

An aerial map of the Grand Forks area, showing the Greenway route highlighted in a darker shade. The map includes major roads, water bodies, and surrounding land. The title and chapter information are overlaid on the map.

The Greenway

Grand Forks, ND • East Grand Forks, MN

Chapter Three Greenway Facilities

May 2001

Chapter 3. Greenway Facilities

Overview

The Grand Forks/East Grand Forks Greenway will serve to transform 2,200 acres of former residential, floodplain and park land into a multi-objective resource supporting a broader diversity of recreational, transportation and economic uses. Further, the Greenway will make it possible to restore streambank vegetation and reestablish native riparian prairie and forest ecosystem. Five distinctive recreation, tourism and community development opportunities will result from the future development of the Greenway:

- 1) An urban riverfront landscape will emerge in both Grand Forks and East Grand Forks that will offer a vibrant physical and economic landscape. This will become a destination landscape for both communities, supporting community events, economic activity, tourism, celebrations and year-round recreational use. This riverfront landscape will also serve as a gateway to both communities. The proposed flood protection dike and levee wall system will separate the downtown areas from the river, so it is important that greenway features be designed with this in mind.
- 2) Parkland will continue to be abundant throughout the Greenway. On the Grand Forks, North Dakota side, the Grand Forks Parks District will reopen many of the park facilities damaged by the 1997 Flood. A variety of recreational activities will be available for local residents, and the Park District will also support use and activities by tourists. On the East Grand Forks, Minnesota side, the State of Minnesota in partnership with East Grand Forks will operate a State Recreation Area landscape that will support tourist based activities. A State Recreation Area is part of the Minnesota State Park System providing more extensive recreation opportunities. East Grand Forks will also continue to operate community parks to serve the needs of local residents.
- 3) The State of Minnesota and East Grand Forks will partner with the US Fish and Wildlife Service (USFWS) to support and program activities. The City of Grand Forks will also partner with the USFWS to program the Grand Forks Nature Center.
- 4) A regional trail system will link both communities together. Separate trails will be provided to support a diversity of use throughout the year. During times of the year when sufficient snowfall exists, snowmobile and cross-country skiing will be available. Ice skating trails on the Red Lake and Red Rivers may also be pos-

Figure 23: Aerial view of the Red River valley and the Grand Forks, ND and East Grand Forks, MN communities.



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Figure 24: Nothing beats the thrill of a big catch on the Red River. Boating and fishing will continue to be a major feature of the Grand Forks/East Grand Forks Greenway system.

sible. During the rest of the year, a wheeled and non-wheeled trail tread will exist for users. The wheeled trail tread will be paved and support bicycling and in-line skating. The non-wheeled trail tread will be paved and unpaved, supporting walking and hiking. Other trail treads may be established for off-road biking and equestrian uses.

- 5) Boating and fishing access will be improved through the development of the Greenway. The US Army Corps of Engineers has pledged, in partnership with the States of North Dakota and Minnesota to redevelop the existing low head dams on the Red River and Red Lake River so that they will support boating and fish migration. The current lowhead dams are drowning machines that pose serious threats to recreational watercraft users. These dams will be modified with large rock boulders, carefully designed step pools and fish passageways. Additionally, the Greenway will support greater access for fisherman to participate in enhanced shore or bank fishing as well as boat fishing. Boat access ramps will be improved at key sites throughout the Greenway.

Further, based on the public input received during the winter 1998, and the summer and fall 1999, community residents feel that the Greenway should offer a wide array of recreational opportunities. This should include community spaces for large and small events, education facilities that describe local history and the importance of riverine landscapes, and concession opportunities that promote economic development. All greenway facility development should be accomplished in a manner that is consistent with floodplain management. Facilities should be sited in locations most suitable for the activity. Elevation should be a key consideration in the location of facilities. Some facilities may need to be constructed outside the flood levee. Facilities within the floodplain must be floodproofed.

Greenway facility development should occur within a radial pattern from the downtown areas of Grand Forks and East Grand Forks. The more intensely developed recreational spaces should be located near the downtowns' while those facilities more suited to wildlife and natural systems would occur further from the downtown areas.

During community workshops in January, February and March 1998, and June through October 1999, local residents defined the most desired Greenway facilities as:

- Paved trails
- Unpaved trails
- Snowmobile trails
- X-country ski trails

- Restrooms
- Wildlife refuge
- Boating and Fishing access
- Community festival areas
- Restoration of the river channel
- Public golf course

A more specific description of the principal greenway facilities for Grand Forks and East Grand Forks is provided on the following pages. This is followed by a description of facility design guidelines, estimates for facility development costs and estimates for facility maintenance costs.

Grand Forks Greenway Facilities

The Grand Forks Greenway consists of approximately 800 acres of land along the Red River. The Greenway extends from South 47th Street to the northern confluence of the Red River and the English Coulee north of the city, a distance of almost 5 miles. The following are the principal facilities and features of the Greenway in Grand Forks.

Festival Park

Festival Park is a new name for an area that has historically been utilized for a number of years by local residents. The park is roughly situated between the Sorlie Bridge and the Kennedy Bridge. Festival Park includes lands of Kannowski Park. Within Festival Park it is anticipated that community events would be held including the Pasta Party and the Fourth of July celebration. Festival Park would contain hardscape features such as plazas and event seating areas, also permanent picnic facilities should be provided. All season trails would also be found within this park. Shore fishing is possible along the banks of the Red River. Temporary restrooms would be provided during events and public parking would be provided within and adjacent to the Park. An important feature for this Park is the proposed flood protection levee. The location of the levee, including the flood wall, will affect the design and function of the Park. Public parking will be located on both the wet-side and dry-side of the levee. Points of entry to the Park would occur from Demers Avenue and 8th Avenue North and should be better defined during the final siting and design of the levee.

Riverfront Amphitheater

The Grand Forks Riverfront Amphitheater is a new feature for the proposed downtown area. It is envisioned that the Amphitheater could range in

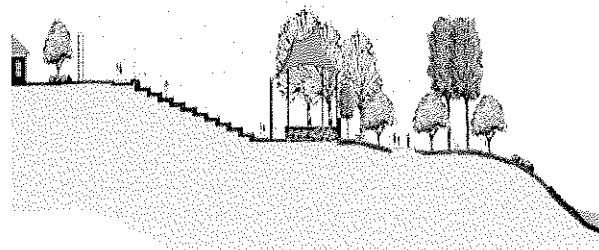


Figure 25: Cross section of the Riverfront Amphitheater proposed for Downtown Grand Forks, ND.

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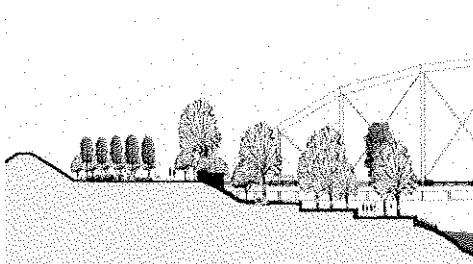


Figure 26: Cross section through the proposed Community Green in Downtown Grand Forks, ND. The Sorlie Bridge is illustrated in the background.

size from a 500 to 2000 seat facility. The primary purpose of the Amphitheater would be to host an array of community events, including musical performances, outdoor theater, community auctions, educational seminars, political rallies and the like. The Amphitheater would be a great addition to the redevelopment of the Grand Forks Downtown, and could serve to supplement events and programs that currently exist at other venues. One of the possible features of the Amphitheater is the manner in which it would be constructed in association with the flood protection levee in the downtown area. It may be possible to integrate seating for the Amphitheater into a reinforced section of the flood protection levee. A similar development treatment has been operational in Augusta, Georgia's flood protection levee for more than a decade. It is anticipated that the stage and accoutrements would be portable so that flooding would not damage the structure. Likewise, permanent seating would be limited for year round use. Additional seating could be added for larger events.

Community Green

The Community Green is envisioned as an extension of the Town Square Park, and would provide a relaxed park setting adjacent to the downtown dominated by large shade trees, meandering paths and riverside trail. The Community Green would be terraced so that several gently sloping groomed grass panels would extend to the riverfront. These panels would be supported by low rock retaining walls. The flood protection levee would again have to be designed to allow access between Town Square Park and the Community Green.

Lincoln Memorial Park

The consultant proposes the establishment of a new Park in the old Lincoln Drive Neighborhood. This Park could be a memorial to the residents that occupied this land during the flood. The memorial park could contain a "scenic" loop road along Lincoln Drive and a memorial trail that could feature plaques, trees and "healing gardens" that could be planted and maintained in partnership with former residents. Shore fishing along the banks of the Red River will also be possible in this park. Entrance to the park would occur through new flood gate closure at 11th Avenue South. Low elevations landscapes would be allowed to return to a natural state.

Grand Forks Park District Parks

The Grand Forks Park District currently manages about 168 acres of "manicured turf type" lands within the area now known as The Greenway. The Park District is continuing its efforts to recover from the devastating impact of the 1997 flood in which it suffered an

estimated \$1 million in loss to existing facilities. The following provides an overview of Park District facilities and their plans for future restoration, use and operation.

Riverside Park

This park received a lot of damage during the 1997 flood, estimated at approximately \$155,000 in total loss. Substantial redesign and redevelopment of this park will occur in the future. The Park District is striving to protect the historic Riverside pool and bathhouse. Formal entrance to the park would occur through new flood gate closures installed at the intersection of North 1st Street and the new levee. Former turf areas, play fields, tennis courts, basketball courts, and playground facilities are proposed to remain at the existing locations. The picnic facilities are proposed to be located at higher elevations.

Kannowski Park

The Park District anticipates that Kannowski Park will be absorbed in other Greenway development plans for the downtown area of Grand Forks. Under this Comprehensive Plan, Kannowski Park would become part of the new Festival Park and Community Green. All existing facilities within the Park, such as the gazebo and picnic facilities will be moved to other locations and replaced with a Gateway entrance landscape proposed by this plan. Existing trails will either remain or be relocated as necessary.

