental cost to upsize the Northeast Interceptor, for example, was assumed to be contributed by UGB expansion areas served by the Northeast Interceptor. Additionally, Hamby alignment costs from future development within the existing UGB was limited to the cost of the Southeast Interceptor Phase 2 (27th Street alignment north of Neff Road). All other Hamby alignment costs were assumed to be contributed by UGB expansion areas within the Hamby alignment service area.

Also, the cost comparison assumes that all UGB expansion areas within a specific scenario develop simultaneously such that all areas receive the same cost share on a per acre basis. For example, where two sub-areas such as North Triangle and OB Riley/Gopher Gulch are within the same scenario, the two areas are assumed to equally contribute to the Northeast Interceptor upsizing on a per acre basis.

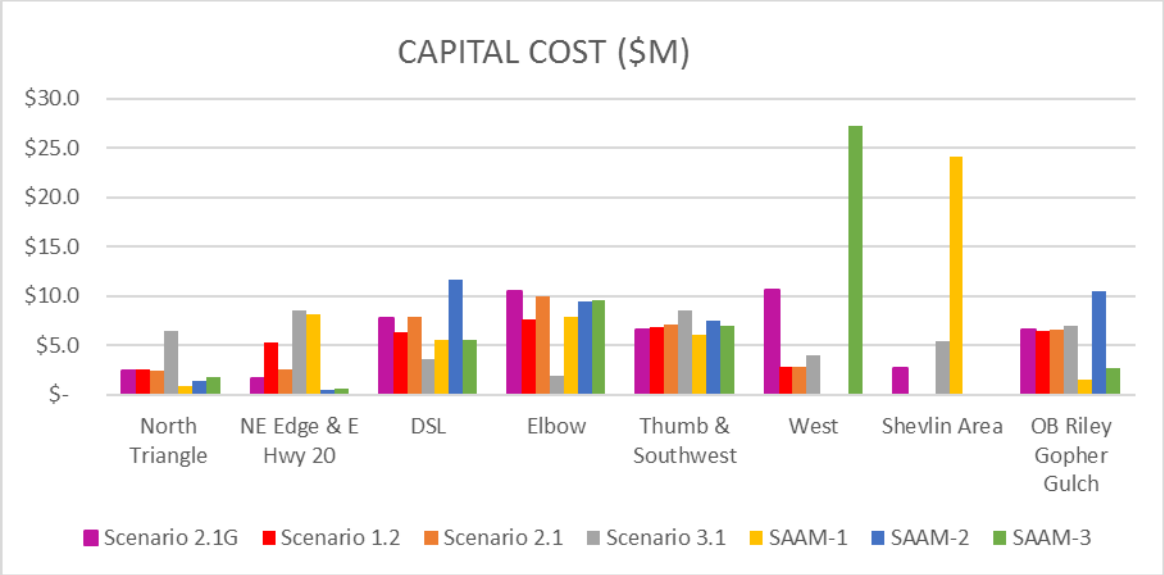
The specific lands served for Scenario 2.1G and the applicable collection system improvements are presented in Figure 1. Similar figures are provided in previous documentation for the other short-term expansion scenarios. The improvements are identified by categories associated with cost: CSMP (funded by development within the existing UGB), UGB expansion (funded by development outside of the existing UGB), or shared (partially funded by development inside and partially funded by development outside of the existing UGB). Relative cost summaries by sub-area and short-term scenario are presented for Initial Capital and Initial Capital per acre in Figure 2. For Scenario 2.1G, two new sub-areas were identified that were previously included with "the Thumb" and "Northeast Edge" areas as described below.

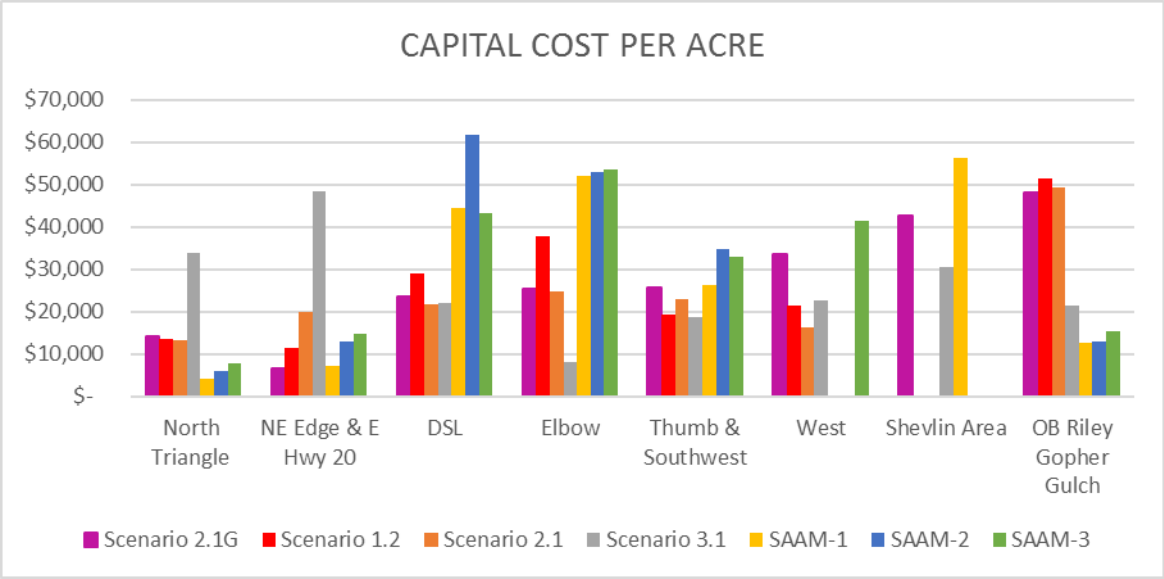
- Southwest – Part of "the Thumb", area west of Highway 97

- East Highway 20 – Part of the "Northeast Edge," area between Highway 20 and Bear Creek Road

In Figure 2, these new sub-areas have been grouped with the original areas for consistency between scenarios.

Figure 2| Capital Cost and Capital Cost per Acre by Sub-area





Existing Infrastructure
- Gravity Main - Existing Trunk
- Gravity Main - Existing
- Vacuum Main - Existing
- Force Main - Existing
- UGB - 2 Mile Buffer
- UGB - Existing
- Parcel

Lift Station Improvements
- CSMP
- Expansion
- Shared (CSMP and Expansion)
- Decommission

Pipe Improvement Category
- CSMP
- Expansion
- Shared (CSMP and Expansion)

Expansion Area Land Type
- Expansion Area
- Park *

* No Improvement Cost

North Triangle
OB Riley Gopher Gulch
Awbrey Glen LS
Northeast Edge
Shevlin Area
Shevlin Meadows LS
West
Hamby Alignment
Colorado LS
Southeast Interceptor
East Highway 20
DSL Property
Elbow
Interim LS2
Southwest
Thumb
Northeast Interceptor
WWTF

0 0.5 1Mile

Murray, Smith & Associates, Inc.

City of Bend
UGB Expansion Analysis

Figure 1
Scenario 2.1G

N W E S

July 2016 12-1354

11213

Summary findings from the relative cost comparison include:

1. Shevlin Area – Most cost effective for Scenario 2.1G and Scenario 3.1where improvements are limited to contribution to the upsizing of the Awbrey Glen lift station and downstream gravity infrastructure. These scenarios rely on existing gravity sewers to convey wastewater to the lift station. Least cost effective for SAAM-1 where the additional development triggers high cost improvements including the regional Gopher Gulch lift station.

2. West Area – Most cost effective for Scenario 2.1 where development is limited to the southerly portion of the sub-area and improvements are limited to localized pipeline extensions to convey wastewater to the existing trunk main and upsizing of the existing trunk main. Scenario 2.1 G is moderately cost effective; however, in addition to the localized pipeline extensions and existing trunk main upsizing, the northerly portion of the sub-area contributes to new gravity piping to convey wastewater to the Awbrey Glen lift station and pump upsizing. The new gravity piping is identified as the alignment associated with long-term growth based on topography. Additionally, the Anderson Ranch portion of the West area contributes to Shevlin Commons lift station and force main improvements. Least cost effective for SAAM-3 where the additional development triggers high cost improvements including the regional Gopher Gulch lift station.

3. North Triangle – Cost effective for all scenarios because of proximity to the Northeast Interceptor. Requires incremental extension of the interceptor west of US Highway 97. Existing lift station and force main capacity in the north are limiting to growth inside and outside of the existing UGB prior to construction of the Northeast Interceptor.

4. OB Riley/Gopher Gulch - Moderately cost effective for all scenarios. Most cost effective on a per acre basis for scenarios where greater area is considered and contributing to infrastructure. All scenarios require incremental extension of the Northeast Interceptor west and south. SAAM-1 and SAAM-3 include shared infrastructure with the Shevlin or West areas to fund the Northeast Interceptor extension. Scenarios 3.1 and SAAM-2 most fully utilize the Northeast Interceptor extension by developing a larger portion of the sub-area without a reliance on the Shevlin and West areas and the regional Gopher Gulch lift station. Existing lift station and force main capacity in the north are limiting to growth inside and outside of the existing UGB prior to construction of the Northeast Interceptor.

5. Northeast Edge/East Highway 20 – Relatively cost effective for all scenarios because of proximity to the Hamby alignment and Northeast Interceptor extension to the WWTF. Scenario 1.2 and SAAM-1 include larger development of the sub-area and more fully take advantage of future trunk main infrastructure. Scenarios 1.2 and 2.1 are less cost effective than the other scenarios where development adjacent to Bear Creek Road requires and interim lift station to delay future extension of the Hamby

alignment. The East Highway 20 development does not require and interim lift station for Scenario 2.1G.

6. DSL Property - Moderately cost effective for all scenarios because of proximity to Southeast Interceptor and reliance on the Hamby alignment and Northeast Interceptor extension to the WWTF. All scenarios require pipeline extensions to connect to the Southeast Interceptor. Additionally, SAAM-2 requires extension of the Hamby alignment to serve the northerly portion of the sub-area (near Darnell Estates). Scenario 2.1G is cost effective on a per acre basis because of development of a larger portion of the sub-area.

7. Elbow – Moderately cost effective for all scenarios because of proximity to Southeast Interceptor and reliance on the Hamby alignment and Northeast Interceptor extension to the WWTF. All scenarios require an interim lift station and localized pipeline extensions to convey wastewater to the Southeast Interceptor delaying an extension of the Hamby trunk main. Scenario 2.1G is cost effective on a per acre basis because of development of a larger portion of the sub-area.

8. Thumb/Southwest - Moderately cost effective for all scenarios because of proximity to Southeast Interceptor and reliance on the Hamby alignment and Northeast Interceptor extension to the WWTF. All scenarios require existing pipeline upsizing on Parrell Road adjacent to the Southeast Interceptor. Scenarios that are less cost effective include service to lands west of Highway 97 including Scenario 2.1G. The Southwest service area west of Highway 97 requires additional upsizing of the Southeast Interceptor and other pipeline extensions; however, these improvements also contribute to gravity service to existing development on pressure sewers or septic.

The specific infrastructure required to serve each sub-area for Scenario 2.1G are summarized in Table 5. Capital costs for infrastructure associated with each sub-area are summarized in Table 6. Improvements and costs are specific to additional infrastructure requirements beyond the capital improvements identified in the CSMP. For example, the Southeast Interceptor phase 1 is not included in the tabular summaries unless there is a sizing differential from the CSMP.

Table 5| Infrastructure by Sub-Area

Sub-Area	Improvement[1]
North Triangle	• Northeast Interceptor above Hamby Confluence • Northeast Interceptor from Hamby Confluence to WWTF
OB Riley / Gopher Gulch	• Northeast Interceptor West Extension • Northeast Interceptor above Hamby Confluence • Northeast Interceptor from Hamby Confluence to WWTF
Shevlin Area	• Awbrey Glen Lift Station • Existing Trunk sewer upsize / parallel pipe
West (North)	• Gravity pipe to Awbrey Glen Lift Station • Awbrey Glen Lift Station • Existing Trunk sewer upsize / parallel pipe
West (Central)	• Shevlin Meadows Lift Station and Force main • Existing Trunk sewer upsize / parallel pipe
West (South)	• Gravity Extension • Existing Trunk sewer upsize / parallel pipe
Southwest	• Gravity Extension • Existing Trunk sewer upsize / parallel pipe • Southeast Interceptor (modified diameter from CSMP) • Hamby Alignment • Northeast Interceptor from Hamby Confluence to WWTF
Thumb	• Existing Trunk sewer upsize / parallel pipe • Southeast Interceptor (modified diameter from CSMP) • Hamby Alignment • Northeast Interceptor from Hamby Confluence to WWTF
Elbow (East)	• Interim Lift Station 2 and Force Main • Hamby Alignment • Northeast Interceptor from Hamby Confluence to WWTF
Elbow (West)	• Gravity Extension • Hamby Alignment • Northeast Interceptor from Hamby Confluence to WWTF
DSL Property	• Gravity Extension • Hamby Alignment • Northeast Interceptor from Hamby Confluence to WWTF
East Highway 20	• Hamby Alignment • Northeast Interceptor from Hamby Confluence to WWTF
Northeast Edge	• Northeast Interceptor from Hamby Confluence to WWTF

Note 1. Improvements are specific to additional infrastructure requirements beyond the capital improvements identified in the CSMP. For example, the Southeast Interceptor phase 1 is not included in the tabular summary unless there is a sizing differential from the CSMP.

Table 6| Infrastructure Costs ($, millions)[1] by Sub-Area

Sub-Area	NEI[2] (from Hamby Confluence to the WWTF)	NEI (above Hamby Confluence)	SEI (current phases)	Hamby Alignment	Gravity (d/s of Awbrey Glen LS)	Other
North Triangle	$0.51	$1.26	-	-	-	$0.65
OB Riley/ Gopher Gulch	$0.41	$1.02	-	-	-	$5.16
Shevlin Area	-	-	-	-	$0.51	$2.14
West	-	-	-	-	$1.61	$9.03
Southwest	$0.12	-	$0.18	$0.61	-	$1.18
Thumb	$0.66	-	$0.24	$2.24	-	$1.44
Elbow	$1.23	-	-	$4.14	-	$5.07
DSL	$0.98	-	-	$3.31	-	$3.44
East Highway 20	$0.01	-	-	$0.03	-	-
NE Edge	$0.54	$0.10	-	$0.94	-	-
Total	$4.44	$2.38	$0.42	$11.26	$2.12	$28.10

Note 1. Improvements and costs are specific to additional infrastructure requirements beyond the capital improvements identified in the CSMP. All costs based on Class 5 estimates as defined by the American Association of Cost Engineers. Typical accuracy ranges for Class 5 estimates are -20% to -30% on the low side, and +30% to +50% on the high side, depending on the construction complexity of the project, appropriate reference information and other risks. Ranges could exceed those shown if there are unusual risks.
Note 2. NEI = Northeast Interceptor, SEI = Southeast Interceptor, WWTF = Wastewater Treatment Facility, LS = lift station, d/s = downstream.
Note 3. Other improvements include gravity pipe extensions, lift stations, etc.

Scenario Ratings

Consistent with the approach for analyzing other infrastructure and land use data for the UGB Remand, the preliminary six (6) scenarios and refined Scenario 2.1G were rated as "Good", "Fair" or "Poor" by sub-area. These ratings were developed qualitatively for overall cost effectiveness based on Initial Capital Cost and Initial Capital Cost per acre. The qualitative ratings were combined with the key findings from the scenario summaries to provide an overall quantitative rating. Additionally, each scenario was given an overall rating on a scale of one (1) to five (5) to indicate overall cost effectiveness with five (5) being the most cost effective. The qualitative and quantitative ratings are shown in Tables 7 thru 9. For visual review "Good," "Fair," and "Poor" ratings are highlighted in green, yellow, and red respectively.

Factor 2: Orderly and Economic Provision of Public Facilities and Services		Author:	Murray, Smith & Associates
Community Outcome B.	Cost Effective Infrastructure	Date:	06/23/2016

Performance Measure S2	**Table 7. Initial Capital Cost of Sanitary Sewer Infrastructure Improvements**
Brief Description of Evaluation:	Initial Capital Cost (millions of dollars) of sanitary sewer infrastructure improvements required to serve new growth, beyond what is included in the existing CSMP. Operation and maintenance costs are not included.
Interpretation and Key	"Good" / "Fair" / "Poor" / No Data. Better ranking fields have lower total cost of improvements needed. At the sub-area level, costs under $6 million are rated "Good", $6-12 million are rated "Fair", and over $12 million are rated "Poor". For Scenario / SAAM totals, under $46 million are rated "Good", $46-50 million are rated "Fair" and over $50 million are rated "Poor".

Evaluation Geography	Scenario 2.1G		Scenario 1.2		Scenario 2.1		Scenario 3.1		SAAM-1		SAAM-2		SAAM-3	
	Value	*Units*	*Value*	*Units*	*Value*	*Units*	*Value*	*Units*	*Value*	*Units*	*Value*	*Units*	*Value*	*Units*
Initial Capital Cost (excluding current UGB)	48.7	$M	38.0	$M	39.5	$M	45.4	$M	54.3	$M	41.0	$M	54.3	$M
Sub-Areas														
North Triangle	2.4	$M	2.6	$M	2.5	$M	1.9	$M	0.8	$M	1.4	$M	1.8	$M
NE Edge & E Hwy20	1.6	$M	5.2	$M	2.6	$M	3.5	$M	8.2	$M	0.5	$M	0.6	$M
DSL Property	7.7	$M	6.4	$M	7.8	$M	6.5	$M	5.5	$M	11.7	$M	5.5	$M
The "Elbow"	10.4	$M	7.7	$M	10.0	$M	8.6	$M	7.9	$M	9.4	$M	9.5	$M
The "Thumb" & Southwest	6.7	$M	6.8	$M	7.1	$M	5.4	$M	6.1	$M	7.4	$M	6.9	$M
West Area	10.6	$M	2.8	$M	2.8	$M	7.0	$M	N/A		N/A		27.2	$M
Shevlin Area	2.7	$M	N/A		N/A		4.0	$M	24.1	$M	N/A		N/A	
OB Riley / Gopher Gulch Area	6.6	$M	6.5	$M	6.6	$M	8.5	$M	1.6	$M	10.5	$M	2.7	$M
Overall Score	3		4		3		3		1		3		1	

Factor 2: Orderly and Economic Provision of Public Facilities and Services		Author:	Murray, Smith & Associates
Community Outcome B.	Cost Effective Infrastructure	Date:	06/23/2016

Performance Measure S3	**Table 8. Initial Capital Cost of Sanitary Sewer Infrastructure Improvements per Developed Acre[1]**
Brief Description of Evaluation:	Initial Capital Cost of infrastructure improvements required to serve new growth, beyond what is included in the existing CSMP, divided by the developed acres.

Interpretation and Key	"Good"	"Fair"	"Poor"	No Data	Ratings are assigned based primarily on the performance of the sub-areas and less on the overall average cost per acre at the Scenario / SAAM level; under $25,000 per acre are rated as "Good", $25,000-40,000 are rated as Fair; over $40,000 are rated as "Poor."

