MOUNTAINLAND ASSOCIATION OF GOVERNMENTS ACTIVE TRANSPORTATION PLAN

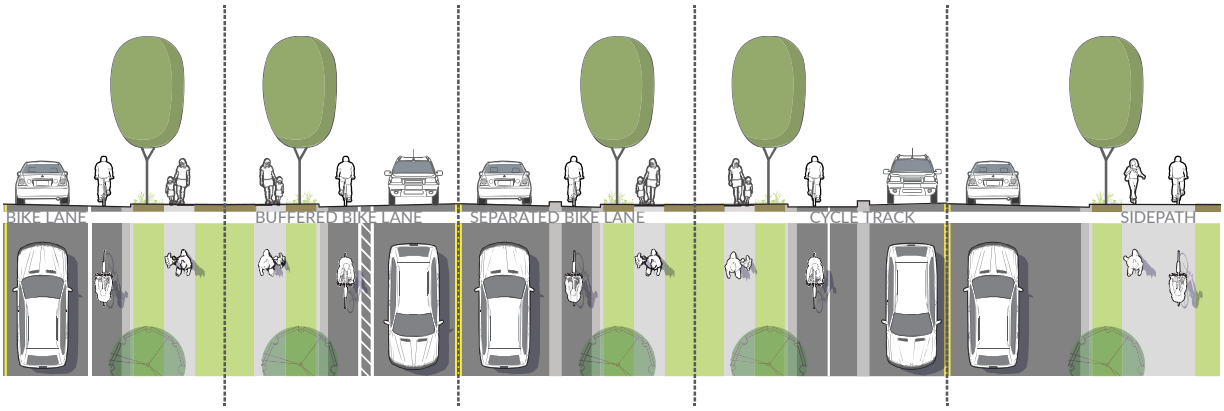
Active Transportation Typologies

2023

ACTIVE TRANSPORTATION TYPOLOGIES

TYPOLOGY CONTINUUM

LEAST PROTECTION



MOST PROTECTION

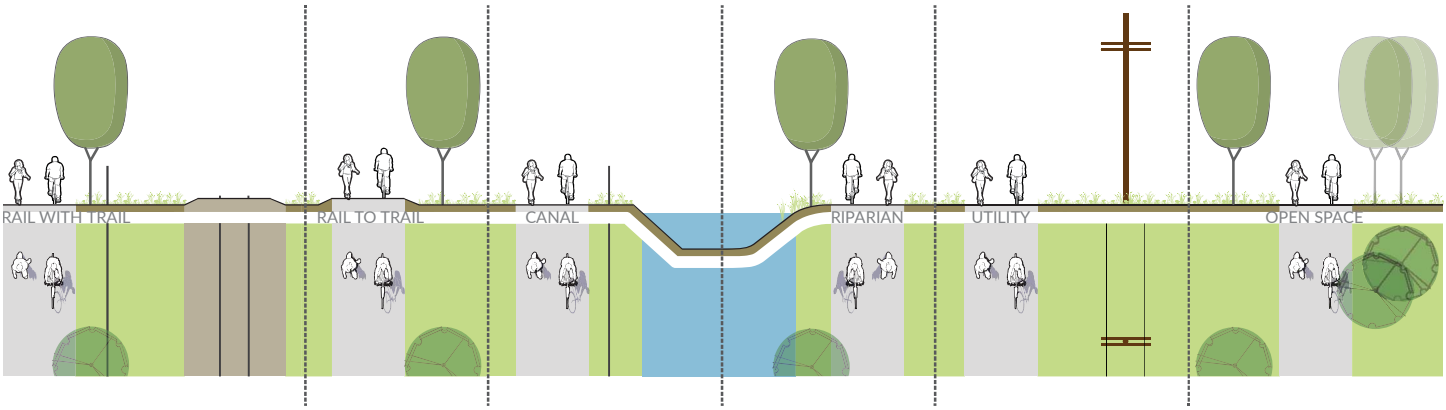
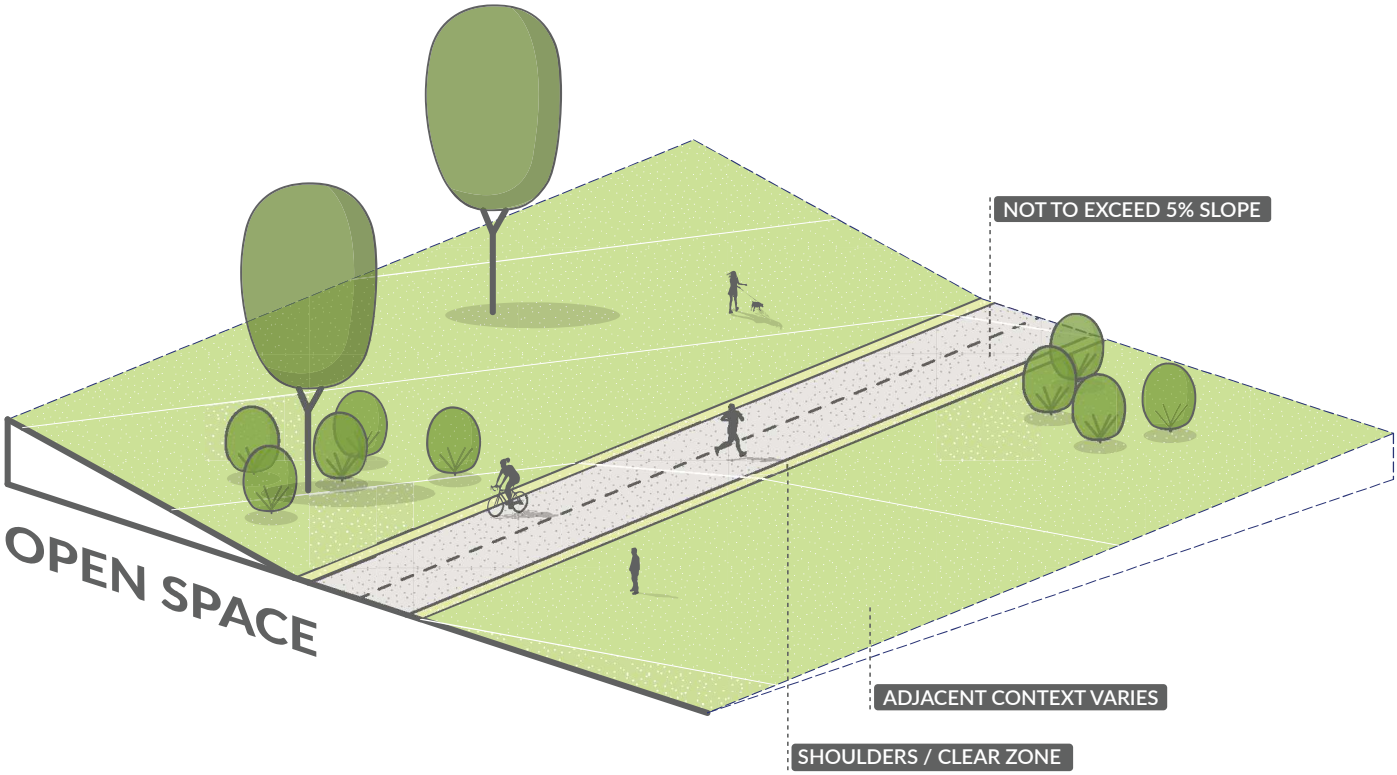


TABLE OF CONTENTS



TYPICAL APPLICATION

A shared use path that runs through open space whether maintained or natural that does not follow a travel or riparian corridor. Design can vary based on topography and surrounding vegetation.

EXAMPLE NETWORK FACILITIES

- Draper Foothills Trail
- Traverse Mountain Connection to West
- Promenade to Lake and Vineyard Frontrunner

REFERENCES

AASHTO, Guide for the Development of Bicycle Facilities, 2012, Chapter 5

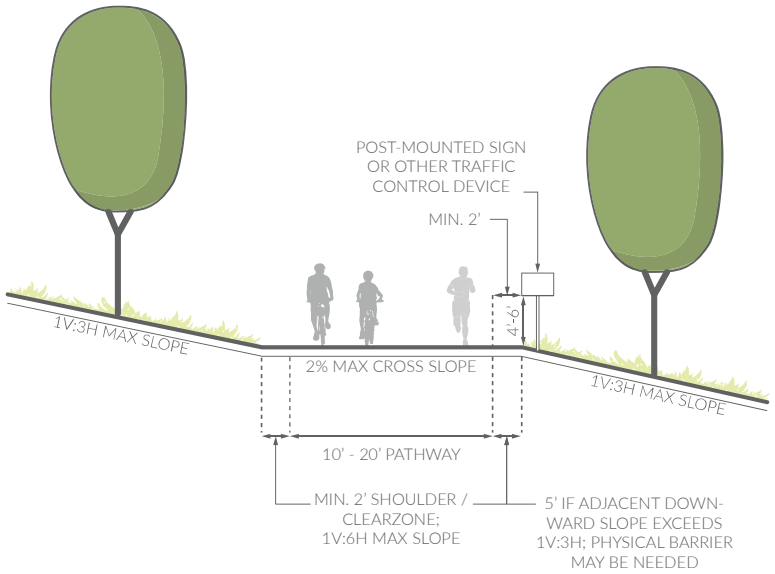
FHWA, Manual on Uniform Traffic Control Devices (MUTCD), 2009

