CITY OF SPOKANE DESIGN STANDARDS *DRAFT V6*

November 13, 2019

STREETS, ALLEYS, BIKEWAYS, AND SIDEWALKS

3.0 Preface

The City of Spokane's adopted infrastructure standards require the design of integrated systems. For streets, this means not only that the full network of streets will function as a system, but that the other systems the streets intersect (transit, bike, emergency response, stormwater) will be seamlessly integrated.

Each section of the standards begins with a brief definition of the topic followed by the design standard.

The following key points guide this document.

- Street design is an iterative process, that entails flexibility and trade-offs. Within the built environment, particularly, physical space might limit what or how specific elements fit together to deliver a desired contextual experience. Decisions may be pushed by regulation, physical constraints, or public opinion, but ultimately should be guided by planned strategies and/or engineering standards.
- Balance is important. To maximize one component often means less achievement of another (prioritizing vehicle speeds degrades conditions for people on foot and bike). The proper balance will vary from place to place in the city.
- Successful design will reflect community priorities, as defined through public outreach activities at planning, scoping, and design levels. Often, achieving a design that balances scope delivery, while accomplishing community goals will require compromise.
- The ultimate focus of street design should be how the street feels for users (drivers, pedestrians, shoppers, transit riders, residents, schoolchildren, etc.) on the ground level, and the desires of the city and community for how they want the space to function.

Transportation facility design will generally be based as either: new infrastructure built to facilitate development activities, or rehabilitation of pre-existing infrastructure. Development of new infrastructure will be held to the requirements here-in to deliver the most appropriate conditions to provide travel through the various urban conditions. Often the existing built environment does not adhere to today's standards, which have been updated over the years to reflect best practices. Thus, rehabilitation work will often require more balancing of priority, and will necessarily vary from the standards due to limitations of space or inadequate meshing of facilities. New Development and Rehabilitation Work, are defined within this standard to provide guidance for the conditions wherein variance from the standards may be acceptable.

3.1 Definitions

AASHTO See Section 1.2

ADA See Section 1.2

ADAAG See Section 1.2

Alley A public or private way designed or intended to provide secondary access to abutting properties. Alleys are generally not intended for through vehicle movements, but are useful to providing access to businesses and residences.

Arterial See *Principal Arterial*, *Minor Arterial*, or *Collector Arterial*.

Bicycle Facilities Facilities designated for use by commuter and recreational bicyclists. The following types of bicycle facilities are identified in the Master Bicycle Plan:

- Neighborhood Greenway
- Shared Lane
- Bike Lane
- Bike-Friendly Route
- Shared Use Path
- Soft Surface Path (unpaved)

Capital Rehabilitation A roadway corridor project that typically replaces the full depth of asphalt pavement, updates curb ramps, and may include utility updates as appropriate. Sidewalk repair, and sometimes replacement, may also be included in a capital project. These projects are administered by the City of Spokane, and the scope of each project is determined in accordance with city plans. As this type of work is done within the built environment, space constraints may impede the full realization of the design standards. Prioritization of standards is generally addressed within this document, but each individual project will need to be scoped with future use conditions in mind.

Center Crown A roadway cross-section with the highest point of the *traveled way* located at the center of the road.

City Engineer Appointed individual overseeing all operations and functions regulated by this title, subject to the authority of the Mayor. See SMC 13.01.0202

Clear Sight Triangle The corner area at an intersection or driveway which must be free of obstructions to provide adequate sight distance. See SMC 17A.020.030N for dimensions.

Clear Zone The unobstructed, relatively flat area provided beyond the edge of the vehicle travel lanes for the recovery of errant vehicles.

Collector Arterial A street providing access and circulation in lower-density residential and commercial/industrial areas. *Collector arterials (consisting of FHWA classifications Urban Major Collector and Urban Minor Collector)* collect and distribute traffic from *local access streets* to *principal* and *minor arterials*. Refer to the Auto Network portion of the City's Comprehensive Plan chapter 4, section 4.4 Modal Elements for additional discussion.

Cross Slope A slope that is perpendicular to the direction of travel.

Crown (Roadway Crown) The term used to define the highest point of the *traveled way* on a roadway cross-section. The City recognizes three types of roadway sections to facilitate drainage: *center crown*, *quarter crown* and *curb crown*, which are defined herein.

Curb Crown A roadway cross-section with the highest point of the *traveled way* located at one curb.

Curb Ramp A ramp constructed in the sidewalk to allow wheelchair access from the sidewalk to the street.

Entrance Gate Queuing Area A length of public or private street on the public side of an entrance gate that allows vehicles to exit the connecting street prior to the gate.

Driveway A cement concrete driveway structure as shown in the Standard Plans.

Fire Lane A road or other passageway developed to allow the passage of emergency vehicles. A fire lane is not necessarily intended for general vehicular traffic usage. Refer to SMC 17F.080 Appendix D for dimensions and requirements.

Greenway A low-volume street that is designed to prioritize pedestrian and bicycle travel. Most often greenways will be implemented on local access streets, and elements of the greenway may disrupt through-travel by automobile as a means of regulating vehicle volume. Greenways are best implemented near and parallel to an arterial street which boasts access to goods and services, thus also providing ready access to users of the greenway. Another crucial element of a greenway is signage that identifies the route as a greenway and provides wayfinding.

Integral Curb and Gutter Concrete curb and gutter which is formed and placed as one unit.

Local Access Street A street that provides access from individual properties to *collector arterials* and *minor arterials* in residential, commercial and light industrial areas. Refer to the Auto Network portion of the City's Comprehensive Plan chapter 4, section 4.4 Modal Elements for additional discussion.

Maintenance Rehabilitation A roadway project conducted by the City of Spokane to refresh the driving surface of the street and thus prolong the pavement service life. These projects are generally confined to the pavement area between curbs. Example treatments may include grind and overlay, chipseal, micro-seal, slurry seal, crack seal, etc.

Median A painted or raised traffic island used to channel, separate and otherwise control vehicular traffic.

Minor Arterial A street providing service for trips of moderate length, connecting the principal arterial system and providing intra-community circulation. Refer to the Auto Network portion of the City's Comprehensive Plan chapter 4, section 4.4 Modal Elements for additional discussion.

Monument A physical survey monument as shown in the City's Standard Plans.

MUTCD See Section 1.2

New Development Development or redevelopment of land adjacent to (and often inclusive of a portion of) the Right of Way, or development of land with the intent of dedicating Right of Way infrastructure. Most private development falls under this category, and occasionally the City of Spokane will develop new streets through vacant or underdeveloped land.

Path Facility designed for use by bicyclists and pedestrians, separated from vehicle traffic by a median or landscaped area.

Pedestrian Buffer Strips Hard surfaced or landscaped areas between travel or parking lanes and sidewalks, also called Planting Strips.

Principal Arterial A street serving major activity centers and providing a high degree of mobility. Refer to the Auto Network portion of the City's Comprehensive Plan chapter 4, section 4.4 Modal Elements for additional discussion.

Private Streets Roadways which are not controlled or maintained by a public authority, and which serve two or more properties.

Quarter Crown A roadway cross-section with the highest point of the *traveled way* located at a distance from one curb of one-fourth the roadway width (as measured from face of curb to face of curb).

Rehabilitation Work Infrastructure updates within the Right of Way typically managed by the City of Spokane. This work may include minor acquisition of adjacent land, but is generally confined to the existing Right of Way width.

Street Classifications *In conformance with FHWA guidance, arterial* and *local access streets* are classified in the Auto Network portion of the City's Comprehensive Plan chapter 4, section 4.4 Modal Elements section as follows:

- Principal Arterial
- Minor Arterial
- Collector Arterial (Major Collector or Minor Collector)
- Local Access Street

Definitions of all of the above classifications are included herein. Private streets are not classified.

Street Character Character consists of refined street definition based upon a street's function within the transportation network (or classification) and its context (land use zoning).

Streetscape or Streetscaping The combinations of living and non-living items that 'dress up' the street. Everything beyond the asphalt makes up the streetscape.

Structural Sidewalks Structural sidewalks shall be defined as all elevated slabs, grates, and panels located within a sidewalk or driveway not supported on grade. Typical examples of elevated structural sidewalks are concrete slabs, steel grates, and steel plates for utility vault lids, service elevator covers, utility covers, and building basements.

Traveled Way The area of roadway which is intended to carry vehicular traffic, not including any shoulders.

3.2 Street Character

Street design is governed by two primary factors: zoning context and classification. Zoning context refers to the environment (land use zoning) in which a street is found. For example, sidewalks must be wider on downtown streets to accommodate higher pedestrian volumes. Street classification speaks to its function within the network, an arterial street with planned bicycle facilities will be built with the facilities the full length of the street regardless of how the facilities might change due to zoning the street passes through. Street Character is defined by the combination of zoning and classification. A principal arterial should have a different character through a CC zone than through a Residential zone.

3.2-1 Street Zoning Application

Spokane's comprehensive plan refers to urban infrastructure contexts for the city. This refers to the land use zoning through which a street traverses and to which the street facilities provide access. Land Use Zoning is defined in Title 17C "Land Use Standards" of the Spokane Municipal Code. Zoning is applied and defined for each land parcel in the city. Streets themselves are not assigned specific zoning, but should take on the context of zoning they front.

Zoning can, for the purposes of selecting street design characteristics, be lumped into four categories: Centers and Corridors, Downtown/Commercial, Residential, and Industrial. While zoning might change multiple times along a given block, street characteristics will necessarily remain constant. Design criteria should be selected for the most generous zoning on a given block, and should be applied block by block. In some instances a street may traverse a different zoning for only one or two blocks, and best judgement should be applied as to whether to shift the street character in such instances.

Motor vehicle volume (Average Daily Traffic – ADT) on a given street should be a strong determinant when considering how the facilities of the street fit together to provide appropriate levels of safety and provision to all users of the street. The street classification is largely determined by existing and planned traffic volume as well as the percentage of freight traffic on the street, and combined with the street type derived from the Land Use Zoning, provides the basis for design expectations for a given street.

Spokane exhibits four street classifications:

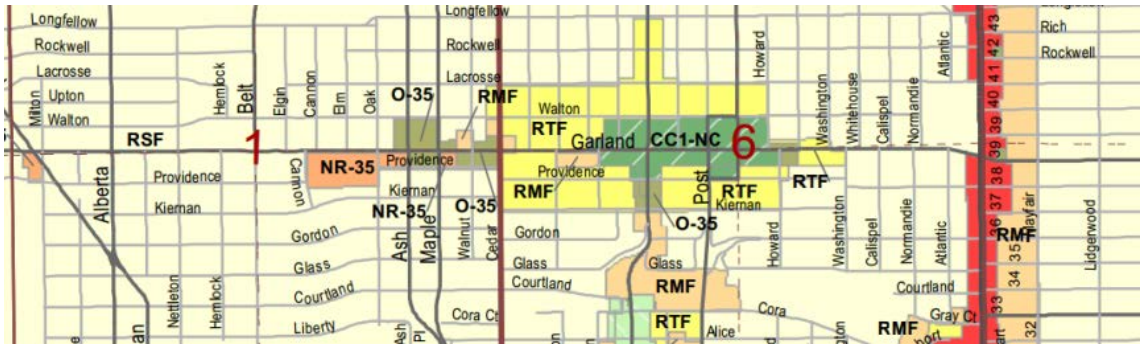
- Principal Arterial – Spokane's largest streets that provide regional connections and serve the highest volumes of traffic.
- Minor Arterials – Similar in design to Principal Arterials, Minor Arterials typically have fewer lanes and connect Collectors to Principal Arterials.
- Collector (Major and Minor) – Streets that circulate through neighborhood hubs and connect to minor and principal arterials. Collector streets are further defined as Major and Minor Collectors depending on traffic volume, but for the purposes of design, these will be treated under the same criterion.
- Local Access – Low-volume and low-speed urban streets providing access to homes and businesses.

In combination, the zoning contexts and street classifications result in sixteen overall street characterizations for Spokane. Street character, identified at the start of a project is the basis for

this design standard, and sets the starting point for decision-making balance through the design process.

Street design for a given street should change with the context. For example, Garland Avenue's zoning changes several times from Alberta to Division, as depicted in Figure 2. Cross sectional design elements for the CC1-NC zone will be selected differently than for the RSF zone. Consult the zoning maps when beginning a street development or rehabilitation project to understand context changes along a corridor that may warrant design adjustments from one stretch of roadway to the next.

Figure 1 – Zoning map (full map available at https://my.spokanecity.org/opendata/gis/)



3.2-2 Special Street Types

There are a few street types that are not classified, but describe conditions to be considered during the design process. See SMC 17D.050A.040U for definitions of more typical street types.

Industrial Routes

Industrial route streets serve the areas where industrial zoning is assigned. Freight routes, as planned for traversing the city, should also be considered Industrial despite other zoning such streets traverse. Due to the high percentage of larger commercial trucks, vehicle lanes are typically wider (11 to 12 feet) to provide sufficient space, which is most important approaching intersections where truck lane changes and turn movements require wider geometric layouts than passenger vehicles. These streets require special attention to factors such as pedestrian crossings, pedestrian visibility, and bicycle facility design to ensure corridors may balance industrial needs and multi-modal functions, particularly where industrial land uses are co-existent with pedestrian-generating facilities.

