CHAPTER 3

EASTSIDE RAIL CORRIDOR REGIONAL TRAIL MASTER PLAN

Not all trails are alike, and building a trail includes much more than simply laying down a strip of asphalt. How wide will the trail be? How will the trail cross roads? Will there be fences or railings along the trail? Some questions about the trail will only be worked out in the design phase. However, the Master Plan defines the character and key design elements for the trail to guide future implementation.

3.0 DESIGN PRINCIPLES AND GUIDELINES

The Master Plan is an early look at how the trail will fit into the corridor. In general, the Master Plan defines a planning envelope where the trail will be located within the corridor. At this early stage of the project, the trail has not been designed, but the Master Plan will provide the framework for future design of the trail, including the basic design criteria and a toolbox of strategies for responding to the varied conditions in the corridor. These conditions include slopes, sensitive natural areas, and adjacent land uses.

The design principles and guidelines described in this chapter of the Master Plan will support a consistent design approach for different phases of the trail development, and provide a baseline to analyze and communicate the trail's anticipated benefits and concerns.

This chapter of the Master Plan also describes trail characteristics and amenities that will provide an exceptional experience for anticipated users.

Examples of typical design features, clockwise from top left:

Low retaining wall and fencing

Bollards near roadway crossings, where necessary

Paved trail with gravel shoulders

Bollards, signage and illumination along a trail

ELEMENTS OF THE TRAIL

The trail design for the ERC will combine typical elements to fit locations in the trail corridor. Design considerations for each of the key elements that will be included in the trail are described in more detail in this chapter, with recommendations for design standards that will be applied as the trail is implemented.

LANDSCAPE

Areas cleared for construction of the trail will be landscaped with low-maintenance plants, mostly native. Grasses and groundcovers will be used nearest the trail, while shrubs and trees may be used farther from the trail.

RETAINING WALLS

Where the trail is located along a side slope, retaining walls are often necessary to create a flat area. Retaining walls are typically constructed of concrete blocks, and will often include a fence at the top of the wall to protect trail users from falls.

ART

Artwork will be an integral part of the trail. In some cases it may be a trailside object; however, it may also include ephemeral events, artist-designed trail elements, or other artistic elements that respond to the trail's unique setting or activity.

TRAIL CONNECTIONS

Intersections between trails will be designed to allow good visibility for trail users in both directions, and safe interactions between trail users entering or leaving each path.

STRUCTURES

Structures, including existing bridges and trestles, new bridges, and elevated boardwalks will be necessary in several locations along the trail corridor.

CROSSINGS

Road crossings require careful design to improve safety. There are several types of road crossings in the ERC, but they will typically include advance warning textures in the trail paving, signage, low landscaping to improve visibility, and crosswalk markings in the street. Bollards will be included where necessary to keep motor vehicles from entering the trail.

LIGHTING

Lighting will be included in select locations along the trail. Different types of light fixtures may be considered to match different needs for illumination.

SIGNAGE

Signs are used to alert trail users to safety concerns, to communicate trail rules, or to assist with wayfinding.

CLEAR ZONES

A clear zone is the setback between the trail and trailside obstacles. Clear zones protect trail users from collisions with walls, structures, signs, or other solid obstructions.

BARRIERS

Barriers are used in some locations for trail user safety and to control circulation between the trail and adjacent areas.

DRAINAGE

Trails typically include open drainage channels.

TRAIL WIDTH AND SURFACING

The basic cross-section is one of the most important design considerations for trail safety and comfort. The central paved portion of the trail is shared by most users, and is the only comfortable surface for road cyclists, wheelchair users, and skaters. Gravel shoulders are typically used by runners and walkers.

3.1 INFLUENCES SHAPING THE TRAIL

Several considerations combine to shape the recommendations for the trail. National and state standards and guidelines have been developed that document best practices for shared use trails and related infrastructure. King County uses these guidelines as a starting point for trail development. The guidelines allow considerable flexibility to fit the unique needs of individual trails. The preferred standards and guidelines for the ERC trail are based on a combination of national guidelines, the County's own guidelines for the Regional Trails System, the anticipated user volumes on the trail, and user preferences that were collected during public outreach for the Master Plan.

STANDARDS AND GUIDELINES FOR SHARED USE TRAILS, ACCESSIBILITY, AND TRANSPORTATION FACILITIES

The minimum requirements for the trail are defined in national, state and local standards and guidelines that represent best practices for safety, sustainability, and trail experience. King County follows guidance from the American Association of State Highway and Transportation Officials (AASHTO) Guide for the Development of Bicycle Facilities for many decisions about the minimum geometry for trails. This guidebook describes recommended trail widths, slopes, turn radii, and other design criteria. The trail must also meet the requirements of the Americans with Disability Act (ADA), providing smooth surfaces, limited grades, and access for all users. The federal Manual of Uniform Traffic Control Devices (MUTCD) provides a guide for signage and other trail-related control devices similar to street traffic signage that guides how the County implements regulatory and informational signs along the trail. The County's guidelines are consistent with national guidelines and recognize the higher levels of use and desired consistency for trail design within the County's Regional Trails System.

The national, state, and local guidance for trail design allows flexibility to adapt to the specific conditions of individual trails. The guidelines for the ERC trail are consistent with adopted standards, and also respond to the anticipated user volumes on the trail and design preferences provided by the public.

USER VOLUMES

Before design criteria can be selected, it is important to understand the volume of people who may use the trail. Very simply, more users on a trail require more space. Anticipated use of the trail is based on modeling that takes land use, employment density, access and connectivity to sidewalks, bicycle lanes, and other trails into consideration. Modeling for future use of the ERC trail included two major components: access and demand.

The demand model (Figure 3-1) for the trail combines population density, general land use, and specific demand generators (such as major employers). The darker blue locations are anticipated to generate more trail trips, while the lighter blue areas are expected to generate fewer trips.

The connectivity analysis studied how far a person must walk or ride a bicycle to access the ERC corridor Main Line. In Figure 3-2, areas shown as darker have more direct access to the trail corridor, while lighter areas require more travel to reach the trail.

Taken together, the combination of demand and access can be compared to user volumes on existing trails like the Burke-Gilman Trail or Sammamish River Trail to anticipate the likely use on different segments of the ERC.

Segments of trail with over 2,000 average users on a peak day are considered very high use. If this level of use were spread out over typical daylight hours, a trail user would pass approximately every 20 seconds. Of course, trail use is not evenly spread throughout the day, or spread evenly throughout the year; therefore, user volumes will vary.

The modeling for the anticipated use of the ERC trail shows high to very high use for the majority of the corridor, with medium use in a few segments. Figure 3-3 shows the volumes of users that are expected to use different segments of the trail. The highest use is anticipated near downtown Renton, through Bellevue and Kirkland, and at the southern end of Woodinville.

