

Manual of Aesthetic Design Practice



**BRITISH
COLUMBIA**

Ministry of Transportation

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Roadway Structures

Roadway Structures

Introduction

Highway structures addressed in this section include the following:

- bridges
- overpasses
- avalanche sheds
- tunnels
- retaining walls
- traffic barriers
- bicycle routes
- curbs
- decorative paving
- safety handrail
- fencing

The design of the visible parts of these structures plays an important role in the aesthetic experience of the driver. This document does not address the aesthetics of general paving materials such as asphalt or concrete.

Recommended Practices

The following pages outline recommended practices concerning the aesthetic design of structures on highways in B.C., as summarized below:

1.0 Select appearance standards for structures in accordance with the Aesthetic Classification of the highway.

2.0 Integrate roadway structures with one another, with the adjacent landscape, and with the characteristics of the region in which they are placed.

3.0 Locate fill-reducing structures such as bridges or walls where aesthetic impacts of large cut/fill slopes are unacceptable.

4.0 Consider the proportion of the structure in relation to the size of the space in which it is situated.

5.0 All structures should be of a bold, simple form.

6.0 Select the colour of material finish to meet the aesthetic objectives of the structure.

7.0 Provide a textured finish to visible structures to avoid large blank faces.

8.0 Design structures to be of unified visual character within each space or structure.

9.0 Include accent elements in design of major highway structures.

10.0 Design roadway structures in concurrence with the guidelines for each type of structure.

1.0 Aesthetic Classification System

Select appearance standards for structures in accordance with the Aesthetic Classification of the highway.

Summary of Roadway Structure Guidelines by Aesthetic Classification			
	Parkway	Tourway	Baseline Highway
Bridges, overpasses, avalanche sheds and tunnels	curvilinear form, colour to match natural setting, highly textured finish, highly detailed, "see-through" handrail, accents and decorative lighting.	curve and tangent form, colour to match natural setting, moderate use of texture, moderately detailed, "see-through" handrail, some accents and decorative lighting.	economical form, colour, texture, minimum spans, minimum detail, minimum accents, minimum lighting.
Retaining walls	curvilinear form, colour to match natural setting, heavily textured, highly detailed, custom designed handrail where required.	curve and tangent form, colour to match natural setting, moderately textured, moderately detailed, custom designed handrail where required.	angular form, economical colour and texture, minimum detailing, simple custom design handrail where required.
Traffic barriers	absolute minimum amount, "see-through" type preferred, custom colour and finish.	"see-through" type preferred in view areas, standard colour and finish.	minimum amount, economical type, colour and finish.
Safety handrail	custom design, material to reflect local theme, custom colour and finish.	custom design, economical material, custom finish.	basic design, economical material with basic finish.

Table H-1
Summary of Guidelines for Roadway Structures. This summary is based on definitions developed in Section B - Aesthetic Classification System. More detailed guidelines are outlined in Section H-10

2.0 Integration of Structures

Integrate roadway structures with one another, with the adjacent landscape, and with the characteristics of the region in which they are placed.

.1 Design roadway structures as an integrated system.

- Reduce the number of elements, where possible.
 - combine traffic barrier flares with bridge guardrail design
 - integrate bridge abutment walls with bridge design
 - combine wall and safety handrail design
 - combine light standard and wall design.

.2 Design structures to fit into the adjacent grades and landscape.

- Bridges and retaining walls should retain existing vegetation and adjacent earthworks.
 - top of wall should follow natural terrain to be retained, or reflect roll of natural terrain typical of the region. However, the natural terrain to be retained should not dictate a "roller-coaster" effect at the top of wall. Maintain stepping/sloping of wall up or down for a minimum length equal to 0.5 seconds at highway design speed. Constant sloped top of wall should change from up to down slope with 5m minimum radius.
 - at the end of wall the earthwork must meet the top of wall.
 - alternatively, if concrete traffic barrier must be placed at the end of the wall, the wall height should be equal and integrated flush with the traffic barrier. Material may be retained behind the traffic barrier.
 - wrap earthwork around the end of wall. For cribbing construction maintain a minimum 0.5m below top of wall elevation. For poured in place construction, taper wall to meet grade.
- Consider integration of lighting structures with adjacent terrain and vegetation.
 - attach lighting to cliff faces.
 - co-ordinate lighting location with retained or proposed planting.

.3 Consider the regional context of the structure.

- Incorporate regional materials, forms or symbols which make the highway structure more responsive to the local community.

