

**RIVER NORTH GREENWAY:
STRATEGIZING A GENERATION 4 GREENWAY AS A DYNAMIC MOSAIC**

by

CHRISTIE MURMAN

A REPORT

submitted in partial fulfillment of the requirements for the degree

MASTER OF LANDSCAPE ARCHITECTURE

DEPARTMENT OF LANDSCAPE ARCHITECTURE, REGIONAL AND COMMUNITY PLANNING
COLLEGE OF ARCHITECTURE, PLANNING, AND DESIGN

KANSAS STATE UNIVERSITY
Manhattan, Kansas

2010

Approved by:

Major Professor
MELANIE KLEIN

Copyright

CHRISTIE MURMAN

2010

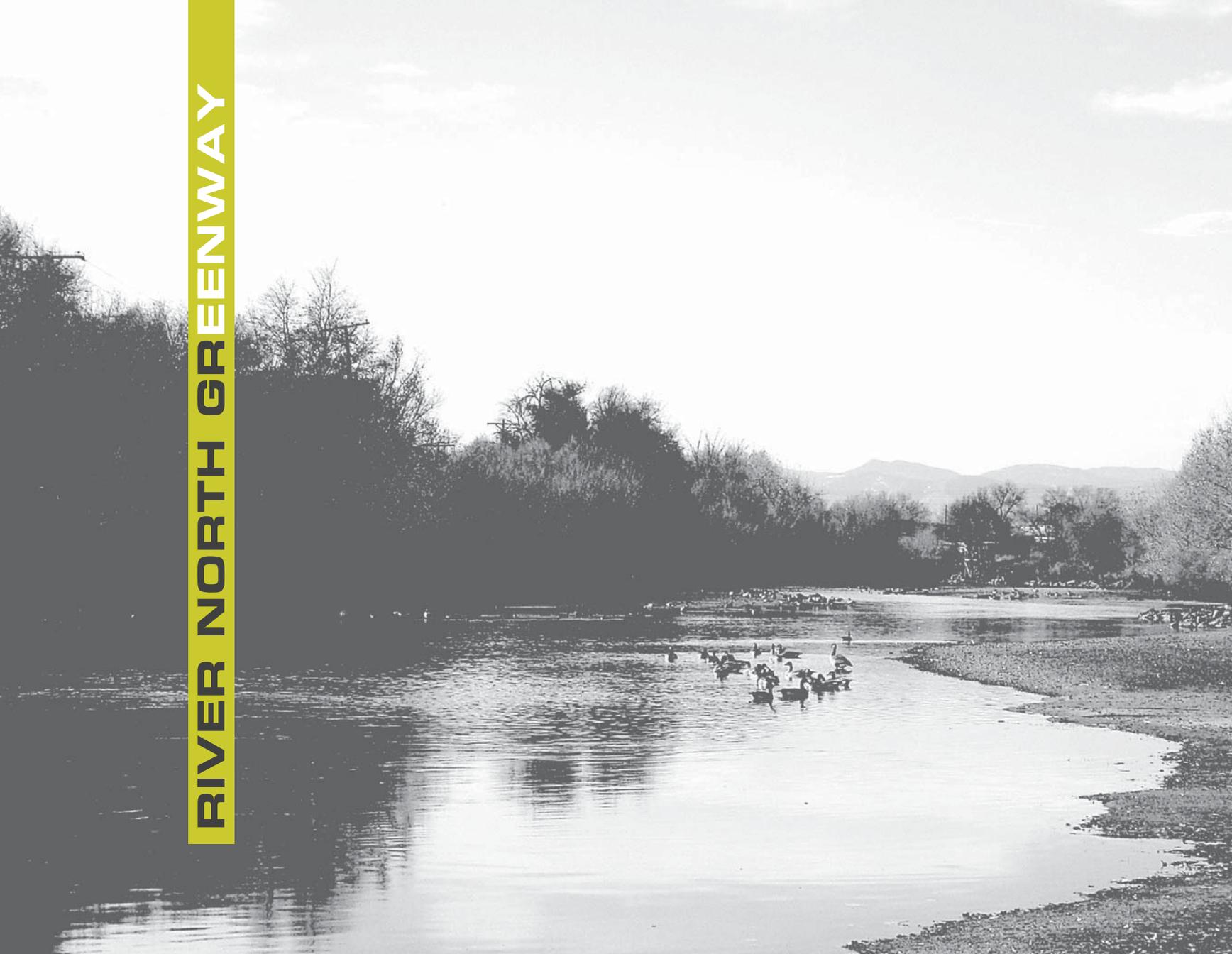
Abstract

Greenways are an evolving landscape form, adapting to the needs of humans through time. Rooted in the work of Frederick Law Olmsted, greenways have progressed to become an international movement. Throughout this progression, three generations of greenways are recognizable—Generation 1: Parkways and Boulevards, Generation 2: Trail-Oriented Recreation, Generation 3: Multi-Objective (Searns 2002). Given the ideals of sustainability that drive our contemporary society, a fourth generation is poised to emerge. Responsive to sustainability, the fourth generation will be envisioned as a holistic system, structured within the frameworks of landscape ecology theory as developed by Richard Forman, and expanded with the progressive thinking of Jack Ahern and Kristina Hill.

River North Greenway in Denver, Colorado is prime for transformation. Compromised by its industrial context, yet vitalized through the flow of the South Platte River and the infill development growing up the valley from Downtown Denver, River North will be re-defined as a holistic system. Utilizing the spatial pattern and process dynamics that define ecological theory (Forman 1996), abiotic, biotic, and cultural functions (Ahern 2007) will become the fundamental elements in strategizing the greenway as a multi-scalar dynamic mosaic (Hill 2005).

River North Greenway will become a complexity of cultural activity and abiotic and biotic health, balancing programmed space with the enhancement and restoration of ecosystems. It will transform the City of Denver, enriching the connection between the city and its river, the people and nature. With its rich history and present potential, River North can become a timeless piece of Denver's urban landscape, shaping meaningful human experiences and preserving nature within the built environment for future generations. In turn, it can propel the greenway movement towards a fourth generation.

RIVER NORTH GREENWAY



RIVER NORTH GREENWAY

strategizing a generation 4 greenway as a dynamic mosaic

christie murman schneider

RIVER NORTH GREENWAY::
strategizing a generation 4 greenway as a dynamic mosaic

christie murman schneider
master's project and report
spring 2010

kansas state university
college of architecture, planning, and design
department of landscape architecture + regional and community planning

LAR 700 | project programming
LAR 705 | master's project and report

*for joe and for my family;
thank you for your enduring love and
support throughout this endeavor.*

ACKNOWLEDGEMENTS

This project is a direct reflection of the support of many gracious individuals throughout the course of my education. Thank you to all the faculty and staff of the Department of Landscape Architecture Regional and Community Planning at Kansas State University who have facilitated my last five years of education, your commitment and passion for the profession of landscape architecture will always be an inspiration. Specific thanks to my major professor Melanie Klein and supporting committee members Blake Belanger and Stephanie Rolley for consistently challenging me to reach for the next level and standing by for critiques and reviews. Additional regards to Jeff Shoemaker of the Greenway Foundation and Jane Kulik of Wenk Associates for their aid in the formulation of my project; and to Valerian and Norris Design for supporting my academic endeavors through internship opportunities. A final big thank you to my husband and family and friends for your enduring love and support. I am so grateful to you all.

ABSTRACT

Greenways are an evolving landscape form, adapting to the needs of humans through time. Rooted in the work of Frederick Law Olmsted, greenways have progressed to become an international movement. Throughout this progression, three generations of greenways are recognizable—Generation 1: Parkways and Boulevards, Generation 2: Trail-Oriented Recreation, Generation 3: Multi-Objective (Searns 2002). Given the ideals of sustainability that drive our contemporary society, a fourth generation is poised to emerge. Responsive to sustainability, the fourth generation will be envisioned as a holistic system, structured within the frameworks of landscape ecology theory as developed by Richard Forman, and expanded with the progressive thinking of Jack Ahern and Kristina Hill.

River North Greenway in Denver, Colorado is prime for transformation. Compromised by its industrial context, yet vitalized through the flow of the South Platte River and the infill development growing up the valley from

Downtown Denver, River North will be re-defined as a holistic system. Utilizing the spatial pattern and process dynamics that define ecological theory (Forman 1996), abiotic, biotic, and cultural functions (Ahern 2007) will become the fundamental elements in strategizing the greenway as a multi-scalar dynamic mosaic (Hill 2005).

River North Greenway will become a complexity of cultural activity and abiotic and biotic health, balancing programmed space with the enhancement and restoration of ecosystems. It will transform the City of Denver, enriching the connection between the city and its river, the people and nature. With its rich history and present potential, River North can become a timeless piece of Denver's urban landscape, shaping meaningful human experiences and preserving nature within the built environment for future generations. In turn, it can propel the greenway movement towards a fourth generation.

TABLE OF CONTENTS

01 **introduce** [001]

02 **define** [009]

03 **explore** [021]

04 **strategize** [061]

05 **design** [073]

06 **sustain** [113]

07 **reflect** [127]

appendix A: glossary [133]

appendix B: literature review [139]

appendix C: precedent studies [149]

references [165]

LIST OF FIGURES

01

1.1: Design Process Cycling | 005
(Christie Murman)

1.2: Overall Project Design Process | 005
(Christie Murman)

1.3: Literature Map | 008
(Christie Murman)

02

2.1: Project Trajectory | 012
(Christie Murman)

2.2: State Context | 013
(Christie Murman)

2.3: Metropolitan Context | 013
(Christie Murman)

2.4: Site Context | 014
(Christie Murman)

2.5: Generation 4 Greenway Potentials | 018
(Christie Murman)

2.6: ABC Model and Human Experience | 018
(Christie Murman)

2.7: ABC Model and Goal Hybridization | 018
(Christie Murman)

2.8: River North Greenway Project Goals | 020
(Christie Murman)

03

3.1: Project Development Process | 024
(Christie Murman)

3.2: Site Inventory Process | 025
(Christie Murman)

3.3: Site Visit Bike Route | 030
(Christie Murman)

3.4: Site Visit Experience Montage | 031
(Christie Murman)

3.5: District Character Word Collage | 034
(Christie Murman, Source: Denver GIS, RINO, The Piton Foundation, Denver Infill)

3.6: Population Estimate | 036
(Christie Murman, Source: RINO)

3.7: Build-Out Population Projection | 036
(Christie Murman, Source: RINO)

3.8: Ecological Goods and Services | 038
(Christie Murman, Source: Denver GIS)

3.9: K-5th Grade Excursions | 040
(Source: SPREE)

3.10: Fishing for Kids | 040
(Source: SPREE)

3.11: Art on the River | 040
(Source: SPREE)

3.12: River Sweep Poster | 040
(Source: Greenway Foundation)

3.13: Northside Park | 041
(Photo by Christie Murman)

3.14: Globeville Landing Park | 041
(Photo by Christie Murman)

3.15: Parks and Recreation | 042
(Christie Murman, Source: Denver GIS, Site Visit)

3.16: Denver Coliseum | 043
(Photo by Christie Murman)

3.17: Northside Park | 043
(Photo by Christie Murman)

3.18: Cultural Catalysts | 044
(Christie Murman, Source: Denver GIS, Site Visit, RINO)

3.19: TAXI Mixed-Use Development | 045
(Source: Denver Infill)

3.20: Denargo Market Redevelopment | 045
(Source: Denver Infill)

3.21: Proposed Infill and Developable Fragments | 046
(Christie Murman, Source: Denver Infill, RIND)

3.22: View from City of Cuernavaca Park | 047
(Photo by Christie Murman)

3.23: View from Denver Coliseum | 047
(Photo by Christie Murman)

3.24: Vistas and Viewpoints | 048
(Christie Murman, Source: National Map Seamless Server, Site Visit)

3.25: Ecosystem Typologies | 049
(Christie Murman, Sources: Colorado Native Plant Society, Site Visit, Wildlife Department)

3.26: Existing Ecosystems | 050
(Christie Murman, Sources: Denver GIS, Site Visit)

3.27: Potential Users | 052
(Christie Murman)

3.28: Corridor Topography | 053
(Christie Murman, Source: National Map Seamless Server)

3.29: Context Topography | 054
(Christie Murman, Source: National Map Seamless Server)

3.30: Storm Drain Outfall | 055
(Photo by Christie Murman)

3.31: Sediment Deposit | 055
(Photo by Christie Murman)

3.32: River Health | 056
(Christie Murman, Source: Denver GIS, RIND, Site Visit)

3.33: Paved Trail | 057
(Photo by Christie Murman)

3.34: Foot Trail | 057
(Photo by Christie Murman)

3.35: Pedestrian Circulation | 058
(Christie Murman, Sources: Denver GIS, RIND, Site Visit)

3.36: Future FasTracks Transit Stop | 059
(Photo by Christie Murman)

3.37: Trail into City of Cuernavaca Park | 059
(Photo by Christie Murman)

3.38: Access and Barriers | 060
(Christie Murman, Sources: Denver GIS, RIND, Site Visit)

04

4.1: Project Development Process | 064
(Christie Murman)

4.2: Design Strategy | 068
(Christie Murman)

4.3: Multi-Scalar Composition | 069
(Christie Murman)

4.4: Elements Scale Program Palette | 072
(Christie Murman)

05

5.1: Design Development Process | 076
(Christie Murman)

5.2: Illustrative Master Plan | 079
(Christie Murman)

5.3: Design Strategy | 081
(Christie Murman)

5.4: Design Recommendations | 082
(Christie Murman)

5.5: Abiotic and Biotic Mat | 084
(Christie Murman)

5.6: Wooded Riparian Banks Ecosystem | 085
(Christie Murman)

5.7: Wooded Riparian Banks Plant Palette | 085
(Christie Murman)

5.8: River, Streams, and Ponds Ecosystem | 086
(Christie Murman)

5.9: Wetlands Ecosystem | 087
(Christie Murman)

5.10: Wetlands Ecosystem Palette | 087
(Christie Murman)

5.11: Short-grass Prairie Ecosystem | 088
(Christie Murman)

5.12: Short-grass Prairie Ecosystem Plant Palette | 088
(Christie Murman)

5.13: Cultural Node Emergence | 090
(Christie Murman)

5.14: Cuernavaca Cove Site Plan | 091
(Christie Murman)

5.15: Cuernavaca Cove Location Map | 091
(Christie Murman)

5.16: Cuernavaca Cove River Activation | 092
(Christie Murman)

5.17: Prospect Filter Terraces Site Plan | 093
(Christie Murman)

5.18: Prospect Filter Terraces Location Map | 093
(Christie Murman)

5.19: Denargo Market River Promenade Site Plan | 094
(Christie Murman)

5.20: Denargo Market River Promenade Location Map | 094
(Christie Murman)

5.21: The Banks Site Plan | 095
(Christie Murman)

5.22: The Banks Location Map | 095
(Christie Murman)

5.23: Lawn and Sculpture Pod | 096
(Christie Murman)

5.24: Prairie Theatre at Globeville Landing Site Plan
| 097
(Christie Murman)

5.25: Prairie Theatre at Globeville Landing Location Map | 097
(Christie Murman)

5.26: Amphitheater Concert Venue | 098
(Christie Murman)

5.27: Sheepherder Bridge Overlook Site Plan | 099
(Christie Murman)

5.28: Sheepherder Bridge Overlook Location Map | 099
(Christie Murman)

5.29: Sheepherder Bridge Overlook | 100
(Christie Murman)

5.30: Northside Fields Site Plan | 101
(Christie Murman)

5.31: Northside Fields Location Map | 101
(Christie Murman)

5.32: Soccer Fields and Lookout Tower | 102
(Christie Murman)

5.33: Heron Pond and Prairie Pointe Site Plan | 103
(Christie Murman)

5.34: Heron Pond and Prairie Pointe Location Map | 103
(Christie Murman)

5.35: River North Farm Site Plan | 104
(Christie Murman)

5.36: River North Farm Location Map | 104
(Christie Murman)

5.37: Connectivity Spine | 106
(Christie Murman)

5.38: Access | 108
(Christie Murman)

5.39: Wayfinding | 108
(Christie Murman)

5.40: Gateway | 108
(Christie Murman)

5.41: Hierarchical Trail System | 109
(Christie Murman)

5.42: Primary Trail | 110

(Christie Murman)

5.43: Primary Trail Section | 110

(Christie Murman)

5.44: Secondary Trail | 111

(Christie Murman)

5.45: Secondary Trail Section | 111

(Christie Murman)

5.46: Tertiary Trail | 112

(Christie Murman)

5.47: Tertiary Trail Section | 112

(Christie Murman)

6.5: Programmed Events | 121

(Christie Murman)

6.6: Implementation Guide Frameworks | 124

(Christie Murman)

6.7: Implementation Guide | 125

(Christie Murman)

C.9: Materiality | 161

(Source: ASLA)

C.10: Trail Network | 162

(Source: ASLA)

C.11: Program Elements and System Responses | 164

(Source: ASLA)

06

6.1: Design Development Process | 116

(Christie Murman)

6.2: Trail and Park Adoption | 118

(Christie Murman)

6.3: Education Signage | 119

(Christie Murman)

6.4: Art Implementation | 120

(Christie Murman)

appendix C

C.1: Project Development Process | 152

(Christie Murman)

C.2: The Fork Concept | 154

(Source: WRT)

C.3: “Rooms” of The Fork | 155

(Source: WRT)

C.4: Ecosystem Improvements | 156

(Source: WRT)

C.5: Sustainable Strategies | 156

(Source: WRT)

C.6: Program Elements and System Responses | 158

(Source: WRT)

C.7: Ecotypes | 160

(Source: ASLA)

C.8: Public Art | 161

(Source: ASLA)

“Greenways are an adaptive urban landscape concept, growing out of classic human needs.”

Robert Searns, 1995

01

INTRODUCE

This chapter describes the expectations of a master's report and documents the genesis of the project. It also introduces personal goals for the project and outlines the design process and timeline utilized for efficient completion of the project. Finally, it overviews the key literature resourced in completion of the report.

INTRODUCTION

The master's project and report experience offers an opportunity to explore my personal interests and take on full responsibility for the development and completion of a project that capstones my educational career. This chapter documents and describes the frameworks for the development of the project and report.

This chapter first overviews the expectations of a master's project and report at Kansas State University before describing the genesis of my specific project and outlining my personal goals. My design process and a timeline of that process according to the linear progression of the academic year is also presented. A brief overview of the literature used throughout the development of the project and report will conclude the chapter.

The next chapter will specifically define the project frameworks by introducing the dilemma and thesis.

MASTER'S REPORT EXPECTATIONS

The master's project and report experience allows students to undertake an independent project which focuses on a specific area of professional interest and, in the development of that project, to demonstrate the highest level of professional competence they have achieved during their professional education.

The master's project and report is the product of two semester's time. The first

semester provides the opportunity for one to identify the appropriate process and methodology for their project and to complete the research, site analysis and program development necessary to initiate planning and design in the second semester. The second semester, therefore, is the development of planning and design solutions as a fulfillment of the process and methodologies established within the first semester.

Throughout the course of the project, the student must take leadership responsibility for scheduling and execution of the work within the basic course schedule of submittal and review deadlines. One must develop solutions through an articulated process that is independent and creative in thought; pushing the envelope of their abilities in pursuing creative solutions for their project and demonstrating strong conceptual thinking. Scholarly methods with the intent of advancing the knowledge or capability of the landscape architecture profession is expected. Exploration of issues relevant to contemporary practice of landscape architecture and demonstration of critical thinking on projects that are socially relevant and ecologically sensitive is vital.

As exhibited through a series of graphic, written and oral presentations, the solution for the project will reveal the complete design or research process and emphasize visual and critical thinking.

PROJECT GENESIS

Throughout the course of my education, I have discovered my passion for landscape architecture to lie within our ability as landscape architects to cross multiple disciplines and harmoniously bring together natural and social systems. The urban environment especially attracts my interest as a canvas for revitalization through the incorporation of green infrastructure. With a vision grounded in meaningful human experiences, a strategic choreography of natural and built environments is essential.

I was fortunate to receive the Mesa Design Discovery Award in the Fall of 2008. This is a research scholarship, funded by Mesa Design Group, to encourage academic pursuits within travel. Building upon my interests, I proposed to explore rail-trail greenways, specifically as adaptive landscape infrastructure. Rail-trails offer a unique opportunity to bring my interests together—to adapt and re-use fragments of our built environment, to create memorable and meaningful experiences for the human user while being a steward to ecological needs within out natural environment.

The rail-trail greenway project piqued my interest in greenways outside of the typology of rail-trails. I was drawn by the broad gamut of ecological and social potentials within a greenway corridor. The evolution of the greenway movement is far from stagnant and I

became interested in discovering the potentials of greenways understood within a systematic approach.

I was fortunate to have the opportunity to sit down with Jane Kulik and Bill Wenk of Wenk Associates, a firm recognized nationally for integration of natural systems and processes into urban settings and for transforming degraded landscapes into vibrant public or natural realms. We discussed some of their past and current work as potential inspiration for a project site. When the River North Greenway Master Plan project in Denver, Colorado was brought up, it immediately piqued my interest. The site was described as a derelict, industrial river corridor, ecologically compromised and lacking of social vitality. But, with the emergence of the River North Art District and additional infill projects , it is on the verge of becoming the up and coming area of Denver.

I then met with Jeff Shoemaker of the Greenway Foundation in Denver , who introduced me to the master planning efforts for the River North Greenway. Mr. Shoemaker gave me insight on the goals and objectives of the project as well as the greenway movement of Denver.