Yield Streets

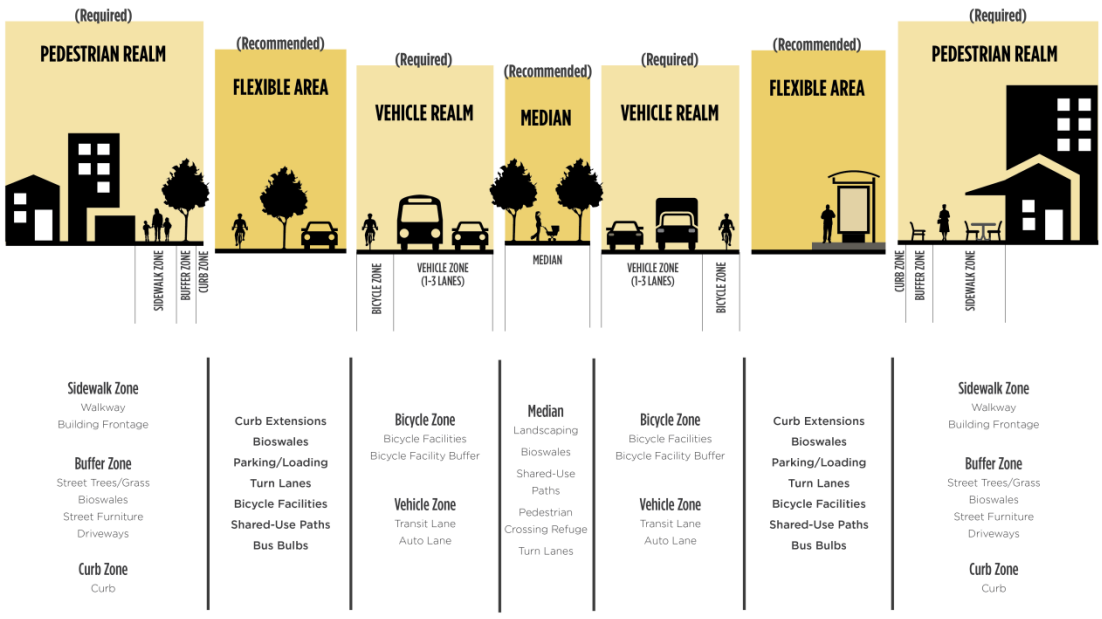
Yield streets are bi-directional streets with a through-way narrower than two cars in width, meaning drivers must yield to each other to pass. Yield streets work best on residential streets when parking utilization is 40-60%, creating a "checkered" parking scheme, which allows drivers to pull over in empty parking spaces or driveways. Yield Streets should only be installed on Local Access Streets with two-way traffic in single-family residential zones that measure 24-26 feet wide with parking on both sides, or 16-20 feet wide with parking on one side. Yield Streets must also have network flow, so dead-end streets must not be allowed to be Yield Streets.

Figure 1 – Example of a Yield Street: Baldwin Ave between N Hamilton St and N Perry St (25-feet curb to curb).

3.2-3 Street Realms and Zones

The cross section of a street includes some elements that are standard to all streets and others that are recommended for certain street character. Within the overarching street areas (Pedestrian Realm, Flexible Area, Vehicle Realm, Median) various elements can be arranged to provide a high-quality street depending on the needs of a given area. By thinking of streets in zones, designers ensure multimodal outcomes by considering all needs in relation to land use zoning context. All Spokane streets must have sidewalks, for example, which fall under a "required" zone, whereas additional elements such as curb extensions or medians can only be built if enough room exists after placing the required elements.

Figure 2 – Street Realms and Zones



The **Pedestrian Realm** includes the area from the property line or building front to the curb and is made up of three primary zones: the sidewalk zone, the buffer zone, and the curb zone, as defined below.

- **Sidewalk Zone.** The sidewalk zone is the area dedicated to pedestrian travel between the buffer zone and the property line. A minimum of 5 to 8 feet of concrete surfacing must be built as defined in the Land Use Zoning. ADA standards also dictate minimum dimensions to be kept clear of obstacles and protruding objects and provide a direct connection along pedestrian access routes. Vending tables, sidewalk cafes, or other activities that protrude into the through-walking space must conform to SMC Section 17C for minimum through-way requirements for the applicable Land Use Zone.
- **Buffer Zone.** The buffer zone is located between the curb and sidewalk zone. This area can be paved or planted, depending on the street character. It may include street trees, parking meters, planters, rain gardens, bioretention swales (overlapping into flexible area), bus shelters, utility poles and boxes, lamp posts, signs, bike racks, news racks and stands, waste receptacles, street furniture and drinking fountains. In addition to the curb zone, the buffer zone provides a buffer for pedestrians from the adjacent roadway and can accommodate snow storage in the winter. Vegetation in this area will generally be maintained by the adjacent property owner, except in the case that such serves a stormwater disposal purpose. In that case, the city will often maintain vegetation.
- **Curb Zone.** The curb zone is a continuation of the sidewalk elevation plane, typically lies between the traveled way and the buffer zone, and consists of 6- to 24-inch-wide elements; although wider elements like bicycle parking or riding facilities are sometimes included. The curb zone will commonly be incorporated into the flexible area for curb extensions or raised cycle tracks, for example. It provides space to open a car door, for vehicle overhangs and for pedestrians to wait for taxis or buses. For those with visual impairments, the curb indicates the border between the sidewalk and the roadway. The curb zone should be free of all objects, furniture, sign posts etc.; particularly adjacent to on-street parking.

Flexible Area. This space between the travel zone – where vehicles and bicyclists move – and the curb zone can be programmed for car parking, bike parking, landscaping, stormwater management (general overlap with buffer zone), pavement-level cycle tracks, shared-use paths, bus bulbs, or curb extensions. Shy space, a distance commonly required on the right side of a vehicle to allow for driver deviation near curbs is also part of this area. Not all streets have enough space for both required and optional elements. Provided here are a menu of options the designer can choose based upon street characterization, environmental responsibility, and comprehensive plan guidance.

Vehicle Realm. This area has two zones:

- **Bicycle Zone.** Consult the Master Bicycle Plan to determine the type of facility and design desired. Depending on the street character, this zone may include shared lane markings, a lane, a buffer between the lane and vehicles, or other components. In some cases the bicycle facilities will be placed in the Flexible Area, such as in the case of a multi-use path or parking-protected bike lanes.
- **Vehicle Zone.** Auto or transit vehicle lanes are included in this zone, including the outer travel lane, inner travel lane(s), and optional Two-Way Left Turn Lane (TWLTL).

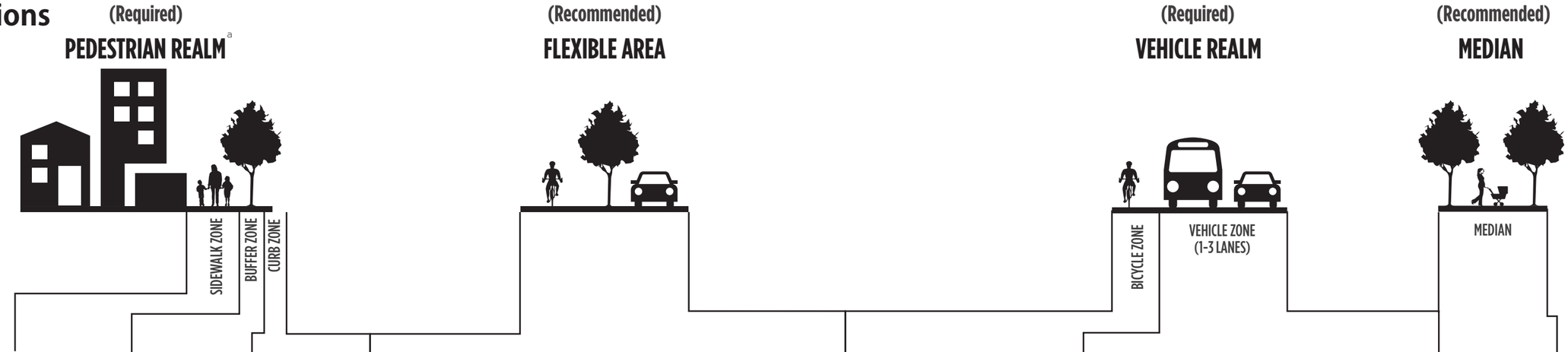
Median. Medians calm traffic, provide refuge for pedestrians crossing the street (especially along wider streets), and present opportunities for landscaping, streetscaping, and stormwater management. Medians can be used midblock in tandem with turn lanes at intersections. Similar to the Flexible Area, not all streets need medians, and when medians are considered, access to

utility access or controls, left turns, alley access, etc. should be maintained where appropriate. Based upon available right-of-way and community input, a menu of options can exist in a median. Pedestrian refuge medians should be installed in accordance with SMC 17H.010.210 and SMC 17H.010.215.

Flexibility in street design may be maintained by referencing a range of possible dimensions rather than prescribing exact requirements. A design, may thus be crafted based upon the unique elements of each street. Street design, particularly within the built environment, requires a range of possible elements and dimensions in order to deliver desired outcomes. Table 1 lays out the target dimensions for street zone elements by street classification and zoning contexts.

Deviations beyond these standards must be approved by the City Engineer.

Table 1 Street Dimensions



	Sidewalk Zone	Buffer Zone[b,c]	Curb Zone	Opt. Shared Use Path[e,f]	Stormwater Management[g]	Curb Extensions[h] / Bus Bulbs[i]	Parking	Bicycle Zone[f]	Bicycle Buffer[k]	Vehicle Zone Outer Lane[l,m]	Vehicle Zone Inner Lane[l]	Vehicle Zone Left Turn or TWLTL	Median[n]
Center & Corridor CC1, CC2, CC3, CC4													
Urban Principal Arterial	8	4	0.5	12	10	7	8	6	2	11	11	11	2
Urban Minor Arterial	8	4	0.5	12	10	7	8	6	2	11	11	11	2
Urban Major/Minor Collector	8	4	0.5	12	10	7	8	6	NA	11	11	10	2
Urban Local Access	5	6	0.5	12	6.5	NA	8	6	NA	10	NA	NA	12
Downtown DTC, DTG, DTU, DTS; Commercial O, OR, NR, NMU, CB, GC; and Form Based Code CA1, CA2, CA3, CA4													
Urban Principal Arterial	7	5	0.5	12	10	7	8	6	2	11	11	11	2
Urban Minor Arterial	7	5	0.5	12	10	7	8	6	2	11	11	11	2
Urban Major/Minor Collector	7	5	0.5	12	10	7	8	6	NA	11	11	10	2
Urban Local Access	5	6	0.5	12	6.5	NA	8	6	NA	10	NA	NA	12
Residential RA, RSF, RSF-C, RTF, RMF, RHD													
Urban Principal Arterial	6	3	0.5	12	6.5	NA	8	6	2	11	11	11	2
Urban Minor Arterial	6	3	0.5	12	6.5	NA	8	6	2	11	11	11	2
Urban Major/Minor Collector	6	3	0.5	12	6.5	NA	8	6	NA	11	11	10	2
Urban Local Access	5	6	0.5	12	6.5	NA	8	6	NA	10	NA	NA	12
Industrial LI, HI, PI													
Urban Principal Arterial	6	6	0.5	12	6.5	NA	NA	6	3	12	12	12	3
Urban Minor Arterial	6	6	0.5	12	6.5	NA	8	6	3	12	12	12	3
Urban Major/Minor Collector	6	6	0.5	12	6.5	NA	8	6	NA	12	12	12	3
Urban Local Access	5	6	0.5	12	6.5	NA	8	6	NA	10	NA	NA	12

[a] In the case of hillside development, defined as low-density development under 10 units per acre, ensure streets are built with 5-foot sidewalks on both sides of the street plus an optional 6.5-foot bio-infiltration swale. On street parking is required on one side of the street. See SMC 17H.010.110 for exceptions.

[b] Per SMC 17C.200.050-1, a tree-planted continuous buffer requires a 5-foot minimum width for commercial zones. For residential and industrial zones, the minimum increases to 6 feet. Alternatively, a narrower buffer may be used in select zones if tree vaults are implemented.

[c] Buffers in commercial areas may be planted or concrete. When stormwater disposal is a governing concern, consideration should be given to use pervious surfaces.

[d] The flexible area includes a menu of options which are chosen based on what maeks most sense according to city plans, environmental responsibilities, and context. In some cases, none of these will fit within the project. Only in very rare cases will more than one fit - for instance, a parking lane plus bio-retention swale.

[e] In places designated for shared-use paths, the path can take the place of the sidewalk zone.

[f] Consult Master Bicycle Plan for guidance on facility type and selection. Possible facilities include bike lanes, buffered bike lanes, and parking protected bike lanes (cycle tracks). Bicycle facilities may operate in the Flexible Area or the Vehicle Realm. Bicycle boulevards and shared roadways are possibilities on Urban Local streets.

[g] Consult the Spokane Regional Stormwater Manual and Eastern Washington Low Impact Development Guidance Manual for desired locations for stormwater facilities. The stormwater catchment area must meet the required volume generated by the planned impervious area.

[h] At intersections and mid-block crossings, provide curb extensions into the parking lane.

[i] On transit corridors, use bus bulbs if space allows to ease boarding, reduce sidewalk congestion, and allow buses to easily re-enter traffic. This should typically be done only if there is a second lane for vehicles to continue around stopped buses.

[j] Care must be taken when applying minimum values for parking and lane width to provide sufficient space as to avoid side-swipe collisions. If adjacent vehicle lanes are selected at minimum width, then parking width needs to be sufficient for a buffer.

[K] Red and orange bike lane routes on the Master Bicycle Plan should include buffers. Separation buffer between bike lane and vehicle lane should be implemented via parallel lane edge stripes with a periodic cross-hatch.

[l] When constraints are prohibitive, consider 10-foot lane width as the minimum.

[m] 12-foot lane includes the width of the gutter pan, if integral curb and gutter is used

[n] A pedestrian refuge should be a raised median with a minimum width of 6 feet. Wider medians up to 30 feet exist and may be implemented where fitting for boulevards.

