



# CHICAGO RIVER CORRIDOR DESIGN GUIDELINES AND STANDARDS

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**City of Chicago**

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# Chapter One: Introduction

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The Chicago River is one of Chicago's most precious and recognized natural resource. Winding its way through the length of the city, it offers a peaceful, natural contrast to the urban environment. For most of Chicago's history, the river has been an important working asset, serving as the city's harbor, supplying water for industry, and carrying away waste water. In the process, the river has been neglected and abused. Renewed development and changes in technology have made it possible to reclaim the river as an aesthetic and recreational resource to improve the quality of life for all Chicagoans.

The framework for the revitalization of the Chicago River is provided by the **Chicago River Corridor Development Plan**. The five goals of this plan are to:

- Create a connected greenway along the river, with continuous multi-use paths along at least one side of the river.
- Increase public access to the river through the creation of overlooks and public parks.
- Restore and protect landscaping and natural habitats along the river, particularly fish habitat.
- Develop the river as a recreational amenity, attracting tourists and enhancing Chicago's image as a desirable place to live, work, and visit.
- Encourage economic development compatible with the river as an environmental and recreational amenity.

Since the implementation of the **River Plan**, there has been a significant amount of public and private investment that have transformed abandoned, underused waterfront areas into new parks and trails, mixed-use and residential projects, and industry. New riverfront communities have emerged, land values have increased, water quality has improved, and the river has become a prime destination as the City's greatest natural amenity after the lake.

## 1.1 ROLE OF DESIGN GUIDELINES AND STANDARDS

The **Chicago River Corridor Design Guidelines and Standards** outline the requirements for development in and adjacent to the setback area along the Chicago River and its branches within the city limits. Setbacks are a very important planning and zoning tool. They provide space for the development of important greenway corridors, multi-use trails, and riverwalk amenities.

*The role of the Design Guidelines and Standards is to outline the City's goals, expectations and requirements for development along the Chicago River.*

Appropriately developed, the river corridor will provide additional open space and recreational opportunities, increase property values, economic vitality, increase environmental awareness, and enhance Chicago's attractiveness as a tourist destination. The **Design Guidelines and Standards** address development options along the river, including but not restricted to architectural treatments,

building construction, parking, fencing, lighting, landscaping, and riverbank treatments. Specific information relating to appropriate riverbank treatments, permit requirements, site furnishings, elements, construction materials and specifications may be found in the Appendices.

### **1.2 APPLICABILITY OF DESIGN GUIDELINES AND STANDARDS**

*Design Guidelines and Standards apply to all new development within 100 feet of the Chicago*

The Chicago Zoning Ordinance (Municipal Code of Chicago, Title 17 Section 8-0912) requires that all new development within one hundred (100) feet of Chicago waterways, with the exception of single family homes, two flats and three flats, be processed as planned developments, subject to review and approval by the City of Chicago Department of Planning and Development, the Chicago Plan Commission, and the Chicago City Council. The ordinance further requires new developments to provide a thirty (30) foot setback from the river and comply with with general goals of the waterway design guidelines established by the Chicago Plan Commission. Those development projects not subject to the Chicago Plan Commission approval are urged to voluntarily comply with these guidelines.

The **Design Guidelines and Standards** provide the basis for review for riverside planned developments by the Department of Planning and Development. Upon completion of review, a description of the applicant's proposal and obligations will be incorporated into the planned development ordinance, subject to approval by the Chicago Plan Commission and the Chicago City Council, and enforceable through the Zoning Administrator.

### **1.3 PRECEDENCE OF DESIGN GUIDELINES**

This document replaces the 1999 edition of the **Chicago River Corridor Design Guidelines and Standards** and the 1990 **Chicago River Urban Design Guidelines for the Downtown Corridor**.

### **1.4 REVIEW BY OTHER PUBLIC AGENCIES**

In addition to the City of Chicago planned development approval process, riverside projects that include modification of the riverbank may require permits from the following state and federal authorities:

**U.S. Army Corps of Engineers** - has jurisdiction under Section 10 and 404 of the Rivers and Harbors Act to issue regional permits, individual permits, and letters of permission for construction on waterways.

**Illinois Department Natural Resources / Office of Water Resources** - requires permits for construction activity in waterways of the State of Illinois.

**Illinois Environmental Protection Agency** - issues permits under Section 404 of the Clean Water Act for projects that may have chemical, physical or biological impacts on the waterway.

**City of Chicago Department of Transportation Division of Engineering**- issues harbor permits for construction within 40 ft of a waterway.

**Metropolitan Water Reclamation District of Greater Chicago** - may require approval for construction projects on the Chicago River that may impede its hydraulic flow. The MWRD owns portions of the Chicago River and leases them to private parties; these leases may impose additional requirements.

**U.S. Coast Guard** - approval is required for activity that may impinge on the navigation interests and safety of the Chicago River.

**Illinois Environmental Protection Agency** - issues National Pollutant Discharge Elimination System (NPDES) permits for industrial discharges, stormwater sewer point discharges, and earth moving construction projects, disturbing at least one acre of land, that may discharge pollutants into water bodies.

## **1.5 AREAS AFFECTED BY THE DESIGN GUIDELINES AND STANDARDS**

These guidelines apply to all branches of the Chicago River and connected waterways within the boundaries of the City of Chicago. (see Figure 1.1)

- Main Branch of the Chicago River
- North Branch of the Chicago River
- North Branch Canal (on the east side of Goose Island)
- North Shore Channel
- South Branch of the Chicago River
- Sanitary and Ship Canal
- South Fork of the South Branch of the Chicago River ('Bubbly Creek')
- Associated slips and inlets along the South Branch and Sanitary and Ship Canal

*The Design Guidelines are intended for use by property owners, developers, designers, individuals, and civic groups interested in development along the Chicago River.*

## 1.6 OUTLINE OF DESIGN GUIDELINES AND STANDARDS

The **Design Guidelines and Standards** are organized into six chapters:

- Setbacks
- Riverbank Zone
- Urban Greenway Zone
- Development Zone
- Bubbly Creek Development Guidelines
- Appendices (Design Specifications)



Figure 1.1 Map of Chicago River

## 1.7 SETBACKS

A setback defines the requirements for the minimum distance between new development and the river. Setbacks are required for all new development, but do not apply to existing buildings or development. Persons responsible for projects along the Chicago River should consult the “Setbacks” section of this document before preparing development or architectural plans for a river edge site.

## 1.8 RIVERFRONT DEVELOPMENT ZONES

Land adjacent to the Chicago River can be categorized into three zones:  
(see Fig. 1.2)

- Riverbank Zone, between the water’s edge and the top of bank
- Urban Greenway Zone, between the top of bank and the river setback
- Development Zone, on the land side of the river setback

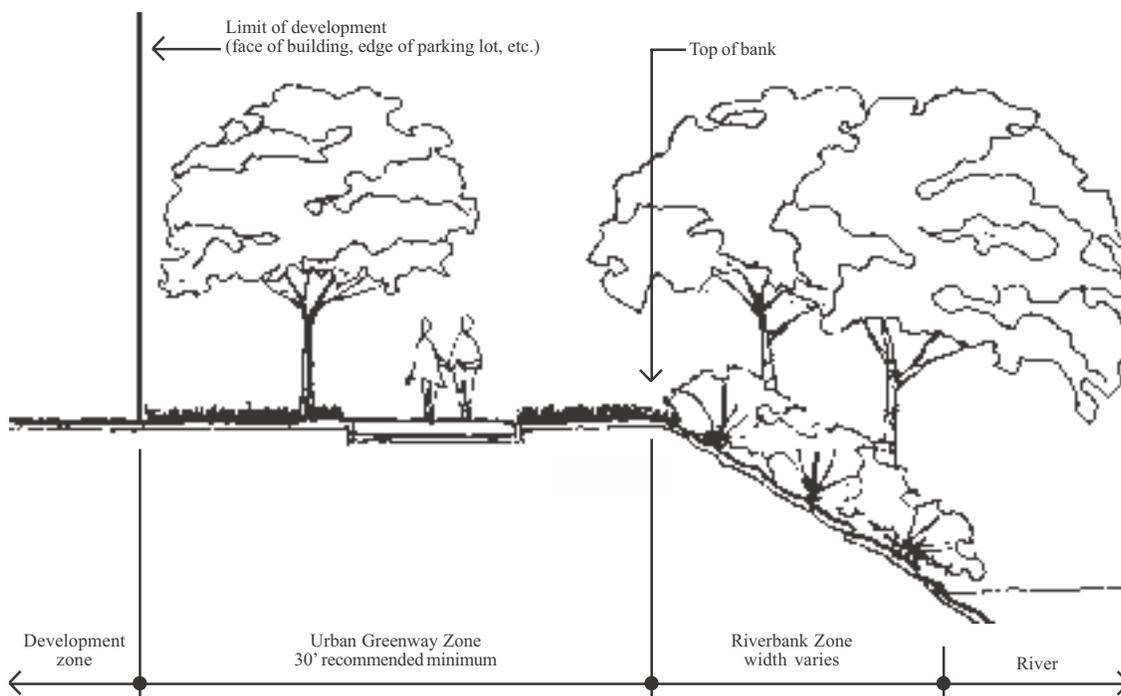


Figure 1.2 Typical riverbank section

### **1.9 RIVERBANK ZONE**

The riverbank zone is the area adjacent to the river between the water's edge and the top of bank. Where there is no bank, but rather a vertical bulkhead or other engineered vertical structure, there is no riverbank zone.

The riverbank zone should not be developed or disturbed except for environmental restoration, landscaping, and nature trails, so that it can act as a buffer between the river and adjacent uses and enhance the natural aspects of the continuous greenway corridor. Exceptions to this principle include development or construction required by river dependent uses and existing buildings or structures.

### **1.10 URBAN GREENWAY ZONE**

The urban greenway zone is the area between the top of bank and the development zone, and should be developed with landscaping and a recreational multi - use trail. Exceptions to this principle include development or construction required by river dependent uses, incompatible industrial use, and existing buildings or structures.

### **1.11 DEVELOPMENT ZONE**

The development zone is the area adjacent to, and on the land side of, the urban greenway zone. The development zone is the area where renovation, redevelopment, or new development will occur. Such development may be commercial, residential, institutional, or any other use permitted by the zoning for the site.

### **1.12 BUBBLY CREEK DEVELOPMENT GUIDELINES**

In the Bubbly Creek river corridor, the river setback is expanded from thirty (30) feet to sixty (60) feet for the purpose of stormwater management and environmental protection. This chapter addresses the specific requirements for new development within the 60 foot setback area.

### **1.13 APPENDICES**

Detailed specifications for site furnishings, elements, construction materials, and requirements are presented to facilitate continuity of appearance and functionality of river development sites.

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## Chapter Two: Setbacks

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### 2.1 APPLICABILITY

A setback is an important zoning tool used to regulate and direct development on individual parcels of land to preserve or achieve a public good or benefit. The most common example of zoning setbacks are front yard, rear yard, and side yard setbacks, which bring order to the street facades of buildings and preserve open space around and between buildings.

*A setback is a zoning tool used to regulate development to preserve or achieve a public good.*

It is important that new development be set back from the Chicago River to protect the natural, scenic, recreational, historical, and economic resources of the river; and to preserve the potential for future development of greenway corridor improvements; and for the development of public access or multi-use trails.

New development must be set back a minimum of thirty (30) feet from the top of the bank of the Chicago River, except for the South Fork of the South Branch (Bubbly Creek), where sixty (60) feet is required (see Chapter 6 for Bubbly Creek guidelines).

