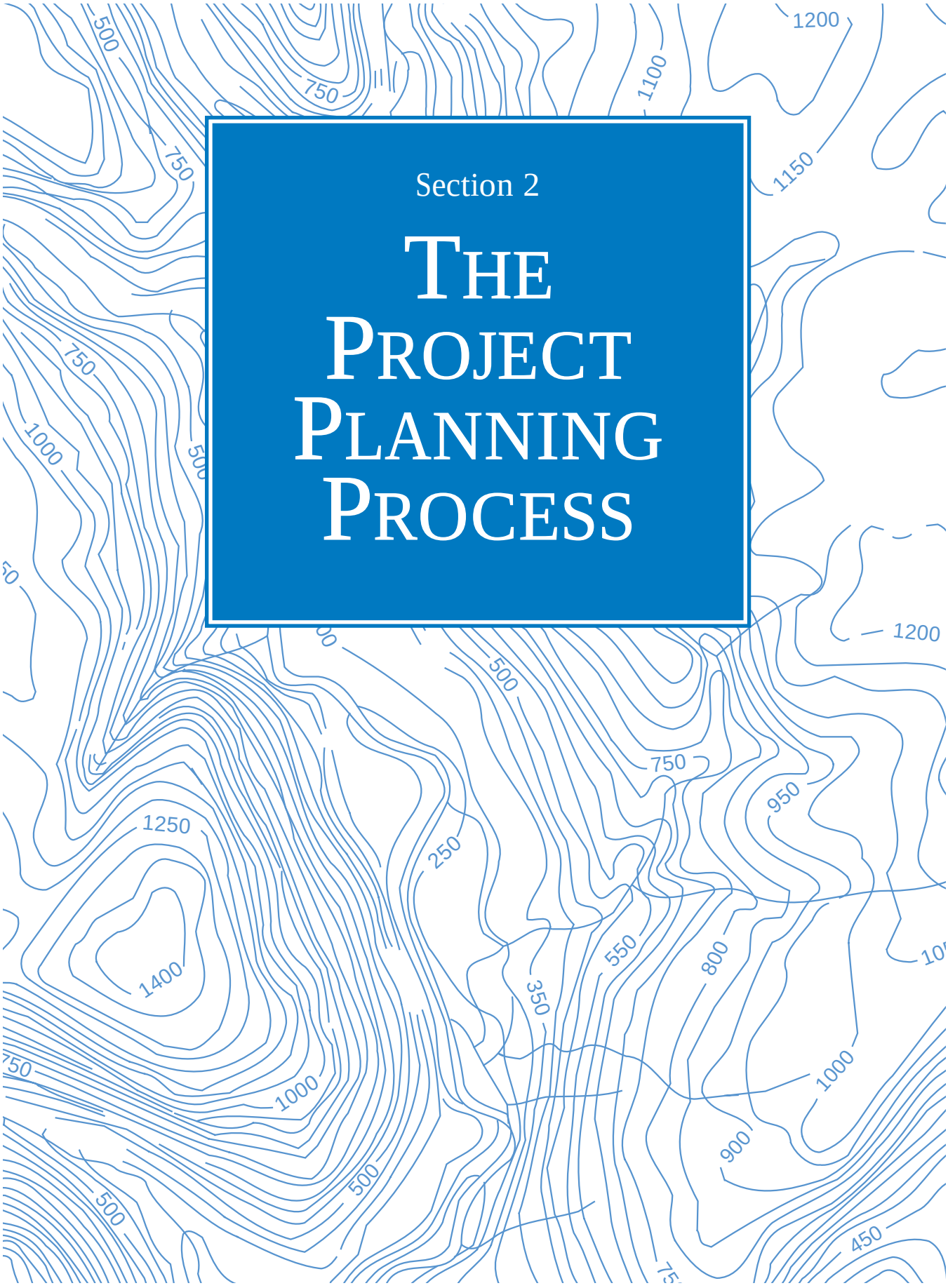
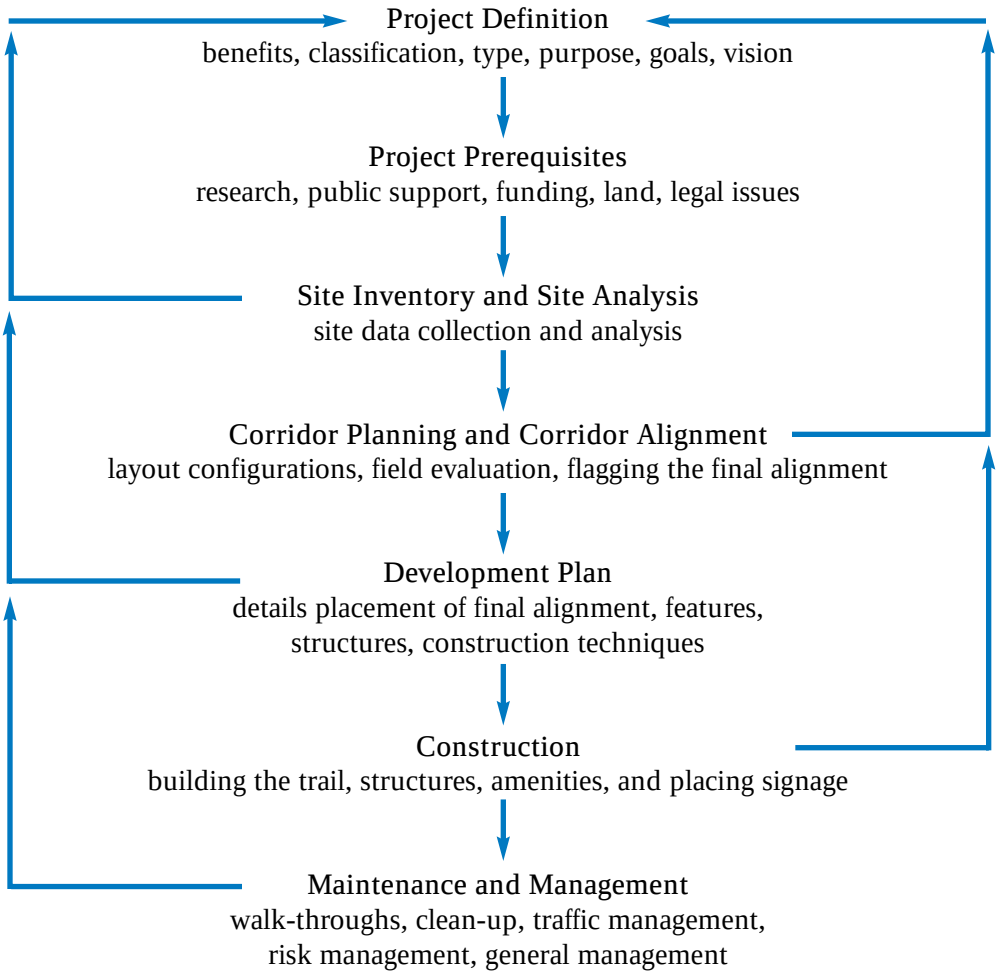


