Draft Technical Memorandum #16

DATE: November 28, 2017

TO: Corvallis TSP Project Management Team and Stakeholders

FROM: John Bosket, Mat Dolata, and Kamilah Buker – DKS Associates

SUBJECT: **Corvallis Transportation System Plan Update**
Task 6.1 Transportation Standards

This memorandum recommends transportation system standards for the City of Corvallis, including recommended modifications to the existing standards to be adopted as part of the Transportation System Plan update. Corvallis applies transportation standards and regulations to the construction of new transportation facilities and to the operation of all facilities to ensure the system functions as intended and investments are used efficiently. These standards enable consistent future actions that reflect the goals of the City for a safe and efficient transportation system. Standards discussed within this document include:

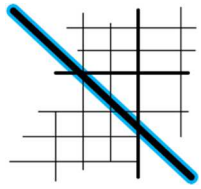
- Street Functional Classification
- Truck Route Designations
- Local Evacuation Routes
- Roadway Cross-Section Standards
- Access Management Standards
- Traffic Impact Analysis
- Mobility Standards
- Local Street Connectivity
- Neighborhood Traffic Management Tools

Street Functional Classification

Street functional classification is an important tool for managing the roadway network. The street functional classification system recognizes that individual streets do not act independently of one another but instead form a network that works together to serve travel needs on local and regional levels. By designating the management and design requirements for each street classification, a hierarchal system is established to support a network of streets that perform as desired.

The recommended functional classification system for roadways in the City of Corvallis is described below. The proposed functional classification map, Figure 1, shows the recommended classification for all roadways in the city, including new street extensions proposed as part of the motor vehicle system improvements (see Technical Memorandum #17).

Classifications shown for County roads inside the Corvallis Urban Growth Boundary (UGB) reflect the City's desired function for those facilities. Although these classifications may not match those shown in Benton County's TSP, Benton County policy is to apply City standards to County facilities within UGBs. Therefore, it is anticipated that Corvallis standards will be applied to County roads located within the Corvallis UGB.



Arterial Classifications

Arterial highway is the functional classification applied for all state highways in the city, including OR 99W, US 20, OR 34, and US 20-OR 34. These highways serve as the primary gateways and main travel routes through the city and generally serve the highest volume of motor vehicle traffic, carrying nearly all the vehicle trips entering, leaving, and passing through Corvallis. Highways are generally for longer motor vehicle trips with limited local access, although the portion of OR 99W through downtown Corvallis also serves as one of the city's main streets and is designated as a Special Transportation Area on the state highway system.

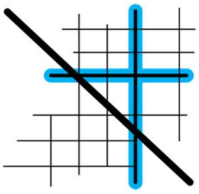
The traffic volume for an arterial highway is generally greater than 10,000 daily vehicles. Managed speeds of 45 mph to 55 mph are applied where high speeds can be accommodated safely. Lower speeds are appropriate in urbanized areas to reflect the roadside environment and surrounding land uses. In the Central Business and other urban commercial areas posted speeds may be reduced to 20 mph to 25 mph. [1]

Due to the higher vehicle volumes and speeds, providing greater separation between pedestrian and bicycle facilities and motor vehicle traffic is preferred on these types of roadways. For example, buffered bicycle lanes can help to improve comfort for people biking and setting sidewalks back from the curb with a planting strip helps improve comfort for people walking.

[1] Corvallis Land Development Code Chapter 4.0 Improvements Required with Development Table 4.0-1

Arterial streets provide a high degree of mobility linking state highways and major commercial, residential, industrial, and instructional areas. Arterial streets are typically spaced approximately one mile apart. They serve high volumes of traffic over long distances, typically maintain higher posted speeds, and limit direct access to adjacent land to support the safe and efficient movement of people and goods. In denser urban areas, speeds may be reduced to reflect the roadside environment and surrounding land uses. Some of the arterial streets in Corvallis (such as Airport Avenue and Lewisburg Avenue) connect to the surrounding areas in Benton County. Others (such as Walnut Boulevard, and Harrison Boulevard) provide routing for cross-town travel. The typical traffic volume for an arterial street is greater than 5,000 daily vehicles and speeds are often managed between 25 mph and 45 mph.

As with arterial highways, providing greater separation between pedestrian and bicycle facilities and motor vehicle traffic is preferred due to higher vehicle volumes and speeds.



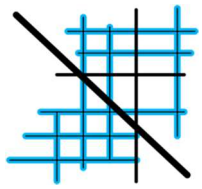
Collector Classifications

Collector and neighborhood collector streets serve a critical role in the roadway network by connecting traffic from Local Streets with the Arterial network within the Corvallis UGB. Collector routes provide access and circulation within residential neighborhoods and commercial/industrial areas. Standard collectors are characterized by a range of uses resulting in a greater intensity of development along its route or at major intersections with other collectors or arterials. Typical land uses include: low to medium high density residential, commercial, or industrial and their associated traffic volumes. The general traffic volume on a collector ranges from 1,200 to 3,000 daily vehicles and speeds are often managed between 25 mph and 35 mph.

Neighborhood collectors differ from collectors primarily by the adjacent land use served, which is generally low to medium density and residential in nature. The purpose of the neighborhood collector is to minimize the impact of traffic to adjacent land uses, while recognizing that collector roadways are still necessary to serve residential areas. Traffic calming techniques may be applied to these roadways as needed at the time of development and reconstruction, or as policy allows. Neighborhood collectors provide more direct access to residences in Corvallis and only serve limited through travel. The typical traffic volume on a neighborhood collector ranges from 1,200 to 2,500 daily vehicles and speeds are managed to no more than 25 mph.

Collectors and neighborhood collectors are generally more comfortable to walk and bike along than arterials and are often easier to cross. Separate bike lanes are

still required, although it is common to place bike lanes directly adjacent to vehicle travel lanes.



Local Street Classifications

Local streets prioritize immediate access to adjacent land over long-distance and through travel. A grid system of relatively short blocks connected by local streets can minimize excessive volumes of motor vehicles and encourage more use by people walking and biking. These roadways generally are lined with residences and businesses and are designed to serve lower volumes of low-speed traffic. Desired traffic volumes are less than 2,000 vehicles per day, although in residential areas, traffic volumes no greater than 1,200 vehicles per day are preferred. A statutory 25 mph speed limit applies in most areas.

Local streets typically provide low-stress travel routes for people walking and biking. Due to lower vehicle volumes and speeds, dedicated bicycle facilities are not required on local streets and cyclists can share the lane with vehicles. Dedicated pedestrian facilities are required, however, curb-adjacent sidewalks on local streets can still provide a high level of comfort for pedestrians.

Note: Proposed roadway alignments are conceptual in nature. Actual alignments could vary significantly and are subject to refinement during development review. However, the location of connections to existing intersections are generally expected to be constructed as shown.