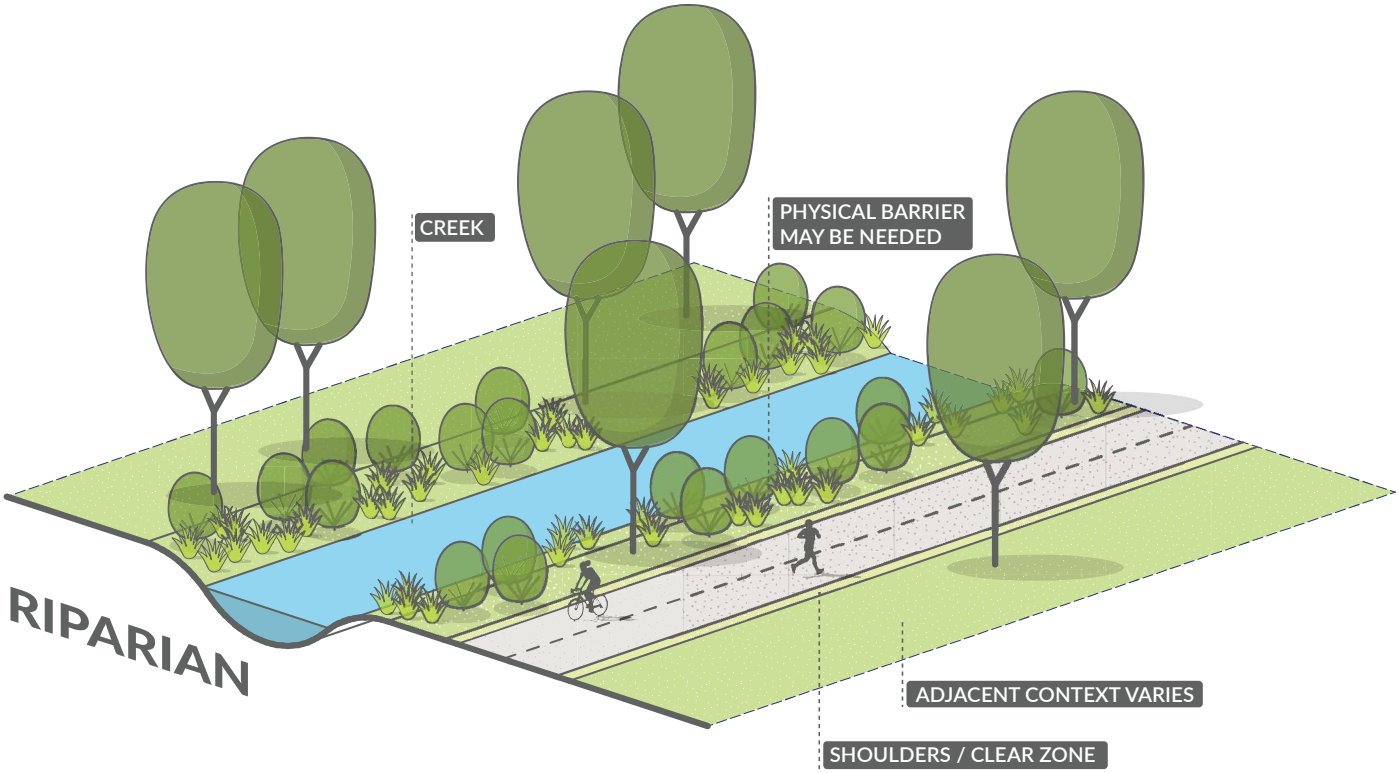
Asphalt path

Soft surface path

DESIGN GUIDELINES

- **Materials:** Asphalt, concrete, or crushed aggregate, depending on local context and expected use. All materials must meet ADA accessibility requirements. Concrete shall have saw-cut jointing for bicyclist comfort.
- **Width:** 12’ is the typical width of multi-use paths; 10’ is acceptable only in areas where physical constraints don’t allow 12’. In high-traffic areas, widen pathway and consider delineating space by slow- and fast-moving users to avoid conflicts.
- **Shoulder / Clear Zone:** Minimum 2’ wide; should be graded with same cross slope as pathway and should not contain landscaping (turf grass is okay) or vertical elements such as fences, signage, light poles, etc. Decomposed granite or gravel is recommended.
- **Vertical Clearance:** 8’ minimum, 10’ typical
- **Slope:** Pathway slopes should be designed at 5% (greater slope is permitted, but should be limited, see AASHTO); Pathway cross slope should not exceed 2%.
- **Setbacks:** Where the multi-use path approaches private property boundaries, proper setback distances should be maintained per regulations. Where possible, increase the setback distance to allow for more vegetation and a better user experience.
- **Other Design Criteria:** Pathway design should comply with all AASHTO requirements for shared use paths related to design speed, sight distances, stopping distances, and grades.





TYPICAL APPLICATION

A shared use path that runs along a riparian corridor. Factors such as stream flow, flood concern, and maintaining a proper distance from sensitive ecosystems can all impact pathway design.

EXAMPLE NETWORK FACILITIES

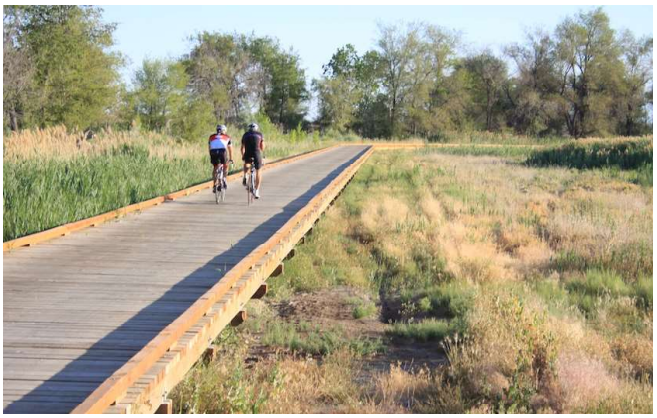
- Regional connection to Dry Creek
- Carterville Trail
- Hobble Creek Trail
- Lindon Heritage Trail

REFERENCES

AASHTO, Guide for the Development of Bicycle Facilities, 2012, Chapter 5

FHWA, Manual on Uniform Traffic Control Devices (MUTCD), 2009

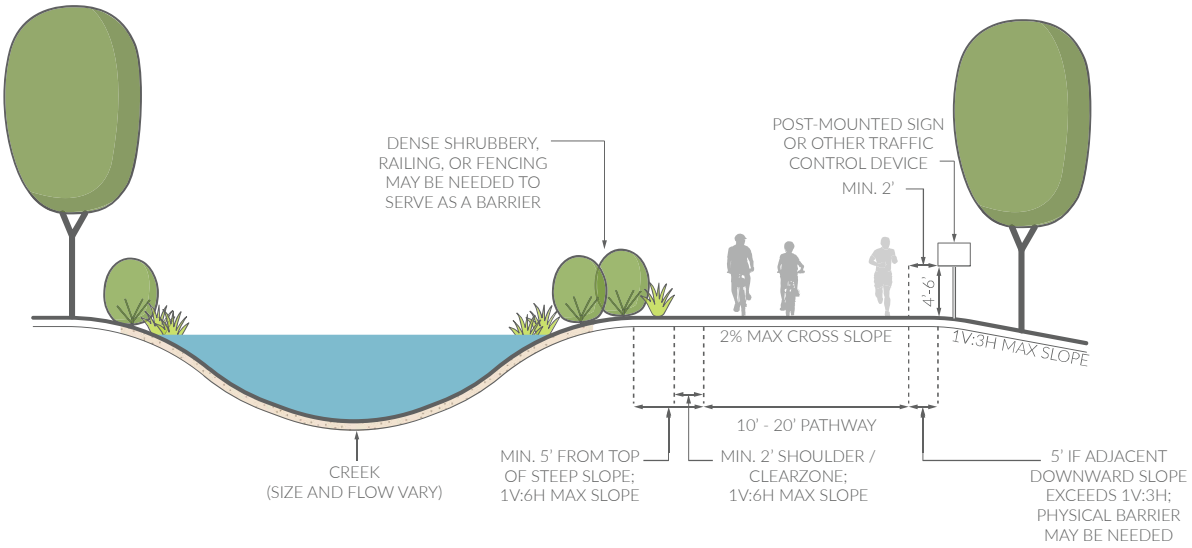
Bridge across a natural waterway

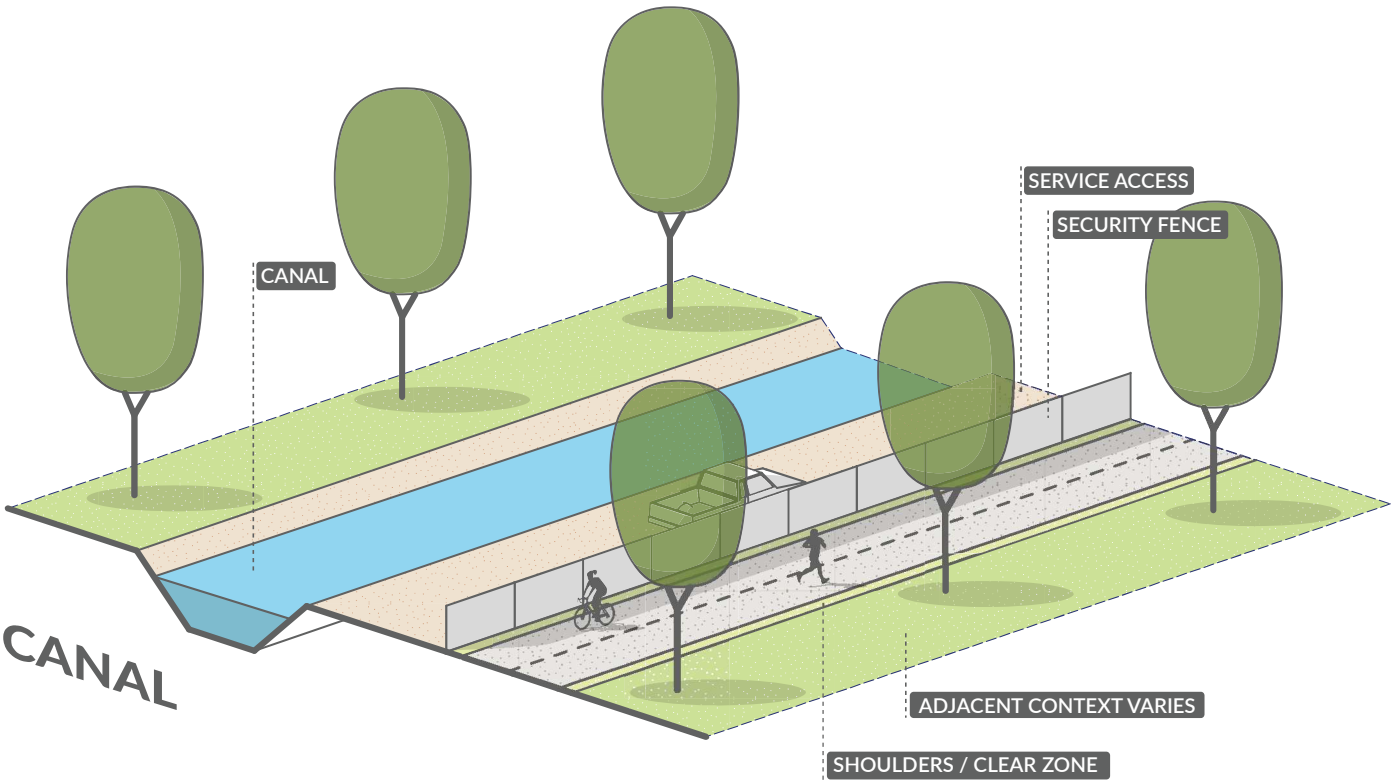


Wooden boardwalk path to minimize riparian disturbance

DESIGN GUIDELINES

- **Materials:** Asphalt, concrete, or crushed aggregate, depending on local context and expected use. All materials must meet ADA accessibility requirements. Concrete shall have saw-cut jointing for bicyclist comfort.
- **Width:** 12' is the typical width of multi-use paths; 10' is acceptable only in areas where physical constraints don't allow 12'. In high-traffic areas, widen pathway and consider delineating space by slow- and fast-moving users to avoid conflicts.
- **Shoulder / Clear Zone:** Minimum 2' wide; should be graded with same cross slope as pathway and should not contain landscaping (turf grass is okay) or vertical elements such as fences, signage, light poles, etc. Decomposed granite or gravel is recommended.
- **Vertical Clearance:** 8' minimum, 10' typical
- **Slope:** Pathway slopes should be designed at 5% (greater slope is permitted, but should be limited, see AASHTO); Pathway cross slope should not exceed 2%.
- **Setbacks:** Provide 5' minimum setback from the top of bank or safety railing.
- **Other Design Criteria:** Pathway design should comply with all AASHTO requirements for shared use paths related to design speed, sight distances, stopping distances, and grades.





TYPICAL APPLICATION

A shared use path that runs along a canal. The canal may be capped or open. Canal corridors often offer excellent opportunities for pathway development due to their linear, regional, and continuous nature, providing off-street connections for a wide variety of ages and abilities. Access and service roads, views to the water, right-of-way width constraints, and safety concerns may all impact pathway design. Close coordination with canal company is critical to addressing maintenance and operational concerns.