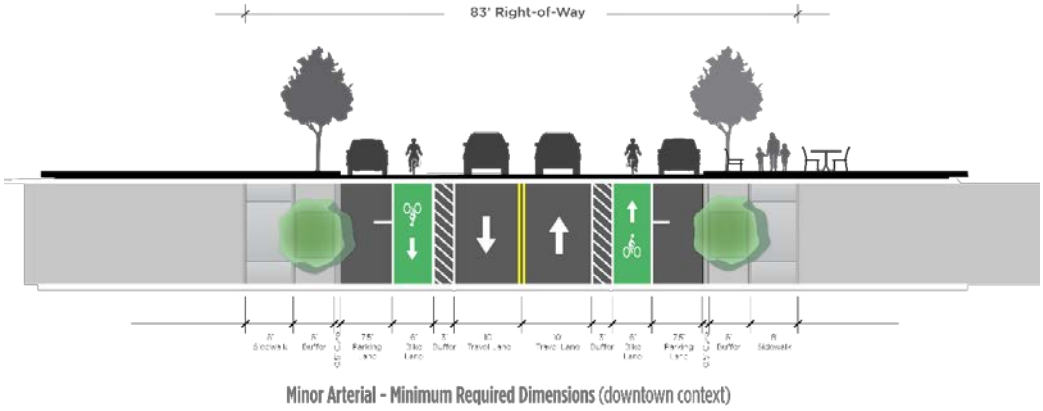
3.3 Right of Way

Follow the guidelines of SMC 17H.010.050 to determine minimum dimensions required for right of way for new development. Rehabilitation work will often seek a balance of uses due to limited available space. Such balance should be determined based on land use context and right of way available.

Narrower right of way widths may be allowed in new development only at the discretion of the City Engineer. Variance requests will be evaluated based on topography, traffic circulation, emergency vehicle access, zoning, utilities, existing development and on-street parking requirements.

Application of Table 1 to a new and existing right-of-way is illustrated below. In some cases, the designer will be laying out a new street (Figure 5).

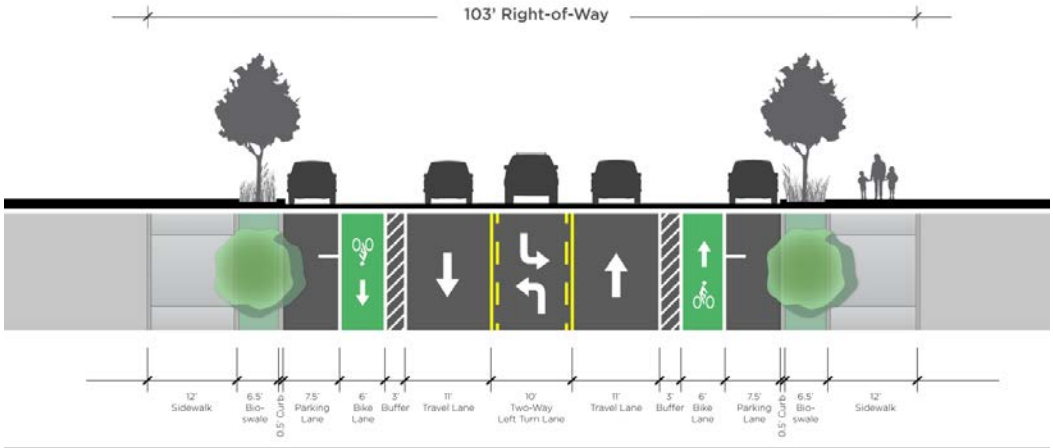
Figure 5 – Sample layout of an Urban Collector



Minor Arterial - Minimum Required Dimensions (downtown context)

In retrofit situations, Minor Arterials built to the city's earlier standards can have space reallocated based upon current pedestrian, bicycle, stormwater, transit, and/or other plans (Figure 6).

Figure 6 –Reallocation of space on example Urban Collector/Minor Arterials



In alignment with city goals (from the Transportation Chapter of the Comprehensive plan) TR A: Promote a Sense of Place and TR B: Provide Transportation Choices to achieve a balanced,

multimodal transportation approach (emphasis on walking, biking, transit) street space must be reallocated if possible to users aside from drivers. Streets carrying ADT of 19,000 or less typically function well as a three-lane road with one lane per direction and a two-way left turn lane. Excess vehicle lanes can be allocated to parking, landscaping, stormwater facilities, bicycle facilities, or widened sidewalks. When undertaking a repaving or reconstruction project on multi-lane streets with ADT of 19,000 or less, designers must undertake a traffic analysis and consider reconfiguring traffic.

3.4 Street Network & Connectivity

Connectivity refers to the density and directness of connections in path or road networks. Well-connected street networks have short links, frequent intersections, and minimal dead-ends or cul-de-sacs. High connectivity creates a more accessible and resilient transportation network, providing direct routes between destinations, multiple route options, and ultimately more capacity.

In designing streets, subdivisions, and retrofitting streets:

- Create blocks no longer than 660 feet in length. In urban settings (dense housing, centers and corridors, downtown, or commercial), strive to create short blocks that foster circulation.
- While rare; when opportunities arise (in the built environment) retrofit areas of the city with existing blocks longer than 660 feet in length with, at minimum, walking and bicycling connections. See Figure 7 for an example.
- When retrofitting areas of the city to create greater connectivity; utilities, emergency access, and maintenance access should be reviewed.

Figure 7 – Baymount Court connects through to Eagle Ridge Blvd for pedestrians and bicyclists.

3.5 Pedestrian Realm Facilities

3.5-1 Sidewalks

Sidewalks are the basic element of walkability, and can be augmented with planted buffer strips, center medians, and street furniture. The sidewalk zone includes both the area in front of a building where cafes or vendors might operate as well as the area for walking through. Ensure that for land uses where cafes and other active frontage uses are expected, appropriate unobstructed sidewalk width for walking is maintained.

Sidewalks shall be located as required by SMC 17H.010.180. Width and profile grade design criteria for sidewalks are outlined in Table 1 and Table 8. Sidewalks shall be designed in accordance with the Standard Plans and City of Spokane GSPs, and may use pervious concrete where feasible (SMC 17C.110.410, 17C.120.230, 17C.130.230). Sidewalks that are elevated 2 feet or more above the abutting property shall have suitable barriers along the edge of the sidewalk.

Where existing, elevated structural sidewalks (vaulted over building basement spaces) are intended to be kept, they shall be designed in accordance with the applicable portions of the latest edition of the Uniform Building Code. The minimum concentrated load, L, to be used in the design shall be 10,000 pounds applied over a contact area of 100 square inches. The minimum single axle load shall be 20,000 pounds. The design tire load shall be 600 pounds per inch of tire width. The construction of new buildings with open space under the sidewalk shall not be allowed, nor shall private utilities for said buildings be placed under the sidewalk.

When development occurs on sites with existing sidewalks; broken, heaved, or delaminated sidewalk adjacent to the project shall be repaired or replaced as part of the project. Locations of sidewalk repair or replacement shall be included on plans submitted to Developer Services for review.

Rehabilitation projects should, where funding sources allow, also consider sidewalk condition and completeness. In some cases a funding source for street rehabilitation may focus solely on pavement, but generally project scoping for capital investment in street rehabilitation should incorporate all transportation elements in the right of way. Existing sidewalk width may fall short of the current standard. Consideration for widening will be a decision during the scoping phase while funding is gathered. Maintenance rehabilitation is not required to adjust sidewalk width or condition of sidewalk parallel to the roadway, but is required to attend to ADA compliance updates at street crossings, in accordance with federal regulations.

3.5-2 Pedestrian Buffer Strips

Buffer strips (separated sidewalk) can add greenery to a street, provide snow storage space, and provide horizontal separation for pedestrians from vehicle traffic. Pedestrian Buffer Strips can be hard surfaced or planted depending on the land-use zoning. The requirements for buffer strips are included in SMC 17H.010.190, which requires buffer strips on both sides of all streets; SMC 17C.200.050, which guides dimensional requirements for incorporating street trees; and Table 1 which compiles the dimensional requirements from each land use zoning as defined in SMC 17C.

Rehabilitation work should include pedestrian buffer strips where space allows in capital projects. However, space limitations may determine availability of this option. Roadway narrowing may be considered when conditions allow, to create the necessary space for pedestrian buffers. Refer to

the Pedestrian Master Plan, and prioritize buffers particularly for projects within pedestrian priority areas. Even creating this condition on one side is preferable to neither side. When creating a buffer on one side, take into account the continuity of pedestrian travel and likely destinations like schools, markets or community facilities. Street maintenance activities (non-capital) are not required to consider linear elements beyond the curblines unless attending to ADA or utility items.

3.5-3 Curbs and Gutters

Integral cement concrete curb and gutter shall be constructed per the City standard plan on roadways with profile grades below 1.0 percent. Special drainage issues may allow the use of alternative curb profiles depending upon road profile and setting, upon approval of the City Engineer. When repairing or replacing existing sections of curb, the type of curb constructed may match the adjacent curb.

The curb radius at alley entrances is addressed in the City's Standard Plans.

Consider curb extensions (bulb-outs or bumpouts) at intersection corners whenever on-street parking is present along the block. Curb extensions shorten the crosswalk width, assure parking setbacks from intersections and crosswalks, and delineate (or "book-end") parking lanes. The extension from the curbline should generally be 1 foot less than the parking lane width, but in some instances additional "shy distance" from the adjacent travel lane may be considered. Curb extensions may also be used midblock to provide traffic calming or to protect a midblock crosswalk. Bumpouts should generally be implemented as part of a series, as singular instances of bumpouts on a corridor could result in a hazard. As discussed in section 3.10, use appropriate design and accommodated vehicles and refer to effective turning radii when designing curb extensions. Curb bumpouts should be constructed with removable candles on the curb line near the travel paths to aid in winter visibility for drivers and snow plowing.

Rehabilitation work should incorporate curb extensions, as described above, when conducting capital work, but not necessarily during maintenance activities.

Figure 9 – Midblock curb extension works to narrow a road adjacent to a school without moving existing curbs

Source: Dan Burden

3.5-4 Curb Ramps

Curb ramps improve access for all – those in wheelchairs, people wheeling strollers, and older adults. Curb ramps shall be designed in accordance with the recommendations of ADAAG, the

WSDOT Standard Specifications, and the City of Spokane Standard Plans and General Special Provisions. Curb ramps shall be located in accordance with the City of Spokane Standard Plans, SMC 17H.010.200, and SMC 17H.010.210E. Rehabilitation activities, whether capital or pavement maintenance, shall include ADA compliance updates as required by federal regulations.

Placing two ADA curb ramps per corner is recommended along arterial corridors, and particularly in Pedestrian Priority Areas as defined in the Pedestrian Master Plan. Ramps should be aligned such that the tactile texture "points" to the opposing ramp across the street. The use of two ramps per corner is most effective where sidewalks are separated from the roadway by a buffer. Where redevelopment is concerned, as well as on local access streets, the use of single curb ramps per corner may be appropriate.

3.5-5 Roadside Planting

Any roadside planting shall conform to the City's clearances/clear zone standards as discussed in Section 3.12 and SMC 17A.020.030N, and SMC 17C.200.050. A permit in accordance with SMC12.02.960 is required for the planting, removal, or pruning of any street tree. Guidelines for proper tree installation can be obtained from the Urban Forestry Department of the Parks and Recreation. Locations of all existing and proposed street trees shall be shown on plans submitted for review.

Existing Street Trees

When development occurs on sites with existing street trees, the following items must be addressed as part of the project:

- All dead or diseased trees must be removed and replaced.
- Trees that are missing shall be replaced.
- Broken or missing irrigation systems shall be repaired or replaced as needed when incorporating new plantings.
- Broken or missing tree grates shall be repaired or replaced.
- All concrete tree grates shall be replaced with metal grates meeting ADA requirements.
- When structural sidewalk is removed and backfilled, concrete planter vaults shall be removed and replaced with an appropriate containment facility providing at least the minimum volume recommended by the Urban Forester.
- Gaps between the tree grate and the soil surface exceeding 2 inches shall be filled in with pea gravel.
- Tree grates that are not flush with the surrounding sidewalk shall be raised or lowered as necessary to prevent a tripping hazard.
- If existing trees have roots that have heaved pavement or sidewalk, work with the Urban Forestry Department to determine an appropriate course of action.

New Street Trees

Tree selection shall be coordinated through the Urban Forestry Department of Parks and Recreation. Approval shall be obtained from the City Engineer and the Urban Forester prior to planting tree(s) in the City right of way.

In an effort to assist in the selection of an appropriate tree, the City has published a document entitled "Spokane Urban Forestry Approved Street Tree List" which is included in Appendix F.

Not all of the trees appearing on this list are acceptable for every situation. Requests to plant trees not included on the list will be considered on a case-by-case basis. The Urban Forestry Department of Parks and Recreation can provide the most current list.

When locating street trees, the following specific criteria shall apply. In the case that these criteria would prohibit planting of street trees, the Urban Forester and City Engineer may elect to make exceptions:

a) Street tree installations shall meet all City of Spokane visibility requirements as defined by sight triangle clearances.

b) Street trees shall be located so as to not interfere with street signs, lighting poles, STA stops or pads and to accommodate ADA pedestrian requirements. Also tree locations should consider the tree canopy reach, and the impact that may have on fire aerial operations.

c) Minimum separation distances from the centerline of a tree to other structures or improvements in the planting strip shall be as follows:

1) 15 feet to edge of driveway;

2) 25 feet to street light luminaire (15 feet may be allowed where lighting pattern is not affected);

3) 15 feet to hydrants and utility poles. No new utility pole location shall be established closer than 5 feet to an existing tree;

4) As required to provide an adequate clear sight triangle as defined below and shown in the Appendix;

5) 5 feet to underground duct or pipe;

6) 10 feet from curb cut for drainage;

7) 20 feet from drywell;

8) and shall conform with the Tree Guidance Ordinance and maintenance standards

d) Trees that are suitable for wet areas shall be selected for planting within bioretention or biofiltration areas. Trees that are planted within bioretention or biofiltration areas shall not interfere with, obstruct, or retard the flow of water in the stormwater facility.

e) Spacing of street trees will be determined by the permitting department. Contact the Urban Forestry Department of Parks and Recreation for more information.

f) If trees are to be planted in an area with no planting strip, the following criteria shall apply:

1) A permanent, hard walking surface at least four feet wide shall be provided between the tree well or planting area and any structure or obstruction.