Section 2

The Project Planning Process

The Work Plan 2.1

Like all major projects, trail projects need to follow a framework of a plan. The master plan or work plan guides the project's progress through logical phases. You should assign time periods or deadlines in which each phase is to begin and to be completed. In the model below, the arrows pointing downwards indicate that the completion of one stage leads into the next stage. The arrows extending outwards and upwards indicate that at each step you should check to see if the work completed reflects the elements earlier defined for your trail. In other words, does the trail meet the purpose and goals, and does it satisfy the characteristics of its type?



2.2 Special Consideration

Trail users pursue many different activities. However trail users share an interest in being active in nature. Individual preferences, of course, determine how close one wishes to be to nature. Some choose to experience an environment in its most natural state, while others are most comfortable in developed surroundings. Such preferences are often synonymous with one's level of understanding and appreciation for the environment. Regardless of this level of appreciation, almost all trails exist to protect a site's environment to some degree. The definition of "protection" may have a different meaning for different trail sites:

1. keeping an area free from intrusions such as resource extraction or structural development
2. maintaining an area's current state
3. slowing down or reversing environmental deterioration
4. providing opportunities for interpretation of and education about the effects of natural or human forces on an area

Protecting the environment is a responsibility of all trail developers, even for those who have not yet identified it as a priority for their trail. A trail whose construction disregards the sensitivity of an area can prove to be detrimental. Keep in mind that anything that has a negative impact on the environment will lessen the appeal of your trail.