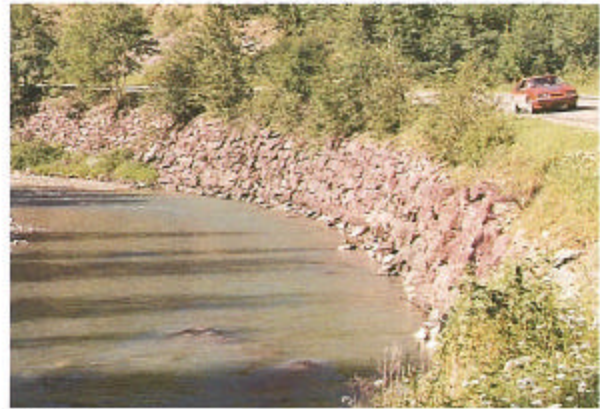


Figure H-1

Note good fit of retaining structure into its setting, and skilful use of drystone wall, seeded wildflower and trees.

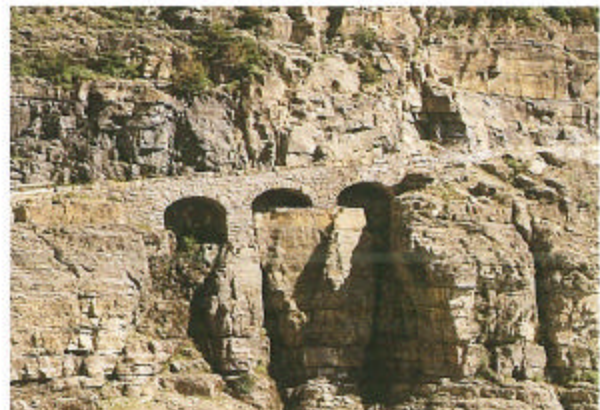


Figure H-2

Select materials which may be indicative of the region in which the structure is placed.

3.0 Location of Structures

Locate fill-reducing structures such as bridges or walls where aesthetic impacts of large cut/fill slopes are unacceptable.

.1 In forested areas, where the height of a combined cut or fill bank exceeds 80% of the average height of the adjacent forest, consider retaining walls or viaducts to reduce the extent of cut and fill.

.2 Where highways cross significant valleys or ravines, consider bridges rather than cut/fill banks. When valleys are narrow, and economics allow, install bridges when:

- Fill banks would be visible to adjacent residential or recreation areas.
- Fill banks would not be screened by surrounding vegetation to views from the road.

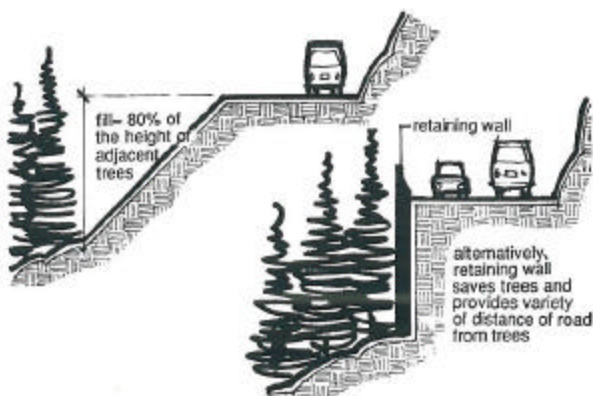


Figure H-3
Consider retaining walls where fills exceed 80% of the height of adjacent vegetation.



Figure H-4
The wall in the background allows the vegetation downslope to be retained. The foreground shows the impact without the wall.



Figure H-5
Bridging streams whenever possible is preferable to installing culverts. Bridges maintain the continuity of the watercourse and help to minimize the impact of highway construction on natural systems.

4.0 Scale of Structures

Consider the proportion of the structure in relation to the size of the space in which it is situated.

.1 Avoid structures which will appear too large.

- Visual scale of structures varies depending on the size of space in which the structure is viewed.
 - the same size of structure will appear small in a huge space, and large in a small space. Therefore, consider the relationship of the size of the intended structure to the space in which it is to be situated.
- First, determine the size of the space in which the structure will be located. The 'space' will be the area in three dimensions (perspective) which can be seen looking down the centreline of the highway when viewing the structure at the closest possible point.
- Second, determine the visual area of the proposed structure, and compare it to the visual area of the space which can be seen. If the structure area exceeds 40% of the visual space, then it will feel too large. Look for ways to reduce the visual scale of the structure.



Figure H-6

The impact of this bridge was reduced by splitting the structure and allowing more light below.

5.0 Form of Structures

All structures should be of a bold, simple form.

.1 The overall shape of each structure should be a simple form, with a minimum of erratic or complex geometry.

- A combination of simple curves, straight lines, and square or rounded corners will be adequate for most structures.

.2 Avoid excessive use of angular, triangular or pointed forms - these should be limited to conditions where the objective is to attract the attention of the driver.

.3 Curvilinear or rounded structures will be 'softer' in appearance, whereas square or angular shapes appear more 'hard'. Generally, a softer appearance in rural highways will be more desirable.



Figure H-7
Curvilinear forms are softer and more in context with rural landscapes.



Figure H-8
Suspension bridges can have a dramatic and positive landscape impact.

6.0 Colour of Structures

Select the colour of material finish to meet the aesthetic objectives of the structure.

.1 Create a colour scheme for structures for a route in its entirety. Recognize the potential of colour to heighten visual interest.