*Minimum setback requirements:  
30 feet setback required along  
the Chicago River.*

The setback should be measured horizontally from the top of the bank, rather than from the water's edge, because the riverbank itself can be very steep and may not be suitable or wide enough for landscaping or a multi-use trail.

*60 feet setback required on  
Bubbly Creek.*

### 2.2 EXCEPTIONS

A Setback is not required for:

- Existing structures or buildings that are within the setback zone
- New single-family homes and two flats and three flats
- River dependent uses

River dependent uses are those uses or activities that can be carried out only on, in, or adjacent to a waterway because the use requires access to the waterway and cannot be located inland (see Appendix 1 for a listing of river dependent uses).

### 2.3 IMPROVEMENTS OR STRUCTURES PERMITTED IN SETBACK AREA

- Paved or unpaved walkways
- Projections from buildings in the private development zone, including but not limited to awnings and canopies, bay windows and balconies, overhanging eaves and gutters, provided the projection does not extend three (3) feet or more into the setback area, and has a minimum clearance of ten (10) vertical feet from setback grade.
- Arbors and trellises
- Fences and walls not exceeding 6 feet in height
- Light standards, benches, drinking fountains, and other riverwalk amenities
- Wheelchair lifts and ramps that meet federal, state, and local accessibility standards for persons with disabilities

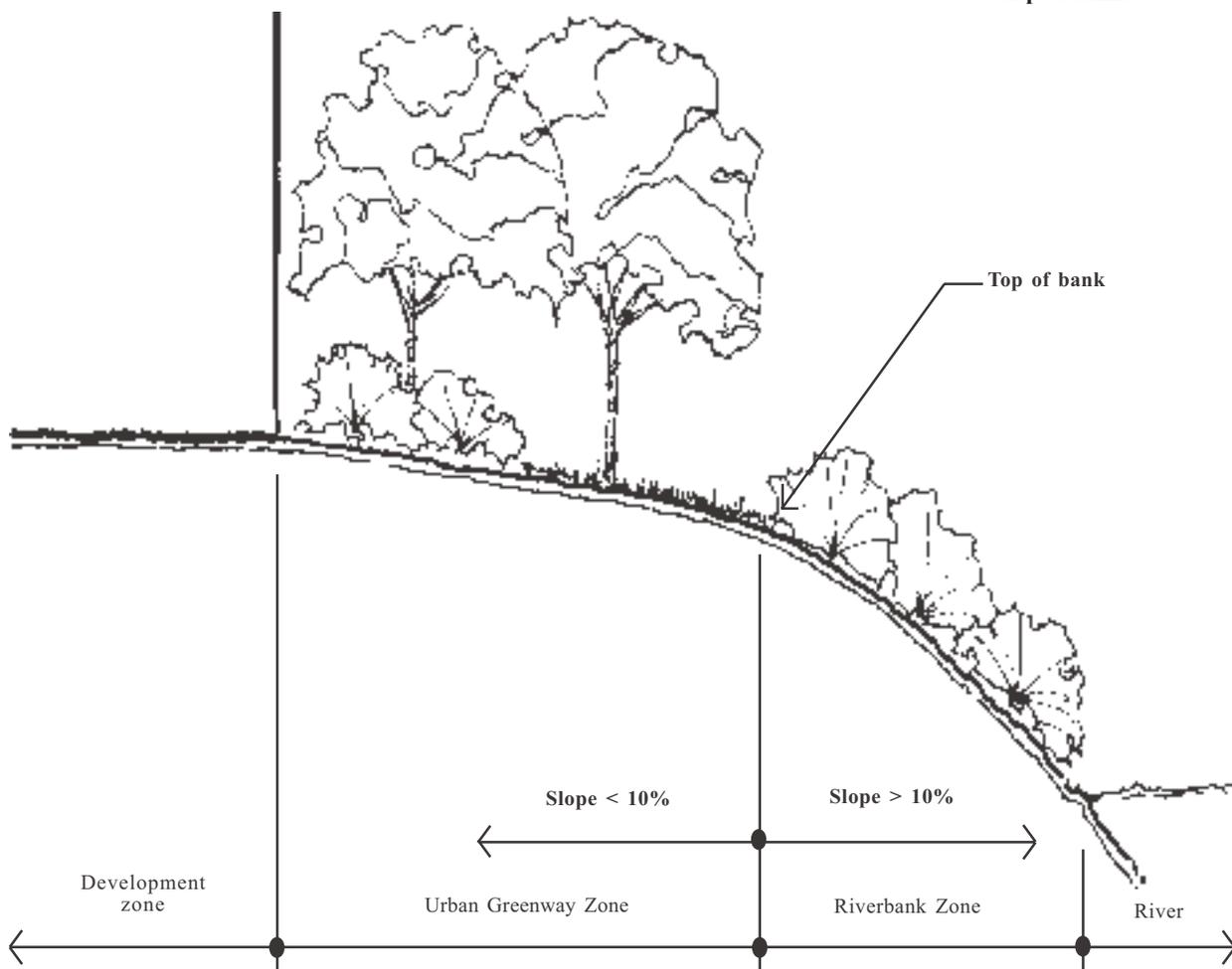
#### 2.4 IMPROVEMENTS OR STRUCTURES NOT PERMITTED IN SETBACK AREA

- Buildings or structures of any kind (except as noted below)
- Vehicular use areas (parking lots, driveways, service drives, loading docks, vehicular staging or storage areas, etc.)
- Overhead utilities
- Private yards, patios, terraces or decks

#### 2.5 DEFINITION, TOP OF BANK (SLOPED BANK)

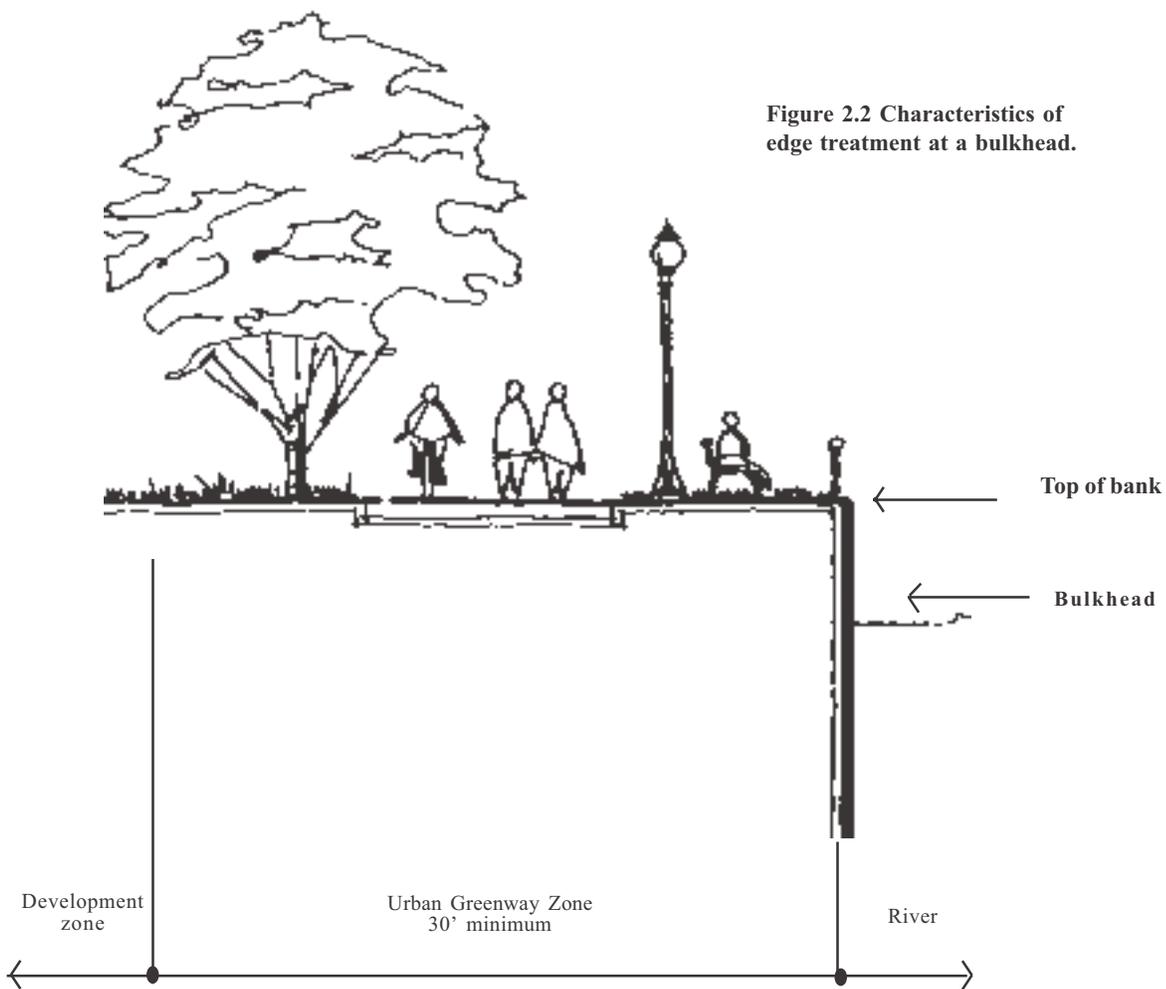
Where the bank is sloped, the “top of bank” is defined as the point at the top of the slope where the slope becomes less than 10 percent (see Fig. 2.1). Where there is a terrace or “bench” in the slope, the top of bank is the point furthest from the water’s edge where the slope becomes less than 10 percent.

Figure 2.1 Characteristics of sloped banks



## 2.6 DEFINITION, TOP OF BANK (VERTICAL BULKHEAD OR SEAWALL)

Where there is a vertical bulkhead or seawall or other engineered structure, the “top of bank” is defined as the point at the top of the bulkhead on the river side (see Fig. 2.2). Where the bulkhead is not in a straight line, the top of bank is defined as the line between points on top of the bulkhead located continuously over land, and does not cross over the water. Where there is a terrace or “bench” between two bulkhead walls, the top of bank is the line furthest from the water’s edge.



## 2.7 ZONING BONUSES FOR SETBACKS

The Chicago Zoning Code (Chapter 17-4-1006) provides floor area bonuses for riverside projects in downtown zoning districts that provide a river setback space exceeding the required minimum 30 feet.

Chapter 17-4-1012 provides floor area bonuses for water features built within the public riverwalk setback area.

Consult the Chicago Zoning Ordinance for details regarding bonuses for river amenities.

## 2.8 VARIANCES

In certain cases a setback less than the recommended 30 feet may be permitted in order to address constrained sites; small, irregularly shaped sites; and to allow flexibility for optimal site plans.

*In certain cases, variances are permitted in the setback zone to accommodate irregular and constrained sites.*

**Maximum variance (depth):** Structures and private yards may encroach into the 30-foot river setback a maximum of ten (10) feet, so that the minimum setback is never less than twenty (20) feet from the top of bank.

**Maximum variance (length):** Structures and private yards may encroach into the required river setback, provided that the encroachment, or the area with a reduced setback, occurs along a maximum of one - third (1/3) of the site's river frontage, measured in linear feet (LF), so that the required setback never occurs along less than two – thirds (2/3) of the site's river frontage.