As a responsible trail developer, assess how your trail project will affect the site's environment, based on at least the following three considerations:

- *The intensity of trail use.*
  How many people will your trail attract in each season?
  Will the activity have an impact (hiking versus mountain biking)?

- *The scale of construction operation.*
  Are machinery and large crews needed?
  Do you want a full-facility trail?

- *The necessity of a trail through a sensitive area.*
  Could the trail go around the sensitive area?
  Would a viewing station for the sensitive area be suitable?

Human-Made Features

There are a number of environmental factors to consider from the moment a site is first assessed. These factors are not always of nature; historic sites sometimes deserve attention as well. Does your trail site contain an old abandoned train station, a building of architectural significance, a man-made canal, a covered bridge, a dam? These features should be preserved as a part of the trail project. Perhaps the project can partner with organizations having related interests. As an example, the local museum may be able to play a role in restoring an historic house.

Natural Features

The natural environment consists of a series of ecosystems. Trail developers need to understand the relationships between plant and animal communities that exist and the effects that may result from alterations made to any of the components. Ecosystems have different tolerance levels for disturbance. Projecting the effects of interferences is a difficult task, however research and others' past experience will assist in identifying the potential outcomes. Development should not proceed if there are questions left unanswered.

Birds and Animals

- The presence of humans can be seriously disruptive to some species. Avoid important habitat zones; trail development may force wildlife to leave.

Vegetation

- Rare and endangered species need special protection. A designated view station allows people to admire, for example, a rare wildflower while keeping them at a safe distance from it.
- Trail clearing and removing a forest canopy will result in wind scald and sun scorch on low-resistance plant species.
- Vegetation could be damaged in the winter by cross-country skiers and snow-mobilers compacting the snow.

Water

- Modifying natural drainage patterns and damming water can threaten some plant species that are sensitive to changes in moisture conditions and soil erosion.
- Areas with organic soils and high water tables are fertile ecosystems and therefore should be protected from trail development.
- Sewage disposal systems need to comply with the standards stipulated by the Department of Environment.

Soils

- Soils should be tested for the degrees of resistance against compaction and erosion. The compaction of soils and removal of vegetation can destroy tree roots and induce erosion.
- Improper changes made to underground waterflow can increase the speed at which the water flows and erode stream banks.

2.3 Mapping the Route

Once your organization has defined the trail project, gained access to land and collected funds, you will be anxious to lay down the route of your trail. Do not jump into this stage until after a thorough inventory and analysis of the site has been done. Upon completion of an analysis you will have a very general idea of where the trail could be routed. The layout pattern will also affect the general location of the trail route.

2.3.1 SITE INVENTORY

An exciting and necessary step in the planning of your trail site is "taking inventory" of the existing features within the trail site. Orthophoto maps, topographic maps, and planometric maps are useful for a preliminary inventory. All maps can reveal certain features of a site including:

- access points, parking lots, major centres for activity (malls, schools, etc.)
- highways, roads, railroads, and water crossings
- wooded areas, slopes, and some geology
- bogs, rivers, lakes, streams, oceans, and harbours
- public versus private property

Although the three maps generally contain the same information, the appearance and detail of this information differs. An orthophoto map is satellite photo of an area that shows all features appearing at a certain scale. Most locations in Nova Scotia will have orthophoto coverage at a scale of 1:10,000. A topographic map is a computer representation of an area with symbols indicating selected features. An index of the symbols is found on the backs of the maps. These symbols can be more useful than a orhtophoto because an orthophoto does not always clearly identify what a feature is. For example, a church may be an unidentifiable building on an orthophoto map, whereas the topographic symbols clearly indicate that indeed, it is a church. Planometric maps are almost equivalent to topographic with the only real visual difference being the lack of colour and gridlines.

These maps contain enough detail only for basic inventory of features, general selection of the trail site, and rudimentary trail alignment. Supplementing maps with aerial photographs and field surveys reveals a great deal of information. This combination of resources is the most suitable medium for your trail planning exercise. The colour and smaller scale of aerial photographs makes it easier to distinguish the vegetation. Field surveys are on-site explorations. An inventory and analysis cannot be done properly without seeing things first-hand. Maps are not always reliable because places are forever changing. The map may show a heavy stand of trees but now those trees may be clear-cut. Head out in a small group (3 or 5 people) to take note of all inventory elements.

Refer to the Appendices for Land Information Maps for more details on maps and photos.