EXAMPLE NETWORK FACILITIES

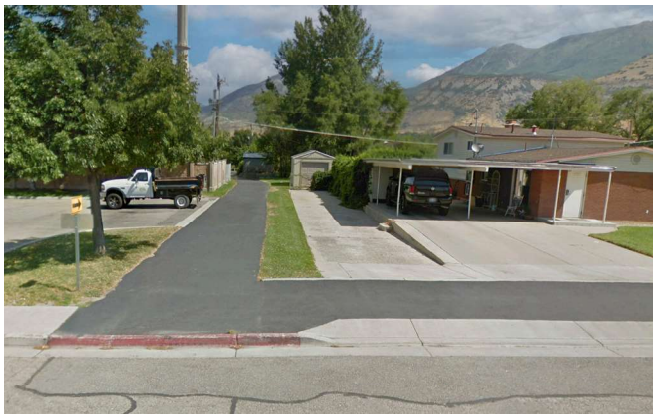
- Saratoga Lehi Canal
- Carterville Trail
- Spanish Fork Canal Trail

REFERENCES

AASHTO, Guide for the Development of Bicycle Facilities, 2012, Chapter 5

FHWA, Manual on Uniform Traffic Control Devices (MUTCD), 2009

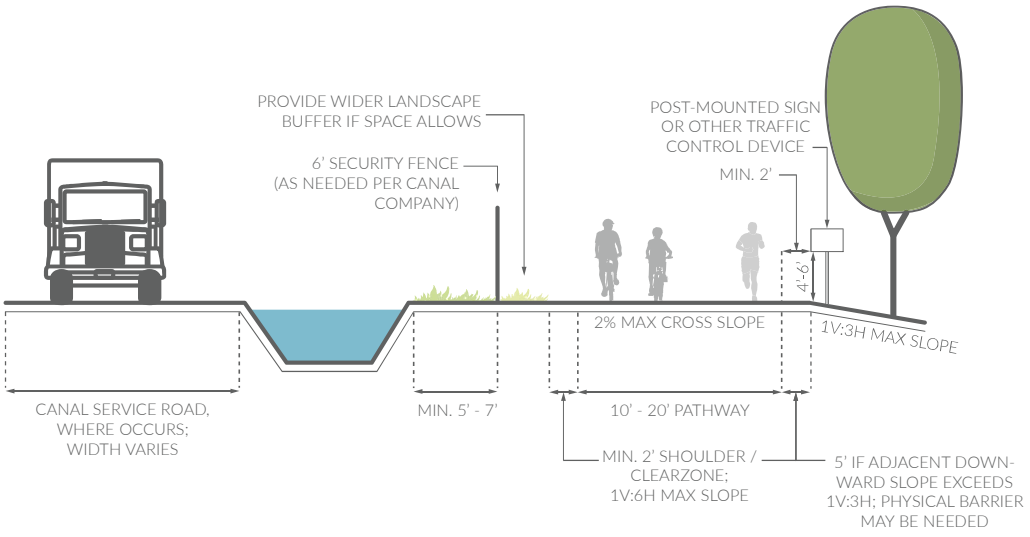
Canal adjacent path

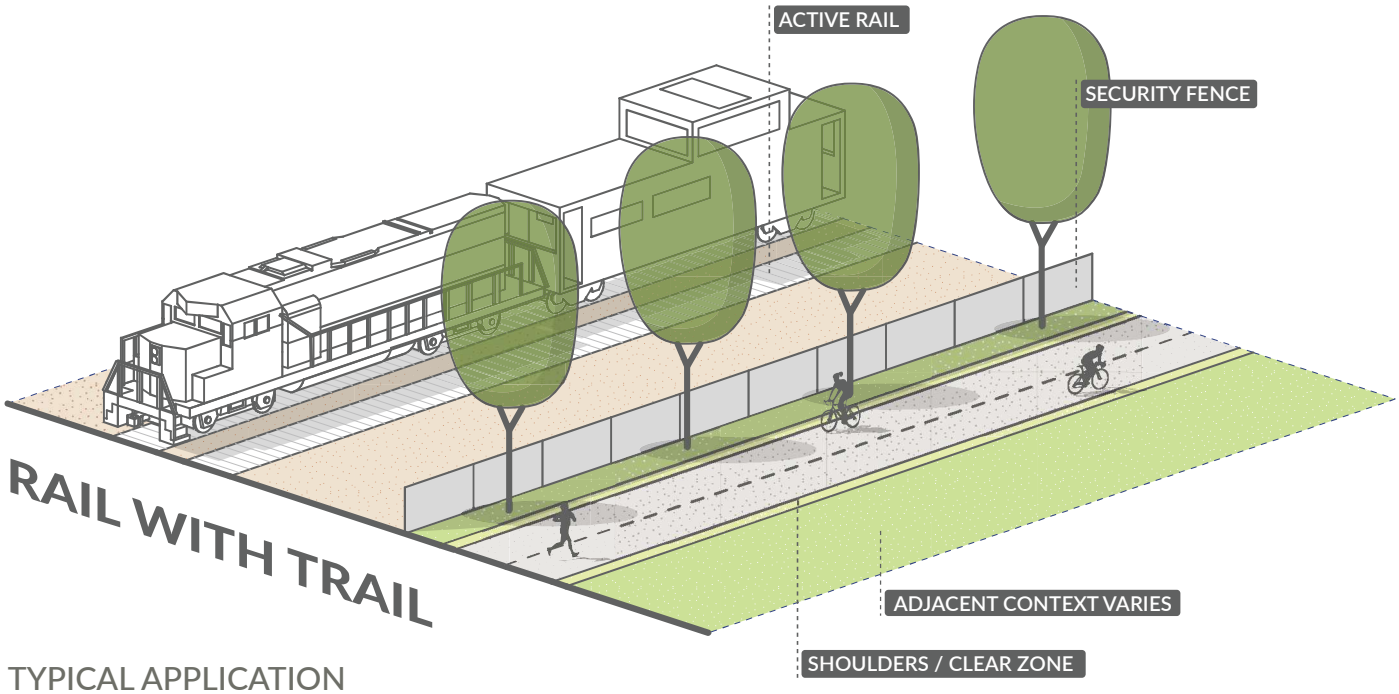


Pathway over a capped canal

DESIGN GUIDELINES

- **Materials:** Asphalt, concrete, or crushed aggregate, depending on local context and expected use. All materials must meet ADA accessibility requirements. Concrete shall have saw-cut jointing for bicyclist comfort.
- **Width:** 12' is the typical width of multi-use paths; 10' is acceptable only in areas where physical constraints don't allow 12'. In high-traffic areas, widen pathway and consider delineating space by slow- and fast-moving users to avoid conflicts.
- **Shoulder / Clear Zone:** Minimum 2' wide; should be graded with same cross slope as pathway and should not contain landscaping (turf grass is okay) or vertical elements such as fences, signage, light poles, etc. Decomposed granite or gravel is recommended.
- **Vertical Clearance:** 8' minimum, 10' typical
- **Slope:** Pathway slopes should be designed at 5% (greater slope is permitted, but should be limited, see AASHTO); Pathway cross slope should not exceed 2%.
- **Setbacks:** Provide 5' minimum setback from the top of bank or safety railing.
- **Fencing:** Depending on canal ownership and liability concerns, fencing may be required between the pathway and canal. Fence should be 6' tall minimum, deferring to canal company requirements. Where possible, set fence back from path to allow for vegetative screening.
- **Other Design Criteria:** Pathway design should comply with all AASHTO requirements for shared use paths related to design speed, sight distances, stopping distances, and grades.





TYPICAL APPLICATION

A shared use path that runs along an active railroad. Rail-with-trail designs vary widely with rail operators, depending on factors such as requirements for setbacks from trains, the frequency and speed of rail service, and the presence of at-grade crossings. Many rail-with-trail facilities have segments of trail that are within thirty feet of active railroad tracks (RTC 2013). Others, such as Salt Lake's S-Line are even closer. Limited right-of-way, inadequate setbacks, concerns about safety/trespassing, future rail expansion, and numerous crossings may affect a project's design and should be discussed early with the rail operator.

EXAMPLE NETWORK FACILITIES

- 1700 West Extension/connection to Frontrunner
- Geneva Road Path
- Santaquin Rail Trail to Payson

OTHER CONSIDERATIONS

- Refer to the AASHTO Bike Guide for guidance for "Railroad Grade Crossings" (Section 4.12.1)
- Refer to MUTCD Chapter 8D for guidance on pathways that cross railroad corridors at grade

REFERENCES

AASHTO, Guide for the Development of Bicycle Facilities, 2012, Chapter 5

FHWA, Manual on Uniform Traffic Control Devices (MUTCD), 2009

FHWA, Rails-with-Trails: Lessons Learned, 2002

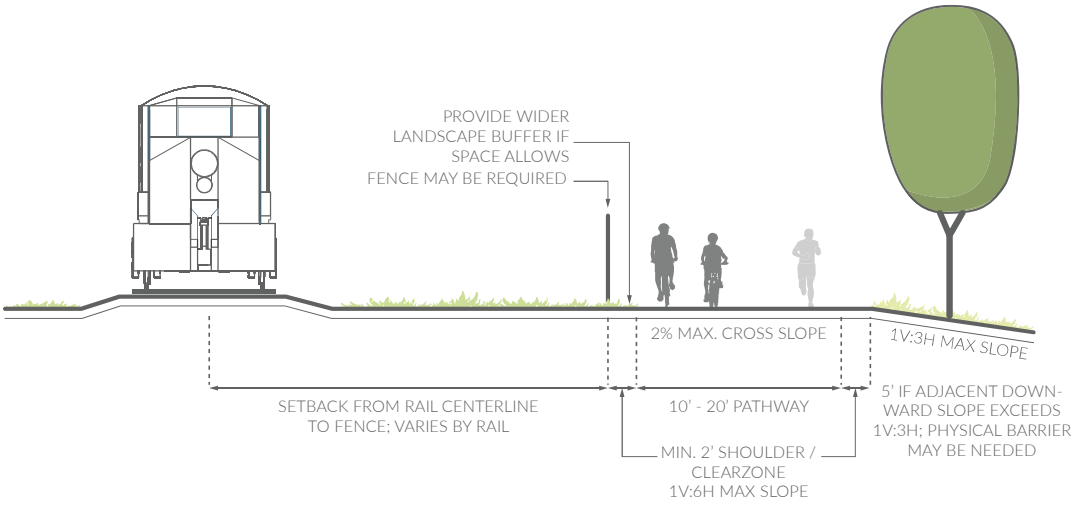
Rails to trails conservancy (RTC). America's Rails-with-Trails, 2013`