.2 Blend structures into the background landscape.

- Respond to colour characteristics of the region.
 - dark khaki green or warm grey for forested backdrop.
 - medium khaki green or warm grey for cropland and wetland backdrop.
 - light khaki green or warm grey for grassland backdrop.

.3 Alternatively, contrast structural landmarks with background landscapes.

- Respond to the colour characteristics of the region.
 - deep primary red or natural concrete for forested backdrop.
 - terracotta or burnt sienna for cropland and wetland backdrop.
 - burnt sienna for grassland backdrop.
 - accent colours of apricot, dark blue, or grey blue may be used with discretion as accent colours.

.4 Finish colour may be gained by colour additives to concrete, or by paint on steel structures. Avoid painted concrete.*

**refer to section 10 of this chapter for practices on application of coloured finishes for aesthetic classifications of roads.*



Figure H-9

This large bridge structure is designed with a muted colour so that it blends with the hillside in the background.



Figure H-10

This retaining wall has not taken into consideration the characteristics of the surrounding landscape and the strong white colour has a dramatically negative impact.

7.0 Texture of Structures

Provide a textured finish to visible structures to avoid large blank vertical surface areas.

.1 Provide textured finish to concrete structures where large vertical surface areas are visible to motorists and from adjacent land uses.

- Apply textured finish to concrete structures of 1.5m or more in shortest dimension.
 - maintain coarse textures on surfaces viewed from a distance.
 - maintain coarse and/or fine textures on surfaces subject to close inspection. Note that as highway design speeds increase toward 90 km/h, the ability to discern fine textured surfaces diminishes.
 - no texture on surfaces not exposed to view.

.2 Finish should respond to materials and texture typical of region.*

- Materials and textures include:
 - stone veneer
 - barnboard finish concrete
 - exposed aggregate concrete
 - bush hammered and/or ribbed concrete
 - sand blasted concrete

**refer to section 10 of this chapter for practices on applications of textures for aesthetic classifications of roads.*



Figure H-11
A well designed culvert headwall - appropriate to a highly visible parkway site.



Figure H-12
This retaining structure is well textured with linear planting strips and vegetation. This scale of detail is appropriate when viewed at highway speeds.



Figure H-13
Stone veneer in process. This would be appropriate on a Parkway project, or area of close public inspection.



Figure H-14
This lock-block with stone finish would be appropriate for a tourway project.

8.0 Unity of Structures

Design structures to be of unified visual character within each space or structure.

.1 Design unity is gained by repetition of similar shapes and materials.

- Avoid designing structures which mix many different forms and materials.
- Choose a dominant form, and repeat this form throughout most of the structure, from the following:
 - curvilinear
 - curve and tangent
 - square
 - rectilinear
 - angular
 - free form
- Choose a dominant material, colour and texture, and repeat this combination throughout most of the structure, from the following:
 - exposed aggregate concrete, buff blend local aggregate, OR
 - unpainted weathering steel
- Design all custom elements within the same space using the same dominant form, material, colour and texture.

.2 Note the emphasis on choice of dominant form, material, colour and texture.

- A structure may still have a unified design and use more than one form and material, as long as the second form/material is limited to a subordinate role in the visual part of the structure (25% or less). These subordinate elements can be designed as accents.



Figure H-15
A good example of repetition of form and texture.



Figure H-16
This bridge structure will have the dominant vertical form of the piers repeated.

9.0 Accents

Include accent elements in design of major highway structures.

.1 Creation of accents involves the design of contrasting components of structures. These contrasting elements will draw the attention of the viewer, and 'accent' the overall design.

- 'Accents' should be limited in scale to no more than 25% of the structure.
- 'Accents' should be designed to be complementary to the structure, but not a total departure from the dominant form of the structure. Accents might include a change in one of:
 - colour - pick an interesting element and make it an accent colour.
 - form - accent an element by altering its shape to make it stand out - create a piece of sculpture.
 - texture - create a panel of different texture.
 - scale - make an element slightly larger to make it visually dominant.
- Avoid creating too many accents - more than one to two accents visible at a time will create visual confusion.
- Examples of accents include:
 - at bridges and overpasses - entrance pillars, infill panels among arches, handrail elements.
 - at tunnels and avalanche sheds - portals, escape exits
 - at retaining walls - pilasters, caps.



Figure H-17

The balustrade of this bridge has repeating accents. These aesthetic features can be adapted to the safety requirements of modern bridges.

10.0 Guidelines

Design roadway structures in concurrence with the guidelines for various types of structure below.

.1 Bridges, Overpasses, Avalanche Sheds and Tunnels.