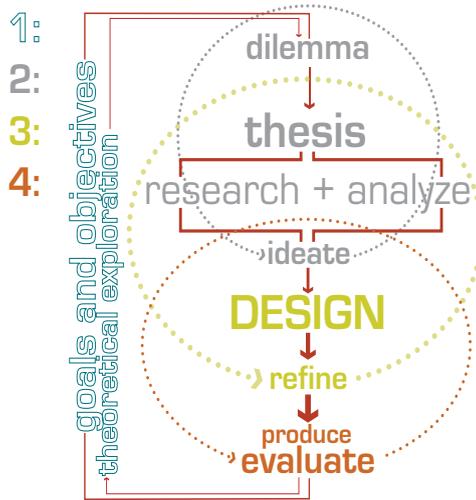
I then began to develop my independent project. The process, methodology, and solutions are documented within this book.

PERSONAL GOALS

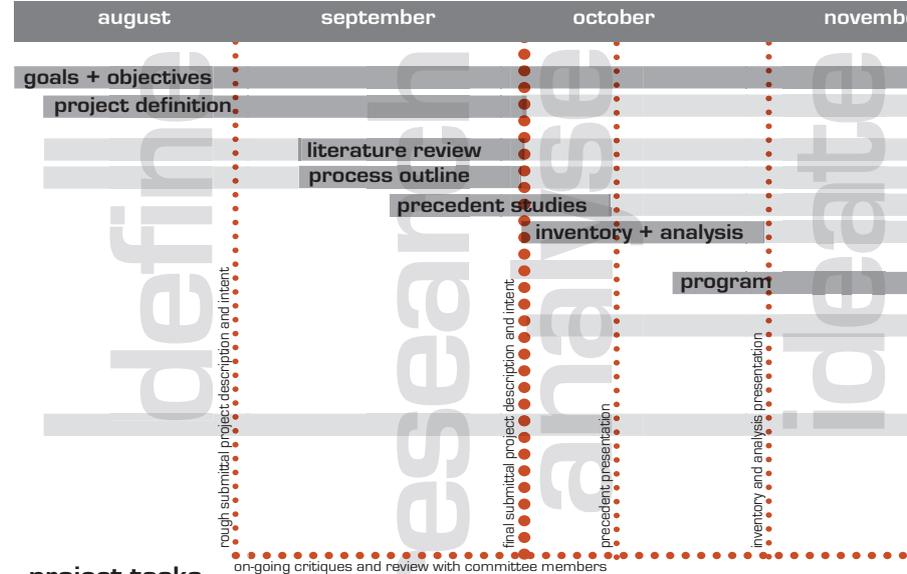
- 01.** understand the potentials of greenways and the impact of the greenway movement as it has evolved through history and into the present.
- 02.** create a project that captures the true vitality of a greenway.
- 03.** further explore the theoretical layers of landscape architecture, in particular the theoretical base of landscape ecology and its ties to contemporary landscape architecture theory.
- 04.** increase my capacity to envision projects within the fourth dimension of time.
- 05.** further explore the potentials and resulting impacts of varying graphic representation techniques.
- 06.** be able to utilize and draw upon the knowledge and skills I've acquired through my previous studies and experiences at K-State, in particular to be able to link past and present projects and studies together with related content.
- 07.** establish a healthy balance between time working in studio and personal time outside of studio.
- 08.** plant a seed towards making a difference in our environments, if I can begin to shape change, I feel as though I will be able to sustain intrigue in the practice of landscape architecture no matter what I may find myself working on.

DESIGN PROCESS

In order to efficiently complete the project, it was important to identify my personal design process as a framework for the work to be done. The abstracted design process is shown in Figure 1.1 and is understood to be a non-linear process, constantly cycling back into the process to redevelop and refine. Figure 1.2 illustrates the design process as it overlays on the timeline of the year. Key completion points and priorities per the time of the year are indicated. Process diagrams specific to project tasks are located throughout the document.



[1.1]



project tasks

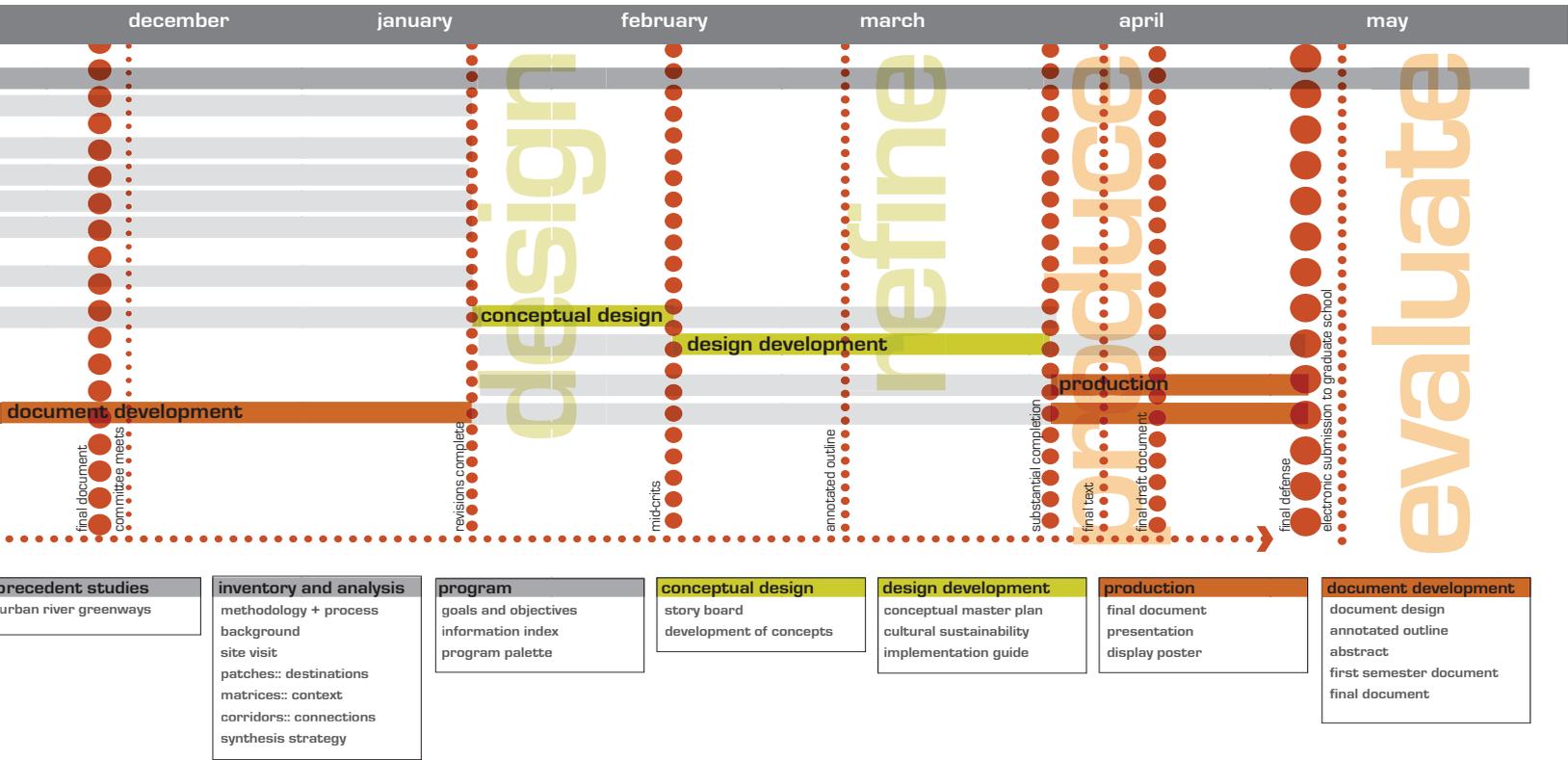
goals and objectives personal goals and objectives personal design philosophy future research	project definition description and intent site selection define dilemma and thesis base materials contacts	literature review literature map literature review glossary	process outline design process diagram task and time flow chart project trajectory
---	--	---	--

simultaneous projects

fluvial system research paper

wedding preparation

[1.2]



mesa design discovery award research

portfolio development and interviews

asla submittal

1.1: Design Process Cycling. My design process is understood as a non-linear process, cyclical design process. *(Christie Murman)*

1.2: Overall Project Design Process. Despite the non-linear, cyclical design process, it is necessary for the project to progress according to a timeline of submittals and reviews. *(Christie Murman)*

LITERATURE MAP

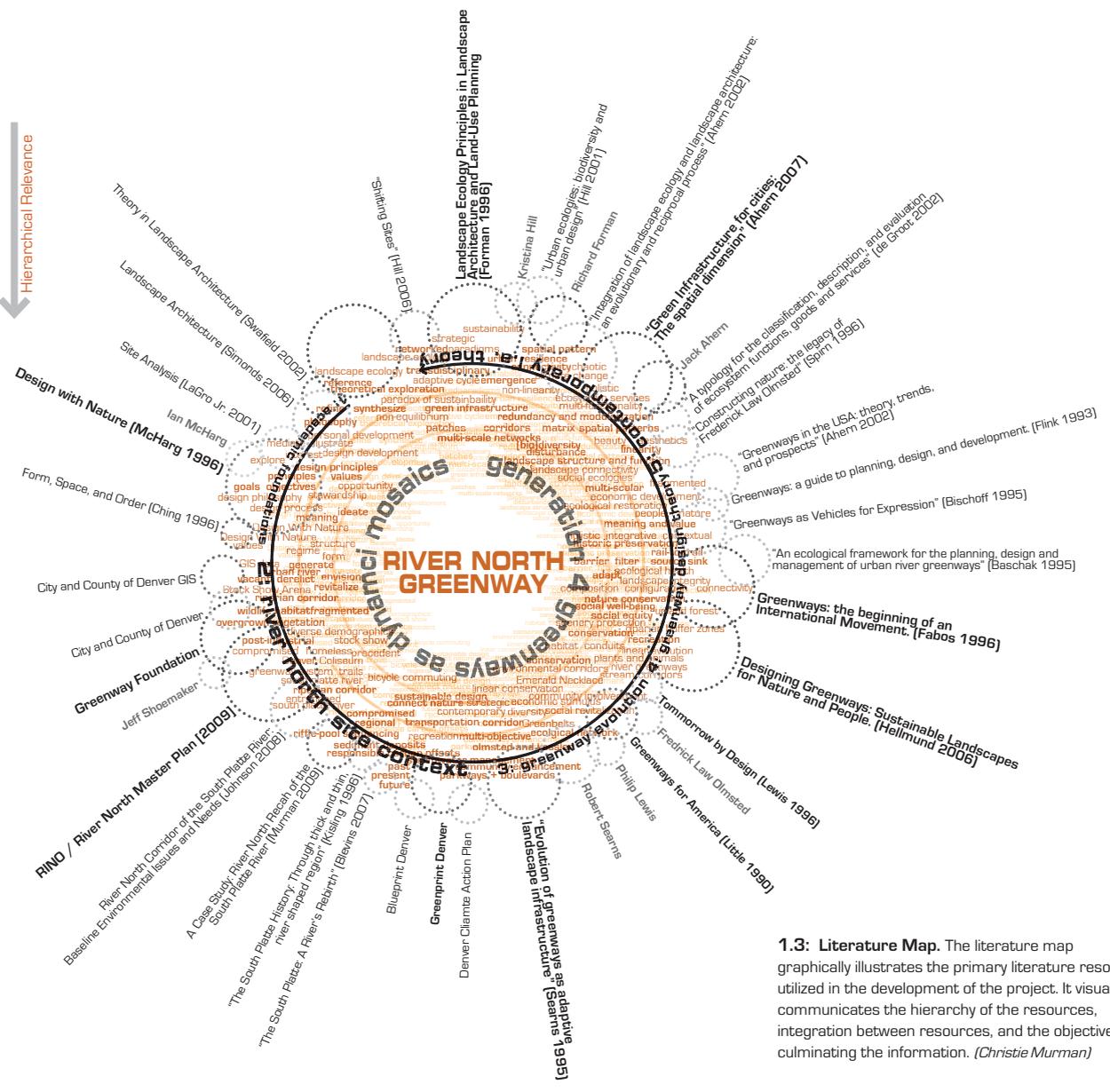
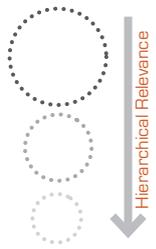
The process of researching, gathering, and analyzing literature is a critical component to the development of a project with breadth and credibility.

The literature map, represented in Figure 1.3, illustrates how the literature has assembled throughout the development of the project. The circular form of literature pieces and key figures represents how all the pieces come together and are ultimately connected. Specific relationships have been identified in the overlap of circles. Furthermore, the size and boldness of the circles represent their hierarchical relevance to my project. The literature is divided into five sub-sections around the circle:

- 1. academic foundations**
- 2. river north site context**
- 3. greenway evolution**
- 4. greenway design theory**
- 5. contemporary landscape architecture theory**

The ideas and concepts that are generated from these literature pieces are represented by the orange text and mass together to support and formulate the development of the River North Greenway as a generation 4 greenway, strategized as a dynamic mosaic. This takes the emphasis off the sub-section divisions to reiterate the importance of the literature pieces and key figures coming together in support of the development of the project.

A review of the key influential literature from the literature map is included in Appendix B. These literature pieces in addition to other pieces that are not specifically reviewed within the Appendix are referenced throughout the document and are influential in the development of the project. The reviews include the information and quotes that are most significant to the development of River North Greenway.



[1.3]

1.3: Literature Map. The literature map graphically illustrates the primary literature resources utilized in the development of the project. It visually communicates the hierarchy of the resources, integration between resources, and the objectives of culminating the information. (Christie Murman)

02

DEFINE

This chapter begins by presenting the dilemma and thesis statements as the foundations for the project. The site is then introduced in terms of location and identifying contextual pieces. The key issues relevant to contemporary landscape architecture are then discussed followed by an overview of goals relative to generation 4 greenways and the River North Greenway, respectively. Finally, the key terms relative to the foundations of the project are defined.

INTRODUCTION

With an indeterminate amount of resources and information available, it is critical to narrow one's focus and scope to be concise and direct. Through a cyclical process of interest-seeking, goal and objective definition, River North Greenway research and literature review, the frameworks of the project are defined.

This chapter begins by presenting the dilemma and thesis statements as the foundations for the project. The site is then introduced in terms of location and identifying contextual pieces. The key issues relevant to contemporary landscape architecture are then discussed, followed by an overview of goals relative to generation 4 greenways and the River North Greenway, respectively. Finally, the key terms relative to the foundations of the project are defined.

This chapter will be followed by an intensive study of the existing conditions of the site and context.

DILEMMA

Greenways exist as a familiar piece of our landscape, corridors and bands stretching, linking, reaching, connecting, looping, and tracing across and through our natural and built environments. Most often designated or preserved simply for their natural or recreational resources, "people fail to recognize the full range

of contributions greenways can make to society and the environment" (Hellmund 2006).

Robert Searns describes greenways as an "adaptive urban landscape concept, responding to classic human needs and part of an evolving, centuries-old landscape form" (Searns 2002). As times have changed, so to has the notion of greenways changed to address new needs and challenges. Searns describes three generations of greenways:

Generation 1 (Pre-1700s - circa 1960): axes, boulevards, parkways and "the way more beautiful" inspired by the likes of Olmsted, Kessler, Burnham and others.

Generation 2 (circa 1960 - circa 1985): the trail-oriented recreational greenway, utilizing rivers, stream and abandoned rail-line corridors.

Generation 3 (circa 1985 - present): the multi-objective greenway, recognizing the potential of greenways as infrastructure for wildlife, flood hazard reduction, water quality protection and utility ways (Searns 2002).

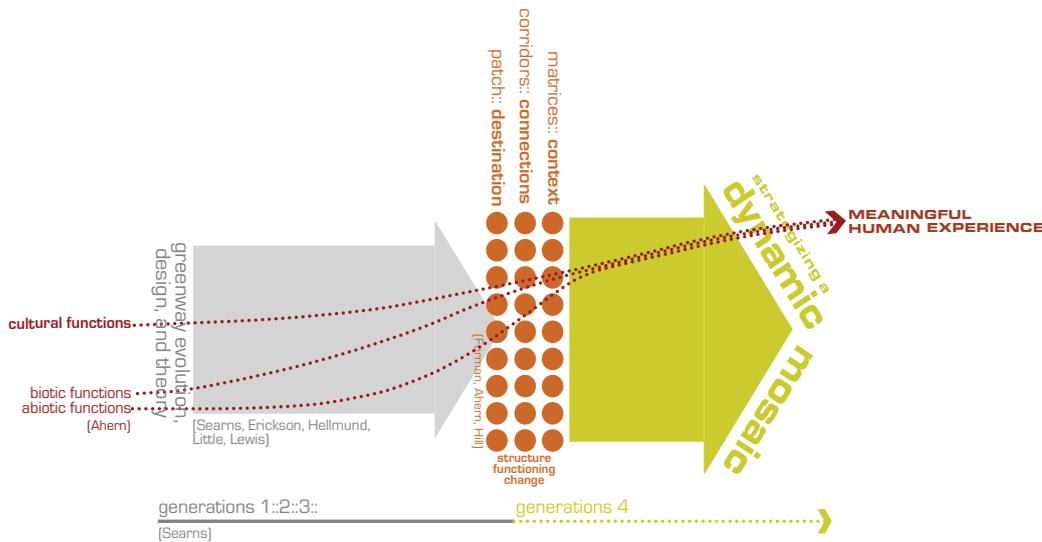
How will our contemporary society shape the defining frameworks of the emerging generation 4 greenway?

The River North Greenway, located within the South Platte River corridor threading through central Denver, CO, is prime for transformation towards a generation 4 greenway. The nearly three mile corridor is visually dominated by commercial and industrial enterprises including many abandoned buildings and vacant lots.

Transportation-related uses including railroads, the regional transportation district maintenance yards and major highways and bridge viaducts heavily influence the character and identity of the corridor. Due to barriers established by roadways and the railroad, the River is disconnected from the surrounding neighborhoods and resultantly lacks reflection of the cultural heritage of citizens who live in these communities that are adjacent to the river.

Ecologically, the South Platte River within this stretch could be described as unnatural and industrial in character. The uses fronting the corridor have encroached the river and caused channelization and narrowing of the river banks, removal of the natural sinuosity and native vegetation of the river, and increased sedimentation and decreased water quality from urban runoff (RINO).

Due to the undesirable nature of the River North Greenway as it exists yet its close proximity to downtown Denver and the thriving Central Platte Valley, there is a strong interest to redevelop and revitalize that portion of the river. Infill development has already begun to migrate up from the Central Platte Valley, most specifically in the form of residential developments. The National Western Stock Show site and the Denver Coliseum are both located along the corridor and are opportunities to further catalyze development and increase the flow of people into the area. Three parks currently exist along the corridor but are under-used and in need of renewal.



[2.1]

2.1: Project Trajectory. The project trajectory is a visual representation of the thesis statement. *(Christie Murman)*

With consideration given to the above, the dilemma or question becomes this—how can the River North Greenway propel the evolution of greenway theory and design towards a generation 4, responsive to the needs of our sustainability-driven contemporary society and stimulating of meaningful human experiences?

THESIS

The River North Greenway will propel the evolution of greenway theory and design towards a generation 4, responsive to the needs of our sustainability-driven contemporary society and stimulating of meaningful human experiences.

By stratifying the potentials of the greenway according to abiotic, biotic, and cultural resources (ABC Model), the spatial pattern and process dynamic at the root of the study of landscape ecology can be applied to strategize the structure, functioning, and change of these resources as a holistic, sustainable system. The mosaic model (Foreman 1996), as a visualization of the compositional elements of a landscape, will be adapted to understand the spatial composition of a greenway through patches as destinations, corridors as connections, and matrices as context.

With these frameworks in place and a vision grounded in a meaningful human experience, the River North Greenway can be conceptualized as a dynamic mosaic; energizing a sustainable vitality for the corridor.

Figure 2.1 is visual representation of the thesis statement.

SITE

The River North Greenway is located within the State of Colorado and the City and County of Denver (Figure 2.2 and 2.3). It is approximately 3 miles in length with an area of more than 300 acres. It is located within the corridor of the South Platte River, which flows east from the continental divide of the Rocky Mountains out to the plains of Nebraska before merging with the North Platte River.

The existing character of the River North Greenway can be generalized into three categories: industrial, ecologically compromised, and lack of social vitality.

Industrial: The context of the greenway is visually dominated by commercial and light industrial enterprises including abandoned buildings and vacant lots. Transportation uses such as railroads, maintenance yards and major highways and bridge viaducts create barriers and also visually influence the character of the greenway.

Ecologically Compromised: The river has been encroached by the surrounding industrial use and is unnatural in character. The corridor has been dramatically narrowed and channelized resulting in steep slopes, increased sedimentation, and unstable banks. In addition, removal of the natural sinuosity and native vegetation of the river has diminished wildlife habitat and decreased water quality.