2) Sidewalk cuts in concrete for tree planting shall be at least 48-inch x 48-inch as shown on the Standard Plans to allow air and water to the root area. Regardless of the sidewalk cut size, the soil volume below the sidewalk should facilitate the minimum volume requirement for root growth as determined by the Urban Forester.

3) In cases where the existing walk cannot meet the four foot width requirement after tree planting, additional sidewalk width must be added within street right of way or an easement or the tree position must be modified.

g) Irrigation systems shall be required for all areas where street trees are planted. Where appropriate, irrigation may be provided by adjacent property owners.

h) Any proposed deviation from these conditions shall require submittal of a written request/ explanation to the Department of Engineering Services or Developer Services and shall be subject to review and approval by the City Engineer and/or the Director of Parks and Recreation.

Low-Impact Development Stormwater Treatments

Conventional stormwater management infrastructure is engineered to convey the largest volume of water from a site as quickly as possible, collecting surface runoff in subsurface structures.[1] Sustainable stormwater management, by contrast, views rainwater as an amenity, using it to improve urban ecology, microclimates, air quality, and the aesthetic quality of the public realm.

Low impact development design utilizes landscaping, engineering, and urban design tools to mimic natural watershed capabilities.

Figure 3 – Lincoln Street stormwater management

Stormwater facilities that fit the urban landscape, particularly in retrofit situations, are described below. Consult the Spokane Regional Stormwater Manual and Eastern Washington Low Impact Development Guidance Manual for detailed standards and placement guidance. Some tools for Low Impact Development are listed below.

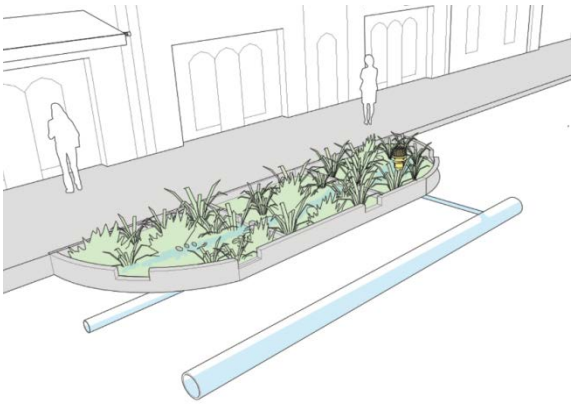
Bioretention Facilities

Bioretention facilities are shallow landscaped depressions that receive stormwater from small contributing areas. They can be integrated into the site as a landscaped amenity because they are small-scale and dispersed. Bioretention facilities can be placed flexibly within medians, curb extensions, or public space. Maintenance of bioretention facilities involves vegetation management, soil replacement, and sediment and debris removal. In some cases it may be preferable to pipe stormwater to a nearby site where a single large bioretention facility can be constructed. This option must be enacted in accordance with the stormwater development

[1] "Chapter 3, Fundamentals of Stormwater Management," *New Hampshire Stormwater Manual* (Concord: New Hampshire Department of Environmental Services, 2006).

guidelines. City rehabilitation maintenance and capital may have more flexibility to operate in this manner due to the extents and connectedness of the right of way.

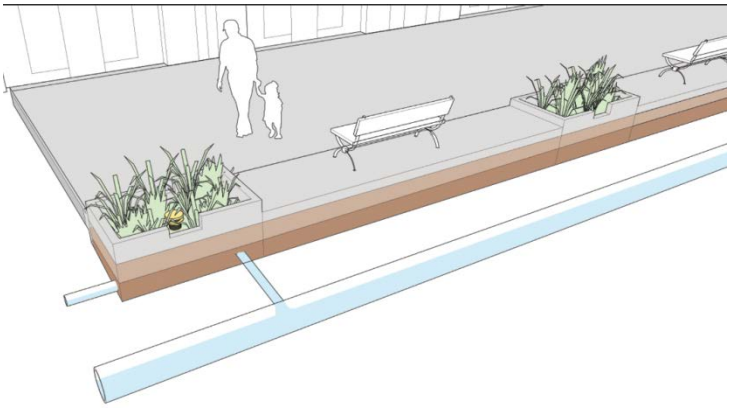
Figure 11 – Bioretention facility



Flow-through planters

Flow-through planters work best in high-density urban areas, constrained sites next to buildings, or areas with poorly draining soils. They are typically used in retrofit situations. These have an impermeable base, but allow runoff to soak through soil and into an underdrain system via a perforated pipe. Maintenance of flow-through planters involves vegetation management, soil replacement, and sediment and debris removal.

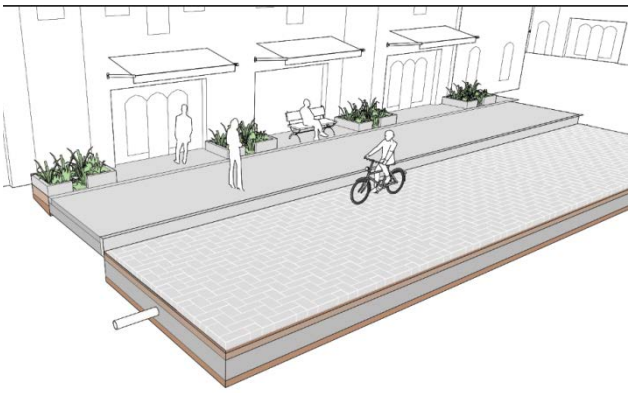
Figure 12 – Flow-through planter



Permeable pavement

Permeable pavements can be used in sidewalks, furnishing zones, or for the whole roadway. Do not use pervious pavement on travel lanes of roads with high volumes and extreme loads, or where hazardous materials, dirt, or anything that could clog the pavement are loaded and unloaded. Permeable pavements, work well in parking lots, sidewalks, residential streets, medians, driveways, and fire lanes. Maintenance of permeable pavement involves street sweeping, leaf pick up, and may include pressure washing and vacuuming.

Figure 14 – Permeable pavement



3.6 Bike Facilities

Bicycle facilities shall be employed where designated in the City's Comprehensive Plan and in the Master Bicycle Plan, and shall be designed in accordance with SMC 17H.010.260. Implementation of planned bicycle routes should be prioritized whenever rehabilitation work is conducted, and new development should consider implementation of bicycle facilities to appropriately tie into the planned or existing network.

Side slopes adjacent to bikeways shall meet the requirements of Table 3. Minimum widths for bicycle facilities are shown in Table 1.

Consult the Bicycle Master Plan for design details on each bike facility type, and consider factors such as ADT, speed limit, and number of lanes when designing the bicycle facilities. Bicycle facility dimensions include the gutter pan. The combination of a single-direction bicycle lane with a bicycle buffer should provide a comfortable facility for users. The overall dimension should not be less than 6 feet without a buffer, or less than 7 feet with a buffer. This wider dimension accounts for curb-side obstructions or door zone dangers. Stress analysis research shows intersections are the toughest part to navigate, especially for people interested but concerned about cycling for transportation. Consult the MUTCD and NACTO Bikeway Design Guide for corridor and intersection treatments.

Green paint should be used only in high conflict areas. Examples of high conflict areas include marking a bike lane through an intersection where there are heavy conflicting right turn movements, marking a contra-flow bike lane through an intersection, or marking the entrance to a right-turn only lane where vehicles must cross the bike lane. Green paint can also be used to connect corridors that are otherwise unclear, or when introducing bicycle facilities newly to a corridor.

Buffered bike lane design should use a parallel line buffer design rather than cross-hatching to minimize the maintenance expense. Short lengths of cross-hatching may be used between parallel lines near conflict zones (intersections or driveways) to better communicate the purpose of the parallel lines as bike lane markings. Vertical elements may be introduced into the bike lane buffer. Certain types of planters may be used in downtown. Reflective plastic bollards may be appropriate elsewhere.

Greenways are residential bikeways that prioritize bicycle and pedestrian travel over vehicle through-put. Several tools may be employed to create a greenway. Generally a greenway will be sited on a residential street paralleling a nearby arterial street. Thus connections to destinations along the arterial are readily accessed, though the stress experienced by the walker or biker are much lower. Prioritizing pedestrian and bicycle traffic is achieved by providing appropriate facilities for these modes of travel and by calming or reducing vehicle traffic flows. Greenways are commonly attributed with slow speed, minimum stop signs, and protected crossings of arterial streets.

Some greenway tools include signing and intersection treatments. Signage should be used to highlight the designated greenway, and should also provide distance-based wayfinding to community destinations for bicycle and walking traffic. Intersection treatments are particularly important to the success of a greenway. Intersections with arterial streets need to provide safe and functional crossing methods for bicycle and pedestrian traffic. Intersection treatments might also be used to dissuade vehicle traffic from the greenway. This can be done through limiting turn movements onto the corridor from more busy streets or even by diverting traffic off of the corridor at lower volume intersections. It is important that these treatments are used only on designated greenway corridors, as the impact to neighborhood traffic patterns can be significant.

3.7 Vehicle Realm Access and Parking

3.7-1 Access Management and Driveway Design

Driveway locations shall be designed to provide for safe operations and minimal disruption of traffic flow. In general, the higher the street classification, the fewer the number of access points that are allowed. In areas of high-density housing, shared driveways are encouraged. Multiple unshared driveways that have minimal separation between them are discouraged. Driveways add conflict points to the street network. Minimize driveway width and place them to minimize conflict and maximize safety.

Access management enables better property access by allowing people to get off the main road and circulate through a block. On higher speed streets, frequent access points become a safety hazard for all users. Reduce the number of driveways per property to reduce conflict points across all modes, as appropriate and when opportunity arises.

Access management (i.e. consolidation or reduction of the number of driveway access points along a corridor) may be conducted during rehabilitation capital projects. However, driveway installations and renovations are generally completed as part of new development and must adhere to the following:

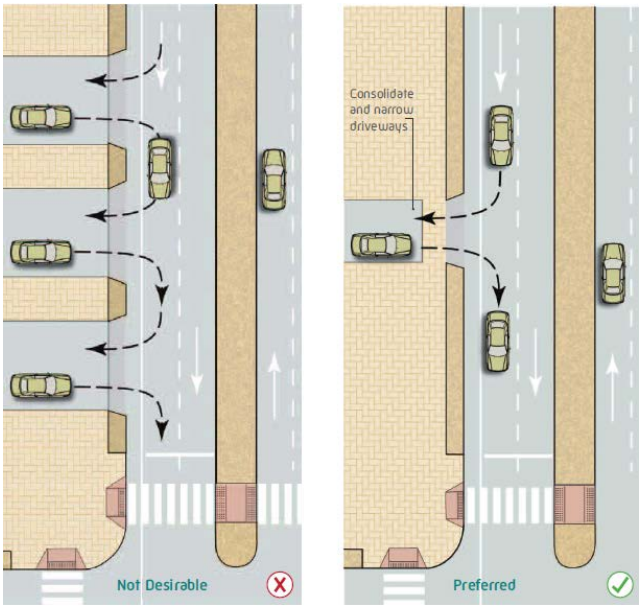
- **Encourage Alley Development to Reduce Driveways on Streets with Bike/Ped Activity**. Alleys provide alternative access to adjoining properties. Require utilization of these alleys instead of driveways to reduce the number of access points on main streets. Develop new alleys where possible to provide this alternative access.
- **Design Driveways to Favor Pedestrians and Bicyclists**. Driveways should not be designed as small intersections, but as minor curb cuts. Sidewalks over driveways should not be sloped as part of the driveway meeting the street. The sidewalk should be dominant over the driveway, and the material used to delineate the sidewalk should continue through the driveway. See Standard Plans for examples.

- **During Street Projects, Assess Closure of Driveways**. When street projects are undertaken, evaluate the potential for consolidating driveways along the street to reduce the number of access points. Where streets do not meet the established driveway spacing standard, require new development and consider opportunities during rehabilitation capital street paving/rehabilitation project to address this.
- **High Volume Commercial Driveways**. On case-by-case basis, commercial driveways should be considered for implementation that will fulfill commercial access requirements without impacting vehicular flow along adjacent streets. Such driveways should be considered in areas where high volume deliveries are required, where the receiving business may be likely to have a designated loading dock. Commercial driveways may also be considered in a dense commercial center, where multiple businesses could share commercial delivery space without restricting parking availability for customers. It is critical that this type of driveway design does not over-ride the facilities for the most vulnerable users, such as pedestrians. If visibility is a challenge for commercial vehicles entering or exiting, warning systems may be installed to warn drivers and pedestrians alike of an approaching vehicle.

Figure 15 - Brick sidewalk pattern is continued over the driveway to establish pedestrian dominance.