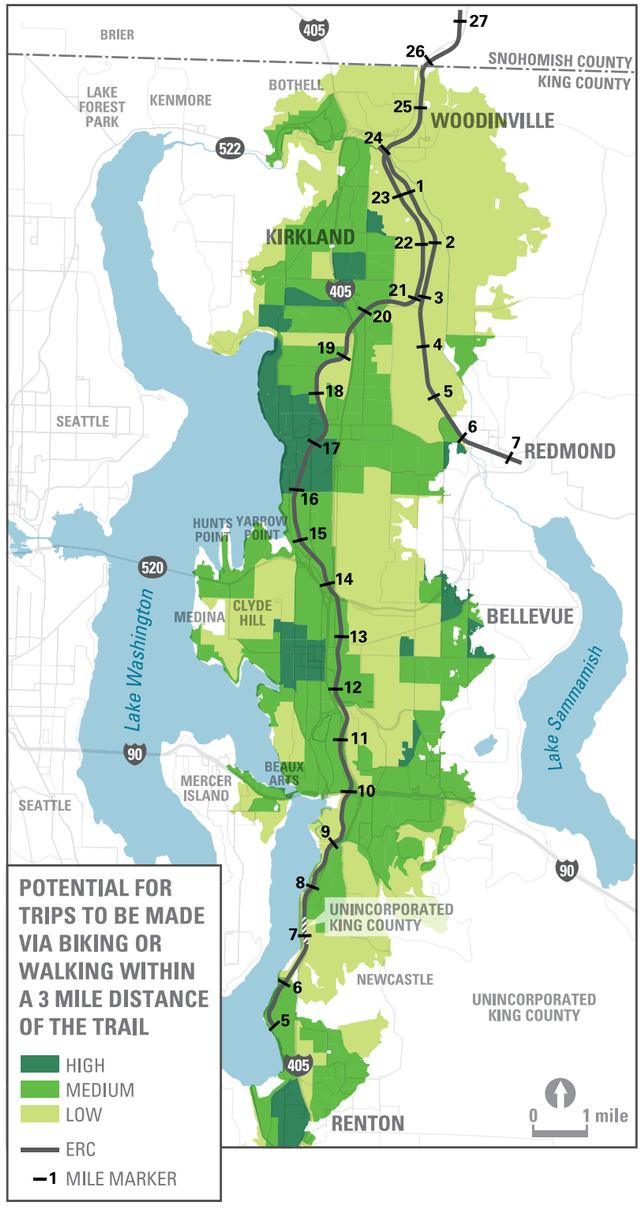


FIGURE 3-1. ERC TRAIL DEMAND

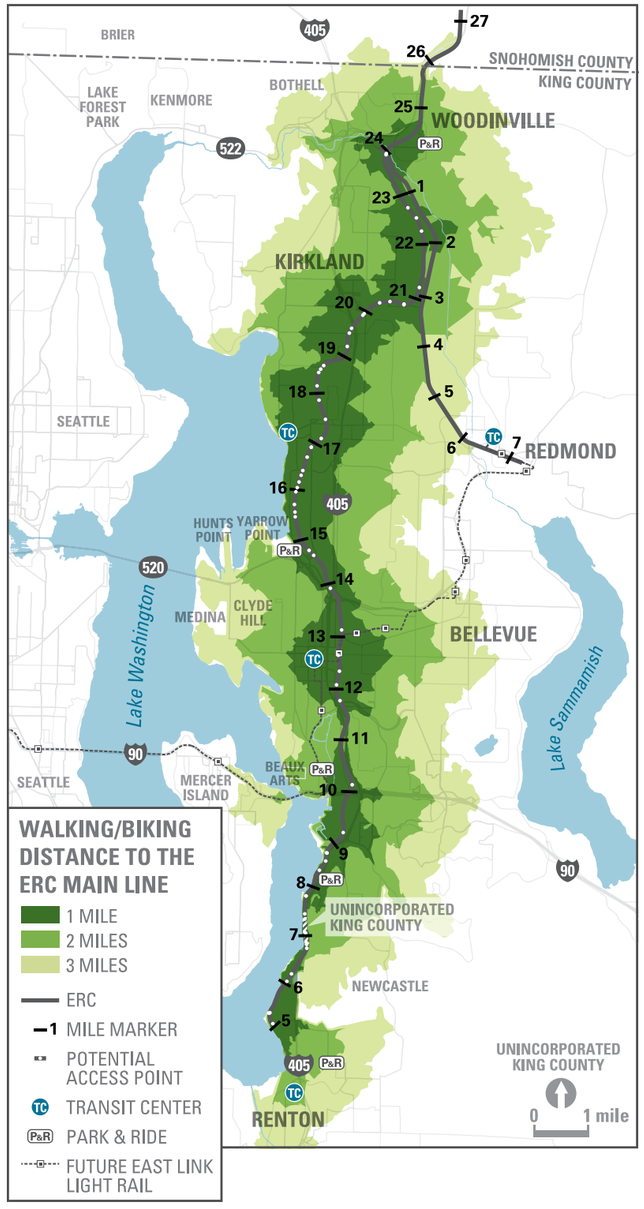


FIGURE 3-2. ERC ACCESSIBILITY

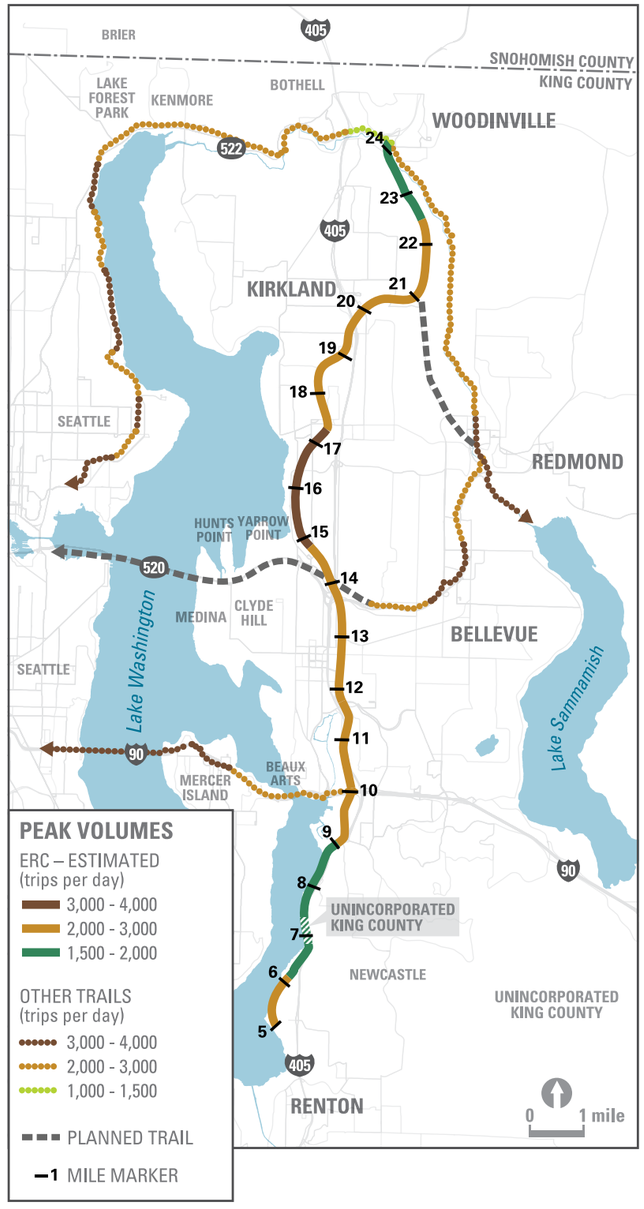


FIGURE 3-3. ERC ESTIMATED PEAK VOLUMES

3.2 TRAIL STANDARDS

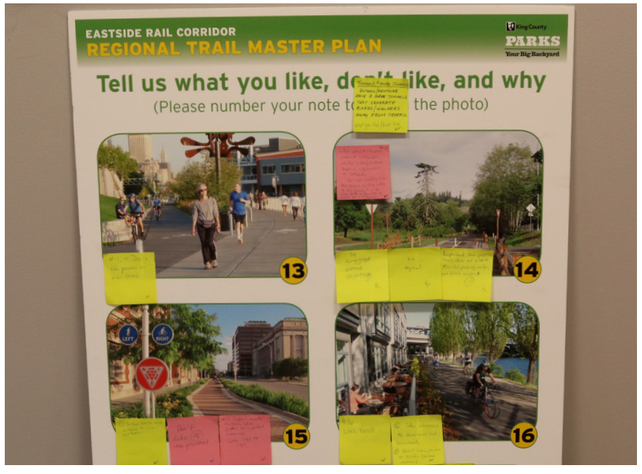
ERC TRAIL CROSS-SECTION

Modeling shows strong anticipated demand for the ERC trail and public input showed a strong interest in separating uses on the trail. The proposed trail standard for the ERC reflects these two considerations, with a typical design that is similar to other regional trails but with variations that support high volumes of use and choices for trail users to avoid conflicts.

The Master Plan recommends a trail standard that is 22 to 24 feet wide including a 12- to 14-foot-wide asphalt path with a 2-foot gravel shoulder and 1-foot clear zone on one side and a 6-foot gravel shoulder and 1-foot clear zone on the other side (Figure 3-4). The 12- to 14-foot main path is adequate width for all but the most crowded times on the trail and the 6-foot-wide shoulder will provide added capacity for pedestrians, and a place where pedestrians can avoid cycling traffic, including higher speed cyclists. This standard provides a comfortable and safe design that provides trail users with choices for using the trail.

In some locations the trail size may need to be reduced to fit within the ERC right of way, avoid negative impacts, or reduce costs. In these locations, the minimum size of the trail will be 18 feet wide, including a 12-foot asphalt trail with 2-foot gravel shoulders and 1-foot clear zones on both sides (Figure 3-5). Narrowing the trail from the preferred section would be rare, and only considered in very narrow sections of the corridor or in locations with exceptionally steep slopes.

There are many possible variations for the configuration of trail elements that may be considered during the design phase. In urban areas, the soft surface trail may not be appropriate and could be replaced with a wider paved trail or a combination of paved trail with adjacent sidewalk.