## 2.9 MITIGATION FOR VARIANCES

To mitigate for the loss of riveredge open space in the setback zone due to the encroachment of structures or private yards where a setback less than the recommended has been permitted, additional open space must be provided elsewhere on site according to the following guidelines:

**Requirement for additional open space for mitigation of variances:** Where structures and/or private yards encroach into the river setback and urban greenway zone, and the setback is therefore less than thirty (30) feet from the top of bank, additional land free of structures, which is not defined or developed as a private yard, should be provided adjacent to the river setback and urban greenway zone to compensate for the loss of open space.

**Amount of additional open space for mitigation of variances:** Additional land should be provided adjacent to, and contiguous with, the setback zone at a rate of 2.5 times the land or open space lost to the encroachment.

**Proportion of additional open space for mitigation of variances:** Additional open space must have proportions of no more than two (2) feet of depth (perpendicular to the setback line) per one (1) foot of frontage along the river setback line, in order to avoid excessively long or deep and narrow parcels of land that could be relatively or completely unusable and have little or no public benefit.

*Additional land should be provided at the rate of 2.5 times the area lost to development.*

#### **2.10 EXAMPLE OF AMOUNT OF ADDITIONAL OPEN SPACE REQUIRED IN MITIGATION OF A SETBACK VARIANCE**

A parcel with 300 feet of river frontage may have a reduced setback of no less than 18 feet for up to no more than 100 feet, or one - third of the river frontage. The remaining 200 feet, or two – thirds of the river frontage, should have the standard 30 foot setback. The total amount of land free of structures should be as follows:

100 Lineal Feet x 12 feet (reduction from 30 foot to 18 foot setback) =  
1200 Square Feet (total land lost in the setback zone)

1200 Square Feet x 2.5 (replacement ratio) = 3000 Square Feet (total amount of additional open space required)

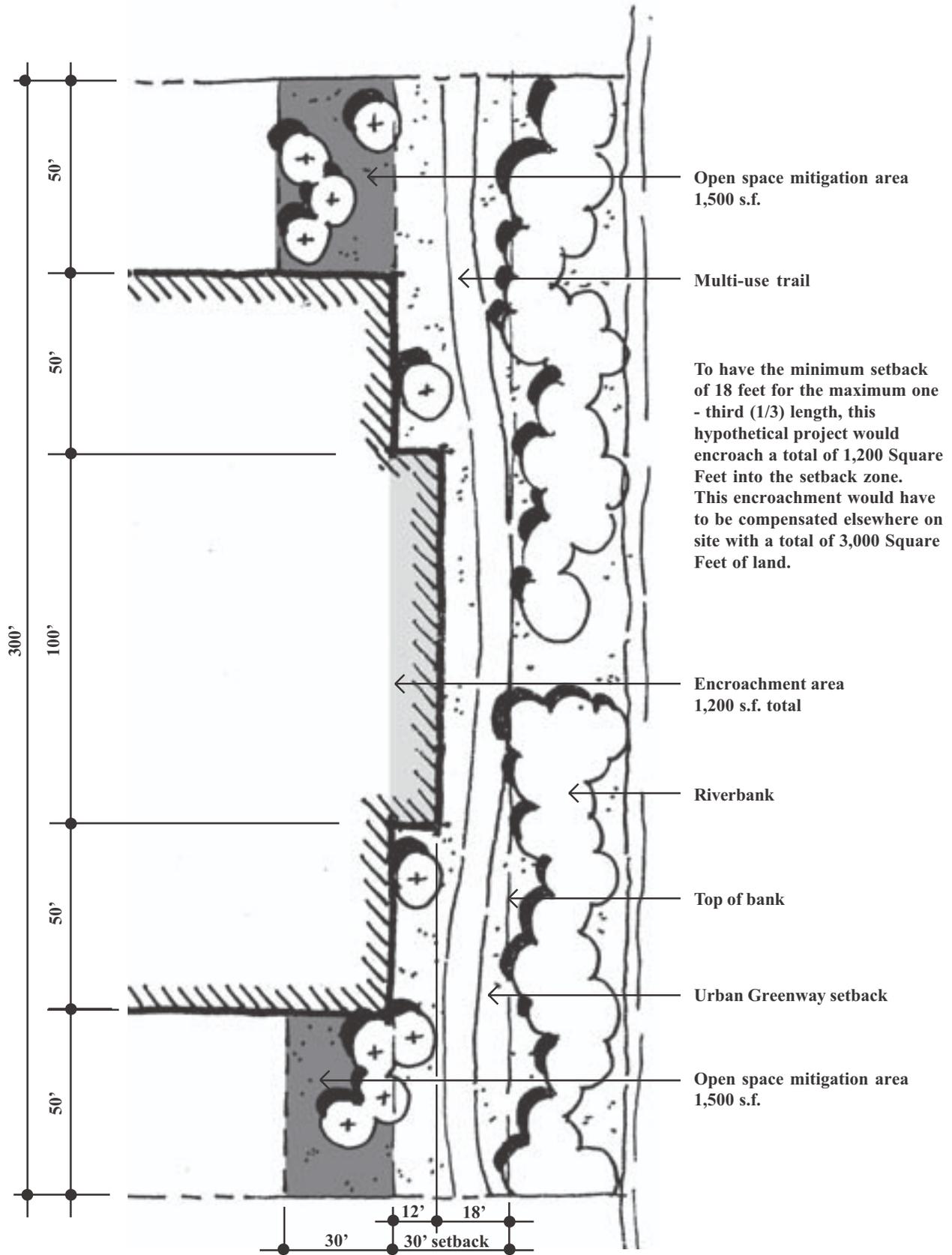


Figure 2.3 Example setback variance

## Chapter Three: Riverbank Zone

### 3.1 DEFINITION OF RIVERBANK ZONE

The riverbank zone is the area adjacent to the river between the water's edge and the top of bank. Where there is a vertical bulkhead or other engineered vertical structure there is no riverbank zone. See the "Setbacks" section for a definition of the water's edge and the "top of bank."

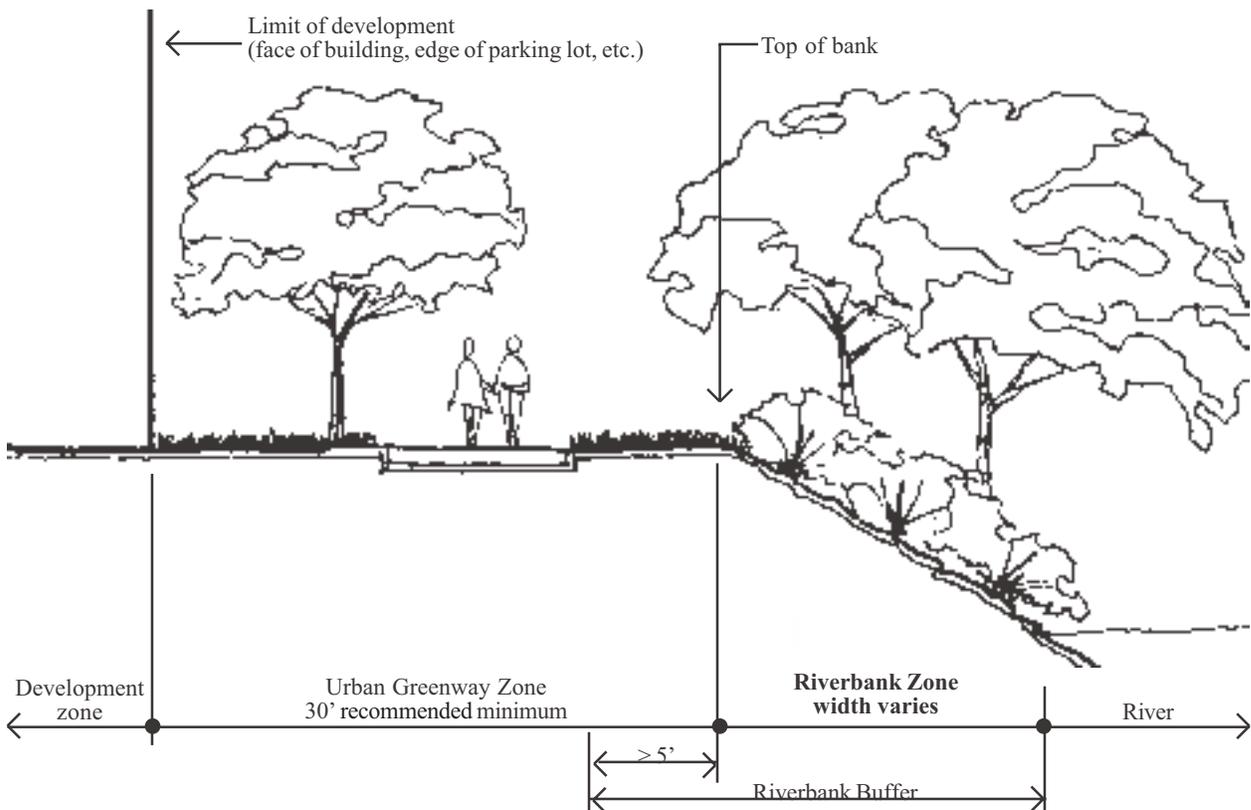


Figure 3.1 Typical riverbank section

### 3.2 RESPONSIBILITY FOR THE RIVERBANK

The Chicago Municipal Code requires riverfront property owners to maintain riverbanks, seawalls, and other attached structures on their property from deterioration that may endanger the health or safety of individuals or impair river navigation (see Appendix J).

*Land owners are responsible for the condition of their riverbank or seawall.*

### 3.3 RIVERBANK BUFFER

Objectives within the riverbank buffer include (see Fig. 3.1):

- New developments should create, restore, and protect riverbank buffers along the river in order to stabilize riverbanks, provide wildlife habitat, protect water quality, and provide an appealing natural environment.
- The riverbank buffer should be managed as a natural sloped bank, utilizing native riparian vegetation and avoiding incompatible structures.
- Where natural riverbanks exist, care should be taken to preserve the natural slope to the extent possible by selective thinning and pruning of weedy and dead vegetation. However, if the steepness of the bank poses a stability and environmental hazard, the bank will have to be recontoured and replanted with native riparian vegetation.
- The riverbank buffer should extend from the water's edge to the edge of the riverwalk path or a minimum of the first twenty (20) feet of the urban greenway zone adjacent to the top of bank, whichever is less. The multi-use trail or its shoulder shall not be located less than five (5) feet from the top of bank.

*The Riverbank Buffer should be managed as a natural area.*

### 3.4 BANK TREATMENT

The riverbank buffer zone should be managed as a natural area, utilizing native riparian and prairie vegetation and avoiding incompatible structures. Degraded riverbanks will lead to higher erosion rates and habitat destruction, water quality impairment, and other threats to infrastructure. In contrast, a natural riverbank will become stronger over time as the native vegetation roots and anchors itself to the riverbank soils.