Central Park

The parkland at Central Park is being eroded by the Red River. The Park District plans to move many of the facilities once located in this park to higher elevations, including the existing loop road. A future parking lot and restroom facilities could be located on the dry side of the levee. Park could also be subject to reforestation and will provide a point of entry for a fishing boats, canoes and kyaks. Also, it may be possible to locate a fishing pier at this park.

Lincoln Park Golf Course

The historic 18-hole Lincoln Park Golf Course was damaged by the 1997 Flood, but was reopened for play by the summer 1998. The Park District proposes to reduce this facility to a 9-hole Junior or Executive Course, with playable holes located on the highest elevations. The proposed levee alignment along Belmont Road will remove from play some holes in the course. More importantly, the dike construction will remove an important stand of mature trees within the golf course. The Park District proposes that the holes and dike

Figure 27: Aerial view of the Lincoln Park Golf Course in Grand Forks, ND



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Figure 28: The existing levee trail behind the Grand Forks Chamber of Commerce is the type of trail that is anticipated throughout the Greenway.

system be integrally developed, creating earth berms that would offer flood protection, while at the same time creating a playable environment for golf. The Park District, City of Grand Forks and the US Army Corps of Engineers will need to determine the appropriate strategy for treatment of the existing golf course buildings.

Sunbeam/Koinoinia Park

It is anticipated that these parks could be reforested and managed as a local nature center. Many of the facilities within this park have been removed, with exception of existing trails. Additional trails and facilities associated with a nature center would be added to enhance this park.

All Season Trails

A system of trails will be developed on both sides of the Red and Red Lake Rivers to provide residents and tourists with access to the entire 2,200 acre greenway. Trails should be developed to support multiple uses within the Greenway simultaneously, and throughout all four seasons. Trails for walking, running, in-line skating, snowmobiling, cross-country skiing and ice skating should be provided. In order to minimize conflicts among trail users, it is desirable to separate users onto multiple trail treads where possible. During warm season months, multiple treads would accommodate wheeled users, pedestrians and outdoor enthusiasts. Trail treads should be paved and unpaved to accommodate these users. During cold season months, separate trail treads should be provided for snowmobilers, skiers and ice skaters. Trail treads should include groomed snow for snowmobiling and skiing, and cleaned ice for skating. Trail tread widths should be wide enough to accommodate various trail user groups in accordance with national trail tread development standards.

Trails should be designed to provide access to key fishing spots along the rivers. Additionally, motor boat and canoe portage should be designated and appropriately sited throughout the Greenway. It is desirable to have a water trail system throughout the Greenway. Finally, the issue of emergency access should be defined in association with emergency management officials in both communities.

During the workshops of 1998, the issue of developing trails on top of the proposed flood levee walls was discussed. It was determined that if possible, an 8-foot wide trail tread should be developed on top of the wall for pedestrian use only.

Gateways to the Greenway

Locating and finding entry to the Greenway system should be comprehensive and easy to understand both by residents and tourists. Trail maps should be provided at key places throughout the community, including visitors information centers, hotels, restaurants and businesses. Access points to the Greenway should be clearly defined by signage and through the development of gateways through the flood levee system. In particular, access from adjacent residential neighborhoods and the downtown areas should be accommodated during the final design of the flood levee system.

All trails should be rated for accessibility. Access information should be posted at the trailheads and throughout the trail system. The recreational needs of all populations should be addressed through the design and development of the trail system. Public parking will need to be provided at key entry points to the Greenway. It may be necessary to locate this parking on the “dry-side” of the flood levee system.

Grand Forks Nature Center

The Red and Red Lake Rivers are situated along one of the most important bird and water fowl migratory routes in North America. As such, the Greenway can become an important resource for migration, nesting and breeding of various species. Bird watching is fast becoming an important economic component of tourism throughout the United States and Canada. A local nature center can also serve to supplement outdoor education for local schools and the University of North Dakota. It is anticipated that the Grand Forks Nature Center would be located on lands formerly known as Sunbeam and Koionia Parks.

Boat Access and Shore Fishing

Improvements for boat access will take place at the existing Riverside Dam, which will be modified by the US Army Corps of Engineers. Additionally, boat access will be provided at Central Park as well. Currently, the principal use of power boats on the river is in support of fishing. The river contains fishable populations of walleye, northern pike, channel catfish and other sport fish species sought by anglers both in open water and during the winter months. Shore fishing is possible in numerous locations throughout the Grand Forks side of the Greenway and is highly sought after by anglers visiting Grand Forks. Principal locations will be provided in all major locations of the Greenway, with public parking, restrooms and other amenities provided to support the anglers experience.



Figure 29: Improved access to shore fishing areas will provide young anglers an opportunity to enjoy the resources of the Red River and Red Lake River.

Riverbank Restoration

Greenway development should include a comprehensive program of riverbank restoration and stabilization. It is recommended that soil bioengineering techniques (featured in the Design Guidelines of this document) be employed to stabilize the riverbanks and result in restoration. This work can be completed in small manageable projects by agencies and volunteers.

Riverside Reforestation

In addition to riverbank restoration, the Greenway lands should also be reforested. Such reforestation will need to occur in cooperation with the US Army Corps of Engineers so as not to conflict with flood protection strategies. Additionally, the reforestation plan should generally follow the vegetation management plan prepared by ACRT.

Potential Automobile River Crossings

The City of Grand Forks, City of East Grand Forks and the Metropolitan Planning Organization have studied potential new river crossings for automobiles. The City of East Grand Forks passed a resolution to study the following options for these river crossings: 17th Avenue South and Elks Drive. The City of Grand Forks and the MPO passed resolutions to study potential crossings between the Point Bridge and south to Merrifield Road, and to keep all options open for potential river crossings. The matter of specific crossings had not been resolved at the date of final printing of this Plan.

East Grand Forks Greenway Facilities

A concept plan for the East Grand Forks Greenway was prepared based on the communities goals and objectives and on feedback from city and agency staff, the MN DNR Area Team, the University of Minnesota Design Center, the Greenway Alliance, Friends of the Greenway, and the public.



Figure 30: A Minnesota State Recreation Area Campground is proposed for the area north of downtown East Grand Forks, MN.

The greenway plan utilizes the protective levees and the area between the levees and the rivers to create an attractive, usable, public green space. It is designed to restore and protect large portions of the area in a natural condition. The greenway will provide areas for walking, bicycling and other trail uses, camping, enhanced fishing opportunities, festivals, winter recreation and quiet areas for picnicking and relaxing. The

area trails will enhance access to the river and to all parts of the community. Colorful landscaping will be added to create pleasing views. Native plants will be used where possible to minimize maintenance needs and to provide wildlife habitat. Greenway improvements

will be designed to compliment and enhance the protective levee system.

New pedestrian bridges will be added to improve access between East Grand Forks and Grand Forks and to improve connections across the Red Lake River. The East Grand Forks Greenway extends beyond the Red River and encompasses the Red Lake River and a proposed ring levee around the city. Four pedestrian bridges are planned:

- 13th Street SE and Lincoln Memorial Park (Grand Forks)
- Across the Red Lake River in Griggs Park
- Directly across from the Visitor's Center at the location of the existing pedestrian bridge (former railroad bridge)
- Forest Court and Riverside Park (Grand Forks)

The East Grand Forks Greenway Plan focuses on the following:

Proposed Visitor's Center & Red River State Recreation Area

Visitor's Center

A visitor's center is planned to be located along the levee, just north of the Blue Moose Restaurant, at the north edge of downtown. The visitor's center would be operated by the Minnesota Department of Natural Resources and will function as a "Gateway to Minnesota Resources". Minnesota DNR will partner with the Minnesota Office of Tourism, U. S. Fish and Wildlife Service, and the City of East Grand Forks in the operation of the state recreation area. It will display local, regional, and state natural, cultural, historic and recreational resources and will act as clearinghouse for information about the State and the Minnesota DNR. The visitor's center will incorporate outdoor classroom opportunities as well as an outdoor amphitheater. The MN DNR visitor's center will complement Cabelas (a large retail sporting goods store opening in the Fall 1999 in downtown East Grand Forks) and will be designed to serve local, regional, national and international visitors. Educational resources are much needed in the area and a State Recreation Area with visitor center will work closely with both Minnesota and North Dakota school system to serve environmental education needs. The visitors center will be the trail head for the East Grand Forks Greenway, with the possibility of a regional trail corridor connection to Crookston. An important link is between the two downtowns a pedestrian bridge at the location of the existing pedestrian bridge (historic railroad bridge).

The visitor's center will also act as the contact center for a proposed State Recreation Area. The State Recreation Area will encompass approximately 900 acres of land located on the east



Figure 31: The proposed Red Lake River Visitor's Center design would be similar in design to the Lewis & Clark Visitor Center in Washburn, ND.

bank of the Red River and on the north and south banks of the Red Lake River.

Sherlock Camping Area

The area located west of Sherlock Park will contain approximately 75 camping spots, group camping and group picnic facilities. The camping area utilizes the existing remaining roads in the previous Sherlock residential neighborhood. The camping area will also contain multi-use trails, picnic areas, nature study areas, wildlife habitat, historic and cultural displays and boat and fishing access. Plans call for the existing dike to remain to provide an appropriate level of flood protection for the campground.

River Heights Park

This area, north of Sherlock Camping Area, would continue the trail network from US Highway 2 to the golf course. Picnic areas and a trailhead would be added. The Army Corps of Engineers conceptual greenway plan shows two trail heads in the River Heights Park. The East Grand Forks Greenway Plan recommends one trailhead and reallocation resources to other recreation facilities in East Grand Forks.

The Confluence Area

This area south of the Red Lake River would focus on cultural and historic interpretation. The area is rich in history and has great views of both rivers and both cities. A self guided trail and outdoor exhibits can help tell the settlement and history of the area. A small parking area, picnic tables and trail connections are also proposed to be located at the confluence.