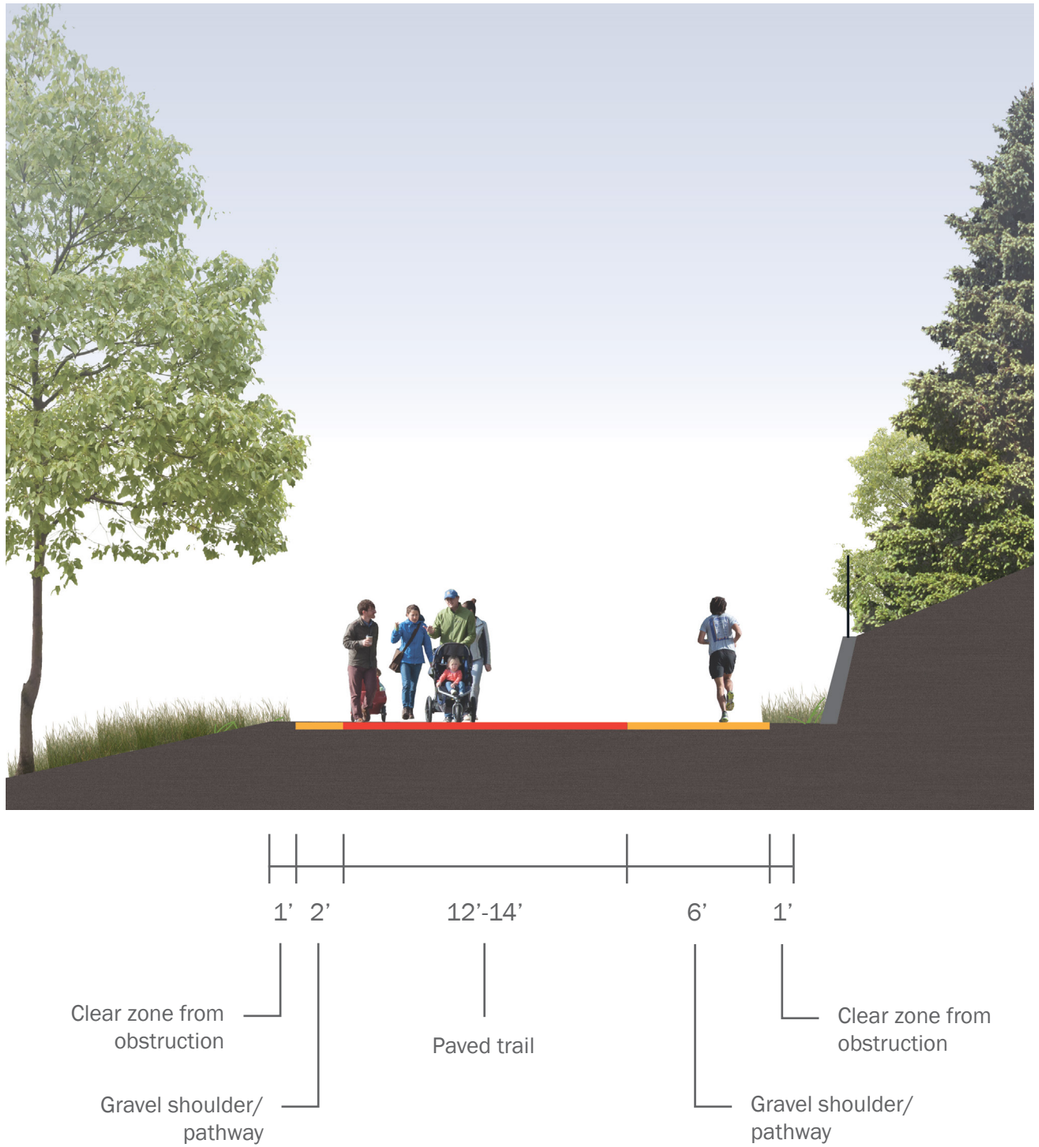


FIGURE 3-4. Preferred Standard Trail Cross-Section

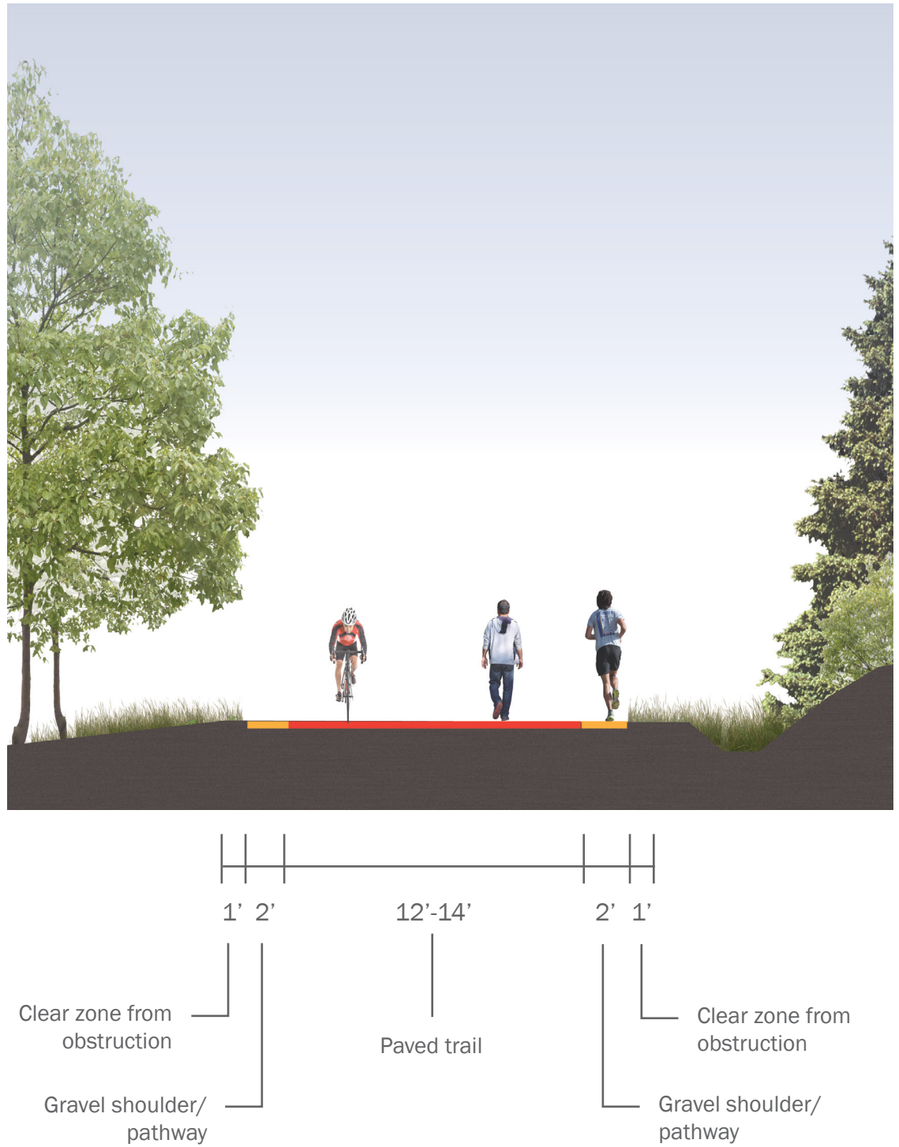


FIGURE 3-5. Minimum Trail Cross-Section

TRAIL CONNECTIONS AND ACCESS

The ERC trail is intended to connect trails, nonmotorized routes, and neighborhoods along the corridor. Local connections are one of the most important elements for making the trail part of everyday life for thousands of trail users who will connect to it from sidewalks, local streets, local trails, and other regional trails. However, similar to a street network, access points where users enter or leave the trail need to be carefully designed to reduce the likelihood of conflicts between trail users. Locations where two busy trails intersect—for example where the ERC will connect to another regional trail such as the I-90 Trail—need to be designed with additional space for trail users to make a safe transition between the trails.

Connecting segments between the ERC trail and other regional and local trails are not included in the environmental review or cost estimate for the Master Plan. It is likely that these connections will be constructed either at the same time or soon after the construction of the ERC if possible.

There will generally be four different types of access to the ERC trail:

Regional Trail Connections

The ERC will connect to several other regional trails along the corridor. However, none of the regional trails that cross the corridor or run nearby to the corridor currently have a direct connection to the ERC. Instead, there are typically gaps between the two trails that will require new connecting segments to be constructed. Different options for making these connections were considered in a separate feasibility report (Parametrix 2015) and in coordination with the applicable local jurisdictions. Chapter 4 includes detailed concepts for some of the connections where clear preferences have been identified. In general, connections between the ERC trail and other trails in the Regional Trails System are intended to be designed to meet regional trail standards for width and grade. Where possible, the intersections between the ERC and these connector trails will be designed as a “T” intersection, where the connector trail meets the ERC at a right angle, and where trail users entering the ERC are encouraged to yield to trail users already on the trail. The intersection design will provide good sight distance and additional space so that trail users can safely make the transition between trails. At very busy intersections, special design treatments such as paving changes or striping may be used to improve awareness of the increased traffic.