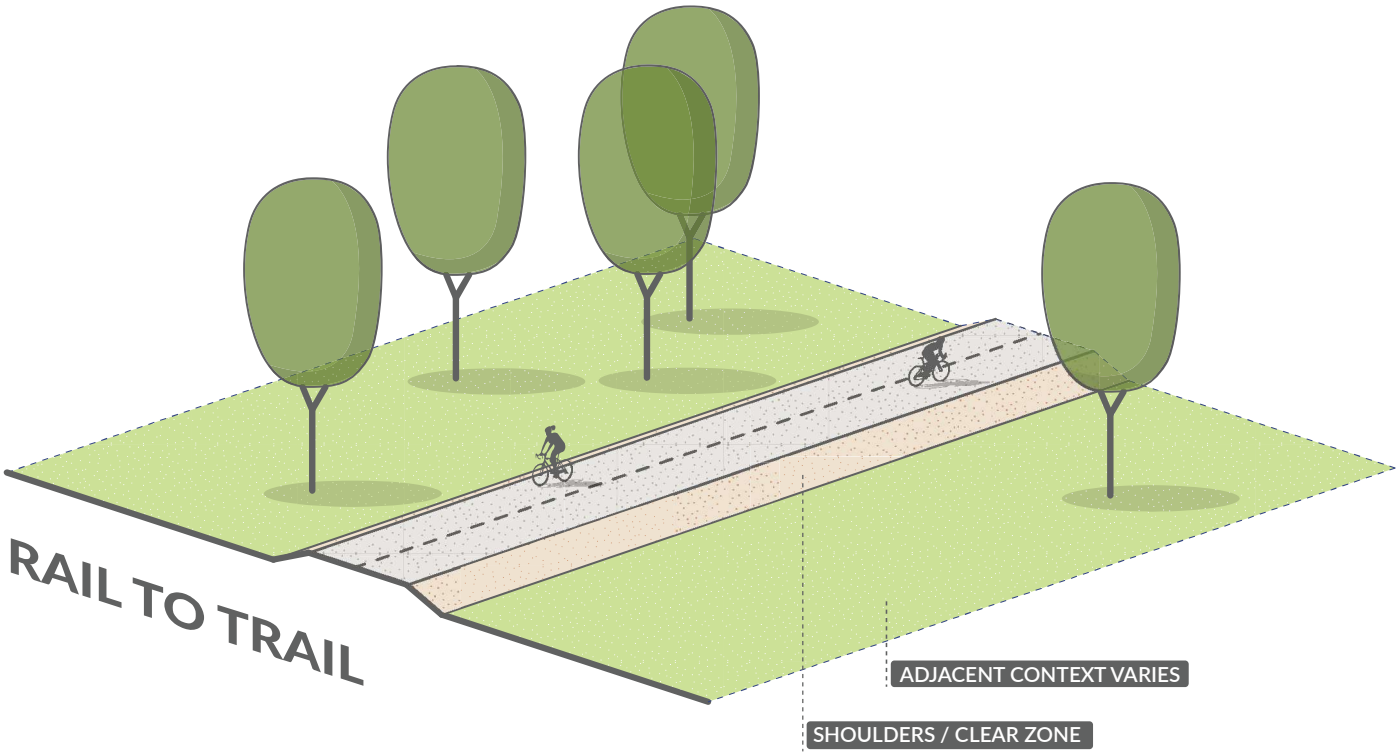
Rail with trail on a wide corridor

Close proximity path in Salt Lake City

DESIGN GUIDELINES

- **Materials:** Asphalt, concrete, or crushed aggregate, depending on local context and expected use. All materials must meet ADA accessibility requirements. Concrete shall have saw-cut jointing for bicyclist comfort.
- **Width:** 12' is the typical width of multi-use paths; 10' is acceptable only in areas where physical constraints don't allow 12'. In high-traffic areas, widen pathway and consider delineating space by slow- and fast-moving users to avoid conflicts.
- **Shoulder / Clear Zone:** Minimum 2' wide; should be graded with same cross slope as pathway and should not contain landscaping (turf grass is okay) or vertical elements such as fences, signage, light poles, etc. Decomposed granite or gravel is recommended.
- **Vertical Clearance:** 8' minimum, 10' typical
- **Slope:** Pathway slopes should be designed at 5% (greater slope is permitted, but should be limited, see AASHTO); Pathway cross slope should not exceed 2%.
- **Setbacks:** The FHWA Rails-with-Trails document provides no consensus on an appropriate setback distance between the paved edge of a pathway and the centerline of the closest active rail track. Setbacks from active rail lines will vary depending on the speed, and frequency of trains, topography, sight distances, available right-of-way, and rail operator standards (FHWA 2002). Coordinate with the Utah Transit Authority and Union Pacific on these and other issues.
- **Fencing:** If required, fencing should be a minimum of 5 feet in height with higher fencing than usual next to sensitive areas such as switching yards
- **Other Design Criteria:** Pathway design should comply with all AASHTO requirements for shared use paths related to design speed, sight distances, stopping distances, and grades.





TYPICAL APPLICATION

A shared use path running along an inactive or abandoned railroad. Rail trails make for great off-street facilities due to the gentle grades and direct connections that they often provide.

EXAMPLE NETWORK FACILITIES

- Goshen Rail Trail

REFERENCES

AASHTO, Guide for the Development of Bicycle Facilities, 2012, Chapter 5

FHWA, Manual on Uniform Traffic Control Devices (MUTCD), 2009

Rail to trail undercrossing

Rail to trail path

DESIGN GUIDELINES

- **Materials:** Asphalt, concrete, or crushed aggregate, depending on local context and expected use. All materials must meet ADA accessibility requirements. Concrete shall have saw-cut jointing for bicyclist comfort.
- **Width:** 12’ is the typical width of multi-use paths; 10’ is acceptable only in areas where physical constraints don’t allow 12’. In high-traffic areas, widen pathway and consider delineating space by slow- and fast-moving users to avoid conflicts.
- **Shoulder / Clear Zone:** Minimum 2’ wide; should be graded with same cross slope as pathway and should not contain landscaping (turf grass is okay) or vertical elements such as fences, signage, light poles, etc. Decomposed granite or gravel is recommended.
- **Vertical Clearance:** 8’ minimum, 10’ typical
- **Slope:** Pathway slopes should be designed at 5% (greater slope is permitted, but should be limited, see AASHTO); Pathway cross slope should not exceed 2%.
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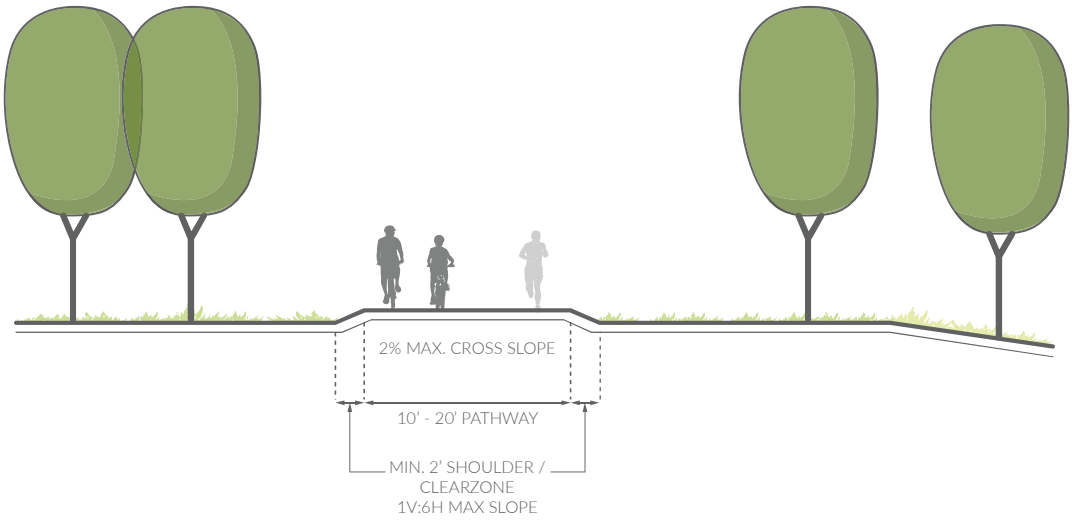
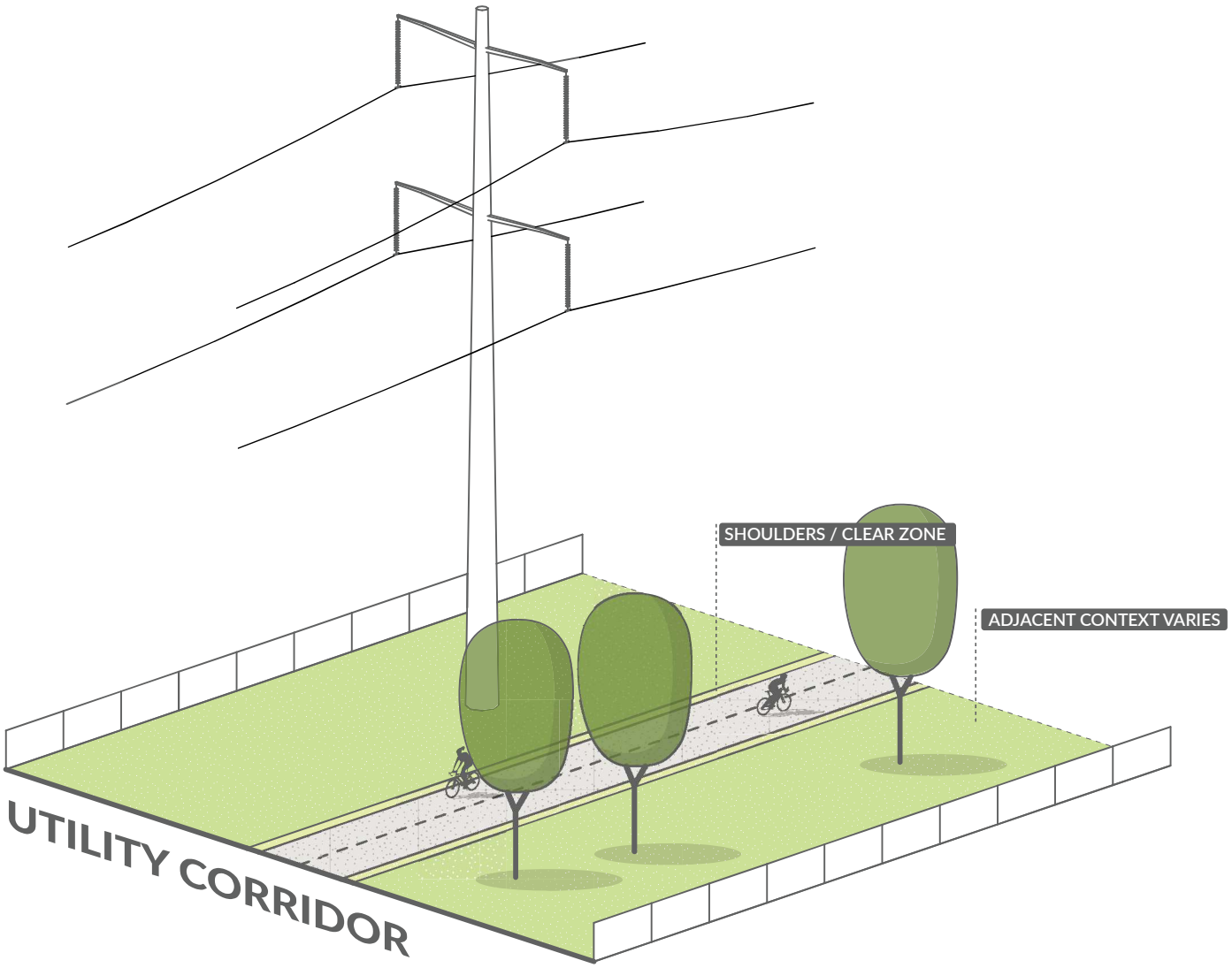




TYPICAL APPLICATION

A shared use path running along a utility easement. This easement is usually a power corridor but could also be other utilities such as stormwater or sewer. Setbacks as dictated by the utility company, vehicular access, and regulated planting materials may all impact shared use path design.