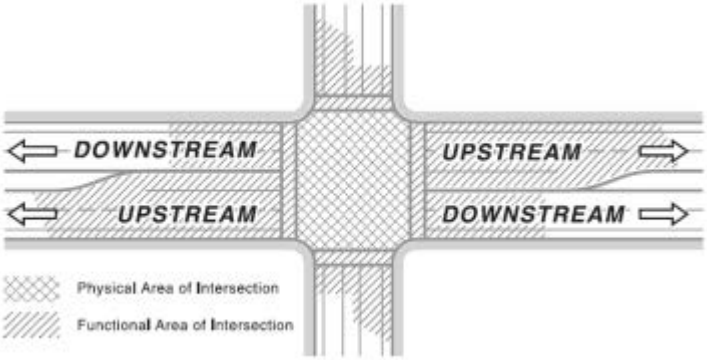
Figure 16 - Continuous Sidewalk Design Establishes Pedestrian Space over Driveway

Figure 17 – Consolidated driveways increase safety for drivers and pedestrians



Access Management Standards

- Principal and Minor Arterial driveway spacing: 125 feet
- Collector driveway spacing: 90 feet
- Local Residential driveway spacing: one per parcel for new development
- Driveways shall be located outside the Functional Intersection Area at signals (area beyond physical intersection that includes decision and maneuvering distance), or in the alternative, may be restricted to right-in, right-out per ITE Access Management.



- One driveway per commercial parcel with one additional access point per frontage street allowed if the property frontage is over ¼ mile in length and the site generates more than 100 PM peak hour departing trips.
- Commercial driveway approaches should be at least 75 feet from the point of curvature of a public road curb return on arterial streets and at least 30 feet for local access streets.
- For commercial driveways handling high volumes, a deceleration lane may be provided approaching the driveway, as justified by a traffic study or operational analysis. The driveway design must still maintain a tight turning radius to foster low speeds.

- Residential driveway approaches may not be closer than 15 feet from the point of curvature of a public road curb return on arterial streets and 10 feet for local access streets.
- Limit the Width of Driveways. Driveway width should be no more than 40% of the frontage (SMC 17H.010.220).
- Restrict Driveways near Bus Stops and Intersections. Do not place driveways within 100 feet of major intersections and 50 feet of other junctions, including bus stops, crosswalks, and small intersections.
- Shared driveways is a strategy to consolidate the number of access points along a block to reduce the number of potential conflict points between motorists and pedestrians. Driveways can be consolidated in instances where a single parcel has multiple access points, or where neighboring parcels may share parking resources. Driveway consolidation typically occurs during redevelopment as parcels and land use along a corridor change. Guidance for shared driveways for Single Family Residential Zoning development projects is found in the Infill Access and Utilities Standard.
- See additional access standards for Downtown Zones in SMC 17C.124.280 and Residential Zones in SMC 17C.110.535.

Standards for State Highways

- Specific access standards apply for state highways within the City limits, which are classified as managed access facilities. Managed access is based on the premise that access rights of a property owner are subordinate to the public's right and interest in a safe and efficient highway system.

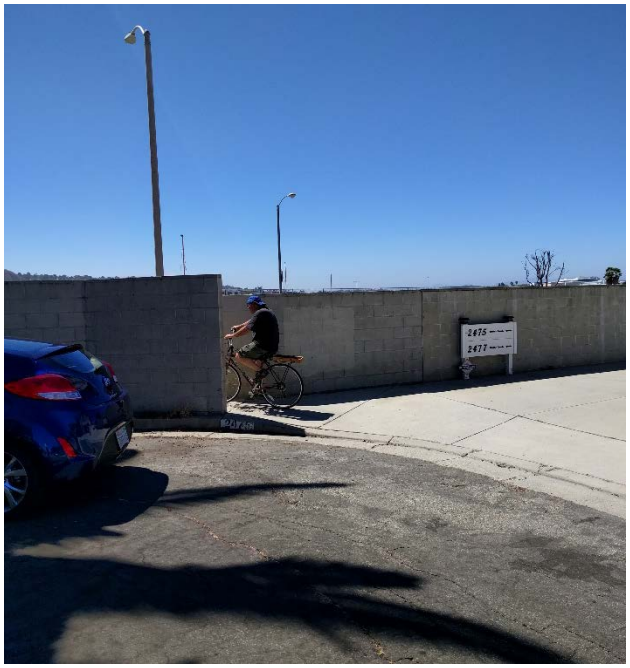
In accordance with Chapter 47.50 RCW, the City adopts by reference, the provisions of Chapter 468-52 WAC, together with all future amendments, in order to regulate and control vehicular access and connection points of ingress to and egress from, the State Highway System within the incorporated areas of the City of Spokane.

3.7-2 Turnarounds

Cul-de-sacs limit connectivity, lengthen emergency response time, and create a physical barrier between residents and trip generators. SMC 17H.010.080 restricts the construction of new cul-de-sacs unless specific conditions are met.

In new developments, require a "stub-out" future roadway connection at the end of a street that will connect to future development. Connect existing turnarounds to any pedestrian and bicycle trails in the vicinity to close a gap in the walking and bicycling network.

Figure 18 - Example of bicycle and pedestrian connection from a dead-end street, providing additional connectivity.



If cul-de-sacs are provided, use the following types:

- **Standard Cul-de-sac**: The standard cul-de-sac is preferred for construction on local access dead end streets. The radius point of the bulb is on the street centerline. Install a stub-out at the end of the turnaround.
- **Offset Cul-de-sac**: An offset cul-de-sac has a radius point offset from the centerline, with one curb being tangent to the bulb curb. Like the standard cul-de-sac, it is intended for use on local access dead end streets.
- **Temporary Cul-de-sac**: A temporary cul-de-sac is similar to the standard cul-de-sac but allows for planned street continuation. Curbing is not installed in the temporary cul-de-sac, and the roadway dimensions resume at the terminus in preparation of further street construction (the terminus is suitably blocked to eliminate immediate access). When the street is extended, new curbs are constructed along the roadway tangent, extending from the end points of the original curbs and the excess asphalt is removed.
- **Hammerhead**: The hammerhead termination may be used on local access dead ends, but is primarily intended for use in dead end residential alleys. Construction of a hammerhead termination on local access streets is allowed only on approval of the City Engineer.

The following specific design criteria shall apply to the design of cul-de-sacs:

1. Cul-de-sac islands may be an option for any permanent cul-de-sac. The island area shall be finished in a manner approved by the City Engineer.
2. Minimum curb radius for the bulb shall be 50 feet plus the radius of a center island, if used.

3. Minimum right of way radius for the bulb section shall be 56 feet plus the radius of a center island, if used. If the sidewalk is to be located on an easement, the minimum right of way radius is 51 feet.
4. Unless otherwise approved by the City Engineer, cul-de-sacs shall be designed to "drain out" to the adjacent street to avoid flooding if the storm drainage system fails.
5. Cul-de-sac profiles shall be established to provide minimum 2% grades at all places along the gutter lines.
6. Provide a 14-foot wide connection (10-foot path plus 2-foot buffers) for pedestrians and bicyclists along fences separating two yards

3.7-3 Entrance Gates (Where Allowed) and Queuing Area

Proposed entrance gates (as allowed under limited circumstances) shall be designed in accordance with SMC 17H.010.100 and shall not interfere with emergency vehicle access. An adequate fire lane must be provided. If a center island is used, a minimum 14-foot wide lane between the face of curb and center island shall be provided. The center island shall not extend past the end of the gate when it is fully opened. In a case where there is no center island, the minimum road width is 20 feet. No parking on either side of the street will be allowed within 48 feet of the gate on both sides of the gate. The no parking zone shall be clearly signed on both sides of the gate. When fully opened, the gate shall not block access to structures or fire hydrants.

Gated streets require a queuing area to allow vehicles to exit the connecting street prior to the gate. The queuing area must be at least 48 feet long (measured from the intersecting curb line) to accommodate fire vehicles. Queuing areas longer than 150 feet will require a public turnaround designed to City Standards.

3.7-4 On-Street Parking

Parking lanes allow drivers and bicyclists to park their vehicles in the public right-of-way, providing convenient access to businesses and homes, and offering loading zones for freight vehicles. Carefully managed, on-street parking can offer traffic calming, economic development, and access benefits. On-street parking lane widths shall be in accordance with SMC 17H.010.120, the City's Comprehensive Plan and/or as directed by the City Engineer. Requests for a reduced street cross-section will be evaluated on a case-by-case basis and a waiver of the on-street parking requirement granted at the discretion of the City Engineer. Parking and utility access locations should not share the same space. When conducting rehabilitation work that refreshes the paved surface, there is opportunity to re-balance the uses of space. The scoping of such projects should consider the need for parking or access points, which offset one another. Consolidation of access driveways can provide additional parking space. This must be done in coordination with adjacent property owners, and in accordance with access management standards.

Parking Lane Width

Parking on arterial streets must be accommodated by 8-foot-wide parking lanes. Parking width on residential streets may be narrower, but the street must meet minimum width requirements defined in SMC 17H.010.060.

Bicycle Lanes Adjacent to Parking

When bicycle lanes are included in the Master Bicycle Plan, consult Table 1 for the desired bicycle lane width to be used in tandem with parking lanes. Ideally, provide a buffer between the bike lane and travel lane, allowing cyclists to ride outside the parked car "door zone". Where parking has a high usage and turnover, consider using parking-protected bike lanes with a door zone buffer to reduce conflicts between bikes and cars.

Angle Parking

Angle parking may increase parking supply if sufficient uninterrupted curb length is available, and is useful in mixed-use areas and retail and commercial districts. Angle parking tends to create a traffic calming effect by inducing caution for motorists driving adjacent to the parking zone. Refer to the city's standard plan G-60 for dimensions.

Utilize back-in angle parking, which requires the driver to back into the space; particularly when placed adjacent to bicycle lanes. This allows drivers to load vehicles from the sidewalk, improves driver-bicyclist visibility as the driver departs the space, and increases safety for the driver as the person can pull out into traffic rather than blindly backing up into traffic.

Other Parking Lane Uses

New uses of the parking lanes such as bike corrals and parklets increase the use of the public space for active living, placemaking and recreation.

Bike Corrals

Bike corrals expand the amount of bicycle parking on a street without taking valuable space away from the sidewalk. Bike Corrals typically replace one parking space at the request of a local business or property owner and accommodates 12-24 bikes. Corrals can be installed at corners to "daylight" an intersection since bicycle parking has minimal effect on the visibility of pedestrians to moving vehicle traffic. Bike corrals have been shown to have a positive impact on nearby business.[2] Corral location must consider:

- Safety for users
  - Set corral back from travel lanes in a parking lane
  - Use corrals on streets with low speed limits and low parking turnover
- Rack placement
  - Perpendicular to curb/roadway for wider parking lanes
  - Angled racks better for narrower lanes
- Land uses
  - Commercial and retail uses have more demand for corrals
- Design
  - Demarcate corral with bollards, rubber curbs, and striping. Planters and reflective bollards may also be used.

[2] Meisel, Drew. Bike Corrals: Local Business Impacts, Benefits, and Attitudes." Portland State University. http://bikeportland.org/wp-content/uploads/2010/05/PDX_Bike_Corral_Study.pdf

Before installing a bike corral, require a maintenance agreement between the city and a local business owner or community organization who will maintain the corral and clear it from snow, dirt, or debris.

Parklets

Parklets repurpose street right-of-way, often motor vehicle parking spaces, into publicly accessible spaces for all to use. Parklets provide additional public space for people to sit, enjoy meals, meet others, and use for art and plantings. Parklets help communities reimagine the role of the public street.

Before installing a parklet, require a maintenance agreement between the city and a local business owner or community organization who will maintain the space and clear it from snow, dirt or debris.

Requirements for parklet design, planning, and maintenance can be found in the SMC 10.55 Parklets and Streateries.

3.7-5 Alleys

Alleys shall be constructed in accordance with SMC 17H.010.130 and the Standard Plans. All alleys shall have a minimum paved width of 12 feet with a 4-foot buffer strip on each side. The buffer strips may be paved, grassed, or graveled. The buffer strip may be used for utilities, but must be kept free of all vertical obstructions. Fences may not be placed in the buffer strip.

Rehabilitation work will generally re-pave alley entrances to assure level matching of paving to the alley surfacing. Alley paving projects must comply with ADA standards where intersecting with sidewalks.

3.8 Vehicle Realm Geometrics and Facilities

3.8-1 Profile Grades

The maximum profile grade for all streets, alleys, and pathways is 8%. A variance may be granted by the City Engineer considering topography, safety, maintainability, function, and emergency vehicle access. The minimum profile grade for all streets, alleys, and pathways is 0.8%. Cul-de-sac profiles shall be established per section 3.7-3. The profile grade at all residential intersections, along minor roadways at arterials, and for all roadways at controlled intersections shall be no greater than 3% at any point within 100 feet of the near end of the curb radius on minor roadways.

Rehabilitation maintenance work need not correct profile grade issues, except as possible to eliminate minor inconsistencies. Rehabilitation capital projects should address needed profile improvements.

3.8-2 Horizontal Curves

Horizontal curves are to be determined in accordance with normal civil engineering procedures, considering design speeds, sight distances, roadway crown, building proximity, and vertical grades. For arterial streets with speeds of 30 mph or higher, A 100-foot horizontal curve radius shall be considered the minimum unless otherwise authorized by the City Engineer. The maximum superelevation on horizontal curves shall be 2%. The minimum horizontal curve radii shall be determined per AASHTO Design for Low Speed Urban Streets, based on design speed,

which shall be the posted speed limit, and considering the roadway crown. Pavement widening on horizontal curves to accommodate large vehicles shall be considered per AASHTO Chapter III - Elements of Design, Table III-23.

Rehabilitation maintenance work need not correct horizontal curvature issues, except as possible to eliminate minor inconsistencies when the roadway is not bounded by curbing. Rehabilitation capital projects should address needed horizontal curvature improvements within a reasonable effort and cost.

3.8-3 Vertical Curves

Refer to Table 2 for sag and crest vertical curve design criteria.

Rehabilitation maintenance work need not correct vertical curvature issues. Rehabilitation capital projects should address needed vertical curvature improvements, as possible while matching adjacent buildings and driveway grades.