Lewisburg Avenue
Granger Avenue
Belhaven Dr
Frazier Creek Dr
Highland Drive
Shasta Avenue
Elliot Circle
M127
Crescent Valley Dr
Jackson Creek Dr
99W
Lester Avenue
Elks Drive
Conifer Blvd
Ponderosa Avenue
Glenridge Dr
Arrowood Cir
Kings Blvd
Satinwood Street
Walnut Blvd
Conser St
9th Street
Circle Blvd
Spruce Ave
Withham Hill Drive
29th Street
Garfield Avenue
Grant Avenue
State Hwy 99W
20
Oak Creek Drive
36th Street
Fillmore Avenue
Buchanan Avenue
Albany-Corvallis Hwy
Harrison Blvd
30th Street
Arnold Way
Van Buren Avenue
5th Street
2nd Street
Campus Way
Monroe Avenue
Reservoir Ave
53rd Street
35th Street
Jefferson Avenue
34
Washington Way
15th Street
West Hills Road
Western Blvd
Brooklane Drive
Avery Park Dr
Avery Ave
Crystal Lake Dr
Research Way
Country Club Dr
Alexander Avenue
49th Street
45th Place
Plymouth Dr
Park Avenue
Goodnight Avenue
Midvale Drive
Rivergreen Avenue
Kiger Island Drive
Herbert Avenue
Weltzin Avenue
Corliss Ave
Airport Place
Airport Ave
Hout Street

CORVALLIS
TRANSPORTATION SYSTEM PLAN

1 Proposed Street Functional Classification

Existing Roads

- ARTERIAL HIGHWAY
- ARTERIAL
- COLLECTOR
- NEIGHBOR COLLECTOR
- LOCAL

Proposed Roads

- ARTERIAL HIGHWAY
- ARTERIAL
- COLLECTOR
- NEIGHBORHOOD COLLECTOR

- Railroad
- Park
- City Limit
- Urban Growth Boundary

Proposed Functional Classification Changes in Corvallis

The following changes to street functional classifications are proposed for existing roadways to reflect changes in travel behavior in the city and improve the function of the planned roadway network:

Table 1: Proposed Changes to Functional Classification on Existing Roadways

Route	Existing Functional Classification	Proposed Functional Classification
Corliss Avenue (OR 99W to East UGB)	Local Street	Neighborhood Collector
Weltzin Avenue (OR 99W to West Terminus)	Local Street	Neighborhood Collector
Herbert Avenue (OR 99W to West UGB)	Collector	Neighborhood Collector
Airport Place (Airport Avenue to Proposed Roadway M101)	Local Street	Collector
Avery Avenue (Allen Street/Avery Park Road to OR 99W)	Local Street	Collector
Spruce Avenue (9th Street to Highland Drive)	Local Street	Neighborhood Collector
Lester Avenue (Glen Eden Drive to West Terminus)	Local Street	Collector
Whiteside Drive (35th Street to Cascade Avenue)	Local Street	Neighborhood Collector
15th Street (Western Boulevard to Philomath Boulevard)[2]	Collector/Local Street	Collector
Circle Boulevard (29th Street to Kings Boulevard)	Collector	Arterial
Circle Boulevard (29th Street to West Terminus)	Neighborhood Collector	Arterial
Gerold Street (West Hills Road to South Terminus)	Local Street	Neighborhood Collector
Glenridge Drive (Ponderosa Avenue to North UGB)	Collector	Neighborhood Collector
Shasta Avenue (Lewisburg Avenue to South Terminus)	Local	Neighborhood Collector
Elliot Circle (Granger Avenue to North UGB)	Local	Neighborhood Collector

[2] This fixes a gap in existing functional classification where a small section of 15th Street is identified as a local street.

Route	Existing Functional Classification	Proposed Functional Classification
10th Street (Buchanan Avenue to Monroe Avenue	Local Street	Neighborhood Collector
West Hills Road (Western Boulevard to 53rd Street)	Collector	Arterial
West Hills Road (53rd Street to Reservoir Avenue)	Neighborhood Collector	Arterial
Crystal Lake Drive (OR 99W to Alexander)	Neighborhood Collector	Collector
Chapman Place (Crystal Lake Drive to OR 99W)	Neighborhood Collector	Local
9th Street (Washington Avenue to Jefferson Avenue)	Neighborhood Collector	Collector
Washington Avenue (11th Street to 15th Street)	Local	Collector
11th Street (Monroe Avenue to Western Boulevard)	Local	Neighborhood Collector
Garfield Avenue (Highland Drive to 9th Street)	Neighborhood Collector	Collector
Conser Street (Jasper Street to Conifer Boulevard)	Arterial	Collector
Crescent Valley Drive (Jackson Creek to just south of Raider Way)	Collector	Neighborhood Collector
49th Street (Technology Loop to Country Club Driver)	Local	Neighborhood Collector

The functional classifications of proposed future roadways can be found in Table 2. These recommended projects have been identified to improve Corvallis' transportation system from sources such as the 1996 TSP, the South Corvallis Area Refinement Plan, the North Corvallis Area Plan, and to address needs identified through this TSP update process. Proposed future roadways have been assigned a project number for identification purposes (e.g., M101) and will be discussed further in Technical Memorandum #17 (Transportation System Solutions).

Table 2: Functional Classification for Proposed Roadways

Future Route	Proposed Functional Classification
A4: OR 99W/US 20-OR 34 Ramps	Arterial Highway
M6: Circle Boulevard Extension (Witham Hill Drive to Harrison Boulevard)	Arterial
M7: North/South Connection 1 (Airport Road to Goodnight Avenue)	Neighborhood Collector
M11: Reservoir Avenue Extension (35th Street to 53rd Street)	Collector
M12: Kings Boulevard Extension (Kings Boulevard North Terminus to Crescent Valley Drive)	Arterial
M15: Crystal Lake Drive Extension (Park Avenue to Goodnight Avenue)	Neighborhood Collector
M20: North Corvallis Bypass (OR 34 – OR 99W)	Arterial Highway
M58: East/West Connection 1 (Highland Drive to Lester Avenue Extension [M77])	Collector
M59: Circle Boulevard Extension (Harrison Boulevard to Washington Way Extension [M11])	Neighborhood Collector
M64: 29th Street Extension (29th Street to Kings Boulevard)	Neighborhood Collector
M71: Satinwood Street Extension (Satinwood Street to Lester Avenue)	Collector
M74: Rivergreen Avenue Extension (Rivergreen to North/South Connection 8 [M101])	Neighborhood Collector
M77: Lester Avenue Extension (OR 99W to Highland Drive)	Collector
M78: Frazier Creek Drive Extension (Elliot Circle Extension to Frazier Creek Drive)	Collector
M79: North/South Connection 2 (Frazier Creek Drive Extension [M78] to Crescent Valley Drive Extension [M58])	Collector
M90: Elliot Circle Extension (OR 99W/Elliot Circle to North UGB)	Collector
M91: North/South Connection 3 (Frazier Creek Drive Extension [M78] to Lewisburg Avenue)	Neighborhood Collector
M92: North/South Connection 4 (Crescent Valley Drive to Spring Meadows Drive)	Neighborhood Collector
M93: Spring Meadows Drive Extension to Highland Drive)	Neighborhood Collector
M94: North/South Connection 5 (Spring Meadows Drive to Lewisburg Avenue)	Neighborhood Collector
M95: North/South Connection 6 (Lester Avenue to Crescent Valley Drive)	Neighborhood Collector
M98: North/South Connection 7 (Rivergreen Avenue to Airport Avenue Extension [M111])	Collector
M99: Herbert Avenue Extension (Herbert Avenue to East UGB)	Neighborhood Collector