- As large scale and custom designed elements, bridges and overpasses, avalanche sheds and tunnels should be designed as pieces of sculpture. Major attention should be given to aesthetics, as these elements will be the most memorable structures on the highway.
- If structures of a similar nature are seen at the same time, they should be designed as matching sets, eg.
 - parallel bridges on divided highways.
 - overpasses seen at the same time.
 - tunnel portals or avalanche sheds seen at the same time.
- Bridge designs should be bold, simple, and unified:
 - minimize the number of spans and columns.
 - where possible create odd numbers of spans (1, 3, 5) and make the central span larger than the remainder.
 - avoid random or complex variation in lengths of spans.
 - 'leap' the chasm.
- Bridge handrails and traffic barriers should receive special design attention:
 - handrail/traffic barriers should be as see-through as possible when a view can be gained from the structure.
 - as vertical elements, handrails and traffic barriers will be the most visible elements on the bridge.
 - the design of traffic barriers on a bridge should provide visual clues that the motorist is crossing a bridge - some modern designs for safety have created such continuity with the road that the bridge is not evident to the driver.



Figure H-18

Unlike this example, parallel structures should be designed as matching sets, even if constructed in different phases.



Figure H-19

Bridge handrails are the most visible part of the bridge structure and should receive special design attention.

- Bridge abutments should be designed in conjunction with adjacent grades, landscape and structures:
 - provide 2:1 side slopes maximum, or retaining wall at abutments.
 - ensure that abutment walls taper into adjacent grades - do not allow vertical jumps exceeding 0.5m at ends of abutment walls.
 - allow for revegetation of bridge abutment slopes, and for retention of vegetation close in to the bridge abutments.
 - incorporate traffic barrier flares into design of bridge approach and bridge traffic barriers.

- Bridge slope protection should be finished to a maintainable condition:
 - aprons which are visible to traffic or adjacent uses should be hard surfaced.
 - aprons not visible may be graded to a 2:1 maximum slope and revegetated with drought tolerant species.
 - blend apron grades into adjacent slopes and complete rounding at top and bottom of apron slope, if not paved.

- Minimize disturbance to the valley or site during construction:
 - plan designated construction routes and construction river crossings in areas to be out of view after construction.
 - retain natural trees and vegetation under the bridge structure where possible.
 - provide for complete revegetation or rehabilitation of areas adjacent to bridges disturbed by construction.
 - in steep slope areas, use opportunities to create or expose waterfalls above the highway.

- Provide recreation amenities associated with bridge crossings or attractive structures:
 - provide a roadside pullout at a vantage point from which to view the structure, or close to the structure to allow access to the abutment of the structure and the associated features.
 - provide trail access from a roadside pullout to the water feature/valley which the structure crosses.
 - provide walkway/bikeway access across the bridge structure.



Figure H-20
Example of a rural bridge slope finished to allow ease of maintenance.



Figure H-21
Example of a more urban bridge abutment.



Figure H-22
Provide pullouts or other recreation amenities associated with beautiful structures.

- Design accent features at the entrance and mid-point of major structures:
 - gateposts or similar features can mark the entrance to major bridges.
 - arches can provide spectacular entrances to tunnels or avalanche sheds.

- Lighting of major structures can take innovative forms:
 - incorporate lighting designs to be integral with the design of the structure - avoid add-on lighting standards.
 - ensure that fixtures on structures are low glare - especially if close to the driver's field of vision.
 - consider accent lighting of structures, either by uplighting or by suspended lights, to create nighttime landmarks.

Guidelines by Aesthetic Classification for Bridges, Overpasses, Avalanche Sheds and Tunnels

	Parkway	Tourway	Baseline Highway
Form	curvilinear form, with arch spans or innovative structures	curve and tangent form, with curved flares at column tops, curved skirts	simple structural form, minimum odd number of spans
Colour (may be accent colour if landmark is desired)	colour to match natural setting, eg. coloured concrete or painted metal	same as for Parkway	economical colour of construction material eg. natural concrete
Texture	highly textured, eg. stone, barnboard concrete, ribbed or bush hammered finish, or other rustification	medium texture, eg. exposed aggregate concrete, sand blasted concrete	economical texture, eg. rubbed finish concrete
Level of Detailing	highly detailed, small repeating panels	moderately detailed, some repeating patterns	simple articulation, little detail
Accents	design accents to entrances and midspan	same as for Parkway, but smaller scale.	minimum design accents
Handrail/Traffic Barrier	custom design, highly detailed, "see-through"	custom design, moderately detailed, semi-open.	"see-through" or solid, economical
Bridge Slope Protection	highly textured finish, e.g. rubble or cobble paving	moderately textured finish, e.g. exposed aggregate concrete, precast pavers.	economical paved finish or revegetation of non-visible areas
Recreation amenities	trail access to local features, pullout to access trail and view structure	same as for Parkway	no special recreation amenities unless conditions warrant
Decorative Lighting	provide decorative lighting of visible structure	same as for Parkway	economical or no decorative lighting

Table H-2
Guidelines by Aesthetic Classification for Bridges, Overpasses, Avalanche Sheds and Tunnels