Local Jurisdiction Trail Connections

Smaller-volume local trails managed by the jurisdictions the ERC passes through are also important connection opportunities for the ERC. In most cases, there are also gaps between local trails and the ERC corridor. In some cases there may be opportunities to develop dedicated connecting trails between the corridor and local trails; however, in many cases the connection would likely be made along the local street system, and connect at locations where the ERC has an existing at-grade crossing. Strong connections between local trails and the ERC are desirable and encouraged. Connections between the ERC and local trails will typically be projects led by the jurisdiction managing the local trail. Trail connections that are not located at existing street crossings will be designed to provide safe access, with similar design characteristics for the intersections with regional trails.

Local Street Crossings

At-grade street crossings will be the most common access points between the trail corridor and surrounding neighborhoods. The standard designs typical for these locations encourages trail users to slow down and be aware of potential crossing traffic as they approach the intersection. In most cases, nearby residents will be encouraged to use street crossings as their access to the corridor.

Neighborhood or Private Connections

There is often strong interest from neighborhoods surrounding regional trails for more direct access than the street system may provide. These neighborhoods or individuals may request access from a street end, neighborhood trail, or as a short cut between a nearby sidewalk and the trail. King County may allow these connections, but will require them to meet standards for access and safety that are similar to the connections between established trails and the ERC. Typically, these types of connections will require a special use permit from King County, and a maintenance agreement to ensure that the trail is maintained as a safe access. King County will consider these requests after the master planning process is complete.

ROAD CROSSINGS

It is easy to imagine what happened when the trains were still running in the railbanked portion of the ERC and approached a road crossing. Lights flashed, bells rang, and gates came down to stop traffic. That system works well for trains, but is not appropriate for trails at road crossings, where bicyclists and pedestrians come to roadways far more frequently. Road crossings are one of the most challenging design elements for a shared use path, and the goal of trail design is to make crossings as safe as possible for both trail users and motorists.

There are two primary considerations where trails and roads intersect: the assignment of priority (who has the right of way) and the specific design treatments for how the crossing works. The ERC is considered a high priority corridor because it would feature a regionally significant trail. The volume of trail users is expected to be high and will likely increase as the region grows. Since volume of use and relative importance of the roadway or trail are key considerations in determining priority, it is probable that trail users would be assigned priority at most of the intersections in the corridor except for intersections with major arterials and highways.

When considering intersection treatments, grade-separated crossings (bridges or tunnels) are attractive because they provide for uninterrupted travel by trail users over or under a roadway, minimize disruptions to motor vehicle traffic, and in theory eliminate conflicts between trail users and vehicles. In the right location, and with thoughtful design, trail bridges can also become community landmarks. However, there are operational and safety considerations and cost implications to grade-separated crossings. According to a Federal Highway Administration study on overcrossings and undercrossings, "Non-structural solutions to crossing problems should receive primary consideration and be thoroughly evaluated as an alternative or supplement to a structural solution."

Similarly, when considering treatments for at-grade intersections, the AASHTO Guide for the Development of Bicycle Facilities recommends following "the principle of providing the least amount of restriction that is effective." Treatments for intersections between trails and roads are often described as a hierarchy from the least to most intensive. The design team will apply federal and state engineering standards and guidelines to determine the appropriate traffic controls at each intersection.

The range of options include:

- Yield-sign regulated crosswalks, where neither motor vehicle traffic nor trail traffic is required to stop unless there is crossing traffic. The choice of whether motor vehicle traffic yields depends on three factors: expected volume, relative speeds, and relative importance of the trail or roadway. At most intersections, except those with major arterials, it is anticipated that motor vehicles will yield. However, priority will be determined by the engineering team at the time of design.
- Stop-regulated crosswalks, where either motor vehicle traffic or trail users must stop at the crossing and wait for a safe time to proceed. As with yield signs, the choice of whether motor vehicle traffic or trail users stop depends in part on whether the roadway or trail is expected to have the most traffic volume. At most intersections, except those with major arterials, it is anticipated that vehicles will stop.
- Signalized crosswalks, where both trail users and motor vehicle traffic are controlled by signals. Traffic lights regulate flow on the street and walk signs regulate trail users. Trail users typically need to push a button to activate the walk signal.

Crossings are complex; therefore, final decisions on the locations and detailed treatments for crossings will be made in the design phase. However, the Master Plan makes preliminary recommendations for crossing types for each of the locations in the corridor, sometimes including options that will be studied in the design phase. In many locations, the choice of crossing location for at-grade crossings will differ for the two build alternatives—on-railbed and off-railbed.

Figure 3-6 identified existing traffic volumes and recommends crossing treatments for the busiest street crossings.

A few typical crossing types are common in the corridor; as such, they are used as examples to provide a sense of what they would look like and how they would likely operate. These typical crossing types are mid-block crossings of low-volume roads and driveways, mid-block crossings of 2-lane arterials, signalized crossings, and grade-separated crossings.