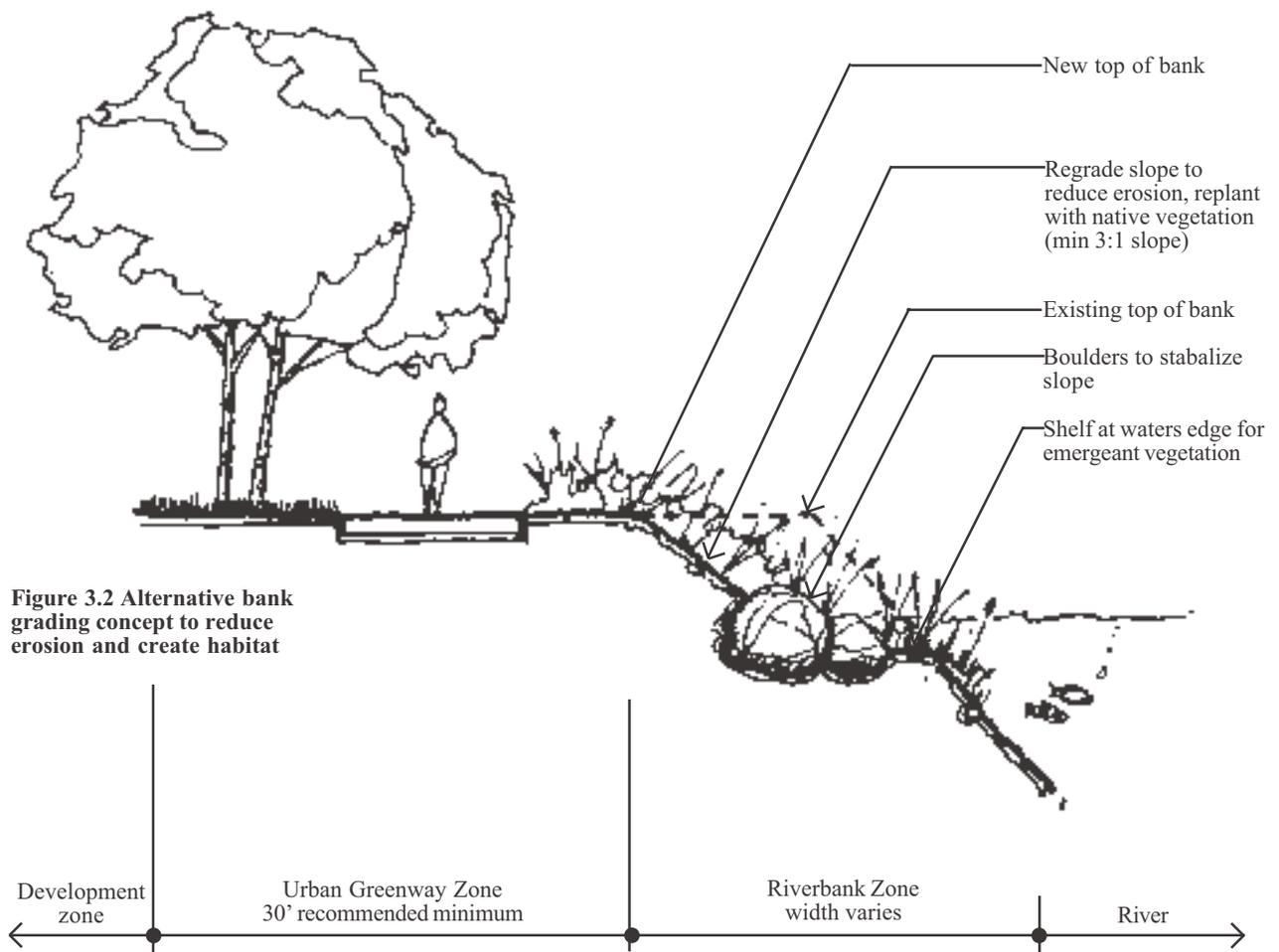
### 3.5 APPROPRIATE BANK TREATMENTS

The goal of riverbank treatment, where there is a sloped or “natural” bank, is to create an environmental buffer and to preserve, restore, or create a naturalistic appearance. Recommended bank treatments may be found in Appendix K.

*New riverbanks need to be regraded to a minimum 3H:1V slope.*

**Bank steepness.** Excessively steep slopes, especially those with soil erosion and / or are steeper than the “angle of repose” of the soil, should be regraded to a minimum 3:1 (horizontal to vertical) slope that can be planted and maintained with naturalistic plantings. This treatment will minimize or eliminate soil erosion.

**Bank profile.** The grading and profile of the regraded bank should vary to be steeper in some places, gradual in others, and not be a single, consistent profile for the entire length.



**Figure 3.2** Alternative bank grading concept to reduce erosion and create habitat

**Bank stabilization.** The riverbank should be stabilized to meet the environmental and aesthetic objectives of the riverbank buffer, and may require the use of an erosion control blanket, geotextile reinforcement, or armoring of the toe of the bank.

**Native vegetation.** Native vegetation adapted to the riparian zone should be used. The recommended reference for native plants is the “Native Plant Guide for Streams and Stormwater Facilities in Northeastern Illinois,” which has been incorporated into the Recommended Plant Palette in Appendix E.

**Structures and fixtures within the riverbank buffer.** Structures should not be located within the riverbank buffer, with the exception of those required by river dependent uses. Fixtures associated with the multi-use trail, that include ramps, steps, and fishing platforms are permitted within the buffer, but should be consolidated in a single area, rather than distributed throughout the buffer.

**Figure 3.3** Example of natural riverbank with native plants



**Clean - up.** Garbage, litter, rubble, paving materials, construction materials, and any other unnatural, unattractive, or inappropriate materials shall be removed from the riverbank.

**Surface treatment.** Paving or other hardening of the bank with engineered treatments is undesirable and should be avoided for non-access related purposes. Such treatments include, but are not limited to, concrete and timber crib walls, retaining walls, “reinforced earth” retaining walls, concrete and asphalt paving, gabions (rock - filled wire baskets), gabion mats (rock - filled wire blankets), concrete - filled fabric blankets, cells, or bags, rip rap (broken stone installed on the surface of the bank), and other engineered or paving solutions.

**Figure 3.4** Example of riverbank with inappropriate surface treatment





**Figure 3.5** Example of effective and appropriate stabilization of riverbank

**Soil erosion.** To minimize or eliminate soil erosion on the banks and sedimentation in the water, sloped banks should be planted such that there are no bare areas. On steeper slopes, soil erosion control blankets or geotextile reinforcement will be necessary.

**Toe of bank stabilization.** Waterline erosion the result of fluctuating water levels and wakes will contribute to the continued erosion and scour of the bank. In these conditions, armoring of the toe of the bank with rip rap or other material is required.

**Beaver protection.** Beavers are becoming more prevalent on the Chicago River and pose a threat to trees. Preventive measures, such as galvanized wire fence of at least 3 feet tall wrapped around the base of trees, are recommended to discourage beavers from gnawing on trees.

**Stormwater discharge.** Chicago's **Water Agenda** promotes efforts to protect, conserve, and manage the City's water wisely to improve the quality of life for residents and future Chicagoans. New developments along the Chicago River are required to direct stormwater discharge into the river and attain 80% of total suspended solids removal, preferably through above ground stormwater best management practices that include rain gardens, bioswales, infiltration areas, green roofs, and permeable pavements.



**Figure 3.6** Beaver Protection



**Figure 3.7 Example of Construction Site with Tree Protection Fence**



**Figure 3.8 Example of Bioswale and Permeable Pavements**

### 3.6 PRESERVATION, RESTORATION, AND IMPLEMENTATION OF PLANTING AND HABITAT

A landscape plan should be prepared to identify vegetation to be removed or preserved. Soil Erosion and Sediment Control Plans are required for any construction activity along the waterway, and should be consistent with the National Resource Conservation Service **Illinois Urban Manual**. Existing native riparian and aquatic planting contributes to the natural and scenic qualities of the greenway corridor, providing habitat for birds, fish, and other wildlife. These native plantings should be preserved.

**Grading.** Existing planting and habitat, both aquatic (in - water) and riparian (adjacent to the water), should be preserved to the extent possible to establish an environmentally stable natural riverbank.

**Protection.** Existing planting and habitat should be protected during construction by installing a tree protection fence at the top of the bank (maintained throughout the construction period). Where grading or other construction or development activities must occur on the riverbank, such areas should be no larger than required, and should be protected by a tree preservation fence around the area in question (see Fig. 3.7).

**New planting.** Advice from an expert in plant selection should be sought before installing new plantings. Existing vegetation should be supplemented with new native plant species to provide habitat for birds, fish, and other animals. Understory shrub and tree planting provide shade cover for fish and serve as a food source (fruits, seeds, etc.) for birds and small mammals.

*Existing native plantings contribute to the natural and scenic values of the greenway corridor providing habitat for birds, fish, and other animals.*

Ideally, live planting should be done in the spring (April-June) or fall (September-November) when the temperature is cooler to ensure the plant a greater chance of survival. Some plantings are only suited to spring installation. In areas where seeding is appropriate, a cover crop such as seed oats with a biodegradable soil stabilization mat should be used to establish a stable vegetative cover.

**Formal vs. informal landscape treatment.** Naturalistic plantings is preferred except in densely built up areas such as downtown that are characterized by high seawalls, hardscaped plazas, and high pedestrian traffic. In these areas more formalized landscape treatment is appropriate.

### 3.7 APPROPRIATE AND INAPPROPRIATE PLANTS

**Appropriate plants.** Plants on the portion of the riverbank subject to inundation and fluctuating water levels should be riparian or floodplain species. See “Recommended Riverbank Plant Palette” in the Appendix E for a detailed list of recommended plant species.

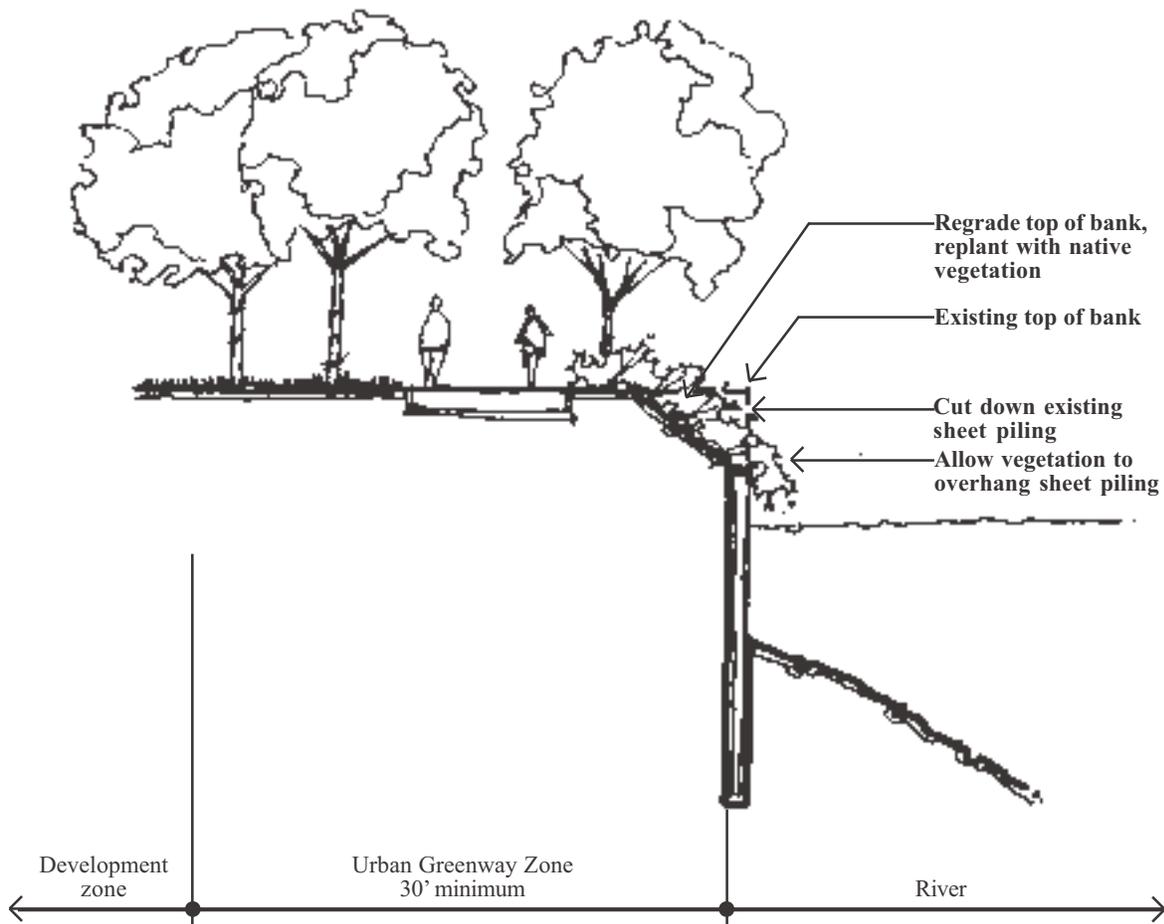
**Inappropriate plants.** Do not use plants that are “invasive” species which will dominate riverbank planting, “alien” species that are not consistent with native plants, high maintenance plants, or plants with little seasonal interest.