.2 Retaining Walls

- The scale of retaining walls should not be out of proportion with the size of the cleared space of the roadway:
 - wall height should not exceed the dimension of the right of way width.
 - walls over 3m height should be broken down into tiers whenever possible.
 - wall tiers or pockets should be revegetated to reduce the visual scale of the wall.
- Walls over 1.2 m in height should not exceed a length which would expose the driver to a continuous section of wall for over 15 seconds while driving at the design speed.
- The location of retaining walls should not detract from the aesthetics of the highway:
 - walls should not dominate the area of effective vision of the driver.
 - attempt to limit walls to the inside radius of curves.
 - realign the road and place the retaining wall on the downslope side: if height or length of wall is excessive, or if existing vegetation must be kept close to the highway edge to mask the hillside scar.
- Integrate walls with other structures, eg.
 - use wall for mounting of light fixtures.
 - extend walls to meet overpasses and bridge abutments.
 - extend walls to act as guardrail or handrail.
- Custom design walls to suit the site:
 - elevation of the wall should follow the grade to be retained as a simple ascent and descent, following the natural grade of the land. Avoid arbitrary rectangular or angular wall elevations which do not relate to the slope to be retained.
 - taper ends of walls to meet adjacent slopes without vertical drops, by either:
 - tapering the wall into the ground, or raising the grade at the end of the wall, by creating a berm in front of the wall.
 - curve walls where required by roadway alignment, or to follow adjacent landforms.



Figure H-23
When possible, locate retaining walls downslope from the highway, to reduce visual impacts from the highway.



Figure H-24
Viewed from the road this retaining structure is completely hidden.



Figure H-25
An example of a retaining structure using locally available materials.

- Provide for drainage and landscape at the top and bottom of the wall:
 - backfill slopes should not exceed 2:1 for revegetation.
 - drainage at base of upslope walls should be piped, to avoid the appearance of a ditch at the base of the wall.
 - allow for landscape installation at the top and bottom of the wall, to reduce the visual height of the wall.

- Avoid use of handrail on walls except where necessitated by public access to the top of the wall:
 - consider creating a handrail/balustrade by vertically extending the wall structure.
 - design handrails in concert with the wall using similar or complementary materials. Avoid add-on standard handrail details, as these will look out of place on top of a wall.
- Design guidelines by Aesthetic Classification for retaining walls are shown in Table H-3.

Guidelines by Aesthetic Classification for Retaining Walls			
	Parkway	Tourway	Baseline Highway
Form	curvilinear form, both horizontal and vertical.	curve and tangent form, both horizontal and vertical.	angular form.
Colour	match to natural setting e.g. coloured concrete.	same	economical colour of material e.g. natural concrete.
Texture	highly textured, e.g. stone, barnboard concrete, ribbed or bushammered concrete, or other rustification. Bin wall with textured concrete veneer.	moderately textured, e.g. sand blasted concrete, exposed aggregate concrete. Bin wall with textured concrete veneer.	economical texture, e.g. rubbed finish concrete, galvanized bin wall.
Level of Detailing	highly detailed.	moderately detailed.	simple detailing.
Accents	includes accent pilasters, arches and cap.	moderate use of accents.	no use of accents.
Handrail	custom design, highly decorative.	custom design, moderately decorative.	simple design, paint finish minimum.

Table H-3
Guidelines by Aesthetic Classification for Retaining Walls

3 Traffic Barriers

- Keep use of traffic barriers to a minimum required for safety.
 - decrease degree of side slope to reduce need for barrier.
 - increase width of median to decrease need for median barrier.
 - avoid columns near roadside or in medians to reduce need for traffic barrier.
- Use the lowest height of traffic barrier required for safety.
 - consider creation of depressed medians and shoulder to reduce the visual height of traffic barriers.
- Minimize the use of yellow paint at concrete traffic barrier ends :
 - attach traffic barrier reflective sign to traffic barrier.
 - consider accent band of reflective vinyl at ends.
 - consider integral coloured concrete.
 - where paint is necessary, ensure that its application standard is high, and that it is maintained regularly to avoid a peeling and unkempt condition.



Figure H-26
The provision of a wide and varied median could have avoided the requirement for a continuous traffic barrier.



Figure H-27
Avoid the use of paint on concrete traffic barriers

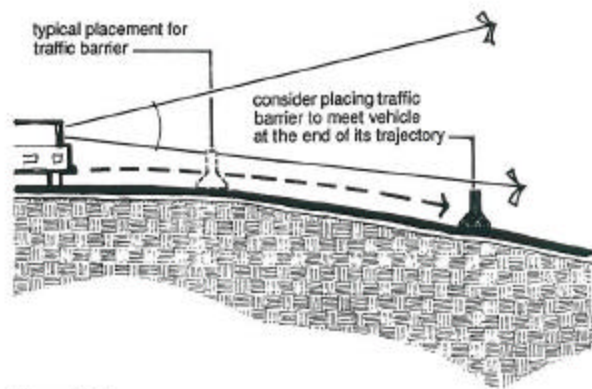


Figure H-28
Locate traffic barriers to minimize their visual predominance.