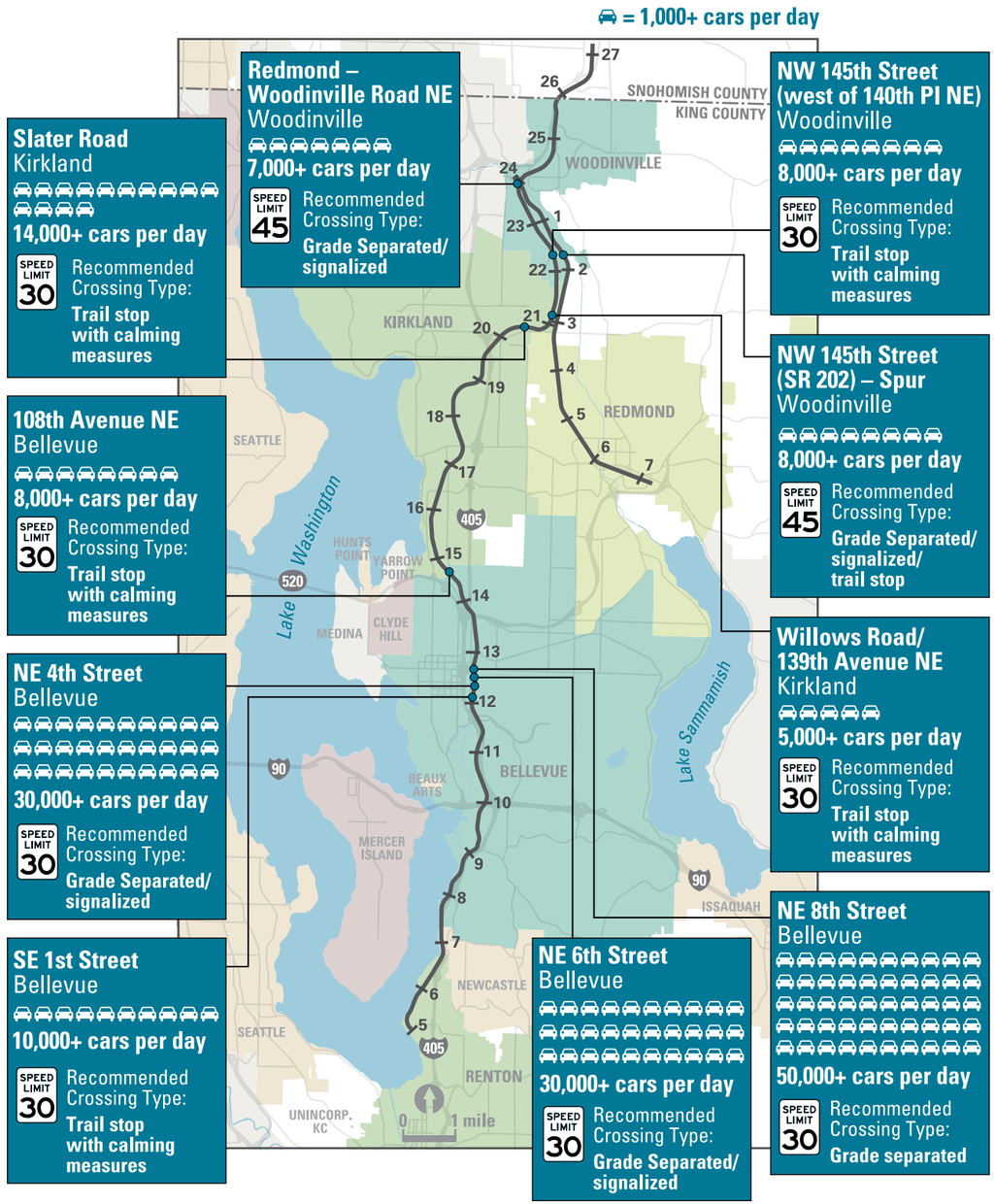


FIGURE 3-6. ERC CROSSINGS

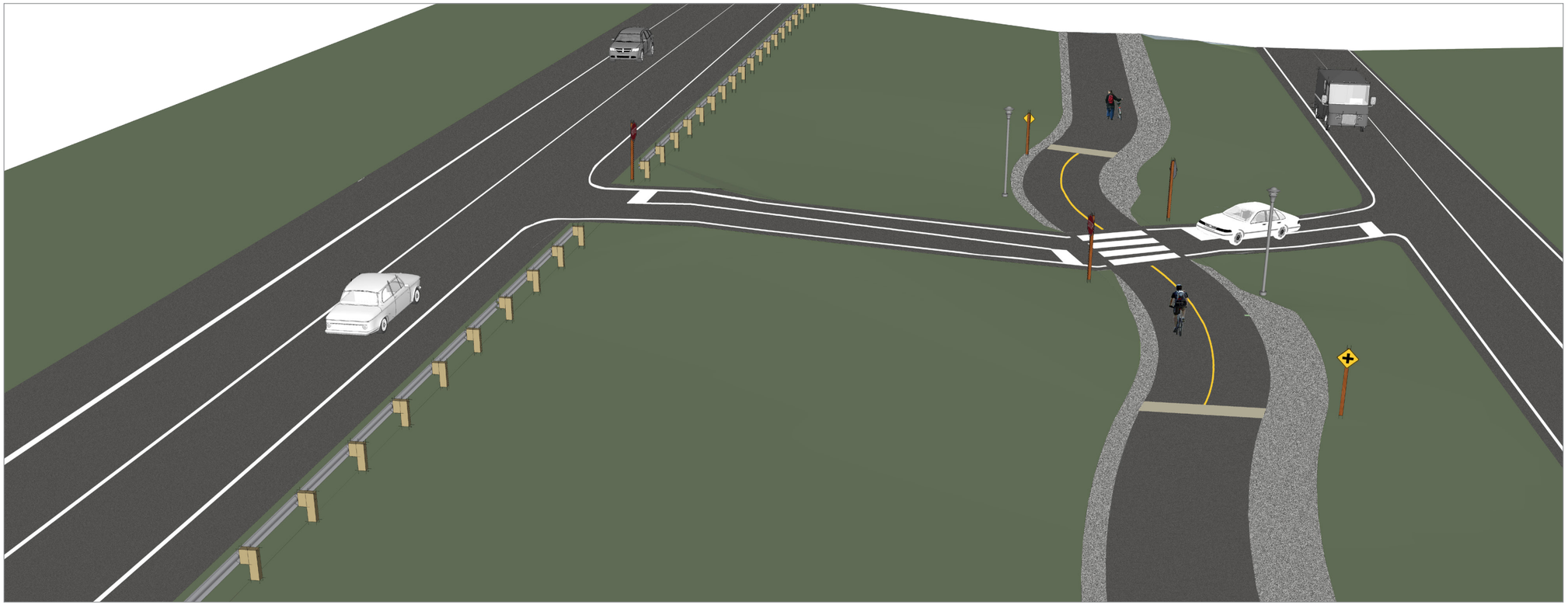


FIGURE 3-7.

MID-BLOCK CROSSINGS OF LOW-VOLUME ROADS AND DRIVEWAYS

The location of the on-railbed alignment intersects a number of low-volume roads and driveways in the middle of a block, most frequently in the Lakefront Segment. At these locations, it is important that the crossing location is far enough from an adjacent intersection to allow adequate space for vehicles to move through the intersection and then stop for trail users. The trail is assigned priority over the road or driveway at these locations because of the trail's status as a regionally significant facility and the relatively high volume of users expected.

East Lake Sammamish Trail approaching a driveway crossing

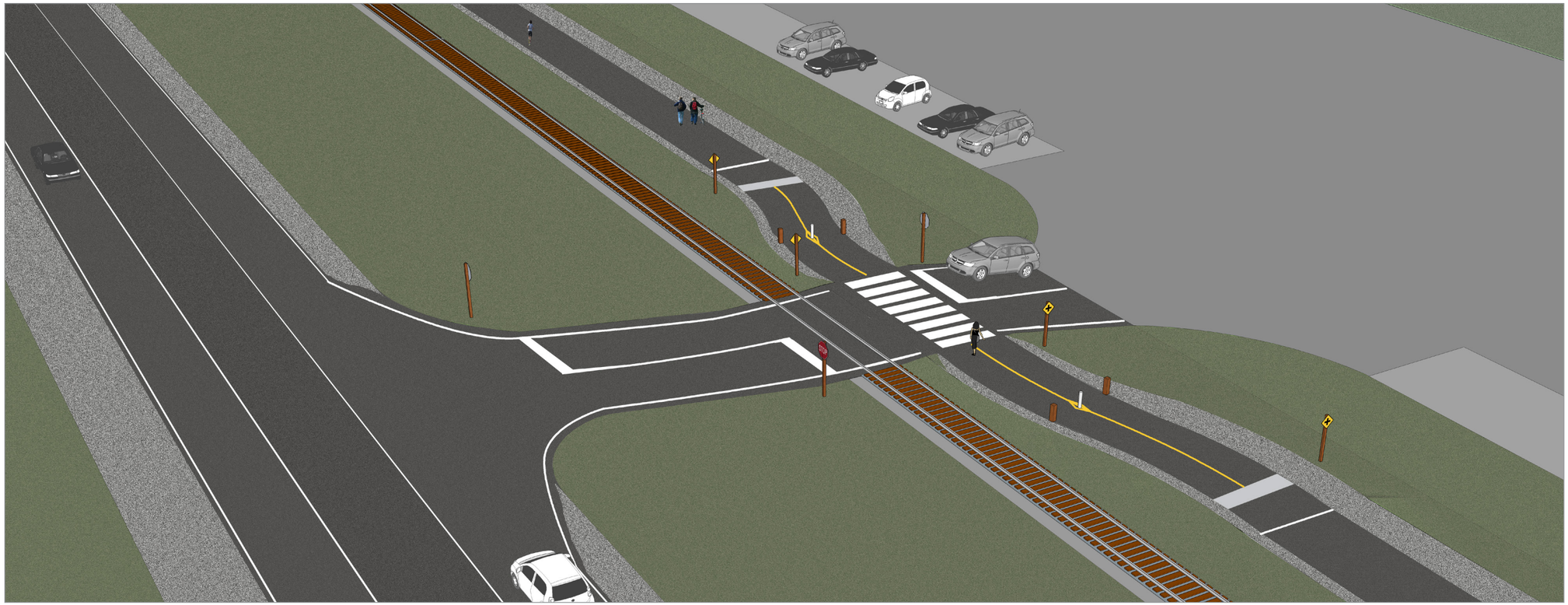


FIGURE 3-8.

Along the Spur section of the Valley Segment, there are frequent crossings at access roads leading to businesses adjacent to the ERC. For these crossings, the off-railbed alignment would be located just east of the existing train tracks, and motor vehicles would be expected to stop before crossing the trail.

Intersection along Burke-Gilman Trail

Changing the Way We Think About Bollards

Until recently, bollards were used routinely at intersections between shared use paths and roadways. Intended to keep motor vehicles from accessing the path, bollards have typically been located in the center and at both edges of the path. In practice, motor vehicles rarely enter paths. However, there have been many cases where bollards have caused bicycle accidents. Current guidelines suggest that bollards not be used unless there is a documented concern for motor vehicle access.

Many of the illustrations and photos in the Master Plan show bollards as an element that may be used if necessary, however they are not likely to be used at the majority of crossings.