Evaluation Geography	Scenario 2.1G		Scenario 1.2		Scenario 2.1		Scenario 3.1		SAAM-1		SAAM-2		SAAM-3	
	Value	*Units*	*Value*	*Units*	*Value*	*Units*	*Value*	*Units*	*Value*	*Units*	*Value*	*Units*	*Value*	*Units*
Initial Capital Cost per Acre (excluding current UGB)	25,262	$/Ac	22,646	$/Ac	23,253	$/Ac	23,966	$/Ac	22,864	$/Ac	24,731	$/Ac	33,520	$/Ac
Sub-Areas														
North Triangle	14,217	$/Ac	13,473	$/Ac	13,258	$/Ac	8,116	$/Ac	4,268	$/Ac	5,853	$/Ac	7,742	$/Ac
NE Edge & E Hwy20	6,534	$/Ac	11,534	$/Ac	20,000	$/Ac	22,062	$/Ac	7,338	$/Ac	12,944	$/Ac	14,831	$/Ac
DSL Property	23,621	$/Ac	29,140	$/Ac	21,846	$/Ac	33,816	$/Ac	44,343	$/Ac	61,882	$/Ac	43,233	$/Ac
The "Elbow"	25,482	$/Ac	37,671	$/Ac	24,779	$/Ac	48,338	$/Ac	52,029	$/Ac	53,094	$/Ac	53,692	$/Ac
The "Thumb" & Southwest	25,606	$/Ac	19,432	$/Ac	22,834	$/Ac	30,655	$/Ac	26,217	$/Ac	34,714	$/Ac	32,918	$/Ac
West Area	33,708	$/Ac	21,361	$/Ac	16,422	$/Ac	21,332	$/Ac	N/A		N/A		41,327	$/Ac
Shevlin Area	42,525	$/Ac	N/A		N/A		22,636	$/Ac	56,235	$/Ac	N/A		N/A	
OB Riley / Gopher Gulch Area	48,010	$/Ac	51,293	$/Ac	49,176	$/Ac	18,840	$/Ac	12,501	$/Ac	13,102	$/Ac	15,448	$/Ac
Overall Score	3		3		4		3		2		2		1	

Note 1. Includes right-of-way, excludes Parks and other open spaces.

Factor 2: Orderly and Economic Provision of Public Facilities and Services		Author:	Murray, Smith & Associates
Community Outcome B.	Cost Effective Infrastructure	Date:	06/23/2016
Performance Measure S1	**Table 9.** Sanitary Sewer Infrastructure Improvements		
Description	Efficiency of sanitary sewer infrastructure improvements required to serve new growth, beyond what is included in the existing CSMP		

Interpretation and Key	"Good"	"Fair"	"Poor"	No Data	Ratings for sub-areas are assigned based on the following considerations: "Good" means the sub-area takes advantage of improvements needed to serve the existing UGB (e.g. Northeast Interceptor and Hamby alignment); "Fair" means there is somewhat costly localized infrastructure needed and/or that the amount of growth in the sub-area does not take advantage of the improvements needed to serve the existing UGB; "Poor" means that costly new regional infrastructure (not a gravity system) is required.

Evaluation Geography	Scenario 2.1G *Qualitative Evaluation*	Scenario 1.2 *Qualitative Evaluation*	Scenario 2.1 *Qualitative Evaluation*	Scenario 3.1 *Qualitative Evaluation*	SAAM-1 *Qualitative Evaluation*	SAAM-2 *Qualitative Evaluation*	SAAM-3 *Qualitative Evaluation*
Sub-Areas							
North Triangle	Incremental extension of NEI west of US 97	Incremental extension of NEI west of US 97	Incremental extension of NEI west of US 97	Incremental extension of NEI west of US 97	Incremental extension of NEI west of US 97	Incremental extension of NEI west of US 97	Incremental extension of NEI west of US 97
NE Edge & E Hwy20	NE Edge relies primarily on Hamby alignment & NEI; E Hwy 20 relies on existing gravity piping and the SEI	Relies primarily on Hamby alignment & NEI, but Bear Creek Road area requires interim lift station	Relies primarily on Hamby alignment & NEI, but Bear Creek Road area requires interim lift station; limited development does not take full advantage of Hamby alignment and NEI	Relies primarily on Hamby alignment & NEI, but Bear Creek Road area requires interim lift station; limited development does not take full advantage of Hamby alignment and NEI	Relies entirely on Hamby alignment & NEI	Relies primarily on Hamby alignment & NEI; limited development does not take full advantage of Hamby alignment and NEI	Relies primarily on Hamby alignment & NEI; limited development does not take full advantage of Hamby alignment and NEI
DSL Property	Relies on Hamby alignment & NEI, localized pipeline required to connect to SEI	Relies on Hamby alignment & NEI, localized pipeline required to connect to SEI	Relies on Hamby alignment & NEI, localized pipeline required to connect to SEI	Relies on Hamby alignment & NEI, localized pipeline required to connect to SEI	Relies on Hamby alignment & NEI, localized pipeline required to connect to SEI	Relies primarily on Hamby alignment & NEI, localized pipeline required to connect to SEI; also requires additional extension of Hamby alignment	Relies on Hamby alignment & NEI, localized pipeline required to connect to SEI
The "Elbow"	Relies on SEI, Hamby, and NEI. Requires interim lift station that does not contribute to long-term gravity improvements. Localized pipeline required to connect to SEI	Relies on SEI, Hamby, and NEI. Requires interim lift station that does not contribute to long-term gravity improvements. Localized pipeline required to connect to SEI	Relies on SEI, Hamby, and NEI. Requires interim lift station that does not contribute to long-term gravity improvements. Localized pipeline required to connect to SEI	Relies on SEI, Hamby, and NEI. Requires interim lift station that does not contribute to long-term gravity improvements. Localized pipeline required to connect to SEI	Relies on SEI, Hamby, and NEI. Requires interim lift station that does not contribute to long-term gravity improvements. Localized pipeline required to connect to SEI	Relies on SEI, Hamby, and NEI. Requires interim lift station that does not contribute to long-term gravity improvements. Localized pipeline required to connect to SEI	Relies on SEI, Hamby, and NEI. Requires interim lift station that does not contribute to long-term gravity improvements. Localized pipeline required to connect to SEI
The "Thumb" & Southwest	Relies on SEI, Hamby, and NEI. Pipe improvement on Parrell Road. Increased improvement pipe diameters and extensions to serve Southwest (west of Hwy 97)	Relies on SEI, Hamby, and NEI. Pipe improvement on Parrell Road adjacent to SEI	Relies on SEI, Hamby, and NEI. Pipe improvement on Parrell Road adjacent to SEI, Additional gravity main required to serve Bany property	Relies on SEI, Hamby, and NEI. Pipe improvement on Parrell Road adjacent to SEI	Relies on SEI, Hamby, and NEI. Pipe improvement on Parrell Road adjacent to SEI	Relies on SEI, Hamby, and NEI. Pipe improvement on Parrell Road adjacent to SEI	Relies on SEI, Hamby, and NEI. Pipe improvement on Parrell Road adjacent to SEI
West Area	Requires expansion & extension of existing pipelines. North portion requires new gravity pipelines and upsizing of Awbrey Glen lift station. Contributes to improvement of Shevlin Meadows lift station and force main.	Requires incremental expansion & extension of existing pipelines	Requires incremental expansion & extension of existing pipelines	Requires expansion & extension of existing pipelines, connection to existing lift station, and pump upsizing at Awbrey Glen	N/A	N/A	Exceeds capacity at Awbrey Glen lift station/force main & requires new regional lift station
Shevlin Area	Requires extension of existing pipelines, connection to existing lift station, and Awbrey Glen lift station improvements	N/A	N/A	Requires expansion & extension of existing pipelines,connection to existing lift station, and pump upsizing at Awbrey Glen	Exceeds capacity at Awbrey Glen lift station/force main & requires new regional lift station	N/A	N/A
OB Riley / Gopher Gulch Area	Requires extension of NEI west of US 20	Requires extension of NEI west of US 20	Requires extension of NEI west of US 20	Requires extension of NEI west of US 20 plus pipeline extension to south	Requires extension of NEI west of US 20; shares infrastructure with new regional lift station triggered by Shevlin Area	Requires extension of NEI west of US 20 plus pipeline extension to south	Requires extension of NEI west of US 20; shares infrastructure with new regional lift station triggered by West Area
Score	3	4	3	3	2	2	1

Note 1. NEI = Northeast Interceptor, including extension to WWTF. SEI = Southeast Interceptor. Hamby = Hamby alignment of Southeast Interceptor.

Key rating considerations related to each scenario are described below. Positives (+) and negatives (-) are highlighted. Overall ratings are highest for scenarios that take advantage of gravity sewer improvements needed to serve the existing UGB (Northeast Interceptor and Hamby alignment).

1. Scenario 2.1G – Rated medium (3) because the scenario takes advantage of the Hamby alignment and Northeast Interceptor by maximizing development in the North Triangle and OB Riley/Gopher Gulch (+). The scenario includes development in the north portion of the West which requires new gravity piping to convey to wastewater to the Awbrey Glen lift station. The development of the north portion of the West and Shevlin areas require Awbrey Glen Lift Station improvements (-). The scenario also includes development west of Highway 97 (Southwest/Thumb) which require upsizing of gravity pipelines and pipeline extensions.

2. Scenario 1.2 – Rated high (4) because the scenario takes advantage of the Hamby alignment and Northeast Interceptor by maximizing development in the Northeast Edge and North Triangle (+). The scenario minimizes development impacts in the West and avoids a regional lift station (+).

3. Scenario 2.1 – Rated medium (3) because the scenario takes advantage of the Northeast Interceptor by maximizing development in the North Triangle (+). The scenario does not take full advantage of the Hamby alignment by minimizing development in the Northeast Edge (-). The scenario minimizes development impacts in the West and avoids a regional lift station (+).

4. Scenario 3.1 – Rated medium (3) because the scenario takes advantage of the Northeast Interceptor by maximizing development in the North Triangle and OB Riley/Gopher Gulch (+). The scenario does not take full advantage of the Hamby alignment by minimizing development in the Northeast Edge (-). The scenario maximizes potential development in the West and Shevlin areas, while avoiding a new regional lift station (+).

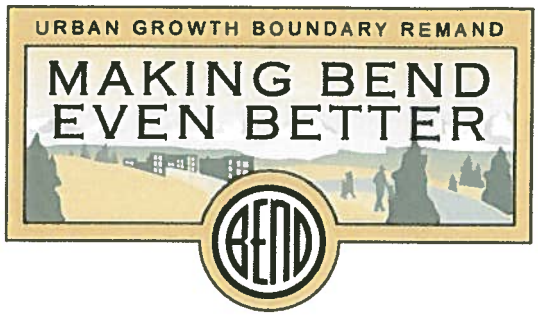
5. SAAM-1 – Rated low (2) because the scenario requires a new regional lift station and force main to serve an expanded area of Shevlin (-). The scenario does takes advantage of the Hamby alignment and Northeast Interceptor by maximizing development in the Northeast Edge and North Triangle (+).

6. SAAM-2 – Rated low (2) because the scenario does not take full advantage of the Hamby alignment by minimizing development in the Northeast Edge (-). The scenario does take advantage of the Northeast Interceptor by maximizing development in the North Triangle and OB Riley/Gopher Gulch (+). The scenario requires a high cost extension of the Hamby alignment to serve the northern portion of the DSL Property (-).

7. SAAM-3 – Rated very low (1) because the scenario requires a new regional lift station and force main to serve an expanded area of the West (-). The scenario does take advantage of the Northeast Interceptor by maximizing development in the North Triangle (+). The scenario does not take full advantage of the Hamby alignment by minimizing development in the Northeast Edge (-).

From a sewer infrastructure planning perspective, the City would prefer to leverage existing or planned infrastructure investments to their full potential where possible. The City is committed to constructing both the Northeast Interceptor and the Hamby alignment in the near future to serve customers within the existing UGB. These projects will require large capital investments and should be leveraged where possible to serve areas outside the existing UGB as identified in this remand process. As noted above, Scenario 2.1G has positives related to utilization of the Northeast Interceptor, Southeast Interceptor, and Hamby alignments. Scenario 2.1G has negatives related to smaller sub-areas including relatively higher costs to serve the north portion of the West area, the Shevlin area, and the Southwest/Thumb area west of Highway 97.

Memorandum



July 18, 2016

To: Bend Urban Growth Boundary Project Team

From: Chris Maciejewski PE, PTOE, DKS Associates
Garth Appanaitis, PE, DKS Associates

Re: Scenario 2.1G Evaluation: Transportation Analysis Technical Memorandum

INTRODUCTION

Purpose

The purpose of this memorandum is to present the analysis of "Scenario 2.1G", adopted as the preferred growth scenario by the Urban Growth Boundary Steering Committee (USC) on April 21, 2016. The results of this evaluation are intended for use in findings in support of the boundary location. This memorandum builds on the October 15, 2015 memorandum from DKS Associates documenting the evaluation of the six alternatives initially evaluated (Scenario 1.2; Scenario 2.1; Scenario 3.1; Supplemental Analysis Area Map 1; Supplemental Analysis Area Map 2; Supplemental Analysis Area Map 3). Results from Scenario 2.1G have been compared to results from the original six scenarios wherever possible.

This memorandum addresses the performance measures evaluated by DKS Associates (see Table 1).

Table 1. Performance Measures in this Technical Memorandum

Evaluation Tools

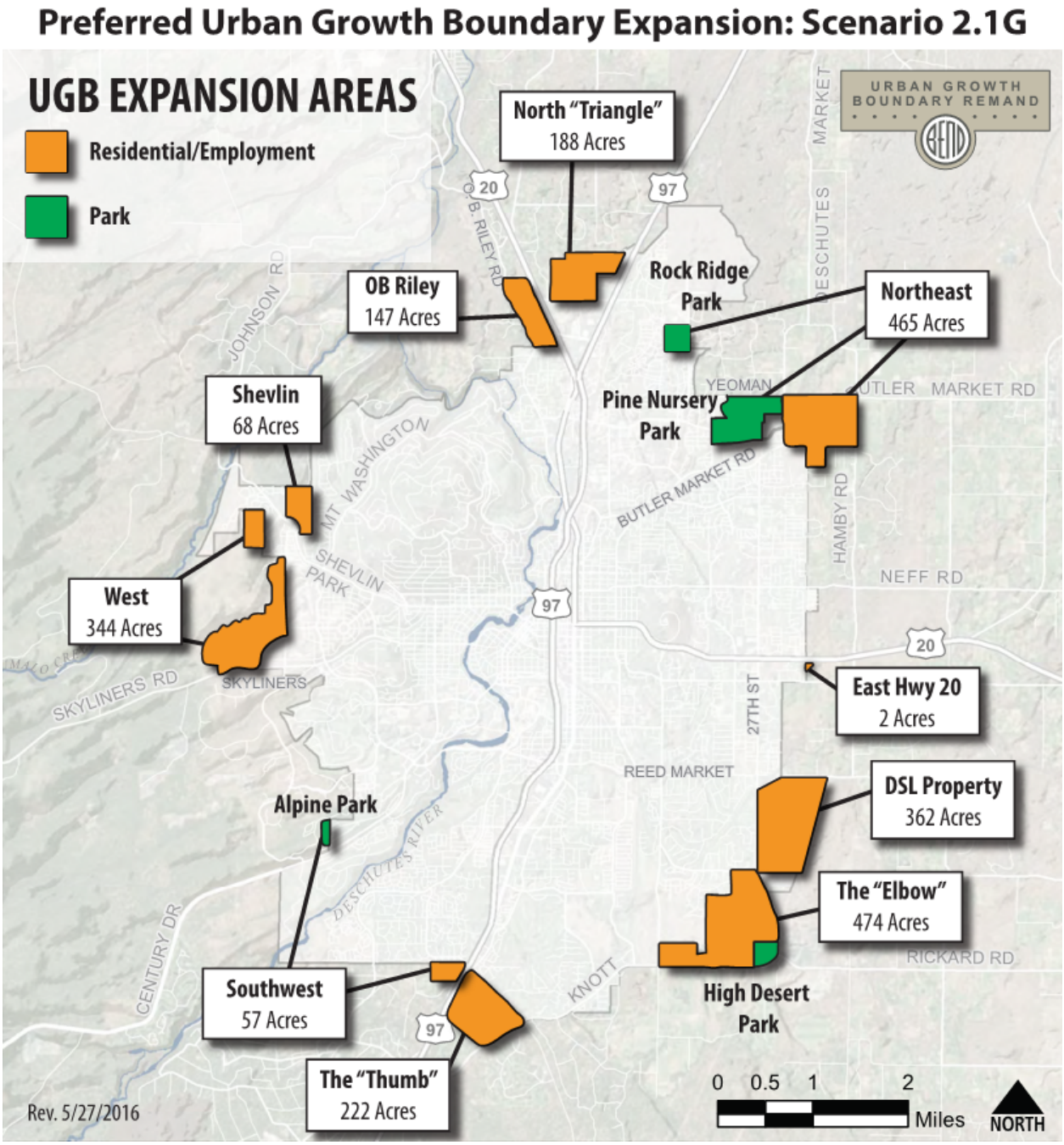
The evaluations described in this memorandum were completed using the following tools:

- ArcGIS mapping software – This tool was used to provide mapping resources, including to lay out the conceptual street system, measure the approximate distances of for new roadways, identify potential geographic properties (existing roads, rail, canals, etc.), and create map figures for presentation.
- Bend MPO Regional Travel Demand Model – This tool is the tool used to forecast future transportation growth and needs in Bend for the year 2028. The project team coordinated with Bend Metropolitan Planning Organization (MPO) staff and the Oregon Department of Transportation's (ODOT's) Transportation Planning Analysis Unit (TPAU), who manages the model, to prepare model scenarios that could be used to measure transportation system impacts for each growth configuration. A summary of key assumptions used in the transportation modeling is included on page 3.

Geographies

These performance measures were evaluated at the subarea level (see Figure 1), as well as for the entire expansion area (all areas that would be added to the UGB under a given scenario) and the City of Bend as a whole (the existing UGB plus the expansion area).

Figure 1. Subareas



Key Travel Demand Model Assumptions

The Bend MPO Regional Travel Demand Model is a tool that utilizes an evaluation of supply (the transportation network) and demand (trip making generated from land use) to forecast the movement of people throughout the City. The model provides outputs that help assess network performance such as roadway volume and congestion at a regional scale, meaning that the network is limited primarily to arterials and collectors (not local streets). Key inputs developed

for the travel demand model evaluation, as described in the following sub-sections, include land use, transit service, regional growth, and transportation network.

Land Use

The land use inputs are aggregations of households and employment in transportation analysis zones for all areas in the Bend MPO boundary. The household and employment inputs for Scenario 2.1G are derived from and consistent with the land use assumptions and capacity estimates done as part of establishing the proposed UGB. Land use assumptions inside the UGB reflect proposed changes to Comprehensive Plan designations for certain Opportunity Sites and proposed efficiency measures that are part of the proposed adoption package for the preferred UGB scenario. Land use for the proposed UGB expansion areas reflects the proposed development mixes and plan designations in each area.

Demographic data used in the model to predict travel behavior, including household size, household income levels, and the average age of the head of household, was derived from existing census data, updated based on outputs of the Envision Tomorrow scenario planning tool (which projects these and other demographic factors based on land use and housing assumptions).[1].

Note that, due to the refinement of the land use inputs to properly account for future student housing and employment on the Oregon State University campus, the modeled population and employment totals for Scenario 2.1G increased somewhat from the original six alternatives.

Transit Service

The public transit system routes and frequency are an important factor for determining mode-split in the travel forecasts. The transit network assumed for Scenario 2.1G is the existing (2016) Cascades East Transit service, which accounts for service enhancements that went into effect in September 2015. This is similar (but not entirely identical) to the assumptions used for the first six scenarios evaluated, which used the Bend MPO Metropolitan Transportation Plan (MTP) mid-term transit system improvements (which was conducted prior to the September 2015 enhancements)[2]. This assumption is consistent with the MPO RTP assumptions for transit service.