Future Route	Proposed Functional Classification
M101: North/South Connection 8 (Airport Place to Rivergreen Avenue Extension [M74])	Collector
M105: Washington Way Realignment (15th Street to 11th Street)	Collector
M108: Technology Loop Extension (Gerold Street to US 20 OR 34)	Neighborhood Collector
M109: Sagebrush Drive Extension (Sagebrush Drive to 53rd Street)	Collector
M110: Kiger Island Extension (OR 99W to West UGB)	Collector
M111: Airport Avenue Extension (OR 99W to North/South Connection 7 [M98])	Collector
M112: Gerold Street Extension (West Hill Road to Sagebrush Drive Extension [M109])	Neighborhood Collector
M113: North/South Connection 9 (North/South Connection 2 [M79] to Satinwood Street Extension [M71])	Collector
M114: Birdsong Drive Extension (49th Street to 53rd Street)	Neighborhood Collector
M116: Shasta Drive Extension (Shasta Drive to Frazier Creek Drive Extension [M78]	Neighborhood Collector
M117: Raider Way Extension (Crescent Valley Drive and Kings Boulevard Extension [M12]	Collector
M118: East/West Connection 3 (North/South Connection 10 [M120] to 53rd Street)	Neighborhood Collector
M119: North/West Connection (West UGB along 69th Street to West Hills Road)	Neighborhood Collector
M120: 66th Street Extension to West Hills Road)	Neighborhood Collector
M121: North/South Connection 10 (US 20-OR 34 to West Hills Road)	Neighborhood Collector
M122: North/South Connection 11 (Country Club Drive to Plymouth Drive)	Neighborhood Collector
M123: Weltzin Avenue Extension to West UGB	Collector
M124: East/West Connection 4 (53rd Street to Gerold Street)	Neighborhood Collector
M125: North/South Connection 12 (Reservoir Avenue to Walnut Boulevard)	Neighborhood Collector
M127: East/West Connection 5 (Elliot Circle to East UGB)	Neighborhood Collector

The naming convention used by the City of Corvallis for the functional classification system is similar (e.g., collector, neighborhood collector), but not the same as the Federal functional classification system naming convention. The relationship between the Corvallis and Federal functional classification system naming conventions can be found in the appendix. Being able to clearly align these systems will be important for the acquisition of future federal funding.

Truck/Freight Route Designations

Corvallis is located within the state's Western Freight Corridor, which contains some of the major intermodal facilities in the state and moves both heavy and valuable goods to markets around the world.[3] Safe and efficient truck freight movement to and through Corvallis is important for both the local and statewide economies.

Streets designated by ODOT as Freight Routes in Corvallis are recognized as being appropriate and commonly traveled corridors for truck passage. Decisions affecting maintenance, operation, or construction on a designated freight route must address potential impacts on the safe and efficient movement of truck traffic. However, the intent is not to compromise the safety of other street users to accommodate truck traffic, especially in areas where many conflicts may be present. The design and management of the state highways in Corvallis is subject to a number of policies and standards in the Oregon Highway Plan and Highway Design Manual intended to maintain safe and efficient movement of large vehicles.

The City of Corvallis does not currently define designated freight routes. As noted previously in Technical Memorandum #2, US 20-OR 34 (Corvallis-Newport Highway), OR 99W (Pacific Highway West), US 20 (Albany-Corvallis Highway), and OR 34 (Corvallis-Lebanon Highway) are part of the National Highway System (NHS), Federal Truck Routes, and Reduction Review Routes. All the highways except for US 20 are designated by ODOT as Freight Routes as well.[4]

Corvallis could consider designating Airport Avenue as a local freight route due to the regional connectivity it provides and the existing heavy vehicle volumes. Furthermore, Airport Avenue is the only arterial roadway located in the southern portion of Corvallis that provides access to industrial areas.

Local Evacuation Routes

In Corvallis, OR 99W is classified as a Tier 2 lifeline route, while US 20-OR 34 and OR 34 are classified as Tier 3 lifeline routes. Oregon Highway Plan Goal 1, Policy 1E designates routes for emergency response in the event of an earthquake, categorized as Tier 1, 2, and 3. The routes identified as Tier 1 are considered to be the most significant and necessary to ensure a functioning statewide transportation network. A functioning Tier 1 lifeline system provides traffic flow through the state and to each region. The Tier 2 lifeline routes provide additional connectivity and redundancy to the Tier 1 lifeline system. The Tier 2 system allows for direct access to more locations and increased traffic volume capacity, and it provides alternate routes in high-population regions in the event of outages on the Tier 1 system. The Tier 3 lifeline routes provide additional connectivity and redundancy to the lifeline systems provided by Tiers 1 and 2.

[3] Oregon Freight Plan 2011
[4] Technical Memorandum #2: Corvallis Transportation Plan Update Task 3.1 Plan Review Summary, August 6, 2015.

It is recommended that the City of Corvallis create policy to acknowledge Local Evacuation Routes and the importance of protecting their function for regional emergency response. Such a policy could help inform future decisions regarding proposed changes to these corridors. However, since ODOT maintains jurisdiction over all Local Evacuation Routes and has decision-making authority for any proposed changes, the impact of local policy would primarily be to show support for future decisions made by ODOT that protect the function of these routes.

Roadway Cross-Section Standards

Roadway cross-section standards identify the design characteristics needed to meet the function and demand for each facility type for City of Corvallis streets. Since the actual design of a roadway can vary from segment to segment due to adjacent land uses and demands, this system allows standardization of key characteristics to provide consistency, while providing application criteria that allows some flexibility in the design standards. Under some conditions a variance to the street standards may be approved by the City Engineer.