- Consider installation of reflectors to lift holes, rather than at junctures.
- Select traffic barrier types with greater "see-through" characteristics for low speed, low volume highways with scenic views below the elevation of the highway. Consider use of:
 - three cable/wood post traffic barrier.
 - W-beam blocked, wood post traffic barrier.
 - box beam, steel post traffic barrier.
- Consider maintenance of roadside under traffic barriers.
 - pave area under and within 300 mm horizontal of traffic barriers to eliminate need to mow at traffic barriers.



Figure H-29
Consider installation of "see-through" forms of traffic barrier where views below the highway are frequent.

Guidelines by Aesthetic Classification for Traffic Barriers

	Parkway	Tourway	Baseline Highway
Amount	absolute minimum required for safety at low design speed	minimum required	minimum required
Type	three cable or W-beam preferred	three cable, W-beam or box-beam preferred	same preferred at areas with views, otherwise concrete acceptable
Colour/texture	cortan steel W-beam, sandblasted coloured concrete finish if applicable	same as for Parkway	economical finish - form finish concrete, galvanized steel

Table H-4
Guidelines by Aesthetic Classification for Traffic Barriers.

4 Bicycle Routes

- Provide safe and convenient bicycle access to highways and incorporate bicycle route system into proposals for comprehensive bicycle route systems.
 - bicycle routes should allow for easy access without requiring cyclists to stop or dismount.
 - bicycle routes should be developed to provide direct access to and from desirable destinations including: shopping areas, recreational facilities, and residential areas.
 - encourage continuity between highway bicycle routes and adjacent portions of bicycle routes.
 - provide the most direct route possible especially where non-recreational cycling is anticipated.



Figure H-30
Bicycle routes can be developed as an integral part of the highway.



Figure H-31
Bicycle routes can be constructed as separate alignments where the conditions and level of use warrant.

- Bicycle route surfaces should be developed to a high quality.
 - surface quality should be smooth and consistent as required by narrow, high pressure bicycle tires.
 - where bicycle routes are separate from roadways, eg. at intersections and railway crossings surface quality should be maintained to create a continuous, uninterrupted traffic flow.
 - bicycle routes should avoid abrupt changes in vertical and horizontal alignment which can be inconvenient or dangerous.
- Bicycle routes should be developed to provide a high level of visual interest.
 - the intense scrutiny of roadsides by cyclists support the requirement for careful clearing and grubbing, and revegetation practices.*
 - avoid bicycle routes adjacent to deep ditches and other unsightly roadside conditions.**
 - bicycle routes should be signed so that direction of travel is easily understandable to cyclists.
 - signage should be such that motorists are aware of the potential presence of cyclists.

*refer to *CLEARING AND GRUBBING*, and *REVEGETATION* for creating natural forest edges

**refer to *EARTHWORKS* to create safe relationship to ditches etc.

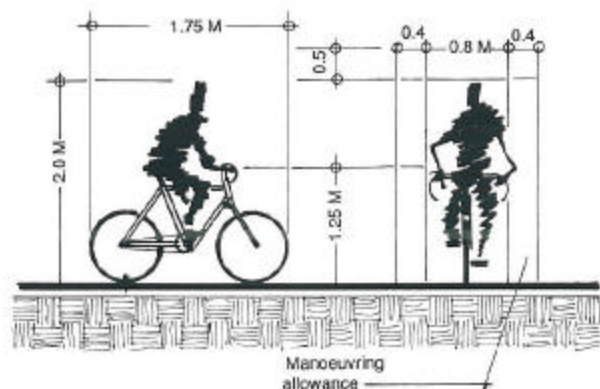


Figure H-32
The dimensions of a cyclist.

- Bicycle routes can be developed in different formats and should be implemented as appropriate for each circumstance.
 - for Tourway and Parkway highway development consideration should be given to separate bikepath alignments if policy and funding permits.
 - for baseline highway developments where shoulder bicycle routes are most appropriate consider providing intermittent sections of separate bikepath alignments to create visual interest.

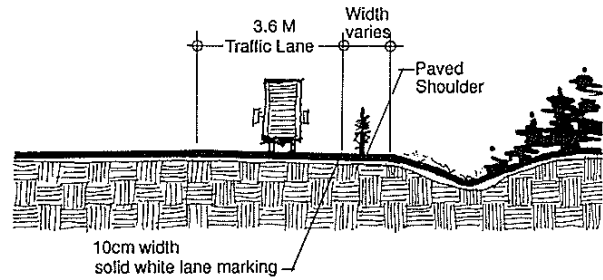


Figure H-34
A smooth paved shoulder along rural highways can be signed as a bicycle route.