---

[1] Key drivers of household income from Envision Tomorrow – primarily housing costs – were updated and

[2] Earlier scenario analysis was conducted prior to service expansion that rolled out September 2015. The 2028 network previously assumed headways of 30 or 60 minutes on all routes, except Route #11. Route #7 is a new route from the transit station to the hospital/medical area. The biggest changes (compared to the assumed 2028 transit network) are on the west side of Bend. First, the model assumed Route #11 operating along Mt Washington Drive and not being in sync with the other routes (headways of 40 minutes versus 30 or 60 minutes for all other routes). Routes #10 and #12 are new and were not considered in the transit plan. These new/modified routes have significantly enhanced transit service along Franklin Avenue, the south half of downtown, Riverside/Galveston, 14th Street, Colorado, the business/industrial park area between Simpson and Colorado, and the OSU site.

Regional Growth

The Bend MPO travel demand model includes roadways and traffic volumes that enter/exit the Bend urban area via major roadways such as US 97 and US 20. Traffic growth on these corridors takes into account regional growth (i.e., growth in surrounding cities or other parts of the state) that would travel to or through Bend. Previous versions of the Bend MPO travel demand model, such as the 2003 and 2030 scenarios utilized for the prior UGB study, utilized estimations from ODOT on these corridors that relied heavily upon historical growth trends. For all of the 2028 scenarios evaluated (including the original six scenarios and Scenario 2.1G), an updated estimate for growth on these corridors was utilized that is based on interpolating from the recent Bend MTP 2040 scenario. This is a key difference, as the Bend MTP 2040 scenario model was estimated by a newer technique that integrates with the statewide travel demand model to enhance predictions of growth on major regional corridors. The outcome of this revised approach is that the forecasted year 2028 traffic volumes on US 20 west of Cooley Road and US 97 south of Knott Road are significantly lower than prior year 2030 estimates, resulting in less congestion on the transportation network.

Transportation Network

The travel demand model transportation network for all of the UGB expansion scenarios was based on the Bend MPO MTP financially constrained planned improvements, which is a subset of the City, County, and State planned improvements that was determined to be reasonably likely given anticipated funding sources. Key roadway capacity projects within the current UGB area from the MTP that are assumed in the 2028 future travel model networks include:

- State Highway System (implementation by 2028 from the overall 2040 project list[3])
    - US 97 / Murphy Road Interchange, including northbound on-ramps and southbound off-ramps
    - US 97 / Cooley Road grade-separation and control improvements (the "mid-term" improvements)
    - US 97 / Empire Avenue northbound off-ramp widening
    - US 20 / 4th Street traffic signal
- City Roadway System
    - Reed Market Road 3rd Street to 27th Street G.O. Bond improvements
    - Murphy Road Phase I, including the US 97 overcrossing and the 3rd Street roundabout
    - Empire Avenue widening from 3rd Street to US 97
    - Empire Avenue extension from Purcell Boulevard to 27th Street
    - Murphy Road extension from Brosterhous Road to 15th Street
    - Frontage roads near the US 97 / Murphy Road interchange
    - Britta Street extensions from Robal Road to Empire Avenue and from Ellie Lane to Halfway Road

[3] Additional State Highway improvements are identified in the MTP for implementation beyond 2028 through 2040. This subset of projects identifies projects that are assumed to be reasonably implemented by 2028.

- Purcell Boulevard extension from Holiday Avenue (north) to Holiday Avenue (south)
- Mervin-Samples Road extension from 3rd Street to Empire Avenue
- O.B. Riley Road widening from Glen Vista Road to Archie Briggs Road
- 18th Street widening from Cooley Road to Empire Avenue
- 27th Street widening from Bear Creek Road to Ferguson Road

In addition to the roadway capacity projects included in model scenarios, each expansion scenario included unique roadway connections to provide access to proposed growth areas. Project tables and graphics showing these improvements are provided as an attachment (see Figure 14).

EVALUATION METHODOLOGY AND RESULTS

Balanced Transportation System

Performance Measure 2.A.1: Vehicle Miles Traveled per Capita

Data Sources and Methodology

No changes to the data sources and methodology for calculation of VMT were made since the evaluation of the six initial alternatives, with the exception of the adjustments to land use and demographic inputs described on page 4. See October 15, 2015 Scenario Evaluation memo from DKS Associates for details.

Summary of Results

The range of VMT results for the prior scenarios is from 9.92 (a 2.9% increase over 2010 and 8.1% increase over 2003) to 10.13 (a 5.1% increase over 2010 and 10.3% increase over 2003) daily VMT per capita. Scenario 2.1G performs better, with 9.81 daily VMT per capita, which results in a 1.8% increase over 2010 and 6.9% increase over 2003). This is likely attributable to the refinements to the demographic and land use inputs described on page 4, with some influence of land use patterns and improved connectivity in expansion areas.

The following ranking was applied to the overall scenarios based on VMT per capita relative to year 2010:

- 5 (best) – VMT/capita reduction from 2010 (no scenarios)
- 4 – VMT/capita unchanged from 2010 (no scenarios)
- 3 – VMT/capita minor increase from 2010 (less than 4%)
  - Scenario 2.1 and Scenario 3.1
- 2 – VMT/capita moderate increase from 2010 (4% to 9%)
  - Scenario 1.2, SAAM-1, SAAM-2, SAAM-3
- 1 (worst) – VMT/capital major increase from 2010 (greater than 9%) – no scenarios

Performance Measure 2.A.2: Average Trip Length

Data Sources and Methodology

No changes to the data sources and methodology for calculation of VMT were made since the evaluation of the six initial alternatives, with the exception of the adjustments to land use and demographic inputs described on page 4. See October 15, 2015 Scenario Evaluation memo from DKS Associates for details.

Summary of Results

The average trip length by scenario for each Transportation Analysis Zone (TAZ), the geographic units used for transportation modeling, is shown in attached Figure 2. In general, areas that are located more centrally to Bend's core, and those areas that have a balance of uses (within the subarea and/or adjacent subareas) will typically have shorter average trip lengths. Outer areas that do not have a well-balanced mix of uses (e.g., primarily residential or primarily employment) typically have longer average trip lengths due to the need for further travel to/from origins or destinations (e.g., outer residential use traveling to the central city core for retail needs).

Overall, Scenario 2.1G generated a higher average daily round trip length than the prior scenarios. This is likely due to additional growth in non-centralized areas, including the West and Thumb areas. This impact is compounded by The Thumb having the highest average trip distance of the subareas. Further, by Scenario 2.1G broadly spreading the growth across the subareas and not having focused growth areas, there is more opportunity for longer cross UGB trips between growth areas (e.g., between West and The Elbow), which result in longer trips.

General subarea observations include:

- The existing UGB has a lower average trip length than all growth areas due to proximity to existing uses inside the UGB.
- The central core of the City has trip lengths lower than the average for the existing UGB. Therefore, more growth in this area, relative to other areas of the City, would improve the system VMT.
- The eastern subareas typically perform better (lower average trip length) than others, including:
    - DSL Property generally has the lowest average trip length,
    - NE Edge generally has the second lowest average trip length,
    - The Elbow has lower trip lengths occurring when a complete grid is provided from 15th Street to 27th near Rickard Road.
- The Thumb and Shevlin area both typically have the highest average trip length
- Other northern and western subareas (North Triangle, West Area, OB Riley/Gopher Gulch) typically have intermediate average trip lengths See Data Sheet for this Performance Measure for a roll-up of results by subarea and alternative.

Performance Measure 2.A.4: Miles of Roadway that Exceed Mobility Standards & Relative Contribution to Congested Roadways

Data Sources and Methodology

No changes to the data sources and methodology were made since the evaluation of the six initial alternatives, with the exception of the adjustments to land use and demographic inputs described on page 4. See October 15, 2015 Scenario Evaluation memo from DKS Associates for details.

Summary of Results

Total congestion and volume is shown in attached Figure 3. Traffic contribution on congested links for each scenario and growth area is shown in attached Figure 4 through Figure 12.

The following observations were made about contribution to congestion at the subarea level:

- The North Triangle and OB Riley/Gopher Gulch contribute to congested facilities on the north end of Bend and therefore typically have higher levels of congestion.
- The DSL Property and The Elbow both contribute to a congested segment of 27th Street and have higher levels of congestion contribution than other growth areas.
- The Shevlin area has the smallest contribution to congested corridors.
- The NE Edge, The Thumb, and West Area all have low/medium contribution to congested corridors.

Overall, Scenario 2.1G would include 12.14 peak hour miles of congested network, which is a ten percent decrease from the prior lowest scenario. While Scenario 2.1G was shown to generate longer trips in some growth areas, there are two primary reasons for the reduction in congested corridors:

1) Growth was emphasized in some UGB expansion subareas that were less reliant on congested corridors. These areas made use of existing under-utilized capacity in the transportation system.
2) The mix of uses (including employment areas in non-centralized areas) created a reverse commute in some cases that would take advantage of remaining roadway capacity on routes that experience congestion in one direction.

See Data Sheet for this Performance Measure for a roll-up of results by subarea and comparison to prior alternatives.

Performance Measure 2.A.5: Walk/Bike Safety and Connectivity

Data Sources

No changes to the data sources and methodology were made since the evaluation of the six initial alternatives. GIS data provided by City of Bend and Deschutes County and aerial photography was used to identify features that would present potential opportunities and constraints to pedestrians and bicycles. The travel demand model for each scenario was used to identify potential locations for future roadway widening that could result in a barrier for pedestrians and bicycles.

Methodology

The qualitative evaluation included three primary components that were considered for each growth area in each scenario:

- Connectivity to adjacent areas – This criterion considered the potential connectivity to the surrounding transportation system (via collectors and arterials[4]) adjacent to the growth area. Growth areas that were isolated would have poor connectivity, while those that bordered adjacent roadways would have some connectivity and those that were connected to roadways and trails would have the preferred level of connectivity to surrounding areas.
- Connectivity within the subarea – Each growth area was reviewed to determine how well pedestrian and bicycle connectivity could be provided on-site to promote movement within the areas. Areas with the ability to design a well-connected roadway grid would provide the best connectivity within the area, while the presence of constraints such as rail or canals would limit the connectivity potential for the area and would require longer trips for pedestrians and bicyclists.
- Safety barriers within the subarea – The presence of major roads within the growth areas provides mobility for motor vehicles, but it also reduces safety for pedestrians crossing these streets and/or bicyclists that travel on these roads. Each growth area was reviewed to determine if the collector and arterial grid would require roadways larger than a 3-lane section based on a review of the roadway capacity needs. The presence of these roadways would decrease the safety of pedestrians and bicycles.

Based on the opportunities and constraints identified in the qualitative assessment of the three combined factors noted above, each area was rated good, fair, or poor. In general, good areas are locations with good connectivity to the adjacent transportation infrastructure and few barriers within the site. Fair areas have either worse connectivity or some site barriers. No internal roadways are planned to be larger than 3-lanes for the potential growth areas, so significant safety barriers within the sites was not a key differentiator. Figure 13 maps the opportunities and constraints for each scenario and growth area.

Summary of Results

See Data Sheet for this Performance Measure for full results by growth area for Scenario 2.1G as well as the initial six scenarios. The following general observations were made about each growth area for Scenario 2.1G:

- Areas that generally perform well

[4] Collectors and arterials serve as the spine of the transportation system. Connections to these routes generally provide opportunities for connecting to other routes and local streets as well as potential for future transit connections (pending future service enhancements). Local streets adjacent to subareas can also be used for pedestrian and bicycle travel, however they may be indirect (depending on individual alignment and destination). Further, since the local street detail of growth areas has not been identified, it is unknown how well such streets would align with the adjacent areas and adjacent collectors/arterials may be needed for intermediate route connections.

    - DSL Property generally offers both a good grid within the area and adjacent trail connections to surrounding areas.
    - The NE Edge generally has good trail connections, and includes improve connectivity with the Yeoman Road extension.
    - The Elbow would fare well due to the collector grid, which includes connectivity between Murphy Road and new east-west collectors via SE 15th St. The collector grid would provide two sets of collector connections in the north-south and east-west directions through the area.
- Areas that generally fare moderately
    - The Thumb would generally fare moderately due to the partial collector grid.
    - The Shevlin area would have some connectivity to existing streets and future trails, but does not connect to the additional trail system to the north.
    - North Triangle would include some future trail connections (with limited regional connectivity) and a grid system for roadways.
    - The West area has a good collector grid and limited trail system.
    - The OB Riley/Gopher Gulch area includes connectivity via OB Riley.

Performance Measure 2.A.6: System Connectivity & Progression of System Hierarchy.

Data Sources

No changes to the data sources and methodology were made since the evaluation of the six initial alternatives. The functional class map from the City of Bend GIS data provided by City of Bend and Deschutes County, and aerial photography was used to identify existing roadway system and opportunities for future enhancements to the grid system.

Methodology

This qualitative measure was based on the ability of the growth area to support an ideal roadway grid spacing of one mile for arterials and one-half mile for collectors. The assumed potential for the new arterials and collectors within each growth area was based on the existing roadway grid system and other constraints (e.g., development, terrain, rail, etc.). The assumed roadway network by scenario for each growth area is shown in attached Figure 14. Good areas have the ability to provide access to development areas via a hierarchy of local, collector, and arterial roadways. Poor areas would likely provide access directly to higher class roadways. Overall results are for variations of sub-areas, not combined scenario results.

Summary of Results

See Data Sheet for this Performance Measure for full results by growth area for each scenario. In general, partial expansion in areas would limit opportunities for connecting system roadways, while scenarios that include full development of a growth area would have a greater opportunity to enhance complete the system and improve connectivity in that area.

The following general observations were made about each growth area:

- Areas that generally perform well
    - OB Riley/Gopher Gulch includes a local grid opportunity with OB Riley as a spine roadway for the area.

    - The Elbow includes refined connectivity that allows for an improved collector network grid in the north-south and east-west direction.
- Areas that generally perform moderately
    - Shevlin and West Areas includes some ability to provide collectors, but difficult to connect local streets.
    - The DSL property includes a north/south collector, but does not include an east-west collector due to limited connectivity opportunities to adjacent areas
- Areas that generally perform moderately, but may be enhanced with broader development in the expansion area.
    - The Thumb allows some collector connection, which would be enhanced if it included a full extension from China Hat to Knott.
    - North Triangle would have some connectivity, but it would not include a connection to the west. The previous scenarios that expand to Old Bend-Redmond highway would enhance the connectivity in the subarea.
- Areas that generally perform poorly
    - The NE Edge includes direct access onto major roadways and does not provide a hierarchy that feeds onto local roads that then distribute traffic to collectors.

Cost-Effective Infrastructure

Performance Measure 2.B.1: Total Cost of Transportation Infrastructure Improvements

Data Sources

No changes to the data sources and overall methodology were made since the evaluation of the six initial alternatives. However, roadway alignments, crossing needs, and functional class designations have been refined in some areas, which impacts estimated costs and may limit comparison to prior alternatives. The following data sources were used to develop the cost of transportation improvements for each cost component (described further in the following section):

- New roadways – The total distance for new roadways was measured using GIS data for the framework of the collector and arterial grid sketched by the project team.
- Roadway capacity improvements – The travel demand model was used to identify locations where capacity improvements would be needed.
- Intersection capacity improvements – The travel demand model was used to estimate intersections that would exceed demand levels typically handled by stop-sign control and would trigger a roundabout or traffic signal improvement. To guide this analysis, ODOT's preliminary signal warrants[5] were used to establish thresholds for potential intersection control improvements for all regional intersections (both local Bend collector and arterial system and State system).

[5] Transportation Planning Analysis Unit, "Appendix 12A – Preliminary Traffic Signal Warrant Analysis Form." *Analysis Procedures Manual*. ODOT, February 2009. https://www.oregon.gov/ODOT/TD/TP/pages/apm.aspx

- Roadway unit costs - The City of Bend provided unit costs for roadway improvements based on recent construction projects in Bend. Since these recent costs were for a subset of the overall project types, a cost-index factor[6] was determined to update the set of unit costs used in prior Bend SDC analysis. The following unit costs were used:
    - Intersection capacity – $2.37 million[7]
    - New 2 lane collector - $1,195 per foot
    - New 2 lane arterial - $1,447 per foot
    - Upgrade 2 to 3 lane arterial - $1,085 per foot
    - Canal crossing - $3.7 million per location
    - RR overpass - $14.2 million per location

Methodology

The following methodologies were applied to identify transportation costs related to each component:

- New roadways – The locations for the base collector and arterial grid system were developed using an ideal spacing of one mile for arterials and one-half mile for collectors. The assumed locations for the new arterials and collectors within each growth area were based on the existing roadway grid system and other constraints (e.g. development, terrain, rail, etc.). The distances for new roads were measured using GIS. Costs for each road were estimated by applying an average roadway unit cost to the total roadway distance. Unit costs varied by type of roadway improvement (e.g., new two-lane collector, upgrade two-lane rural arterial, etc.). Right of way costs were also considered (assumed to be $10 per square foot).
- Roadway capacity improvements – The congested roadways from the travel demand model were reviewed to identify streets that would require capacity improvements beyond the improvement projects identified in the Bend MPO MTP and the City TSP reasonably funded projects. On the state highway system, if corridor demand was forecasted to exceed capacity, but the volumes under Scenario 2.1G were less than those in the 2028 TPR base scenario (a scenario developed to forecast what the system would look like with no UGB expansion and all growth occurring in the currently acknowledged boundary), additional mitigations were not recommended. On the City roadway system, the congested roadways were reviewed to determine if the demand exceeded capacity (v/c ratio greater than 1.0) or would just be a congested condition (accounting for capacity from center turn lanes and roundabout or signalized intersections, v/c ratio would be approaching but not exceed 1.0), the latter not requiring

[6] Recent unit costs for Reed Market Road of $1,085 per foot were divided by the prior comparable SDC costs of $492 per foot, which resulted in an escalation factor of 2.21 from prior project costs. This factor was applied to the prior cost estimates for other roadway types to derive the unit costs listed for each item.

[7] Based on average roundabout cost at Empire/18th ($2.7 million), Simpson/Mt Washington ($2.2 million), and Powers/Brookswood ($2.2 million)

widening mitigation. Like the base roadway costs, the unit costs for each capacity improvement were applied to the improvement length to derive the total cost.

- Intersection capacity improvements – The travel demand model was used to identify intersections that were forecasted to have traffic volumes that exceed levels that are typically served by stop-control. ODOT's preliminary signal warrants[8] were used to set volume thresholds for major and minor street intersection approaches for roads in the regional travel demand model. Intersections that exceeded the threshold and are currently planned for stop-controlled were identified as candidates for intersection control improvements. The high level analysis did not identify control specifics related to traffic signals or roundabouts. Since roundabouts are preferred in Bend and typically have higher initial installation costs, average roundabout costs from City data were assumed for each identified intersection improvement location.

The costs for the three components were summed to provide an overall transportation cost for each scenario. These costs do not reflect currently planned transportation improvement programs such as the Bend MPO MTP and the City's SDC and CIP program. Therefore, the costs identified for each scenario are costs that are in addition previously planned (and reasonably funded) improvements. This high-level infrastructure analysis does not capture additional urban upgrades that may be needed (and are reported separately), such as frontage improvements that may be required by development along arterial, collector, or local roads.

Summary of Results

Table 2 summarizes the total Scenario 2.1G cost for each cost component attributed to the UGB Expansion. The project maps (Figure 14) and tables (Figure 15) are attached that summarize the project details and costs included in each component.

Table 2. Scenario Transportation Costs ($ Millions) Attributed to the UGB Expansion

Cost Element	Scenario 2.1G
New Roadways*	119.0
Roadway Capacity	2.5
Intersection Capacity	2.4
Total	123.9

Note: * Reported roadway cost includes refined alignments that were not reflected in prior scenario analysis. Therefore, there may be limited ability to compare to prior results.