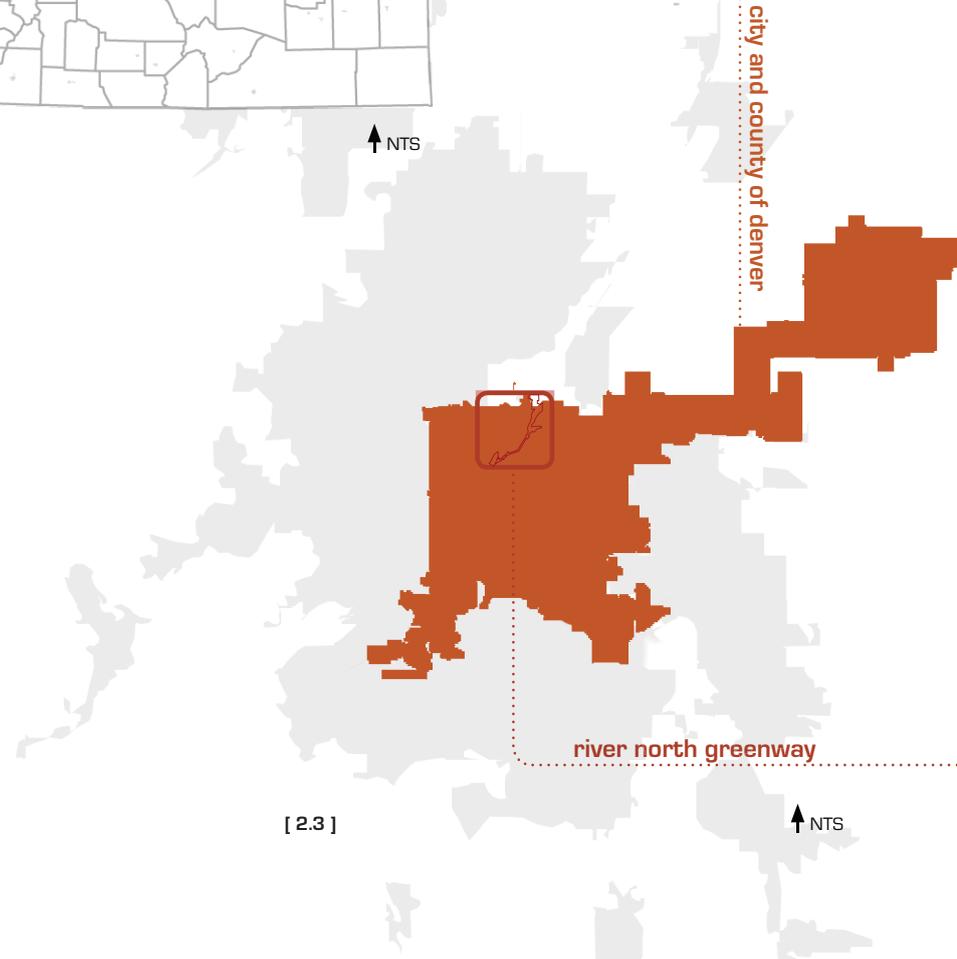
Lack of Social Vitality: The surrounding neighborhoods are detached from the river due to physical barriers such as the roadways and railroads. This has resulted in a lack of use and cultural identity that would be fostered if a connection to the river was reestablished. Also, the industrial character and overgrown character inhibits users due to safety concerns.

Figure 2.4, illustrates the primary identifying contextual sites of the River North Greenway.



[2.2]

↑ NTS



city and county of denver

river north greenway

[2.3]

↑ NTS



legend

— site boundary



[2.4]

2.2: State Context. River North Greenway is located within the State of Colorado in the United States of America. *(Christie Murman)*

2.3: Metropolitan Context. River North Greenway is located within the City and County of Denver. *(Christie Murman)*

2.4: Site Context. River North Greenway is located within the South Platte River corridor and is adjacent to well-known Denver landmarks such as the National Western Stockshow and the Denver Coliseum. *(Christie Murman)*

KEY ISSUES RELEVANT TO CONTEMPORARY LANDSCAPE ARCHITECTURE

We live in a fragmented world. Our built environments juxtapose the cycles and processes of the natural environment. Waterways and riparian corridors have been segmented and manipulated to conform to the contextual built environment. Wildlife habitat exists in disconnected patches across the urban landscape. The city is fragmented according to land use and even neighborhoods are fragmented based on race, social class, and income variances (Hellmund 2006).

However, the connective, linear nature of greenways has and continues to create an opportunity to mesh and intertwine the fragments of our natural and social ecologies into a holistic system. By their very definition, greenways are “networks of land and water corridors designed and managed for multiple purposes with an overall aim of sustaining the integrity of the landscape, including both its natural [biophysical] and social components” (Hellmund 2006).

The greenway movement, founded by the ideals of Frederick Law Olmsted and George Kessler illustrated in their vision for boulevards and parkways, has been evolving and adapting

to the values and needs of our society as it has progressed through time. Robert Searns has specifically taken a closer look at this evolution of the greenway and describes three generations of greenways:

Generation 1: axes, boulevards and parkways that were the ancestral greenways.

Generation 2: trail-oriented recreational greenways that provide access to rivers, streams, ridgelines, railbeds, and other corridors within the urban fabric.

Generation 3: multi-objective greenways that go beyond recreation and beautification to address such areas as habitat needs of wildlife, promoting urban flood damage reduction, enhancing water quality, providing a resource for outdoor education, and other urban infrastructure objectives (Searns 2002).

How will our contemporary society shape the defining frameworks of the emerging generation 4 greenway?

Our contemporary society is driven by the ideals of sustainability; sustainability as a lifestyle, sustainability as a marketing tool, sustainability as a global vision, and the list goes on. Sustainability

is commonly defined as “making sure present needs are met without compromising the needs of future generations” (Benedict 2006). This being said, it’s clear that an inherent evolution for generation 4 greenways is to be responsive to the call of sustainability, specifically through the lens of landscape ecology. “By defining landscape ecology as the study of flows of organisms, energy, and materials through space, ecological theorists created a new conceptual bridge that can connect the contemporary paradigms of ecology to the theoretical and practical concerns of landscape architecture” (Hill 2005). Richard Forman, a leading theorist of landscape ecology states, “the deeper message is the importance of a new form of linkage between ecology and culture, land and people, nature and humans” (Forman 1996).

Jack Ahern expands on the progressive relationship of landscape architecture and landscape ecology, “the interaction of landscape ecology and landscape architecture holds great promise as a long-awaited marriage of basic science and its application; of rational and intuitive thinking; of the interaction of landscape pattern and ecological process over varied scales

of space and time, with explicit inclusion of the “habitats,” activities, and values of humans” (Ahern 2002). In regard to sustainability, “the logical reasons for integrating these two fields are clear and compelling, with a great potential to support sustainable landscapes through ecologically based design” (Ahern 2002).

With the goal of the greenway functioning as a dynamic mosaic, a holistic and sustaining system, the understanding of the potential of the greenway is critical. Jack Ahern brings forward the Abiotic, Biotic, and Cultural (ABC) Resource Model saying “this broad, multipurpose, and multi-functional suite of ecological and cultural functions supports the broad principles of sustainability” (Ahern 2007).

These principles are an expansion of the initial frameworks at the core of greenway design. Charles Little says, “greenways should be seen as a beginning in a journey toward an environmental consciousness” (Little 1990). In fact, Frederick Law Olmsted “imitated ‘natural scenery’ because he believed that contact with such scenery would improve human health” (Spirn 1996).

Therefore, it should be clear that the goal is not to re-create the greenway but rather to envision the continued evolution of greenways. Robert Searns states that “greenways reflect an adaptive response to very basic human needs. Through several centuries of industrialization, urbanization, and increasing human impact on the landscape, people have sought ways to find refuge, to have outdoor spaces that both soothe and entertain the psyche. Linked to this is the desire to remain connected with nature, to maintain a semblance of the ‘natural’ landscape in the urban setting” (Searns 1995).

Anne Spirn shares thoughts similar to Searns. Spirn states, “all landscapes are constructed, they are phenomena of nature and products of culture, there is always a tension in landscape between the reality and autonomy of the nonhuman and its cultural construction, between the human impulse to wonder at the wild and the compulsion to use, manage and control...” (Spirn 1996).

Anyone “who has the ‘attitude’ to approach our environment as a coherent system, as a kind of whole that cannot be really understood

from separate components only, is a landscape ecologist” (Hellmund 2006). Therefore, landscape architects must recognize that “greenways offer a strategic approach to conserving and enhancing landscape integrity by focusing on some of landscape’s most important connections and dynamics” (Hellmund 2006).

Landscape architects have an exciting realm to explore while remaining responsive to the reconciliation of environmental, social, and economic demands—the triple bottom line of sustainability. Consider the words of Frederick Law Olmsted:

What artist [landscape architect] so noble... as they who, with far-reaching conception of beauty, in designing power, sketches the outlines, writes the colors, and directs the shadows of a picture so great that Nature shall be employed upon it for generations, before the work they arranged for shall realize their intentions.

-Frederick Law Olmsted

GENERATION 4 GREENWAY GOALS potentials

Generation 4 greenway goals (Figure 2.5) have been derived through a literature review of the evolution of greenways through time, precedent studies, and a response to the goals of our sustainability-driven contemporary society. To understand these goals as working together within a holistic system, they were organized according to the frameworks of abiotic, biotic, and cultural functions. A generation four greenway should accommodate the coexistence of abiotic, biotic, and cultural functions, as adapted from the ABC Model (Aherm 2007)

The goals in Figure 2.5 should be understood as a comprehensive outline of the potentials a greenway holds. As the project develops, these goals will be synthesized and prioritized in terms of the specific needs of the River North Greenway.

human experience

While maintaining the ideal of the equal existence of the abiotic, biotic, and cultural functions within greenway design, hence the

equilateral triangle shown in Figure 2.6, what is ultimately going to make the development of this project successful is the power of the human experience. Therefore the links between the cultural functions and the abiotic and biotic functions should spawn meaningful experiences for the users. The desired human experiences are:

ENGAGE through an experience of wonder and stimulation, individually and together as a community of people.

EDUCATE through an experience of discovery and learning, peaking intrigue and interest.

PROTECT through an experience of assured safety and comfort.

PROVIDE for through an experience of convenience and functionality.

INSPIRE through an experience of physical freedom and connectedness to nature.

RESTORE through an experience of mental escape and environmental awareness.

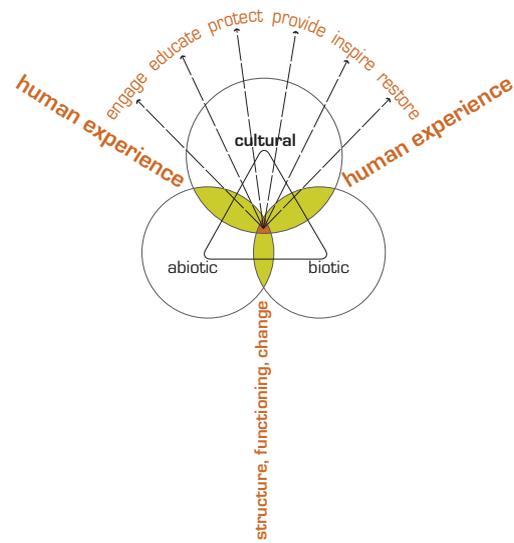
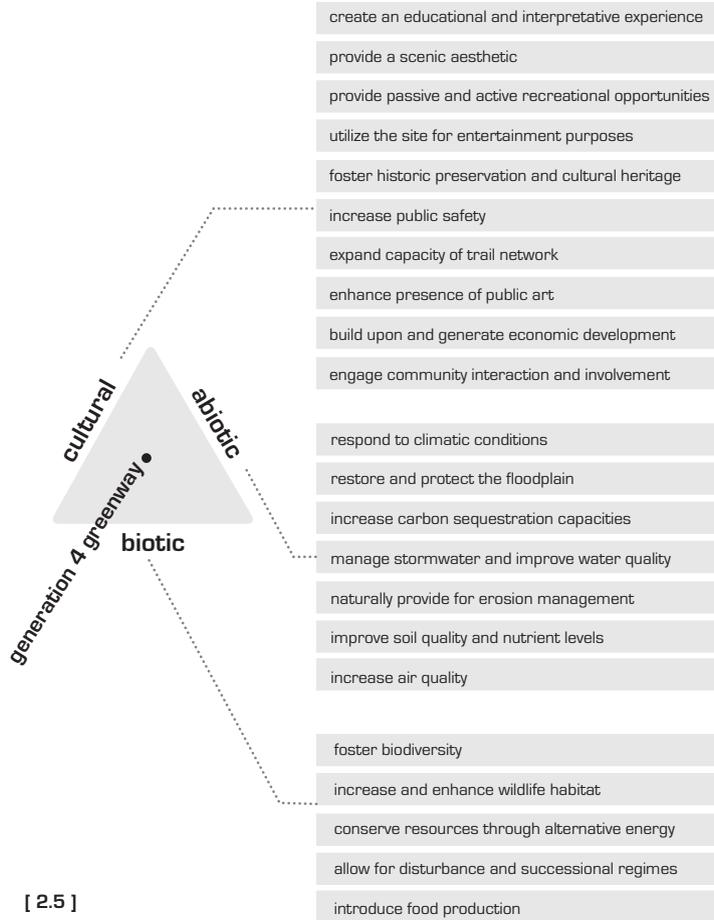
In order for the greenway to be envisioned as

a dynamic mosaic, the abiotic, biotic, and cultural functions must hybridize and coexist within multi-functional spaces. However, given the significance of the human experience, relationships between the cultural functions and abiotic and biotic functions must be most carefully considered. The conceptual approach for connections between the cultural functions and the abiotic and biotic functions is represented in Figure 2.7.

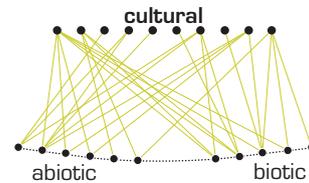
2.5: Generation 4 Greenway Potentials. The potentials for generation 4 greenways have been organized compiled through literature review and precedent studies. The potentials have been organized within the frameworks of the Abiotic, Biotic, and Cultural Resource Model (ABC Model). *(Christie Murman)*

2.6: ABC Model and Human Experience Dynamics. Maintaining the ideal of the equal existence of the abiotic, biotic, and cultural functions, the human experience will ultimately define the success of the greenway. *(Christie Murman)*

2.7: ABC Model and Goal Hybridization. The abiotic, biotic, and cultural functions should hybridize and coexist as multi-functional spaces, with the human experience as the focal concern. *(Christie Murman)*



[2.6]



[2.7]

RIVER NORTH GREENWAY PROJECT GOALS

The project goals of River North Greenway can be best understood through a careful exploration of the key words of the project title. The project title is, River North Greenway: strategizing a generation 4 greenway as a dynamic mosaic. Therefore, the objectives of the project will be explored according to the key words: River North Greenway, strategize, generation 4 greenway, dynamic, and mosaic.

Figure 2.8 represents the stratification of the project title and corresponding objectives for each key word. The objectives outlined supplement the frameworks of the project and will be foundational in critically analyzing the “success” of the project within the conclusions, in chapter 7.

KEY TERMS

Full glossary of terms available in Appendix A.

ABC Model comprehensive and inclusive model recognizes the needs and reciprocal impacts of humans on biotic and abiotic systems and processes (Ahern 2007)

abiotic non-living physical environment factors

biotic biological factors

cultural human-based factors

dynamic pertaining to, or characterized by, energy or effective action; vigorously active or forceful; energetic (Dictionary.Com)

landscape ecology the patterns of landscapes and the relationships of those patterns to ecological processes (Hellmund 2006)

structure the spatial elements that compose the structure of the greenway and provide for multi-functionality and the support of a diversity of experiences and functions (Forman 1996)

functioning the connectivity of the spatial elements through movement networks and corridors that support the ultimate generator and catalyst of the greenway system, the human, but also with consideration given to animals, plants, water, wind, materials, and energy (Forman 1996)

change the capacity of the system to adapt and sustain through time (Forman 1996)

multi-scalar to function at multiple scales

mosaic model used for describing and understanding the spatial configuration of landscapes, utilizes three fundamental landscape elements to define landscape structure: patches, corridors, and matrix (Ahern 2007)

patch a relatively homogeneous non-linear area that differs from its surroundings (Ahern 2007)

corridor a strip of land of a particular type that differs from adjacent land on either side (Hellmund 2006)

matrix the dominant land cover type in terms of area, degree of connectivity and continuity, and control that is exerted over the dynamics of the landscape (Ahern 2007)

sustainability making sure present needs are met without compromising the needs of future generations; maintaining resources in such a way to be able to renew themselves over time or to keep in existence and supply with necessities (Benedict 2006)

RIVER NORTH GREENWAY:

strategizing

a generation 4 greenway

as a dynamic

mosaic

RIVER NORTH GREENWAY

envison the future of River North greenway according to the frameworks of the City and County of Denver and the Greenway Foundation, yet expand the scope to contemporary landscape architecture theory.

re-connect the city to its river and the people to nature.

STRATEGIZE

phase according to the fourth dimension of time

respond to contextual patterns

establish a process and methodology that could be repeated

GENERATION 4 GREENWAY

understand the evolution of greenways and key figures

propel greenway design and theory from generation 1 through 3 towards generation 4

respond to the call of sustainability

emphasize unique opportunities of the greenway typology

DYNAMIC

understand human-based catalysts of activity and generators of meaningful human experience

integrate ecosystem enhancement and restoration as a critical component of the overall system

respond to urban energy and flows

MOSAIC

utilize landscape ecology as a means for understanding the spatial composition of greenways

emphasize the multi-scalar dynamic of greenways

explore the site from large spatial composition down to site specific element composition

recognize the diversity of elements that compose a whole.

[2.8]

2.8: River North Greenway Project Goals. The project title has been stratified according to the key terms and explored in terms of objective per each key word. Resultantly, the project goals and objectives for River North Greenway are clearly articulated (*Christie Murman*)

“All landscapes are constructed. They are phenomena of nature and products of culture. There is always a tension in landscape between the reality and autonomy of the nonhuman and its cultural construction, between the human impulse to wonder at the wild and the compulsion to use, manage, and control...for the world is not infinitely malleable; nature may be constructed, but it is not only a construction.”

Anne Spirn, 1996

03

EXPLORE

This chapter begins with an overview of the site inventory process. It then describes the historical background of the site, observations and experiences from site visits, and the existing site conditions in terms of matrices as context, patches as destinations, and corridors as connections.

INTRODUCTION

To effectively transition from theoretical foundations to design recommendations, an intensive study of the existing site conditions is critical. Figure 3.1 abstractly represents the project development process, this chapter will discuss the site inventory.

As represented in Figure 3.1, the site inventory process is a direct response to the goals of a generation 4 greenway organized within the frameworks of abiotic, biotic, and cultural functions. In order to synthesize the abiotic, biotic, and cultural functions into a holistic system, the inventory will be organized according to matrices as context, patches as destinations, and corridors as connections. The site inventory is further influenced by an initial generation of potential program for the site.

This chapter begins with an overview of the site inventory process. It then describes the historical background of the site, observations and experiences from site visits, and the existing site conditions in terms of matrices as context, patches as destinations, and corridors as connections.

A synthesis of the site inventory information will be presented in the next chapter. It will propose a strategy for design recommendations.

SITE INVENTORY PROCESS

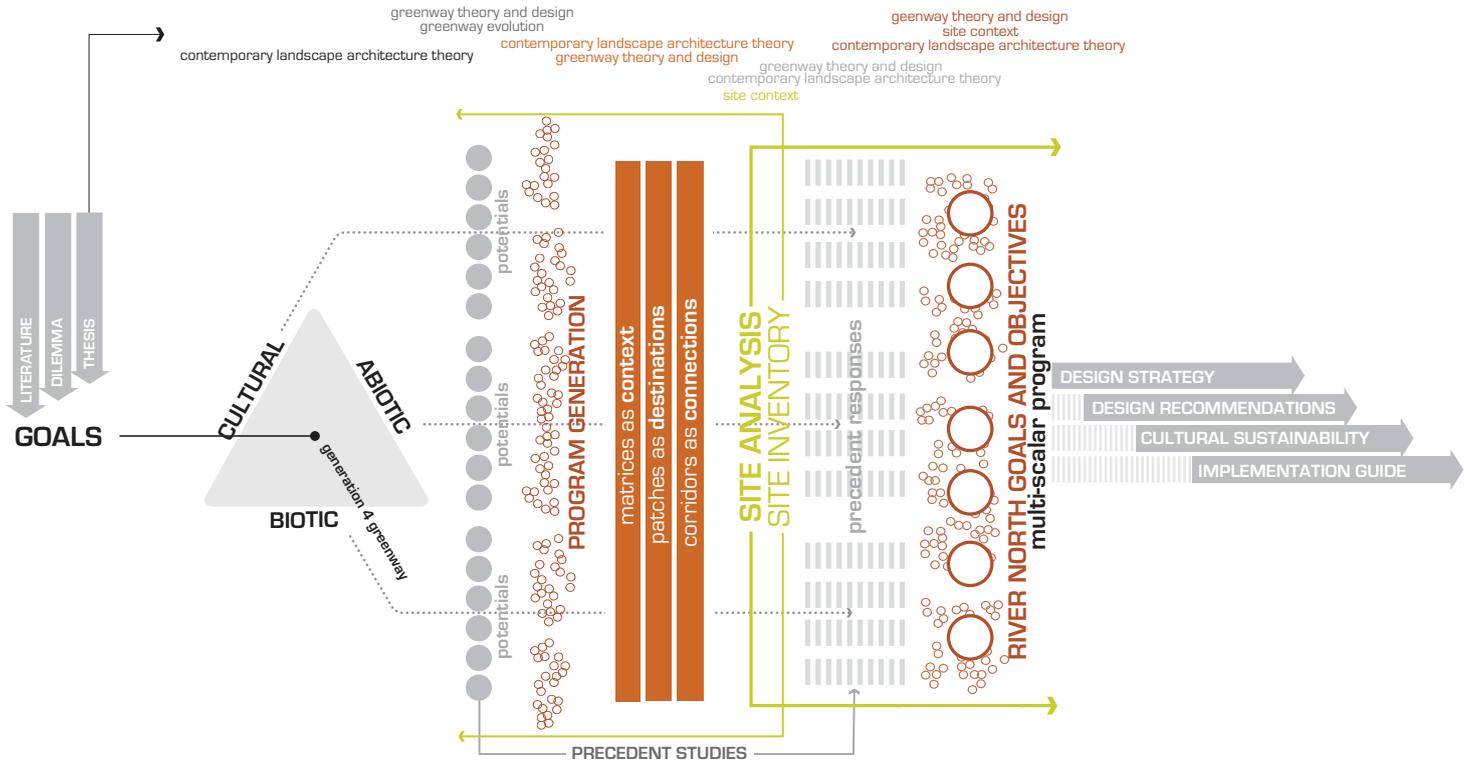
In order to determine what specific elements and systems of the site are most critical to inventory and analyze in terms of the development of the project, there was a process of goal seeking, program generation, exploration, and inventory synthesis, as represented in Figure 3.2.