Enhanced Downtown Riverfront.

The downtown portion of the EGF Greenway extends from the confluence of the Red Lake and Red Rivers of North to the Sherlock Camping Area. This portion includes the downtown riverfront. The concept plan includes use of the area between the levee and the waters edge for passive and active recreation. A major feature is a network of trails running along the river and along the levee with connections to the boardwalk, upland trails and to pedestrian/bike bridges across the rivers. The plan envisions the following uses:

Downtown River Plaza

An "invisible" flood wall was built between the downtown and the Red River. The wall includes large sections of removable panels, which provide flood protection when installed and allow views of the river when removed. The area between the river and the invisible flood wall will be the most intensely used and visible area within the



Figure 32: Fishing is an important activity for many area residents and visitors to East Grand Forks.

greenway. This area will be landscaped to create a pleasing image while retaining views of the river and of Grand Forks. Landscaping and site improvements will be designed to withstand periodic flooding. The trails will provide access between the river and the boardwalk located just inside the invisible flood wall. The trails from the upper portion of the site converge at the river on a pier fishing dock to provide access to the river next to downtown. The upper area adjacent to the invisible wall will be used for parking. Those parking areas will be landscaped and will be designed to function for events like farmers markets and craft shows. This area is considered to be one of the highest quality river fisheries in Minnesota. Fisherman access is important and will be provided at several locations.

Griggs Park

This area is to be used as a winter activities park and for special events. The park will also provide the major boat access to the rivers. Winter activities will be ice skating, sledding and cross country skiing. A parking lot, enhanced boat ramp, warming shelter, lighting, picnic tables, and trails are planned. The area could also contain an athletic play field and a possible area for event and overflow parking. A secondary dike is planned to provide sledding opportunities in the winter and informal seating in the summer for ballgames and special events.

Griggs Park will include architectural markers weaved into the trail system to denote the previous flood levels and act as memorial and education. Fishing is an important activity on the Red Lake and Red Rivers. Boat access and state fishing improvements combined with habitat improvements are planned.

Sherlock Park Amphitheater

Sherlock Park would remain as a city park with an added amphitheater. Trails would be built along the river to connect the areas north and south of US Highway 2. The Army Corps of Engineers levee will create mounding for a performance amphitheater. It is anticipated that a stage would be added to allow concerts and area performances.

Ring Dike and Loop Trail System

The East Grand Forks Master Plan prepared by the University of Minnesota Design Center is a long term plan which calls for a levee to encircle the city. Two loop levees would be built, one south and one north of the Red Lake River. The two dikes would act as a growth boundary, greenway and landscape feature. A pedestrian/bike trail would follow the levee alignment offering two large loop trails totaling over 20 miles. At the major vehicle entrances into the city the greenway would have colorful accent plantings and entry signs to

provide a gateway to the Greenway and to the City of East Grand Forks. In addition to providing a trail loop for recreation, the loop greenway and trail would link parks, schools, neighborhoods and downtown. Trail access to shore fishing should be provided along all rivers. A proposed corridor trail is recommended to connect East Grand Forks with Crookston.

Gateways

The gateways into East Grand Forks are planted with a variety of colorful native plants to accent and beautify the entrances into the city. Entrance signs into the city and into Minnesota will accompany the gateway planting. The gateway planting can be accomplished through partnerships between the city, the Minnesota Department of Transportation and volunteer groups. Groups can "adopt" a gateway area and participate in the installation and on-going maintenance. Gateway plantings and signs should be located along eastbound US 2 at the river bridge, westbound US 2 near Business Highway 2 (see below), at DeMers Bridge, at 1st Street SE Bridge and Bygland/Central entrances.

Eastern US 2 Gateway

The existing easterly entrance into East Grand Forks from US Highway 2 (Business Highway 2) is currently developed with industrial uses. The Greenway plan proposes to relocate the easterly US 2 gateway to the county road north of the present US 2 and Business 2 intersection. The county road is largely undeveloped, and has better sight lines and alignment. The relocated gateway offers the ability to create a more pleasing visual entrance and to stimulate new development along the entrance.

Restoration and Maintenance

The Greenway vegetation consists of a mix of natural species, turf grass and areas where vegetation has not yet been reestablished after the 1997 flood. The management strategy calls for mowed turf grass near downtown, along the edges of trails and other recreation facilities, within portions of city parks and along the top and dry side of most levees. Within the Red River corridor, native grasses will be the predominant landscape with scattered areas of native trees for shade and visual interest. The existing trees in the Red Lake River floodplain will be retained. Overall, the strategy will be to have a more "manicured" landscape near downtown and next to residential neighborhoods and a natural habitat closer to the rivers and in the less developed areas. This will be accomplished through selective mowing of key areas and planting a pleasing mix of native grasses, wildflowers and trees within the urban portion of the Greenway. The riverbank edge is a priority for establishment of sustainable vegetation to reduce erosion and to stabilize the riverbank.

Facility Design Guidelines

The design development guidelines featured in this chapter have been tailored to meet the specific facility development needs of the Greenway for Grand Forks, ND and East Grand Forks, MN. The purpose of these guidelines is to assist public and private sector agencies, organizations and individuals in developing greenway facilities that are in keeping with overall Greenway objectives. These guidelines provide a variety of trail facility and ecological restoration objectives. These guidelines are not a substitute for a more thorough examination and detailed landscape architectural and engineering evaluation of each project segment. These guidelines serve as minimum standards for greenway facility development. The cities of Grand Forks and East Grand Forks disclaim any liability for the use, appropriateness and accuracy of these guidelines as they apply to a specific project.

The following publications have been used in the preparation of these guidelines: Adherence to national design standards for off-road trails and greenway facilities, as defined by the American Association of State Highway Transportation Officials (AASHTO), the Americans with Disabilities Act, and the Manual on Uniform Traffic Control Devices. For more in-depth information and design development standards, the following publications should be consulted:

Greenways: A Guide to Planning, Design and Development
Published by Island Press, 1993
Authors: Charles A. Flink and Robert Searns

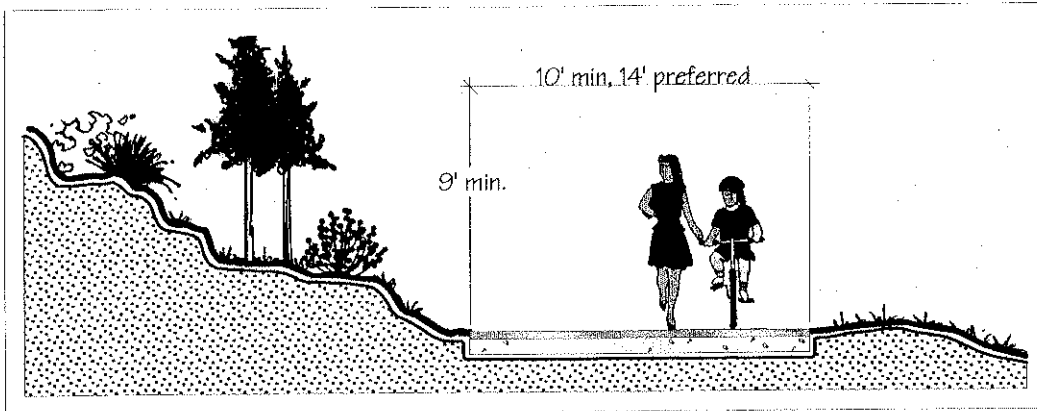
Trails for the Twenty-First Century
Published by Island Press, 1993
Edited by Karen-Lee Ryan, Rails-to-Trails Conservancy

Guide to the Development of Bicycle Facilities
Most current edition and Published by American Association of State Highway Transportation Officials (AASHTO). Available from FHWA or AASHTO.

Manual on Uniform Traffic Control Devices (MUTCD)
Most current edition. Published by the U. S. Department of Transportation, Washington, DC

Universal Access to Outdoor Recreation: A Design Guide
Published by PLAE, Inc., Berkeley, CA, 1993

In all cases, the recommended guidelines in this report meet or exceed national standards. Should these national standards be revised in the future and result in discrepancies with this chapter, the national standards should prevail for all design decisions.



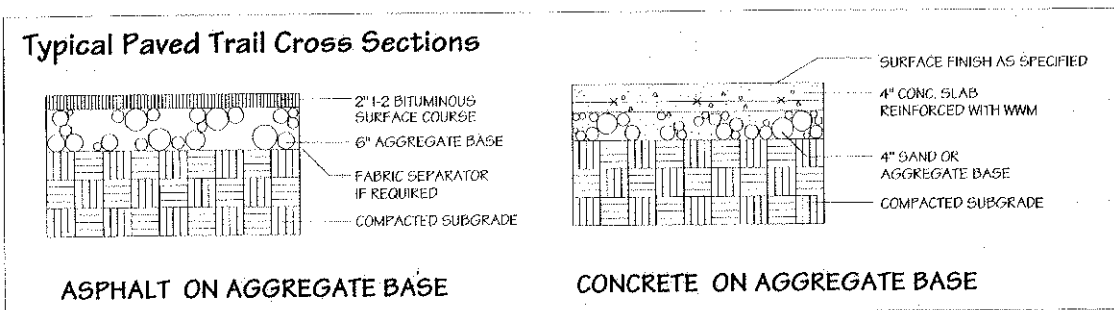
Typical pavement design for paved, off-road multi-use trails should be based upon the specific loading and soil conditions for each project. These trails, typically composed of asphalt or concrete, should be designed to withstand the loading requirements of occasional maintenance and emergency vehicles. In areas prone to frequent flooding, it is recommended that concrete be used for its excellent durability.

One important concern for asphalt multi-use trails is the deterioration of trail edges. Installation of a geotextile fabric beneath a layer of aggregate base course (ABC) can help to maintain the edge of a trail. It is also important to provide a 2' wide graded shoulder to prevent trail edges from crumbling.