In addition to the costs listed in Table 2, there are two improvement projects identified through the analysis that appear to be necessary with or without the proposed UGB expansion, which would be attributable to growth in the current UGB, but are not currently planned/funded:

- US 20 / Old Bend-Redmond Highway intersection improvements - $2.4M

[8] Transportation Planning Analysis Unit, "Appendix 12A – Preliminary Traffic Signal Warrant Analysis Form." *Analysis Procedures Manual*. ODOT, February 2009. https://www.oregon.gov/ODOT/TD/TP/pages/apm.aspx

- US 20 / Cooley Road intersection improvements - $1.6M

While Scenario 2.1G has low overall cost relative to the prior scenario, roadway alignments, crossing needs, and functional class designations have been refined in some areas, which impacts estimated costs and may limit comparison to prior alternatives. Mitigation costs for Scenario 2.1G would remain low. The Elbow and DSL Property would have moderate subarea costs due to the extent of development in those subareas.

See Data Sheet for this Performance Measure for a roll-up of results by subarea and alternative.

Performance Measure 2.B.2: Cost per Acre of Transportation Infrastructure Improvements

Data Sources

No changes to the data sources and overall methodology were made since the evaluation of the six initial alternatives. However, roadway alignments, crossing needs, and functional class designations have been refined in some areas, which impacts estimated costs and may limit comparison to prior alternatives. The following data sources were used to develop the cost of transportation improvements for each cost component (described further in the following section):

- New roadways – The total distance for new roadways was measured using GIS data for the framework of the collector and arterial grid sketched by the project team.
- Development area – The total acres of development for each subarea were summarized using GIS mapping tools and were provided by the project team for each scenario.

Methodology

The following methodologies were applied to identify cost-efficiency:

- New roadways and cost – The location and cost of base roadways for each subarea were determined using the methodology described in Measure 2.B.1.
- Cost-efficiency – The total costs for each subarea were divided by the total developable acres to identify the cost/acre.

This measure focused on base roadway cost (new arterials and collectors); mitigation costs were not included at the subarea level.

Summary of Results

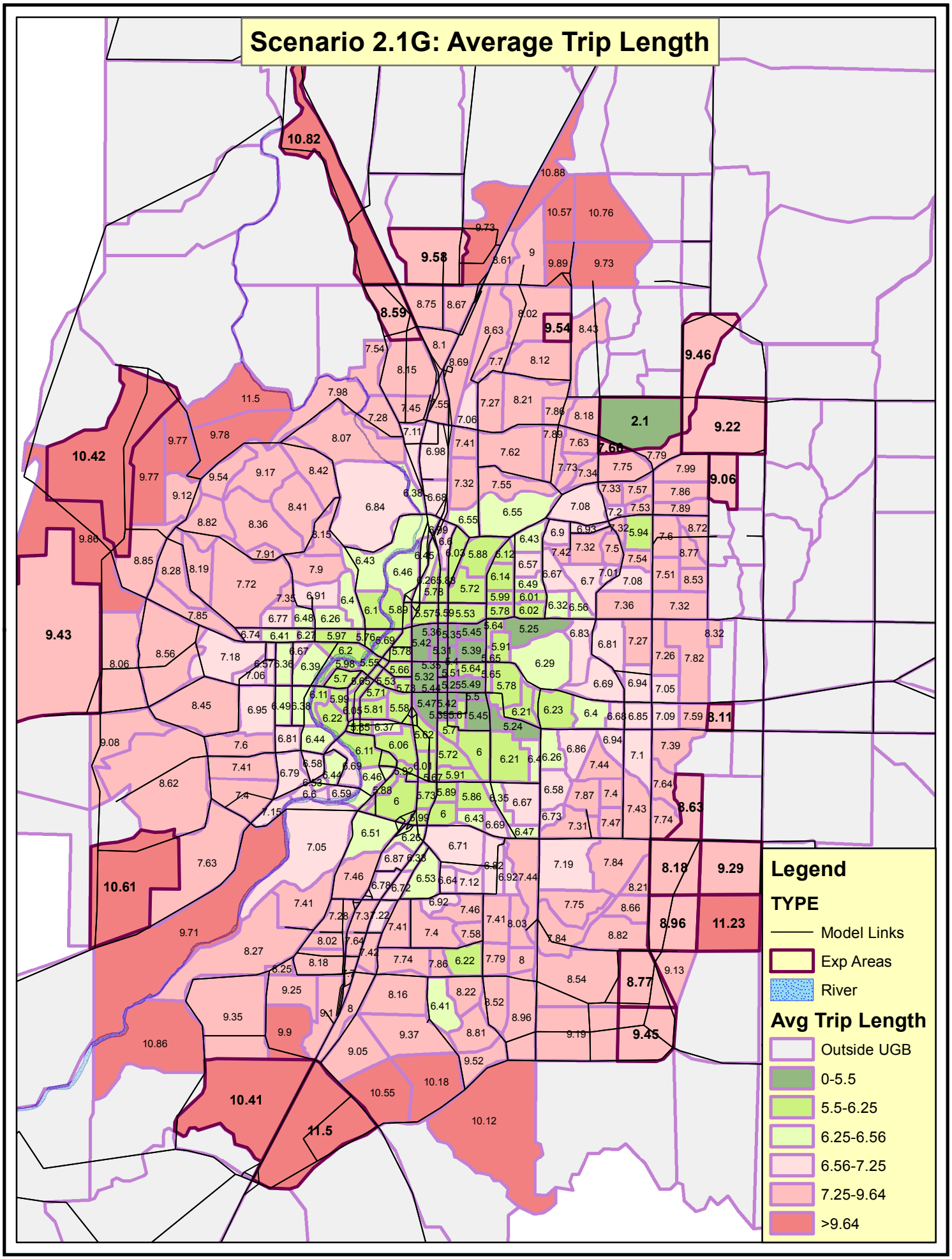
For each subarea in each alternative, transportation costs for the new roadway network ranged from $0/acre (in infill sites where the network already exists) to nearly $300/acre in some subareas. The general observations about the average cost for growth areas include:

- The Elbow has a moderate average cost, which is due to the moderate overall network costs balanced by a large growth area.
- The North Triangle has a moderate average cost, based on low connectivity costs and lower acreage.

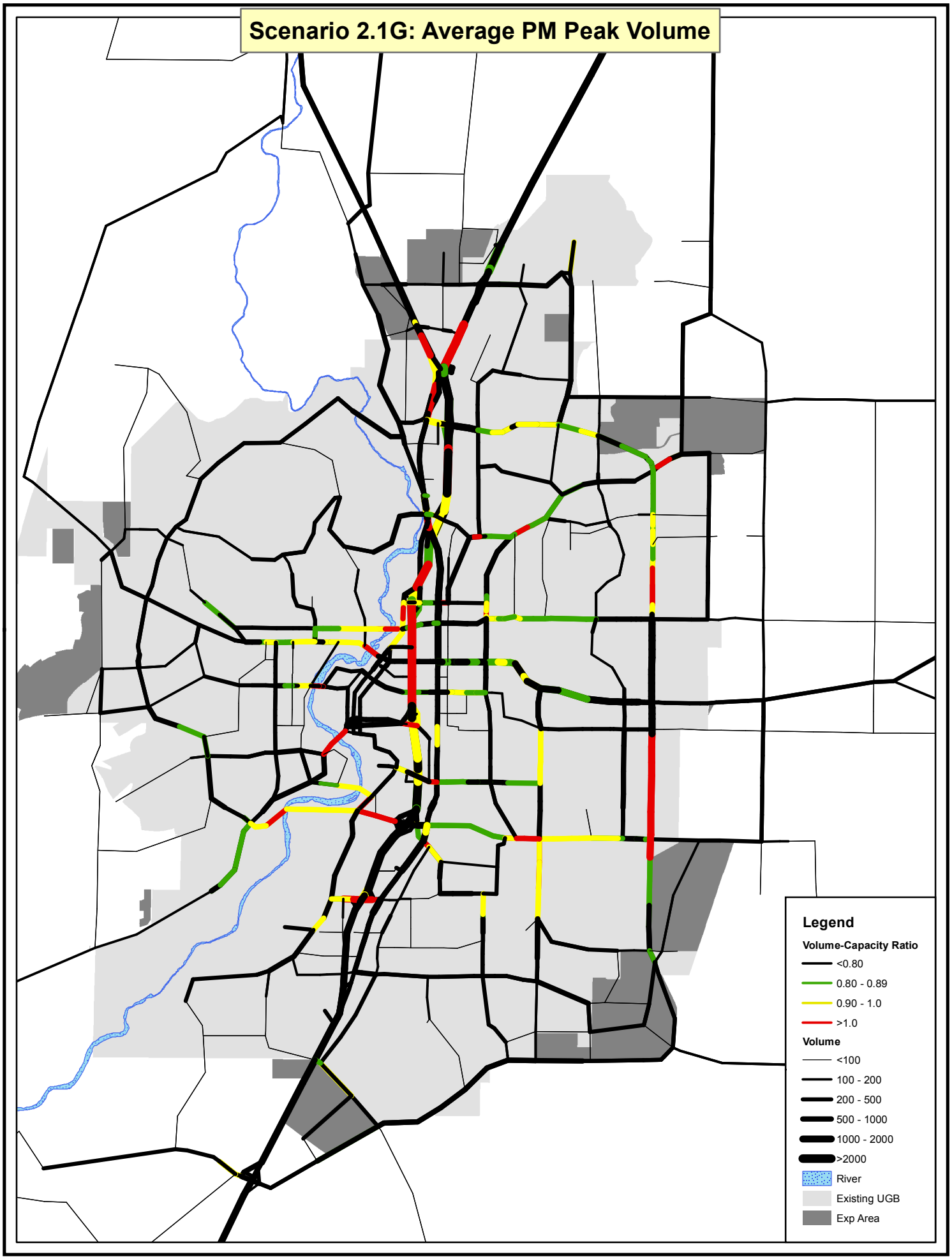
- The NE Edge has a lower average cost since it only includes the Yeoman to Butler Market extension and includes a large development area
- The DSL property has a moderate average costs due to the combination of moderate overall network costs and moderate area.
- The West has a low/moderate average cost due to the low/moderate total cost and the moderate/large area.
- Shevlin has a moderate/high average cost. While the total network cost is low, it would also support a smaller area, which drives up the average cost.
- The Thumb has low/moderate average costs due to a low/moderate total network cost and moderate area.
- OB Riley/Gopher Gulch has the lowest average costs due to the amount of developable acres included and the limited network improvements (extension of Robal Road).

While Scenario 2.1G has the lowest overall cost per acre relative to the prior scenarios, roadway alignments, crossing needs, and functional class designations have been refined in some areas, which impacts estimated costs and may limit comparison to prior alternatives.