Utilizing goals derived from the evolution of greenways, reorganized according to abiotic, biotic, and cultural functions, an initial list of potential program was generated. The goals and initial program ideas were then looked at simultaneously to identify the key questions that would need to be addressed in order for the goals and programs to become realistic opportunities for the River North Greenway. The questions were answered in terms of

what specific inventory pieces would need to be analyzed. But this alone left the abiotic, biotic, and cultural realms stratified.

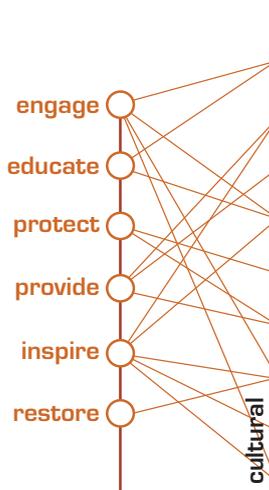
In order to strategize the greenway as a dynamic mosaic composed of abiotic, biotic, and cultural functions working together as a holistic system, the three realms had to be merged. In order to do this, the concepts of landscape ecology were drawn upon to envision the abiotic, biotic, and cultural realms integrating spatially as matrices, patches, and corridors. These three spatial components were further adapted to be more indicative of function—matrices as context, patches as destinations, and corridors as connections. The proposed inventory was then reorganized and synthesized into these categories.

The following content will first set the historical background of the South Platte River and the greenway movement in Denver. The site visits will then be explored and documented. Finally, the proposed inventory will be analyzed as to how it can inform design through matrices as context, patches as destinations, and corridors as connections.



[3.1]

3.1: Project Development Process. This diagram is an abstracted visualization of the project development process, this chapter will discuss the site inventory. (Christie Murman)



site visit → human experience

goals	program generation	exploration
Educational and Interpretative	outdoor classrooms temporary exhibits / displays educational / wayfinding signage path embedded information	Who will the users be? What are the educational opportunities?
Scenic Aesthetic	nature trails habitat patches and corridors observation decks lookout towers	Are there high points or vista points? What is the character of the surrounding context?
Diversity of Recreational and Leisure Opportunities	cognitive playgrounds park amenities open lawns whitewater activities sport fields	Where are the current recreational opportunities? What are the key entertainment centers?
Historic and Cultural Heritage Preservation	interpretive history signage neighborhood themed parks and gateways adaptive industrial remnant re-use	What are the key historic districts, buildings, remnants? What is the character and vitality of the surrounding neighborhood?
Public Safety	outdoor concert / film venues picnic meadows	What are the surrounding land uses? Where are high crime areas? neighborhood?
Trail Network	boardwalks crushed rock paved single-track	Where are the existing trails and what material are they? What are the key access points, barrier to access, trailheads? Where are there opportunities to tie into other forms of alternate transportation?
Public Art	seating fountains mileage markers	Where does public art exist? Are there art-oriented neighborhoods in Denver?
Economic Development	lighting trail maintenance multiple access points	Where are there vacant lots or potential land to develop adjacent to the greenway? What land is publicly owned?
Community Engagement and Interaction	interactive sculpture local design competitions outdoor studios access responsive to new development diversity of program community gathering spaces ecologically responsible	What are the demographics of the Neighborhoods? What are the opportunities to get involved?
Understand Climatic Conditions	neighborhood adopted parks / segments design / build projects community gardens / urban agriculture	What is the climate of Denver, CO?
Restore and Protect Floodplain and River Health	seasonal program diversity shelter emergent benches meanders	Where is the floodplain? Where has the floodplain been encroached and where are the opportunities to restore? What is the general condition of the South Platte River?
Increase Carbon Sequestration	tree-planting programs cover crops / urban agriculture	What are the most effective carbon sequestering techniques? Where do these techniques exist and how could they be expanded?
Manage Stormwater and Improve Water Quality	wetland basins and channels detention basins riffle-pool sequencing backwater wetland pools	What is the natural drainage pattern and stream system? Where could stormwater be daylighted?
Naturally Provide for Erosion Management	debris and sediment capture catch basins grass swales and buffers rain gardens riparian buffer pervious materials vegetate banks system of terrace walls	Where are the primary impervious surfaces? What determines bank stability? Where are banks stable? Where are banks unstable?
Improve Soil Quality and Nutrient Levels	increase biodiversity reduce impervious surfaces aerate	What are the current soil conditions? What are means for increasing soil quality?
Increase Air Quality	tree-planting programs vegetate	What are means for increasing air quality?
Foster Biodiversity	riparian edges grasslands meadows wooded areas wetlands / marshes	What are the typical plant species and ecotypes of Denver? Where does strong biodiversity on the site? What are invasive species to beware of?
Conserve Resources	alternative transportation routes solar power wind power	What resources are important to conserve within a greenway?
Increase and Enhance Wildlife Habitat Patches and Corridors	connect wildlife habitat separate from human use	What are the typical wildlife species of Denver? What are the native ecotypes of Denver? Where are there vacant lots or development opportunities? What are adequate patch size and corridor widths for each species?
Allow for Disturbance and Successional Regimes	patches adequate for burning community gardens demonstration gardens	What are these regimes? Are they possible?
Establish Urban Agriculture / Community Gardens	sustainable agriculture demonstrations urban farm	What site conditions are important to community gardens?

cultural

abiotic

biotic

inventory

analysis

design strategy

- user matrix
- viewpoints and vistas map
- parks map and amenities matrix
- entertainment nodes map
- historic landmarks map
- neighborhood map and character study
- land use map
- crime density map
- trail map
- access points and barriers map
- proposed rail map
- transportation?
- existing public art
- developable land map
- proposed infill and development
- population density
- community programs
- climate discussion
- floodplain map
- carbon sequestration discussion
- river and tributaries map
- stormwater outfalls map
- primary impervious surfaces
- bank stability analysis
- soil map
- soil quality figures
- air quality figures
- ecotypes and species matrix
- alternative transportation map
- ecotype and wildlife matrix
- habitat patch and corridor figures
- disturbance and successional regime discussion
- existing community garden map

matrices:: context

District Character and Historical Overview

Population Estimate and Projections

Ecosystem Services

Climate

Disturbance and Successional Regime

Community Programs and Involvement

patches:: destinations

Parks and Recreation

Cultural Catalysts

Proposed Infill and Developable Fragments

Viewpoints and Vistas

Existing Ecosystem Fragments

corridors:: connections

Potential User Matrix

River Health

Corridor Topography

Pedestrian Circulation

Contextual Access

strategizing a dynamic mosaic

- 1 abiotic and biotic mat
- 2 cultural node overlay
- 3 connectivity spine

3.2: Site Inventory Process. In order to determine what specific elements and systems of the site are most critical to inventory and analyze in terms of the development of the project, there was a process of goal seeking, program generation, exploration, and inventory synthesis. *(Christie Murman)*

BACKGROUND

history of the south platte river and the denver greenway movement

The South Platte River was first documented by fur traders in 1813, but did not become well known to the outside world until 1820 through the accounts of Army Major Stephen Long's expedition from Nebraska out to Colorado's Front Range. Long described the South Platte as "a dreary and monotonous plain, sparingly skirted with narrow undulating lines of timber, which grow only along the margins of considerable streams of water" (Kisling 2002).

It was the North Platte River that was originally the primary road westward for 19th-century settlers, headed to Oregon and the California gold fields. But in 1859 that changed, gold was discovered at the confluence of Cherry Creek and the South Platte and Denver was established. The South Platte became a primary route west as gold seekers followed it on their rush to the Rockies. As the mining industry grew, the waters became contaminated to the point it was no longer safe to drink. Smelters, slaughterhouses, mills and factories dipped

into the River for fresh water but dumped their wastes right back into it. In addition, settlers began tapping the River for irrigation water. In fact, in 1860, the Union Colony known today as Greeley was granted the first South Platte irrigation rights (Kisling 2002).

Mining grew and with it grew Denver, agriculture, trade, and population. The River was not suited to keep up with this growth. Water companies multiplied and water wars began, all centered on the minimal River flow which "in the summer was as easy to cross as a street" (Kisling 2002). But in 1894, the Denver Union Water Company won the wars by tapping the South Platte upstream and supplying Denver with water by gravity cheaper than its rivals could by pumping it up from the river bottoms (Kisling 2002).

In 1965, disaster struck, the South Platte flooded leaving "25 dead; 1,500 homes and 750 businesses damaged or destroyed" (Kisling 2002). On that particular day, the River had a

flow of over 150,000 cfs while an average 100 year flood is estimated at only 18,000 cfs. Due to early warnings, a significant amount of lives were saved, but there was over \$110,000 in damages which would be equivalent of \$1 billion in damages today (Urbonas 2004).

"As the 1965 flood worked its way through Denver, the countless car bodies, trailers, tires, appliances, concrete and asphalt rubble, etc. were all spewed back at the humans who had presented the River and its floodplain with these "deposits" for over a century" (Urbonas 2004).

By the 1970's, the River was almost completely dominated by industry and rail. Over 250 drains spewed anything and everything unwanted, undesired, or in need of disposal such as storm water runoff, oil, grease and raw sewage alongside, adjacent to or directly into the River. Few trees survived along its banks, wildlife and fish were relatively non-existent and flow was harmful and potentially deadly if ingested (Urbonas 2004).

Consequently, in 1974, Mayor Bill McNichols appointed Joe Shoemaker as chairman of the Platte River Redevelopment Committee and the effort was initiated to meet five seemingly “impossible” goals (Greenway Foundation):

1. Improve the water quality.
2. Remove boating obstacles.
3. Build a system of hike-bike paths.
4. Create park space.
5. Maintain the flood carrying capacity

(Urbonas 2004).

The work began with Confluence Park, the birthplace of Denver and was shortly thereafter followed by Globeville Landing Park. The River slowly began to see a change. In 1976, the Greenway Foundation was established as a non-profit organization in charge of managing the redevelopment and restoration of the River. By 1983, they had constructed 12 riverside parks, 10.5 miles of concrete hike-bike trails, and 9

white-water boat-chutes or passages (Urbonas 2004).

In 1996, the mayor of Denver at the time, Wellington Webb, declared it “The Year of the Platte” and funneled about \$1 billion in public money into new streets, parks, trails, wildlife and water-quality improvements and economic development incentives into what is known as the Central Platte Valley. The investment was quickly followed by condo developers, eager to utilize the new river as a “front-yard” and “playground” (Blevins 2007).

The Greenway Foundation continues to partner with the City and County of Denver and other local and regional jurisdictions to further enhance, preserve and protect our urban waterways. Since, 1974 the Foundation has created seventeen riverside parks, numerous white water boat chutes, and a nationally recognized urban trail system, collectively known as the South Platte River Greenway (Greenway Foundation).

Most recently, the Greenway Foundation produced a master plan for the River North Greenway that strives to transform the River North area from an eyesore into one of the most popular public places in Denver—additionally serving as an economic stimulus for development and redevelopment (RINO 2009). The plan is in direct response to the success of the Central Platte Valley as a valuable environmental and recreational amenity and economic driver for Denver.

SITE VISIT

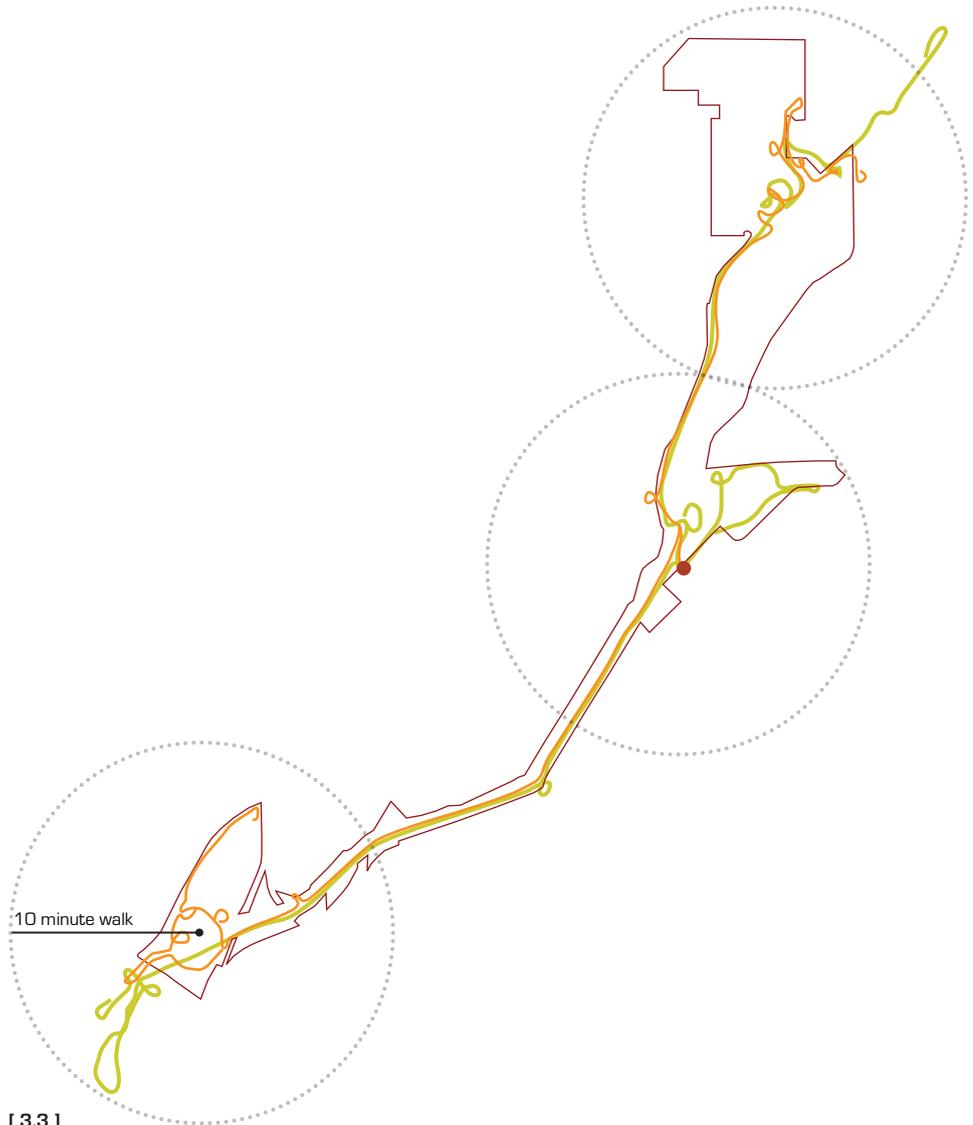
observations and experience

Two site visits allowing for observation and experience of the River North greenway as it exists were conducted, the first on August 15, 2009 and the second on November 6, 2009. These dates allowed the greenway to be observed with full foliage and then with nearly no foliage. Both times I set off on my bike from the Globeville Landing Park parking lot, traversing north up to Heron Natural Area and then tracing on my track back down to the City of Cuernavaca Park. Approximately three hours time allowed for coverage of the trail with multiple stops for pictures, further exploration, back-tracking, sign reading, etc.

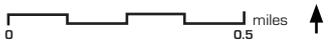
I was impacted by the diversity of experiences the site had to offer. The South Platte River in some locations offered a beautiful scenic aesthetic but in other areas was heavily encroached and resultantly degraded. The parks were desolate with little to no activity, claimed by graffiti, although the potential of the available space was exciting. The Heron Natural Area appeared pristine if taken out of

its industrial context, with wetlands, a pond, and habitat that was clearly supporting wildlife and fostering biodiversity. However, in context it was uncomfortable to approach and felt neglected and unvisited. The trail was functional for the entire stretch but the multiple viaducts, railroad crossings, and the lack of people around put me at edge when there was a passer-by or interaction on the trail. The context ranged from new infill residential units such as TAXI, to manufacturing warehouses, stockyards, rail yards, vacant lots, freeways, and derelict post-industrial structures.

Figure 3.3 illustrates the routes I took on each site visit. Figure 3.4 , on the following page, is a photo montage that attempts to capture the questions and experiential qualities of the site visit.

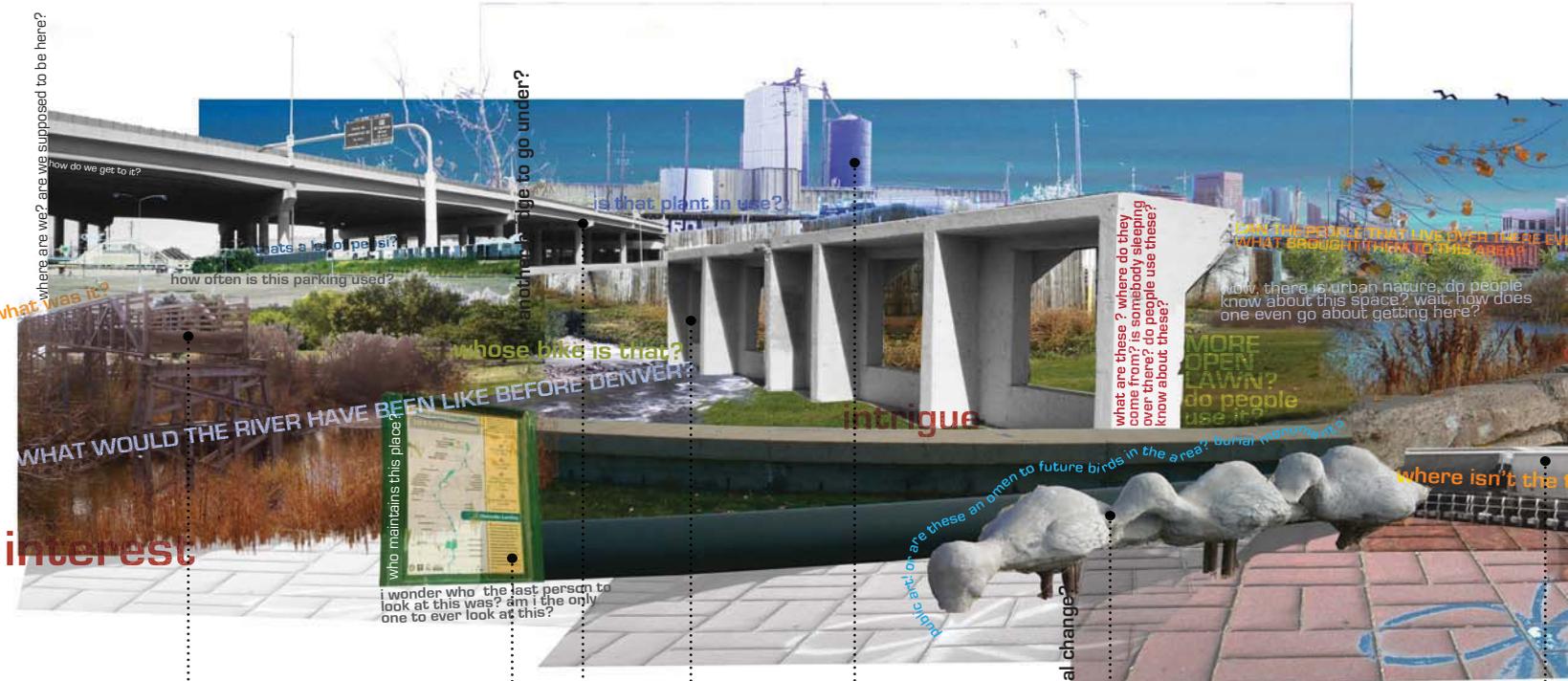


- legend**
- site boundary
 - august 15 bike route
 - november 3 bike route
 - point of beginning/end



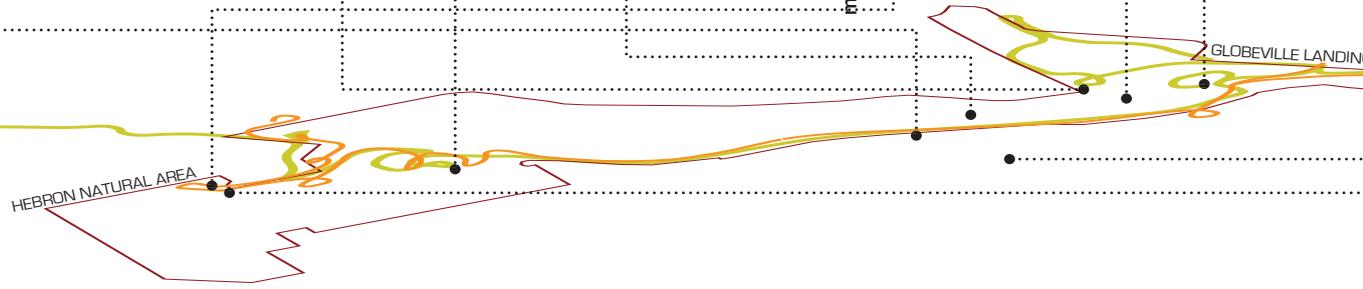
[3.3]