3.8-4 Roadway Side Slopes

Roadway side slopes shall meet the requirements of Table 3; special sloping may be required to meet minimum sight distances.

Rehabilitation maintenance need not correct side slope issues. Rehabilitation capital projects should address needed improvements, particularly where safety has proven to be compromised due to obstructions to sight distance.

3.8-5 Roadway Drainage

Stormwater collected within the roadway must be effectively routed to drainage facilities, such that flow accumulations and pooling are minimized, or otherwise efficiently dissipated. Minimum roadway profile grades are shown in Table 4. Standard Plan W-101 provides a chart for selecting a roadway crown section based on roadway width and curb height differential. Refer to the City's Standard Plans for cross-section and staking data. For vertical curves, the designer's attention is called to the limiting K-value factors shown in Table 2.

Generally, no more than three lanes should be sloped in any one direction. On wide streets, a quarter-crown or center-crown cross-section is recommended, or the designer may consider stormwater collection at the median.

Refer to Section 3.5-5 herein for stormwater disposal methods and design requirements. New development and re-development treatment requirements are addressed in the stormwater design guidelines.

3.8-6 Pavement Markings

Design plans for pavement markings shall be approved by the City Engineer prior to construction. Plans shall include all existing and proposed striping, show the full width of the street, and show existing conditions beyond the proposed development. Any existing markings that are to be removed shall be clearly designated.

Rehabilitation maintenance and capital work shall incorporate markings for all users of the street as determined within this standard for planned pedestrian, bicycle, and vehicular facilities.

3.8-7 Through Traffic Lanes

Refer to Table 1 for traffic lane design width guidelines.

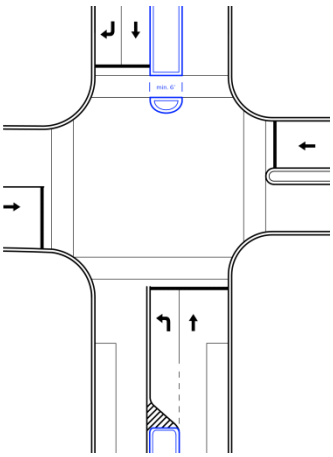
Rehabilitation maintenance and capital work shall incorporate markings for all users of the street as determined within this standard for planned pedestrian, bicycle, and vehicular facilities.

3.8-9 Exclusive Turn Lanes

Left and right dedicated turn lanes widen the intersection, often require adding another signal phase, and thus lengthen the overall delay for users. Dedicated turn lanes should be used only when specifically determined by an engineering analysis to solve congestion issues. The engineering analysis should consider the impact not only on the target intersection, but also the surrounding street network. Refer to appropriate MUTCD guidelines for design and application of dedicated turn lanes.

If left turn lanes must be provided, match with a pedestrian refuge on streets wider than three lanes (Figure 21 below). Ideally, provide a refuge of at least 6-feet. In connected networks, left turns can be restricted at periodic intersections to avoid having long exposed pedestrian crossings at every intersection.

Figure 21 – Pedestrian refuge at left turn lane pocket



Rehabilitation maintenance work need not incorporate roadway reconfiguration projects, unless planned as a follow-up to rehabilitation capital work that conducts such changes, and thus would otherwise leave pavement patching.

3.8-10 Tapers

The standard taper length for narrowing or offsetting of a lane shall be based on the design speed, per the U.S. Department of Transportation Manual on Uniform Traffic Control Devices (MUTCD).

3.8-11 Medians

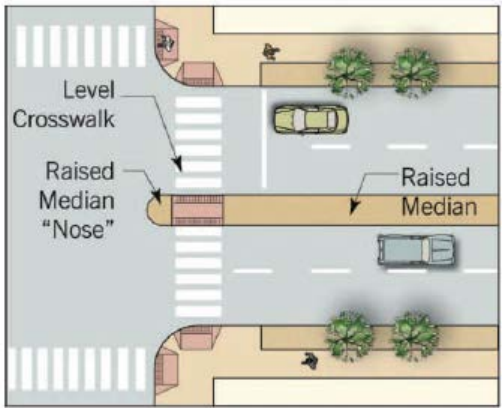
Build medians in accordance with Table 1 on new streets. In retrofit situations, vehicle lanes could be narrowed to add pedestrian refuge islands or medians at unsignalized marked crosswalks on

principal or minor arterials in dense zoning[3]. Pedestrian refuge islands should be considered for wider street crossings. A minimum of 6 feet is required for a pedestrian refuge median (8 feet is optimal). However, in retrofit situations a narrow pass-through may be more desirable than no island at all. A narrow median pass-through can provide a place for crosswalk warning signage and also work to reduce vehicular speeds by visually narrowing the roadway.

Streets with existing 16-foot wide medians could accommodate both the turn lanes and pedestrian refuge islands. This amount of space would allow 10 feet for turn lanes and 6 feet for a pedestrian refuge.

Medians, where constructed, shall not exceed 600 feet in length without a break that allows emergency vehicles to cross through the median and continue in the same direction (S-Turn movement). The break in the median does not need to allow for U-turn movements. Consider the space required for turning movements when installing in tandem with bulbouts. At crosswalks, protect the crossing with a raised median nose (Figure 23).

Figure 23 - Protecting crossings with a median tip provides safety from turning traffic.



Rehabilitation maintenance work need not adjust nor replace medians. Rehabilitation capital projects should consider the space used by the median, and the utility of that space to be maintained as median or other uses. Pavement and median condition should be considered as possible replacement items during scoping of capital work.

3.8-12 Bus Zones

Transit riders must walk along and often cross the street to access and exit their bus stop. Transit-supportive design provides safe and convenient walking routes considering every passenger's trip from start to finish. Transit stops play an important role as part of the streetscape; with the integration of quality bus shelters, wayfinding maps, real-time information systems, and other key features, bus stops have the potential to enhance the public realm.

Stop Placement

Stop placement must be determined through discussion with STA. Locate bus stops in safe and secure locations where they meet both passenger and operational needs. Each intersection and potential bus stop exhibits unique characteristics that should be considered. Near and far side

[3] Per crosswalk ordinance https://static.spokanecity.org/documents/projects/crosswalkordinance/adopted-crosswalk-ord-c35141.pdf

stops at signals both have pros and cons. Locating stops on the far side reduces conflicts between right-turning vehicles and buses, but can also result in traffic queues through the intersection. Far side stops also allow buses to clear the intersection and efficiently continue operations. Near side stops place the riders closer to the crosswalk. Coordinate all stop placements with STA such that operations are directly considered.

Provide safe and convenient pedestrian crossing facilities at all bus stops.

Locate safe, convenient, and ADA-accessible crossing facilities at or near all bus stops matched to street type. Bus stops on the far-side of intersections require pedestrians to cross behind the vehicle. On the far-side, provide an 80-foot no parking zone with the bus stop located at the far end of the zone.

Where it is impractical to locate bus stops on the far side, near side bus stops should be located at least 5 feet from the intersection crosswalk to ensure pedestrian visibility and space to load/unload bicycles. Provide a 100-foot no parking zone with the bus stop located at least 5 feet from the crosswalk, preferably 10 feet away. No parking zones will need to be longer for bus pullout conditions. Refer to route bus size and Transit Authority plans for routes along the roadway when selecting the proper facility type and size.

Ensure minimum levels of amenities are located at each bus stop.

Bus stop amenities encompass the infrastructure present where passengers wait for transit vehicles. They include physical infrastructure such as seating, shelters, and lighting, and informational infrastructure like transit maps or real time information boards. Bus stops with higher levels of activity typically have more intensive infrastructure.

Coordinate with STA to ensure shelter location, seating, schedule information, and properly located bus stop signs do not interfere with pedestrian zones and accessibility.

- **Paved and Accessible Waiting Areas.** Provide a paved waiting area that is ADA accessible. In most cases, a sidewalk can serve this purpose, although on busy streets a bus stop may have colored or stylized pavers to differentiate the waiting area from where pedestrians move through the stop. The waiting area should be large enough for ADA compliant space as requisite for boarding and alighting. Higher-use transit stops may warrant additional paved frontage for queueing passengers.
- **Supply Secure Bicycle Parking Where Demand Warrants.** Secure bike parking at bus stops encourage people to ride bikes to transit, expanding the reach of transit for many users. Provide leased bike lockers, on-demand eLockers, and basic bike racks where appropriate. Locate basic bicycle parking such as staple racks at all HPT stops and bicycle lockers at all park-and-ride locations. Other optional parking facilities include bike corrals or covered parking areas.

Rehabilitation maintenance work is performed between curb lines, and need not address transit facility updates. Rehabilitation capital work should coordinate closely with the needs of current and future transit facilities and incorporate these as appropriate.

3.8-13 Roundabouts

Roundabouts will be reviewed in every case and shall be designed in accordance with WSDOT's design standards. Roundabouts are intended for arterials and collectors. Roundabouts ease congestion and improve safety at skewed or five-leg intersections.

Typically, roundabouts are larger scale facilities, as they are intended for use along arterials and collectors as previously noted. They facilitate traffic flow without the need for signalization. Roundabouts generally reduce the number of conflict points for vehicles in the intersection and reduce the severity of collisions between vehicles. Design is critical to facilitate safe travel for bicyclists or pedestrians to limit conflicts at the legs of the intersection. While vehicle safety is generally improved, improper design can degrade safety for bicycle and pedestrian travel.

Rehabilitation maintenance work will generally be applied to roundabout surfaces, but implementation of these facilities would qualify as rehabilitation capital work.

3.8-14 Asphalt Binder Selection

All Hot Mix Asphalt binder and aggregates used in the traveled way shall conform with WSDOT specifications, and meet the requirements for durability and performance.

These specifications apply to all rehabilitation maintenance and capital work.

3.8-15 Pavement Section Thickness

The minimum asphalt thickness shall be in accordance with Standard Plan W-101A. As noted in W-101A, the City Engineer may require a pavement design for local access (residential or commercial) streets. This will be evaluated on a case-by-case basis. All arterials require a pavement design, which shall be approved by the City Engineer. A rational pavement design for either arterials or residential streets must contain the following:

1. Traffic Loading – an estimate of the number and types of loadings that roadway will carry for the design life. This estimate of loading must be established by a procedure accepted by the City Engineer and be expressed in 18-Kip Equivalent Single Axle Loads (ESAL's).

2. Subgrade Support—a representative value for the stiffness of the native material on which the road will be built. This value will be established by a procedure accepted by the City Engineer and be expressed as resilient modulus (MR). When determining MR, soil sampling is to include:

a) Obtaining a sufficient number of soil samples which adequately represents the subgrade MR, and where significant changes in MR occur;

b) Constructing a soil log to a minimum of five foot depth below proposed subgrade and classify the soil per USC; and

c) Recording the location of where the samples were obtained, normally by station and offset. This record shall be provided to Engineering Services.

3. Analysis- a procedure for establishing the surfacing depth requirements for a given traffic loading and subgrade resilient modulus. The City Engineer must approve this procedure. The following procedure is pre-approved: Guide for Design of Pavement Structures (26), 1994 the American Association of State Highway and Transportation Officials (AASHTO).

The pavement design life is 20 years for new construction and 15 years for pavement overlays. The structural pavement calculations, soil sample locations, lab results, design criteria and recommendations are to be included in a report prepared by the sponsor's engineer. All design factors used are to be listed in the report, including traffic loads projected to occur over the life of the pavement. The report is to be stamped by an engineer, licensed in the State of Washington.

These specifications apply to all rehabilitation maintenance and capital work.

3.8-16 Pavement Patching

The City of Spokane has adopted a pavement cut policy which has been included in Appendix F. All pavement cuts for utility work and patches shall be designed and constructed in accordance with this policy and the City of Spokane GSPs[4].

These specifications apply to all rehabilitation maintenance and capital work.

3.8-17 Survey Monuments

At a minimum, monumentation shall be provided in the following locations:

a) At center of each cul-de-sac

b) At point of curvature on all horizontal curves

c) At point of tangency on all horizontal curves

d) On the roadway centerline at the end of every plat.

Monument pins with cases shall be installed at these locations in accordance with the City's Standard Plans.

These specifications apply to all rehabilitation maintenance and capital work.

3.9 Neighborhood Traffic Calming

Traffic calming increases safety through vertical and horizontal measures, and by reducing traffic in residential neighborhood areas. Install traffic calming strategically to protect vulnerable users, reduce speeds in areas exhibiting safety concerns, and as part of the city's Neighborhood Traffic Calming Program. Tools include:

- Horizontal measures – Chicanes, intersection and midblock curb extensions, traffic circles
- Vertical measures – Raised crosswalks, tabletop intersections
- Traffic reduction – Diverters, medians with walking and bicycling cut-throughs

A formal neighborhood traffic calming program is presently administered by the City. Included in the program is a "Traffic Calming Toolbox", outlining the basic options for solving concerns within any given neighborhood. This toolbox, although not exhaustive, is a good reference for optional traffic calming elements within capital or development projects.

Implementation of traffic calming is required only for approved applications. New developments may include traffic calming measures as appropriate, subject to approval of the City Engineer. Rehabilitation maintenance and capital projects will install traffic calming elements as programmed.

3.10 Intersections

Intersections represent the most complex pieces of the network. They are the place at which multiple modes meet and need to pass safely through. Keeping intersections compact increases

[4] https://static.spokanecity.org/documents/business/designstandards/2018-general-special-provisions-for-private-contracts.pdf

eye contact between users, and making them legible or intuitive means each user knows where he or she belongs. Follow these principles of intersection design:

- Make intersections as compact as possible
- Identify utility maintenance access in design considerations
- Analyze intersections as part of a network, not in isolation
- Design intersections as shared spaces
- Integrate space and time; for example adjust signalization timing to improve flow rather than widening

The maximum centerline distance between intersections shall be 660 feet. The minimum recommended centerline distance is 150 feet. In general, intersections should be at right angles. The minimum acute intersecting angle for streets shall be 70-degrees. For stop sign-controlled streets the 70-degree (tangent) portion shall extend along the controlled street a minimum of 30 feet from the end of the curb radius. For all cases, the effects of sight distance shall be considered.