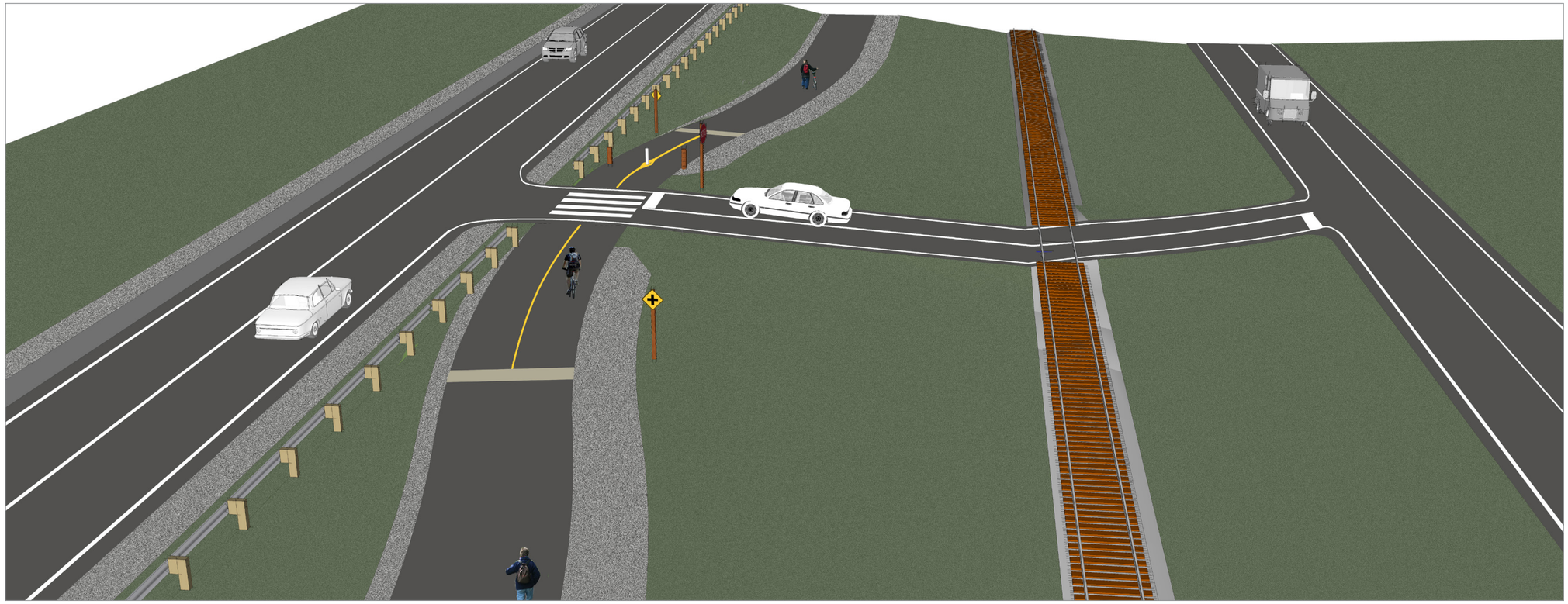


FIGURE 3-9.

CROSSINGS OF LOW-VOLUME ROADS AND DRIVEWAYS AT EXISTING INTERSECTIONS

The location of the off-railbed alignment intersects a number of low-volume roads and driveways near existing roadway intersections, most frequently in the Lakefront Segment. There is often not enough queueing distance for a motor vehicle between the intersecting roadway and the trail. In these situations, the trail will move up to meet the adjacent intersection, functioning as a cross walk at the intersection. Motor vehicles would stop short of the trail before turning onto the intersecting roadway.

Intersection along East Lake Sammamish Trail

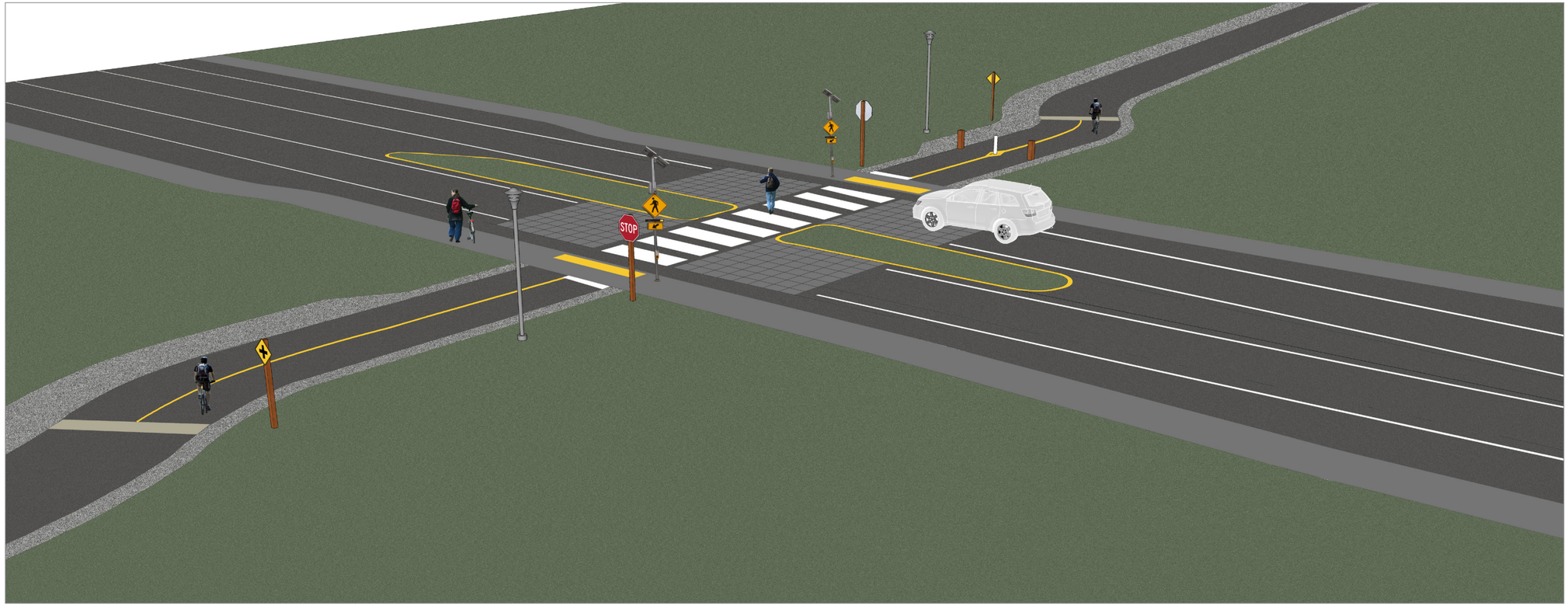


FIGURE 3-10.

MID-BLOCK CROSSINGS OF 2-LANE ARTERIALS

There are several places where the on-railbed and off-railbed alignments intersect 2-lane arterials (one lane in each direction) with some combination of challenging road grades, skewed angles of intersection, and higher road volumes and speeds. In these situations, an unsignalized crossing could be designed safely if combined with other traffic safety features. Crossings could be redeveloped to include medians, warning lights for oncoming drivers, and other features typically associated with traffic calming strategies.

Intersection along East Lake Sammamish Trail

SEE AND BE SEEN—SIGHT DISTANCE TRIANGLES AND SAFETY AT ROAD CROSSINGS

Imagine you are a bicyclist on the trail, approaching a road crossing. As you near the road, your highest priority for safety is to look towards the roadway and identify if any cars are coming, and whether it will be safe to cross. If there is tall, dense vegetation near the intersection it becomes much harder to evaluate whether there is traffic at the crossing, and whether it will be safe to cross. Similarly, drivers approaching intersections with trails are looking out for trail users to evaluate how they should behave at the intersection.

The ability for trail users and drivers to see each other at intersections is a critical element in designing a safer trail.

During the design phase, the "sight distance triangle" for each intersection will be identified based on national standards (AASHTO). Within these sight distance triangles, vegetation, signs, or structures that might interfere with vision are not allowed. Typically, these areas will be planted with grass or low-lying groundcovers.

Sight distance requirements also play a part in determining the type of traffic control at intersections. Intersections that are designed for either vehicles or trail users to yield, rather than stop, require much larger sight distance triangles for safety.

SIGNALIZED CROSSINGS

The ERC crosses near two existing signalized intersections: the intersection of NE 124th Street and Willows Road and the intersection of NE 175th Street and Woodinville-Redmond Road NE. New signalized crossings may be considered where the trail crosses roadways with more than one traffic lane in each direction, or where the speed limit is higher than 30 mph. In these situations a new signalized crossing may be appropriate. Trail users would activate a stop light for automobile traffic and a walk signal for the trail crossing.

Pedestrian on trail must be able to see approaching vehicles in both directions at intersections.

GRADE-SEPARATED CROSSINGS

As previously explained, there are advantages and disadvantages to grade-separated crossings that must be carefully considered. Shared use paths are one of the most popular types of routes for all types of human-powered travel. Located in their own rights-of-way, separate from roadways and traffic, shared use paths typically provide the most comfortable trail experience. Grade-separated crossings where paths meet roadways are one strategy to continue that experience—allowing trail users to continue without stops and with no worries about potential accidents. In the right location, and with thoughtful design, trail bridges can also become community landmarks.