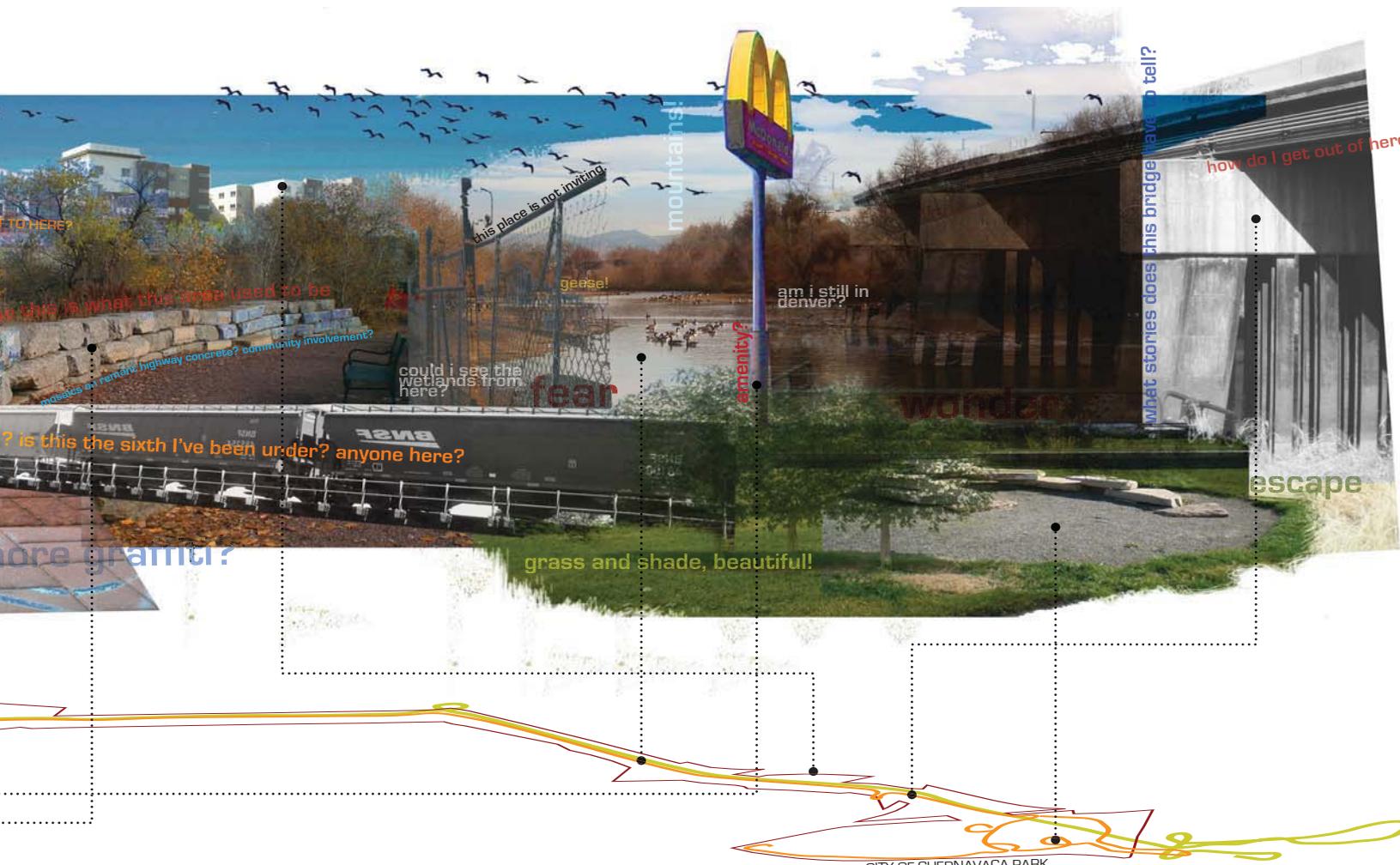
3.3: Site Visit Bike Route. Two site visits allowed for observation and experience of the River North Greenway as it exists. *(Christie Murman)*



interest

m intrigue





CITY OF CUERNAVACA PARK

3.4: Site Visit Experience Montage. A photo montage utilized to graphically capture the questions and experiential qualities of the site visit. Images are cross-referenced with the general location taken on the greenway. *(Christie Murman)*

MATRICES:: CONTEXT

district character and historical overview

There are six districts that directly interact with the River North Greenway: Central Platte Valley, Highlands, River North, Globeville, Elyria/Swansea and Prospect. Figure 3.5 illustrates the general area of these neighborhoods. Following is a brief discussion on the character of each district.

01 central platte valley

Denver was born in 1858 at the confluence of the Cherry Creek and the South Platte River or what is now referred to as the Central Platte Valley. Initially composed of residential and commercial uses the valley slowly evolved to become industry dominated. But in the 1980's, a major redevelopment effort cleaned up the river and revitalized the area to the residential and commercial culture it once knew. It is now one of Denver's most vibrant mixed-use districts with multiple lofts, REI headquarters, and Commons Park (Denver Infill).

02 highland

Highland district lies on a bluff northwest of downtown Denver from which derives its name. It is one of the city's oldest districts, characterized by Victorian-era architecture and small neighborhood commercial blocks where the streetcar used to stop. With its great views of the skyline, proximity to downtown, and historic flair, Highland has seen significant amount of infill projects and building renovations (Denver Infill).

03 river north

The River North district will be the primary generator for this project. Almost entirely industrial in nature, the area has long been cut off from the city by a mess of rail yards and viaducts. But the area has recently been discovered due to its authentic industrial character and its proximity to the river and downtown. Once the home of the Denargo Market, Denver's wholesale hub for fresh produce, it is now dominantly the host of a vibrant art scene, transforming the area from an isolated industrial enclave into a thriving mixed-use district that offers an eclectic urban setting for a density of designers and artists (Denver Infill).

04 globeville

The Globeville district is one of the older areas of the city, it was not until 1902 that it was annexed into the Denver. It was originally established on ranch land purchased by the Globe Smelter Company. As other smelter and packing houses located nearby, local workers were attracted to Globeville. Construction of Interstate 25 and Interstate 70 in the mid 1900's unfortunately bisected the district horizontally and vertically. Although, a population of people remains within this core area, as the edges are zoned and used for heavy industry. The population of the neighborhood is ethnically diverse and in recent

times has been one of the highest areas of crime in the City. (The Piton Foundation).

05 elyria/swansea

The Elyria/Swansea neighborhood was an early site of settlement surrounding the birth of Denver, people and industry were attracted to this area as it was flat and close to the South Platte River. The construction of Interstate 70 bisected the site east to west although it remains anchored by the Denver Coliseum, National Western Complex, Purina manufacturing center, and the Pepsi bottling distribution center. Crime and gang activity is common in this district. An area plan for the Elyria and Swansea neighborhoods was begun in 2007 and is a vision for a healthier and more livable neighborhood (The Piton Foundation).

06 prospect

Prospect was characterized by derelict industrial warehouses for most of the 20th century. But the redevelopment of the South Platte River has brought new life to this district, several historic conversions have and continue to take place, building on the energy of the nearby Coors Field and the serenity of the City of Cuernavaca Park (Denver Infill).

population estimate and build-out projection

overview

As part of the River North master planning effort, a current population estimate (Figure 3.6) and a build-out projection (Figure 3.7) were compiled. The current population estimate shows a lack of density in close proximity to the greenway. This is clearly indicative of the lack of social vitality that has been noted within the greenway corridor. The build-out projection is indicative of the influx of residents to this area with the infill and redevelopment projects that have and continue to be proposed and completed. With this increase in people living close to the greenway, it is legitimate to assume an increase of activity within the River North greenway.

opportunities

- Provide ample connections to the greenway from the areas where large population increase is projected.
- Develop program that responds to the character of the infill and development projects yet creates a contrastive, unique experience specific to the greenway and the South Platte River.

limitations

- Large homeless population will be displaced that currently resides within this stretch of the South Platte corridor.

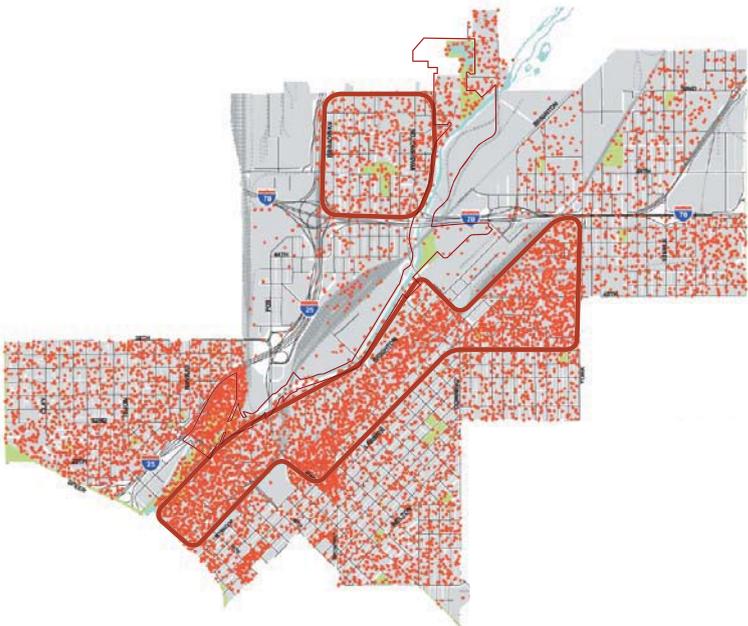


legend

- site boundary
- each dot represents 10 people



[3.6]



legend

- site boundary
- each dot represents 10 people
- significant growth districts



[3.7]

3.6: Population Estimate. A current population estimate for the River North Greenway planning area. *(Christie Murman, Source: RINO)*

3.7: Build-out Population Projection. A build-out population projection for the River North Greenway planning area. *(Christie Murman, Source: RINO)*

ecological goods and services

overview

Defined as benefits people obtain from ecosystems, ecosystem services can be understood as air quality, soil quality, nutrient cycling, carbon sequestration, and climate and disease regulation among others. Because these services are generally free, the true worth of healthy ecosystems is often not recognized or accounted for in decision-making (USDA). However, River North greenway, as a key piece of the Denver metropolitan green infrastructure, can bolster these services.

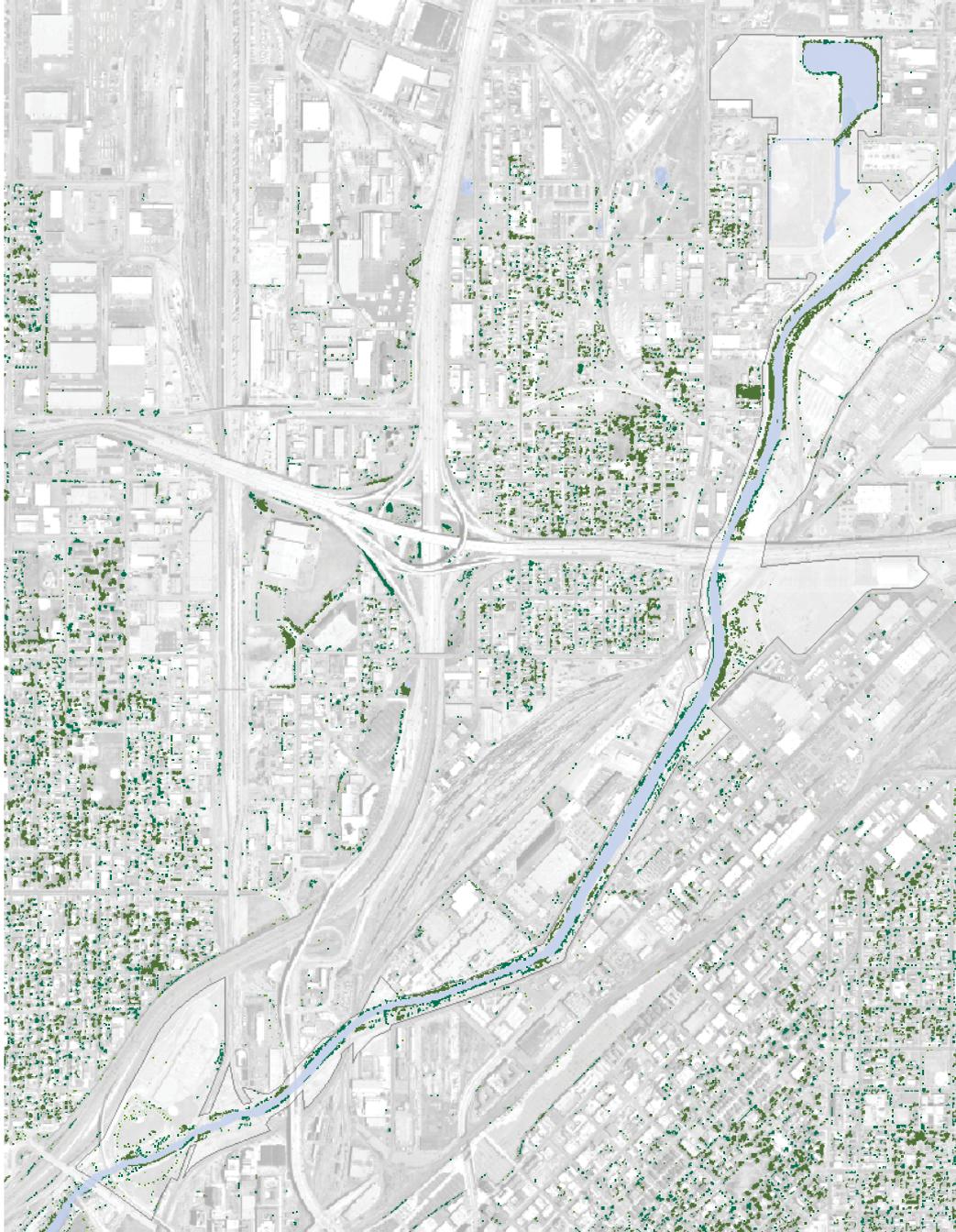
Forests and wetlands are most efficient in providing ecosystem services and should be integrated into the River North greenway as much as possible. Although forests may not be feasible, tree cover of any kind is of benefit. Figure 3.8 shows the current tree cover and water on the greenway and in the surrounding context. Because of the industrial context the trees are limited primarily to the neighborhoods and on the banks of the South Platte River.

In 2007, Denver kicked off the Tree by Tree - Mile High Million program in 2007 with a goal

of planting one million trees by 2025. This is part of the Greenprint Denver initiative that promotes ecologically-friendly practices and sustainable development within the community. River North greenway could substantially contribute to that goal by increasing the amount of trees in the corridor. In addition, wetlands should be established as a means of stormwater management, this will be discussed further in the discussion on the health of the South Platte River (Greenprint Denver).

opportunities

- Increase the amount of trees within the corridor and in the parks to foster ecosystem services that are depleted due to the industry that dominated the context.
- Re-construct wetlands as an expansion of Heron Natural Area and at stormwater outfalls along the river, this will foster ecosystem services and improve the management of stormwater and water quality.



legend

- site boundary
- deciduous tree cover
- coniferous tree cover
- south platte river and ponds



[3.8]

3.8: Ecological Goods and Services. Forests and wetlands are most efficient in providing ecosystem services and should be integrated into the River North greenway as much as possible. Although forests may not be feasible, tree cover of any kind is of benefit. This diagram depicts the current tree cover and water on the greenway and in the surrounding context. *(Christie Murman, Source: Denver GIS)*

climate

overview

Denver is located on the high plains at the foot of the Rocky Mountains. The climate is characterized by moderate temperatures, low humidity, and more than 300 sunny days a year making it an ideal climate for year-round outdoor activity and recreation.

With around 16 inches of precipitation annually, Denver's climate is semi-arid; winter storms are short-lived and the snow melts quickly (MetroDenver).

opportunities

- Use of the greenway should be planned equally for all four seasons.
- Provide spaces that embrace the sun in addition to structures that provide protection from the sun during the warmer summer months.

disturbance and successional regimes

overview

Due to the urban development that has encroached the River and its corresponding ecosystems, the disturbance and successional regimes that are fundamental to the maintenance of healthy and sustainable ecologies have been limited to nonexistent.

With an abridged understanding of these regimes, it is understood that the as much ecosystem restoration as possible will seed a successional regime that will continue into the future. The short-grass prairie may be able to be maintained by fire if designed to accommodate a staged maintenance activity on a biennial basis.

opportunities

- Recreate and restore ecosystems to support disturbance and successional regimes.

limitations

- Urban context and proximity will make it difficult to strategize these regimes.

3.9: K-5th Grade Excursions. Denver elementary students get a first-hand experience with the South Platte River on a field-trip organized by SPREE. *(Source: SPREE)*

3.10: Fishing for Kids. Kids give fishing a hand on the South Platte River during a SPREE organized outing. *(Source: SPREE)*

3.11: Art on the River. A mural painted at Confluence Park by Art on the River. *(Source: SPREE)*

3.12: River Sweep Poster. A poster advertising the annual South Platte River Sweep that happens at Confluence Park. *(Source: Greenway Foundation)*



[3.9]

community programs

overview

There are many community programs that foster involvement with the River and the greenway, most especially within the Central Platte Valley district. By building upon these programs within the River North greenway, it is likely that the people that live in close proximity would begin to get involved and take on responsibility for the greenway. These programs include the following:

South Platte River Environmental Education Program:

SPREE: works with public schools in Denver to integrate a field day and South Platte curriculum.

K-5th Grade Excursions: a series of curriculum that exposes students to the a variety of experiences in conjunction with the river and natural spaces along the river (Figure 3.9).

Fishing for Kids: provides an exciting day of fishing for students, in addition to a fishing rod they keep at the end of the day (Figure 3.10).

Art on the River: The Art Students League of Denver works with kids to create artwork to be displayed along the river (Figure 3.11). (SPREE)

CityWild: provides low income and culturally diverse youth with outdoor and environmental learning opportunities, specifically rafting trips on the South Platte River (City Wild).

River Sweep: community clean-up effort to remove trash and debris along the banks and trails of the South Platte (Greenway Foundation). Figure 3.12 shows a poster advertising the clean-up effort.

opportunities

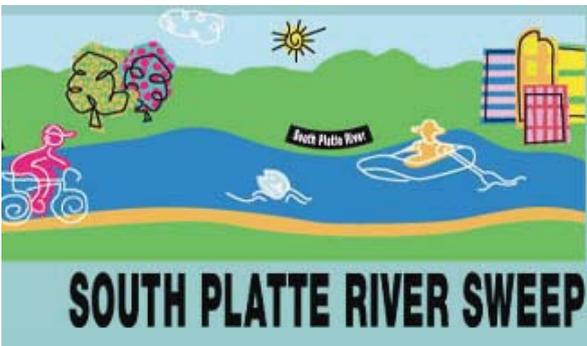
- Develop design program elements that would aid in staging these activities, such as outdoor classrooms, an area for public art projects, and fishing accessible banks.
- Educate residents on the community involvement that is behind the clean-up and care of the river.



[3.10]



[3.11]



[3.12]

PATCHES:: DESTINATIONS

parks and recreation

overview

There are three parks that exist within the site, as shown in Figure 3.15: City of Cuernavaca, Northside Park (3.13), and Globeville Landing Park (Figure 3.14). Although these parks occupy a large amount of the site, the program and activities they offer is limited, they are characterized by vast amounts of open lawn or turf. In most cases they include a seasonal rest room although those appear to be vandalized and unused. There is increased activity at the south end where there is kayak course on the river spilling in from the Central Platte Valley, a softball field and a picnic shelter. The City of Cuernavaca sees the most use due to its relativity to the activity of Central Platte Valley and Downtown.

opportunities

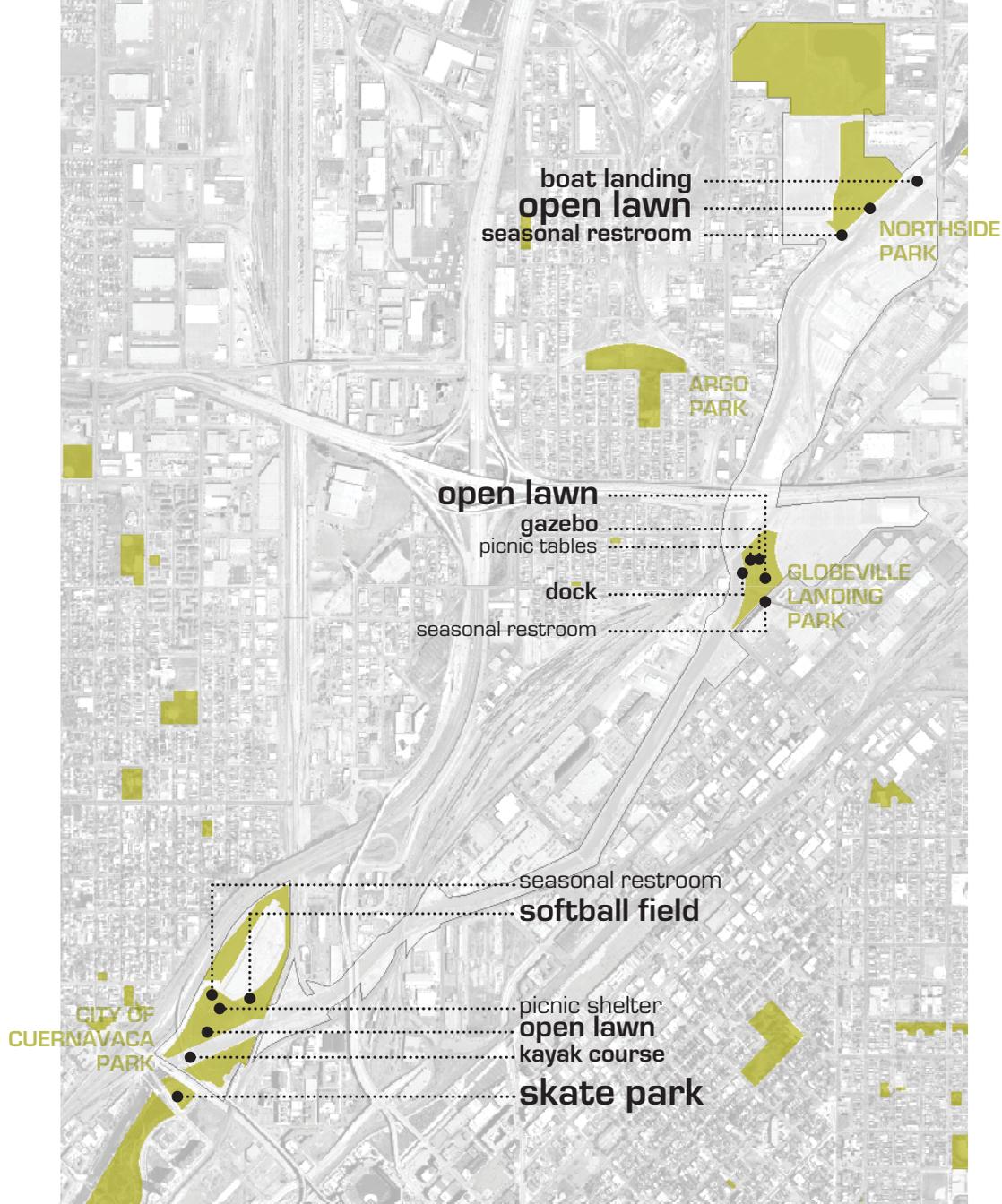
- Introduce program and activities that are destinations for potential users These could be sports fields, entertainment venues, community gardens. This will begin to stimulate the social vitality that the site is lacking.
- Enhance the existing parks to become the primary spaces of the greenway, reevaluating connections into and out of these sites and the program and spaces they offer.