The minimum width for two-directional trails is 10', however 14' widths are preferred where heavy traffic is expected. Centerline stripes should be considered for paths that generate substantial amounts of pedestrian traffic. Possible conflicts between user groups must be considered during the design phase, as cyclists often travel at a faster speed than other users.

Asphalt is a hard surface material that is popular for a variety of rural, suburban and urban trails. It is composed of asphalt cement and graded aggregate stone. It is a flexible pavement and can be installed on virtually any slope.

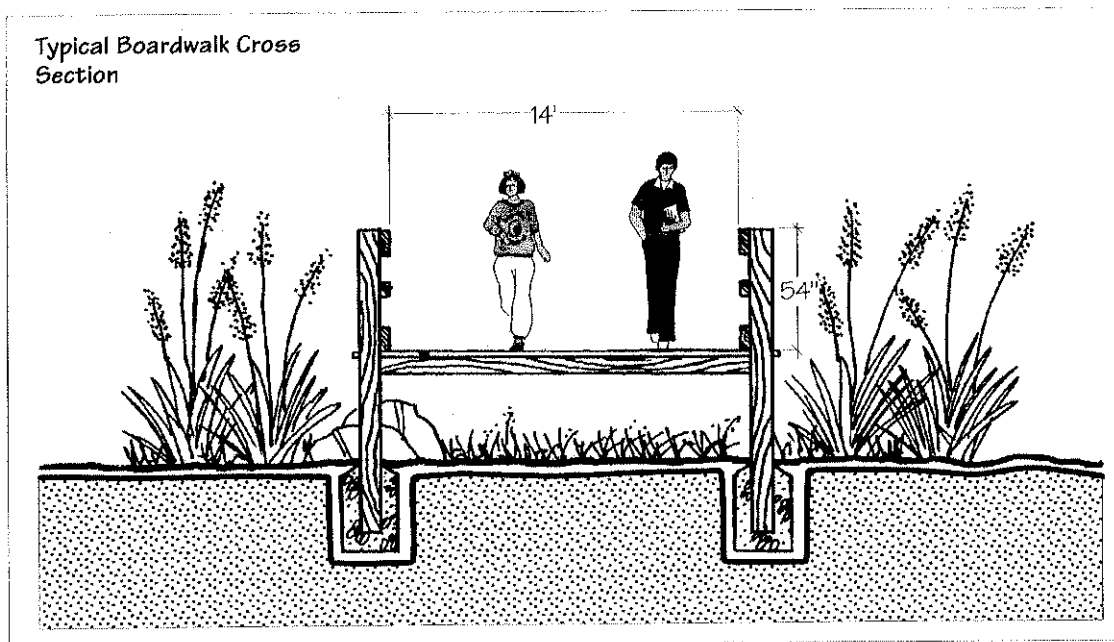
Concrete surfaces are capable of withstanding the most powerful environmental forces. They hold up well against the erosive action of water, root intrusion and subgrade deficiencies such as soft soils. Most often, concrete is used for intensive urban applications. Of all surface types, it is the strongest and has the lowest maintenance requirement if it is properly installed.



Paved Multi-Use Trail

Boardwalks, or wood surface trails, are typically required when crossing wetlands or poorly drained areas. While boardwalks can be considered multi-use trails, the surface tends to be slippery when wet, and not best suited for wheeled users. Boardwalks intended for use by bikes, pedestrians, in-line skaters, etc. should be a minimum of 14' wide. However, boardwalk trails limited to pedestrian use can be as narrow as 8'.

Wood surfaced trails are usually composed of sawn wooden planks or lumber that forms the top layer of a bridge, boardwalk or deck. The most commonly used woods for trail surfacing are exposure- and decay- resistant species such as pine, redwood, fir, larch, cedar, hemlock and spruce. Wood is a preferred surface type for special applications because of its strength and comparative weight, its aesthetic appeal and its versatility. However, wood can be very slippery when wet. Synthetic wood, manufactured from recycled plastics, is now available for use as a substitute in conventional outdoor wood construction. While these products are more expensive than wood lumber, recycled plastic lumber lasts much longer, does not splinter or warp and will not discolor.

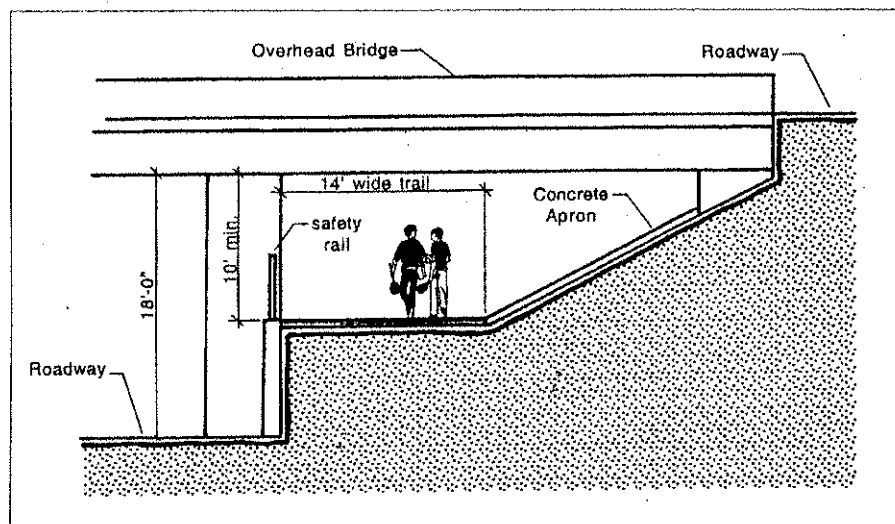
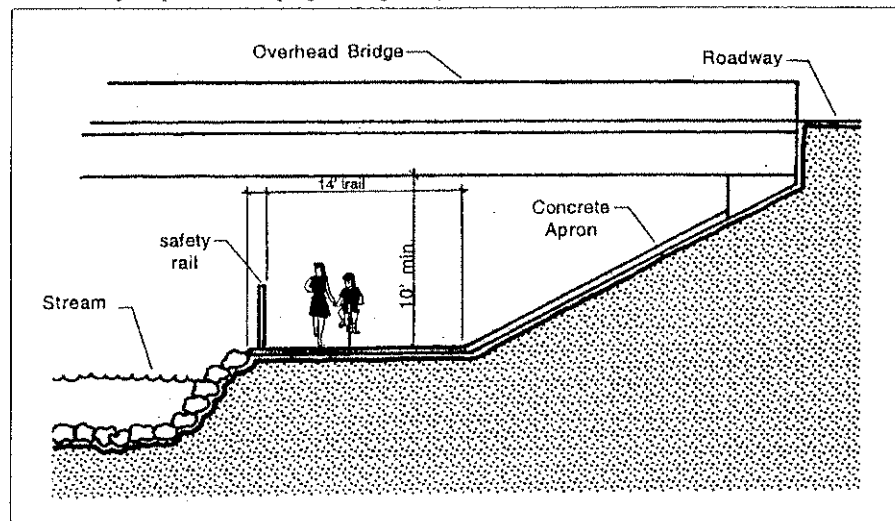


Boardwalk Trail

Trail underpasses can be used to avoid undesirable at-grade intersections of trails and roadways. These underpasses typically utilize existing overhead roadway bridges or culverts that are large enough to accommodate trail users. There are several key issues that must be addressed in the design of a trail underpass:

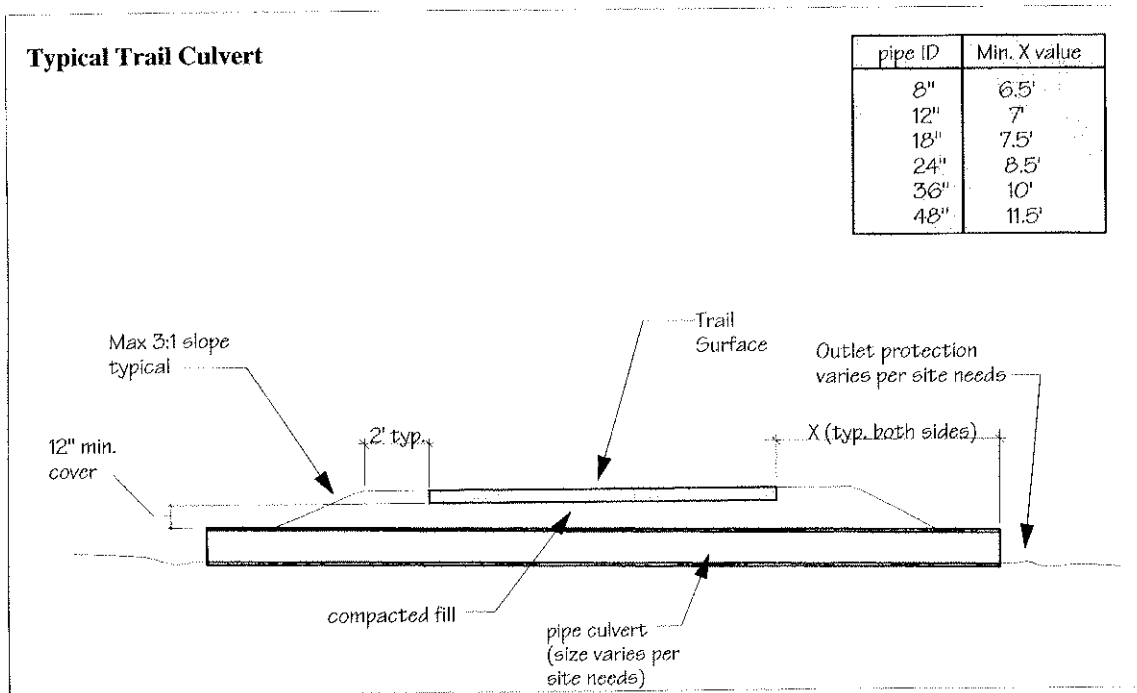
1. The vertical clearance of the underpass must be at least 10';
2. The width of the underpass must be at least 12';
3. Proper drainage must be established to avoid pooling of stormwater inside the underpass; and
4. It is recommended that underpasses be lighted for safety.