EXAMPLE NETWORK FACILITIES

- Lehi Powerline Trail
- Alpine Main City Trail (The Metro)

REFERENCES

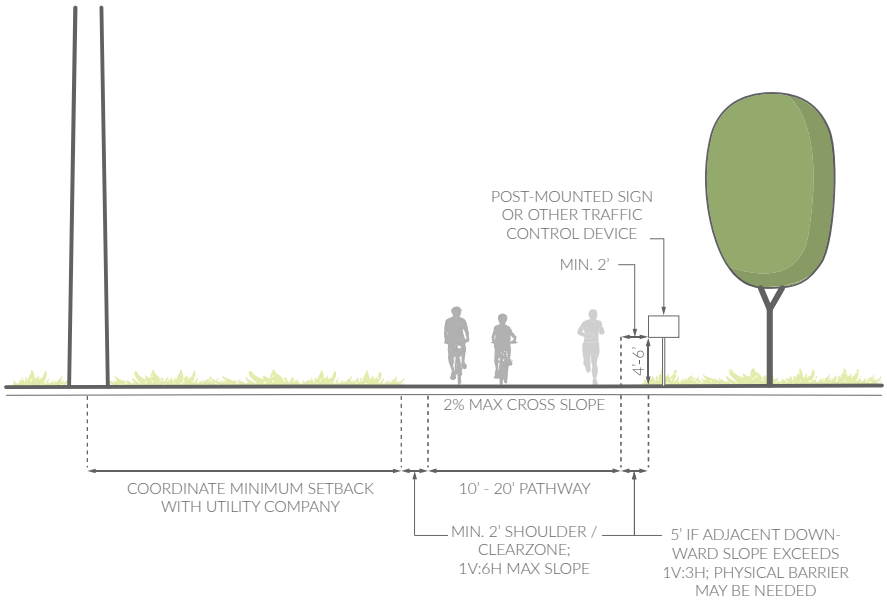
AASHTO, Guide for the Development of Bicycle Facilities, 2012, Chapter 5

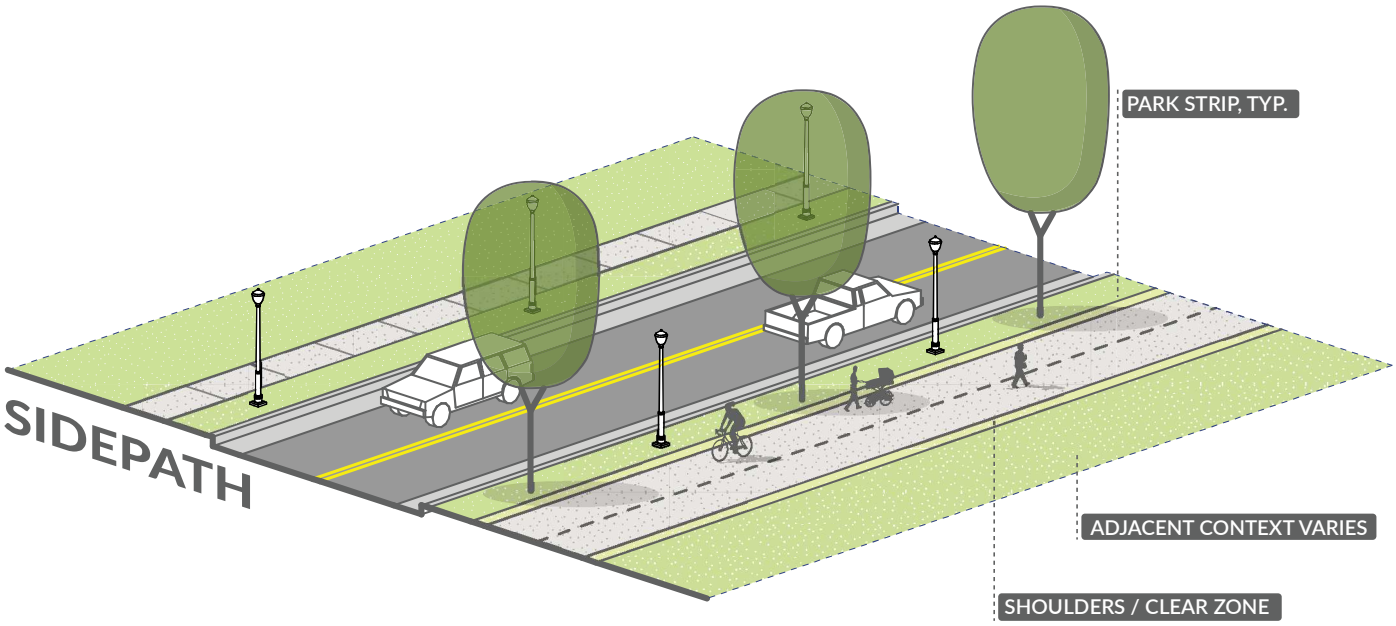
FHWA, Manual on Uniform Traffic Control Devices (MUTCD), 2009

Shared use path along a power corridor

DESIGN GUIDELINES

- **Materials:** Asphalt, concrete, or crushed aggregate, depending on local context and expected use. All materials must meet ADA accessibility requirements. Concrete shall have saw-cut jointing for bicyclist comfort.
- **Width:** 12' is the typical width of multi-use paths; 10' is acceptable only in areas where physical constraints don't allow 12'. In high-traffic areas, widen pathway and consider delineating space by slow- and fast-moving users to avoid conflicts.
- **Shoulder / Clear Zone:** Minimum 2' wide; should be graded with same cross slope as pathway and should not contain landscaping (turf grass is okay) or vertical elements such as fences, signage, light poles, etc. Decomposed granite or gravel is recommended.
- **Vertical Clearance:** 8' minimum, 10' typical
- **Slope:** Pathway slopes should be designed at 5% (greater slope is permitted, but should be limited, see AASHTO); Pathway cross slope should not exceed 2%.
- **Setbacks:** Setbacks and clear distances may be required by the utility owner to allow access to their equipment. These distances should be coordinated on a case by case basis.
- **Fencing:** Depending on utility ownership and liability concerns, fencing may be required between the pathway and any utility lines. Fence should be 5' tall minimum, deferring to local regulations. Where possible, set fence back from path to allow for vegetative screening.
- **Other Design Criteria:** Pathway design should comply with all AASHTO requirements for shared use paths related to design speed, sight distances, stopping distances, and grades.





TYPICAL APPLICATION

A shared use path running along the edge of an adjacent street or road is referred to as a sidepath. Since they serve as both bikeway, trail, and street sidewalk, special consideration should be given to pathway width. Where the right-of-way allows, or where roadways can be narrowed, this is a great option for creating an active corridor along existing roadways.

EXAMPLE NETWORK FACILITIES

- Canyon Road Pathway
- State Street Pathway (American Fork / Pleasant Grove)
- Lakeshore Trail Extension
- Main Street Spanish Fork

REFERENCES

AASHTO, Guide for the Development of Bicycle Facilities, 2012, Chapter 5

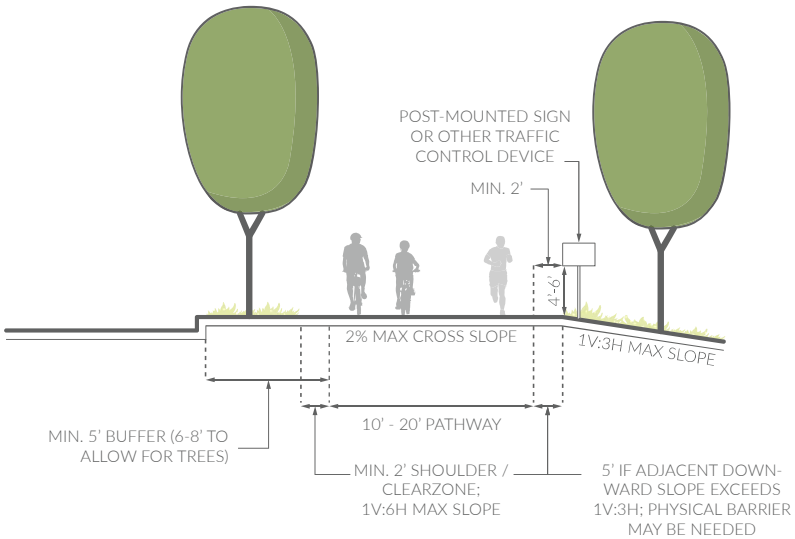
FHWA, Manual on Uniform Traffic Control Devices (MUTCD), 2009

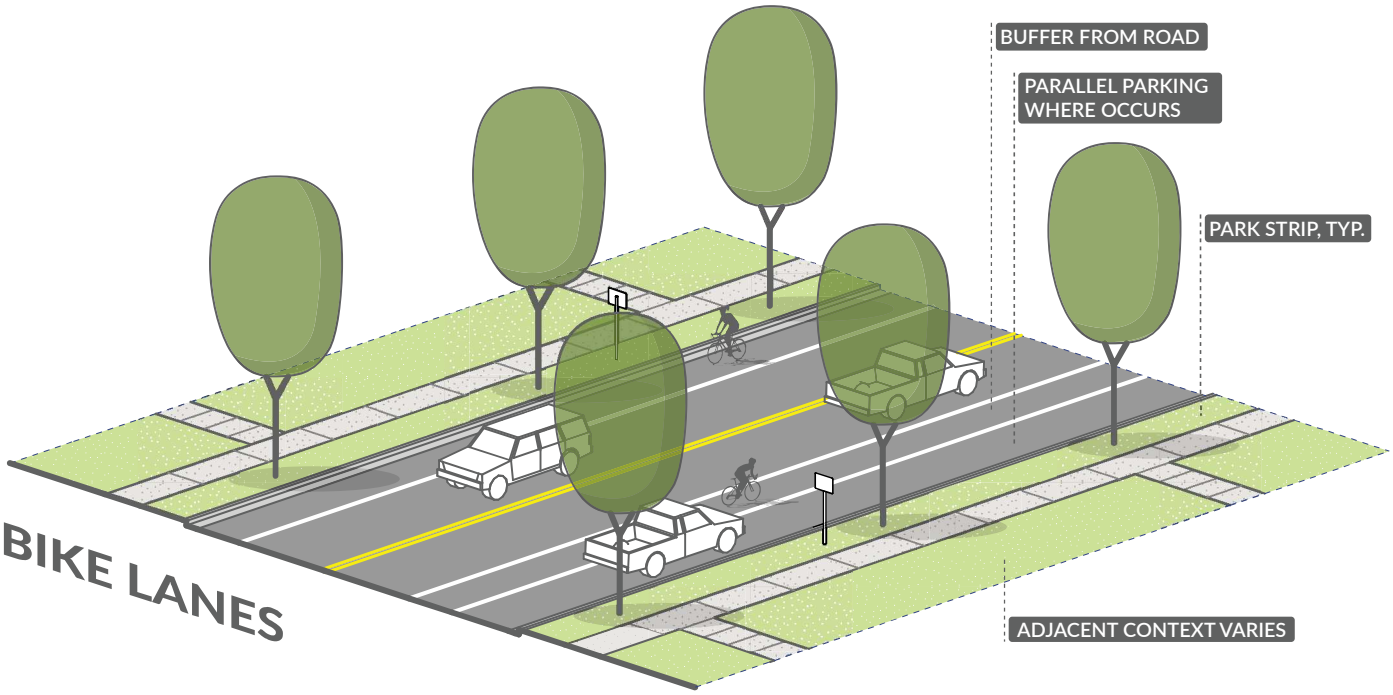
Concrete shared use path

Asphalt shared use path

DESIGN GUIDELINES

- **Materials:** Asphalt, concrete, or crushed aggregate, depending on local context and expected use. All materials must meet ADA accessibility requirements. Concrete shall have saw-cut jointing for bicyclist comfort.
- **Width:** 12’ is the typical width of multi-use paths; 10’ is acceptable only in areas where physical constraints don’t allow 12’. In high-traffic areas, widen pathway and consider delineating space by slow- and fast-moving users to avoid conflicts.
- **Shoulder / Clear Zone:** Minimum 2’ wide; should be graded with same cross slope as pathway and should not contain landscaping (turf grass is okay) or vertical elements such as fences, signage, light poles, etc. Decomposed granite or gravel is recommended.
- **Vertical Clearance:** 8’ minimum, 10’ typical
- **Slope:** Pathway slopes should be designed at 5% (greater slope is permitted, but should be limited, see AASHTO); Pathway cross slope should not exceed 2%.
- **Setbacks:** The path should maintain a 5’ minimum buffer from adjacent streets to accommodate such elements as trees, light poles, and utilities. This buffer also makes for a safer and more comfortable user experience. Setbacks from adjacent private property may also be considered, although frequently this type of path can run along the property edge.
- **Other Design Criteria:** Pathway design should comply with all AASHTO requirements for shared use paths related to design speed, sight distances, stopping distances, and grades.