### 3.8 BANK TREATMENT (BULKHEAD OR SEAWALL)

Where the bank is a vertical structure such as bulkhead or seawall there is no riverbank zone per se. Planting at the top of the bulkhead or seawall may soften the appearance of these structures.

**Railing.** Provide a continuous safety railing for the length of the vertical bulkhead or seawall more than 30 inches above the mean water level. The railing should comply with all applicable building codes and other regulatory requirements.

Figure 3.9 Alternative edge treatment at a bulkhead.



**Ladder.** Provide ladders attached to the face of the bulkhead to enable access for persons who may fall into the river to reach safety.

**Life rings.** Provide life rings in cabinets attached to poles or the railing near the bulkhead to provide emergency assistance for persons who may fall into the water.

**Planting.** Vines and shrubs that spill over the top of the bulkhead should be planted at the top of the bulkhead, where space and function permit, to soften the hard appearance of the bulkhead.

**Seawall height.** The finished height of new seawalls or bulkheads should be the minimum necessary above the high water mark, and must not exceed the height of seawalls or bulkheads located on adjacent properties.

### 3.9 RIVER DEPENDENT USES

River dependent uses are those uses or activities that can be carried out only on, in, or adjacent to a waterway (see Appendix A for definition of river-dependent uses). Although the river dependent use may be located in the adjacent greenway zone and / or development zone, such uses will necessarily impact the riverbank zone.

**Existing river dependent uses.** Existing river dependent uses are appropriate uses that should remain.

**New river dependent uses.** New river dependent uses are appropriate uses that should be accommodated. Such new uses should, to the degree



**Figure 3.10** Examples of river dependent use on the Chicago River.

possible, impact the riverbank and urban greenway as little as possible and should accommodate an alignment for a potential multi-use trail.

**Multi-use trail alignment.** The alignment for a proposed or potential multi-use trail should be located on the land side of river dependent uses, rather than adjacent to the river, to avoid circulation, safety, and security conflicts or other unacceptable conditions.

**Landscaping and screening.** Though there is no setback requirement for river dependent uses, landscaping and screening is required for portions of the river frontage not in active use for loading or off-loading materials.

## Chapter Four: Urban Greenway Zone

### 4.1 Definition of Urban Greenway Zone

The urban greenway zone is the area between the top of bank or face of vertical bulkhead and the setback line or development zone.

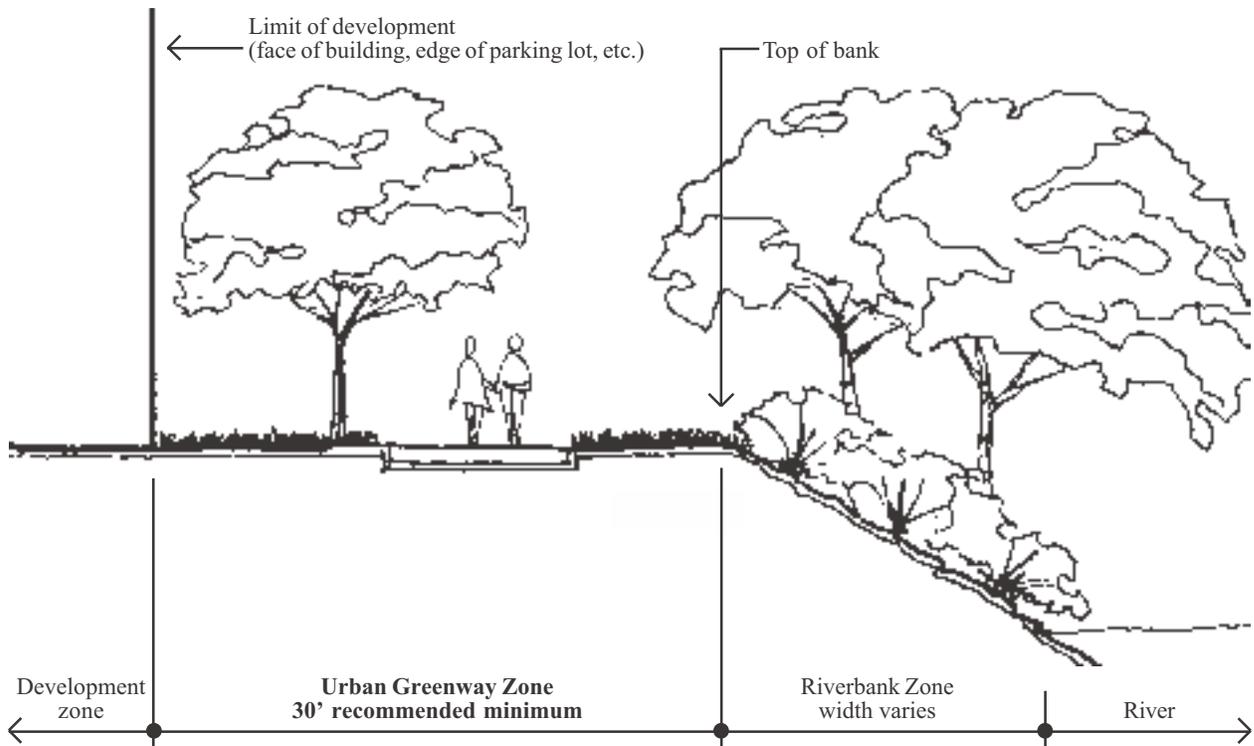


Figure 4.1 Typical riverbank section

### 4.2 LAND - BASED RECREATIONAL USES

The urban greenway zone should be developed as a passive recreation linear park with a multi-use trail. In general, the urban greenway zone is too small to accommodate active, land-based recreational uses.

### 4.3 WATER - ORIENTED RECREATIONAL USES

Water-oriented recreational uses within the river corridor will often depend on access to facilities located within the urban greenway zone. Such uses include launching areas for human-powered craft (canoes, kayaks, rowboats, rowing shells, etc.), fishing docks or piers. Launch areas typically require gangways or ramps from the top of the bank down to river level, floating docks or similar structures in the water, vehicular access to the launching area, and parking. Ancillary elements in the launching area may include lighting, signage, graphics, railings, fencing, seating, bicycle racks, trash receptacles, and landscaping. In addition to the launching

facility and ancillary elements, these uses should offer convenient access to toilets and public telephones.

**Location of water – oriented recreational uses.** Water – oriented recreational uses may be located in both the urban greenway zone and the riverbank zone.

**Location of ancillary elements of water – oriented recreational uses.** Ancillary elements should be located conveniently close to the launching area or other water access point, but preferably not located or placed in the riverbank that compromises the natural character of the river corridor.

**Location of parking serving water – oriented recreational uses.** Parking should never be located in the riverbank or urban greenway zones, but should be located at a convenient distance from the river.

#### 4.4 MULTI - USE TRAIL

The City proposes to establish a continuous multi - use trail throughout the river corridor to accommodate uses that include walking, jogging, running, bicycling, roller-skating, in-line skating, and skateboarding. The multi - use path should be signed and striped as required to minimize use conflicts (see Appendix G for trail design).

*A key goal of the Chicago River Development Plan is to construct a continuous multi-use trail along the extent of the Chicago River.*

**Location:** A multi - use trail along at least one side of the river is a key goal of the **Chicago River Corridor Development Plan**, and should be constructed in the urban greenway zone as recommended in the development plan. The alignment and design of the multi-use trail should minimize impacts to sensitive areas and habitats, such as wetlands and floodplain areas.

**Design criteria:** The multi – use trail, including underbridge connections, cantilevered walkways, floating boardwalks, etc., should be designed to meet all relevant and current codes, standards, and regulations. These should include, but not limited to, the Americans with Disabilities Act (ADA), American Association of State Highway and Transportation Officials (AASHTO) standards for multi - use trails, the Chicago Zoning Code, the Chicago Building Code, the **Guide to the Landscape Ordinance**, and any other relevant codes, standards, and ordinances.

#### 4.5 PAVING

Safe, affordable, and maintainable paving is an important and integral part of the multi - use trail, in order to minimize hazards, injuries, and liability, reduce capital expenditures, and keep maintenance costs under control.

**Width:** Recommended multi - use trail width is 10 feet. Minimum width is 8 feet. In areas with heavy use or multiple modes (e.g., walkers, bicyclists, and rollerbladers, etc.), a wider trail of either 12 or 14 feet is recommended.

**Striping:** Pavement should be striped in accordance with AASHTO and other relevant standards.

**Pavement design and materials:** See Appendix C for more information on appropriate paving materials and pavement design.

*The recommended path width of the riverwalk trail is 10 feet.*

#### 4.6 LIGHTING

Attractive pedestrian - scale lighting is recommended to make the urban greenway safe and secure, and is an important and integral part of the multi - use trail. Lights should be spaced closely enough together that pools of light from adjacent light sources are easily seen by trail users (see Fig. 4.2).

**Lighting levels:** Adequate lighting for safety and security should be provided. The actual lighting level will vary according to the individual site and the existing ambient light levels from other sources.

**Spacing:** Regardless of the spacing dictated by lighting levels, lights should be spaced no further than 100 feet apart.

**Luminaires and poles:** See Appendix C for specific lighting information.



Figure 4.2 River edge lighting

#### 4.7 FURNISHINGS

Appropriate furnishings and fixtures should be provided throughout the length of the multi - use trail to make it attractive and functional for users (where furnishings are to be provided on a linear foot basis, fractions should be rounded off to the nearest whole number). Specific information regarding the following site furnishings is included in Appendix C.

**Benches.** Benches are to be placed along the multi - use trail to encourage public access and at points of scenic interest. Benches should be securely fastened to a concrete slab or footing. One bench should be provided for every 250 linear feet of river frontage.

**Trash receptacles.** In addition to trash receptacles at seating areas, one trash receptacle should be provided for every 250 linear feet of river frontage.

**Bicycle racks.** Bicycle racks should be provided at seating areas and at points where the multi - use trail intersects points of access to the street grid.

**Drinking fountains.** Drinking fountains should be universally accessible, of robust construction, designed for outdoor use, mounted securely to a concrete slab, and equipped with a drain inlet or catch basin within five feet of the drinking fountain. Drinking fountains should be provided at seating areas as noted below.



Figure 4.3 Bike rack



**Figure 4.4 Seating area at Fullerton Plaza**

#### 4.8 SEATING AREAS

Where appropriate, seating areas are encouraged along the multi - use trail, in addition to the individual benches and other site furnishings (see Fig. 4.4).

**Location.** One seating area should be provided for every 500 linear feet of river frontage.

**Seating area.** Each seating area should provide a minimum of two benches, one trash receptacle, and one bicycle rack (see “Furnishings” above). Drinking fountains are required in seating areas where the overall river frontage of the parcel is greater than 1,000 feet.