Inventory Elements

A thorough inventory is one that first observes all elements, then records information that is applicable to your trail. Gather information from

- existing and current sources such as maps, aerial photographs, studies, and books, and
- your on-site investigation (field survey).

You should not settle for one way over the other. You will have a complete understanding of the site only if both methods are used.

Use one of the three maps of your trail site to record an accurate inventory of the elements found in the area. You may wish to use a reasonable photocopy of the map because maps used "in the field" get battered and full of markings; a clean map is needed later for planning processes. Insert distinctive symbols and/or colours on the map to differentiate between the site's elements. Maintain a clear legend at the base of the map that explains exactly what the symbols identify. Recording the inventory with care and neatness will make it much easier for everyone involved in developing the trail to refer to the map for later purposes. Some locations have numerous elements to inventory, and too many symbols on one map can be confusing. Avoid overwhelming your map with information by recording natural elements and artificial elements on separate maps.

The following is a list of typical elements recorded in a site inventory.

- *Slope*
  The slope is measured at any given position along the terrain. A slope is the relationship of the vertical distance to the horizontal distance and is expressed as a ratio, percentage, or the degree of an angle. Slope is an important detail in determining the route. Steep slopes are not appropriate for inexperienced trail users and persons with mobility impairments. They may mean more construction, like stairs, switchbacks, or retaining walls. Slopes also affect the rate of erosion and drainage, which determines the type of drainage control necessary.

  General slope information can be interpreted from the contour lines presented on topographic and orthophoto maps. The maps outline a range of slopes within a broad zone, therefore this level of detail is normally insufficient for slope identification at any single location. For a more accurate slope measurement, use an instrument called a clinometer.

- *Hydrology*
  Your maps will sufficiently locate most water systems. Water systems make a trail more appealing. Note all bodies of water and wet areas, for this will give you a general idea of where you would like your trail to be (whether it crosses or goes around them) and what adjustments need be made (e.g., a bridge). Look for the following on your site:

lakes	rapids	swamps	navigable channels
ponds	waterfalls	intertidal zones	seasonal drainage
rivers	floodplains	navigable channels	
streams	marshes	seasonal springs	

  Once an initial trail corridor has been determined, associated drainage patterns should be highlighted on your map.

- *Vegetation*
  Both vegetation and wildlife habitats are important aspects of a trail inventory, often serving as major attractions. There is much to include in this inventory, so study the area closely and carefully record the elements. Note the following components:

tree species	coverage and maturity
understorey density	fields and old fields
coastal meadows	aquatic and wetland vegetation
bogs	coastal marshes

  You may have to investigate further when gathering information on plant-life because it can easily be overlooked. Such information may be documented in studies, journals, or books. Register all major plant communities (plant associations), exotic and rare species, habitat boundaries ('ecozones') and plant succession.

- *Topographic Features*
  Topographic features such as ridges, peaks, cliffs, ravines, gullies, and caves should be indicated on the map. Besides being attractions in their own right, such features can also impose severe restrictions on the trail alignment.

- *Geology*
  Geologic and topographic features are ideal for a trail that tries to provide interpretative opportunities. Identify rock outcrops, types of bedrock escarpments, old beach lines (dune succession), glacial deposits, faults and other geologic features. Contact museums, Government Bookstore, private bookstores, universities, and libraries for documents or books on Nova Scotia geology.

- *Wildlife*
  Habitats of both marine and terrestrial animals should be noted. This information may be available from the same sources used for the vegetation study. Feeding sites where young are reared are of concern. Most often the trail alignment will avoid such sites to prevent disruption of these natural processes. If you wish to offer an opportunity to view an animal in its habitat, you must consider what the species will tolerate and the proximity of the viewing station. Think of the safety of both humans and wildlife.

- *Climate*
  Do not overlook the climate; weather conditions will discourage or entice people. Track the climactic environment for prevailing and storm wind directions, seasonal temperatures, slope orientation to south sun, tidal action, and incidence of fog, snow and rain. Environment Canada's weather centre would be the best source for most of this information.

- *Soils*
  Examine or test soils at multiple spots on the site. Some soils are more suitable than others for building a tread. See the Appendix titled *Identifying Soils*.
  Soil characteristics to note are texture, depth, wetness (drainage), stoniness, and fertility. An initial appreciation of soils within the trail site can be obtained through maps of the Nova Scotia Soil Survey Series, available through the Department of Natural Resources.