Roadways under ODOT jurisdiction are subject to design standards in ODOT's Highway Design Manual. Similarly, roadways under OSU jurisdiction are subject to design standards set forth in the Land Development Code.[5] Even though they are under ODOT jurisdiction, Corvallis defines cross-sections for Arterial Highways to identify the City's preferred cross-section elements.

Special Designation Standards

Roadway cross-section standards are generally aligned with the functional classification hierarchy described previously. However, there are common situations where special designations like those described below apply different design standards.

Local Connector standards may apply to some Local Streets based on City of Corvallis staff guidance during development review and other transportation planning activities. Using a Local Connector standard allows for greater flexibility to expand the width of local streets where deemed necessary. The managed speed of local connecters is 25 mph but the desired traffic volume remains less than 2,000 daily vehicles.

Local Connectors generally provide some through-traffic functions within developments and access to arterials, collectors, and other local streets. Example applications of the Local Connector standard may include:

- Direct access to a collector or arterial street
- Potential transit route
- Higher traffic volumes than surrounding local streets

[5] Corvallis Land Development Code Section 3.36.60.18 identifies OSU Street Standards and Table 3.36-5 identifies OSU functional classification. These standards may be updated through the ongoing OSU Campus Master Plan effort.

- Fewer driveways than surrounding local streets
- Zoning density of RS-9 or higher

Local Industrial standards may apply to Local Streets in industrial areas. Application of these standards should consider transitions to standard streets and long-range development potential based on comprehensive plan designations. The Local Industrial standards are intended to accommodate large vehicles.

Staff should consider applying Local Industrial standards based on the dimensions of the vehicle trying to navigate the situation and the number or percentage of those vehicles compared to the overall traffic anticipated by the traffic impact study for proposed development or redevelopment. Changes for a Local Industrial standard may include:

- Curb to curb width
- Curb radius at intersections
- Pavement section design and material
- Driveway width

Typical Cross-Section Standards

Planning level right-of-way needs can be determined using typical standards information provided in this section. Table 4 shows the proposed roadway cross-section elements, based on the standards identified in the City of Corvallis Land Development Code (Arterial Highway designations follow the City's preferred design guidelines and are subject to the design standards in ODOT's Highway Design Manual. Design standard ranges listed for state highways are only current at the time of the TSP update).[6] Minor revisions to the current standards for organization, clarity, and consistency are shown in underlined red text.

Figures 2 through 8 illustrate the cross-sections standards for arterial highways, arterials, collectors, neighborhood collectors, local streets, local connectors and local industrial streets. These street standards are compliant with the Oregon Transportation Planning Rule, which specifies that local governments limit excessive roadway widths.[7]

[6] Corvallis Land Development Code Chapter 4.0 Improvements Required with Development Table 4.0-1
[7] OAR 660-012-0045 (7)

Table 4: Proposed Typical Cross-Sections for Corvallis Roadways

	Arterial Highway	Arterial	Collector	Neighbor-hood Collector	Local	Local Connector	Local Industrial
Standard Right-of-Way Width	68 ft. (2-lane, no parking)	82 ft. (3-lanes)	68 ft. (2-lanes)	66 ft. (2-lanes, no parking)	50 ft. (parking both sides)	56 ft. (parking both sides)	50 ft. (no parking)
Curb-to-Curb Width	34 ft. – 74 ft.*	48 ft.	34 ft.	32 ft.	28 ft.	34 ft.	28 ft.
Parking	Not Typical	Not Typical	Not Typical	8 ft. lanes (optional)	shared surface both sides	shared surface both sides	8 ft. lanes (optional)
Auto Amenities	2-5 Lanes (11 – 12 ft.)	3-5 Lanes (12 ft.)	2-3 Lanes (11 ft.)	2 Lanes (10 ft.)	Shared Surface	Shared Surface	Shared surface
Bike Amenities	2 Lanes (6 ft.)	2 Lanes (6 ft.)	2 Lanes (6 ft.)	2 Lanes (6 ft.)	Shared Surface	Shared Surface	Shared Surface
Pedestrian Amenities	2 Sidewalks (6 ft.) Ped. Islands	2 Sidewalks (6 ft.) Ped. Islands	2 Sidewalks (6 ft.)	2 Sidewalks (6 ft.)	2 Sidewalks (5 ft.)	2 Sidewalks (5 ft.)	2 Sidewalks (5 ft.)
Planting Strips[2]	2 (11 ft.) Strips	2 (11 ft.) Strips.	2 (11 ft.) Strips	2 (11 ft.) Strips.	2 (6 ft.) Strips.	2 (6 ft.) Strips	2 (6 ft.) Strips.
Transit	Typical	Typical	Typical	Typical	Permissible / Not typical	Permissible / Not typical	Permissible / Not typical
Traffic Calming[8]	No	No	Not Typical	Permissible	Permissible	Permissible	Not Typical
Preferred adjacent land use	High Intensity	High Intensity	Med. to High Intensity	Medium Intensity	Low Intensity	Med. to High Intensity	Industrial
Access Control	Yes	Yes	Some	No	No	No	Some
Turn lanes[9]	As needed at intersections with Arterials or Collectors	12 ft. Continuous and/or medians with ped. islands	11 ft. Typical at intersections with Arterials or Collectors	Not typical; 10 ft. if needed	Not typical: 9 ft. if needed	Not typical; 9 ft. if needed	Not typical; 12 ft. if needed
Through-traffic connectivity	Primary Function	Primary Function	Typical Function	Typical Function	Permissible function	Permissible function	Permissible function

Notes:

- Changes from development code Table 4.0-1 noted in UNDERLINED RED TEXT
- These standards do not preclude the flexibility currently allowed through the Planned Development process in CLDC Chapter 2.5 Planned Development

[1] Street widths of less than 28 ft. shall be applied as a development condition through the Subdivision process in Chapter 2.4 -Subdivisions and Major Replats and/or the Planned Development process in the Development Code Chapter 2.5 -Planned Development. The condition may require choices between improving the street to the 28-ft. standard or constructing the narrower streets with parking bays placed