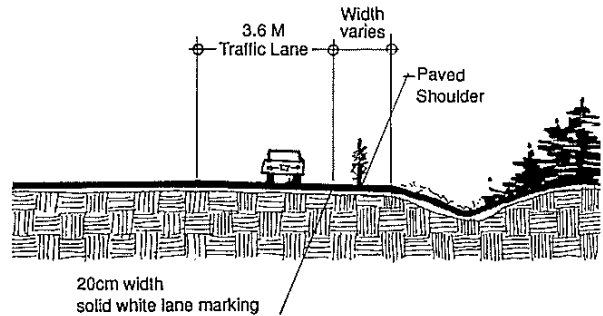


Figure H-35
Bike lanes have preferential use for cyclists.

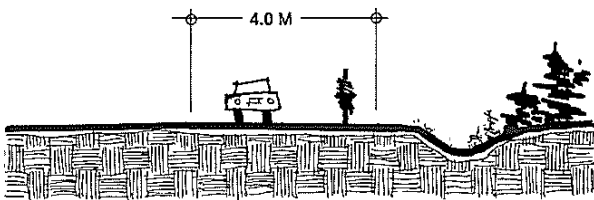


Figure H-33
With the Shared Roadway alignment motorists and bicyclists share the same lanes.

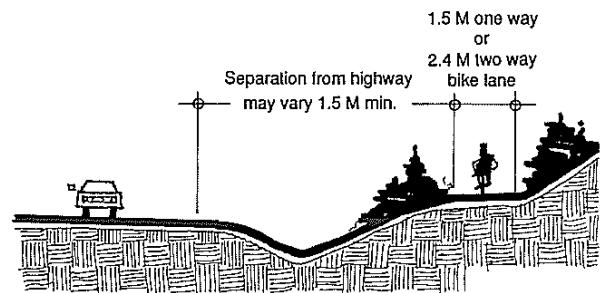


Figure H-36
Bike paths with separate alignment are preferable in Tourway and Parkway situations.

5 Curbs

- Provide curbs where required to keep traffic out of landscape areas.
 - at all parking areas.
 - at feature landscape areas.
- Use concrete curbs where affordable. Do not use asphalt curb where it is likely to be bruised or broken by vehicle impact.
 - in parking areas.
 - high traffic areas.
 - narrow shoulder areas.
- Minimize use of paint on curbing:
 - develop alternate colouring techniques such as integral colour to concrete and reflective vinyl tape.
 - upgrade standards of paint design, application and longevity.
 - increase maintenance standard to avoid chipping, peeling paint on curbing.



Figure H-37
Minimize the use of paint on curbs, or develop higher maintenance standards to minimize peeling, cracking condition.

6 Decorative Paving

- Install decorative paving on median or roadside areas
 - where pedestrian and vehicular traffic is to be discouraged.
 - where widths of medians are less than 2.0m, and therefore too narrow for planting.
- Decorative paving should be set in mortar or designed with joints which impede the growth of weeds.
 - keep top of decorative paving flush with top of curb, and tightly jointed, to avoid collection of sand/water and subsequent weed growth.
- Create a coarse textured finish to decorative paving:
 - to be visible to passing motorists.
 - to help disguise small scale litter.
 - to show through sand/soil deposits.



Figure H-38
Decorative paving should be installed in traffic islands and medians where space is insufficient to allow planting.

7 Safety Handrail

- Design handrails for bridges and walls as an integral part of the design of the bridge or wall, not as a standard detail.
- Minimize the use of safety handrail, using it only when:
 - pedestrians may be adjacent to the drop.
 - and the drop is 2:1 or steeper, with the height of drop exceeding 2m.
 - or the drop is steeper than 1.5 :1, and exceeds a height of 450mm.
- Basic design requirements for safety handrail above a slope 2:1 or steeper if height of drop exceeds 2m are:

height	1067mm
space between horizontal members	450mm
space between vertical members with continuous horizontal bars	3000mm
space between vertical members without horizontal bars	100mm
- Consider custom design of handrail to respond to its proposed site and region.
 - use materials or design form prevalent in the region or locale e.g. timber, nautical theme, marsh theme.

- Basic design requirements for safety handrail above a slope or vertical drop exceeding 1.5:1 are as per National Building Code, which requires that:
 - handrails be non-climbable
 - and that a 100mm diameter spherical object will not pass through the handrail.
- Handrail requirements for physically challenged in roadside facilities, are in addition to the above.
- Design handrails to be pleasant to the touch.
 - top rail should be smooth, rounded, and free of slivers or vertical interruptions to a handhold.
 - top rail should have rounded corners at end of railing. Avoid angular changes in direction on the top rail.
 - avoid use of chain link fencing for handrails
- Design guidelines by Aesthetic Classification for safety handrails are shown in Table H-5.

