

Guidelines from Technical Appendix: Facility Planning and Design Guidelines

1. Planning and design of the AT network should be primarily based on two design modes: cycle based and pedestrian based. Most other modes fall under these two categories.
2. Skateboarders, in-line skaters and cross-country skiers have special design requirements which should be considered when designing a trail.
3. Although ATV's are not an AT mode of travel, their requirements and interaction with AT users should be considered where ATV use is permitted.
4. The bicycle network portion of the HRM AT Plan should consist of a primary "spine system", and a secondary "community system".
5. The spine system should consist of routes designed to be direct and that support cycling for commuting purposes.
6. The spine network should be comprised mainly of on-road bike lanes, paved shoulder bikeways with some wide curb lanes and signed-only routes as well as linear off-road multi-use pathways, serving as a higher-order cycling network for experienced and confident cyclists. Most on-road facilities on Peninsular Halifax may consist of signed-only routes due to spatial constraints.
7. The community system should consist of routes that lead into the spine system. Community system routes should connect local destinations such as schools, community centres, residential areas, local stores, commercial nodes, parks and recreational areas.
8. The pedestrian-based portion of the HRM AT Plan should consist of a pedestrian zonal system, which consists of connections between zones and key missing links within zones.
9. The pedestrian zonal system should consist of geographic zones of pedestrian facilities that see increased pedestrian infrastructure as one gets closer to schools, Regional Centres and transit nodes.
10. Pedestrian zones should be connected to encourage longer and more frequent trips across zonal boundaries.
11. Key missing links within pedestrian zones should be identified so they may be scheduled as high infrastructure implementation priorities.
12. The minimum ROW width of a multi-use trail should be between 3.0m and 5.0m and the

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- minimum height should be between 2.4m and 3.0m where feasible.
13. The recommended minimum horizontal space for a pedestrian or wheelchair is 1.5m.
 14. The recommended operating space that should be allocated for an in-line skater 3.0m of horizontal clearance, and 2.5m of vertical clearance. Trails accommodating two-way travel should be a minimum of 3.0m, or 4.0m where frequent in-line skating is expected.
 15. Providing the operating envelope design width of 1.5m for a cyclist is always recommended and should be provided whenever possible.
 16. When conditions permit, an additional 0.5m should be included in the width of the paved shoulder or bike lane for on-road facilities where the grade of the road approaches or exceeds 8%, where possible ($1.5\text{m} + 0.5\text{m} = 2.0\text{m}$).
 17. When grades exceed 8% and/or are in constrained situations, either wide curb lanes or signed-only routes (descent) and Share the Road signs (ascent) may be considered.
 18. On steep road segments where motor vehicle volumes or the percent of commercial traffic exceed a desirable threshold for a cycling facility type, consideration may also be given to reducing the posted speed limit or selecting an alternative route for cyclists.
 19. All off-road pedestrian and cycling routes (with the exception of footpaths and hiking trails) should be designed in such a way that they are accessible to cyclists, pedestrians, and those using mobility devices.
 20. Grades in excess of 5% should be avoided wherever possible on accessible trails or those intended for inexperienced users.
 21. Steps and ramps should be provided along routes where steep grades cannot be avoided.
 22. Where roadway design characteristics such as sight-distances and curvatures exceed cycling route design parameters, special design consideration should be given to any existing or proposed roads that do not meet the minimum design parameters for a cyclist or may pose a potential hazard to on-road users.
 23. The guidelines set out in this report should be referenced and any geometric modifications made as required.
 24. Although new or improved HRM roads will typically be designed to the “Red Book” roadway standards and thus exceed the minimum design parameters related to speed for

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- pedestrian and cycling facilities, some existing roads may not. In these cases, additional signing should be considered when implementing on-road facilities.
25. When designing off-road facilities, consideration should be given to the design speed for cyclists and all other expected user groups.
 26. The design of off-road cycling and pedestrian systems should take into consideration stopping sight distances for bicycles and wheelchairs.
 27. Horizontal curves of roads proposed for on-road bikeway facilities should conform to roadway design standards set out in the HRM Red Book and/or the TAC Geometric Design Guide for Canadian Roads. When this condition cannot be met, additional cautionary signing should be introduced.
 28. Consideration should be given to providing additional width on off-road bikeway segments at curves that have less than a 32m radius.
 29. The Nova Scotia Trail Federation's Trails Manual should be consulted for issues relating to the width and route planning of off-road trails.
 30. HRM should adopt bicycle friendly design guidelines for all streets, whether a road is designated as part of a cycling network or not.
 31. The minimum design width for a bike lane in an urban area without on-street parking should be 1.2 m from the face of curb. Bike lanes 1.5m in width are recommended as a standard, while a preferred width of 1.8 m should be considered on roadways with higher AADT's, speed limits, and truck volumes such as found on busy arterial roadways.
 32. Bike lanes should be clearly identified on roadways through bicycle route signing, bicycle symbol pavement markings and bike lane signs.
 33. Bike lanes are typically recommended where feasible for collector and arterial roads designated to have cycling facilities. In locations where a bike lane is not deemed feasible following a review, consideration should be given to providing a wide curb lane. If this is not possible, as a minimum, a Bicycle Signed only routes should be provided if thresholds permit.
 34. On proposed bikeway routes in the Halifax Region where on-street curb parking exists, an assessment should be undertaken to determine whether the parking can be removed or relocated. In the event that on-street parking is seen as a priority, parking bays should first be considered as a preferred design.