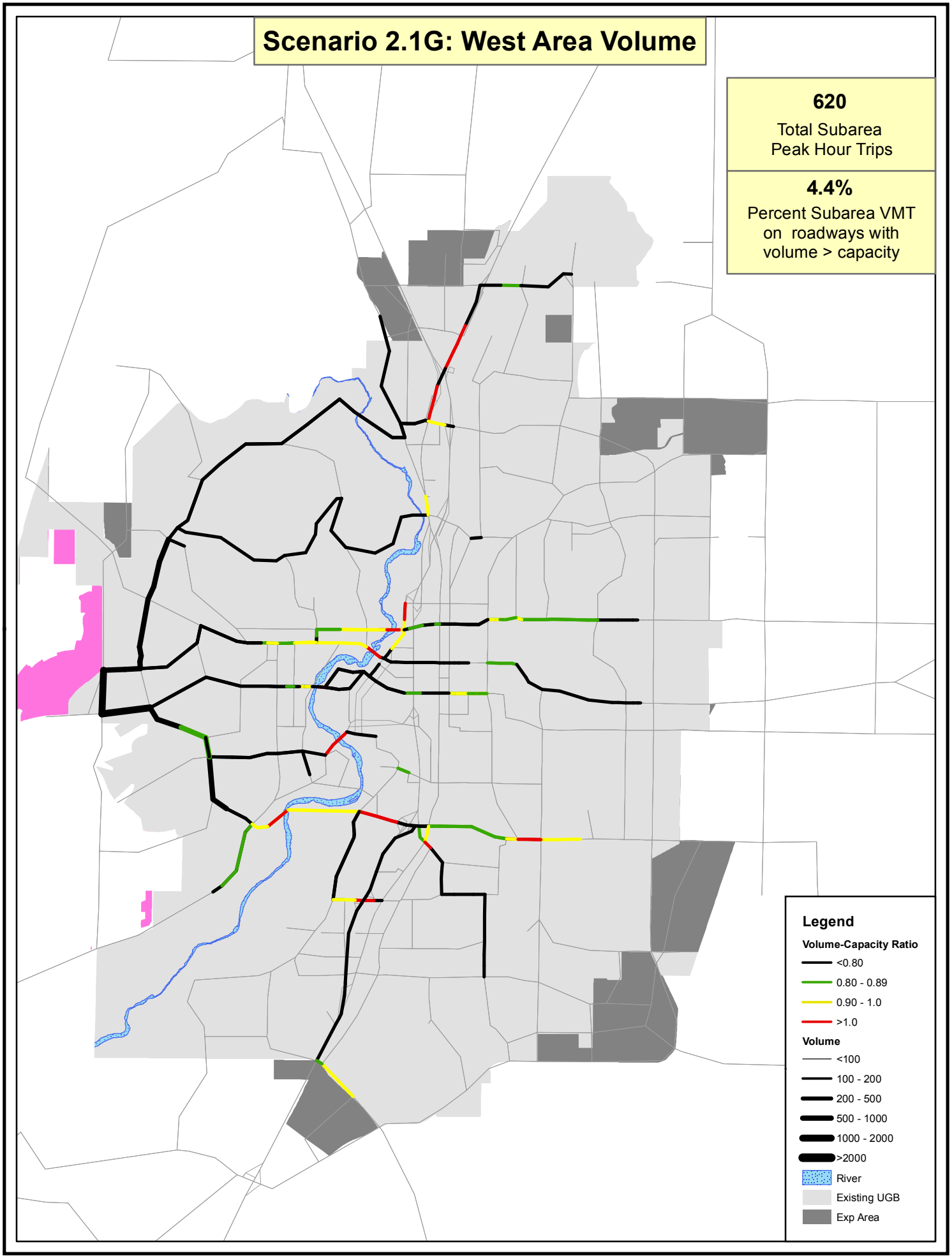
Scenario 2.1G: Average Trip Length



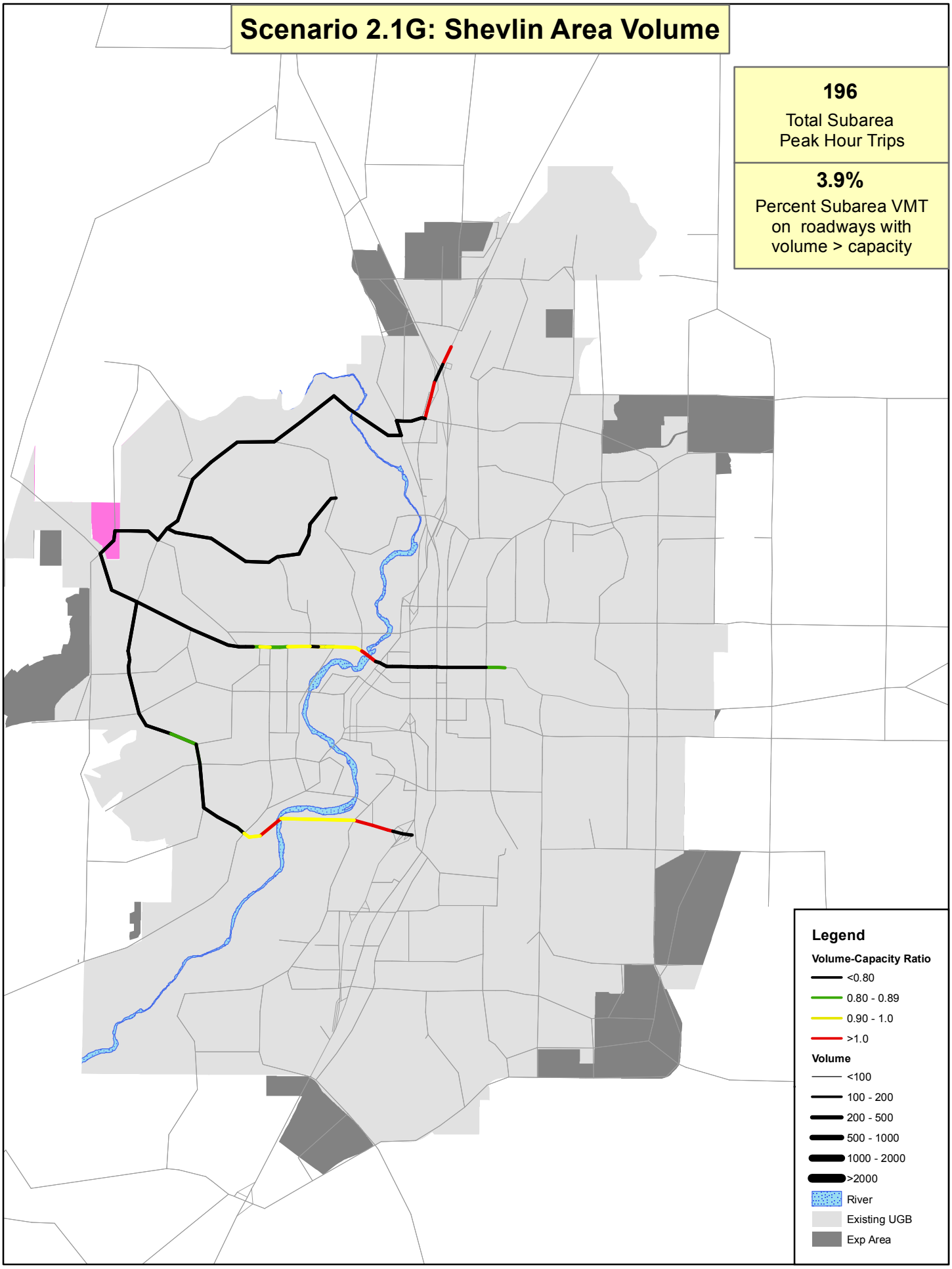
Scenario 2.1G: Average PM Peak Volume



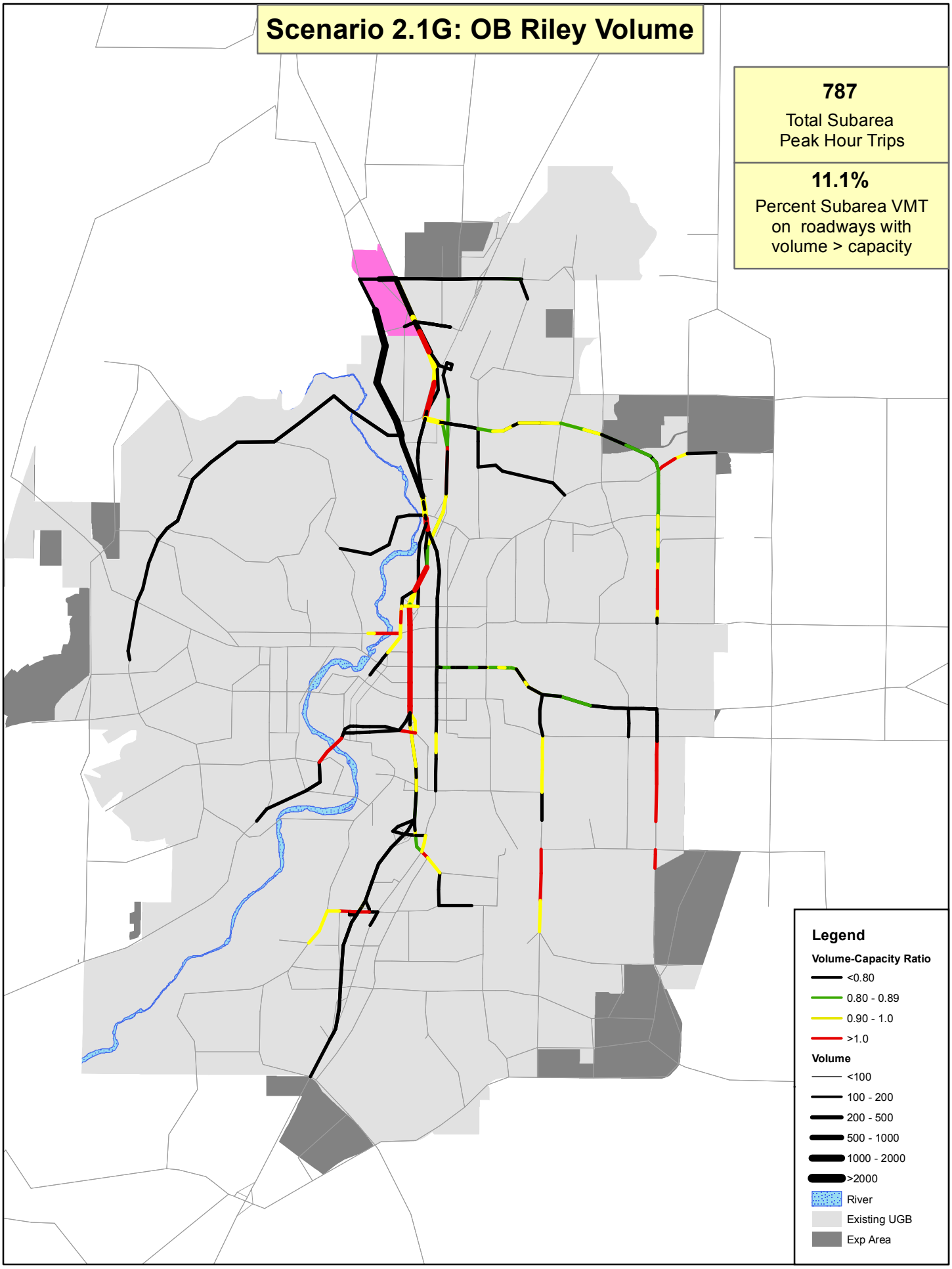
Scenario 2.1G: West Area Volume



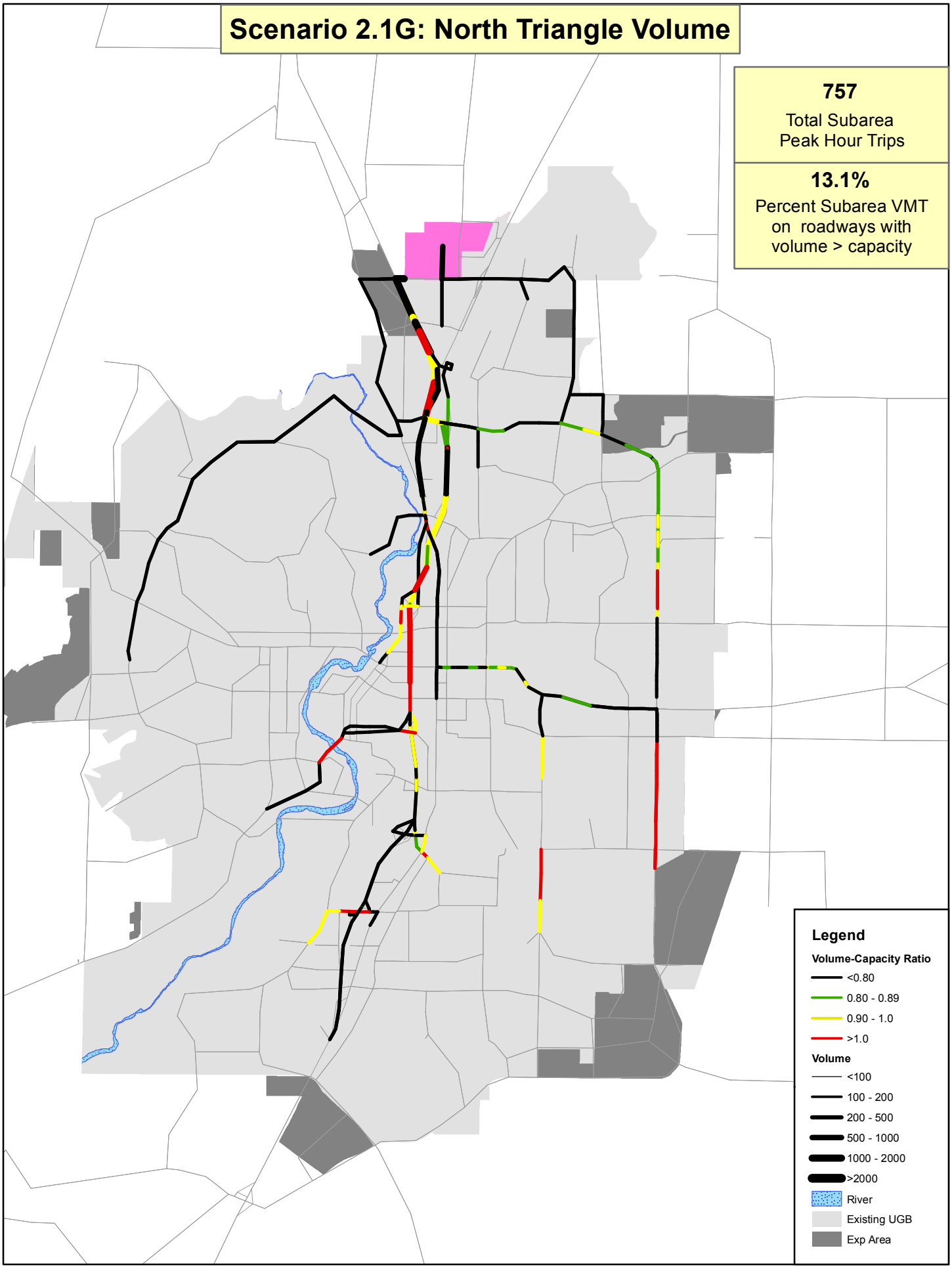
Scenario 2.1G: Shevlin Area Volume



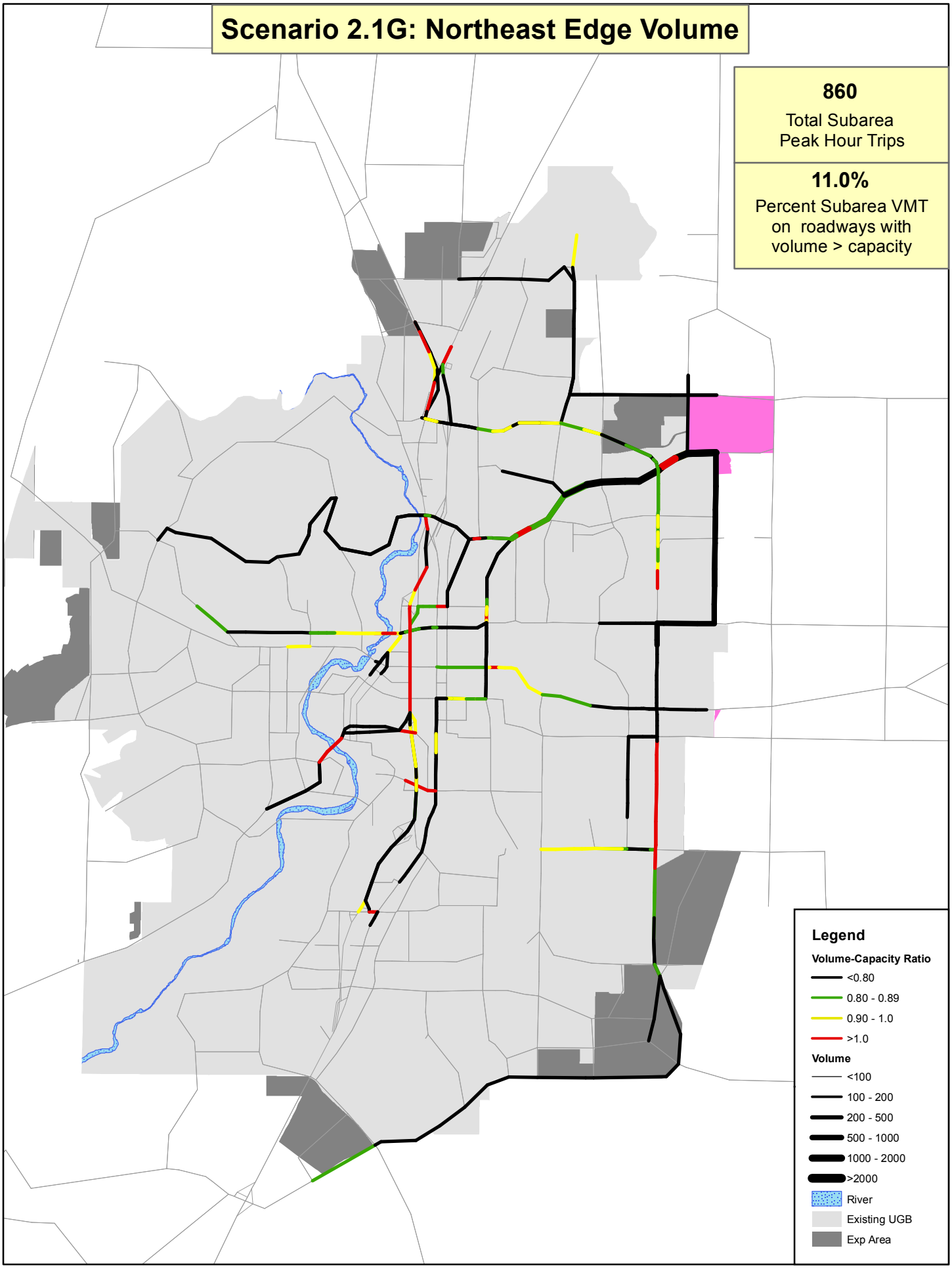
Scenario 2.1G: OB Riley Volume



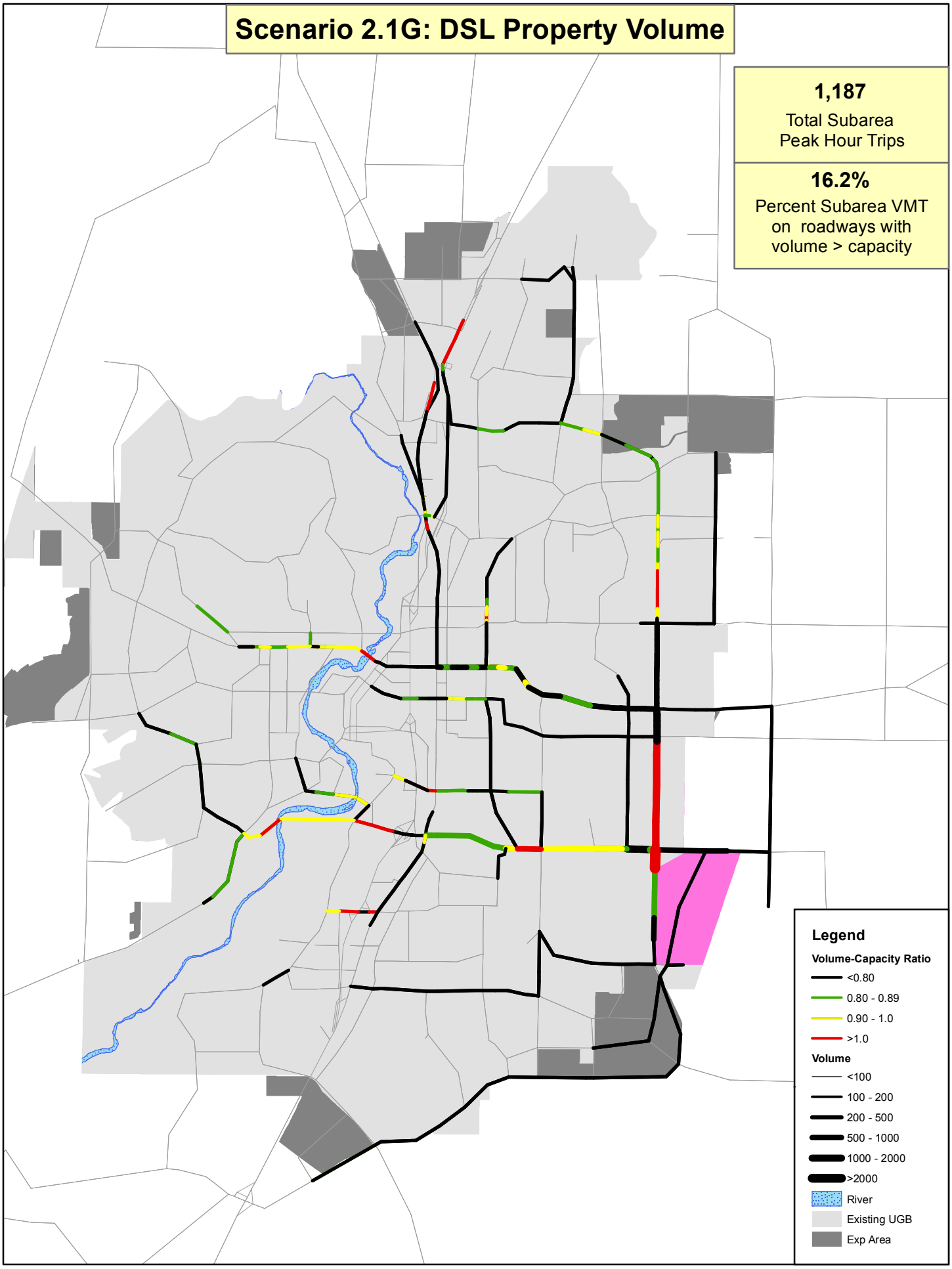
Scenario 2.1G: North Triangle Volume



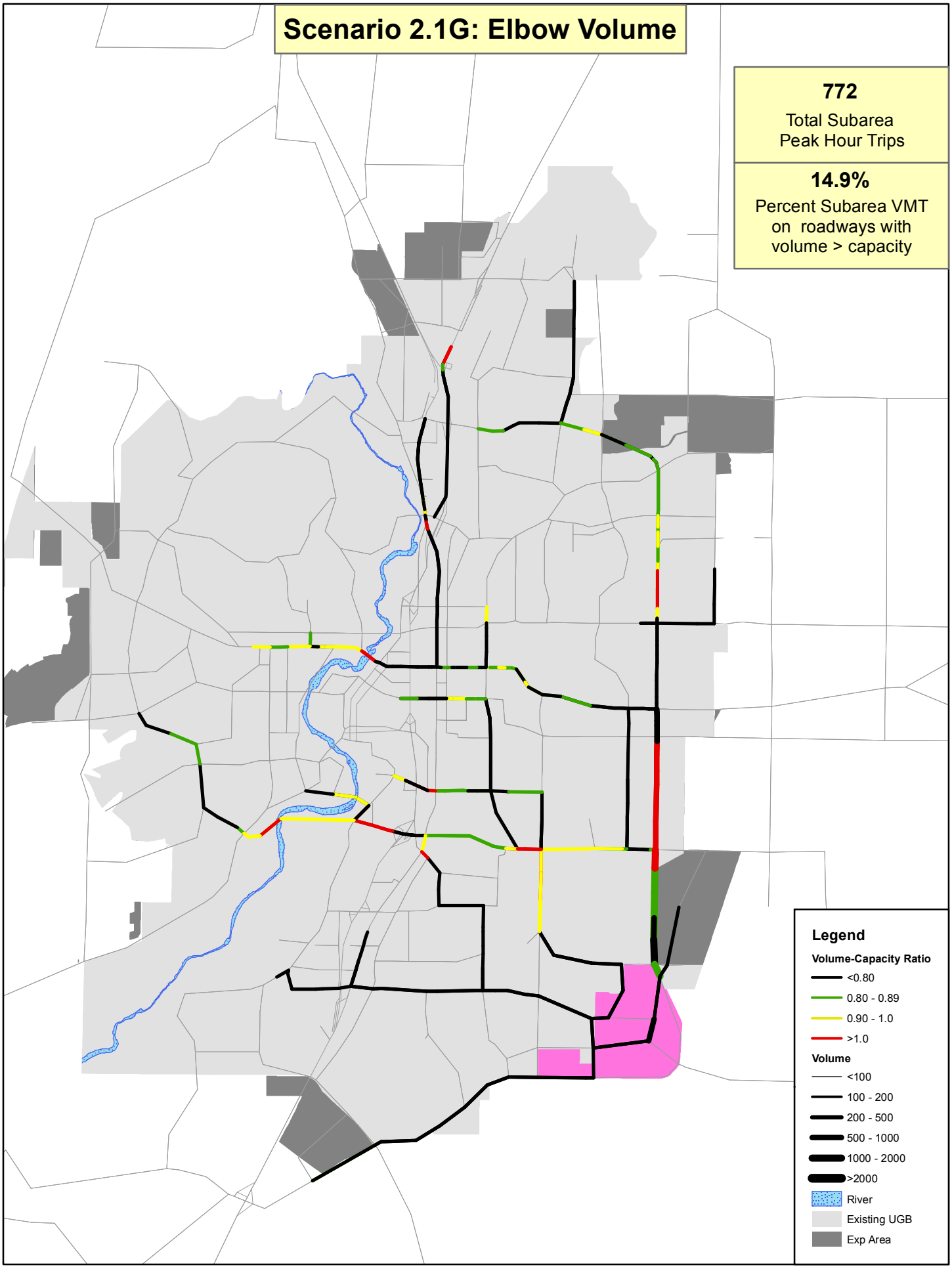
Scenario 2.1G: Northeast Edge Volume



Scenario 2.1G: DSL Property Volume



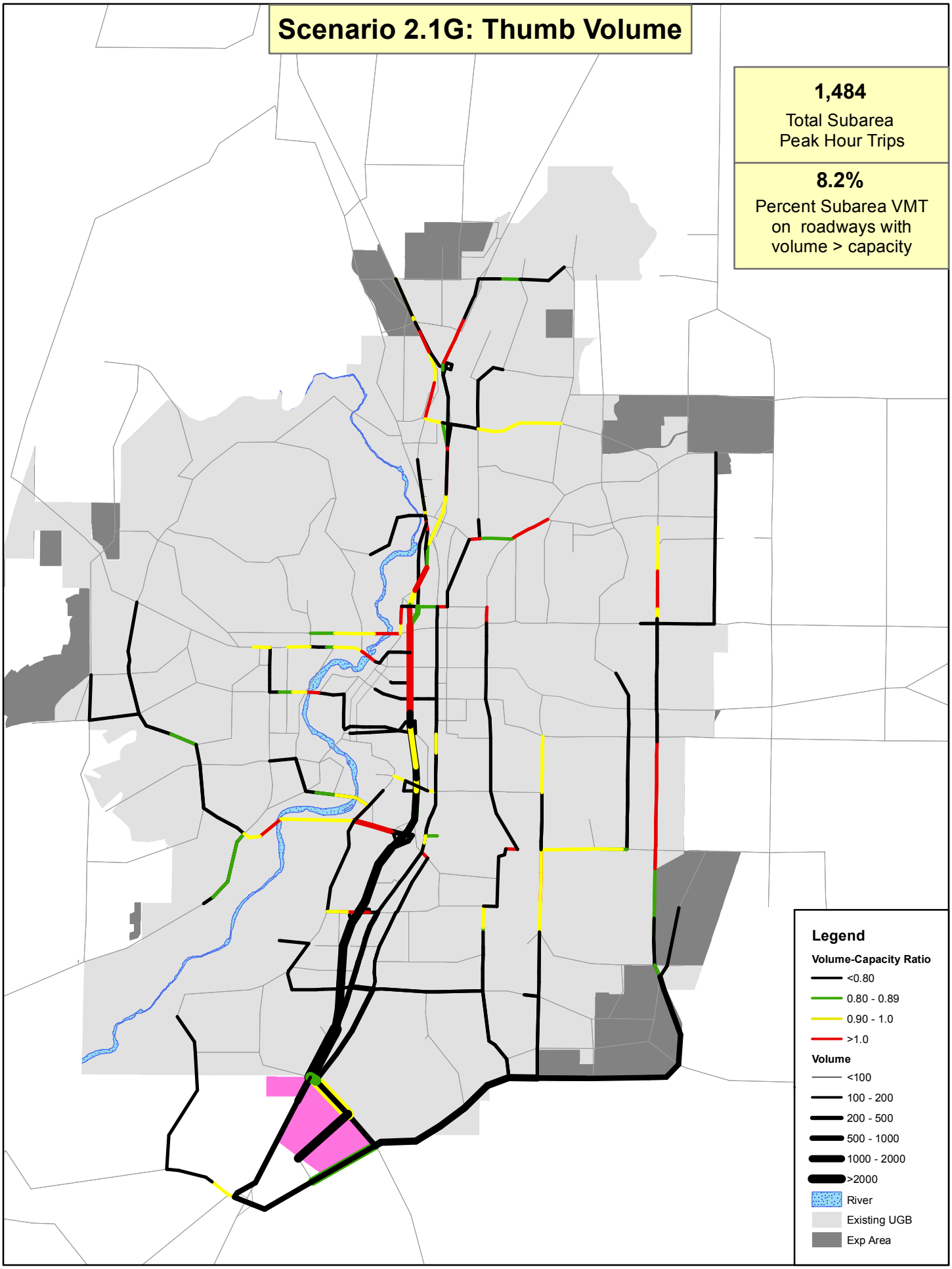
Scenario 2.1G: Elbow Volume



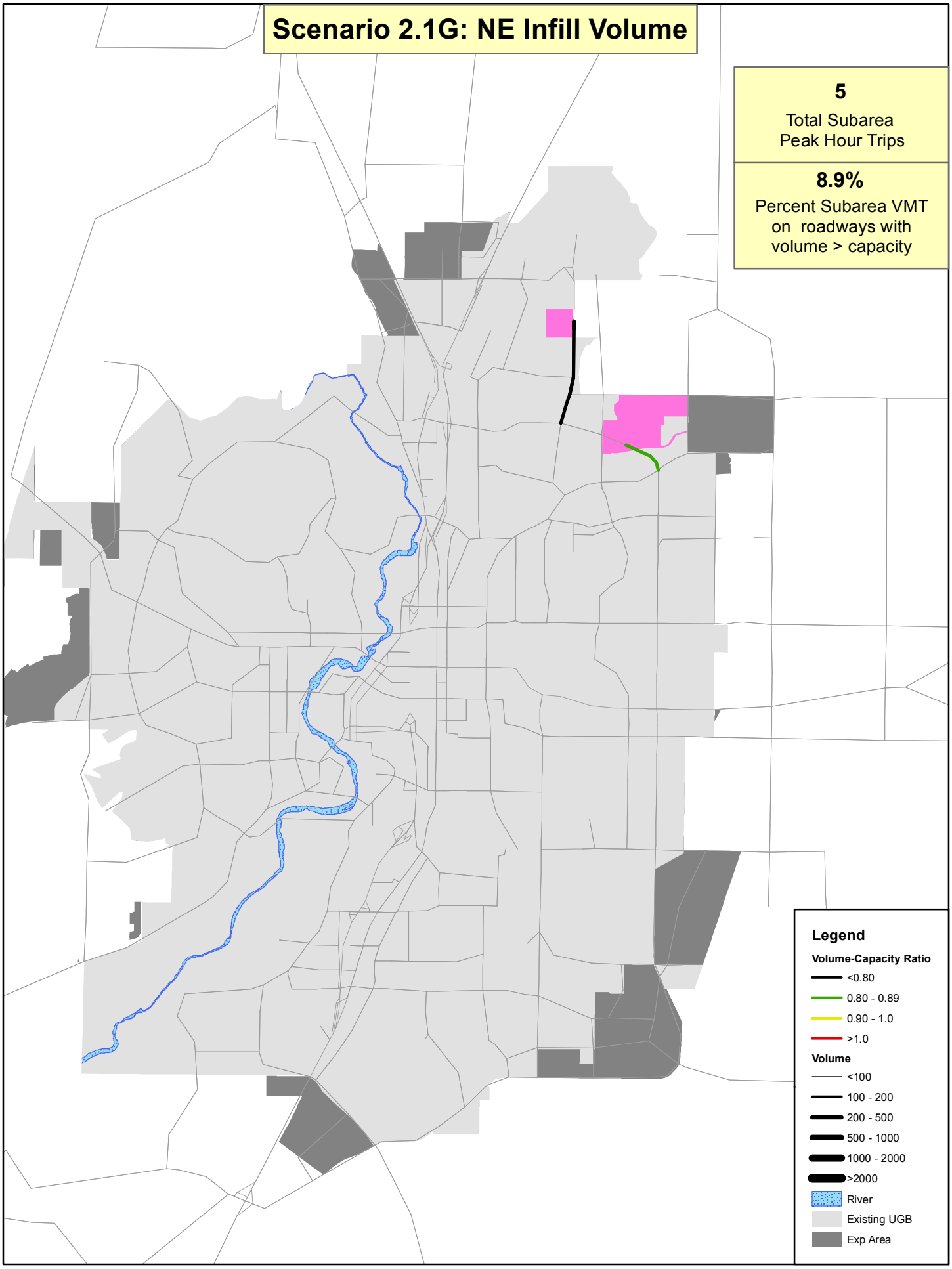
Scenario 2.1G: Thumb Volume

1,484
Total Subarea
Peak Hour Trips

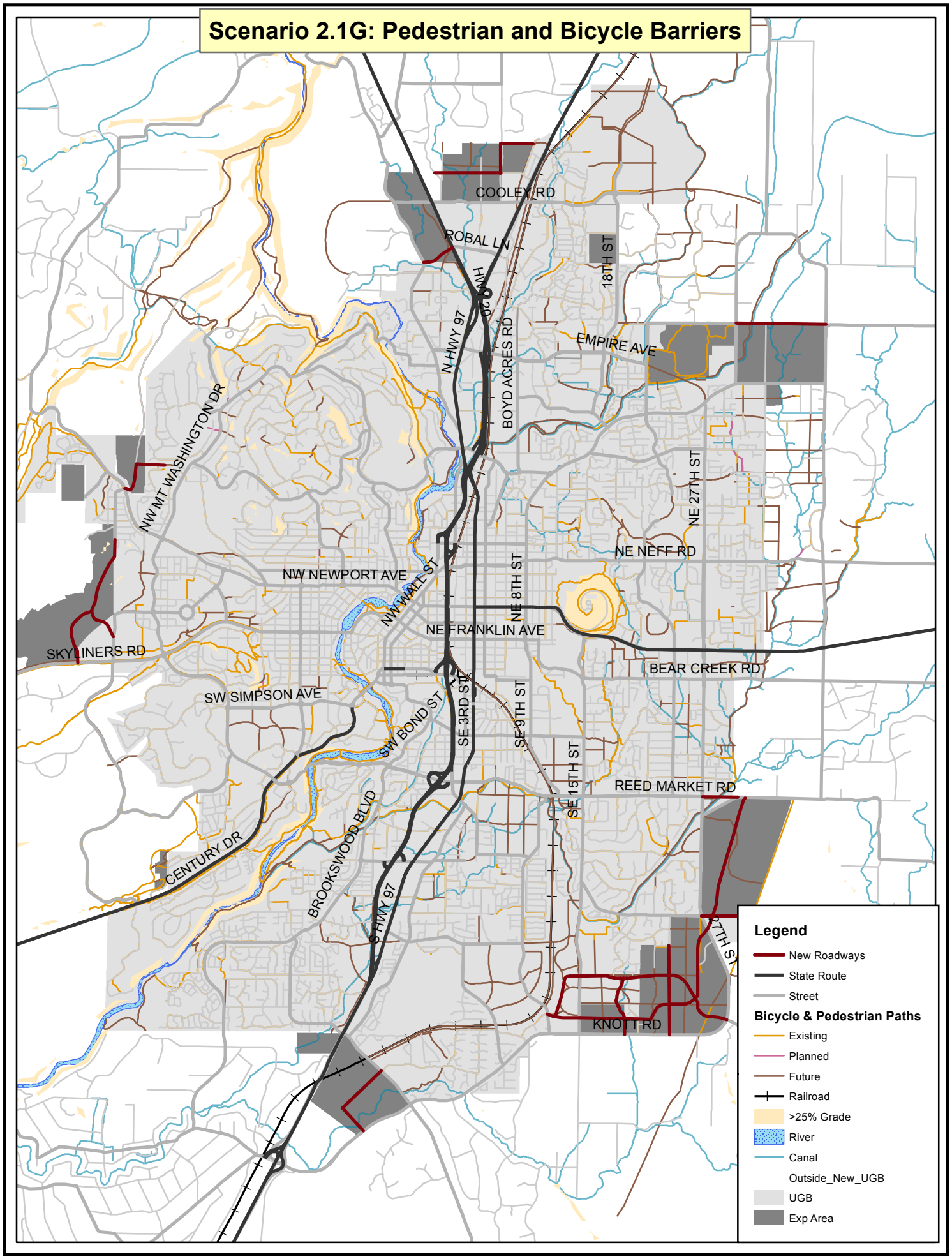
8.2%
Percent Subarea VMT
on roadways with
volume > capacity



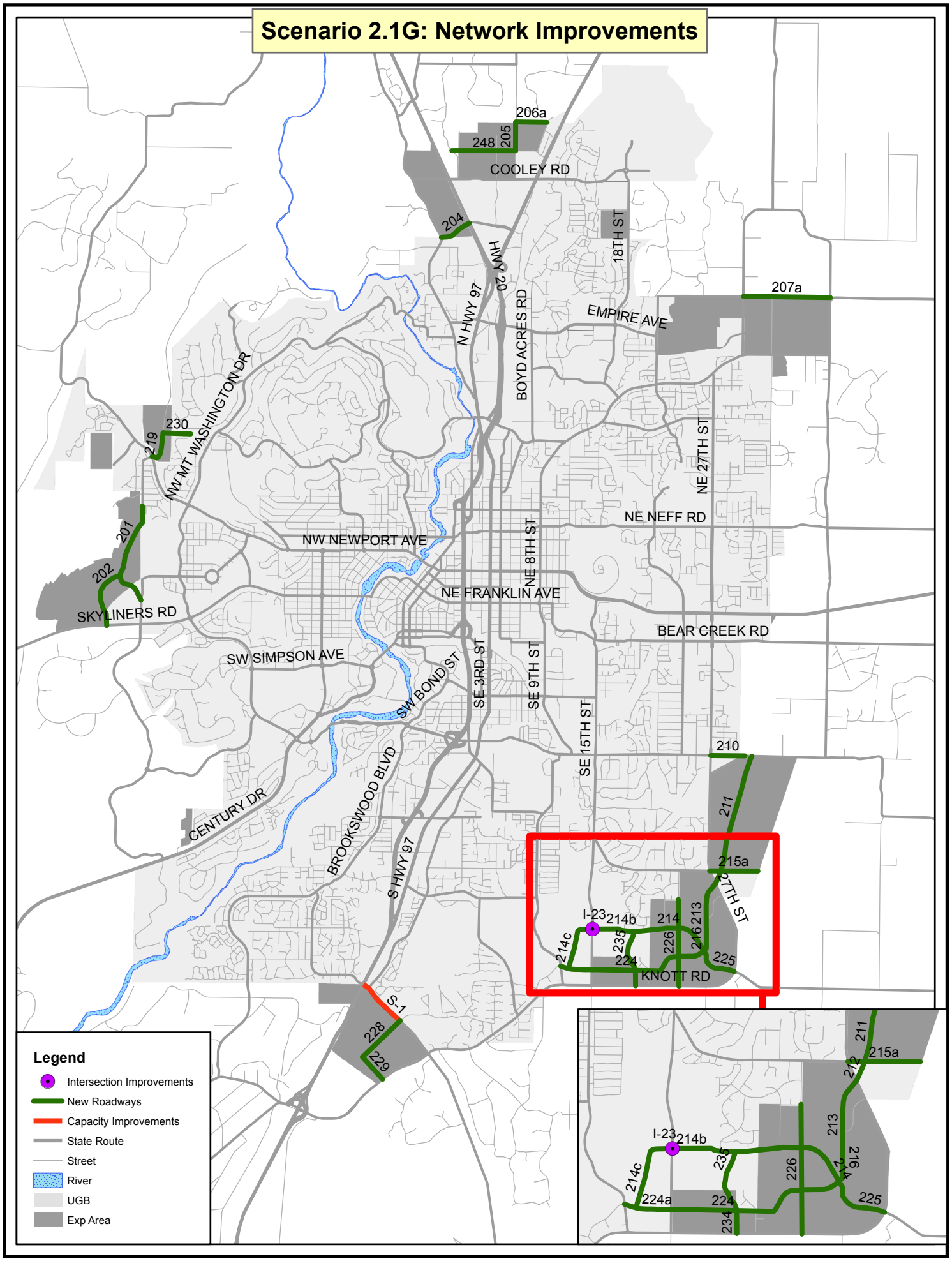
Scenario 2.1G: NE Infill Volume



Scenario 2.1G: Pedestrian and Bicycle Barriers



11249


Scenario 2.1G: Network Improvements
206a
205
248
COOLEY RD
204
HWY 20
18TH ST
N HWY 97
BOYD ACRES RD
EMPIRE AVE
207a
NW MT WASHINGTON DR
230
219
NE 27TH ST
NE NEFF RD
201
NW NEWPORT AVE
NE 8TH ST
202
NE FRANKLIN AVE
SKYLINERS RD
BEAR CREEK RD
SW SIMPSON AVE
SW BOND ST
SE 3RD ST
SE 9TH ST
SE 15TH ST
210
211
CENTURY DR
BROOKSWOOD BLVD
S HWY 97
215a
217
I-23
214b
214
213
214c
235
226
216
224
225
KNOTT RD
S-1
228
229
Legend
Intersection Improvements
New Roadways
Capacity Improvements
State Route
Street
River
UGB
Exp Area
212
224a
234

11250

Scenario 2.1G

New Roadways Cost Summary

Road ID	Roadway Name	Subarea	Length (miles)	Number of Lanes	Functional Class	Railroad Crossing	Number of Bridges	Road String	Unit Cost	Base Cost	ROW Cost	Crossing Cost	Total Cost
201	Skyline Ranch Road Extension	West	0.95	2	Collector	no	0	2Collector	$1,195	$5,994,147.66	$3,009,600	$0	$9,003,748
202	Crossing Drive Extension	West	0.54	2	Collector	no	0	2Collector	$1,195	$3,407,199.72	$1,710,720	$0	$5,117,920
204	New Road	OB Riley	0.28	2	Collector	no	0	2Collector	$1,195	$1,766,696.15	$887,040	$0	$2,653,736
205	Hunnell Road Extension	Triangle	0.25	2	Collector	no	0	2Collector	$1,195	$1,577,407.28	$792,000	$0	$2,369,407
206a	New Road	Triangle	0.27	2	Collector	no	0	2Collector	$1,195	$1,703,599.86	$855,360	$0	$2,558,960
207a	Yeoman Road Extension	NE Edge	0.76	2	Collector	no	1	2Collector	$1,195	$4,795,318.12	$2,407,680	$3,724,450	$10,927,448
210	New Road to Stevens	DSL	0.3	2	Collector	no	1	2Collector	$1,195	$1,892,880.00	$950,400	$3,724,450	$6,567,730
211	New Road	DSL	1	2	Collector	no	0	2Collector	$1,195	$6,309,629.11	$3,168,000	$0	$9,477,629
212	New Road	DSL	0.12	2	Collector	no	0	2Collector	$1,195	$757,155.49	$380,160	$0	$1,137,315
213	New Road	Elbow	0.42	2	Collector	no	0	2Collector	$1,195	$2,650,044.23	$1,330,560	$0	$3,980,604
214	New Road	Elbow	0.61	2	Collector	no	0	Collector	$1,195	$3,848,856.00	$1,932,480	$0	$5,781,336
214b	New Road	UGB	0.48	2	Collector	no	0	Collector	$1,195	$3,028,608.00	$1,520,640	$0	$4,549,248