Guidelines by Aesthetic Classification for Safety Handrails

	Parkway	Tourway	Baseline Highway
Form	custom design	custom design	simple design, standard adapted to conditions and adjacent structures
Material	timber, metal, or alternate decorative materials	same as for Parkway	metal pipe rail, radius ends
Colour	custom colour or finish	custom colour	painted, neutral colour to blend with adjacent natural setting

Table H-5
Guidelines by Aesthetic Classification for Safety Handrails

.8 Fencing

- Wood post and woven wire fencing are adequate for all rural areas of the province.
- Wildlife fencing should be a higher version of livestock fencing, with wood posts and woven wire.
- Avoid the use of chain link fencing in rural areas.
- In wooded areas, install fencing back from the edge of the woods. Allow feathering, undulation and fragmentation of the forest edge to occur around the fenceline, so that the fence is sometimes within the woods and sometimes at the edge of the woods.
- Locate fences to the outside of cut or fill slopes wherever possible, and avoid silhouetting the fence against the sky or against a view.
 - do not locate fence at top of fill bank.
 - set back fence minimum 3m from top of cut bank.



Figure H-39
Wood post and agricultural style woven wire are appropriate for wildlife fencing. Note that fencing is routed through the trees in some cases.

.9 Signs

- Provide adequate illumination for night viewing.
 - preferably all signs should be fully reflectorized
 - signs not adequately visible by fluorescence should be lit by attached overhead light, matching the length, scale and colour of the sign.
- Limit the number of Ministry signs.
 - provide signs only for directional, and safety purposes of the driver. Avoid all other signs which apply to jurisdictional and electoral purposes. This information can be supplied to inquiring parties through government offices and maps.
 - commensurate to the visual absorption capacity of the driver at highway design speed, consolidate sign messages onto one board wherever possible. Examples would be adding tonnage limits and/or highway demarcation number onto directional/distance signs.
 - commensurate to the visual absorption capacity of driver at highway design speed, consolidate several boards onto a single support structure wherever possible.
 - encourage the existing program of consolidating private businesses' information onto Ministry "blue signs". Ensure that subsequent to installation of "blue signs", that all signs to be replaced are removed.
 - encourage all service club and local information signs to be consolidated onto standard information boards at municipal entrances. These information signs could be separate from custom designed community entrance signs which are provided by the community to identify the community and welcome visitors.
 - encourage private business associations, such as those related to Bed and Breakfast operations to develop standard signing.
- Provide clear and visually clean information.
 - develop and consistently use symbols to designate food, fuel, rest facilities, accommodation, telephone, transportation services, tourist attractions, recreational facilities, hospitals, police and information.
 - develop and consistently use symbols to designate intended tourist routes.

- implement and consistently use internationally recognized symbols to designate directional and safety instructions, instead of verbiage.
 - verbiage shall be minimized and utilize a system of upper and lower case letters wherever possible.
 - provide symbol information on rest area advance signs about specific facilities available such as picnic, tourist information, trash receptacle, telephone, toilet, camping and recreational opportunities, and of natural attractions available such as waterfalls and viewpoints.
 - provide information on rest areas advance signs about distance to next closest rest area on same route.
- Provide a clean and solid looking silhouette with the sign.
 - support structure of sign should consist of galvanized or I-bar post, or wood post. In Parkway or Tourway situations, a special signage system might be developed for the route.
 - support structure should consist of two posts or I-bars for all signs wider than typical stop sign.
 - where two or more sign boards are attached to a support structure all signs should be equal in length.
 - where sign support structures require pier footings, the top of the piers should be flush with the grade.

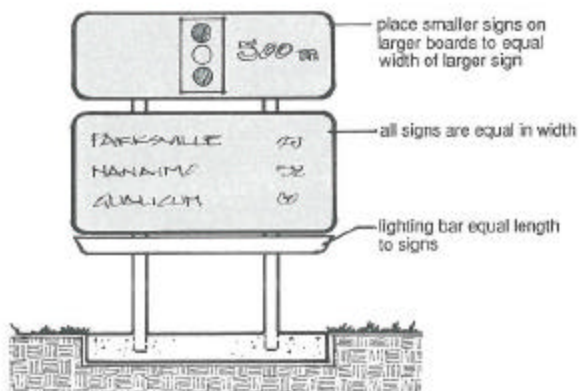


Figure H-40
Consolidate several signs onto a single support structure. Signs and sign lighting enclosures should be of equal length to create a clean silhouette. Piers should be flush with grade.

- Provide and coordinate a consistent format and series of size types, for all Ministry signs.
 - consider that signs be broken down into two or three categories based on width, eg. one category of signs carrying one symbol such as stop signs, and two categories of signs carrying text and/or symbols such as directional and "blue" signs.
 - consider that all signs stand at consistent distances from the pavement edge, and at consistent heights.
- Minimize the obstruction of views or visual impact with signs.
 - avoid locating signs where views or clearings exist along the roadside. All unnecessary signage, earmarked for that specific location should be located at the next most convenient location further along the highway.
 - wherever signs must be located in conflict with views or clearings along the roadside, provide background planting typical to the vegetation of the region.



Figure H-41
Avoid locating signs where they obstruct views.