Unfortunately, grade-separated crossings are complex and expensive. In addition to the bridge, the trail needs to begin ramping up to a crossing hundreds of feet before the actual intersection. At the crossing itself, it becomes a significant challenge to connect between a sidewalk and the trail, which is now raised almost 30 feet above the roadway. In many locations, there is not enough space to provide a ramp up to a bridge crossing.

A basic principle of bicycle or pedestrian travel is a strong tendency to favor the shortest, most direct route. Grade-separated trail crossings, which may require ramps to reach required crossing elevations, can increase the distance bicycles and pedestrians must travel. The length and configuration of the ramps may also require out-of-direction travel. As a result of the additional travel distance, perceived delay, or circuitousness of the grade-separated approach, grade-separated crossings are frequently avoided for shorter, more direct routes. An Institute of Transportation Engineers (ITE) study found that 70 percent of pedestrians would use a grade-separated crossing if the travel time was equal to the at-grade crossing time. If the crossing time for the grade-separated route was over 50 percent greater than the at-grade crossing time, very few pedestrians would choose the route.

In addition to the safety concern, bridges and tunnels often lack continuity with the surrounding bicycle and pedestrian network and cost substantially more than at-grade intersection treatments.

Bridge crossings must also be coordinated with power lines, traffic signals, and other existing infrastructure at the crossings. Tunnels present some of the same challenges. Buried utilities are often located several feet under roadways, requiring reconstruction of sewer and water pipes. In low-lying areas, tunnels are difficult to drain, and may even flood.

Many crossings along the ERC were designed to be grade-separated for the railroad. The ERC currently passes over Coal Creek Parkway, I-90, and a few smaller streets, and crosses under NE 12th Street, SR 520, and the northbound lanes of I-405. The renovation of existing bridges and the consideration of new bridges are discussed further later in this chapter.

Typically, the existing bridges will be renovated for the new trail with high quality surfacing (typically asphalt or concrete) and guardrails. New grade-separated trail crossings in the ERC are only considered for high-volume roadways (NE 8th Street and NE 4th Street) and for highways (I-405 southbound lanes and SR 202).

BRIDGES AND BOARDWALKS

Like most historic railroad corridors, the ERC includes bridges that cross over not just roads, but streams and valleys. The Wilburton Trestle is the landmark bridge on the corridor, but there are also bridges over May Creek and Coal Creek. Like the bridges crossing roads, these existing structures will be renovated for the new trail with high quality surfacing (typically asphalt or concrete) and guardrails. The railings are intended to provide safety while allowing views from the structure. In some cases, bridges may also be locations for viewpoints or opportunities for public art.

New bridges and boardwalks would likely be used along the trail as a design option for reducing impacts on wetlands in the corridor. In many locations along the corridor it would not be possible to locate the trail outside of wetlands; however, boardwalks allow the trail to be constructed through wetlands without affecting wetland hydrology.

For all new structures and for existing structures, where feasible, a minimum width of 16 feet between handrails is recommended. Even wider surfacing is recommended for the new bridge over I-405 and the Wilburton Trestle. Trail users often do not feel comfortable riding or walking directly adjacent to bridge railings. Because of this "shy distance," the paved width on structures to accommodate the high user volumes expected for the ERC trail needs to be generous.

GATEWAYS OR TRAILHEADS

The final design for the ERC trail will include gateways, also called trailheads, with parking and amenities in a few locations along the corridor. While the majority of trail users are not expected to drive to the trail, there will still be demand for parking generated by users who do not have practical access except by car. Gateways with dedicated parking for trail users will provide locations to access the trail without users needing to park in nearby neighborhoods. Gateways are also opportunities to provide amenities for trail users, such as drinking fountains, bicycle racks, and restrooms that they may need during their trip.

In most cases, gateways will not be located within the current ERC ownership. The corridor typically does not have sufficient space to provide parking, and use of the corridor for gateways is not consistent with the long-term multi-use vision for the corridor. In some locations there are opportunities to develop gateways on publicly owned land adjacent to the corridor; other locations may require acquisition of private property to provide adequate space. Some potential locations for gateways are shown in Figure 3-11 and discussed in Chapter 4 where the alternatives for the trail plan are described in more detail.

The size, character, and amenities of gateways depend on the site selected and the specific opportunities available there. Some potential locations for gateways provide opportunities for viewpoints, picnicking, or park features in addition to parking and trail access. At a minimum, gateways will include parking for 10 or more cars, transition areas with seating to allow trail users to prepare for their trip, bicycle racks for short-term storage, and wayfinding information. In some locations gateways may also include water fountains and restrooms, picnic tables, art installations, covered bicycle parking, and other user amenities.

Gateways are managed very much like small parks and are open from dawn to dusk. Typically, gateways have easy visibility from nearby roads for law enforcement purposes. These locations are regularly visited for trash removal and routine maintenance.

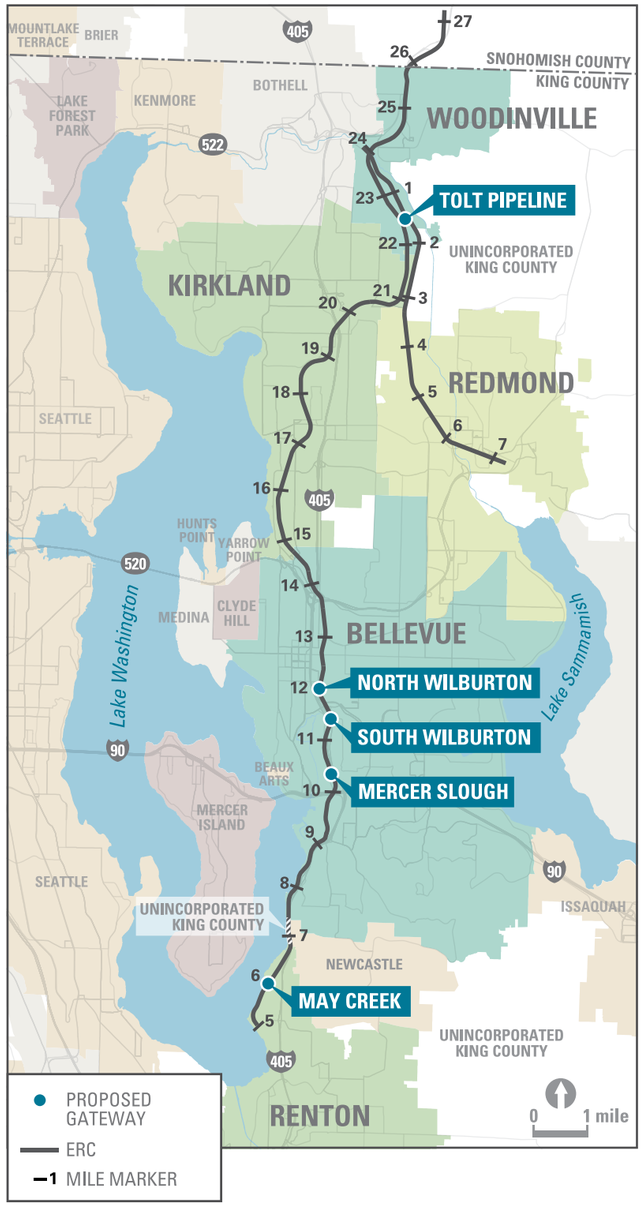


FIGURE 3-11. PROPOSED GATEWAY LOCATIONS

King County | PARKS | Your Big Backyard

SIGNAGE

Signage along the ERC trail will be important for welcoming trail users, identifying place, communicating trail rules, controlling traffic, and aiding wayfinding. Kiosks can also be placed at strategic locations to purvey trail information and also establish a special place along the trail. Signage is a basic feature at gateways, access points, and in advance of intersections. In planning for a trail along the ERC, the importance of signage must be balanced against over-signing the corridor. The size and placement of signs in the ERC will comply with the MUTCD and King County's guidelines for the Regional Trails System and other relevant standards. The details of signage will be determined during future design. There is a strong interest in developing signage for the entire ERC, including the Cross Kirkland Corridor and Redmond Central Connector, that provides consistent and recognizable information for trail users.

RETAINING WALLS

Constructing a trail in the ERC requires creating a flat area for paving and gravel. The former railbed (constructed with rails, ties, and a ballast base) is typically 8 to 10 feet wide. The width of the ERC trail is proposed to be 18 to 24 feet wide. The on-railbed alignment would require widening the existing bench created for the railroad, while the off-railbed alignment would require creating a new flat area for the entire width of the proposed trail. Where the surrounding topography is relatively flat, grading for the trail would not affect an area much wider than the trail itself. However, where the surrounding topography is steeper, grading for the trail could include cut and fill slopes extending beyond the width of the trail.