214c	New Road	UGB	0.49	2	Collector	no	0	2Collector	$1,195	$3,091,704.00	$1,552,320	$0	$4,644,024
215a	New Road	DSL	0.41	2	Collector	no	0	2Collector	$1,195	$2,586,947.94	$1,298,880	$0	$3,885,828
216	New Road	Elbow	0.16	2	Collector	no	0	2Collector	$1,195	$1,009,540.66	$506,880	$0	$1,516,421
219	Skyline Ranch Road	Shevlin	0.28	2	Collector	no	0	2Collector	$1,195	$1,766,696.15	$887,040	$0	$2,653,736
224	New Road	Elbow	1.08	2	Collector	no	0	2Collector	$1,195	$6,814,399.44	$3,421,440	$0	$10,235,839
224a	New Road	UGB	0.28	2	Collector	no	0	2Collector	$1,195	$1,766,696.15	$887,040	$0	$2,653,736
225	New Road	Elbow	0.32	2	Collector	no	0	2Collector	$1,195	$2,019,081.32	$1,013,760	$0	$3,032,841
226	New Road	Elbow	0.75	2	Collector	no	0	2Collector	$1,195	$4,732,221.83	$2,376,000	$0	$7,108,222
228	New Road	Thumb	0.45	2	Collector	no	0	2Collector	$1,195	$2,839,333.10	$1,425,600	$0	$4,264,933
229	New Road	Thumb	0.26	2	Collector	no	0	2Collector	$1,195	$1,640,503.57	$823,680	$0	$2,464,184
230	New Road	Shevlin	0.24	2	Collector	no	0	2Collector	$1,195	$1,514,310.99	$760,320	$0	$2,274,631
234	Raintree Courth Extension	Elbow	0.25	2	Collector	no	0	2Collector	$1,195	$1,577,407.28	$792,000	$0	$2,369,407
235	Raintree Courth Extension north	UGB	0.26	2	Collector	no	0	2Collector	$1,195	$1,640,503.57	$823,680	$0	$2,464,184
248	Loco Road Extension	Triangle	0.56	2	Collector	no	0	2Collector	$1,195	$3,533,392.30	$1,774,080	$0	$5,307,472
												Total (New Roadways)	$119,000,540

Corridor Improvement Projects

P#	Corridor	Begin	End	Improvement	Distance	Unit Cost	Cost
S-1	China Hat Road	US 97	New Roadway (Thumb)	widen from 2 lane to 3 lane	2,350	$ 1,085	$ 2,549,750
						Total (Corridor)	$2,549,750

Intersection Improvement Projects

P#	Begin	End	Improvement	Cost
I-23	Murphy Road Extension (East)	15th Street	roundabout or traffic signal	$2,366,666
			Total (Intersection)	$2,366,666

Cost Summary

New Roadways	$119,000,540
Corridor Capacity	$2,549,750
Intersection Capacity	$2,366,666
TOTAL	**$123,916,956**

Memorandum

July 18, 2016

To: Karen Swirsky, Nick Arnis

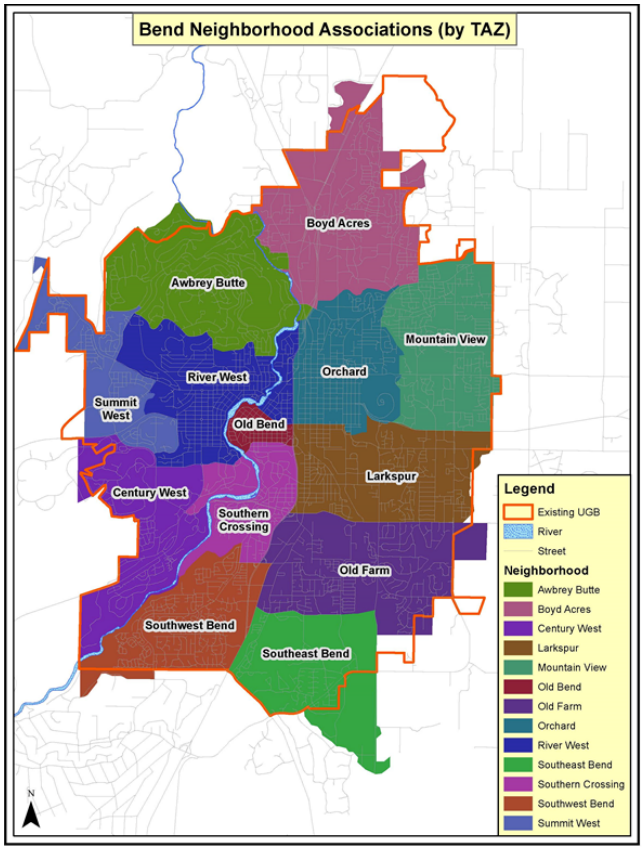
From: Chris Maciejewski, PE, PTOE, DKS Associates
Aaron Berger, DKS Associates

Re: Base Year Travel Demand Model Selection for VMT Evaluation

The purpose of this memo is to describe why we recommend the UGB project team use the newer base year 2010 model scenario (as opposed to the prior 2003 base year model scenario) to measure VMT per capita to represent year 2008 conditions. In summary, the travel demand model scenario for 2003 described in the UGB Remand does not account for the increases in population, the new roadway network additions, and the new transit system that occurred between 2003 and 2008. These factors affect the amount and location of trips, mode choice, and trip distribution/assignment, which significantly affects the VMT per capita calculation. Therefore, the 2003 model scenario is not a valid predictor of 2008 VMT per capita conditions compared to the 2010 model scenario.