#### 4.9 SIGNAGE

Directional, informational, identity, and regulatory signage and graphics are useful and necessary components of the multi - use trail. The City of Chicago has developed a riverwalk identity program that includes signage and graphic standards. For more specific signage information, see Appendix D.

**Directional and regulatory signage.** Provide directional and regulatory signage where the multi - use trail intersects with streets or other trails and where there are regulatory requirements (e.g., “stop,” “yield,” etc., or as dictated by AASHTO standards).

**Interpretive signage:** Provide informational signage at points of historic or other interest.

*The City of Chicago has developed signage standards to be used throughout the river corridor.*

**Identity signage.** Identity signage should be provided where the multi-use trail intersects with streets or other public access points. The signage should state the riverwalk is open to the public during defined hours (typically normal Park District hours).

#### 4.10 UNDERBRIDGE CONNECTIONS

Bridges and their abutments are often barriers to continuous riverside access along the Chicago River. Underbridge connections should be built where space beneath the bridge deck permits, so that the multi - use trail can run continuously adjacent to the riverbank.

*Underbridge connections provide safe continuous well-lit passage through bridges and heavy street arterials.*

**Responsibility.** Responsibility for construction of the multi - use trail underbridge connection may be the City of Chicago, the adjacent property owner / developer, or shared between them. Cost sharing will be determined during the planned development review process.

**Alignment.** Properties adjacent to potential underbridge connections should be designed not to compromise or eliminate access to develop the multi-use trail connection. The alignment of the multi - use trail to and through the underbridge connection should avoid blind corners, tight radii, and steep slopes that present safety and security problems.

**Width.** Width should be per AASHTO standards and as indicated above under “Multi – use Trail.”

**Paving.** Paving of the underbridge connection in the public right - of - way should be poured - in - place concrete with a light or medium broom finish, per “Multi - Use Trail Paving” above. Asphalt is not an acceptable material, due to the dark color and consequent poor visibility under the bridge.

**Lighting.** Underbridge connections should be illuminated with fixtures mounted to bridge abutments or piers. Illumination levels should be designed and maintained at 3.0 footcandles.

**Railing.** Provide a continuous safety railing, including a minimum of 20 feet on the approaches to the underbridge connection from the multi - use trail. Such a railing should comply with all applicable building code and other regulatory requirements. In the absence of more restrictive requirements, see Appendix 3 for specific information on railing articulation.

#### 4.11 CANTILEVERED WALKWAYS

Buildings that have been built to the water’s edge, as well as bridges and their abutments are often barriers to continuous riverside access along the Chicago River. Where the multi - use trail cannot be built on land within the greenway zone,

and where a detour around such an obstruction on the land side would be so long or indirect as to discourage use of the multi - use trail or effectively interrupt it, construction of a cantilevered walkway around the building or bridge should be considered to maintain a continuous multi - use trail adjacent to the riverbank.

**Design guidelines.** Design specifications for cantilevered walkways should be consistent with the requirements for “Underbridge Connections.” The deck material consist of poured-in-place concrete or treated heavy duty timber decking, with joints aligned perpendicular to the direction of travel on the trail.

#### 4.12 FLOATING WALKWAYS OR WALKWAYS BUILT OVER WATER

Buildings, that have been built to the water’s edge, as well as bridges and their abutments, are often barriers to continuous riverside access along the Chicago River. Where the multi - use trail cannot be built on land within the greenway zone or on a cantilevered walkway over water, and where a detour around such an obstruction on the land side would be so long or indirect as to discourage use of the multi - use trail, construction of a floating walkway around the building or bridge should be considered.

*Floating boardwalks present opportunities to bring the public closer to the water’s edge and extend the continuity of the riverwalk around difficult development conditions.*

**Design expertise:** Floating walkways should be designed by an experienced marina designer working with a landscape architect and / or civil engineer or other experienced trail designer.to ensure that the design is safe, and secure.

**Design guidelines.** Design specifications for cantilevered walkways should be consistent with the requirements for “Underbridge Connections.” The deck material consist of poured-in-place concrete or treated heavy duty timber decking, with joints aligned perpendicular to the direction of travel on the trail.

#### 4.13 WATER FEATURES

Water features, including but not limited to fountains or cascading waterfalls, are encouraged architectural design elements which reflect the natural elements of the Chicago River.

*Water features and nature trails present excellent opportunities to reflect the natural elements of the Chicago River.*

#### 4.14 NATURE TRAILS

Nature trails are appropriate in the greenway zone where there are natural areas that merit access and / or interpretation. Bird houses/feeders and bat boxes are encouraged near these trails to attract wildlife.



Figure 4.5 Nature Trail

**Nature trail location.** Nature trails should not be the main trail, but secondary trails separated from the principal multi - use trail.

**Nature trail surface.** Nature trails should have a “soft” surface (e.g., wood chips or gravel), little or no lighting, and interpretive or informational signage.

#### 4.15 OTHER IMPROVEMENTS

Other public are appropriate within and adjacent to the greenway zone provided they do not preclude the future development of a multi - use trail along the river.

#### 4.16 ACCESS POINTS, STREET ENDS, AND OVERLOOKS

Access to the river and the water’s edge can be as important as development of continuous access along the river. Particularly where land ownership and development conditions do not easily permit public access along the river, it is important that access be provided to the river. Access points may developed where streets stop at the river.

Access points may be developed with a number of features, including but not limited to cul - de - sacs or turnarounds to remove vehicles from close proximity to the river; vehicular barriers which could be planters or highway type barriers to prevent vehicles from driving into the river; seating areas with benches, trash receptacles, bicycle racks, and other site furnishings; lighting, for ambiance, safety, and security; landscaping; and access by steps and / or ramps to the water’s edge.

**Access points:** Develop access points to the river wherever possible, but especially where there is no public access along, or adjacent to, the river and where street rights - of - way stop at the river.

**Overlook development:** Develop overlooks at access points and street ends. Overlooks may include cul - de - sacs or turnarounds, vehicular barriers, seating areas with benches, trash receptacles, bicycle racks, and other site furnishings such as lighting, landscaping, and steps and / or ramps to the water's edge.

#### 4.17 RIVERSIDE CAFES AND RESTAURANTS

Seating for riverside cafes and restaurants are encouraged within the development zone provided that it does not block public access to the multi-use trail or privatize or restrict use on the river greenway zone.

*River Cafes provide new dining opportunities for residents and visitors as well as promote public appreciation for the Chicago River.*

#### 4.18 LANDSCAPING

The greenway zone should be heavily and attractively landscaped with particular attention to screening through industrial, commercial, and residential areas. Plantings should respond to these conditions by aligning in more formal rows, grids, or bosques in or near the downtown area where space is limited and architectural influences suggest a more formal arrangement. Where the greenway zone passes through informal areas, trees and other plantings should be arranged informally with and whenever possible native plants should be selected.

**Tree locations:** Locate trees in informal groupings where the greenway zone and the river corridor have a more naturalistic, informal character. Align trees in more formal rows, grids, or bosques in or near the downtown where space is more limited and the architectural influences suggest a more formal arrangement.

**Vine locations:** Plant vines at the base of all blank buildings walls, retaining walls, bridge abutments, or other structures that have little inherent architectural interest.

*The use of low mow wildflower and prairie mix is recommended on the riverbank and urban greenway zone.*

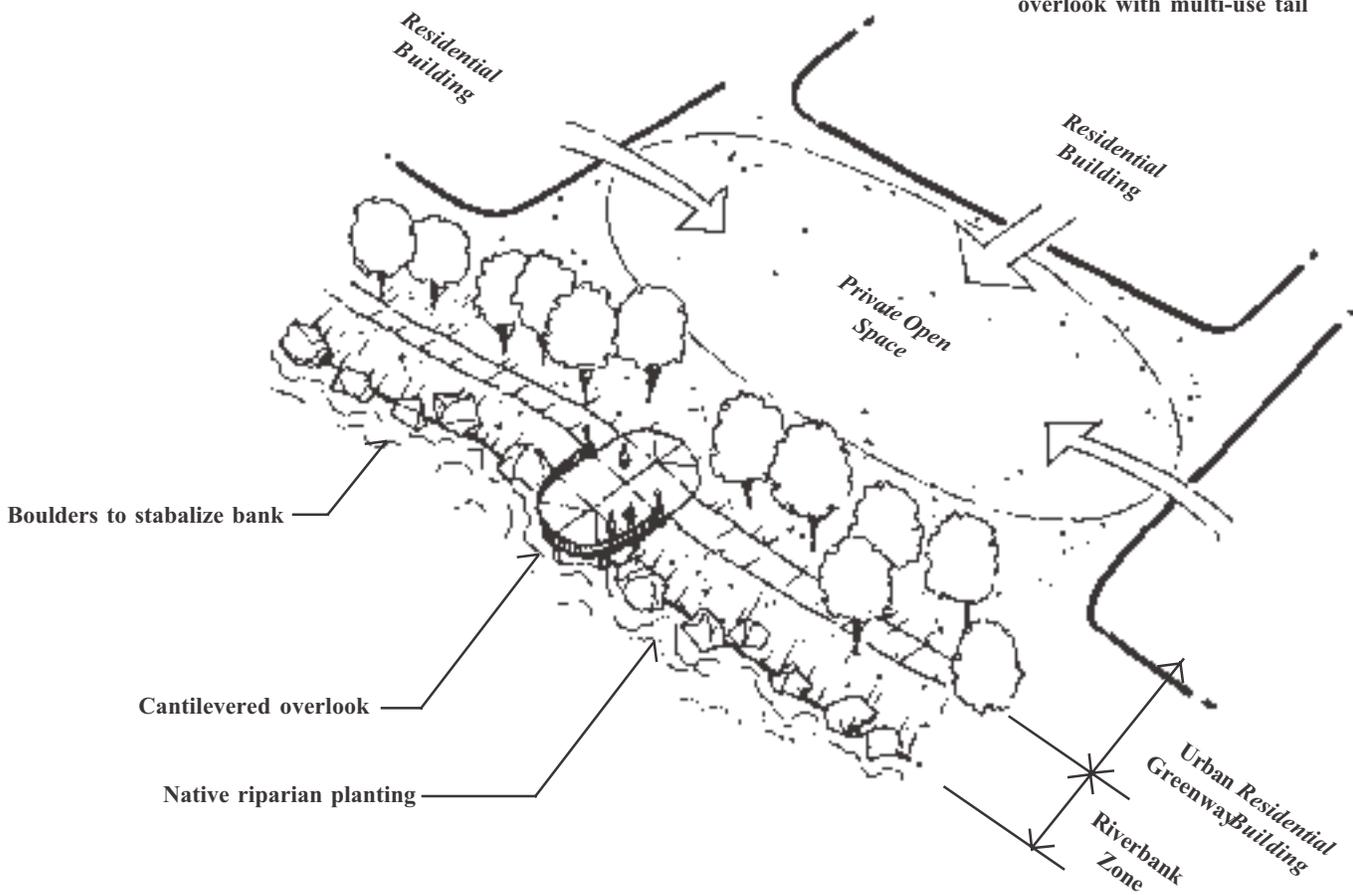
**Shrub, groundcover, and perennial bed locations:** Plant shrub, groundcover, and perennial beds throughout the greenway zone, to provide landscape interest near the ground and alongside the multi - use trail. To the extent possible, native wildflower and low mow grasses are encouraged for wildlife habitat enhancement and reduced maintenance responsibilities.