- *Scenic Opportunities*
  Look for views of scenes or features. Viewpoints may already naturally exist or may need to be elevated or extended to put the subject in sight. Make reference on your map to these points and any other areas which appear promising.

  Elevated points such as knolls, spurs, and ridges often show potential. Locations which allow viewing of natural attractions (e.g., waterfalls) from various perspectives make the trail more interesting. Scenic opportunities can be plotted on the map by means of a distinctive symbol and a broad arrow indicating the viewing direction.

- *Human-Made Elements*
  Chances are your topographic map will not demonstrate all human-made features on your trail site. As a result you will have to scout the area. Record features such as: existing trails, roads, cart tracks, railways, towers, underground and above-ground power lines, buildings, urban-type development, resource development (mining, lumbering, aquaculture), farms, water pollution, monuments, and historic sites.

- *Recreation Opportunities*
  Existing opportunities for secondary recreation activities such as swimming, rock climbing, or surfing should be identified when appropriate to the trail experience being provided.

2.3.2 SITE ANALYSIS

The next step in the process of mapping your trail route is to analyze the information gathered in the site inventory. The inventory information is used to assess the site characteristics relative to the needs of trail users and requirements for environmental protection. The conclusions you draw from the assessment are then documented in the analysis plan. This is basically organizing inventory information on a clean map that is of particular importance; it will facilitate in selecting the route. Here are examples of the sorts of information that your analysis plan should indicate.

- Areas not suitable for trail construction because of sensitive environmental conditions.
  Examples: unstable soils, steep slopes, floodplain, fragile ecosystem, special wildlife areas.

- Areas to be avoided because of conflicts with other uses.
  Examples: primitive trails should be remote from highways; intensive-use trails should stay clear from special zones needing preservation.

- Zones with desirable or undesirable climactic conditions.
  Example: areas prone to fog are unsuitable for trail activity, especially in hazardous areas.

- Hazardous areas.
  Examples: avalanche zones, “soft rock” areas, black bear habitat.

- Interesting interpretive features, natural or artificial (human-made).
  Examples: geological features, vegetation, wildlife, abandoned settlements.

- Features of visual interest.
  Examples: specimen trees, waterfalls, rock outcrops, areas of strong visual and spatial character, vistas.

The analysis plan is not meant to delineate the route of the trail, but should provide a framework for trail corridor planning.

Note for rails-to-trails developers:
By early 1998 a detailed audit of all provincially owned abandoned rail lines will be completed. The audit will detail:

- *recreational and tourism potential and constraints*
- *cultural and natural values*
- *environmental elements*
- *existing condition of lines and their suitability for trail*
- *condition of bridges and other engineered structures*

This is a joint project of the Nova Scotia Trails Federation, the Recreation Facility Association of Nova Scotia, and Nova Scotia Sport and Recreation Commission.

2.3.3 LAYOUT PATTERNS

Trails are laid out according to several different patterns. Trail activities are not limited to one single layout pattern because participants of every activity have different abilities and needs. You will have to base your decision on the site characteristics, the type of trail you are building, the users, and the users' skill level. There are six common layout patterns; however, this should not restrict you from making alterations that accommodate your trail's requirements.

Linear

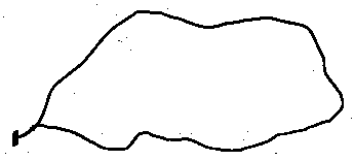
Linear

The linear form is a simple layout commonly used for long-distance trails and 'point B'-oriented trails. This form is most suitable for two-way traffic. It is an ideal means for connecting facilities (e.g., parking area and beach) or accessing backcountry on a primitive trail. Primitive trails of linear form can be entered by multiple access points and by other trails. This layout form allows for expansion to develop a more extensive system. Linear trails should have a definite origin and destination rather than just fading out.

The impact on the trail site environment is potentially doubled because most travel from origin to destination and back on the same route. Natural attractions, campsites, and other user services should be located off the main trail connected by a short spur trail. This allows greater control of impacts on the site and reduces the perception of overuse.

Loop

Loops are ideal for operators who desire a long-distance trail but have access to a small area of land. The loop form is preferred where users must return to the starting point; it is especially appropriate for interpretive and day-use trails. The traffic direction is easily designated. The loop reduces physical wear on the trail and its environment and it provides more interest to the users, who do not have to retrace their steps.