BIKE LANES

TYPICAL APPLICATION

On-street bike lanes designate an exclusive space for bicyclists through the use of pavement markings and signs. The bike lane is located directly adjacent to motor vehicle travel lanes and is used in the same direction as motor vehicle traffic. Bike lanes are typically on the right side of the street, between the adjacent travel lane and curb, road edge or parking lane.

EXAMPLE NETWORK FACILITIES

- State Street Lehi
- 300 W Bike Lanes in Provo
- 9600 N Bike Lanes (Highland / Lehi)
- Goshen 200 S Bike Lanes

REFERENCES

AASHTO, Guide for the Development of Bicycle Facilities, 2012, Chapter 4

FHWA, Manual on Uniform Traffic Control Devices (MUTCD), 2009

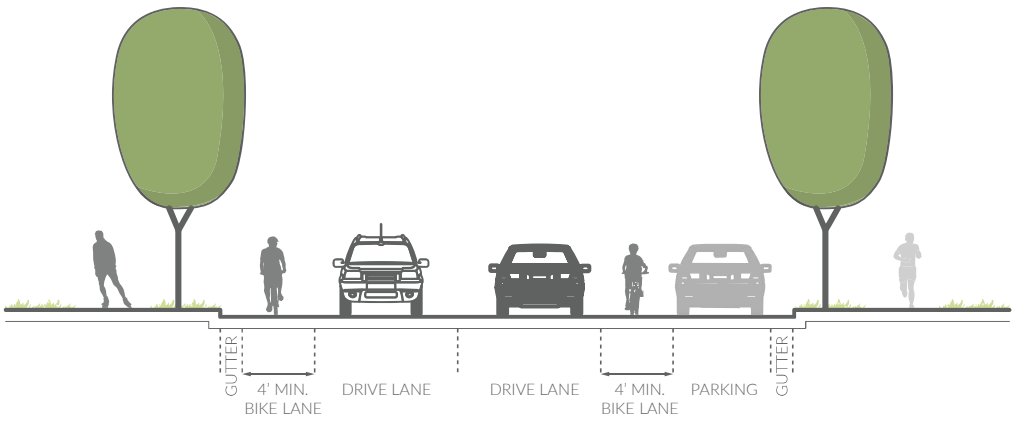
NACTO

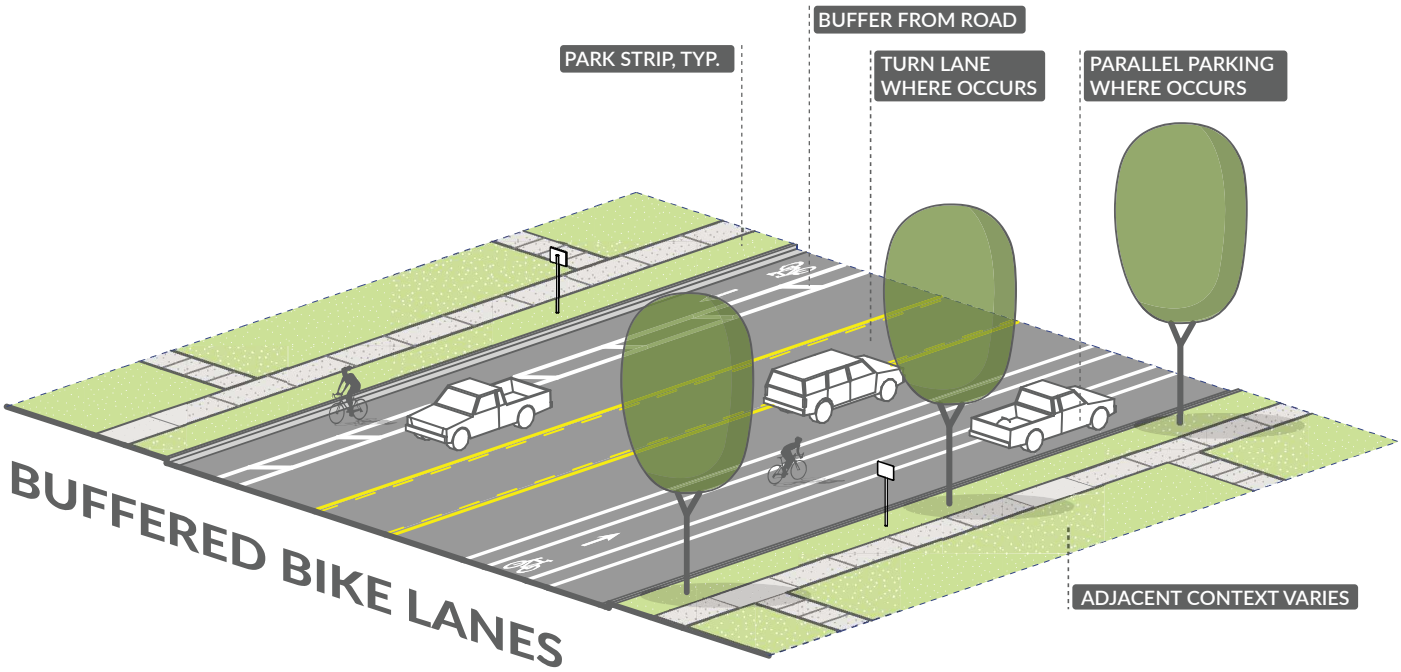
Curbside bike lane

Bike lane adjacent to parking

DESIGN GUIDELINES

- **Materials:** Due to being an on-street facility, the main material will most likely be the same as the rest of the roadway.
- **Striping and Pavement Markings**: Include a bicycle lane marking (MUTCD Figure 9C-3) at the beginning of blocks and at regular intervals along the route (MUTCD 9C.04).
- **Width:** 4’ is the minimum total width per lane, but where possible, 5’ provides for a more comfortable riding experience. On roadways with higher speeds, additional width should be considered. Do not stripe bike lanes wider than 7’ as they may be mistaken as a travel lane. Conventional bike lanes are most helpful on streets with speeds between 25 MPH and 35 MPH. If speeds are at or above 35 MPH, or if roadway width allows, buffered lanes, separated lanes, or cycle tracks should be considered.





TYPICAL APPLICATION

Buffered bike lanes are conventional bicycle lanes paired with a designated buffer space, separating the bicycle lane from the adjacent motor vehicle travel lane and/or parking lane. Buffered lanes should be considered if roadway width allows, if traffic volumes are high, or if roadway speeds exceed 35 MPH.