[3.13]



[3.14]





legend

— site boundary

● parks



[3.15]

3.13: Northside Park. Open lawn at Northside Fields offers space for activities but program and draws to the site are limited. *(Photo by Christie Murman)*

3.14: Globeville Landing Park. Globeville Landing Park is desolate, with excessive turf that is generally unoccupied. *(Photo by Christie Murman)*

3.15: Parks and Recreation. There are three parks that exist within the site: City of Cuernavaca, Globeville Landing, and Northside. Although these parks occupy a large amount of the site, the program and activities they offer is limited, as they are characterized by vast amounts of open lawn or turf. *(Christie Murman, Source: Denver GIS, Site Visit)*

cultural catalysts

overview

Cultural catalysts (Figure 3.18) are defined within the context of the greenway as elements that have the potential to attract people. These catalysts offer something unique whether its through entertainment capacity, historical value, or artistic interest.

The site is in proximity to three large entertainment centers that draw large amounts of people for events: National Western Stockshow Complex, Denver Coliseum (Figure 3.16), and Coors Field. A strong connection of these venues to the greenway could produce economic benefits for the venue as well as catalyzing the social vitality of the site.

Historically charged sites such as the remnants of the Sewage Treatment Facility in Northside Park (Figure 3.17), the former sheepherder bridge in conjunction with the National Western Complex and the old Denargo Market area could establish a unique identity for the site. In addition the incorporation of public

art relays a sense of value and significance to an area as well as the presence of educational signage as a means of engaging the user.

Cultural catalysts stimulate a connection between the user and the site.

opportunities

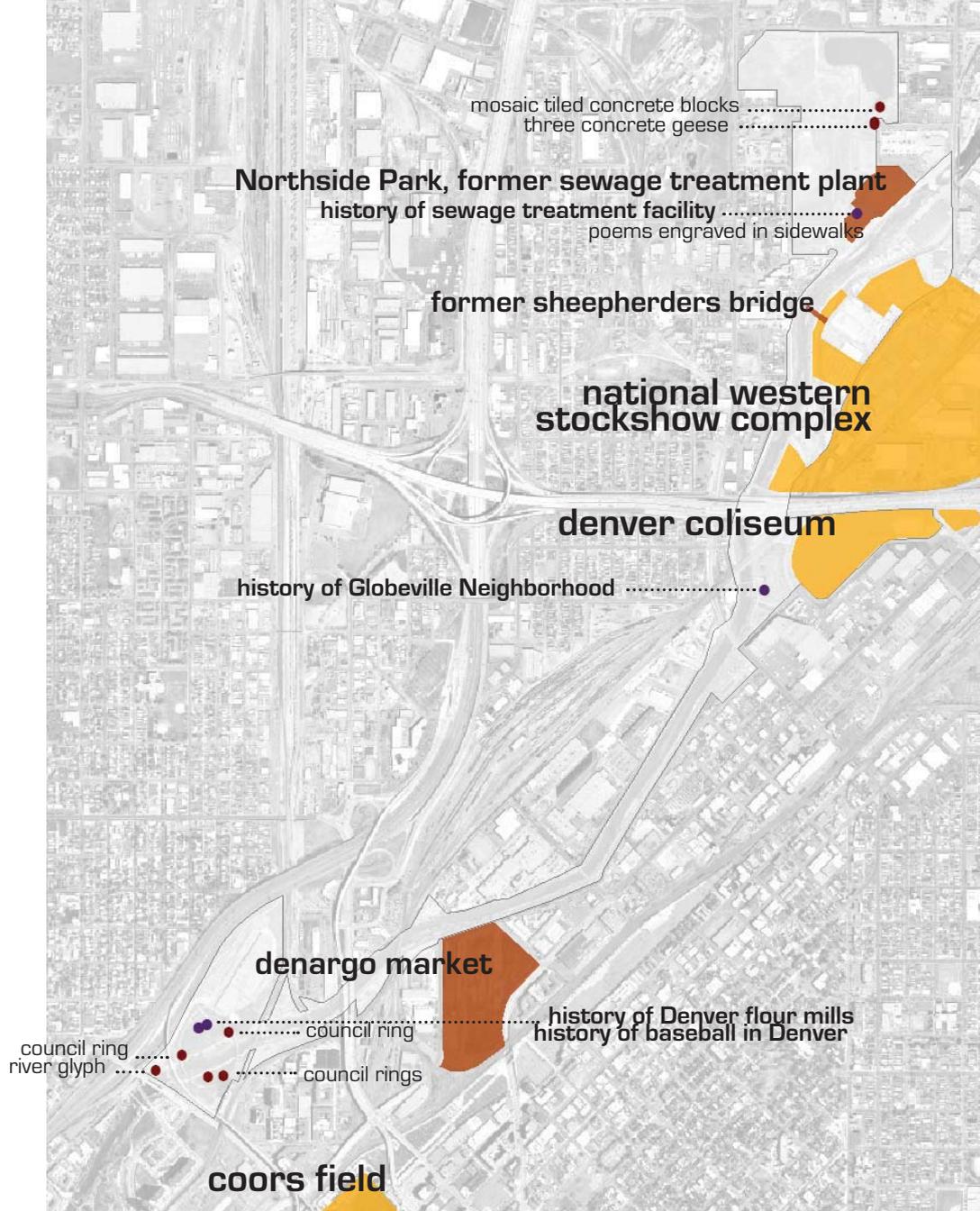
- Increase programmed activity in proximity to the entertainment centers.
- Draw upon the historically charged sites to create an identity for the greenway.
- Incorporate educational and interpretive signage to engage and educate the users in terms of the historic and cultural significance of the site.
- Increase the amount of public art, specifically in terms of projects where the community can be involved and engaged.
- Propose community gardens as a space for community engagement and involvement.

[3.16]



[3.17]





legend

- site boundary
- historical remnant
- entertainment center
- public art
- informational signage
- community gardens (none existing)



[3.18]

3.16: Denver Coliseum. The Denver Coliseum is a large entertainment center for Denver, offering events year-round. *(Photo by Christie Murman)*

3.17: Northside Park. Northside Park was once a sewage treatment facility for the City of Denver. Structural skeletons remain and are integrated within the existing park. *(Photo by Christie Murman)*

3.18: Cultural Catalysts. Cultural catalysts are defined within the context of the greenway as elements that have the potential to attract people. These catalysts offer something unique whether its through entertainment capacity, historical value, or artistic interest. *(Christie Murman, Source: Denver GIS, Site Visit, RIND)*

proposed infill and developable fragments

overview

The greenway should be designed and envisioned as an extension of proposed infill into the landscape. With the influx of residents that will occur in the proposed infill, there should be connections that establish a relationship between these developments and the greenway.

Although the proposed infill, such as TAXI development (Figure 3.19) and Denargo Market redevelopment (Figure 3.20), are located primarily in the southern portion of the site (Figure 3.21), if the trends continue as they have, infill will continue to migrate to the north. The greenway can be a means for stimulating economic development much like in the Central Platte Valley.

Therefore, the developable greenway

fragments should be thought of in terms of generating further economic development of the River. As a first step, this can be done through the abiotic and biotic restoration and revitalization of these industrially compromised areas.

opportunities

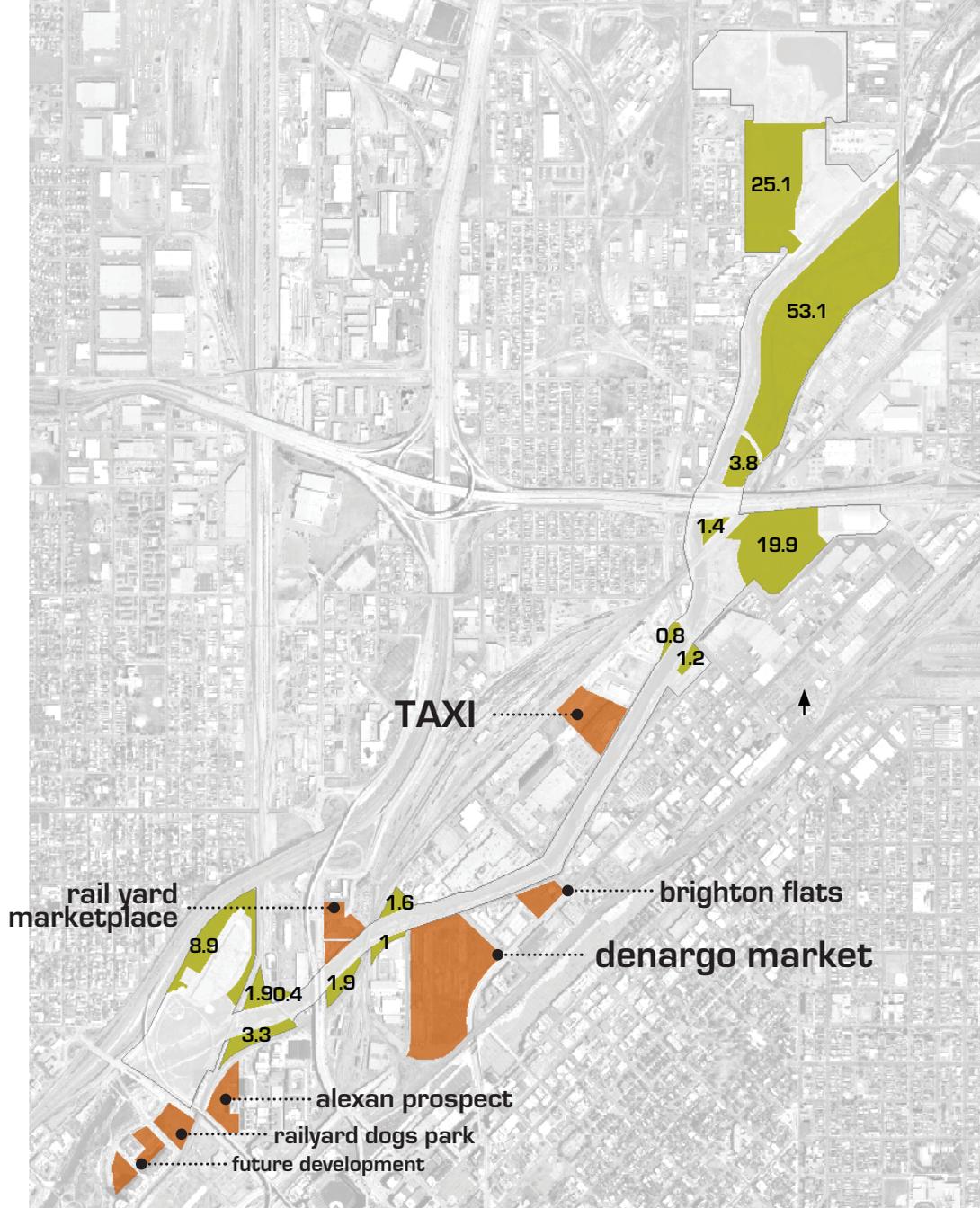
- Ensure access to the greenway from the proposed infill locations.
- Continue the progression of economic development up the valley to the North by strategizing uses in the developable fragments that will encourage residents, businesses, etc.
- Make residual spaces efficient in terms of ecological services.

[3.19]



[3.20]





legend

- site boundary
- proposed infill
- developable greenway fragments and acreage



[3.21]

3.19: TAXI Mixed-Use Development. The TAXI mixed-use development already exists in its first phase and will continue to grow as the phasing progresses to the next stage. *(Source: Denver Infill,)*

3.20: Denargo Market Redevelopment. The redevelopment of Denargo Market is proposed and would further catalyze the River North District. *(Source: Denver Infill)*

3.21: Proposed Infill and Developable Fragments. The development of the greenway should be directly relative to proposed infill and capitalize on the developable fragments that exist along the greenway. *(Christie Murman, Source: Denver Infill, RINO)*

viewpoints and vistas

overview

Within an inward oriented urban context, views that extend outward, beyond the immediate context become very valuable. Within the River North greenway there are two vistas that would be considered desirable to the people of Denver. The first would be the view west out to the Rocky Mountains and the second would be the view south to the downtown Denver skyline (Figure 3.24).

These vistas are both able to be seen from the open lawn of Northside Park and the parking lot of the Denver Coliseum (Figure 3.23). From the west side of City of Cuernavaca Park there is an open view of the skyline (Figure 3.22) and from the east side there is a view out to the mountains.

opportunities

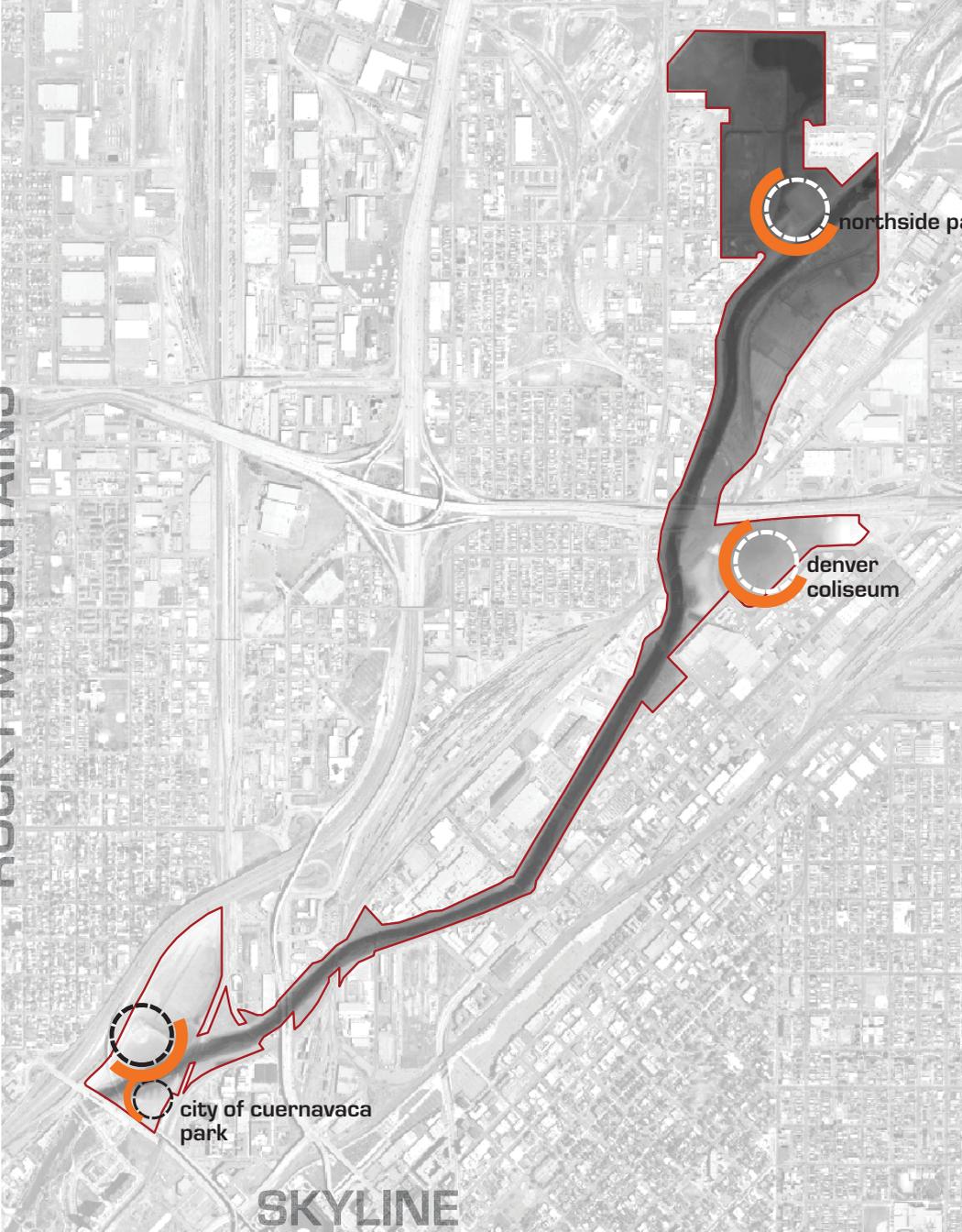
- Propose program that takes advantage of the vistas out of the site.
- Preserve the spaces that provide for the views out of the site.

[3.22]



[3.23]





legend

-  site boundary
-  elevation
- LOW HIGH
-  viewpoint
- viewshed



[3.24]

- 3.22: View from City of Cuernavaca Park.** The west side of City of Cuernavaca Park offers an open view to the downtown Denver skyline. *(Photo by Christie Murman)*
- 3.23: View from Denver Coliseum.** The parking lot of the Denver Coliseum offers an open view to the mountains and also to the downtown Denver skyline. *(Photo by Christie Murman)*
- 3.24: Vistas and Viewpoints.** Within the River North greenway there are two vistas that would be considered desirable to the people of Denver. The first would be the view west out to the Rocky Mountains and the second would be the view south to the downtown Denver skyline. *(Christie Murman, Source: National Map Seamless Server, Site Visit)*

existing ecosystem fragments

overview

With one of the foundational goals of the greenway being to increase abiotic and biotic function, the restoration of the ecosystems that historically occupied the river corridor and its context before the development of Denver is critical. The restoration and reestablishment of ecosystems will increase biodiversity, enhance wildlife habitat, and provide ecological goods and services such as improved air quality, soil quality, nutrient cycling, and carbon sequestration.

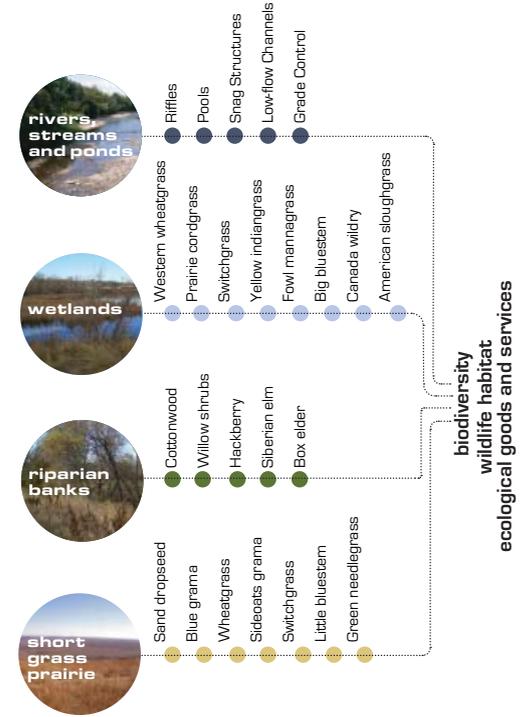
At the western edge of the high plains of Colorado, this area would be predominantly covered by short grass prairie if not for the development of Denver. The exceptions would be riparian corridors and the woody vegetation they support.

Therefore, the ecosystems typologies to be restored and increased within the site will be river, streams, and ponds, wetlands, riparian banks, and short grass prairie (Figure 3.25). Each of these require a specific plant palette and varying restoration techniques, as annotated in Figure 3.25.