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35. The desired width of the parking lane should be a minimum of 2.2 m, with the adjacent bike lane 1.8 m. Where the road right-of-way or other factors limit the opportunity to provide parking bays, standard on-street curb parking widths should be assumed.
36. Contra-Flow bike lanes may be considered for streets designated for one-way motor vehicle traffic to permit cyclists to travel in the opposite direction of motor vehicle traffic. Cyclists may also ride in the same direction as motor vehicle traffic in a separate bike lane or share the motor vehicle travel lane.
37. Boulevard bikeways and multi-use trails are separated from regular motor vehicle travel lanes and located in place of, or sometimes adjacent to, a sidewalk. They should be used along primary recreational corridors, reverse frontage lotting, and segments where there are few if any mid-block driveways.
38. Appropriate signing at intersections where bi-directional bikeway boulevards are present is very important to warn and provide clear direction to both motorists and cyclists as to where they should proceed when travelling through an intersection.
39. Paved shoulders are the preferred facility for creating connections between rural communities.
40. Paved shoulder bicycle routes in the Halifax Region should have a preferred design width of 2.5m (including a gravel shoulder). In locations where this lane width for paved shoulders cannot be achieved, especially in constrained rights-of-way, a minimum paved shoulder width of 1.2 m with an adjacent granular shoulder of at least 0.5 m is a reasonable compromise.
41. Paved shoulder facilities should always be separated from the motor vehicle travel portion of the road by an edge line (pavement marking), and should be clearly identified through bicycle route signing. Edge lines should only be used on rural roads where there are no curbs, and should be a single line placed on the right side of the travel lane closest to the paved shoulder.
42. Edge lines to denote a bike route are only recommended for paved shoulders in rural areas since these roads typically have a gravel shoulder beyond the paved shoulder for a cyclist to recover should they be forced off of the paved section of the roadway.
43. Paved shoulders on rural roads should not be denoted as reserved bicycle lanes since they should still be used as a refuge for disabled vehicles. Paved shoulder cycling routes should only be signed as bicycle routes.

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44. Signed-only cycling routes are appropriate for the community system that consists of cycling routes that are “local” in nature and feed into the spine network.
45. Streets with signed-only cycling routes should typically only be signed as on-road bike routes if there is adequate pavement width to safely accommodate both motor vehicles and cyclists, and when adequate sight lines and acceptable AADT volumes exist.
46. On very low volume rural roads with limited truck traffic, good sight lines and sometimes physically constrained ROW’s, the existing travel lane may be designated as a cycling route, with cyclists and motorists expected to share the same lane. In these cases, “Share the Road” signs should be erected at strategic locations to communicate this message to all road users.
47. The preferred width for a wide curb lane is between 4.2m and 4.5m.
48. In urban areas, proposed signed-only cycling routes should be implemented along roads with wide curb lanes and bicycle route signs where possible.
49. Where the width of a wide curb lane extends beyond 4.0m along a designated cycling route, the application of pavement markings such as a bicycle stencil should be considered to indicate the presence of cyclists on the roadway to motorists.
50. Existing and future pedestrian sidewalks should be incorporated into the spine and neighbourhood systems in urban areas for all system segments proposed within road rights-of-way.
51. A “buffer” zone should also be provided where applicable to separate pedestrians from the street.
52. Different sidewalk surface materials should also be used when designing sidewalks. Patterns of cross-hatching, dimpling or scoring should be applied at sloped or potentially slippery areas.
53. The recommended minimum width for a multi-use trail is 3.0 m while the preferred width is 4.0m. In areas with frequent in-line skating or other traffic a 4.0m to 6.0m with should be considered depending on local conditions.
54. The recommended minimum clear height for a multi-use trail is 2.4m – 3.0m.
55. In locations where high use is anticipated, trails with a width of 4.0m – 5.0m should be considered, where feasible.