EXAMPLE NETWORK FACILITIES

- Geneva Road buffered bike lane

REFERENCES

AASHTO, Guide for the Development of Bicycle Facilities, 2012, Chapter 4

FHWA, Manual on Uniform Traffic Control Devices (MUTCD), 2009

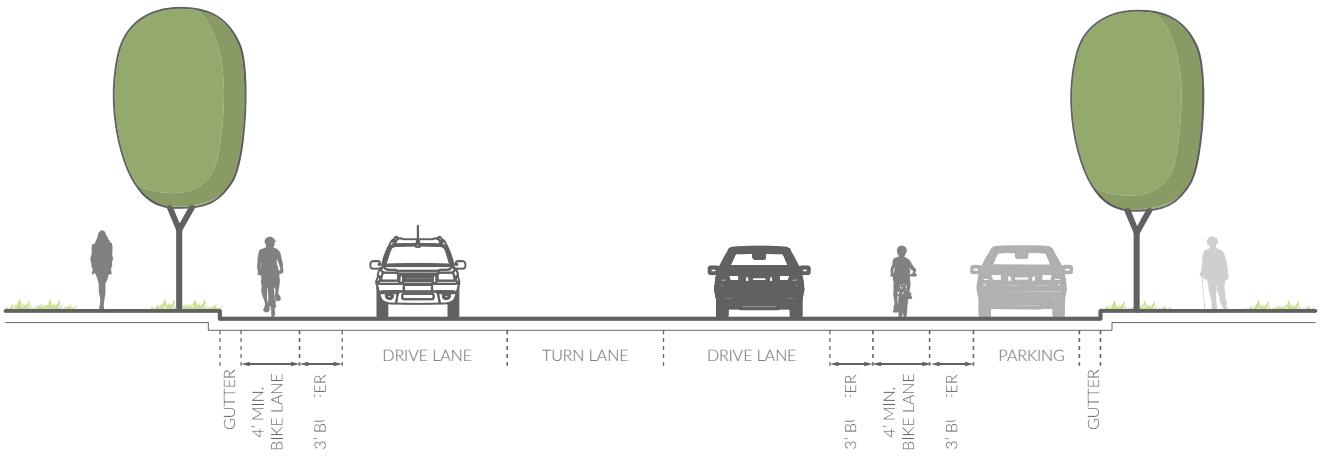
NACTO

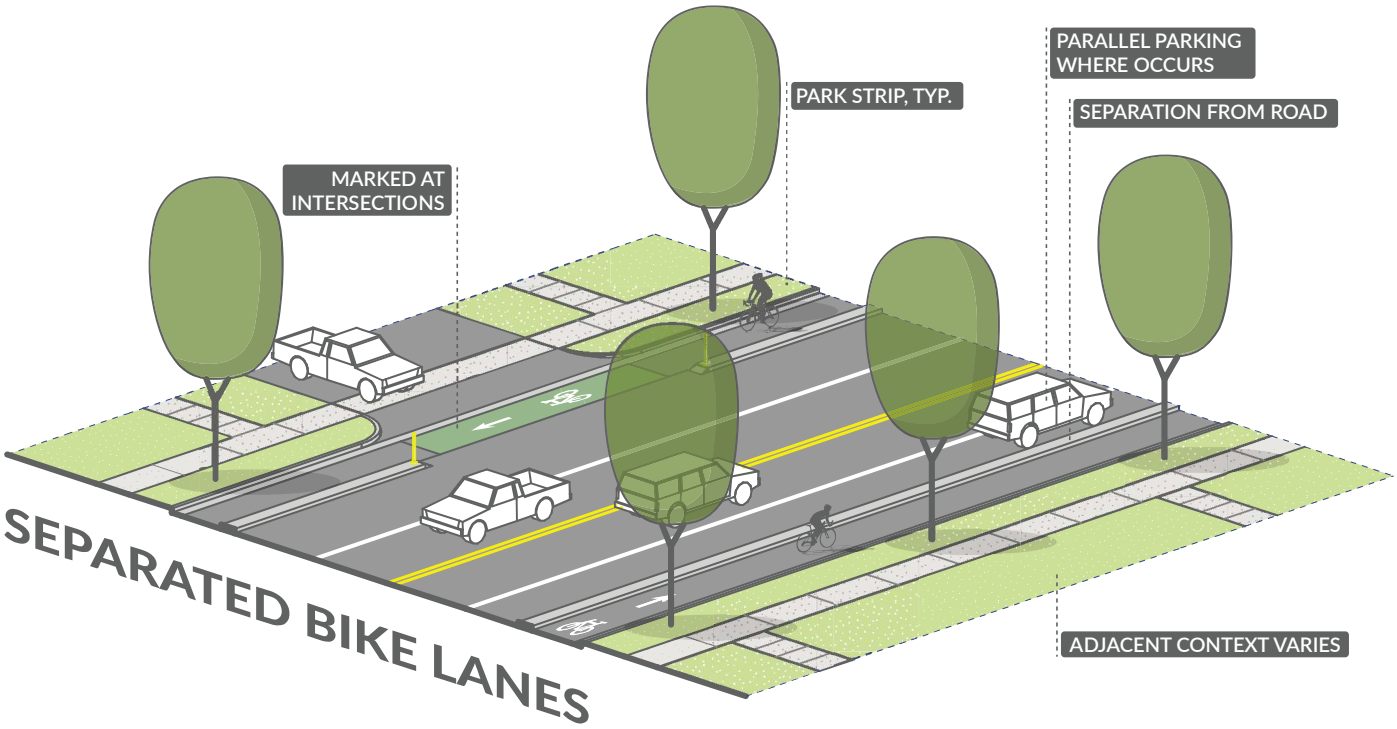
Buffered bike lane with parking

Buffered bike lane

DESIGN GUIDELINES

- **Materials:** Due to being an on-street facility, the main material will most likely be the same as the rest of the roadway, but could also be concrete.
- **Width:** Buffered bike lanes should be at least 5’ wide, not including buffers.
- **Striping and Pavement Markings**: Include a bicycle lane marking (MUTCD Figure 9C-3) at the beginning of blocks and at regular intervals along the route (MUTCD 9C.04).
- **Buffer Dimensions:** Buffers should be at least 2 feet wide. If buffer area is 4 feet or wider, white chevron or diagonal markings should be used.
- **Buffer Orientation:** On roadways without on-street parking, buffers should be placed between the travel lane and the bike lane. On streets with on-street parking, engineering judgment should assess parking occupancy, parking turnover, and vehicular speeds to determine whether the buffer should be oriented next to the travel lane, next to the parking lane, or both.





TYPICAL APPLICATION

On-street facilities with vertical separation from traffic lanes are referred to as separated bike lanes. Due to the vertical barriers, separated bike lanes run on the far side of the street behind on-street parking. Barriers usually take the form of a raised concrete curb, but other raised barriers can also be used. Separated lanes should be considered if roadway width allows, if traffic volumes are high, if there are problematic or dangerous intersections, if there is a high volume of bicycle traffic, or if roadway speeds exceed 35 MPH.

EXAMPLE NETWORK FACILITIES

- Cougar Boulevard, Provo

REFERENCES

AASHTO, Guide for the Development of Bicycle Facilities, 2012, Chapter 4

FHWA, Manual on Uniform Traffic Control Devices (MUTCD), 2009

FHWA, Separated Bike Lane Planning and Design Guide, 2015

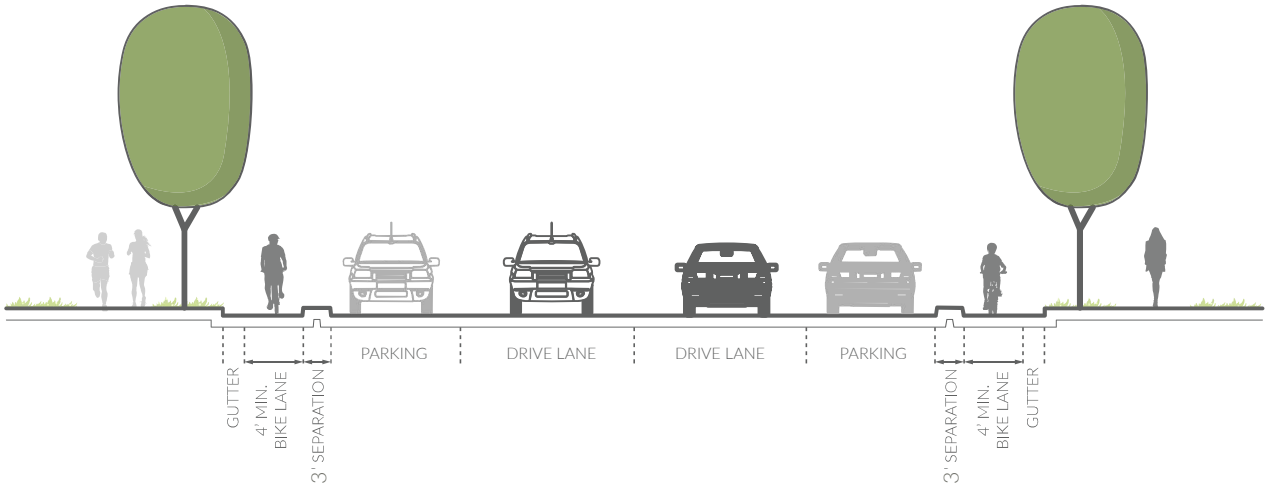
NACTO

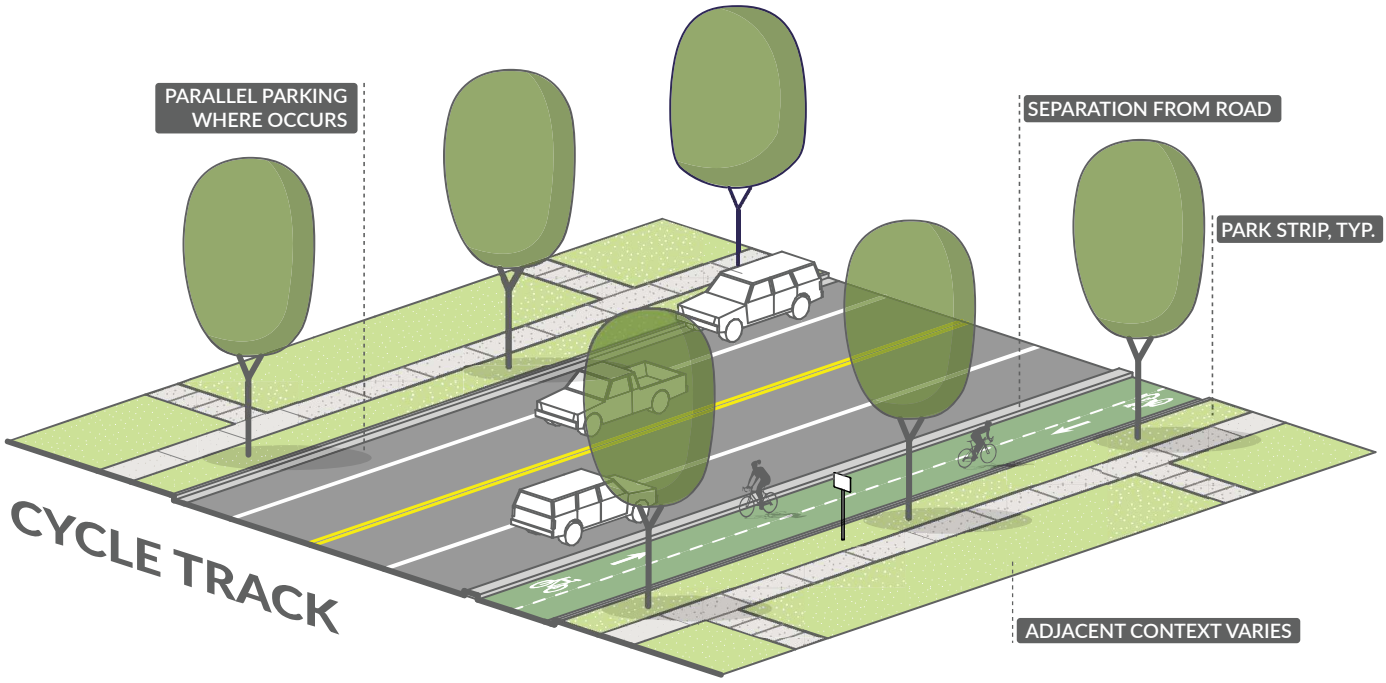
Bike lane with candlesticks as separation

Bike lane with curbs and planting as separation

DESIGN GUIDELINES

- **Materials:** Due to being an on-street facility, the main material will most likely be the same as the rest of the roadway, but could also be concrete.
- **Width:** Separated bike lanes should be at least 5' wide, not including buffers.
- **Striping and Pavement Markings**: Include a bicycle lane marking (MUTCD Figure 9C-3) at the beginning of blocks and at regular intervals along the route (MUTCD 9C.04).
- **Separation Methods / Buffers:** Separated bike lane buffers may be configured in a variety of ways. This may include the use of bollards, concrete curbs, or on-street parking to separate the bike lane from the adjacent travel lane. When placed next to on-street parking, there shall be a 3' buffer zone between the bike lane and the parking lane to mitigate dooring hazards. Separated bike lanes may also be designed at street-level, curb-level, or an intermediate level between the street elevation and top of curb.





TYPICAL APPLICATION

On-street facilities that are grouped together and placed to one side of the roadway are referred to as a cycle track. Cycle tracks are physically separated from traffic and allow for two-directional flow on the same side of the roadway. Special design care should be taken at intersections to allow for intuitive and safe bicycle flow. Driveways and on-street parking may also be factors in design. Cycle tracks should be considered if roadway width allows, if traffic volumes are high, if there are problematic or dangerous intersections, if there is a high volume of bicycle traffic, or if roadway speeds exceed 35 MPH.