intermittently along the street length. The condition may require fire-suppressive sprinkler systems for any dwelling unit more than 150 ft. from a secondary access point.
* To be applied in RS-9 and lesser zones.
[2] The standard is parking on both sides except, where streets must cross protected Natural Features, street widths shall be minimized by providing no on-street parking and no planting strips between the curb and the sidewalk on either side of the street.
[3] Lane widths shown are the preferred construction standards that apply to the existing routes adjacent to areas of new development, and to newly constructed routes. On Arterial and Collector roadways, an absolute minimum for safety concerns is 10 ft.
[4] Center turn-lanes may be 12 feet (minimum) to 14 feet (maximum) on Arterial Highways and Arterials. Arterial Highways are subject to the design standards in ODOT's Highway Design Manual.
[5] An absolute minimum bike lane width for safety concerns is five feet which is expected to occur only in locations where existing development along an established sub-standard route or other severe physical constraints preclude construction of the preferred facility width. Parallel multi-use paths in lieu of bike lanes are not appropriate along the Arterial-Collector system due to the multiple conflicts created for bicycles at driveway and sidewalk intersections. In rare instances, separated (but not adjacent) facilities may provide a proper function. Consideration should be given for additional width for buffered bike lanes/separated bikeways on arterial and higher-volume collectors.
[6] On existing streets, 5-foot minimum sidewalks may be permitted to limit right-of-way impacts.
[7] On streets with curbside sidewalks, 6-foot minimum sidewalks should be included for all roadways, including local streets.
[8] Traffic calming includes such measures as bulbed intersections, speed humps, raised planted medians, mid-block curb extensions, traffic circles, signage, and varied paving materials as identified in the Transportation System Plan.
[9] Turn lanes may be constructed at any intersection, regardless of functional classification, if recommended through a professional engineering traffic study and approved by the City Engineer. The City cannot approve turn lanes on ODOT facilities.

Cross-Sections in Special Situations

Typical cross-section standards are for all new development in unconstrained areas. Redevelopment, areas with Natural Features, Natural Hazards, or other site constraints are special situations that may require non-standard roadway cross-sections. This section describes cross-section standards that may be varied by the City Engineer. Further variation may be allowed through a Lot Development Option, Planned Development, or Capital Improvement Project.

Arterial Highway

- Arterial highways are under the jurisdiction of ODOT and not subject to this section, but may be varied based on State requirements.

Curb-to-Curb Width

- On local streets, curb-to-curb widths of less than 28 ft. may be applied as a development condition through the land development approval process.
- On local streets, curb-to-curb width may be reduced to 25 ft. with parking on one side, or 20 ft. with no parking.
- On local connector streets, curb-to-curb width may be reduced to 28 ft. with parking on one side or 20 ft. with no parking.
- Where streets must cross Natural Features or Natural Hazards, street widths may be reduced by providing no on-street parking on one or both sides of the street.
- Though not typical for new construction, on-street parking may be required on collector or arterial roadways on a case-by-case basis.

Parking

- Though not typical for new construction, there is on-street parking along some collector and arterial roadways. The City Engineer may require, with development or redevelopment, continuation or extension of on-street parking along collector and arterial roadways.

Auto Amenities

- Travel lane widths may be reduced from standard widths, but will maintain these minimums.
- Arterial: 11 ft.
- Collector or Neighborhood Collector: 10 ft.
- Center turn-lanes may be 12-14 ft. on Arterials.

Bike Amenities

- Bike lane width may be reduced to 5 ft. only in locations with existing development along an established sub-standard route or other severe physical constraints preclude construction of the standard facility width.
- Parallel multi-use paths in lieu of bike lanes are not appropriate along the Arterial-Collector system due to the multiple conflicts created for bicycles at driveway and sidewalk intersections. In rare instances, separated (but not adjacent) facilities may provide a proper function.

Pedestrian Amenities

- Existing sub-standard 5 ft. sidewalks may be permitted to remain to limit right-of-way impacts.
- For new streets with curbside sidewalks, the minimum sidewalk width is 6 ft.

Planting Strips

- To minimize right-of-way impacts, planting strips on neighborhood collectors may be reduced to a 6-foot minimum when on-street parking is provided.
- To minimize right-of-way impacts, planting strips may be removed at intersections when providing needed turn lanes.
- Where streets must cross Natural Features or Natural Hazards, street widths may be minimized by providing no planting strips between the curb and the sidewalk on either side of the street.