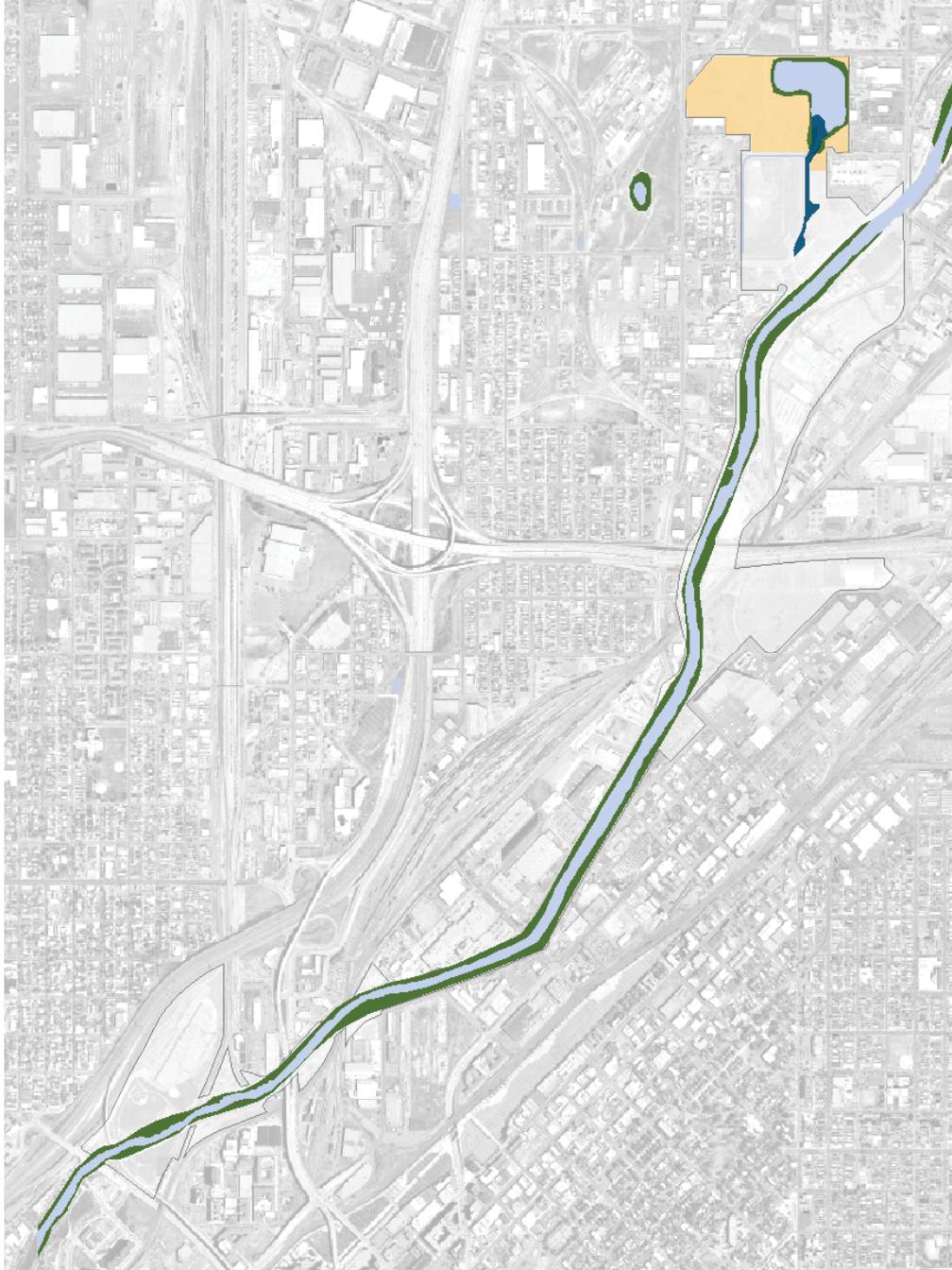
The ecosystem typologies all exist in some form or fragment within the site as indicated within Figure 3.26. South Platte River corridor and Heron Natural Area are most established as functioning ecosystems. In order to truly increase biodiversity, enhance wildlife habitat, and increase ecological services these fragments should be connected and expanded as much as possible.

opportunities

- Establish the restoration of ecosystems as a priority and preface to the infiltration of cultural nodes and circulation.
- Instill an environmental ethic and appreciation of these natural areas within the users by making them safe, approachable, and able to be interacted with; educational.
- Use ecosystem restoration as a means for improving the scenic aesthetic of the greenway.



[3.25]



legend

- site boundary
- wetlands
- river, streams, ponds
- wooded riparian banks
- short-grass prairie



[3.26]

3.25: Ecosystem Typologies. Four ecosystem typologies compose River North Greenway: river, streams, and ponds, wetlands, wooded riparian banks, and short-grass prairie. Each ecosystem is composed of plant species and supports biodiversity, wildlife habitat, and ecological goods and services. *(Christie Murman, Sources: Colorado Native Plant Society, Site Visit, Wildlife Department)*

3.26: Existing Ecosystems. This diagram generally indicates existing ecosystem fragments within River North Greenway. *(Christie Murman, Sources: Denver GIS, Site Visit)*

CORRIDORS:: MOVEMENT

potential users

overview

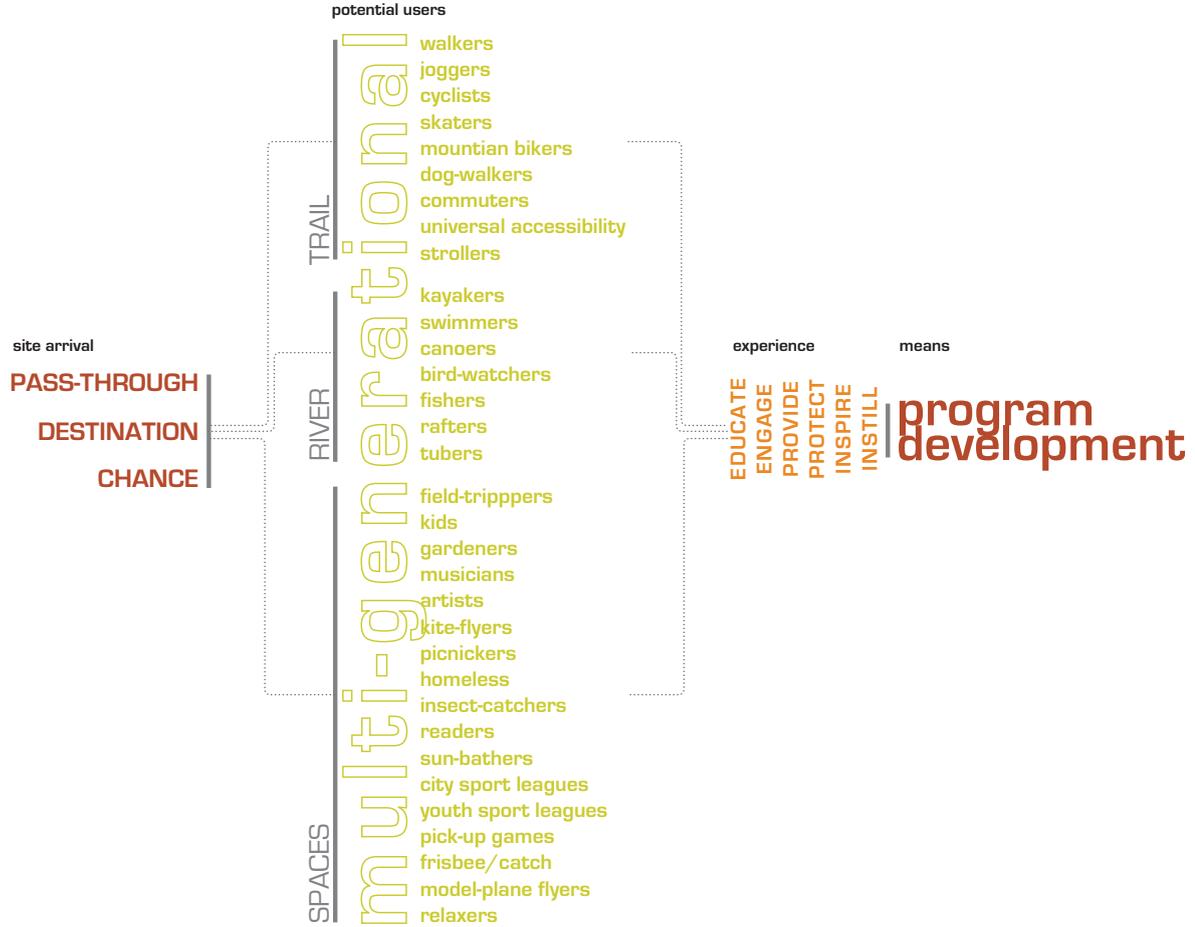
There are many potential users (Figure 3.27) that will come to the greenway. They will arrive at the site either as they pass-through utilizing the larger greenway network of Denver, as a destination, or they come across it by chance.

It is critical to consider the range of users and what they would desire within the greenway in terms of program and experience. An analysis of the potential users helps to inform the development of the program elements and systems.

For the purposes of this diagram, the users were stratified in terms of their use of the trail, river, and individual spaces.

opportunities::

- Diversify the program to accommodate the wide-range of potential users, this will allow the greenway to be more sustaining through time.
- Recognize the varying interests and motives for people coming to the site; passive and active.



[3.27]

3.27: Potential Users. This diagram indicates the range of potential users and the desired experiences to provide through program development. *(Christie Murman)*

topography

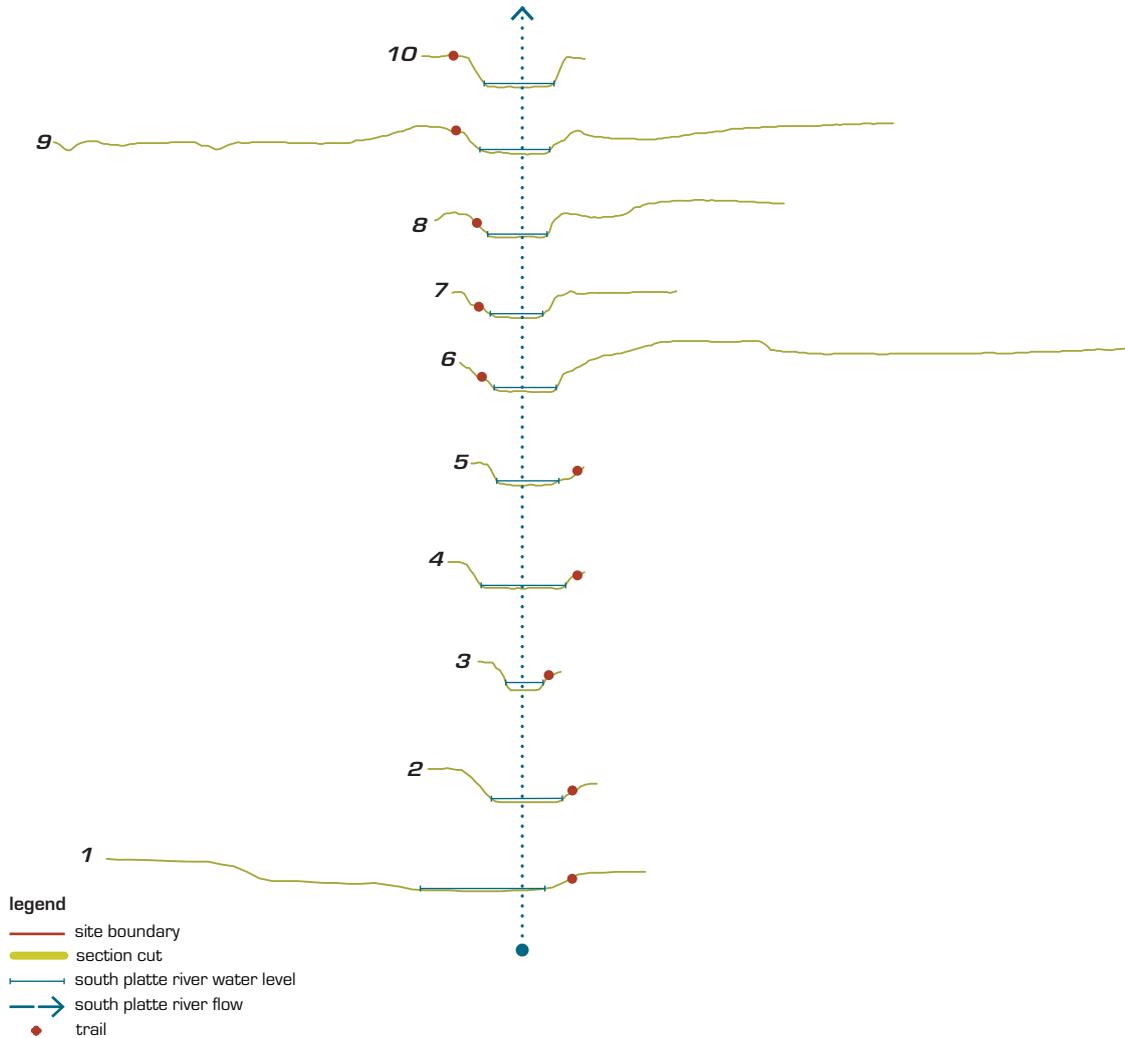
overview

The topography of the context is primarily flat, with slight terracing in the South Platte River valley (Figure 3.29), evident of its historic floodplain. However, due to the encroachment of the urban context, the river has become channelized and detached from its historic floodplain.

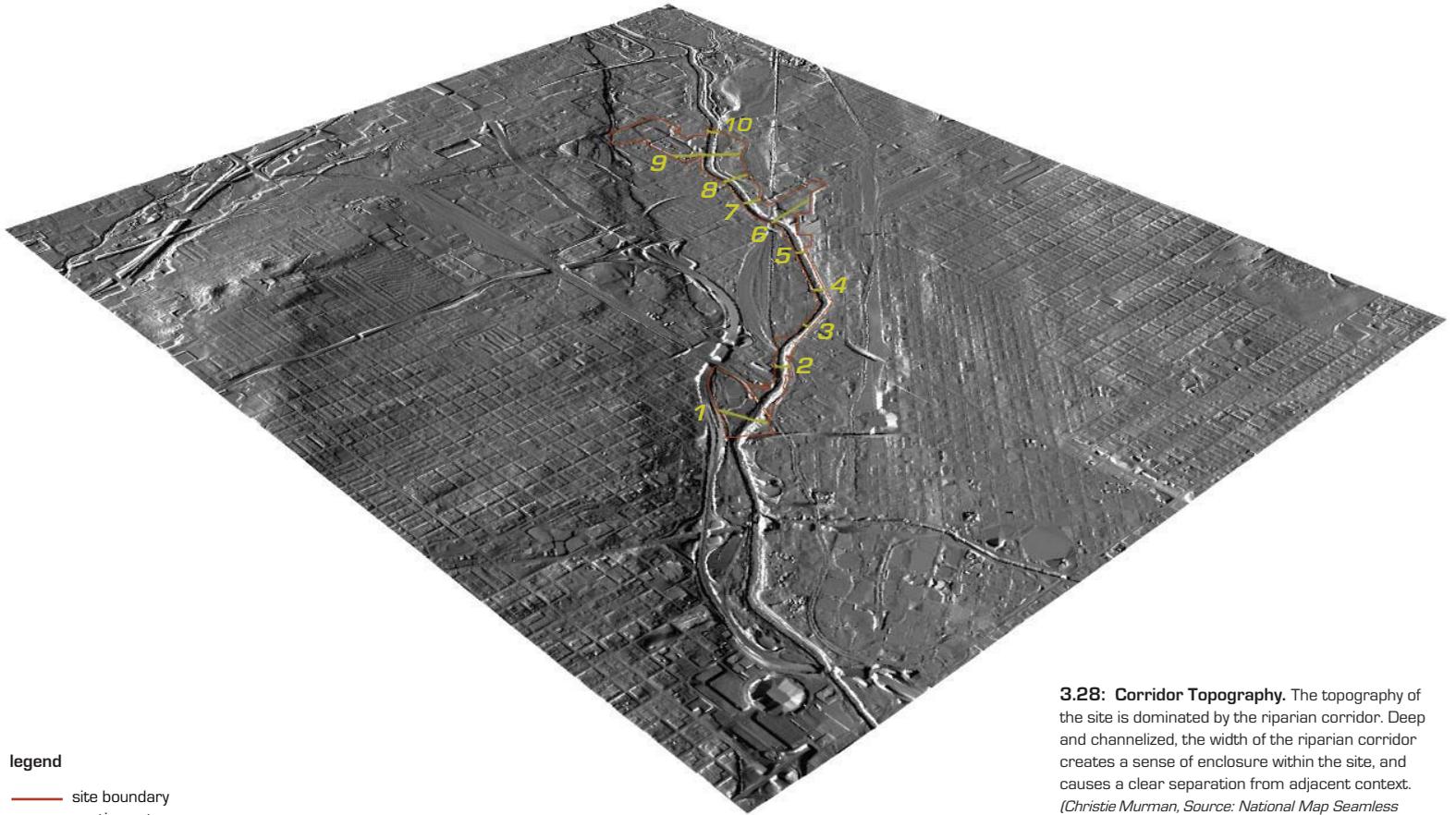
The topography of site is dominated by the riparian corridor. Deep and channelized the width to depth ratio of the riparian corridor creates a sense of enclosure within the site, providing a clear separation from adjacent context as diagrammatically represented in Figure 3.28. This can be freeing from the urban context but it can also encourage crime due to the lack of visual connection with adjacencies. The corridor should be opened up where possible to diversify enclosure with visual site lines and ultimately create an environment that instills a sense of safety.

opportunities

- Lay back banks primarily for stabilization, but also to decrease the sense of enclosure that is frightening to a user within an urban context.



[3.28]



NTS

legend

- site boundary
- section cut

[3.29]

3.28: Corridor Topography. The topography of the site is dominated by the riparian corridor. Deep and channelized, the width of the riparian corridor creates a sense of enclosure within the site, and causes a clear separation from adjacent context. *(Christie Murman, Source: National Map Seamless Server)*

3.29: Context Topography. The topography of the context is primarily flat, with slight terracing in the South Platte River valley, evident of its historic floodplain. *(Christie Murman, Source: National Map Seamless Server)*

river health

overview

The South Platte River, through the River North reach, is typical of an urban river—encroached and therefore channelized by development. The River has lost its ability to naturally maintain itself.

Figure 3.32 show that there are thirteen stormwater outfalls within the site that discharge nearly 20 square miles of urban runoff into the River. Banks are cut, oversteepened, and unstable; maintained by the concrete rip-rap at the base and sporadic vegetation up and down the length. The river is extremely flat with 0.2 % grade down its length. This results in high sediment deposition within the channel and at point bars. There are only two white water riffles within the reach indicating that there is a lack of riffle/pool sequencing typical of a healthy river.

The River has also been disconnected from its floodplain as it becomes more and more channelized. There is a chance a 50-year or 100-year storm would result in overflows along the west bank, but primarily high flows would result in scouring of the channel bed, bars and banks, and interruption of any structural diversity that may have existed within the channel.

Figure 3.30 and 3.31 are photos taken on site that exhibit existing conditions.

opportunities

- Provide grade control structures that simulate riffle/pool sequencing and provide opportunities for boating and fishing.
- Re-grade over-steepened banks to reduce de-stabilization during high-flows.
- Increase woody vegetation along the riparian and channel banks to provide habitat and stabilize the banks.
- Introduce river edge wetlands to capture urban pollutants and sediments discharged from the stormwater outfalls.
- Introduce “snag structures” that provide refuge and protective cover for aquatic species.

limitations

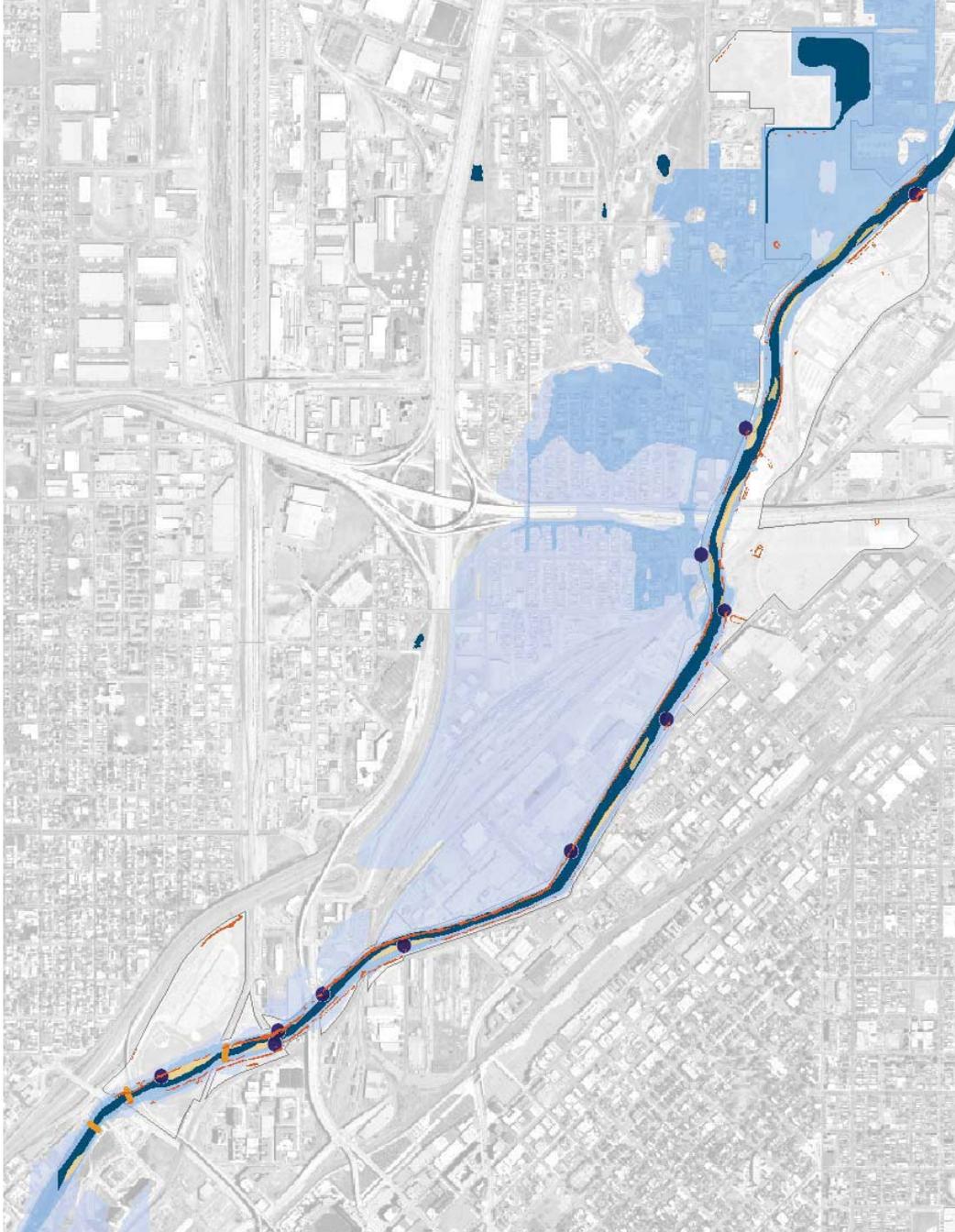
- Roads and buildings encroach the channel making it difficult to take any drastic action.