Rehabilitation maintenance projects may implement adjustments to striping patterns, but will not be expected to adjust curb placement except as necessary for ADA compliance measures. Intersection design principles should be reconsidered for rehabilitation capital projects. This is particularly important if there are high incidents of collision, but may also be important if the use patterns have evolved since the original construction; i.e. a new industrial area has developed.

3.10-1 Crosswalks

Ensure safe pedestrian crossings along centers and corridors, and near pedestrian generators. The crosswalk standards are outlined in SMC 17H.010.210 and SMC 17H.010.215.

- **Include crossings at generators.** Provide marked crosswalks along centers and corridors and near schools, parks, hospitals, churches, trail crossings, and other pedestrian generators that require safe crossings.
- **Placement**. In the Downtown, Commercial, Centers and Corridors, and Form Based Code zones, and along principal and minor arterials, stripe each leg of every intersection (both signalized and unsignalized).[5] Use midblock crossings to accommodate significant pedestrian generators. Marked midblock crossings must be approved by the City Engineer.
- **Design**. In the Downtown, Commercial, Centers and Corridors, and Form Based Code zones, provide a minimum 6-foot pedestrian refuge at unsigalized crosswalk locations where the total crossing is 3 or more lanes.
- **Striping.** Refer to City of Spokane standard plan.
- **Stop bar.** Refer to City of Spokane standard plan.

3.10-2 Intersection Controls

- Time pedestrian signals based upon a walking speed of 3.5 feet per second per MUTCD.

[5] Full ordinance https://static.spokanecity.org/documents/projects/crosswalkordinance/adopted-crosswalk-ord-c35141.pdf

- In downtown, use **signal progression** to calm motor vehicle traffic and reduce congestions. Along designated bikeways, set signal timing to a moderate biking speed, (15 MPH) providing people on bikes a "green wave."
- Use of Pedestrian Recall is addressed in SMC 16A.84.040.
- In urban areas with heavy pedestrian traffic, use **Leading Pedestrian Intervals** (LPI). LPIs add a few seconds of time for pedestrians to establish themselves in the crosswalk before the vehicle signal turns green, enforcing that turning traffic yield to pedestrians. LPI is addressed in SMC 16A.84.050.
- Regular re-timing for signalized intersections.
- At rehabilitated or new signals, retrofit with Accessible Pedestrian Signals. Use audible signals near concentrations of vulnerable populations, such as near senior centers or hospitals. Intersection APS retrofits are addressed in SMC 16A.84.060.
- **RFBs/HAWKS**. Install pedestrian-activated tools such as Rapid-Flash Pedestrian Beacons and High-Intensity Activated Crosswalks in locations that serve pedestrian generators as ascribed by engineering analysis and approved by the City Engineer.

3.10-3 Curb Radius

Curb radii influence driver behavior—positively and negatively—affecting turning speeds and the safety of all users. Minimize curb radius based upon the design and accommodated vehicle. Calculate both the actual radius – the radius of the curb itself- and the effective radius, or the wheel track of vehicles. For example, at intersections with on street parking and no curb extensions, the effective radius is much higher than the actual radius. In all cases, consider the widths of the approach and receiving lanes, as crowding may cause poor driver response.

Table 5 – Intersection Curb radius and speed

	Residential and Industrial	Center & Corridor, Downtown, Commercial, and Form Based Code
Actual Radius	20 feet minimum	10 feet minimum
Effective Radius	25 fee tminimum	20 feet minimum
Turning Speed	15 - 20 MPH	10 - 15 MPH

Retrofit existing curbs with curb extensions to reduce actual and effective turning radius. Consider curb extensions whenever on-street parking is present. However, consideration for stormwater flow-lines must be incorporated into design and retrofits.

Figure 24 – Curb extension in Spokane establishes effective radius

Curb radius determines turning speed. Use corner radius to keep turning speeds as low as possible while allowing the design vehicle to turn.

For bus bulbs, a bulb for a single bus measures 30' long, allowing both doors to open on the bulb, and measures 6-8' wide. On heavy ridership routes where more than one articulated bus platforms several times per day, the bulb measures up to 140' in length. The return angle will be 45 degrees. If the route requires buses to turn right after stopping at a bulb, ensure actual and effective radius meets appropriate bus turning templates.

3.10-4 Design Vehicle

Streets should be designed to serve the most vulnerable user. Designing streets for the largest possible vehicle results in streets with oversized intersections and large turning radii. The result is higher operating speeds for the most frequent vehicles on the street – passenger cars. Use both design vehicles and accommodated vehicles for intersection design. Each intersection is unique, and designing for the largest most frequent vehicle (comprising 10% or more of Average Daily Traffic) allows for better –controlled turning speeds on streets and at intersections. Follow these guidelines for selecting design and accommodated vehicles:

- **Establish a *design vehicle***. The selected design vehicle should be the largest vehicle that accounts for at least 10% of a street's average daily traffic. Selection of the design vehicle should consider the make-up and expectation for traffic flowing through a given intersection. The design vehicle will dictate the minimum turn radius.
- **Establish an *accommodated vehicle* for infrequent users.** The accommodated vehicle is the largest expected vehicle. Use curb and turning radii that allows the accommodated vehicle to use the full street for turns, including parking lanes, bikeways, and adjacent lanes. Consider medians and curb lines as barriers. Restrict parking near intersections and employ recessed stop lines if needed.

Figure 25 – Infrequent accommodated vehicle can encroach into opposing lane

The use of design and accommodated vehicles during design allows more flexibility to adjust designs in favor of pedestrian or bicycle traffic (the most vulnerable users). The following points illustrate options to consider space requirements with this greater latitude.

- Consider the use of tools such as **staggered (offset) stop lines** (where opposing queue storage is adequate) to accommodate vehicles before electing to widen intersection curb alignments.

Figure 26 – Recessed stop bar used where bus must turn right frequently

- **Incorporate SU-30**. The largest frequent user (candidate design vehicle) of most local streets is a 30-foot delivery truck (SU-30).
- If designing a segment of a designated emergency response route, use appropriate fire apparatus as the accommodated vehicle. In some instances, truck selection might be determined by the fire trucks expected to use the route based on proximity to nearest fire stations.

Table 6 summarizes likely design and accommodated vehicles by context and street type.

Table 6 - Minimum Design Vehicle Standards

	RESIDENTIAL AND INDUSTRIAL				CENTER & CORRIDOR, DOWNTOWN, COMMERCIAL, AND FORM BASED CODE[7]				
Street Type	Principal Arterial	Minor Arterial	Collector	Local	Principal Arterial	Minor Arterial	Collector	Local	Industrial
Design Vehicle (10% or more of ADT)	WB-40	WB-40	WB-40	SU-30	SU-30 & STA 40' bus	SU-30 & STA 40' bus	SU-30 & STA 40' bus	SU-30	SU-30
Control Vehicle (Infrequent Largest User)	WB-50	WB-50	WB-50	WB-50	Ladder truck	Ladder truck	Ladder truck	Ladder truck	WB-40

[7] Urban streets zoned for industrial uses may require larger design and control vehicles.

3.10-5 Speed & Safety

Street design sets the context for driver response. Historic design practices have used 85th percentile observed speeds or have established design speed higher than the posted speed. In particular, design speed is used during design of horizontal curves. Because design speed is one of the factors in determining street context, it should be established as the posted or target speed. This practice will avoid "speed creep", which can occur when streets are built to operate at higher speeds than posted and the next design period resets with a speed study revealing the 85th percentile has increased. Streets designed for the target operating speed have proven to have greater user compliance, and are thus safer for all users.

Table 7 – Target speeds by street type

	RESIDENTIAL AND INDUSTRIAL				CENTER & CORRIDOR, DOWNTOWN, COMMERCIAL, AND FORM BASED CODE[7]			
Street Type	Principal Arterial	Minor Arterial	Collector	Local	Principal Arterial	Minor Arterial	Collector	Local
Design Speed=Posted Speed=Target Speed (mph)	30-35	30	30	20-25	30	30-25	30	20-25

3.11 Signing, Traffic Signals, and Illumination

3.11-1 Street Signs

All existing and proposed street signs required by MUTCD as part of street design shall be shown on the plans, and shall be subject to review and approval by the City Engineer. The plans shall include all existing and proposed signs, show the full width of the street, include any signs on the opposite side of the street, and show existing conditions beyond the proposed development. Prior to construction, shop drawings for all new street signs shall be submitted to Street Maintenance - Signs and Markers for approval.

Rehabilitation maintenance and capital work should update signage as appropriate.

3.11-2 Street Traffic Signal Design

Street traffic signals shall be designed with direct coordination and review by the City Street Department. Final designs shall be approved by the City Engineer.

Rehabilitation maintenance and capital work should consider traffic signal updates and replacements as appropriate.

3.11-3 Street Lighting

Arterial Street Lighting

The purpose of arterial lighting provided by the city is for public safety. Lighting levels may be increased on arterials if the City Engineer determines higher levels are appropriate. Generally, low-volume neighborhood collector arterials will have lighting similar to residential streets while high-volume minor and principal arterials may have continuous high-level lighting service.

Arterial lighting will typically be installed on wood poles. The City Engineer may elect to install metal poles on certain streets.

Street lighting will generally be provided by the serving utility company. However, on bridges, traffic signals, and other locations where appropriate lighting is not available through the utility company, the City may provide lighting equipment and maintenance.

The City may also install lighting at un-controlled arterial crosswalks at the discretion of the Street Lighting Guidelines.

The City will pay energy, maintenance and equipment costs for street lighting.

The need, type and location for new lighting is determined by the Street Lighting Guidelines. A request by adjacent property owners is not required for arterial lighting. However, lighting may be installed over the objection of adjacent property owners if the Street Director determines the lighting is required to meet public safety requirements. Adjacent property owners have the option of upgrading to metal poles through direct negotiation with the serving utility company.

If the arterial lighting service provided by the City does not fit the desired needs of the adjacent property owner, developer, or neighborhood association, they may install a private lighting system. The City will not participate in the costs of any such system. The presence of such a private system will not preclude the City from providing street lighting in conformance with this policy if requested. All private lighting systems will require appropriate permits and encroachment agreements.

The Downtown Spokane Streetscape Infrastructure Program provides guidance on the design, siting, and placement of street lighting within Downtown. This guidance may serve as a guide for providing lighting in other areas of the City where it may be appropriate.

Rehabilitation maintenance projects will not be required to update street lighting. Rehabilitation capital projects should consider updating lighting as defined here-in.

Decorative Street Lighting

Decorative street lighting is limited to specific areas of the city. These areas are defined below. This section is not applicable to lighting installed and maintained by the Parks Department. For new installations the maintenance cost may be funded by a business district or similar organization. The city has adopted three specific luminaire styles that must be used for all new

installations or updates. The styles are referred to as Modern Acorn, Transitional Series and Traditional Series. Project designers should refer to Standard Plan J-200 for the specific type to use in each downtown location, and refer to the Street Department for guidance on specific types not listed on that plan.

Central Business District. Generally defined as the area south of the Spokane River, west of Division, north of I-90 and east of Maple Street. Some areas in the CBD provide decorative pedestrian lighting and street lighting, others are pedestrian only.

University District. The area east of Division, south of the river, and north of the railroad. This lighting is maintained by WSU.

Gonzaga District. Parts of the Gonzaga campus including the frontage along Hamilton Street. This lighting is maintained by Gonzaga.

East Sprague Business District. The area along Sprague Avenue east of Division to Altamont Street.

North Bank/Spokane Arena. There is some decorative lighting in the vicinity of the Spokane Arena and north edge of Riverfront Park.

Monroe-Lincoln South. This business district has pedestrian lighting on the arterial street from approximately 10th Avenue to 15th Avenue.

Garland District. This business district is interested in installing decorative lighting along Garland Avenue from Madison Street to Howard Street.

Hillyard District. The Hillyard Business District has decorative lighting along Market Street.

North Monroe. Monroe Street from the river north to Alice Avenue.

Kendall Yards. The Kendall Yards development has decorative pedestrian lighting throughout the development. This lighting is maintained by Kendall Yards.

West Broadway. Broadway Avenue from approximately Elm Street to Walnut Street within the West Central neighborhood.

Browne's Addition. The intersection of Pacific Avenue and Canon Street in the Browne's Addition neighborhood.

Local Access Street Lighting

Local Access Street lighting consists of a 100 watt high press sodium (or LED equivalent) cobra head type lighting fixture on a wood pole at each intersection. Midblock lights may be installed on long blocks of 600 feet or more. However, lights will not be placed less than 200 feet apart.

- The Streets Department maintains a first-come, first-serve priority listing for new lights to be installed as funding comes available.
- Street lights will not be provided at dead ends or at the end of cul-de-sacs. However a midblock street light may be approved for cul-de-sac streets at least 600 feet long.
- The person or group requesting lighting may upgrade the basic wood pole to a metal pole through private negotiations with the electrical service company.

- If the basic street lighting service provided by the city does not fit the desired needs of the adjacent property owner, developer, or neighborhood association, they may install a private lighting system after obtaining the appropriate permits and encroachment agreements. The city will not normally participate in the cost of any such system.

3.12 Clearances/Clear Zones

3.12-1 Vertical Clearances

The clearance above any street surface shall be as provided in SMC 17H.010.240 and SMC 12.02.0462.