Background

The UGB Remand described using the regional travel demand models for year 2003 and 2030, which were the model years available at the time of the prior UGB evaluation to approximate the 2008 to 2028 planning horizon. Since the time of the UGB Remand,, the Bend MPO and ODOT TPAU have since updated the regional model scenarios to base year 2010 and future year 2028. This memo discusses the differences between the 2003 and 2010 base year model scenarios and how closely they relate to 2008 conditions.



Land Use

The year 2010 base model scenario is proposed for use over the 2003 base model scenario as it provides a much closer comparison to 2008 land use conditions. The

2010 base model scenario was developed for the Metropolitan Transportation Plan (MTP), and includes updated land use reflecting the 2010 development conditions in Bend. Between 2003 and 2008, the population of Bend increased from 59,646 to 77,181[1], an annual growth rate of 5.3%/year. With the economic downturn occurring in 2008, the population of Bend remained virtually the same between 2008 and 2010, dropping slightly from 77,181 to 76,639[2]. The population growth between 2003 and 2008 was verified through comparison of historical aerial imagery of housing units in each Neighborhood Association in Bend. Figure 1 shows the Neighborhood Association mapped to the TAZs used in the travel models.

The growth in each neighborhood was verified against the household growth between the 2003 and 2010 base model scenarios. The residential land use changes between the 2003 and 2010 base model scenarios are summarized by neighborhood Table 1.

Table 1: 2003/2010 Model Residential Comparison

Neighborhood Association	2003 Model Households	2010 Model Households	2003-2010 Model Household Growth	Locations of primary residential growth between 2003 and 2008 verified in the model
Awbrey Butte	1,291	1,645	354	North of Farewell Dr
Boyd Acres	1,524	2,434	910	Along Boyd Acres Rd and Morningstar Rd
Century West	961	1,412	451	West of Cascade Middle School
Larkspur	3,173	3,498	325	Along the 27th St corridor
Mountain View	4,975	5,405	430	West of 27th St
Old Bend	1,024	945	-79	Did not experience residential growth
Old Farm	2,505	3,108	603	Multi-family units along Hwy 96 and single family units on the Brosterhouse Rd corridor
Orchard	2,535	3,095	560	Multi-family units near Pilot Butte and single family units north of Butler Market Rd
River West	3,906	3,899	-7	Did not experience residential growth
Southeast Bend	1,050	1,147	97	Did not experience significant residential growth
Southern Crossing	915	983	68	Did not experience significant residential growth
Southwest Bend	1,893	2,954	1,061	West of Brookswood Blvd
Summit West	644	1,305	661	Fairly distributed but very high growth
Totals	**26,396**	**31,830**	**5,434**	**20.6% increase in households between models**

Employment totals did not change significantly between the 2003 and 2010 model scenarios.

[1] U.S. Census Bureau; American Community Survey, 2008 Vintage Population Estimates

[2] U.S. Census Bureau; American Community Survey, 2008 and 2012 Vintage Population Estimates

Roadway Network

The 2010 base model scenario network was also updated to reflect following projects constructed between 2003 and 2010:

- American Lane Re-alignment with Brosterhous Road
- NW Crossing Drive Connection between Shevlin Park Road and NW Morningstar Road
- NW Hunnell Road Connection between Cooley Road and Robal Road

Each of the projects listed were constructed prior to 2008. Therefore, the 2010 base model scenario is a more accurate representation of the roadway network in 2008

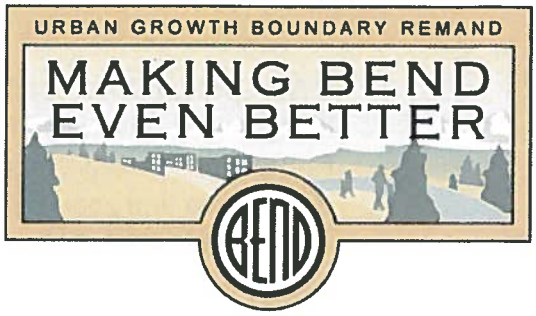
Transit Network

The 2010 base model scenario network includes transit service that exists today in Bend, but was not present in 2003. The 2010 base model scenario transit network detail closely matches the transit service that was in place in 2008. Therefore, the 2010 base model scenario is a more accurate representation of the transit network in 2008

Conclusions

Due to the updated land use, roadway network, and transit network developed for the 2010 base model scenario, the UGB project team believes it is necessary to use the 2010 base model scenario over the 2003 base model scenario for VMT per capita analysis to estimate 2008 conditions. These model scenario inputs for 2010 are a much better and accurate representation of the land use and transportation in Bend in 2008. As stated, these inputs affect the amount and location of trips, mode choice, and trip distribution/assignment, all of which significantly affect VMT per capita analysis.

Memorandum



July 14, 2016

To: Karen Swirsky, Nick Arnis

From: Chris Maciejewski, P.E., PTOE, DKS Associates

Re: Bend UGB Expansion – TPR Evaluation For Changes Within the Current UGB

INTRODUCTION

The purpose of this memorandum is to present the evaluation and findings related to Oregon Administrative Rule (OAR) 660-012-0060 for proposed changes to Comprehensive Plan designations and land use regulations within the currently acknowledged Bend Urban Growth Boundary (UGB) as part of the Bend UGB Expansion project. This section of the Transportation Planning Rule[1] (TPR) requires local governments to determine whether an amendment to an acknowledged comprehensive plan or land use regulation would result in any of the following effects:

(A) Types or levels of travel or access that are inconsistent with the functional classification of an existing or planned transportation facility;

(B) Degrade the performance of an existing or planned transportation facility such that it would not meet the performance standards identified in the TSP or comprehensive plan; or

(C) Degrade the performance of an existing or planned transportation facility that is otherwise projected to not meet the performance standards identified in the TSP or comprehensive plan.[2]

SUMMARY OF LAND USE ACTIONS

The proposed changes to Comprehensive Plan designations and land use regulations within the current UGB include:

- New mixed-use designations and/or zones in opportunity areas, including:
  - The Bend Central District, between the Parkway and 4th Avenue from roughly the railroad on the south to Revere on the north (implemented as a special plan district);

[1] OAR 660-012 is commonly referred to as the Transportation Planning Rule.

[2] OAR 660-012-0060(1)(c)

    - CWP/Century Drive opportunity site (implemented using the new mixed use plan designations developed for the UGB project; zone changes are being deferred);
    - KorPine opportunity site (implemented using the new Mixed Use - Urban plan designation and zone developed for the UGB project);
    - East Downtown opportunity site (implemented using the new Mixed Use - Urban plan designation; zone changes are being deferred); and
    - The Inner Highway 20 / Greenwood Ave opportunity site (implemented using the new Mixed Use - Neighborhood plan designation; zone changes are being deferred).
- Changes to land use regulations, including:
    - Minimum residential densities for residential development within 660 feet of transit in commercial and mixed-use zones
    - Reduced parking standards for mixed-use development
    - Raising the minimum density in the RS zone (especially for new master-planned neighborhoods);
    - Allowing a greater mix of housing types outright in the RS zone;
    - Increasing the maximum residential density in RL zone;
    - Removing the cap on net density for multi-family housing in the RM and RH zones to allow greater flexibility in reaching the allowed maximum gross density; and
    - Enabling greater densities in ME zoned land by removing maximum lot coverage and the minimum front setback as well as providing height bonuses for affordable housing and vertical mixed use.

As these proposed changes include Comprehensive Plan map, zoning map and development code modifications, a TPR evaluation was conducted to determine if the changes would cause a significant effect (i.e., impact) to the transportation system that requires mitigation.

APPROACH

Through scoping coordination with Oregon Department of Transportation (ODOT) Region 4 and Department of Land Conservation and Development (DLCD) staff, it was determined that a travel demand model link-level analysis utilizing the Bend Metropolitan Planning Organization (MPO) regional travel demand model was appropriate for assessing those impacts within the current UGB. There are several reasons for this approach:

- ODOT Region 4 staff determined that link-level analysis was adequate for TPR evaluation within the current UGB as the intended outcome of the actions is to improve land use efficiency and transportation system performance, with any potential impacts likely occurring in areas that have been studied in-depth in past plans with known issues and potential solutions.
- The increased development potential generated by the broadly-applicable changes to land use regulations is spread over thousands of acres (most of the vacant and redevelopable land within the current UGB). Furthermore, many of the changes have the effect of increasing the minimum intensity of development than increasing the

maximum intensity of development. As a result, differences in expected intensity of development within the planning horizon are generally modest and diffuse relative to the reasonable worst case development potential under the existing regulations.

METHODS

The following sections describe the key methods/assumptions used as the basis for the technical analysis.

Mobility Standards for Traffic Capacity Analysis

The City's Transportation System Plan does not include mobility standards to utilize for impact assessment. However, the City's development code includes a v/c ratio standard for major intersections of 1.0 for peak hours (or the hour adjacent to the peak hour for certain areas). To support the traffic capacity analysis described in the previous section, the City's intersection v/c ratio standard were applied to travel model links representing City facilities. For links representing ODOT facilities, v/c ratio standards from the Oregon Highway Plan were applied. These targets were utilized to compare UGB Scenario 2.1G to the TPR base and where the proposed changes were found to cause a link to exceed mobility targets or further degrade an already over-target condition, the links were identified for potential mitigation.

Horizon Year for Evaluation

The City's Transportation System Plan (TSP) was based on travel demand modeling of growth to the year 2020; however, due to issues with land use buildout consistencies and partner agency support of the technical modeling work that underlies the analysis, it cannot serve as a base for comparison for TPR analysis. The UGB planning horizon and corresponding Remand requirements are based on a horizon year of 2028. Therefore, 2028 was used as the horizon year for TPR evaluation.

Base-Case Scenario for Determining Significant Effect

When conducting TPR significant effect evaluation, a key data point for comparison is how the planned system performs under the current Comprehensive Plan and TSP. For the Bend area, the TSP's modeling work cannot be relied upon and the MPO's regional travel demand model does not currently have a scenario specifically developed to represent growth to 2028 based on currently designated land uses. Therefore, the project team developed a 2028 land use allocation and corresponding travel model scenario that achieves population and employment control totals within the existing UGB and is consistent with existing Comprehensive Plan designations. For consistency with the UGB expansion scenarios, the project team utilized Envision Tomorrow to allocate the housing and employment growth based on the current regulations and plan designations.

Specifically, the approach to allocating population and employment was as follows:

- Use Envision Tomorrow to allocate housing and employment growth.

- Begin from the Bend Buildable Lands Inventory (BLI) that underlies the draft preferred UGB expansion scenario and current plan designations, and the base case assumptions developed to estimate capacity under current plan designations and historic trends.
- Adjust the original base case development type assumptions and application of development types as follows:
    - Apply development types consistent with current plan designations to residential lots that are allowed to add at least one unit under the existing plan designation density and are not within a historic district, but were not identified as having capacity because there is little or no undeveloped land on the property.
    - Apply development types to additional commercial and industrial properties, consistent with the existing plan designations, where projected employment densities are above current employment densities.
    - Add a small redevelopment rate to residential development types (2-7% of developed acres, with higher rates on RM and RH than RL and RS).
    - Increase redevelopment rates for commercial, industrial and mixed use development types to about 35% of developed land (except MDOZ, which is about 20%).
    - Adjust the building mix across most development types to increase density and bring the overall housing and employment mixes more into line with the needed housing mix present in the draft preferred UGB expansion scenario. Continue to rely only on buildings that meet current development code standards (e.g. parking, building height and setbacks) and keep residential density within the currently allowed density ranges so that all assumed development is consistent with existing regulations.
    - Reduce amount of land set aside as "other land" from 13% to 3% for all development types (less private open space assumed than historical trends).
    - Adjust development assumptions for Juniper Ridge to match the "reasonable worst case" identified for the Employment Subdistrict Zone Change transportation study for development through 2025 (as an approximation of 2028).
- Add projected population / housing and employment growth to estimated existing housing and employment from 2014 to establish 2028 totals.

Note that the Oregon State University Cascades Campus was not part of the Envision Tomorrow modeling of the TPR base scenario (because its employment and student housing was accounted for separately from other employment and housing growth for UGB capacity purposes), but it was built into the transportation model for the TPR base scenario. (For Scenario 2.1G, the OSU assumptions were integrated into Envision, but with the same population and employment numbers and types as in the TPR base scenario.)

For school enrollment areas, the approach was to:

- Identify new schools only inside the UGB and on School District owned property outside the UGB based on input from the School District on the 2028 UGB scenarios.

- Adjust from 2010 attendance boundaries to reasonably approximate attendance areas for new schools.

Reasonably Funded Network Assumptions

The final key assumption for the TPR evaluation was the future improvements that were accounted for in the travel forecasting and system performance evaluation. As described in the TPR, only improvements that are reasonably likely to be funded were assumed. For regionally significant facilities, the recent Bend MPO 2040 MTP includes a financial assessment and a corresponding constrained project list. MPO staff has subsequently coordinated with City and ODOT staff to determine a subset of the planned improvement list that aligns with the funding forecast through the year 2028. For other City facilities, the City has recently completed a detailed funding evaluation (including SDCs and bond revenues) to determine which TSP improvements are reasonably funded by 2028. Finally, funding for transit system enhancements have been recently approved that increases service levels for 2015 to levels previously planned for 2028. Therefore, the newly implemented transit system was maintained in the model network. These three combined improvement programs formed the basis for the 2028 transportation network for TPR evaluation.

SUMMARY OF RESULTS

The attached figures show the travel demand model link plots utilized for the analysis. Figure 1 and Figure 2 show forecasted weekday PM peak hour volume and demand-to-capacity ratios for the TPR base and Scenario 2.1G scenarios, respectively. Figure 3 shows the isolated volume change on the system between the scenarios based on the opportunity site locations, where the mixed-use land use changes are concentrated. Based on the link information, the following conditions were determined:

- Scenario 2.1G causes Hwy 20 between Cooley Road and 3rd Street to further degrade above the mobility target compared to the TPR base scenario. Other locations on the state highway system were found to either be below mobility targets, or in some cases improve with Scenario 2.1G relative to the TPR base scenario.
- On the City's system, Scenario 2.1G was not found to cause significant effect on links that do not already have reasonably likely funded projects in the City's adopted Transportation System Plan, with one exception. China Hat Road to the east of US 97 (to the proposed collector roadway west of Knott Road) was found to degrade and need additional capacity compared to the TPR baseline.
- Isolating the traffic changes from the opportunity site zones (Figure 3) found that the proposed plan and zone amendment areas do not cause significant increase traffic volumes on links exceeding mobility targets, except for Hwy 20 between Cooley Road and 3rd Street as identified above. This includes on China Hat Road as noted above, where the increase in volume corresponding to the capacity need was found to be primarily due to proposed UGB expansion areas and not the proposed changes within the current UGB.

Based on the link-level evaluation, the proposed actions within the current UGB were found to have significant effect only on Hwy 20 between Cooley Road and 3rd Street. To remedy this impact, the corridor can be improved by the improvement project identified in the Bend MPO 2040 Metropolitan Transportation Plan (MTP), which would add a travel lane to southbound Hwy 20 from Cooley Road to 3rd Street.