Trail underpasses that utilize box culverts can sometimes be installed as part of a roadway improvement project at greatly reduced cost.



Trail Underpass

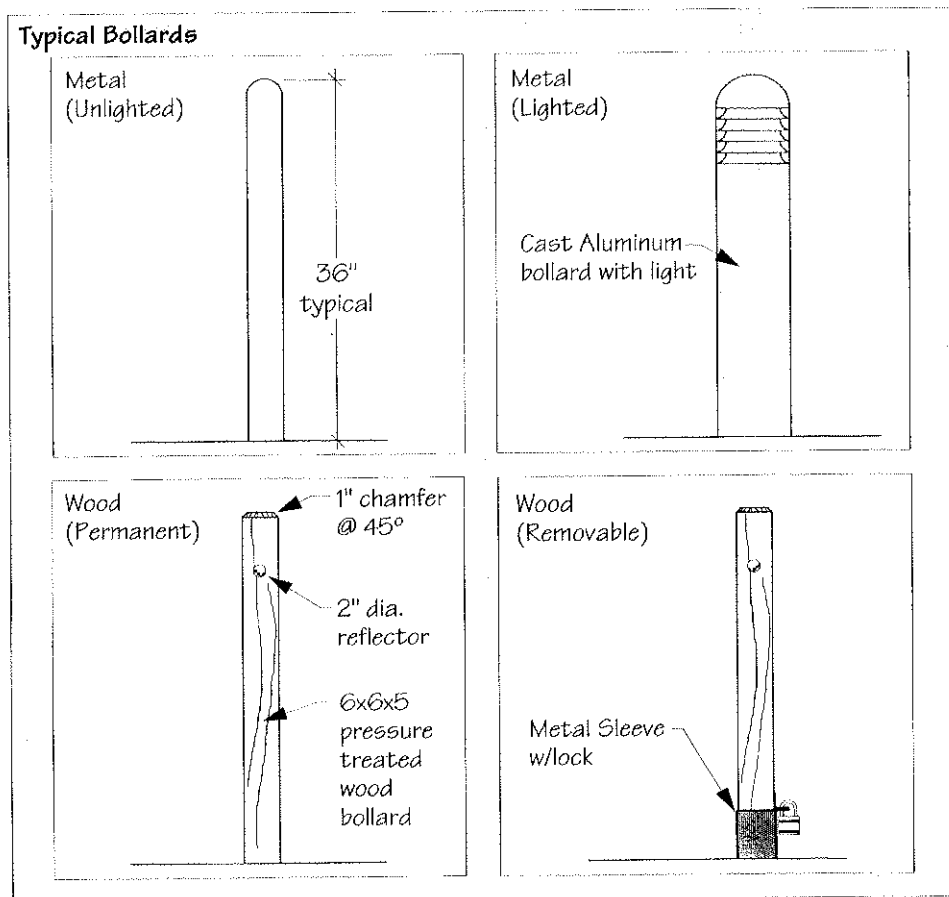
Proper installation of trail culverts is important to insure proper stormwater runoff drainage, trail user safety, and longevity of the trail surface. Pipe length, diameter, and material specifications will vary depending on specific site needs. Two materials typically used for trail culverts are reinforced concrete pipe, and High Density Polyethylene (HDPE) recycled plastic pipe. Plastic pipes are typically less expensive on a per foot basis. The graphic below outlines proper installation parameters for greenway trail culverts.



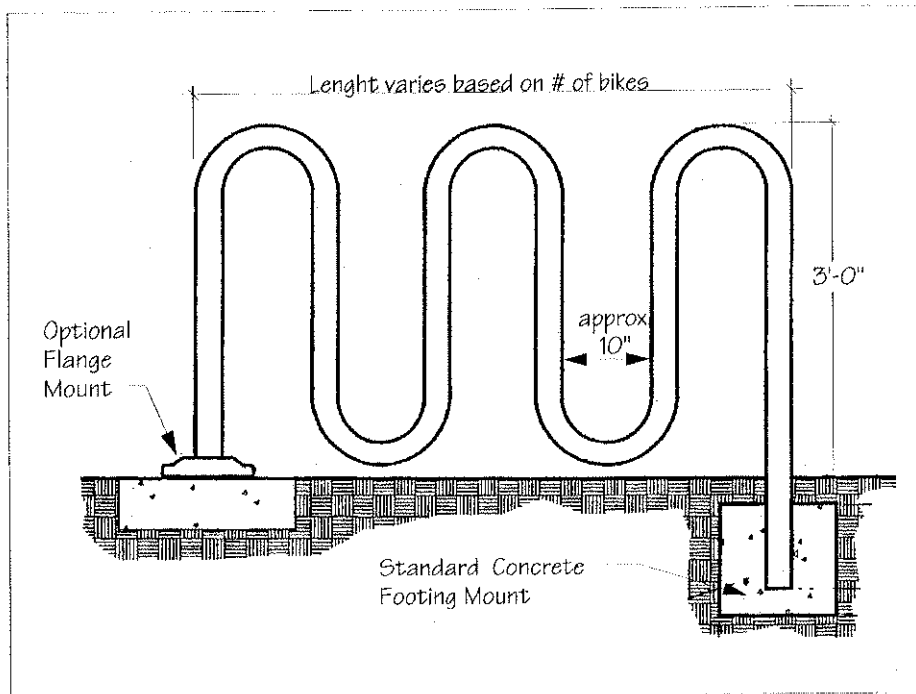
Trail Culvert

Bollards are intended to provide separation between vehicles and trail users. They are available in a variety of shapes, sizes, and colors and come with a variety of features. Lighted bollards are intended to provide visitors with minimum levels of safety and security along trails which are open after dark. Bollards should be chosen according to the specific needs of the site and should be similar in style to the surrounding elements. The graphic below illustrates several typical bollard examples.

The contractor is to provide proper footings and anchors for bollard installation, according to manufacturers specifications. Typical construction materials for bollards include painted steel or aluminum, with halogen or metal halide lights in weather tight casings. Removable bollards can be installed to provide trail access for emergency and maintenance vehicles.



Trail Bollards



Bicycle Rack Design & Location Criteria

It is important to choose a bicycle rack design that is simple for cyclists to operate. Bicycle racks should be designed to allow use of a variety of lock types. It may be difficult initially to determine the number of bicycle parking spaces needed; bicycle racks should be situated on-site so that more racks can be added if bicycle usage increases.

The design shown above has proven popular and effective in numerous communities. It is expensive to fabricate locally, easy to install, vandal resistant, and works well with the popular high-security locks. In addition, it can be installed as a single unit, on a sidewalk, or in quantity at a major recreation center.

The location criteria included below are a mix of those developed by the cities of Denver and Seattle for siting bicycle racks, and are recommended for the Mill Creek area:

- Racks should be located within 50 feet of building entrances (where bicyclists would naturally transition into pedestrian mode.)
- Racks should be installed in a public area within easy viewing distance from a main pedestrian walkway, usually on a wide sidewalk with five or more feet of clear sidewalk space remaining (a minimum of 24 inches clear space from a parallel wall, and 30 feet from a perpendicular wall)
- Racks should be placed to avoid conflicts with pedestrians. They are usually installed near the curb and at a reasonable distance from building entrances and crosswalks.
- Racks can be installed at bus stops or loading zones (only if they do not interfere with boarding or loading patterns, and there are no alternative sites). Many communities across the nation, including Phoenix, AZ, Portland, ME, Austin, TX and Denver, CO, have also installed racks on their buses to facilitate bike-on transit travel.

Bicycle Rack

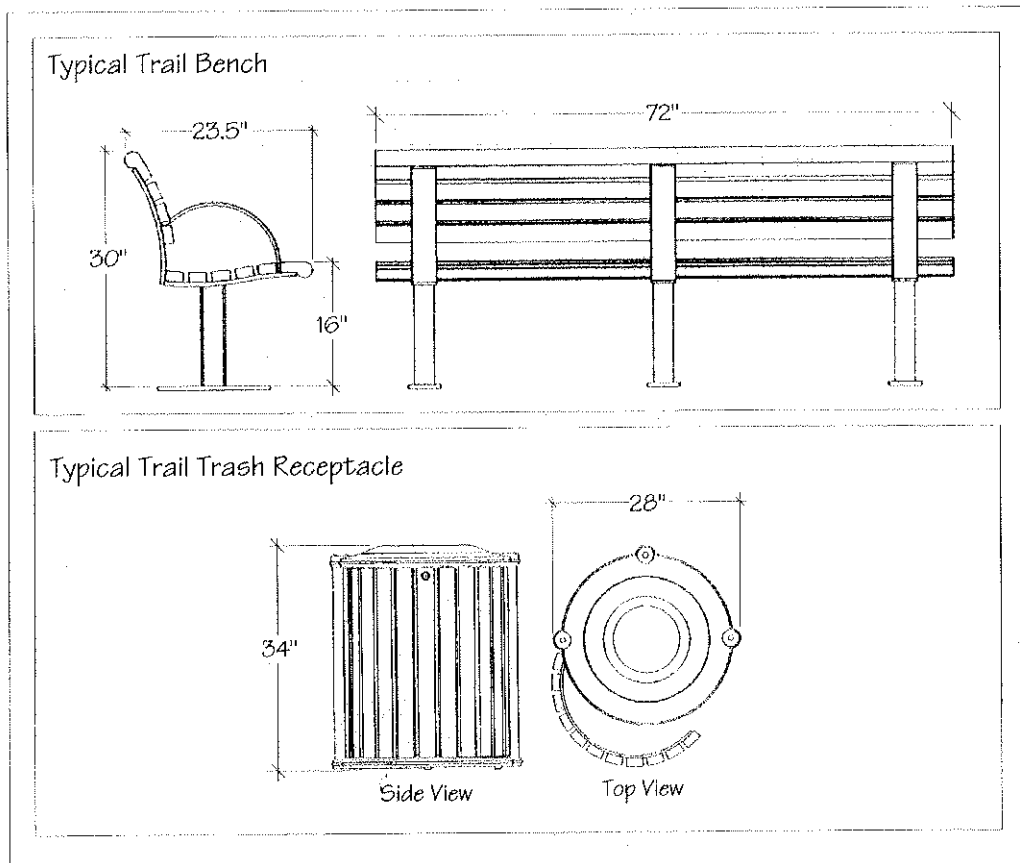
Trash receptacles

Trash containers are necessary along all trails. They can be attractive as well as functional and should be selected based on the amount of trash expected, overall maintenance program of the trail, and types of users. Trash cans need to be accessible to both trail users and maintenance personnel. At a minimum, 22-gallon or 32 gallon containers should be located at each entranceway and at each bench seating area. They should be set back three feet from the edge of the trail. The location of additional trash cans will depend upon the location of concessions, facilities adjacent to the trail and areas where trail users tend to congregate.