Loop

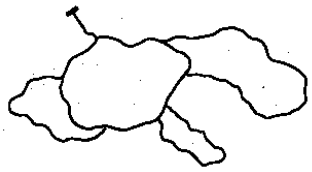
Stacked Loop

A series of simple loops stacked on one another works nicely in a small area. A range of experience levels can be accommodated because the loops can increment in difficulty by following challenging terrain conditions. The system allows users to choose a distance that will give them a part day or full day of activity.

Stacked Loop

Satellite Loop

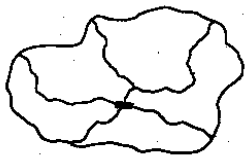
This design has loops travelling out from and back to the central collecting loop. Each loop can cater to the users' varying preferences for difficulty rating, length, terrain condition, level of solitude, interpretive themes, and so on. A satellite loop requires good directional signage.



Satellite Loop

Spoked Wheel

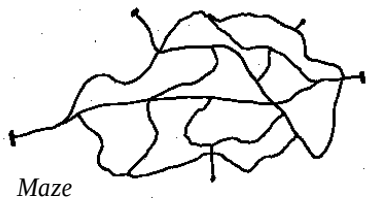
This radial layout is an ideal form where a central facility is to be provided; it is especially suitable for a day-use trail system. The radial layout makes good use of a small trail site. It allows a wide range of alternatives for travel distance, as trail users can turn back to the trail head from a number of points. One setback is that the direction of travel is difficult to control along the spokes. Good directional signage is necessary.



Spoked Wheel

Maze

The maze layout is a network of interconnected trails that maximizes the use of an area. It presents users with the greatest variety of opportunities by allowing them to assemble a personal route. A maze layout is especially appropriate for urban or near-urban day-use trails where heavy use must be accommodated. A maze layout is easily established in areas laced with country-lanes or logging roads. A maze layout can have multiple access points. It must be heavily marked and signed to prevent people becoming lost or over-extending themselves. Individual trails cannot easily have a designated traffic direction.



Maze

2.4 Trail Corridor Planning

2.4.1 Preliminary Corridor Route

Information gathered for the site inventory and site analysis is used to identify potential broad trail corridors for field evaluation. Generally, rail corridors follow distinct natural features: valleys, ridges, rivers, coastlines, old railways, etc. There will be situations, however, where a corridor will go through less featureless terrain, and will require map and compass layout.

The trail classification, type, purpose, and objectives determine the level of detail required for identifying the route. Use the map with the inventory on it to record a potential route for field evaluation. Place a transparent mylar sheet over the map and draw the route. This allow you to see the desirable features and the problem areas you want to avoid. Use a different mylar sheet for each potential route if more than one is proposed. At this stage, the routes are potential because field testing reveals situations that cannot be predicted during inventory or from the drawing board.

When drawing potential routes, keep the following in mind:

- Make sure that the trail corridor reflects the trail purpose and objectives.
- Remember who the users are, what the activities are, and what layout pattern is most suitable.
- Respect the environment, especially its fragile components.
- Incorporate a variety of attractions and opportunities (however, do not sacrifice the environment)
- Avoid incompatible areas that constrain the construction (e.g., steep slopes), the appeal (e.g., infested trees), or the use of a trail (e.g., seasonal floods).
- Weigh the relative costs of trail route options (e.g., going around a slope may be less expensive than stair-work).

Once the proposed trail corridors are compiled on the map, take the map to the field for evaluation. In general, this on-site work involves the planning team walking and flagging the entire route or routes to evaluate the the proposed route conditions. Do not expect to complete evaluating the corridor in a single attempt. The planning team will constantly have to backtrack until the best alignment is found. Be sure to note all changes to the proposed route on the map.

The best time of year to do the core of this field work is either in the spring or the fall when trees and underbrush have no leaves and there is no ice or snow. This allows for greater viewing distance through the trees and identification of drainage patterns of soils. However, it is best to check the corridor area in the spring, summer, fall, and winter to note any seasonal differences (e.g., drainage, animal activity, winds, views, etc.). Winter field work is necessary for trails that host winter activities, such as cross-country skiing and snowmobiling, to investigate snowfall amounts, snow surface conditions, and where windchill factors may affect trail use.