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56. That HRM adopt the retrofitting guidelines recommended in Tables 3.2 and 3.3 of the Planning and Design Guidelines.
57. HRM should continue to use its current pavement marking scheme for on-road bicycle facilities and consider the use of Shared Use Lane Markings where applicable.
58. Cycling facilities at intersections should be carefully designed to encourage safe and predictable movement of pedestrians, motorists and cyclists.
59. Any “hatched” area along rural paved shoulders at intersections with right-turn lane curbs should not be designated as an on-road cycling facility unless it is greater than 1.2 m in width and it forms part of a continuous cycling route.
60. A detailed review of intersections with sub-standard bike lanes should be undertaken when intersections are improved to determine if sufficient right-of-way can be obtained to provide standard bike lanes at these locations.
61. Coloured pavement treatments should be considered at intersections with complex geometry or in areas with high conflict zones between cyclists and motorists.
62. Appropriate signing should be used in conjunction with the coloured pavement to identify to both motorists and cyclists the priority at an intersection.
63. Should HRM decide to pursue coloured pavement, the emerging technology of “microsurfacing” should be investigated.
64. HRM should initiate a practice of considering bicycles in the timing of traffic signals at intersections and in the selection, sensitivity and placement of vehicle detection devices wherever there is bicycle traffic.
65. The application of pavement markings is recommended to increase the efficiency of bicycle detection at intersections to actuate either a mixed traffic or bicycle signal phase. These pavement markings could also help to direct cyclists to the actuation zone and to position themselves properly in the lane.
66. Since cyclists are considered vulnerable road users, consideration and care must be given to them when designing facilities for their use.
67. The general countermeasures indicated in Table 4.1 should be considered for minimizing common motor vehicle and cyclist collisions.

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68. Advanced stop bars and bike boxes should be considered at locations in the Halifax Region where cyclist volumes are high and measures are being considered to give cyclists more priority at intersections (e.g. adjusting signal timings or phasing sequences).
69. The minimum 60 m transition zone between the curbside cycling facility, and the bike pocket, left of the right turn lane / channel, should be maintained, whether the curbside facility is a bike lane, paved shoulder or signed-only route.
70. When a bicycle lane situated between two motor vehicle travel lanes extends for a distance greater than 240 metres, consideration may be given to relocating it to the curbside of the roadway with the applications recommended by TAC for a Bicycle Lane Adjacent to a Curb Lane Transition applied at each end of the roadway.
71. Given the absence of applicable local guidelines, the values indicated in Table 4.2 should be referenced for determining the minimum side clearances on bridges when the installation of cycling facilities on bridges is being considered.
72. The creation of a bike lane on a bridge may be considered if the bridge has shoulders, or if the traffic lanes are wide enough to permit the creation of a wide curb lane to accommodate bicycles on the travelled way.
73. The TAC standards for accommodating on-road bikeways over expressway interchanges should be adopted by HRM for future cycling facilities.
74. In situations where it may be more desirable to allow a cyclist to choose their own merge, weave or crossing manoeuvres, it is recommended that the pavement markings for the bicycle lane be discontinued through the crossing area.
75. Coloured pavement may also be considered for the portion of the bicycle route crossing the motor vehicle travel lane.
76. HRM should ensure the accommodation of pedestrian and cyclist safety and access during all road construction activities. This should include, but not be limited to:
 - construction notices posted on the Region's website;
 - advance signing for construction activities;
 - temporary conditions that are compatible with bicycles such as non-slip surfaces, ramped utility cuts and timber decking placed at right angles to the direction of travel; and
 - pedestrian and bicycle specific detours where appropriate
77. HRM should investigate the possibility of using coloured and/or textures pavement at

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high volume crossings and at 100 series highways on and off ramps.

78. Pedestrian displays should be installed at all signalized intersections and should be placed at levels that are clearly visible to pedestrians and motorists. Push buttons for pedestrian signals should be placed at heights that are within reach of all pedestrians, including children and those in wheelchairs or other mobility devices. Countdown and audible traffic signals are other enhancements that may be considered for signalized intersections in the Halifax Region.
79. A study of the effectiveness of animated signals in reducing pedestrian injuries at crosswalks should be undertaken. If the results are favourable toward animated signals, a program to install these signals at high conflict intersections should be initiated.
80. HRM should consider the installation of sidewalk extensions along key pedestrian routes, especially along routes that form part of the community pedestrian system.
81. Curb ramps should be provided on all route segments that are identified or signed to accommodate wheelchairs. Curb ramps should be added where any new sidewalks are constructed.
82. Advanced stop bars are recommended in locations where there are heavy right-turning traffic volumes and no exclusive right turn lanes are provided.
83. HRM should review its spacing threshold for installing mid-block pedestrian crossings to ensure it strikes the best balance between the needs of motorists and pedestrians.
84. It is recommended that HRM consider pedestrian refuge islands as an appropriate measure to accommodate a mid-block crossing on high volume and/or multi-lane roads.
85. It is recommended that HRM continue to use mid-block signal controlled crosswalks and expand the program to other locations where appropriate.
86. HRM should continue to evaluate the effectiveness of the advanced stop / yield markings and implement them at intersections where they would be most effective if test results continue to be positive.
87. Railroads with wide enough rights-of-way can typically accommodate a multi-use trail.
88. Trails adjacent to active and / or under-utilized rail corridors should be separated from the rail line through the provision of a planted berm or fence.