ATTACHMENTS

Figure 1 – "TPR Base" Scenario Peak Hour Volume and Demand-to-Capacity Ratios
Figure 2 – Scenario 2.1G Peak Hour Volume and Demand-to-Capacity Ratios
Figure 3 – Peak Hour Volume Difference (2.1G minus TPR Base) For Opportunity Site Zones

Figure 1

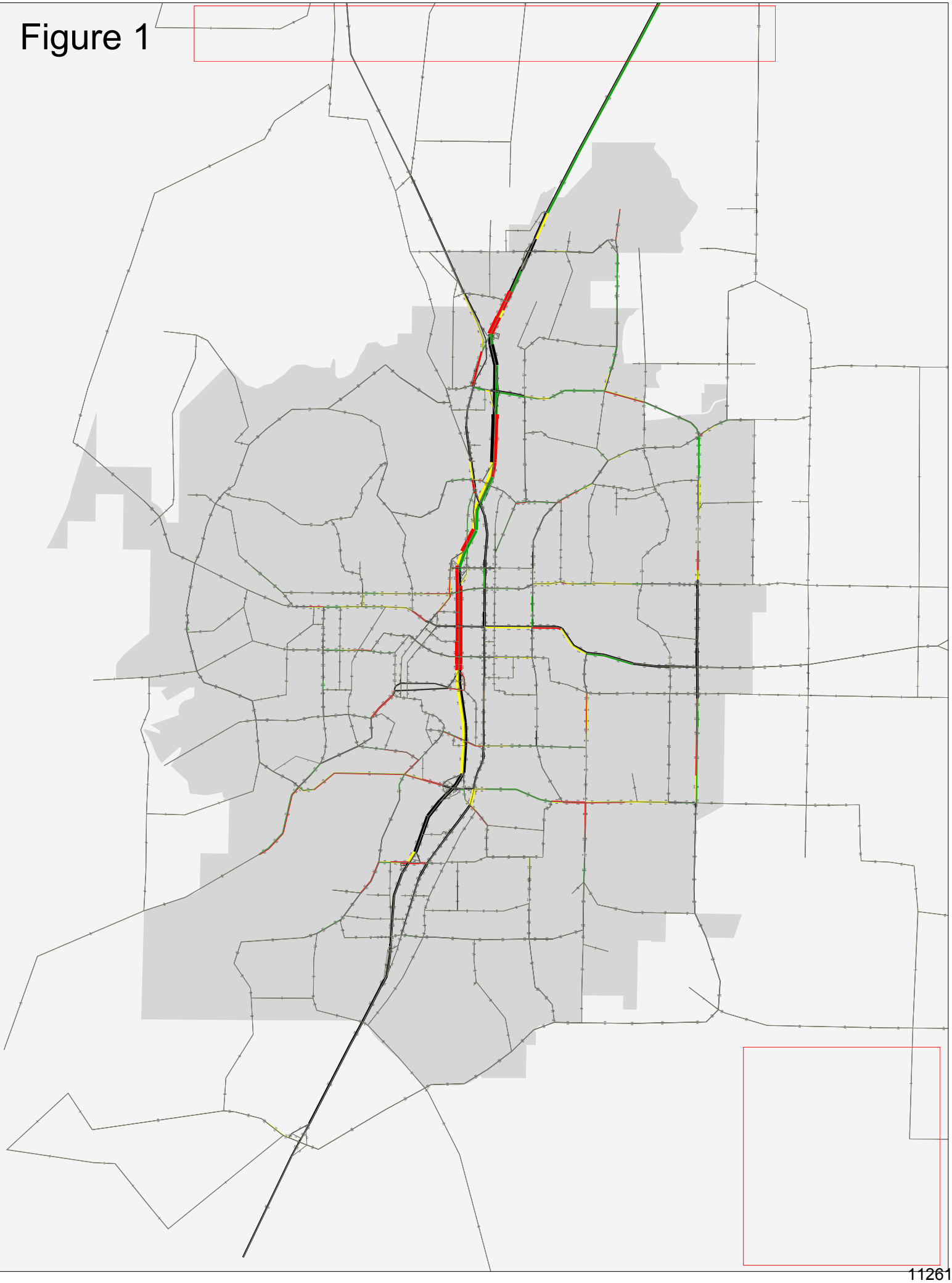


Figure 2

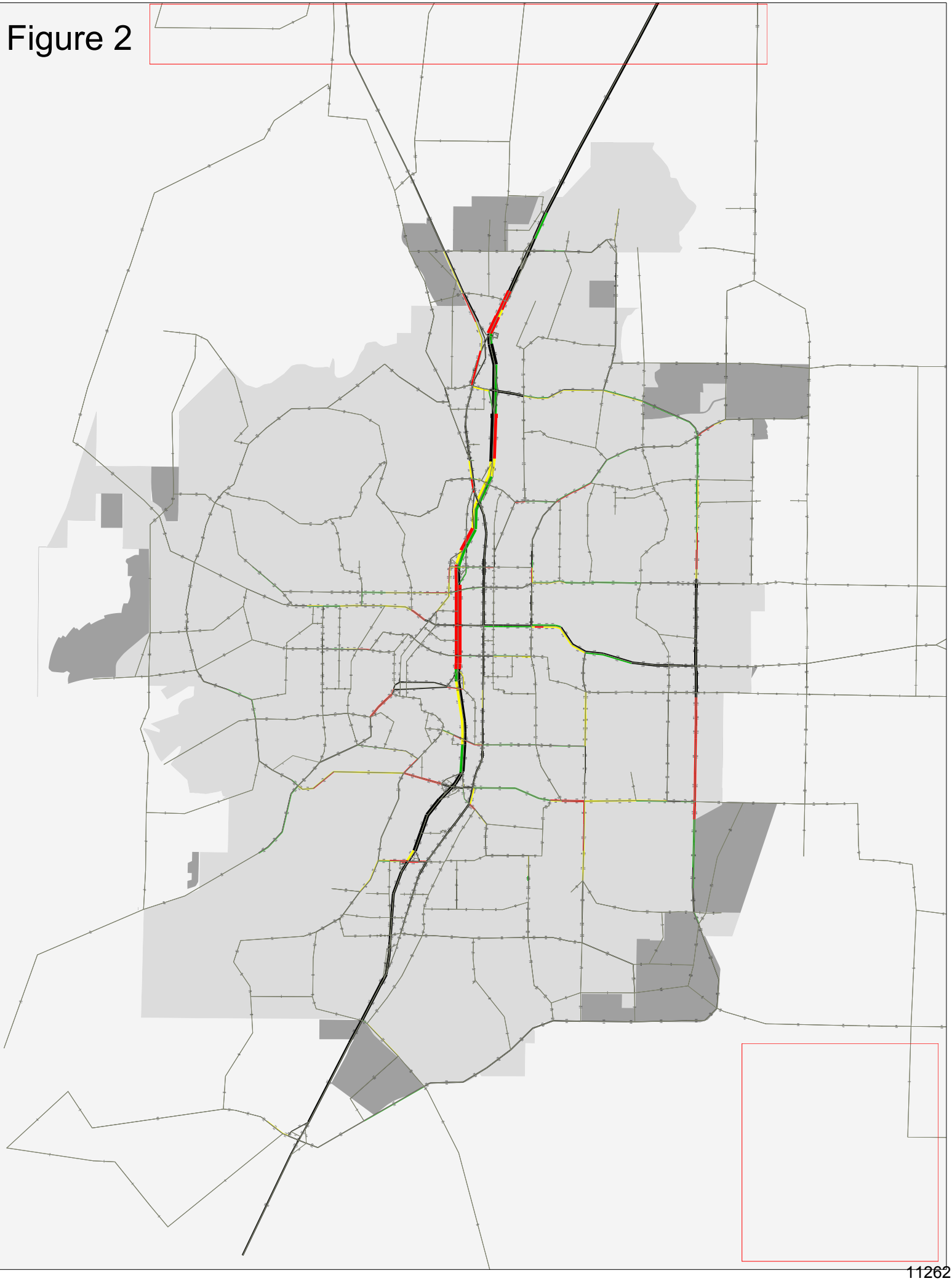
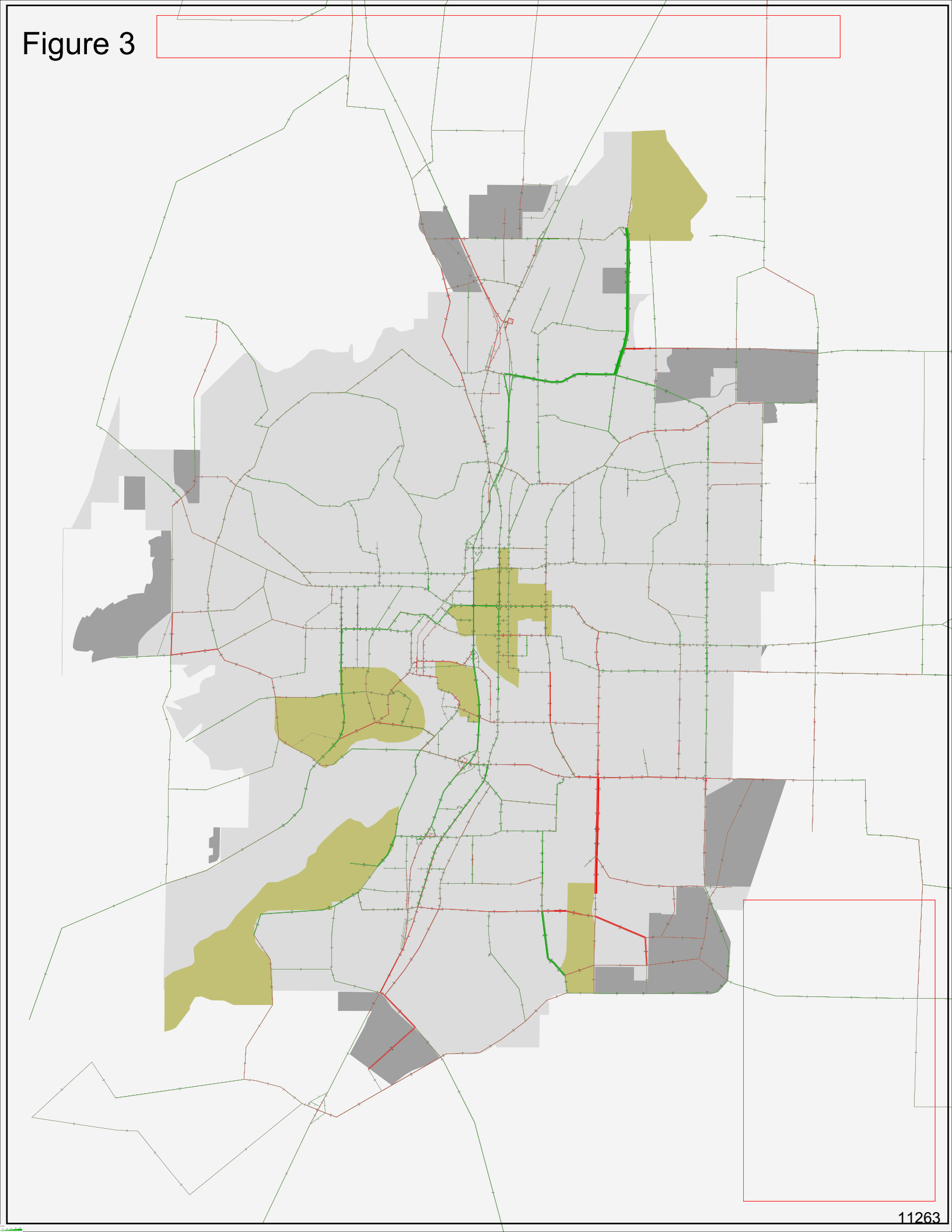


Figure 3



11263

2040 Financially Constrained MTP Project List

Number	Road	From	To	Improvement	Final Cost	Funding Source		
					Updated by CH2MH	State	City	City Urban Renewal
7	Empire Avenue	3rd Street	Highway 97 NB ramps	widen to 5 lanes and install signal at SB ramps	$3,900,000		$3,900,000	
8	Empire Avenue	Purcell Boulevard	27th St extension	Construct 2 lane extension	$6,700,000		$6,700,000	
9	Reed Market Road	27th Street Intersection		Re-align Stevens to connect directly to Reed Market Road	$4,700,000		$4,700,000	
10	O.B. Riley Road	Empire Avenue Intersection		Construct intersection control improvements	$1,900,000		$1,900,000	
11	Murphy Road	Brosterhous Road	15th Street	Construct 2 lane extension	$11,375,000		$11,375,000	
12	Highway 97/Cooley Road area improvements			Various intersection and lane upgrade improvements	$30,000,000	$16,000,000		$14,000,000
13	Empire Avenue (Bend)	Highway 97 NB off-ramp		Widen existing ramp to 2 lanes	$3,000,000		$3,000,000	
14	Highway 97	Powers Road Intersection		Preliminary engineering and ROW aquistion for overcrossing or interchange	$6,500,000	$6,500,000		
15	Highway 20 (Greenwood Avennue)	4th Street Intersection		Install traffic signal	$413,000		$413,000	
16	Yeoman Rd	18th Street	Existing section	Construct 2 lane extension	$1,009,265		$1,009,265	
17	North frontage road	Murphy Road	Powers Road	New 2-lane road	$5,400,000		$5,400,000	
18	South frontage road	Murphy Road	Parkway off-ramp	New 2-lane road	$13,800,000		$13,800,000	
19	Britta Street (north section)	Robal Road	Empire Avenue	New 2-lane road	$1,000,000		$1,000,000	
20	Britta Street	Ellie Lane	Halfway Road	New 2 lane road extension	$2,000,000		$2,000,000	
21	Purcell Boulevard	Holiday Ave (south)	Holiday Ave (north)	New 2 lane road extension	$2,287,670		$2,287,670	
22	Mervin Samples Road - Sherman Road	O.B. Riley Road	Empire Avenue	Upgrade to 2 lane collector roadway and install traffic signal at Highway 20	$6,100,000	$2,000,000	$4,100,000	
23	O.B. Riley Rd	Glen Vista Road	Archie Briggs Road	Upgrade to 3 lane arterial	$6,700,000		$6,700,000	
24	27th St	Bear Creek Road	Ferguson Road	Upgrade to 3 lane arterial	$11,500,000		$11,500,000	
25	Highway 97	Murphy Road		Construct northbound on and southbound off ramps	$6,100,000			$6,100,000
26	18th St	Cooley Road	Empire Avenue	Complete 3 lane arterial corridor	$6,100,000		$6,100,000	
42	Highway 20	Cooley Road		Construct intersection control improvements	$1,600,000		$1,600,000	
45	Highway 20	Cooley Road	3rd Street	Add second southbound through lane	$4,800,000		$4,800,000	
46	City of Bend			Other future local transportation projects	$39,000,000		$39,000,000	
				Totals	**$175,884,935**	**$ 24,500,000**	**$ 131,284,935**	**$ 20,100,000**
				Available		$24,500,000	$132,000,000	$7,000,000 Murphy
								$14,000,000 Juniper Ric
				Net		$0	$715,065	$900,000

BEND METROPOLITAN PLANNING ORGANIZATION
POLICY BOARD MEETING
Minutes
September 25, 2014
DeArmond Room, Deschutes County Services Building, 1300 NW Wall Street, Bend, Oregon

1. CALL TO ORDER – INTRODUCTIONS

Chair Capell called the meeting to order at 3:02 p.m. with a quorum of member jurisdictions present. Attending during the meeting were:

Policy Board
Mark Capell, *Bend City Council,* **Chair**
Tony DeBone, *Deschutes County Commission,* **Vice-Chair**
Gary Farnsworth, *Oregon Department of Transportation* (ODOT)
Victor Chudowsky, *Bend City Council*

MPO Staff
Tyler Deke, *Manager*
Jovi Anderson, *Program Technician*
Cameron Prow, TYPE-*Write* II

MTP Consultant Team
Ashleigh Griffin, *Kittelson & Associates, Inc.*
Chris Maciejewski, *DKS Associates*
Matt Kittelson, *Kittelson & Associates, Inc.*
Sonia Hennum Daleiden, *Kittelson & Associates, Inc.*

Visitors
Damian Syrnyk, *City of Bend,* Growth Management
Gary Vodden
Nick Arnis, *City of Bend,* Growth Management Manager
Peter Christoff, *Merrill O'Sullivan LLP* (BMPO Attorney)
Richard Ross

(Secretary's note: The three-digit figure following a motion title shows the number of member jurisdictions voting in favor/against/abstaining.)

2. VISITOR COMMENTS (None)

3. 2040 METROPOLITAN TRANSPORTATION PLAN UPDATE PRESENTATION

Documents: copy of PowerPoint presentation, draft 2040 MTP including project lists (committed, 2040 financially constrained, illustrative) and maps (BMPO organizational boundary, committed roadway improvements, illustrative roadway improvements, pedestrian facilities, bike facilities)

Ms. Daleiden outlined the agenda, desired outcomes for today's meeting, and schedule to date and said the draft 2040 MTP received a thorough review by multiple agencies. She presented the Refined Revenue Forecast and discussed key content revisions made to the draft 2040 MTP over the last two weeks.

Mr. Maciejewski presented the final travel demand model and discussed key changes to the Preferred Alternative or financially constrained project list (modify US97/Powers Road

project to include only preliminary engineering and right-of-way acquisition and add US20/Cooley Road and widening of US20 from Cooley Road to 3rd Street as City-funded projects) and the Aspirational Alternative (add US97/Powers Road as a full improvement construction project after preliminary engineering and add a grade-separated improvement to US20/Cook Avenue in Tumalo).

Ms. Daleiden discussed updates made to MTP chapters on Land Use, Motor Vehicles, Pedestrian & Bicycle, Environmental Considerations, and Outstanding Issues. On September 24, 2014, the BMPO Technical Advisory Committee (TAC) unanimously recommended adoption of the 2040 MTP as presented with changes indicated to the project list from Deschutes County.

4. DISCUSSION ON FINAL 2040 MTP

Policy Board concerns included consistency with North Corridor planning.

5. 2040 MTP ADOPTION

Document: Resolution 2014-06

Chair Capell opened the public hearing on Resolution 2014-06 at 3:17 p.m. and closed it when no one offered testimony.

Vice-Chair DeBone reported that Chris Doty, Deschutes County Roads Department Director, fully supported the proposed 2040 MTP.

Motion 1 (3/0/0): Mr. Farnsworth moved to adopt the Bend MPO 2040 Metropolitan Transportation Plan through Resolution 2014-06 as drafted. Mr. DeBone seconded the motion which passed unanimously.

Chair Capell thanked the consultant team for their hard work on this project.

Ms. Daleiden commended the MPO staff for their diligence in making sure that Stage 1 was completed on time.

6. WRAP-UP/NEXT STEPS

Ms. Daleiden said during previous discussions the Policy Board directed that tasks included should be those required and those that will provide the most value for transportation planning and community investment. The TAC recommended that Stage 2 tasks include compliance with new federal regulations (MAP-21/Moving Ahead for Progress in the 21st Century Act), expansion of the MPO boundary to include Tumalo, Bend Parkway Study, alternate mobility standards (performance measures), and analysis of bicycle and pedestrian crossings. Additional tasks that need to be done could be included in the next formal update of the MTP after the UGB process is completed. The TAC also recommended that agency representatives form a group within the next month to begin brainstorming the scope and funding options of the Bend Parkway Study.

Mr. Maciejewski identified areas of concern along the Bend Parkway including safety, vehicle movement, travel information, and access management. He noted that final recommendations would not be possible until the UGB process is done.

Policy Board members discussed reviewing the financially constrained project list once the Bend-Redmond model is available and including ODOT and City commitments to

focus on Parkway study areas relative to the North Corridor project (Empire, interconnection between US20 and US97) in the Parkway study scope.

Ms. Daleiden said the regional model was expected to be available by March-April 2015. She stated the Policy Board's adoption of the 2040 MTP met the federal requirement and outlined the final steps needed to prepare the adopted MTP for publication.

7. DRAFT 2015-2018 METROPOLITAN TRANSPORTATION IMPROVEMENT PROGRAM

Documents: Bend MPO 2015-2018 MTIP, Table 3 – Programmed Projects by Agency, Resolution 2014-05, copy of PowerPoint presentation

Mr. Deke said the City applied for and received ODOT funding to construct sidewalks on 3rd Street from Franklin Avenue to Murphy Road (Key 17731). However, the City was unable to move forward with this project due to federal funding constraints about adding new projects to the 2012-2015 MTIP until the BMPO MTP update was done. He summarized TAC feedback on the proposed amendment to the 2012-2015 MTIP.

Policy Board concerns included when construction would begin (2016) and ADA (Americans with Disabilities Act) compliance.

Motion 2 (3/0/0): Mr. Chudowsky moved to approve the Bend MPO 2012-2015 Metropolitan Transportation Improvement Program amendment as presented. Mr. Farnsworth seconded the motion which passed unanimously.

Mr. Deke discussed the financial summary, review/adoption process, and comments received to date on the 2015-2018 MTIP. Funds obligated for the Bend MPO 2015-2018 MTIP were broken down by jurisdiction and obligation (design, land purchase, utility relocate, construction, other). Projects identified for each jurisdiction included Cascades East Transit (annual operations, bus replacement), City (3rd Street sidewalks and compressed natural gas [CNG] fueling station), County (Skyliners Road), and ODOT (US97 North Corridor, Greenwood Avenue/8th Street, US97 from Romaine Village to Lava Butte, various signal and Intelligent Transportation System improvements). Each project in the 2015-2018 MTIP has identified funding source(s) reasonably expected to be available over the program period. Funding for the 2015-2018 MTIP ($38,221,488) is much less than for the 2012-2015 MTIP (about $90 million).

Policy Board concerns included the scope and impacts of the US97 project from Romaine Village to Lava Butte (pavement replacement, median extension), advance notice to industry to facilitate private investment in CNG technology, alternate fuel technology in new motor vehicles, and City progress on the CNG fueling station.

Mr. Farnsworth invited Mr. Chudowsky and Mr. DeBone to an ODOT Region 4 discussion in October 2014 and suggested Policy Board review of that discussion at its next meeting.

Motion 3 (3/0/0): Mr. DeBone moved to adopt the Bend MPO 2015-2018 Metropolitan Transportation Improvement Program through Resolution 2014-05. Mr. Chudowsky seconded the motion which passed unanimously.

8. ADJOURN

With no further business, Chair Capell adjourned the meeting at 3:42 p.m.