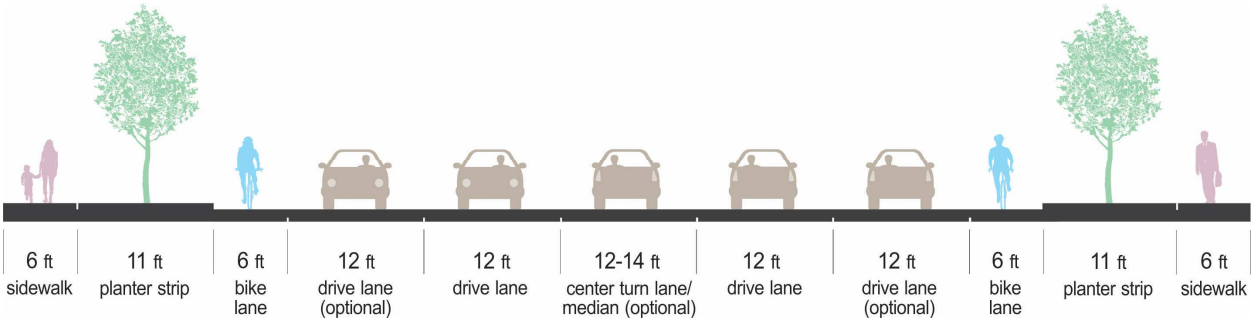


Figure 2: Arterial Cross-section

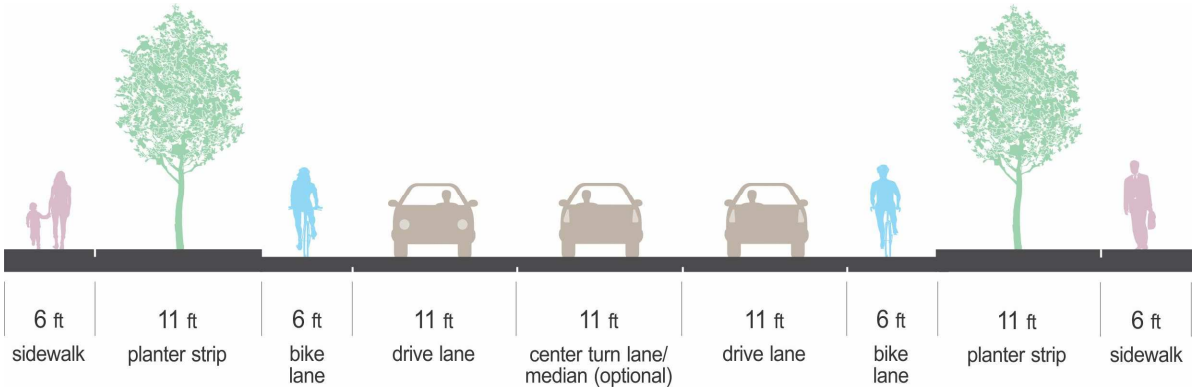


Figure 3: Collector Cross-section

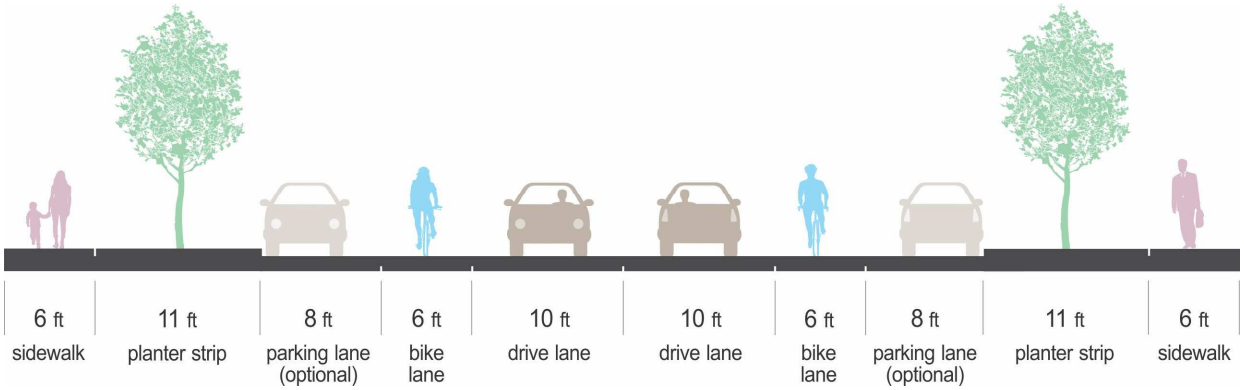


Figure 4: Neighborhood Collector Cross-section

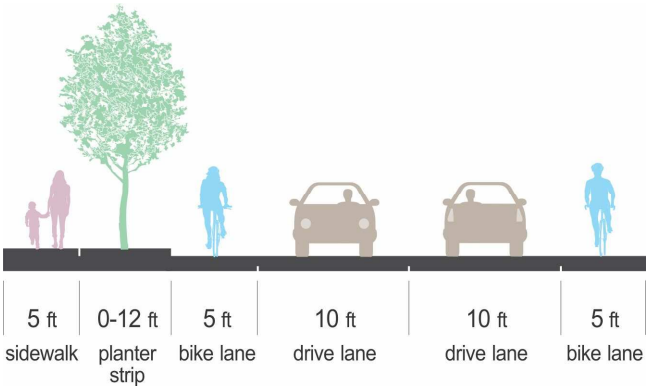


Figure 5: Brooklane Drive Cross-section

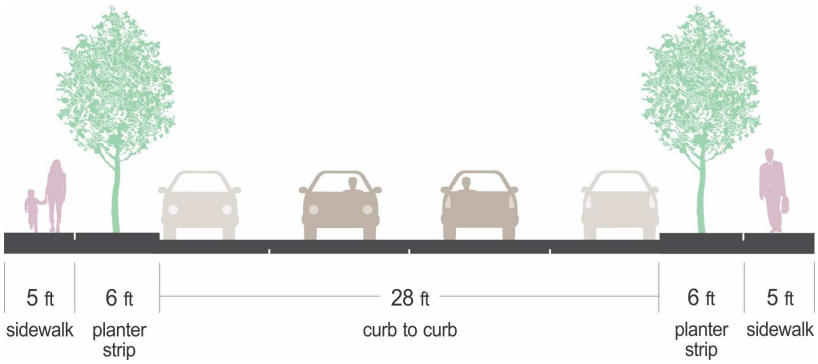


Figure 6: Local Street Cross-section

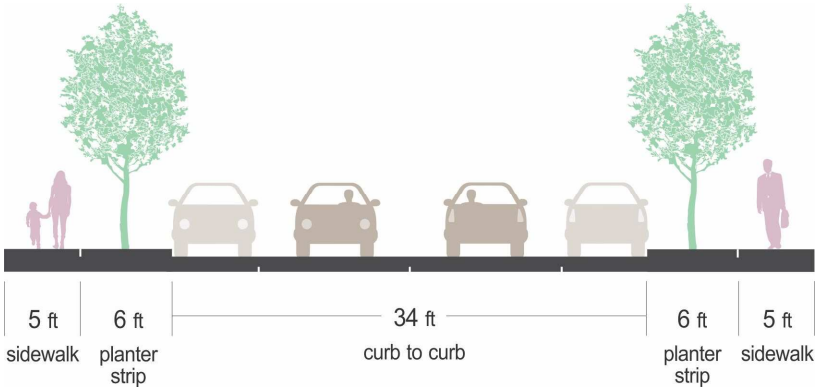


Figure 7: Local Connector Cross-section

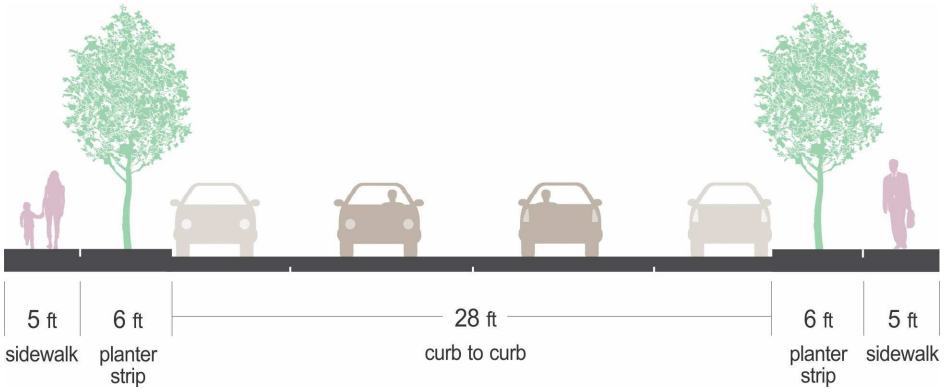


Figure 8: Local Industrial Cross-section

Access Management Standards

The number and spacing of access points, such as driveways and street intersections, along a roadway affects its function and capacity. Access Management is the control of these access points to achieve the desired balance between through mobility and local accessibility consistent with the functional classification of the street.

Access management is especially important on arterial and collector facilities to reduce congestion and crash rates and to provide for safe and efficient travel. Since each access point represents an additional location for potential conflicts, reducing or consolidating driveways on these facilities can decrease collisions and preserve capacity on high-volume roads, maintaining traffic flow and mobility within the city.

Balancing access and good mobility can be achieved through various access management strategies, including establishing access management spacing standards for driveways and intersections.

Corvallis Access Spacing Standards

Existing access spacing guidelines in the adopted TSP (1996) recommend minimum spacing between arterials streets of one mile in a grid pattern (where possible). According to the TSP (1996), driveways on arterials should be spaced 100 to 150 feet apart. In the future planning of development property access should be moved to adjacent collectors and local streets before accessing via the arterial, or should consolidate multiple accesses. Corner commercial sites at the junction of arterials and/or collectors should consolidate driveways away from the intersection a minimum of 300 feet to allow adequate turn pocket lengths.