Benches

Benches along trails allow users to rest, congregate or contemplate. Trail benches should comfortably accommodate the average adult. They should be located at the primary and secondary entrances to the trail and at regular intervals, and should be set back three feet from the trail edge.

The graphics below illustrate a bench and trash receptacle that are manufactured using recycled plastic lumber instead of conventional treated wood lumber. These prefabricated units cost more initially but last longer and require little or no maintenance.

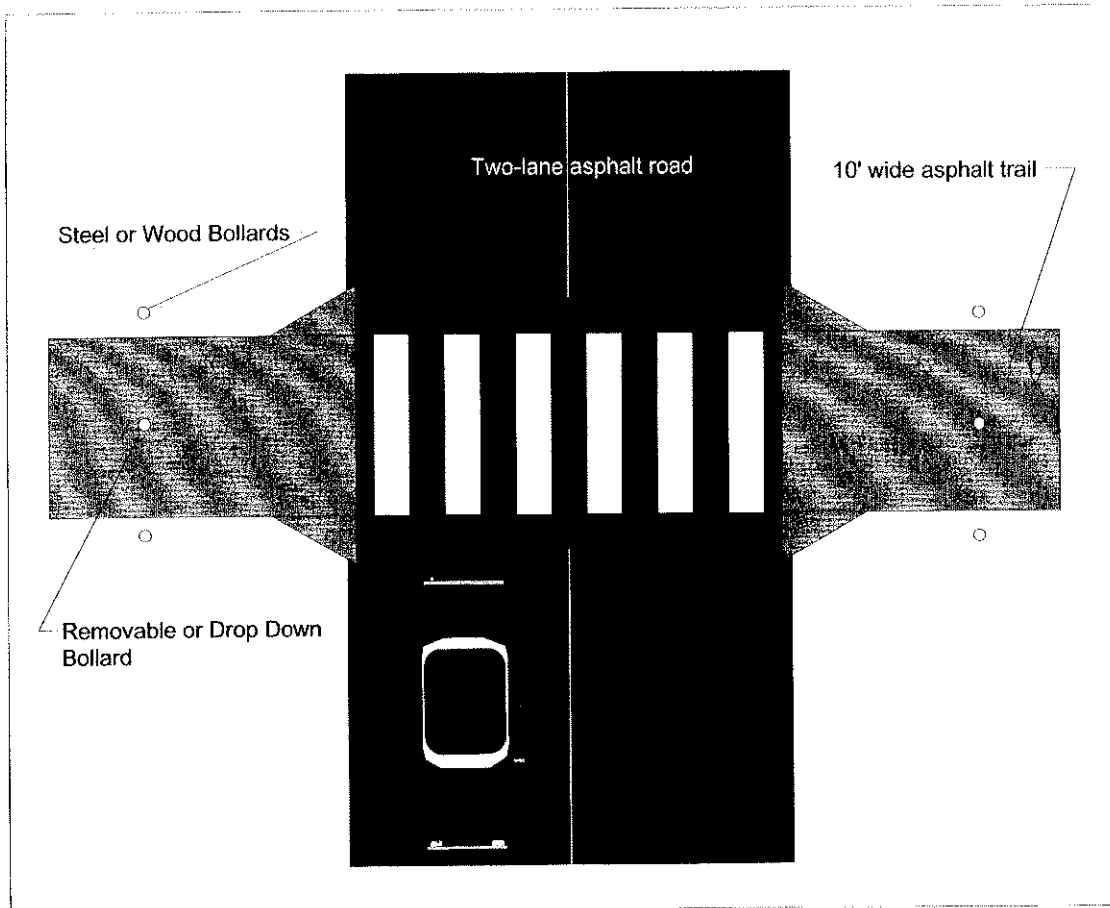


Site Furniture

Trail/Roadway intersections can become dangerous conflict areas if not carefully designed. For at-grade intersections, there are usually several design objectives:

1. Site the crossing area at a logical and visible location.
2. Warn motorists of the upcoming crossing.
3. Maintain visibility between trail users and motorists.
4. Inform trail users of the upcoming intersection.

Intersections and approaches should be on relatively flat grades. In particular, the bicyclist should not be required to stop at the bottom of the hill. If the intersection is more than 75 feet from the curb to curb, it is preferable to provide a center median refuge area, per ADA (Americans with Disabilities Act) or ANSI (American National Standards Institute) standards. If crossing traffic is expected to be heavy, it may be necessary to provide a traffic signal that responds to bicycles and/or can be pedestrian activated.



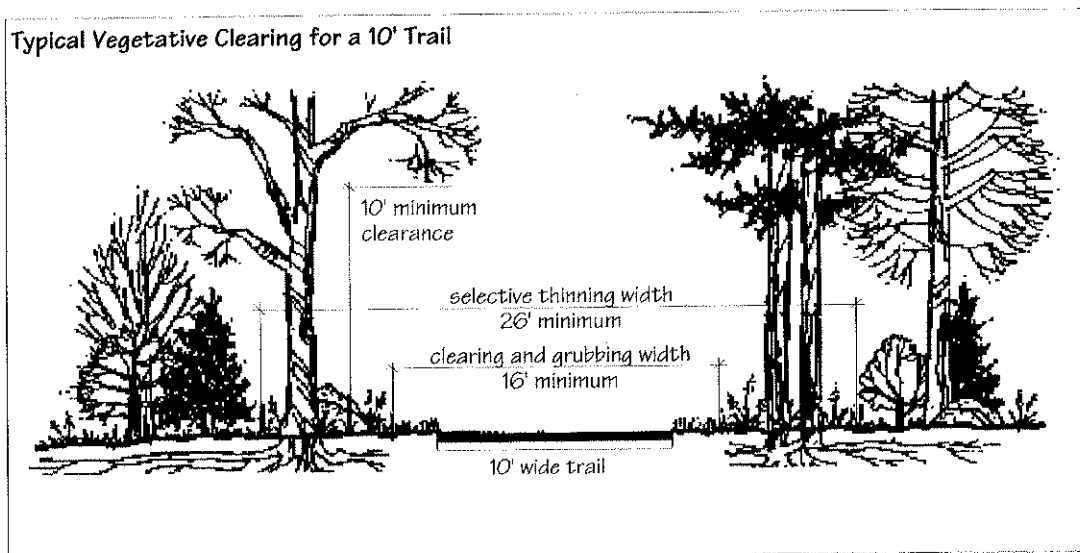
Trail Intersection with Roadway

The Greenway

Grand Forks, ND & East Grand Forks, MN

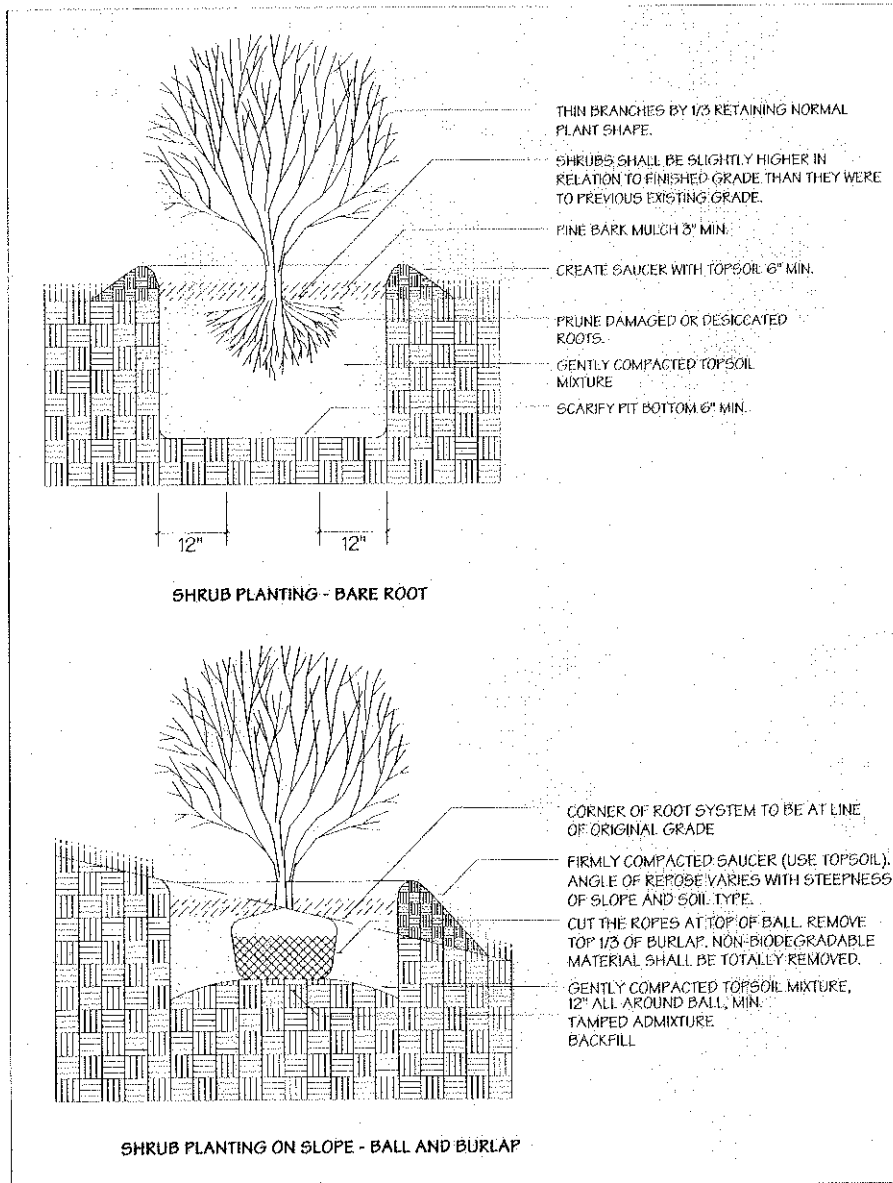
Vegetative clearing refers to the amount of vegetation removal that is required for various levels of trail development. The amount of vegetative clearing required for any one trail will depend on the type of trail being developed. While footpaths or hiking trails require little or no vegetation removal, paved pathways may require significantly more.