**Plant species:** See Appendix 8 for a detailed list of recommended plant species.

#### 4.19 PUBLIC ART

**Public art:** Public art, including, but not limited to sculpture, mosaic and tile panels, water features and environmental artwork are encouraged within, or adjacent to, the greenway zone.

Figure 4.6 Cantilevered overlook with multi-use tail



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## Chapter Five: Development Zone

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### 5.1 Definition of Development Zone

The development zone is the area adjacent to the Chicago River corridor that does not fall within the urban greenway / setback zone or the riverbank zone, and that may be developed or redeveloped with new or existing structures for private use as permitted by zoning.

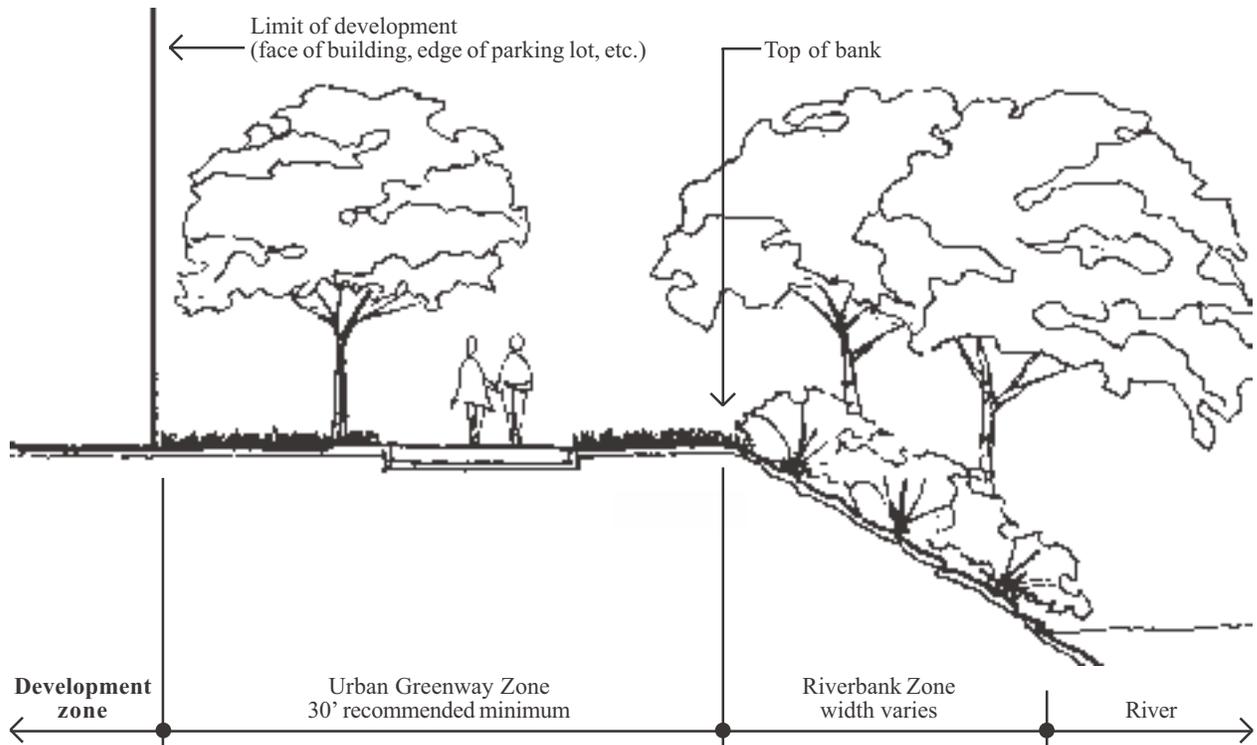


Figure 5.1 Typical riverbank section

### 5.2 DESIGN, ORIENTATION AND MASSING OF NEW STRUCTURES AND BUILDINGS

The river elevation of any riverside building should be treated architecturally as one of its principal facades.

**Building design:** The river facade of buildings should be designed as a principal or major facade, and should have at least the same design elements, articulation, relief, and other architectural considerations as the other facades.

**Building materials:** The materials on the river facade of buildings should be of at least the same quality as the materials on the other facades.

**Orientation.** New structures and buildings should be oriented to the river, and not turn their back on the river, so that the greenway zone and

**Figure 5.2** New buildings should be orientated to the river to create a safe and lively riverfront.



riverbank zone are not perceived only as the area behind the structure or building. Entrances and windows on the river side will generate pedestrian circulation and activity in the greenway zone, which will make it more active, safe, and secure.

**Massing.** It is equally important that the massing of new structures and buildings be sensitive to the river and the greenway zone, so that the river and greenway zone are not overwhelmed by tall and dense structures and buildings built to the setback line.

### **5.3 RENOVATION OF EXISTING BUILDINGS**

It is equally important the adaptive re-use of existing buildings and structures on the river oriented to the river so that the greenway zone and riverbank zone are not perceived only as the area behind the structure or building. The design principles in the previous section for the “Design, Orientation and Massing of New Structures” apply.

### **5.4 SCREENING OF PARKING LOTS AND VEHICULAR USE AREAS**

Parking lots and vehicular use areas should be attractively landscaped such that the view from the river and greenway zone is a green, attractive one. These areas should meet the landscape requirements of the City of Chicago Zoning Ordinance Chapter 17-11 Landscape and Screening Requirements and the City of Chicago’s **Guide to the Chicago Landscape Ordinance**.

Landscape Screen Requirements for:	Vehicular Use Areas	Non-Vehicular Use Areas
Fence	4ft ornamental metal fence, but not placed within river setback area.  >6ft ornamental metal security fence requires approval of Zoning Administrator.	4ft ornamental metal fence is permitted, but not placed within river setback area.
Tree	2 per 25 linear feet of river frontage.  Placement of trees is riverside of fence, and may be placed in natural layout.	1 per 25 linear feet of river frontage.  Placement of trees is river side of fence, and may be placed in natural layout
Hedge	Continuous hedge 3ft on center spacing.  Placement of hedge is river side of fence.	Not required.
Foundation Plantings	Not applicable.	Foundation plantings are required in front of building.

**Figure 5.3 Riverfront screening requirements**

**Screening:** In addition to the standard requirement of one (1) tree per 25 linear feet of river frontage within the river setback area, parking lots and vehicular use areas, per the Landscape Ordinance, require its own separate perimeter screening requirement of one (1) shade tree per 25 linear feet and a continuous hedge which must be maintained between thirty (30) inches and forty - eight (48) inches in height (see Fig. 5.3).

### 5.5 SCREENING OF STORAGE AREAS

Outdoor storage areas, should be screened from view from the river and greenway zone.

**Outdoor storage area screening.** Screen walls or fences of high quality durable materials are required for outdoor storage areas. Acceptable materials include poured-in-place concrete, split face or ground face concrete masonry units, and heavy wood. The height of the screen shall not exceed eight (8) feet.

*Appropriate screening is required to maintain an aesthetically pleasing river front.*

**Unacceptable materials.** Unacceptable materials for screening include chain - link fencing, plastic slat inserts, and lightweight lattice wood panels.

**Landscaping of screening walls and fences.** Screening walls and fences should be planted with vines at the base, and the vines should be trained up and over the walls and fences to soften their appearance and increase the amount of landscaping visible from the river and greenway zone.

## 5.6 LIGHTING

Lighting in the development zone should be adequate and appropriate for safety and security, and well as an attractive feature of the project site.

*Appropriate lighting is required to provide for a safety and security, as well as attractive landscape elements to the development zone.*

**Lighting levels.** Provide lighting with an adequate light level for project safety (visibility, adequate and safe illumination of vehicular use areas, etc.) and security (visibility, continuous illumination of vehicular use and other areas, avoidance of dark or unilluminated areas, etc.).

**Light fixture and luminaire style.** Light fixtures and luminaires should be attractive, pedestrian scale fixtures with articulated bases, poles, pole tops, and luminaires.

**Light fixture height.** Recommended light fixture height is less than twenty (20) foot; maximum light fixture height is thirty (30) feet.

**Light pattern.** Luminaires should be equipped with shields so that light does not shine into adjacent residential or institutional areas.

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## Chapter Six: Bubbly Creek Development Guidelines

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The development of the South Fork of the South Branch of the Chicago River traces back to the 1860s and the origins of the Chicago Union Stock Yards, which occupied the area bounded by Pershing Road, Halsted Street, 47th Street and Ashland Avenue.

Five hundred thousand gallons of fresh water were pumped daily from the Chicago River into the yards, and vast quantities of untreated waste was dumped into the waterway. Bubbly Creek became a notorious open sewer, its name derived from the bubbles caused by decaying matter which filled the river bottom..

Upton Sinclair wrote about the deplorable conditions of the Chicago Union Stock Yards in his novel, *"The Jungle"* (1906). He described Bubbly Creek as if "...grease and chemicals that are poured into it undergo all sorts of strange transformations, which are the cause of its name; it is constantly in motion, as if huge fish were feeding in it, or great leviathans disporting themselves in its depths. Bubbles of carbonic acid gas will rise



**Figure 6.1** Historic Chicago Union Stockyards



**Figure 6.2** Bubbly Creek today with the Racine Avenue Pump Station in background

to the surface and burst, and make rings two or three feet wide. Here and there the grease and filth have caked solid, and the creek looks like a bed of lava; chickens walk about on it, feeding, and many times an unwary stranger has started to stroll across, and vanished temporarily.”

Bubbly Creek still effervesces today. At its southern terminus lies the Metropolitan Water Reclamation District’s Racine Avenue Pump Station, the largest facility of its kind in the United States. Fourteen pumps drain a 30 square miles area discharging stormwater into the river during heavy storm events. The remainder of the time Bubbly Creek is stagnant.

Over time, stormwater management practices (BMPs) can significantly improve the water quality of Bubbly Creek. These BMPs include new parks, open spaces, greenways, green roofs, cisterns, swales, wetlands,



Figure 6.3 Racine Avenue Pump Station Sewershed 30 sq mile Service Area

and other improvements in public and private developments. Within this sewershed, all new developments are responsible for reducing their stormwater contribution.

### **6.1 PURPOSE OF SETBACK FOR BUBBLY CREEK**

Special measures are necessary at Bubbly Creek to mitigate the degraded conditions of the waterway and its banks. A wider setback is needed to rebuild the riverbank in a manner that provides protection from sedimentation, erosion, and runoff.

Existing riverbanks along Bubbly Creeek are fairly steep (steeper than 3H:1V), high (greater than 10ft), eroded, and unstable. In many cases the original timber retaining wall has failed. These banks are susceptible to waterline erosion, sloughing and gulying, particularly if there are heavy weight loads located near the top of the bank.

The expanded setback provides the physical space to rebuild dilapidated banks in a sustainable manner for the purpose of stormwater management, stabilizing riverbanks, water quality improvements, and providing appropriate naturalistic landscaping and public access. Other benefits include improved wildlife and fish habitat, pollutant removal, runoff attenuation, and streamside aesthetics.

### **6.2 BUBBLY CREEK BOUNDARY**

Bubbly Creek extends south from the South Turning Basin of the South Branch of the Chicago River to its terminus at the MWRD Racine Avenue Pump Station. The boundaries approximate 27th Street on the north to 39th Street on the south (see Fig. 6.4).

*Bubbly Creek extends from 27th Street to 39th Street.*

### **6.3 SETBACK REQUIREMENTS**

All new developments on Bubbly Creek are required to setback sixty (60) feet from the existing top of bank as established by survey at the time of planned development application.