EXAMPLE NETWORK FACILITIES

- 1700 W Cycle Track in Lehi
- East/West Cycle Track Lehi to American Fork on 700 S and 200 S

REFERENCES

AASHTO, Guide for the Development of Bicycle Facilities, 2012, Chapter 4

FHWA, Manual on Uniform Traffic Control Devices (MUTCD), 2009

FHWA, Separated Bike Lane Planning and Design Guide, 2015

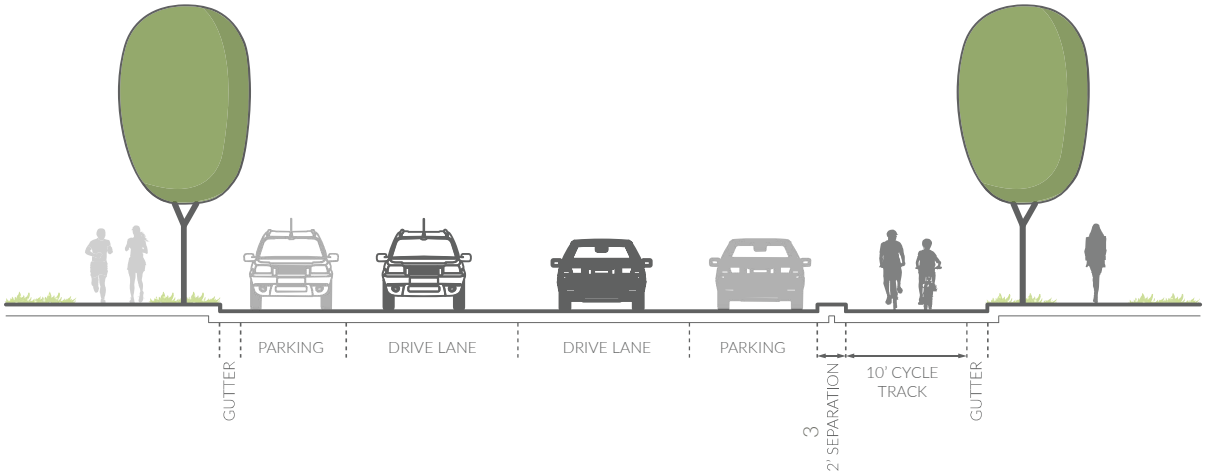
NACTO

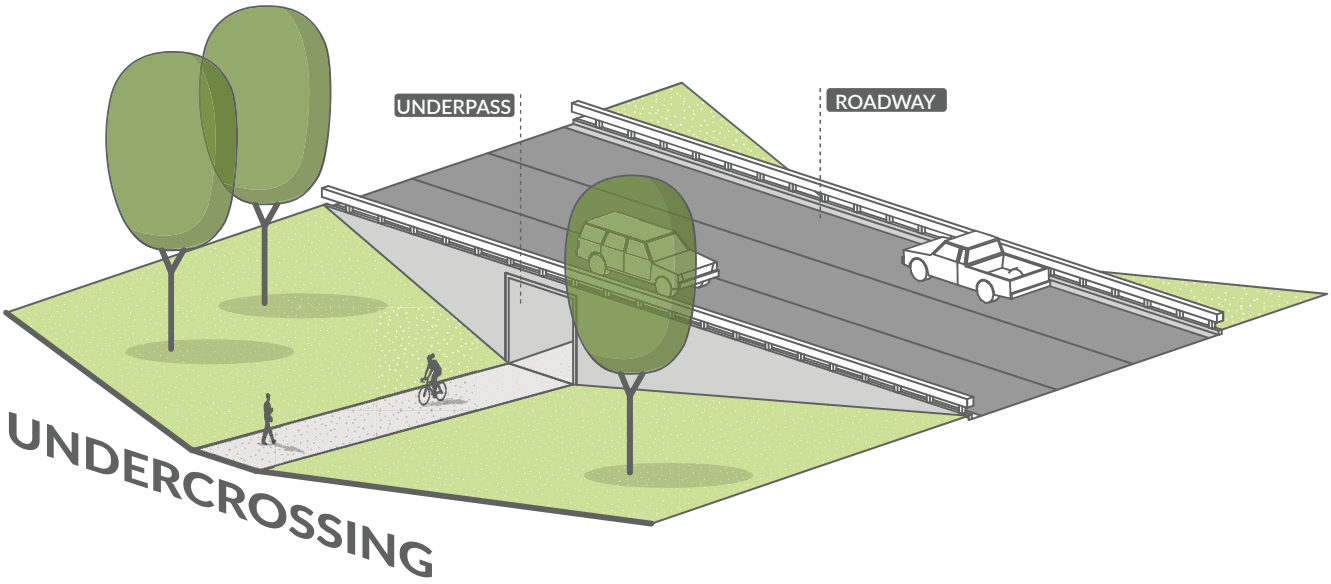
Cycle track with sculptural separation elements

Separated cycle track

DESIGN GUIDELINES

- **Materials:** Due to being an on-street facility, the main material will most likely be the same as the rest of the roadway, but could also be concrete. Concrete shall have saw-cut jointing for bicyclist comfort.
- **Width:** 10’ width recommended (5’ in each direction). In constrained areas, 8’ width may be acceptable. On roadways with higher speeds, additional width should be considered.
- **Striping and Pavement Markings**: Include a bicycle lane marking (MUTCD Figure 9C-3) at the beginning of blocks and at regular intervals along the route (MUTCD 9C.04).
- **Separation Methods / Buffers:** Cycle track buffers may be configured in a variety of ways. This may include the use of bollards, concrete curbs, or on-street parking to separate the cycle track from the adjacent travel lane. When placed next to on-street parking, there shall be a 3’ buffer zone between the cycle track and the parking lane to mitigate dooring hazards. Cycle tracks may also be designed at street-level, curb-level, or an intermediate level between the street elevation and top of curb.
- **Other Design Criteria:** Track design should comply with all AASHTO requirements for shared use paths related to design speed, sight distances, stopping distances, and grades.





TYPICAL APPLICATION

A shared use path running underneath an at-grade roadway or railway. Grade leading to underpass should not exceed 5%. Clearance should be 10' minimum. Lighting and other placemaking strategies should be considered in the tunnel portion.

OTHER CONSIDERATIONS

- Three-sided pre-cast undercrossing structures have historically performed better than four-sided structures for MAG jurisdictions. However, site-specific conditions and analysis should determine how undercrossings are constructed.

REFERENCES

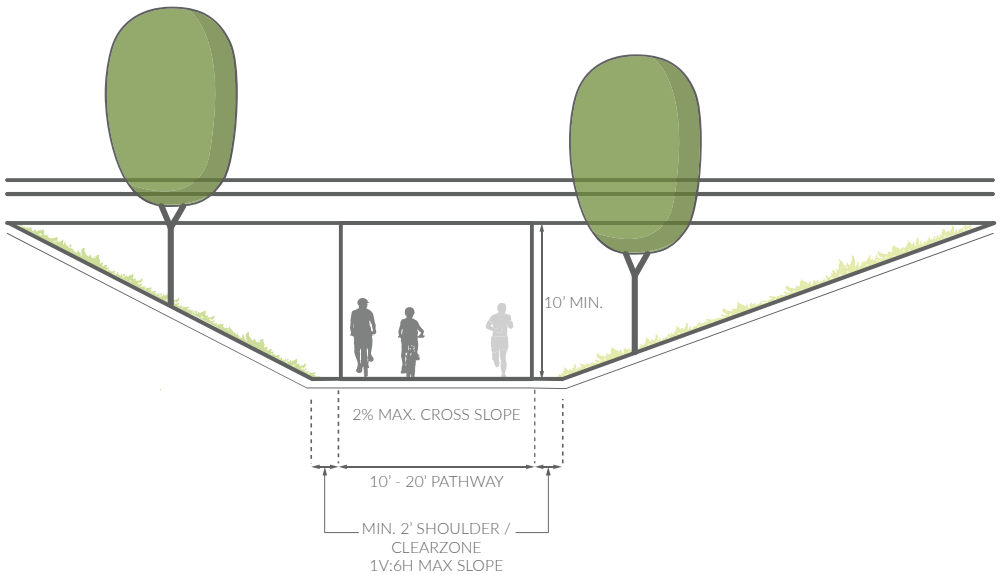
AASHTO, Guide for the Development of Bicycle Facilities, 2012, Chapter 5

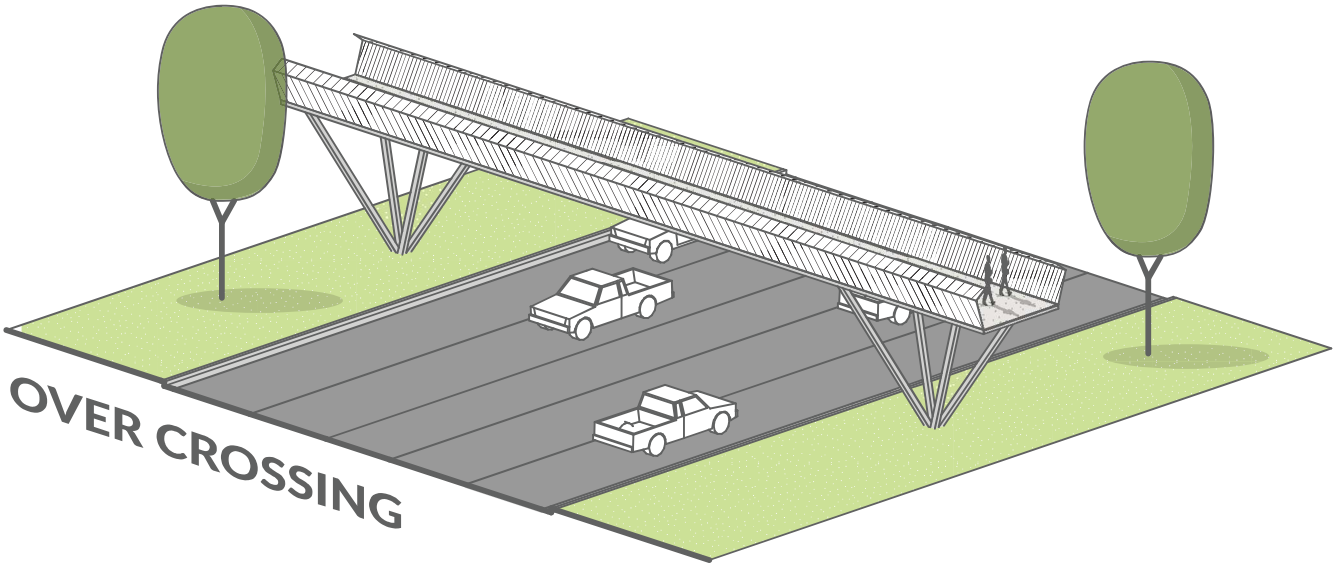
FHWA, Manual on Uniform Traffic Control Devices (MUTCD), 2009

Box undercrossing

DESIGN GUIDELINES

- **Materials:** Asphalt, concrete, or crushed aggregate, depending on local context and expected use. All materials must meet ADA accessibility requirements. Concrete shall have saw-cut jointing for bicyclist comfort.
- **Width:** Undercrossings should be 16’ wide to account for a 12’ shared use path and 2’ shoulders.
- **Shoulder / Clear Zone:** Minimum 2’ wide; should be graded with same cross slope as pathway and should not contain landscaping (turf grass is okay) or vertical elements such as fences, signage, light poles, etc. Decomposed granite or gravel is recommended.
- **Vertical Clearance:** 8’ minimum, 10’ typical
- **Slope:** Pathway slopes and approaches to undercrossings should be designed at 5% (greater slope is permitted, but should be limited, see AASHTO); Pathway cross slope should not exceed 2%.
- **Lighting:** Undercrossings should include adequate lighting.
- **Other Design Criteria:** Pathway design should comply with all AASHTO requirements for shared use paths related to design speed, sight distances, stopping distances, and grades.





TYPICAL APPLICATION

A shared use path passing over a roadway or railway. Clearances should be coordinated with the jurisdiction that it passes over whether that is a road, waterbody, or railroad.

EXAMPLE NETWORK FACILITIES

- UVU Pedestrian Bridge, Orem

REFERENCES

AASHTO, Guide for the Development of Bicycle Facilities, 2012, Chapter 5

FHWA, Manual on Uniform Traffic Control Devices (MUTCD), 2009

UVU overcrossing at I-15

DESIGN GUIDELINES

- **Width:** Overcrossings should be 16’ wide to account for a 12’ shared use path and 2’ shoulders.
- **Slope:** Pathway slopes and approach ramps to overcrossings should be designed at 5% (greater slope is permitted, but should be limited, see AASHTO); Pathway cross slope should not exceed 2%.
- **Railings:** Railings should be 42” high and should include a rub rail placed at handlebar height to prevent bicycle handlebars from catching on the railing. For crossings over UDOT facilities, defer to UDOT standards for railings and fencing requirements. For rail overcrossings, defer to rail operator guidelines.
- **Other Design Criteria:** Additional width or pull-outs should be provided at scenic vistas where stopping or gathering may occur.