Several access management strategies were identified and are recommended to improve local access and mobility:

- Develop specific access management plans for arterial and collector streets in Corvallis to maximize the capacity of the existing street facilities and protect their functional integrity.

- Work with land use development applications to consolidate driveways where feasible.
- Provide left turn lanes where warranted for access onto cross streets.
- Construct raised medians to provide for right-in/right-out driveways as appropriate.

It is recommended that new development and roadway projects located on city streets meet the access spacing standards summarized in Table 5. Access points include public streets, private streets, and private commercial or residential driveways. A variation to the access spacing standards may be granted in areas with limited property frontage and/or environmental constraints as well as in established commercial areas (e.g., downtown Corvallis) at the discretion of the City Engineer.

Table 5: Proposed Access Spacing Standards for City Street Facilities

Street Facility	Minimum Access Spacing for Street Intersections	Minimum Access Spacing for Site Access *
Arterial	300 feet	150 feet
Collector	200 feet	150 feet
Neighborhood Collector	200 feet	150 feet
Local	-	-

Note: Intersection and driveway spacing measured from centerline to centerline.
*Minimum access spacing may be reduced with treatments such as shared site access, restricted right-in/right-out turn movements, and medians.

Benton County and ODOT Access Management Standards

Both Benton County and ODOT maintain access regulations for roadways under their jurisdiction. Benton County's access regulations are documented in the Benton County TSP in Appendix B. However, Benton County policy is to apply City standards to County facilities within UGBs. Therefore, it is anticipated that Corvallis standards will be applied to County roads located within Corvallis.

Access Management regulations for the state highways are provided through the *1999 Oregon Highway Plan* and OAR 734-051.

Traffic Impact Analysis

Corvallis's development review process is designed to manage growth in a responsible and sustainable manner. By assessing the transportation impacts associated with land use proposals and requiring that adequate facilities be in place to accommodate those impacts, the City is able to maintain a safe and efficient transportation system concurrently with new development, diffusing the cost of system expansion.

Adopted traffic evaluation and analysis requirements allow the City to assess and mitigate potential impacts of development on transportation facilities. The Development Code (Subsection 4.0.60.a) requires traffic evaluations (estimation of trips associated with the proposed development) for all development proposals. A traffic impact analysis (TIA) must be prepared as part of a development proposal if the proposal is expected to exceed a threshold of 30 or more peak hour trips or to trigger specific safety or capacity issues.

The TIA scope and content is determined by and coordinated with the City Engineer. Pursuant to the Development Code, a TIA must include intersection Level-of-Service (LOS) analyses; LOS standards are established in the TSP. Adopted TSP LOS standards for intersections on Arterial and Collector streets are reflected in Auto Traffic and Circulation policies in Policy 11.3.9 in the Comprehensive Plan.

Subsection 4.0.60.a.2 of the Development Code requires a TIA to include recommended mitigation if the TIA identifies safety issues or LOS conditions below the minimum standards.

Technical Memorandum #3 included a review of Corvallis' Land Development Code and an assessment of the potential gaps that should be addressed in order to maintain compliance with the state Transportation Planning Rule (TPR) (OAR 660-012) and to help the transportation system keep up with planned growth.[8] That review found that the existing Land Development Code already addresses the TPR requirements and no changes are recommended.

Mobility Standards

Mobility standards, or targets, are the thresholds set by an agency for the maximum amount of congestion that is acceptable for a given roadway. Adopted mobility standards can be used to prioritize investment decisions and help the City ensure that transportation facilities are improved in a timely manner to support new growth. If these standards are set too low, the City may experience more congestion than has been determined to be acceptable for the quality of service desired. However, if they are set too high, the cost of meeting them would likely include construction of more paved surfaces and may result in excessive impacts to property and the environment or may discourage future development.

[8] Technical Memo #3: Corvallis Transportation System Plan Update Task 3.2 Regulatory Review, April 24, 2015

Corvallis Mobility Standards

Corvallis' currently adopted mobility standard requires that traffic operations for both signalized and unsignalized intersections meet a minimum performance target of Level of Service (LOS) D during the peak hour. LOS is a "report card" rating (A through F) based on the average delay experienced by motorists. LOS A, B, and C indicated conditions where traffic moves without significant delays over periods of peak hour travel demand. LOS D, E, and F are progressively worse. LOS D, the current mobility standard, equates to a maximum allowed average delay per vehicle of 55 seconds at signalized intersections and 35 seconds at stop-controlled intersections. During all other hours of the day, a LOS of C or better is required. These same standards are applied to streets under Benton County jurisdiction. [9]

The 2040 Baseline scenario (meaning no substantial transportation improvements are made through the year 2040) analysis from Technical Memorandum #12 identified only one intersection under City jurisdiction that would fail to meet the LOS D standard (Harrison Boulevard at 30th Street), while seven others would operate right at LOS D. This indicates that having a mobility standard of LOS D for the peak hour would not be overly restrictive and should continue to serve Corvallis well through 2040. However, there is likely little need to maintain the requirement for operation at a LOS C or better during other hours of the day.

City staff have expressed an interest in exploring a change in mobility standards to one that is volume-to-capacity (v/c) [10] ratio-based (like ODOT uses – See ODOT Mobility Targets discussion below), instead of continuing to use LOS. The ability to consistently calculate v/c ratios tends to be somewhat better than with LOS and City staff believe that v/c calculations often produce results that better match field observations.

While there is no direct correlation between LOS and v/c ratios, a v/c ratio in the range of 0.85 to 0.90 would be roughly equivalent to a LOS D. If the City changed their mobility standard to allow congestion up to a v/c ratio of 0.85 during the peak hour, the number of failing intersections under the 2040 Baseline scenario would increase to nine (Kings Boulevard at Grant Avenue, 9th Street at Buchanan Avenue, Harrison Boulevard at 29th Street, 9th Street at Van Buren Avenue, Highland Drive at Walnut Boulevard, Circle Boulevard at 9th Street, 15th Street at Western Boulevard, 35th Street at Western Boulevard, and Harrison Boulevard at 30th Street), with two more approaching the standard. However, all of these intersections would comply with the standard if recommended improvements are made from this TSP update according to the Illustrative Scenario (see Technical Memorandum #17). Therefore,

[9] Benton County does not have adopted mobility standards at this time. However, the need for County mobility standards will be assessed as part of the County's current TSP update process.

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

if the City desired to change their mobility standard to be v/c ratio-based, setting the threshold at a v/c ratio up to 0.85 during the peak hour may be reasonable.