Centreline Investigation of the Trail Corridor

After reviewing the selected corridor routes is complete, the next step is to transfer the centreline of the corridor from the map onto the site. This is accomplished by determining the compass bearings and distances from the map and transferring this information on the ground (basic orienteering procedure). The compass person provides the directional control and distance determination along the centreline control. The distances can be determined either through pacing or by using a surveyor's hip chain or 50-metre tape. Extra workers are required for sighting, flagging, exploring problem areas, etc. This method is particularly helpful in less featureless terrain, dense forest cover or where accessing specific features or attractions is required.

The straight line bearing and distances should be flagged adequately with flagging tape for future reference. Be sure the colour of the tape is bright and does not blend with the landscape or foliage. Securely tie flags to tree trunks and branches that are close together so that they can be easily seen from both directions. Double-flag and number stations for each compass bearing reading. Also note any new observations and specific treatments missed in the site analysis.

2.4.2 Trail Alignment

After flagging is complete, the team should further investigate the centreline to confirm the trail route that best protects resources and that offers the best experience for users. They should also check trail construction requirements and the location of specific structures again. It is very important that no right-of-way cutting takes place before this evaluation has been done to prevent the unnecessary removal of vegetation.

2.4.3 DEVELOPMENT PLAN

This is the final layout phase before construction begins. You must formalize the alignment by duplicating it on a map and a development plan. The development plan gives specifics rather than just graphical representations. Indicate precisely on your map the following items:

- the final trail alignment as flagged in the field
- areas where structures will be built
- places where special construction techniques will be used
- routes where construction materials and equipment can be brought in

For shorter trails, refer to the location of these items by numbering the spot on the map and providing an identical number on a wooden stake on the trail. On lengthy trails it is difficult, if not impossible, to record all this information on a standard scale map; in this case refer to the location by the distance from the origin (as in example below). For a more complete development plan, complement the map with specification drawings and development guidelines. Also indicate the phases of trail construction. Your goal may be to have an entire trail system in five years, meaning it will have to be completed in phases over a period of time.

It is highly recommended that you have a development plan because a 'build as you go' method will only waste time, resources, and dollars. The development plan will help keep the construction crew informed and on schedule, and gives the detail they need to proceed with construction.

DEVELOPMENT PLAN - Phase 1 of Dewberry Trail

Distance Mark	Schedule	Construction	Comments
entry to 0.8 km	first 5 days	install bollards at entry at 0.55 km install bridge across brook	see plans 10a,b,c & 11a.
0.8 to 1.4 km	3 days	.....	.....
... to .....km	..... days	.....	.....

Note for rails-to-trails developers:
Good news! Corridor planning and corridor alignment are easier processes for rail-trails than it is for trails to be built 'from scratch.' The rail corridor is already aligned and the layout is linear. Unless additions will be made, there is little to do in this respect.

Aesthetic Quality 2.5

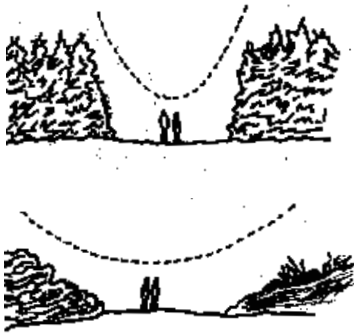
When aligning the trail corridor route, take into account the points of visual interest and spatial character of your trail site. These are important factors that will affect the 'feel' of the trail. Visual character should be assessed while on-site during the corridor alignment phase. Determine a variety of aesthetic vantage points in terms of space and perspective. These aesthetic factors are the key attractions to most trails, which often assist their overall success.

2.5.1 SPACE

The manipulation of space along a trail influences how users experience the trail. Variations of space can set different moods and feelings. Changing spaces entice the trail user to explore further, whereas a visually uniform trail over a long distance can become stagnant to some people. Consider using combinations for subtle and abrupt changes.

You can change the space to create interest by changing the arrangement of space, the degree of confinement, or the scale of space. There are five basic arrangements of spaces common to most trails.