Single-tread, multi-use trails are the most common type of trail in the nation. These trails vary in width, can accommodate a wide variety of users, and are especially popular in suburban and urban areas. While the vegetative clearing needed for these trails varies with the width of the trail, the graphic below outlines typical requirements.



Vegetation Clearing

The amount of landscaping needed for greenways will vary from project to project. While some projects will require little or no plantings, other projects may require it for vegetative screening, habitat restoration, erosion control or aesthetics. The graphics below illustrate planting techniques for two types of shrub material (ball & burlap and bare root) which may be used in greenway development.



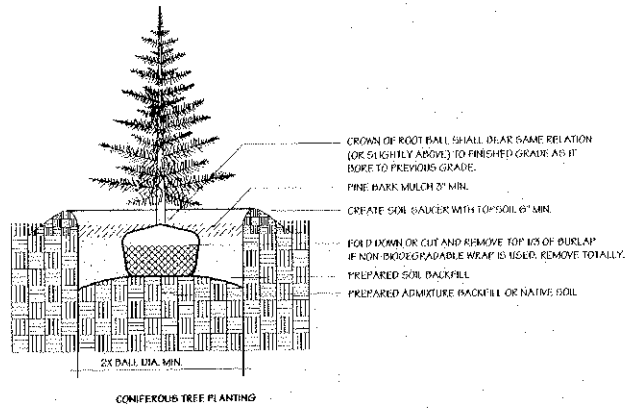
Planting Details: Shrubs

The Greenway

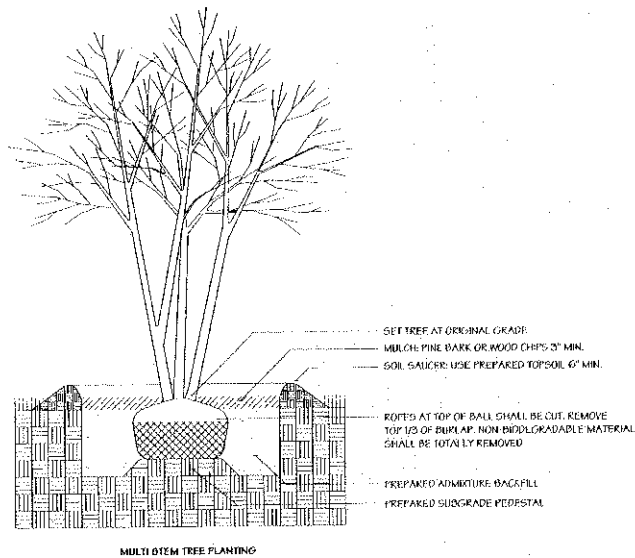
Grand Forks, ND & East Grand Forks, MN

Trees are important to greenways and trails for both aesthetic and environmental reasons. Not only do they contribute to the appearance of a trail, their shade cools the environment for trail users and provides habitat for birds and wildlife. When choosing trees and shrubs for use in greenway corridors, it is recommended that indigenous and well adapted species be used. This will reduce the need for chemical and water applications as a part of long term maintenance. The following graphics represent common installation practices used for planting several different types of plant material.

Typical evergreen planting techniques

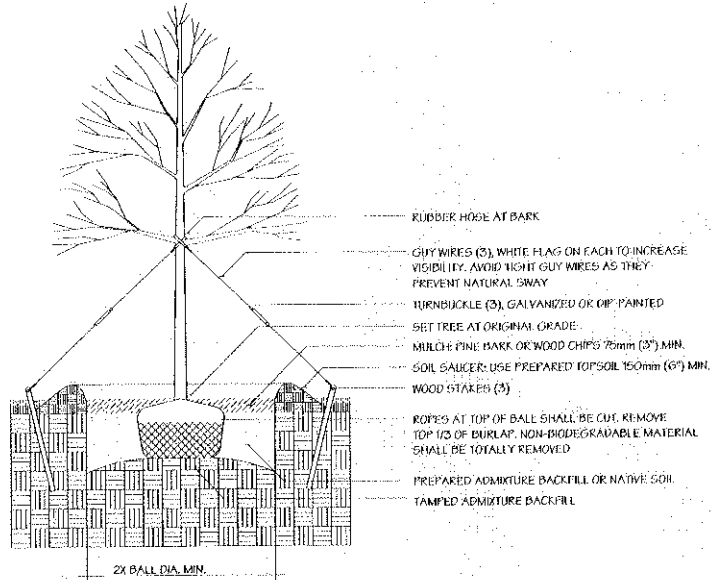


Typical multi-stem tree planting techniques

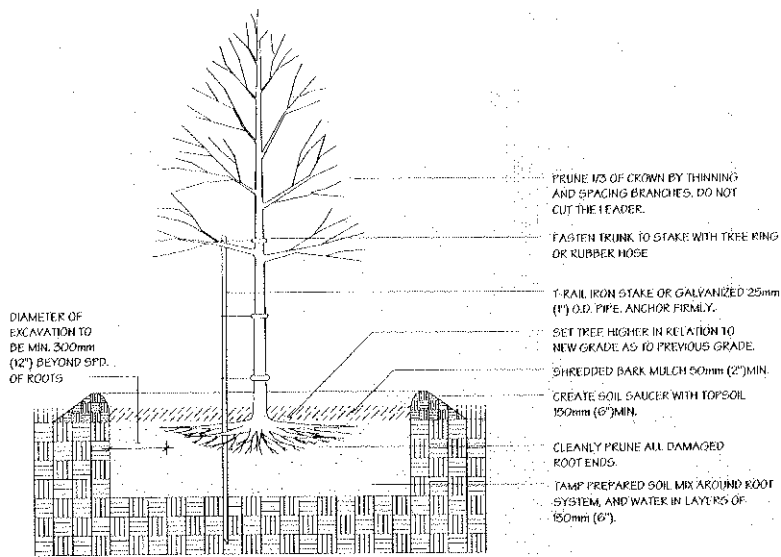


Planting Details: Trees

Typical deciduous tree planting techniques for ball & burlap and bare root trees.