Rehabilitation maintenance projects must coordinate with Urban Forestry to ensure the tree canopy is in compliance. Rehabilitation capital projects must similarly ensure the tree canopy is in compliance, and should consider opportunities to improve upon other hazards or obstructions.

3.12-2 Clear Sight Triangle

For design purposes the clear horizontal sight distance triangle at intersections shall be as described in AASHTO "A Policy on Geometric Design of Highways and Streets", Chapter 9, section on Sight Distance.

For vegetation enforcement purposes, use the clear view triangle shown in SMC 17A.020.030.

3.12-3 Horizontal Clear Zones

Clear zones are unobstructed, traversable areas that extend beyond the curb-to-curb dimensions of the traveled street. Clear zones allow for loss of control and other erratic driving behavior.

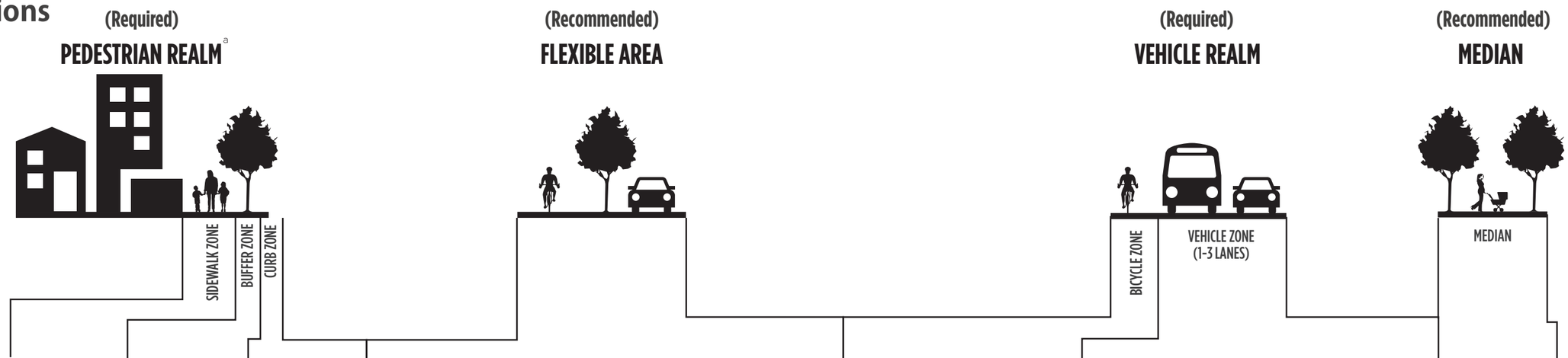
Generally, clear zones can be reduced in urban areas. Clear zones (i.e. wide unobstructed sidewalk and/or shoulders lining the roadway) encourage higher-speed and less safe driver behavior. The presence of street trees and other roadside features tend to decrease overall speeds, increasing safety for all users and more comfort for people walking and biking.

The City of Spokane clear zone policy includes the following, which should be administered in accordance with policy ADMIN 0370-08-04:

- Clear zones are not applicable to local urban streets. However, a minimum lateral offset of 1.5-feet is needed between the curb face and obstructions.
- For arterials and collectors with speeds of 35 mph or less the clear zone should be between 4 feet and 6 feet from the curb face. A larger clear zone on the outside of horizontal curves is desirable. On streets with on-street parking, bike lanes, or on streets without curb the clear zone is measured from the edge of traveled way.
- Streets with speeds of 40 mph or higher should maintain a 10-foot clear zone as defined in policy ADMIN 0370-08-04.
- Signal, lighting, parking meters and ITS equipment should be exempted from the policy, although desired placement is at least 1.5 feet from the face of curb.
- Within medians the clear zone should be 1.5 feet along straight sections, and 3 feet near intersections where the median is near the alignment of turning movements.

3.13 Reference Tables

Table 1 Street Dimensions



	Sidewalk Zone	Buffer Zone[b,c]	Curb Zone	Opt. Shared Use Path[e,f]	Stormwater Management[g]	Curb Extensions[h] / Bus Bulbs[i]	Parking	Bicycle Zone[f]	Bicycle Buffer[k]	Vehicle Zone Outer Lane[l,m]	Vehicle Zone Inner Lane[l]	Vehicle Zone Left Turn or TWLTL	Median[n]
Center & Corridor CC1, CC2, CC3, CC4													
Urban Principal Arterial	8	4	0.5	12	10	7	8	6	2	11	11	11	2
Urban Minor Arterial	8	4	0.5	12	10	7	8	6	2	11	11	11	2
Urban Major/Minor Collector	8	4	0.5	12	10	7	8	6	NA	11	11	10	2
Urban Local Access	5	6	0.5	12	6.5	NA	8	6	NA	10	NA	NA	12
Downtown DTC, DTG, DTU, DTS; Commercial O, OR, NR, NMU, CB, GC; and Form Based Code CA1, CA2, CA3, CA4													
Urban Principal Arterial	7	5	0.5	12	10	7	8	6	2	11	11	11	2
Urban Minor Arterial	7	5	0.5	12	10	7	8	6	2	11	11	11	2
Urban Major/Minor Collector	7	5	0.5	12	10	7	8	6	NA	11	11	10	2
Urban Local Access	5	6	0.5	12	6.5	NA	8	6	NA	10	NA	NA	12
Residential RA, RSF, RSF-C, RTF, RMF, RHD													
Urban Principal Arterial	6	3	0.5	12	6.5	NA	8	6	2	11	11	11	2
Urban Minor Arterial	6	3	0.5	12	6.5	NA	8	6	2	11	11	11	2
Urban Major/Minor Collector	6	3	0.5	12	6.5	NA	8	6	NA	11	11	10	2
Urban Local Access	5	6	0.5	12	6.5	NA	8	6	NA	10	NA	NA	12
Industrial LI, HI, PI													
Urban Principal Arterial	6	6	0.5	12	6.5	NA	NA	6	3	12	12	12	3
Urban Minor Arterial	6	6	0.5	12	6.5	NA	8	6	3	12	12	12	3
Urban Major/Minor Collector	6	6	0.5	12	6.5	NA	8	6	NA	12	12	12	3
Urban Local Access	5	6	0.5	12	6.5	NA	8	6	NA	10	NA	NA	12

[a] In the case of hillside development, defined as low-density development under 10 units per acre, ensure streets are built with 5-foot sidewalks on both sides of the street plus an optional 6.5-foot bio-infiltration swale. On street parking is required on one side of the street. See SMC 17H.010.110 for exceptions.

[b] Per SMC 17C.200.050-1, a tree-planted continuous buffer requires a 5-foot minimum width for commercial zones. For residential and industrial zones, the minimum increases to 6 feet. Alternatively, a narrower buffer may be used in select zones if tree vaults are implemented.

[c] Buffers in commercial areas may be planted or concrete. When stormwater disposal is a governing concern, consideration should be given to use pervious surfaces.

[d] The flexible area includes a menu of options which are chosen based on what maeks most sense according to city plans, environmental responsibilities, and context. In some cases, none of these will fit within the project. Only in very rare cases will more than one fit - for instance, a parking lane plus bio-retention swale.

[e] In places designated for shared-use paths, the path can take the place of the sidewalk zone.

[f] Consult Master Bicycle Plan for guidance on facility type and selection. Possible facilities include bike lanes, buffered bike lanes, and parking protected bike lanes (cycle tracks). Bicycle facilities may operate in the Flexible Area or the Vehicle Realm. Bicycle boulevards and shared roadways are possibilities on Urban Local streets.

[g] Consult the Spokane Regional Stormwater Manual and Eastern Washington Low Impact Development Guidance Manual for desired locations for stormwater facilities. The stormwater catchment area must meet the required volume generated by the planned impervious area.

[h] At intersections and mid-block crossings, provide curb extensions into the parking lane.

[i] On transit corridors, use bus bulbs if space allows to ease boarding, reduce sidewalk congestion, and allow buses to easily re-enter traffic. This should typically be done only if there is a second lane for vehicles to continue around stopped buses.

[j] Care must be taken when applying minimum values for parking and lane width to provide sufficient space as to avoid side-swipe collisions. If adjacent vehicle lanes are selected at minimum width, then parking width needs to be sufficient for a buffer.

[K] Red and orange bike lane routes on the Master Bicycle Plan should include buffers. Separation buffer between bike lane and vehicle lane should be implemented via parallel lane edge stripes with a periodic cross-hatch.

[l] When constraints are prohibitive, consider 10-foot lane width as the minimum.

[m] 12-foot lane includes the width of the gutter pan, if integral curb and gutter is used

[n] A pedestrian refuge should be a raised median with a minimum width of 6 feet. Wider medians up to 30 feet exist and may be implemented where fitting for boulevards.

Table 2 – Vertical Curve Design Parameters

	ARTERIALS				
	Principal	**Minor**	**Collector**	**Parkway**	**Local Access**
Minimum Design Speed[1]	40 mph	35 mph	35 mph	30 mph	30 mph
Vertical Curves are required if the Algebraic Grade Difference, A, is:	A>1%	A>1%	A>1%	A>2%	A>2%
Minimum Length is 3 times the Design Speed					

	Alley	**Bicycle/ Pedestrian Pathway**
Minimum Design Speed[1]	20 mph	20 mph
Vertical Curves are required if the Algebraic Grade Difference, A, is:	A>2%	A>2%
Minimum Length is 3 times the Design Speed		

CREST	
Design Speed	**"K" Factor[2]**
20 mph	167>K>10
25 mph	167>K>20
30 mph	167>K>30
35 mph	167>K>50
40 mph	167>K>80

SAG	
Design Speed	**"K" Factor[2]**
20 mph	167>K>10
25 mph	167>K>20
30 mph	167>K>30
35 mph	167>K>50
40 mph	167>K>80

where:

L = KA
L = Length of Curve
K = "K" Factor
A = Algebraic Difference between grades

[1] Design speed is posted speed plus 5 mph. In practice, speeds may be less or more than shown depending on other design factors not accounted for herein. The design engineer shall justify the use of values other than those listed above.

[2] Minimum "K" as defined in AASHTO, is used to find minimum curve length for sight distance. Maximum "K" used to find maximum curve length for drainage.

Table 3 – Side slopes

	Arterials	Local Access
Grade break at back of walk		
up	4:1	1.5:1
down	4:1	2:1
Grade break at one foot behind walk		
up	1.5:1	1.5:1
down	2:1	2:1

	Arterials	Local Access
Grade break at edge of pavement		
up	4:1	1.5:1
down	4:1	2:1
Grade break at edge of traveled way, including any shoulders		
up	1.5:1	1.5:1
down	2:1	2:1

Notes:

1. Use WSDOT standards when curbs do not exist
2. Grades shown are horizontal:vertical

Table 4 – Street Profile Grades

	ARTERIALS				
	Principal	Minor	Collector	Local Access	Parkways
Minimum Profile Grade Integral Curb and Gutter	0.8%	0.8%	0.8%	0.8%[1]	0.8%
Maximum Profile Grade	8.0%	8.0%	8.0%	8.0%	8.0%
Grade at Intersections[2]					

	ALLEYS		TRAILS	
	Comm.	Resid.	Bikeways	Paths
Minimum Profile Grade Integral Curb and Gutter	0.8%	0.8%	0.8%[1]	0.8%
Maximum Profile Grade	8.0%	8.0%	8.0%	8.0%
Grade at Intersections[2]				

Notes:

Cul-de-sac profiles shall be established to provide minimum one percent grades at all places along the gutter lines.

Unless otherwise approved by the Engineer, the profile grade at all residential intersections, along the minor roadway at arterials, and for all roadways at controlled intersections shall be no greater than three percent at any point within 100 feet of the near end of the radius.

Table 5 – Curb radius standard

	Residential and Industrial	Center & Corridor, Downtown, Commercial, and Form Based Code
Actual Radius	**20 feet minimum**	**10 feet minimum**
Effective Radius	**25 fee tminimum**	**20 feet minimum**
Turning Speed	**15 - 20 MPH**	**10 - 15 MPH**

Table 6 – Minimum Design Vehicle Standards

	RESIDENTIAL AND INDUSTRIAL				CENTER & CORRIDOR, DOWNTOWN, COMMERCIAL, AND FORM BASED CODE[7]				
Street Type	Principal Arterial	Minor Arterial	Collector	Local	Principal Arterial	Minor Arterial	Collector	Local	Industrial
Design Vehicle (10% or more of ADT)	WB-40	WB-40	WB-40	SU-30	SU-30 & STA 40' bus	SU-30 & STA 40' bus	SU-30 & STA 40' bus	SU-30	SU-30
Control Vehicle (Infrequent Largest User)	WB-50	WB-50	WB-50	WB-50	Ladder truck	Ladder truck	Ladder truck	Ladder truck	WB-40

[7] Urban streets zoned for industrial uses may require larger design and control vehicles.

Table 7 – Target Speeds by Street Type

	RESIDENTIAL AND INDUSTRIAL				CENTER & CORRIDOR, DOWNTOWN, COMMERCIAL, AND FORM BASED CODE[7]			
Street Type	Principal Arterial	Minor Arterial	Collector	Local	Principal Arterial	Minor Arterial	Collector	Local
Design Speed=Posted Speed=Target Speed (mph)	30-35	30	30	20-25	30	30-25	30	20-25

Table 8 – Profile grade of sidewalks and buffer strips

	ARTERIALS			LOCAL ACCESS	
	Central Business District	Centers and Corridors	All Other Areas	Residential	Commercial
Sidewalk Cross Slope	1/4" per ft.	1/4" per ft.	1/4" per ft.	1/4" per ft.	1/4" per ft.
Sidewalk Profile Grade	same grade as street profile				
Contiguous with curb Isolated from curb	5% max	5% max	5% max	5% max	5% max