**Exceptions to the Setback Requirement.** Exceptions to the setback requirement include existing structures or buildings that are located within the setback zone and river dependent industrial uses that require barge access



Figure 6.4 Map of Bubbly Creek and area affected by 60ft river setback

**Setbacks on Bubbly Creek shall accommodate** (1) riverbank improvements, (2) stormwater best management practices, (3) public riverwalk trail, and (4) landscape buffer/screening.

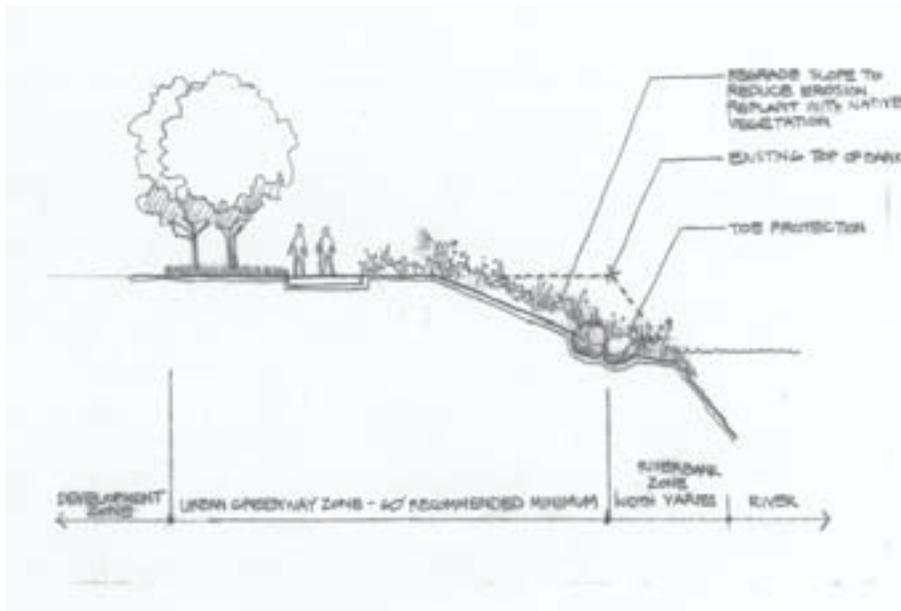
#### 6.4 GUIDELINES FOR THE REPAIR OF SLOPES.

Excessively steep slopes are required to be repaired and re-contoured to a minimum 3H:1V slope (see Fig. 6.5). The slope shall be planted with native vegetation, and stabilized with an erosion control fabric or geotextile reinforcement system. Terracing, soil wraps, and other bioengineered solutions are other options that can be used to treat steeper slopes.

**Toe of Bank Stabilization.** The toe of the bank is the point where the riverbank meets the water, and may need to be reinforced with rip rap, coir biologs, and live staking to control water line erosion and scour from fluctuating water levels.

**Tree Survey.** A tree inventory of all trees larger than 8 inches in diameter at breast height will be required.

**Removal of Trees.** Recontouring of the bank may entail the removal of significant number of trees. Care should be taken to preserve the healthiest and largest trees, particularly trees located at the toe of the bank.



**Figure 6.5** Recommended treatment of 60' river setback for an existing slope condition.

### 6.5 GUIDELINES FOR REPAIR OR MODIFICATION OF SEAWALLS

The construction of new seawalls or bulkheads is discouraged on Bubbly Creek. If a new seawall or bulkhead is necessary, the height of the new seawall shall be low as possible, but above the high water mark, and limited to the height of the seawall on adjacent properties.

Seawalls shall be lowered to the extent possible, but not below the existing tie back anchorage system, to accommodate a sloped natural vegetated embankment between the development site grade and the top of the modified seawall. The slope of this embankment shall not exceed 3H:1V (see Fig. 6.6)

Additionally, the top of the seawall shall be covered with overhanging native vines or vegetation.

### 6.6 STORMWATER MANAGEMENT REQUIREMENTS

Central to improving the environmental quality of Bubbly Creek is the integration of above ground stormwater BMPs. To the extent possible the river setback should manage as much of the stormwater from the development site before diverting stormwater into the sewer system or waterway.

**Purpose.** Stormwater best management practices, such as vegetated bioswales, infiltration strips and level spreaders, will attenuate water flow and improve water quality.

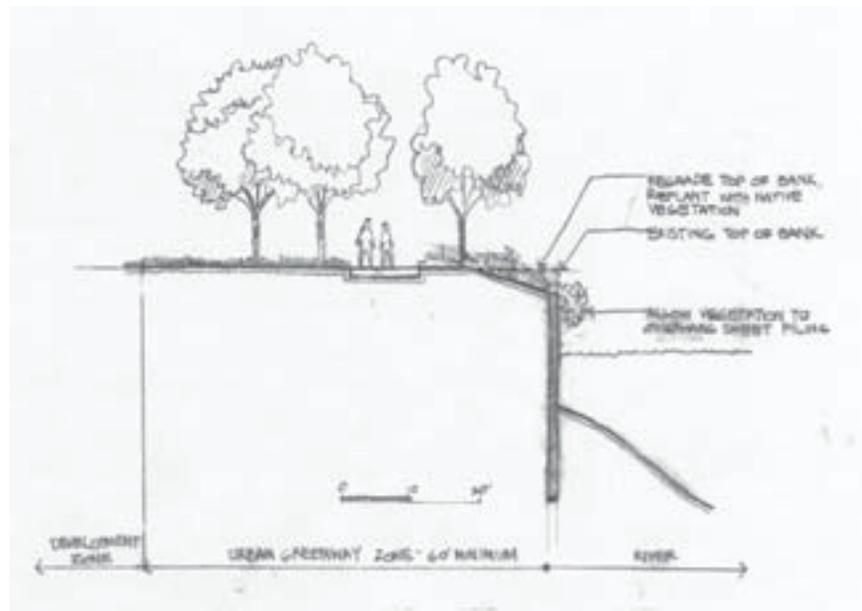


Figure 6.6 Recommended treatment of 60' river setback for an existing bulkhead condition.

Swales with native grass vegetation are nearly twice as effective as pavement in reducing velocity and flow. The slower the flow, the more effective the swale will be to assimilate nutrients before they reach the water body.

**Design.** The stormwater management plan extends beyond the river setback and should be integrated into the entire development site to include design elements such as parkway swales, grading, pumps, rain gardens, green roofs, permeable pavements, and ponding on roadways. Conveyance to the river setback is accomplished through a sewer pipe connection or swale. Underdrains are recommended as base for permeable pavements if underlying soil is not sand.

Avoid designing linear swale systems characteristic along highways. The design should be more fluid, sinuous, and naturalistic, and does not necessarily have to be designed as one continuous swale, but a network of swales connected by culverts. The design should also provide opportunity for public education and interpretation.

Design guidelines for stormwater BMPs are located Appendix L.



Figure 6.7 Example of riverfront industrial site utilizing riverbank recontouring, infiltration area, and porous pavers for stormwater management.

**Size and Release Rate Requirements.** Below are BMP sizing specifications that meet the target 80% total suspended solids reduction. Alternative sizing methodologies, in lieu of, or in addition to the ones below, may be specified by the Department of Water Management or Department of Environment.

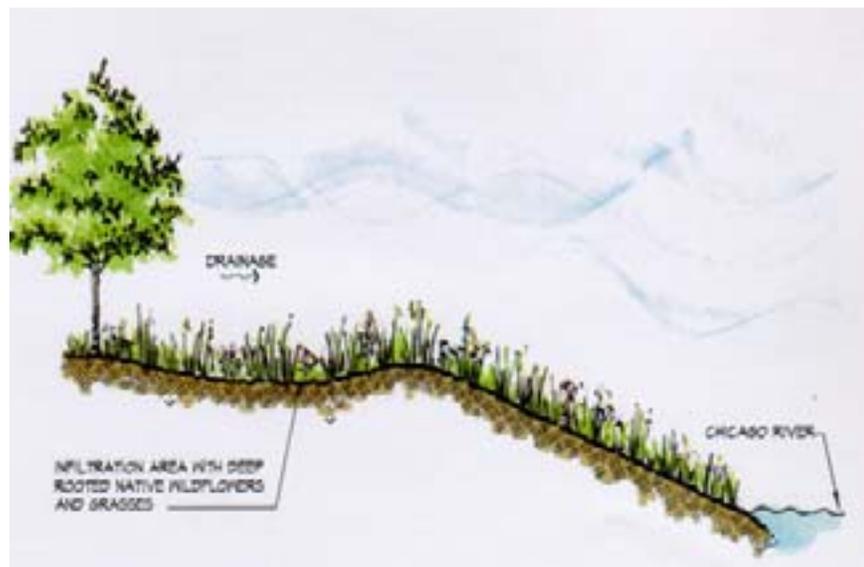
For volume based BMPs (infiltration basins, rain gardens, permeable pavers) - BMPs should be sized to capture and retain the first flush volume, defined as the first one inch of precipitation.

For flow based BMPs (swales, filter strips) - BMPs should be sized to treat the first flush storm, defined as the two year, one hour storm based on the City's standard precipitation data used in stormwater calculations (TP-40). First flush flow velocity should be kept to less than one foot per second with a minimum BMP residence time of nine minutes to allow for adequate settling of particulates. The 100 year flow velocity should also be evaluated to ensure it does not cause scour to the riverbank.

For ponds and stormwater wetlands - Release rates should be no greater than 0.04 cfs/acre for the two year, 24 hour storm event based on the City's TP-40 rain data.

Construction of a single BMP large enough to meet the water quality requirement may not always be possible. Therefore, a combination of BMPs in series ("treatment train") may be used. Landscaping. Stormwater bioswales shall be planted with native

*BMPs should be designed and sized to meet the target 80% total suspended solids reduction.*



**Figure 6.8** Example of stormwater infiltration area along the river

wet prairie mix, predominated by native grasses at least 8 inches in height. Taller prairie grasses are more effective attenuating flow and capturing pollutants than turf grass.

**Maintenance.** Once the vegetation is established, stormwater BMPs require very little maintenance. Mowing or prescribed burning may be done once every two to three years to remove the dead organic accumulated material (see Appendix 10). Stormwater BMPs need to be kept free of obstructions and debris which may impede flow.

#### **6.7 LANDSCAPE BUFFER AND RIVERWALK MULTI-USE TRAIL**

Private uses outside the 60ft river setback need to be appropriately screened by landscaping. Apart from the specifications outlined in Chapter 5, the following apply:

**Riverwalk trail.** The placement of the riverwalk trail shall not be located on the riverbank nor on top of stormwater swales or infiltration areas as to impede the flow of water. Boardwalks are a solution to locate a path on top of a stormwater bmp without interfering with the function of the bmp.

**Landscape design.** The intent is that the entire 60 foot setback be planted with native vegetation. Trees and shrubs should be located in naturalistic layered groupings.

The placement of landscape screening should be sensitive to the placement of stormwater BMPs so as to not impede its capacity to convey or infiltrate stormwater.

**Fencing.** To create a naturalistic aesthetic, fencing is discouraged on the riverwalk trail, with the exception for safety purposes where the trail approaches the riverbank.

#### **6.8 DEVELOPMENT ZONE REQUIREMENTS**

The development zone for Bubbly Creek is the area outside the 60 foot setback zone, that may be developed or redeveloped with new or existing structures for residential, commercial, and manufacturing uses as allowed by zoning. Chapter Five Development Zone specifications apply.

**Figure 6. 9 Example of landscaped buffer adjacent to riverwalk trail**