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89. Barriers should be considered at off-road trail entrances to prevent access by unauthorized users such as motor vehicles, and to caution trail users that they are entering or exiting a trail environment.
90. Other barriers should be installed where appropriate.
91. Barriers should not restrict access to those with disabilities.
92. Multi-use trail bridges should be designed with non-slip surfaces, have vertical railings attached to the outside of the structure and include cover plates over expansion joints.
93. The Nova Scotia Trails Federation's Trails Manual features detailed information on the suitability of many bridge types and should be consulted before any trail bridge decisions are made.
94. Safety "rub-rails" may be considered along bicycle trails with railings to prevent a cyclist's handlebar from catching the vertical supports of the railing.
95. The four main underlying principles of CPTED should always be considered when implementing the AT Plan:
 - Natural Access Control;
 - Natural Surveillance;
 - Territorial Reinforcement; and
 - Maintenance.
96. Properly located entrances, exits, fencing, landscaping and lighting should direct both foot and automobile traffic in ways that discourage crime.
97. The needs of AT users should be fully incorporated into any roundabout designs in HRM.
98. Transitions between different facility types is especially important between on-road cycling facilities and off-road cycling facilities or multi-use trails, as they typically require a change in the cyclist's trajectory and / or a transition between routes shared with motor-vehicle traffic to routes that are not, or vice versa.
99. Appropriate signing and / or pavement markings should be installed to direct cyclists to the new cycling facility type.
100. Bicycle racks should be designed to provide lateral support to the parked bicycle and should be made from materials that can resist being cut by common hand tools such as bolt and pipe cutters, wrenches and pry bars.

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101. Racks, whether as single units or grouped together, should be securely fastened to a mounting surface to prevent the theft of a bicycle attached to a rack.
102. Bicycle racks should be placed adjacent to the entrance that it serves without inhibiting pedestrian flow in and out of the building. Rack areas should be no more than 15 m from an entrance and should be clearly visible along a major building approach line.
103. HRM should ensure that all catchbasin covers are bicycle friendly. Bicycle covers on proposed bicycle routes should receive priority for adjustment.
104. Rest and staging areas should be provided at strategic locations along the AT route system. HRM and its partners, including the private sector, should work together to identify and implement rest and staging areas, where possible.
105. It is suggested that a hierarchy of Regional and Local Gateways be established that represents region-wide and local level contexts.
106. Gateways should become a recognizable feature in the Halifax Region's landscape to both tourists and residents alike.
107. Gateways should become an integral part of the marketing initiative and should be identified on the bicycle and other AT map.
108. HRM should further promote and expand its bus-mounted bike rack program to include conventional transit buses, eventually covering all Metro Transit core routes. Quality bicycle parking facilities should also be provided at transit and ferry terminals throughout the Region.
109. Transit terminals should feature safe and convenient pedestrian access, including direct links to sidewalks and major destinations.
110. HRM and its partners should provide trip-end facilities for employees and visitors at all public buildings where feasible, and the private sector should be encouraged to do the same. The option of development incentives for new commercial and mixed use projects should be investigated by HRM.
111. Consideration should be given to promoting and / or implementing trip-end facilities as part of efforts to apply a region-wide transportation demand management (TDM) strategy.
112. HRM should develop a formal logo for the HRM AT system.

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113. HRM should develop and implement a formal on and off-road AT System Signing Plan to support the existing and proposed HRM AT System.
114. HRM should ensure that all designated bicycle routes are properly signed.
115. All AT signage should be consistent throughout the Region.
116. When possible, especially in the spring, summer and fall months, priority consideration should be given to debris removal on arterial roads with cycling facilities and sidewalks.
117. Off-road trails should be swept at least once a year following winter and / or prior to special events except those that are designed to be challenging and would be compromised by sweeping.
118. The maintenance of AT facilities should be based on HRM's road, sidewalks and trails maintenance standards.
119. In the spring, summer and fall months a program of litter, debris and leaf removal for AT facilities should be implemented.
120. Other maintenance guidelines set out in this report should be adopted by HRM as the basis for a maintenance regime for on and off-road AT system maintenance in the Region.
121. In the winter months, on and off-road AT systems that serve as part of the primary cycling network should receive priority for snow clearing and removal.
122. HRM should ensure that bus stops and sidewalks, particularly those that connect to bus stops, receive a higher priority during snow clearing efforts.
123. HRM should provide sidewalk snow-clearing throughout the entire municipality in order to provide a uniform standard of service.
124. Consideration should be given to clearing trails during the winter that provide key connections or links to "spine" segments of the AT system.