In many situations it is not practical to create the necessary grade for the trail without using retaining walls. Without retaining walls, cut and fill slopes could extend into streams or wetlands, require extensive clearing of existing vegetation, or even extend beyond the ERC ownership. Because much of the ERC is located on hillsides, there would likely be many retaining walls used to create a stable trail surface and reduce impacts on the corridor.

Retaining walls reduce the amount of earthwork (cutting and filling) necessary to construct the trail. While the cost of the retaining walls is higher, impacts on adjacent areas would be reduced. Retaining walls can have important effects on the character of the trail corridor. While the walls can be beneficial in protecting existing vegetation, they are also prominent features, and often require fencing at the top of the wall to protect trail users from falls.

In considering the potential effects and cost of the trail, extensive use of retaining walls is assumed. The specific locations along and within the ERC, as well as the type of walls, will be determined during the design phase of the project.

BARRIERS AND FENCING

Barriers and fencing are used along trails for safety and to guide circulation. In general, three types of barriers are used along trails:

Motor Vehicle-protection Barriers

Motor vehicle-protection barriers are used when the trail is immediately alongside a road, driveway, or parking area. The purpose is to protect trail users from motor vehicles. King County's Regional Trails System typically includes wood barriers in these situations; however, concrete barriers or standard guardrails are also sometimes appropriate.

Trail Safety Barriers

Trail safety barriers are located to protect trail users from falls if they lose control and leave the trail; these are typically applied where the trail is adjacent to a steep slope or drop-off. For example, retaining walls typically include safety barriers along their tops. The most common type of trail safety barrier for King County's regional trails is vinyl-coated chain link fence, typically colored black. Steel railings may also be used for safety barriers where a more substantial structure is needed, such as a guardrail along a bridge or boardwalk.

Guidance Barriers

Guidance barriers are sometimes used to control circulation where the edges of public space may not be clear to trail users. These types of barriers are typically low split rail or wood pole fences, and are used to discourage access to sensitive areas or adjacent private property. The character of guidance barriers can change depending on the adjacent land use. Informal wood fencing is typically used in residential neighborhoods, but other materials or treatments, such as bollards rather than continuous fencing, may be more appropriate in commercial districts along the ERC.

The location of barriers and fencing will be defined during the design phase. While barriers and fencing play an important role for safety and to clarify the limits of public ownership, they are also prominent design elements in the trail corridor. In general, designers work to reduce the use of barriers as much as possible to provide the best trail experience.

PLANTING

The ERC includes a combination of open areas with gravel, unmaintained grass cover, and larger vegetation. Where there is existing landscape, the corridor is typically vegetated with a combination of native forest, invasive species such as Himalayan blackberry, or ornamental plantings maintained by corridor neighbors. Construction of the trail will only take up a part of the corridor, and existing landscape that does not need to be removed for trail construction will be evaluated to determine if it is consistent with public use, including aestehtics and overall trail design. Where construction does require clearing, the trail corridor will be replanted except for paving, gravel, retaining walls, and similar elements. To create a sustainable, maintainable landscape along the length of the trail, replanting will typically be simple, with a focus on meadow grasses and native trees and shrubs. To provide a safe environment for the trail, shrubs are typically planted 5 feet or more from the trail edge, and trees are planted 15 feet or more from the trail.

The area directly adjacent to the trail is expected to be maintained, usually by mowing, while the areas farther from the trail are usually allowed to naturalize and likely would not be maintained once plants are established. In the design phase, planting strategies for specific areas will be developed based on the character of the surrounding neighborhoods. In some locations taller shrubs may be used as a visual screen between the trail and nearby homes. In other locations the landscape may be selectively opened up to improve visibility and for security surveillance—an important consideration for discouraging vandalism and other unwanted behaviors.

Where trail neighbors or underlying jurisdictions are interested in developing a more ornamental landscape, there may be opportunities where the County, following the master planning process, would allow use of the trail corridor for ornamental plantings through a special use permit. In these cases maintenance for the landscape would be the responsibility of the permittee.

Planting and vegetation management is more carefully considered at intersections, where it is important to maintain sight distance triangles (see page 3-14). In these locations the landscape must be maintained at a low elevation to allow good visibility between trail users and drivers.

ILLUMINATION

Currently, King County's Regional Trails System is open from dawn until dusk. The County is currently considering a policy change that would extend the hours of the regional trails to 24 hours per day. Under current operations, illumination is provided typically at intersections with roads, as required by the local jurisdiction. If the operational hours of the trails are extended to 24 hours per day, additional illumination criteria may be considered by the County and applied to the ERC during the design phase of the project. In conjunction with the future design of the ERC trail, King County will contemplate additional lighting, consistent with AASHTO Bike Guide recommendations at the following locations:

- Undercrossings where trail users may feel uncomfortable or vulnerable. For the ERC, the undercrossings of I-405 and SR 520 would be considered.
- Approaches to bridges and boardwalks. For the ERC, this would include existing railroad bridges that may be restored for trail use and new bridges, like those over I-405 and NE 8th Street.
- Changes in trail geometry. For the ERC, this could occur where the trail alignment shifts to cross perpendicular to a driveway or closer to an adjacent road.
- Areas in which the trail mixes with cross pedestrian and/or bicycle traffic. For the ERC, this could include the area around the Wilburton Station and at the intersections of the ERC trail with other regional trails (such as the I-90/Mountains to Sound Trail).

Other areas that could be considered include intersections with driveways that are steep or skewed, and remote areas in which "overwatch" is not possible from adjacent streets and highways.

Illumination would be designed to support pedestrian safety and security while minimizing glare and obtrusiveness to surrounding neighborhoods. A variety of lighting types may be used on the trail, depending on the functional need and the neighborhood context.

Typically, taller light fixtures would be used where uniform illumination needs to be provided for the entire trail surface, or where strong, uniform illumination would enhance safety.

These locations may include trail intersections, trailheads, and crosswalks (note that most crosswalk locations are already well lit by street lighting and may not require additional trail lighting). In locations where lighting may be necessary to make obstacles visible, or improve visibility between trail users, but uniform lighting would not be necessary, smaller lightpoles or lights on bollards may be used to reduce potential overflow into adjacent neighborhoods.

The final selection of a lighting strategy for segments of trail that need illumination would take surrounding land uses into consideration. For example, there might be less concern with overflow lighting in commercial areas than in residential areas.

PUBLIC ART

As King County moves forward with phased design and construction of the ERC trail, likely by segments, the development would generate 1 percent for art revenue that would be applied to commission new artworks and art experiences to enhance the corridor. Project opportunities would be scoped based on recommendations included in the 2015 King County Regional Trails System Arts Master Plan, and approval by the 4Culture Public Art Advisory Committee. Project opportunities would also be identified through a collaborative charette process with local art agencies and local historic societies. 4Culture is King County's designated cultural service provider. Public Art 4Culture commissions contemporary art for shared public space, bringing artists' work and aesthetics to the design and culture of the built environment.

The Arts Master Plan outlines a comprehensive vision for the creation of public art and integrated design features to make the Regional Trails System network more distinctive, attractive, and unique. The plan, created by artist Brian Borrello in conjunction with 4Culture and King County Parks, serves as a framework for planners, artists, and community members who are creatively shaping the trails of the future. It also defines a unified regional trails aesthetic as well as a vision and ethos for enhancing user experience and articulating the identity of the system.

The Arts Master Plan vision and ethos envision the Regional Trails System as a comprehensive network of experience corridors. Guiding principles for future development recognize the trails as:

- Movement corridors leading to destinations and as destinations themselves;
- Providing opportunities to express the unique personality of each trail while striving for accessibility and optimal user experience;
- Cultivating public places that are aesthetic, green, interesting, social, cultural, and shared;
- Connecting trailside communities;
- Building a legacy of artwork and aesthetic enrichment; and
- Enhancing public awareness of trails and their surrounding environment.

High-quality art and design can inspire trail use and offer pleasant, provocative, and enriching experiences. Public art can aid in identifying the trail system, and can enhance the character and identity of King County. It also contributes to the beauty, cultural vitality, and economic development of the region. Public art provides a lasting cultural legacy and augments the perception of safety in public spaces, which can lead to decreased vandalism. Public art on the trails can also improve connectivity among communities, open spaces, parks, neighborhoods, town centers, public amenities, and cultural destinations.

As an integral part of the regional trails network, the ERC trail will have an opportunity to share in this comprehensive, network-wide cultural program. While the trail will include features that make the regional trails network safe, accessible, and familiar, the ERC's unique route, history, and the character of the landscape and communities through which it runs will favor the creation of distinctive cultural and artistic development.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