ODOT Mobility Targets

All intersections under state jurisdiction in Corvallis must comply with the mobility targets in the Oregon Highway Plan (OHP). ODOT uses v/c ratios as performance measures for mobility rather than LOS. The ODOT v/c targets vary with highway classification, special highway designations, area type, and posted speeds. A summary of the mobility targets applicable to Corvallis area highways is provided in Table 6 (pursuant to OHP Goal 1, Policy 1F, Table 6).

Table 6: Highway Mobility Targets

Highway (segment)	Special Designation	Highway Signalized Intersections (v/c)	Unsignalized Intersections	
			Highway Approaches (v/c)	Side Street Approaches to Highway (v/c)
US 20-OR 34	Freight Route on a Statewide Highway	0.85	0.85	0.95
US 20-OR 34 (Western Blvd to Willamette River)	Expressway	0.85	0.85	0.95
OR 99W	Freight Route on a Regional Highway	0.90	0.90	0.95
OR 99W (between Polk Ave and Western Blvd)	Special Transportation Area	0.95	0.95	1.0
US 20	Regional Highway	0.95	0.95	0.95
OR 34	Freight Route on a District Highway	0.90	0.90	0.95

The 2040 Baseline scenario analysis from Technical Memorandum #12 identified 14 of the 18 study intersections under ODOT jurisdiction as failing to meet adopted mobility targets. With the recommended transportation improvements in place from the Illustrative scenario (see Technical Memorandum #17), the number of failing intersections is reduced to three. However, many of the improvement projects required are unfunded and costly. It may be a long time before they are actually constructed, even beyond the horizon year of 2040. This suggests that it may not be reasonable to expect the current mobility targets to be met over the next 20 years and that continuing to apply this standard to state facilities could create a substantial financial burden for future development.

OHP Action 1F.3, of Policy 1F allows local jurisdictions to consider alternative mobility targets for state highways where it would be infeasible to meet adopted targets. A commonly used approach to this is to

apply the v/c targets to an average weekday condition rather than to the 30th highest annual hour. Applying these same state mobility targets to average weekdays would reduce the number of failing intersections under the 2040 Baseline scenario from 14 to 11. Further adjustments to increase some v/c ratio thresholds up to 0.95 would bring five to seven more intersections into compliance.

Considering the high cost of improvements required to meet ODOT's current mobility targets and the limitations that may impose on future development in Corvallis, it is recommended that the City consider working with ODOT to establish a set of alternative mobility targets that are reasonable with respect to anticipated funding through 2040.

Local Street Connectivity

Local street connectivity is required by the state Transportation Planning Rule (OAR 660-012) and is important for Corvallis' continued development. Providing adequate connectivity can reduce the need for wider roads, traffic signals, and turn lanes. Increased connectivity can reduce a city's overall vehicle miles traveled (VMT), balance the traffic load on major facilities, encourage citizens to seek out other travel modes, and reduce emergency vehicle response times. While improvement to local street connectivity is easier to implement in developing areas, retrofitting existing areas to provide greater connectivity should also be attempted.

Corvallis' existing street connectivity is limited primarily by natural features such as hills and wetlands, railroads, large industrial developments, and by areas yet to be developed. The Corvallis Land Development Code[11] regulates proposed development to ensure good transportation system connectivity is provided. This section refers to the TSP for the location of new Arterial, Collector, and Neighborhood Collector Streets. Local Connector and Local Streets are to be located based on an approved street network plan, pursuant to Subsection 4.0.60.c. Street network plans must provide for connectivity within the transportation system, and traffic calming and other management techniques cited in the Development Code should be used to reduce traffic volumes and speeds on Local Streets as needed.

Subsection 4.0.60.o establishes the following block perimeter standards by zone type (Table 7), for areas that are larger than two acres and do not have an established street system. The provisions allow variations of up to 50% under specified conditions, if approved by the City Engineer.

[11] Corvallis Land Development Code Section 4.0.60 (Public and Private Street Requirements)

Table 7: Corvallis Block Length Standards

	Maximum Block Perimeter	Through-Block Pedestrian Connection Required for Block Faces Longer Than X Feet
Residential Zones	1,200 feet	300 feet
Neighborhood Center and Professional and Administrative Office Zones	1,200 feet	250 feet
Other Commercial Zones and Limited Industrial-Office Zone	1,500 feet	400 feet
Mixed Use Employment and Mixed Use Transitional Zones	1,800 feet	400 feet

Land division block standards are based on the requirements above and include requirements that each lot shall abut a street for at least 25 feet, with some specific exceptions (Subsections 4.4.20.02.b and 4.4.20.03.b). The design and construction of connector roadways should evaluate whether neighborhood traffic management strategies are necessary to protect existing neighborhoods from potential traffic impacts caused by extending stub end streets. In addition, in order to establish appropriate expectations, the City should require the installation of signs indicating the potential for future connectivity when development constructs stub streets.

Neighborhood Traffic Management Tools

Neighborhood Traffic Management (NTM) describes strategies that can be deployed to slow traffic, and potentially reduce volumes, creating a more inviting environment for people walking and biking. NTM strategies are primarily traffic calming techniques for improving neighborhood livability on local streets, though a limited set of strategies can also be applied to collectors and arterials (Table 8). Mitigation measures for neighborhood traffic impacts must balance the need to manage vehicle speeds and volumes with the need to maintain mobility, circulation, and function for service providers, such as emergency responders. The Active Transportation Toolkit developed through this TSP update process provides examples of commonly used NTM strategies that Corvallis could consider for future applications.

Table 8: Application of Neighborhood Traffic Management Strategies

NTM Application	Use by Function Classification			Impact	
	Arterials/ Collectors	Neighborhood Collectors	Local Streets	Speed Reduction	Traffic Diversion
Chicanes		✓	✓	✓	✓
Chokers		✓	✓	✓	✓
Curb Extensions	✓	✓	✓	✓	
Diverters (with emergency vehicle pass-through)		✓	✓		✓
Median Islands	✓	✓	✓	✓	
Raised Crosswalks		✓	✓	✓	✓
Speed Cushions (with emergency vehicle pass-through)		✓	✓	✓	✓
Speed Hump		✓	✓	✓	✓
Traffic Circles		✓	✓	✓	✓

The City of Corvallis has a formal neighborhood traffic management program.[12] The traffic calming program provides two goals: reduce speeds in neighborhoods and reduce cut-through traffic on adjacent local streets. The program provides guidelines and a procedure to apply these traffic calming techniques to the Corvallis Neighborhood Traffic Calming Plan (NTCP) addressed in the 1996 TSP.

Any NTM project should include coordination with emergency response staff. Furthermore, priority routes should be identified in conjunction with emergency response staff to avoid the application of NTM strategies.

[12] City of Corvallis Council Policy Manual Policy Area 9 – Right of Way Matter, CP 9.07 Traffic Calming Program 2008.