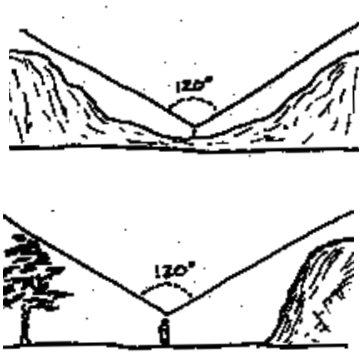
Closed Top and Sides	dark forest spaces where the trail is completely enclosed by vegetation or landforms
Closed Top, Open Sides	solid canopy of branches and leaves overhead but there are side views
Open Top, Closed Sides	the sky is in view but the sides are closed off by vegetation or landform.
Open Top, One Side	where the sky is in view and one side is open to view
Open Top and Sides	completely open and exposed to sun and wind



Degree of Confinement

Obviously not all five are necessary and not all are applicable to your site' however, do attempt to arrange spaces in different ways.

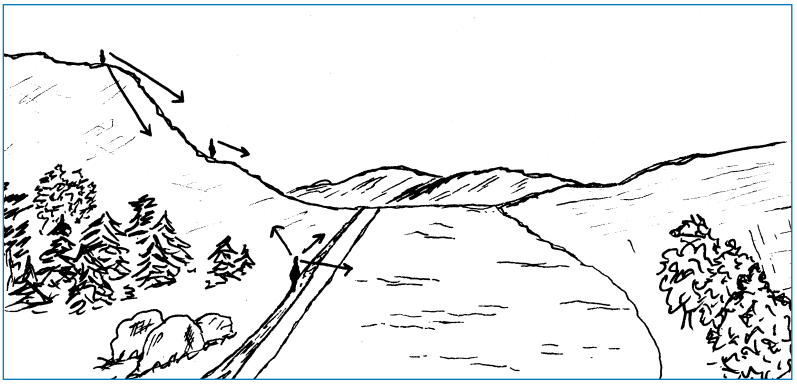
Two more ways to manipulate space to create visual interest include varying the degree of confinement and scale of space. Confinement is described as the height of the 'walls' that form the space in relation to the breadth of space. The relationship between the size of the space and the size of the viewer is called the scale. Examples of both appear to the right.



Scale of Space

2.5.2 PERSPECTIVES

Once you have identified specific points of scenic interest, you will then have to choose the best viewing position. Given that your site's terrain is not flat, the trail should provide users with views at varied heights. Hilltops and ridges are high points that have panoramic views and allow users to familiarize themselves with the trail site. In contrast, the user can become more attuned to the immediate environment at lower points.



Also, consider distant and close-up views of specific features and the user's orientation to a feature. For example, the view of lush farmland may be better from one side of a river than from the other.

Perspective is not only important for features and scenes, it is important throughout the entire length of the trail. Think of when you drive on a four-lane highway: most often, it is straight and uniform. Is it not dull? The driver rarely has a sense of curiosity for what visual feature lays ahead. Now imagine you are heading out for a horseride or hike on a trail; you find that it is straight, that you can see a kilometre ahead, and that it is bordered by a wall of trees. Probably not all that captivating, right? Well, highways are built this way for quick, safe, and cost-effective commuting between points A and B. Trail users like to wonder what is around the next corner.

It's best not to take this too literally, keeping safety a priority with sight distances and tread width. The user should have opportunities to see ahead for quite some distance and others to see only what is immediately ahead. On slow-moving trails (hiking, snowshoeing) short sight distances are acceptable, but with faster activities (snowmobiling, biking, skiing), safe sight distances are crucial.

Abandoned rail lines are ideal for recreation trails. Rail lines travel long distances, pass through towns, have cleared right-of-way, and have a prepared subbase, to name a few of the many advantages. The only disadvantage is that for some users, hikers for example, the perspective on the trail can be monotonous because the corridors tend to be straight. It is less of a problem if there is a view or an interesting feature (e.g., mixture of old growth trees), however, it is tiresome with unchanging scenery, such as through a field. It is also not necessarily a problem for snowmobilers, ATV users, and cyclists.

If boredom is a concern to rails-to-trails developers, some additions may help. Perhaps the trail can be made interpretative, side trails could be added occasionally, or features could be added to the side of the trails. In England, pieces of art made out of rail line parts were placed to the side of the rail trail.

Trails on old rail lines are not solely for a day of recreational activity; they are ideal for a safer and enjoyable means of travelling on long distance trips and commuting. Without rail trails, long distance trips from, to, or within the province are complicated by roadways on which it is illegal to use vehicles other than those registered for the purpose; for example it is illegal to drive snowmobiles on highways.