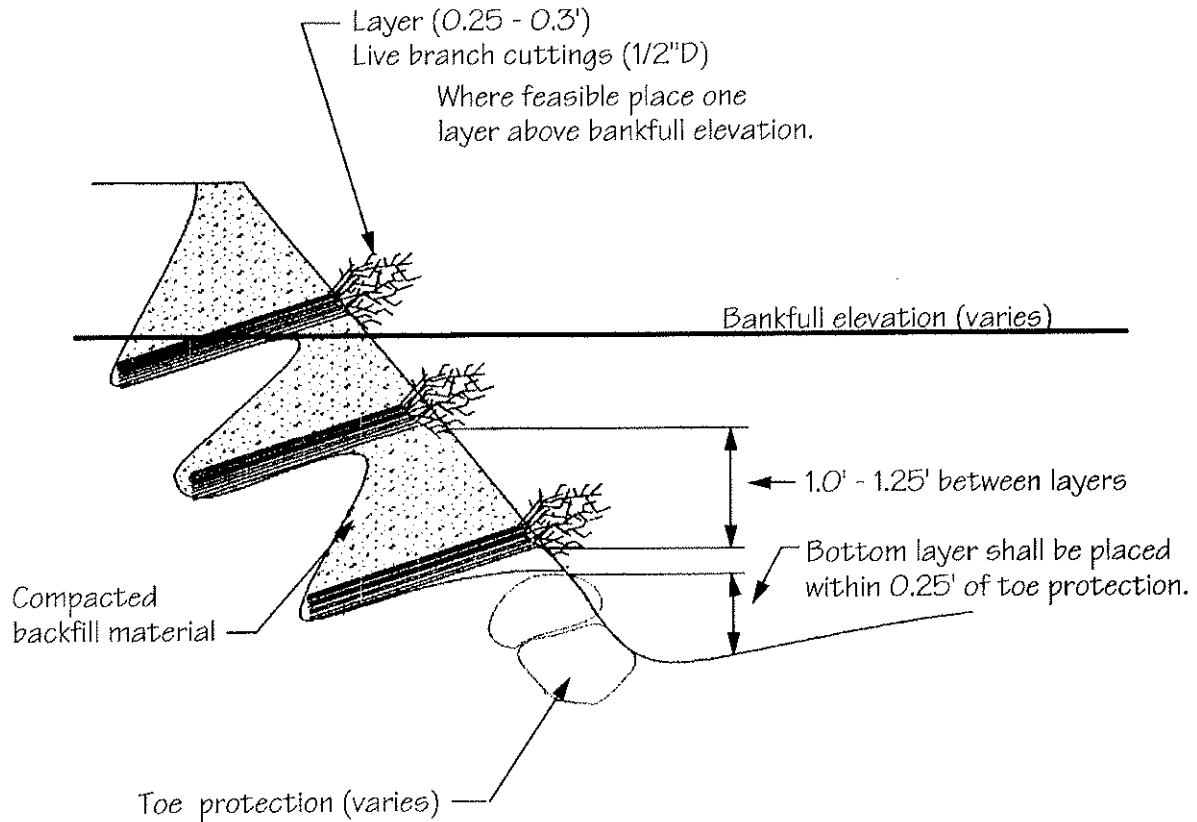


DECIDUOUS TREE PLANTING

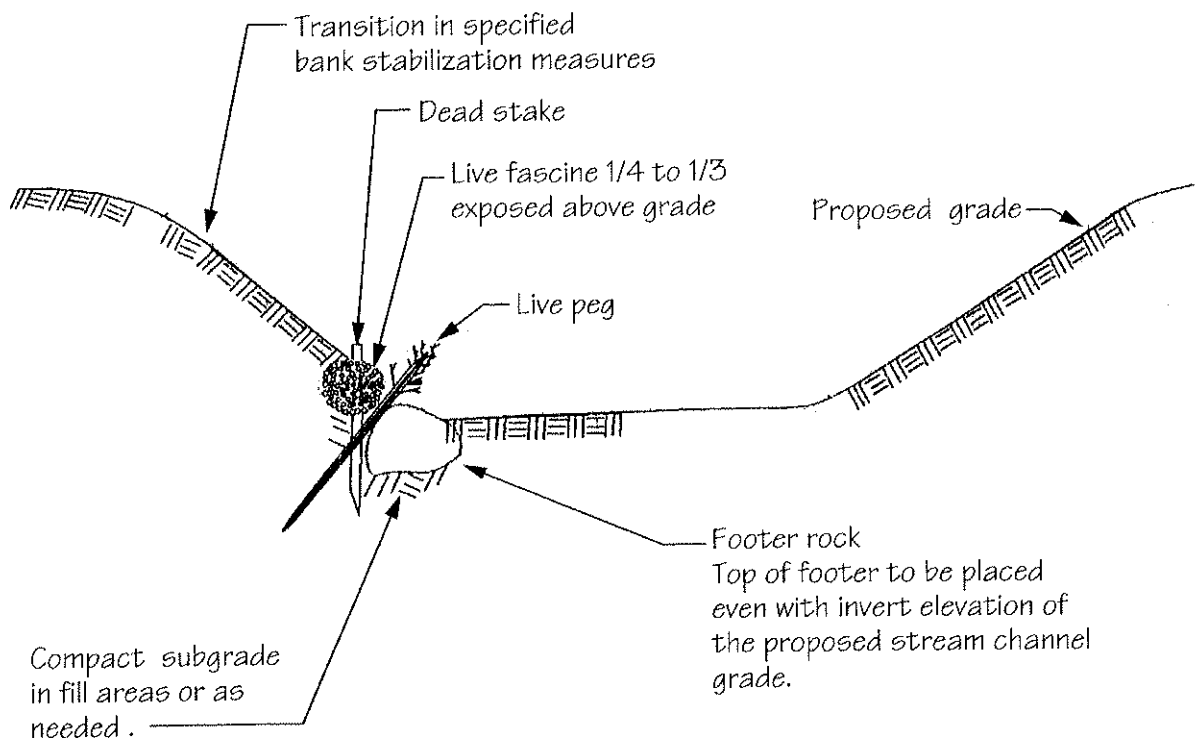


DECIDUOUS TREE PLANTING - BARE ROOT

Planting Details: Trees

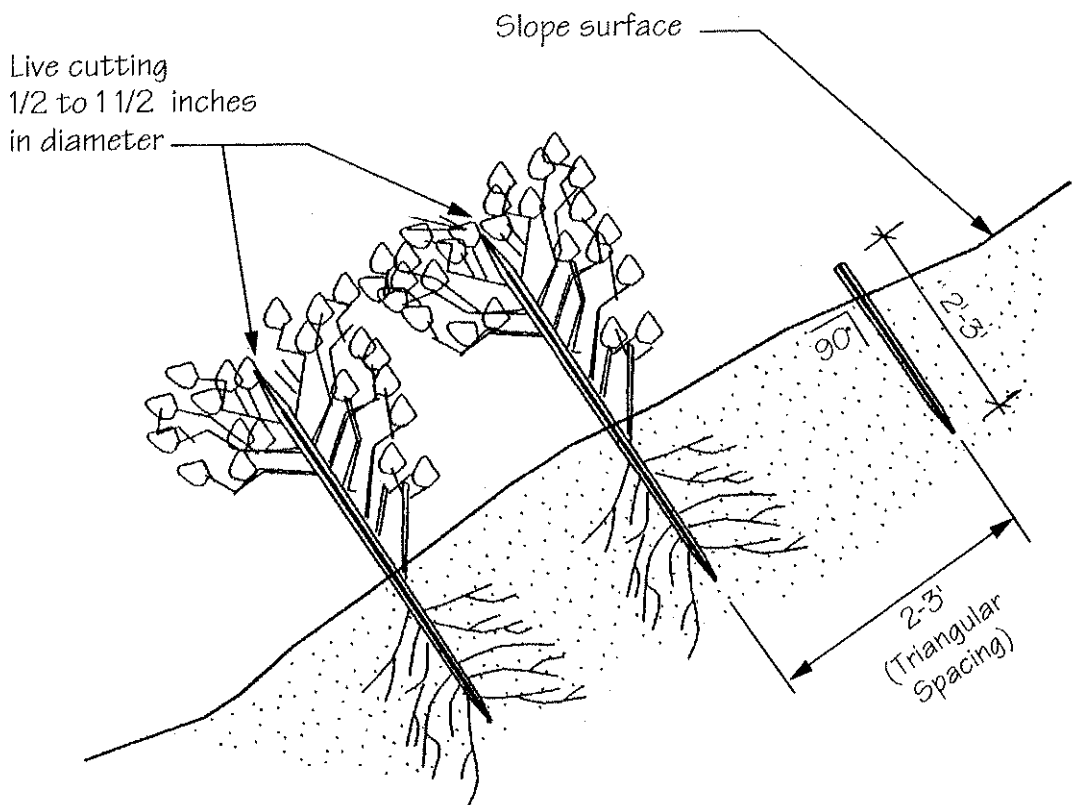


Riverbank Restoration: Live Branch Layering Cross Section

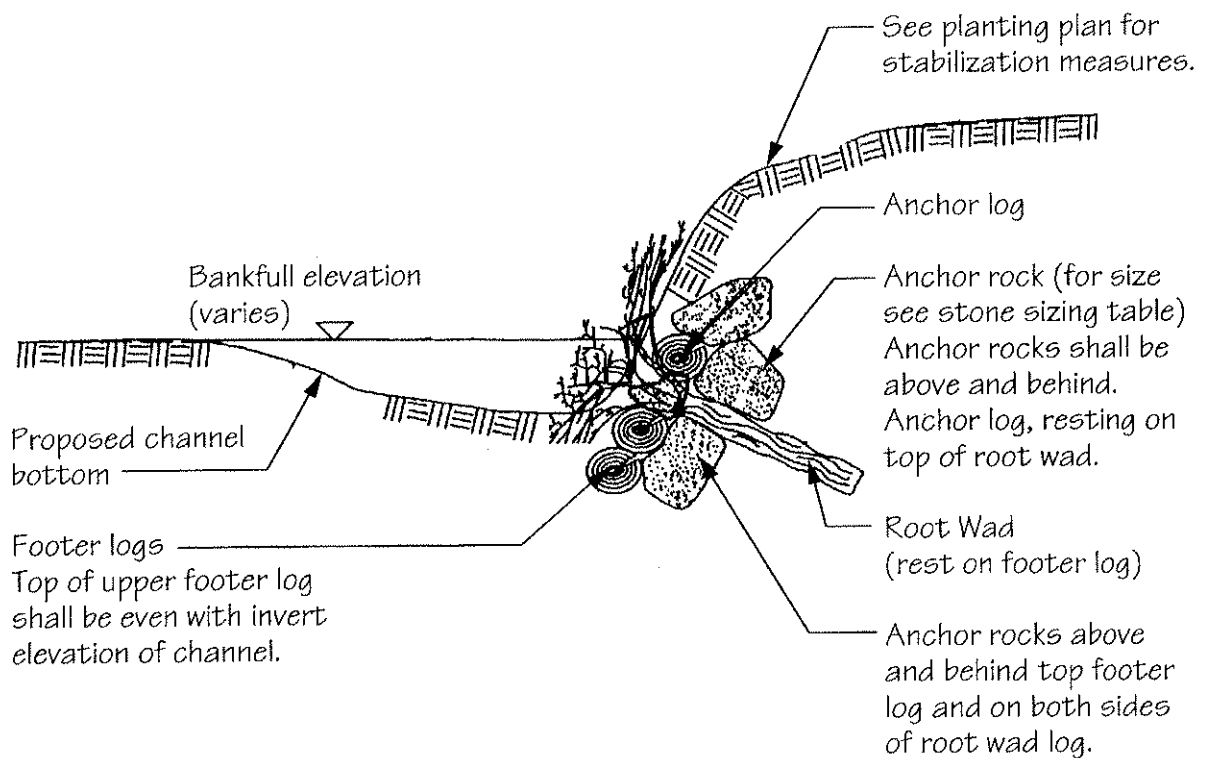


Note:
Refer to the toe protection dimension table
for footer rock & live fascine size.

Riverbank Restoration: Live Fascine Toe Protection (FTP) Cross Section



Riverbank Restoration: Live Stake Installation Cross Section



Riverbank Restoration: Root Wads Cross Section