[3.30]



[3.31]





legend

- site boundary
- river, streams, and pond
- 50 year floodplain
- 100 year floodplain
- stormwater outfall
- unstable bank >25%
- whitewater riffle
- point bars and sedimentary deposits



[3.32]

3.30: Storm Drain Outfall. A storm drain outfall within the River North reach is eroded and does not provide any filtration to incoming storm water runoff. *(Photo by Christie Murman)*

3.31: Sediment Deposit. High sediment deposit amounts are common throughout the River North reach. *(Photo by Christie Murman)*

3.32: River Health. The South Platte River, through the River North reach, is typical of an urban river—encroached and therefore channelized by development. *(Christie Murman, Source: Denver GIS, RIND, Site Visit)*

pedestrian circulation

overview

A network of pedestrian circulation within as well as into and out of the greenway is essential to the cultural vitalization of the site.

As it exists, and as represented in Figure 3.35, there is an 8' wide paved trail with a crushed rock shoulder that serves as the primary movement corridor through the site south to north and vice versa. However, it is difficult to access the trail as there are limited access points and connections into the urban fabric. Furthermore, there are very limited parking spaces that are difficult to find if unfamiliar with the area. Therefore, users that currently visit the site primarily come from the southern end, Central Platte Valley, and utilize the River North stretch as a pass-through space.

In addition, since there is only a single trail, one side of the River is most always cut off from access to the trail with limited pedestrian connections across the river either via pedestrian bridges or traffic bridges that are pedestrian accessible.

There are two proposed rail stops in correlation with the RTD FasTracks (RINO). These should be connected into the pedestrian circulation of the site.

Figures 3.33 and 3.34 are photos taken on site that exhibit existing conditions.

opportunities

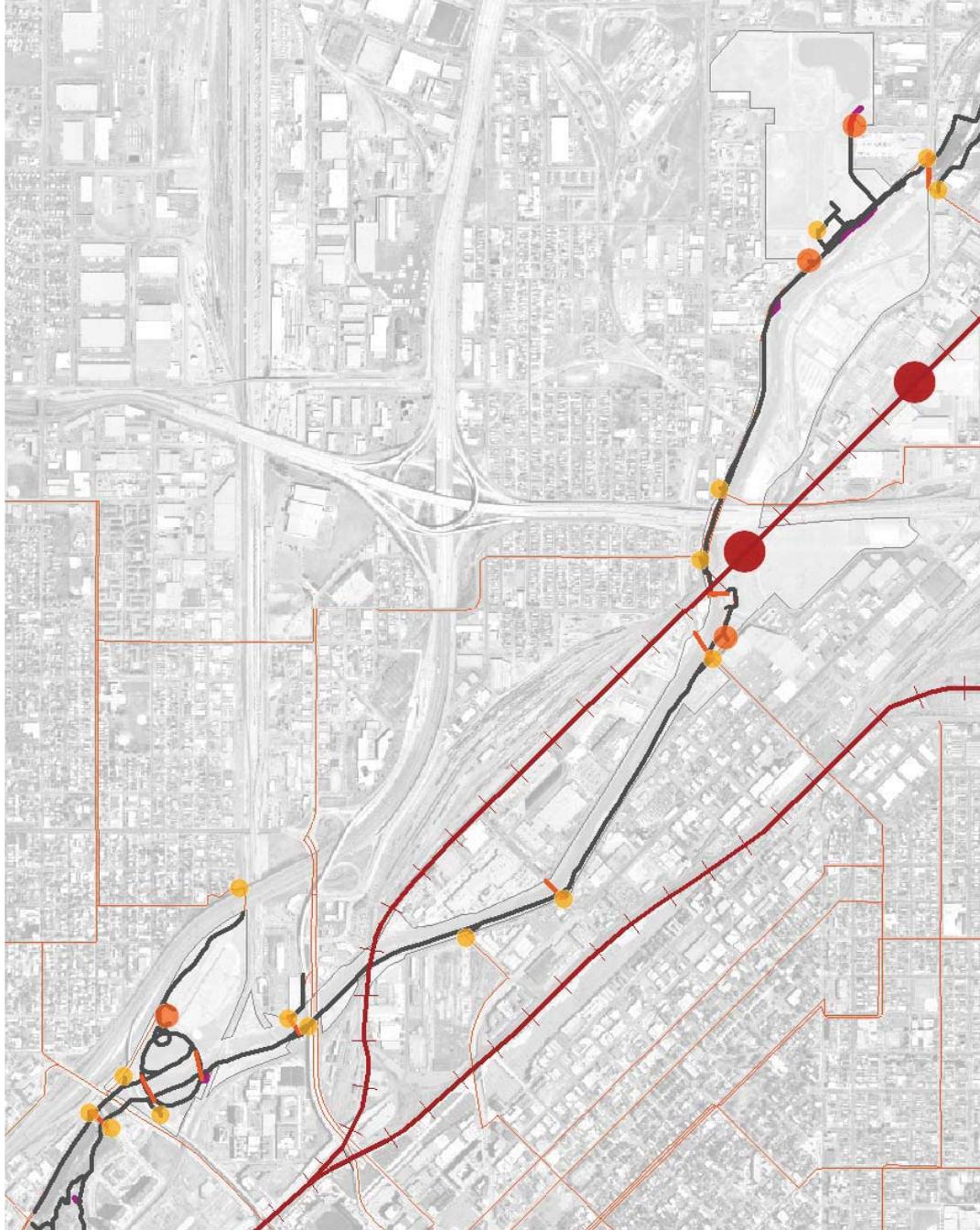
- Emphasize the central connecting trail but diversify the options of pedestrian circulation within the site by varying surfaces, widths and access to both sides of the River.
- Connect to the proposed RTD FasTracks rail stops.
- Increase access points to the greenway in relation to proposed infill and the location of cultural catalysts.
- Emphasize the access points as gateways to the greenway.
- Increase pedestrian bridges to facilitate access between the two sides of the river.

[3.33]



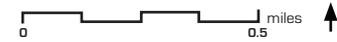
[3.34]





legend

- site boundary
- pedestrian bridge
- access points
- access points with minimal parking
- on-street bike route
- paved trail
- crushed rock trail
- + potential RTD FasTracks rail line
- potential RTD FasTracks rail stop



[3.35]

3.33: Paved Trail. The primary trail through the greenway is paved, with a crushed rock shoulder that at some points separates from the paved trail. *(Photo by Christie Murman)*

3.34: Foot Trail. A foot trail is visible along the River bank through some stretches of the greenway. *(Photo by Christie Murman)*

3.35: Pedestrian Circulation. A network of pedestrian circulation exists within the greenway but significant gaps and opportunities remain. *(Christie Murman, Sources: Denver GIS, RIND, Site Visit)*

access and barriers

overview

The site is disconnected from its surrounding context for many reasons. Interstate 25 is just to the west of the site and Interstate 70 bisects the site north and south, making the greenway visible but hardly accessible within the complication of exit and entry ramps and multiple lanes of traffic. Furthermore, there are railroad tracks with few traffic crossings to both the west and the east of the site. And lastly, due to the industrial context, blocks are irregular and streets that do reach the riverfront are few. Overall, this means there are very few routes to access the site. These conditions are represented in Figure 3.38.

By tracing the existing pedestrian access points to the site back into the urban context, the key intersections can be noted that would enable users to more efficiently and effectively make their way to the site. The proposed RTD FasTracks rail stations will also create access points into the site.

Figures 3.36 and 3.37 are photos taken on site that exhibit existing conditions.

opportunities

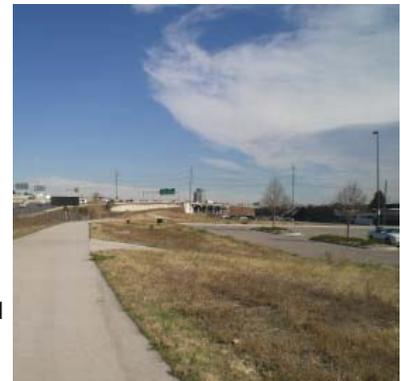
- Create green streets that emphasize the primary access routes to the site from the urban context. Green streets should be focused on the pedestrian experience, providing sidewalks, bike lanes, and street trees as a minimum.
- Propose way-finding at key intersections that would aid potential users in finding the site.

limitations

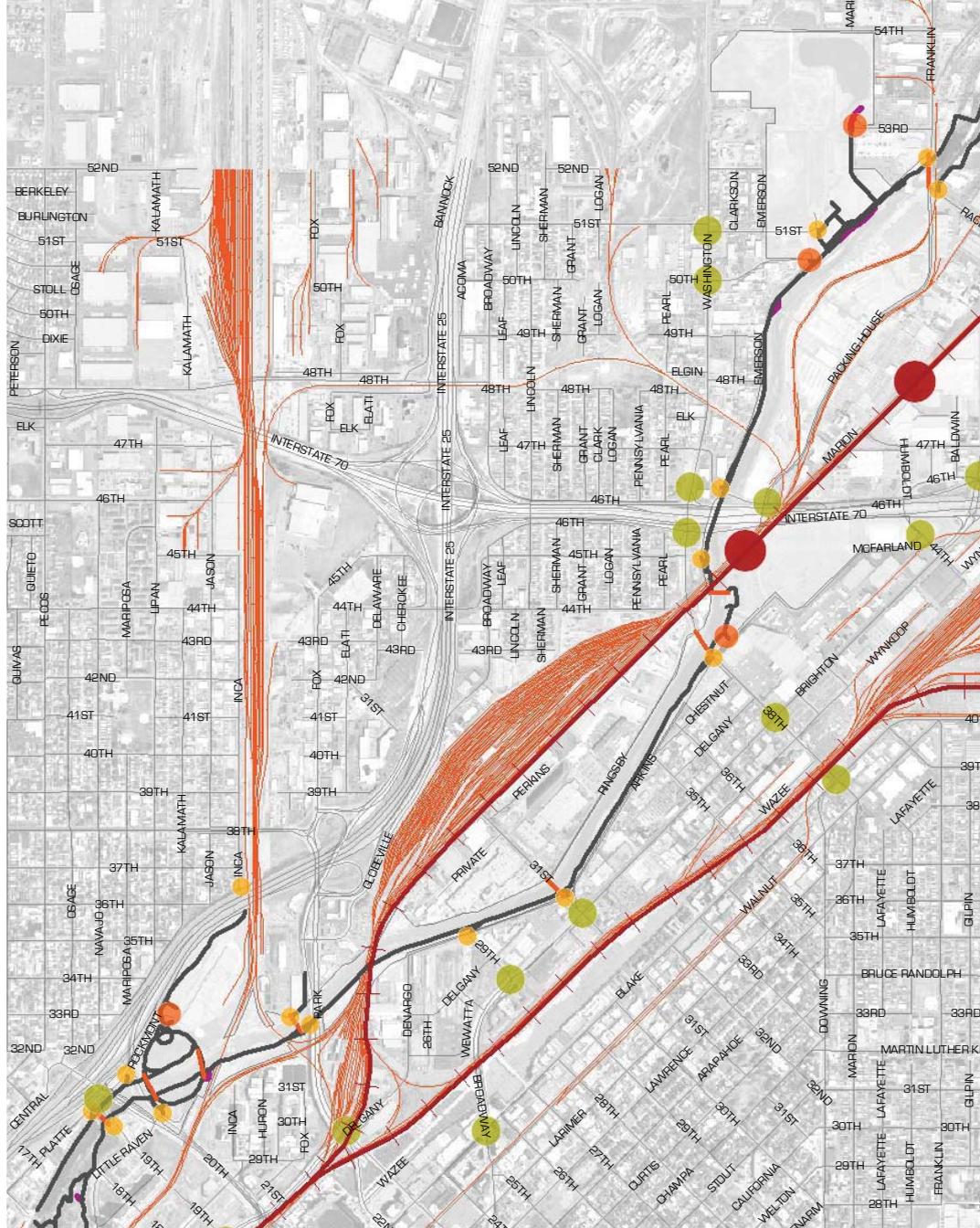
- Interstates and railroads will remain barriers.



[3.36]



[3.37]



legend

- railways
- + + potential RTD FasTracks rail line
- potential RTD FasTracks rail stop
- site boundary
- site access point
- critical access intersections
- street network



[3.38]

3.36: Future FasTracks Transit Stop. A FasTracks transit stop is proposed to the west of the Denver Coliseum. *(Photo by Christie Murman)*

3.37: Trail into City of Cuernavaca Park. City of Cuernavaca is particularly difficult for automobile accessibility. However, shown is a trail leading into the site after passing under I-25 from the Highlands District, aiding in pedestrian accessibility. *(Photo by Christie Murman)*

3.38: Access and Barriers. River North Greenway is disconnected from its surrounding context due to interstates, railways, and the irregularity of the street network supporting an industrial land use. *(Christie Murman, Sources: Denver GIS, RIND, Site Visit)*

“In reclaiming and reoccupying lands laid waste by human improvidence or malice...the task is to become a co-worker with nature in the reconstruction of the damaged fabric.”

George Perkins Marsh, 1864

04

STRATEGIZE

This chapter will first outline the driving goals and objectives of the River North Greenway as a response to the site inventory and over-arching goals for the project. The design strategy will then be introduced as a means for design development. Finally, the programming for the site will be discussed in terms of the multi-scalar composition of the greenway.

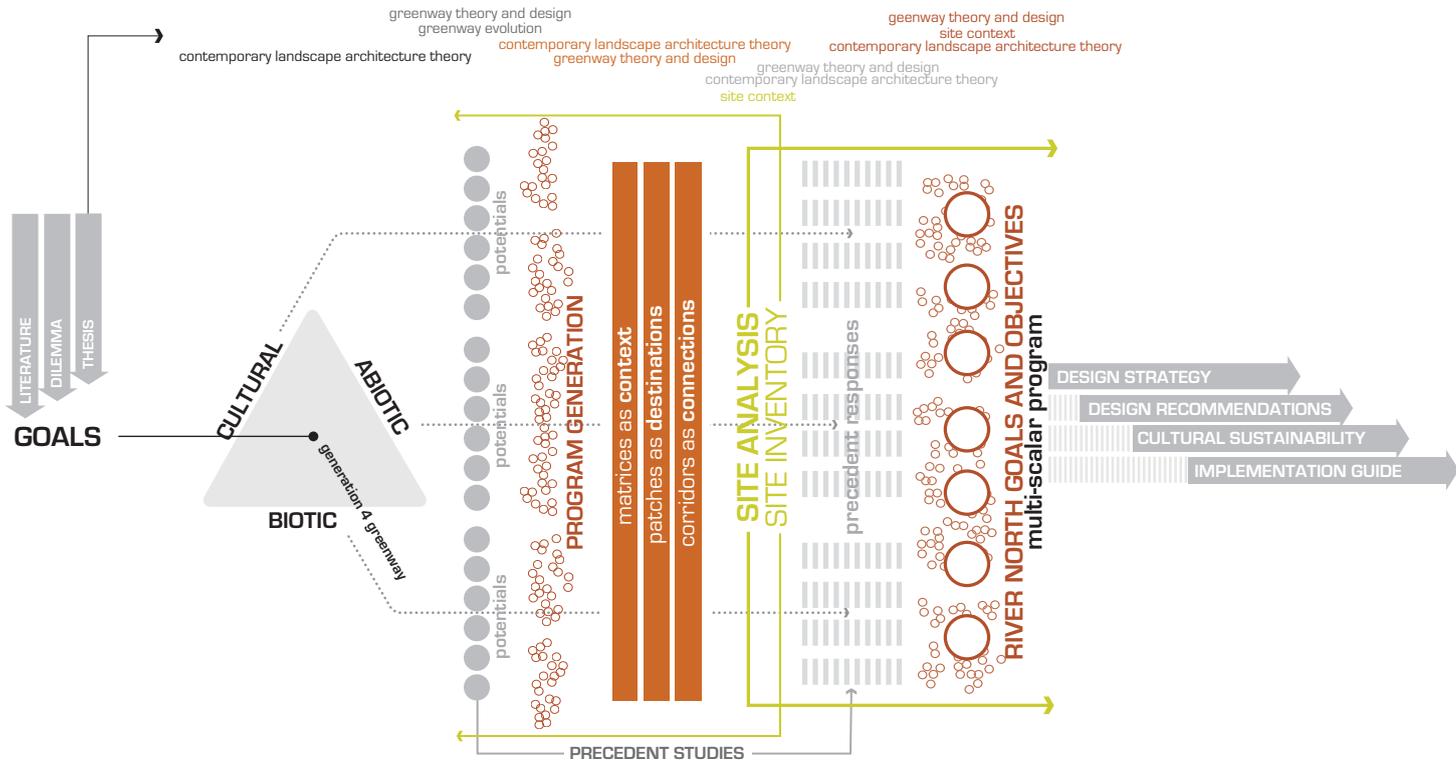
INTRODUCTION

To strategize a design response for the River North Greenway, the site inventory information must be synthesized and analyzed into a tangible form for design development. Figure 6.1 abstractly represents the project development process. This chapter will discuss the site analysis and programming pieces of that process.

As represented in Figure 4.1, the site analysis picks up the site inventory information and synthesizes it into a strategy for design development. The program palette initially generated within the site inventory process, is refined to reflect the opportunities that exist within the River North Greenway. Therefore, the program is a response to the existing site conditions but also remains adaptive to the design strategy developed within the process of site analysis.

This chapter will first outline the driving goals and objectives of the River North Greenway as a response to the site inventory and over-arching goals for the project. The design strategy will then be introduced as a means for design development. Finally, the programming for the site will be discussed in terms of the multi-scalar composition of the greenway.

Design recommendations specific to the River North Greenway will be presented in the next chapter.



[4.1]

4.1: Project Development Process. A visual representation of the project development process is presented in this diagram. The following chapter is specifically a synthesis of the site analysis, presenting River North goals and objectives, a design strategy, and a multi-scalar program palette. *(Christie Murman)*

RIVER NORTH GOALS + OBJECTIVES

As a response to the process of site inventory and analysis and precedent studies, driving program goals and objectives were synthesized from the initial abiotic, biotic, and cultural goals. These overall program goals and objectives respond directly to the opportunities and limitations of the River North greenway.

Create hybridized spaces that layer the restoration of the abiotic and biotic systems with cultural destinations and circulation to promote MULTI-FUNCTIONALITY and long-term SUSTAINABILITY.

Restore ecological health of the River as much as possible.

Propose cultural program that can effectively layer with abiotic and biotic systems.

Restore ecosystems to increase biodiversity, enhance wildlife population, and provide ecological services such as air quality, soil quality, and carbon sequestration.

Develop a hierarchy of cultural nodes that create neighborhood, district and city DESTINATIONS, these nodes will respond and adapt to existing and contextual frameworks

through time; propelling connections into, along, and out of the greenway.

Provide spaces that attract users and are therefore activated.

Utilize destination spaces as primary gateways into and out of the greenway.

Choreograph hierarchy of spaces in response to the contextual population densities and program densities.

Ensure greenway amenities support a variety of HUMAN EXPERIENCES for a multi-generational range of users with varied interests and motives for coming to and being within this stretch of the greenway.

Provide a balance of leisure and active program.

Consider all ages of users in terms of program.

Support multi-seasonal interest and use.

multi-functionality

sustainability

destinations

human experiences

connectivity

identity

safety

community

Maximize **CONNECTIVITY** not only within the greenway, but infiltration into and out of the greenway. The greenway should be thought of in terms of a living system, supporting not only the movement of humans but also, wildlife, plant seeds, etc.

Trail system should be enhanced and diversified to better support multiple users.

Connections between natural areas and the water patterns and movement on the site should be frameworks for site development.

Develop a unique "**IDENTITY**" that fills a niche not supported by any other stretch of the extensive greenway network of Denver.

Utilize the momentum of the River North Art District to establish an identity.

Build off of the development of the Central Platte Valley district.

Employ unique adjacencies such as the Denver Coliseum, the National Western Complex, and the adaption of the former sewer treatment plant to what is now Northside Park.

Protect and provide for the **SAFETY** of the user.

Address the homeless population that currently inhabits a good portion of the River corridor and viaducts.

Provide night lighting to extend the use of the greenway.

Maximize visual connectivity into and out of the site to promote a sense of comfort.

Create more access points.

Involve and engage the **COMMUNITY** to instill a sense of ownership and adoption of the spaces and trails of the greenway, this will ensure long-term sustenance.

Piggy-back off of current community programs that engage the River and greenway.

Create community gathering spaces such as playgrounds, recreation centers, community gardens.

Promote design/build projects, community art installations, trail/park adoption programs, etc.

DESIGN STRATEGY

The site inventory provides the basis for a synthesized analysis of opportunistic conditions that the River North Site holds. By drawing together the inventory information that was presented in matrices as context, patches as destinations, and corridors as connections, a dynamic mosaic can begin to be strategized.

The dynamic mosaic can be envisioned within three realms: Abiotic and Biotic Mat, Cultural Node Emergence, and Connectivity Spine, shown in Figure 4.2. These three realms interact seamlessly as a functioning system of abiotic, biotic, and cultural functions.

step 1: abiotic and biotic mat

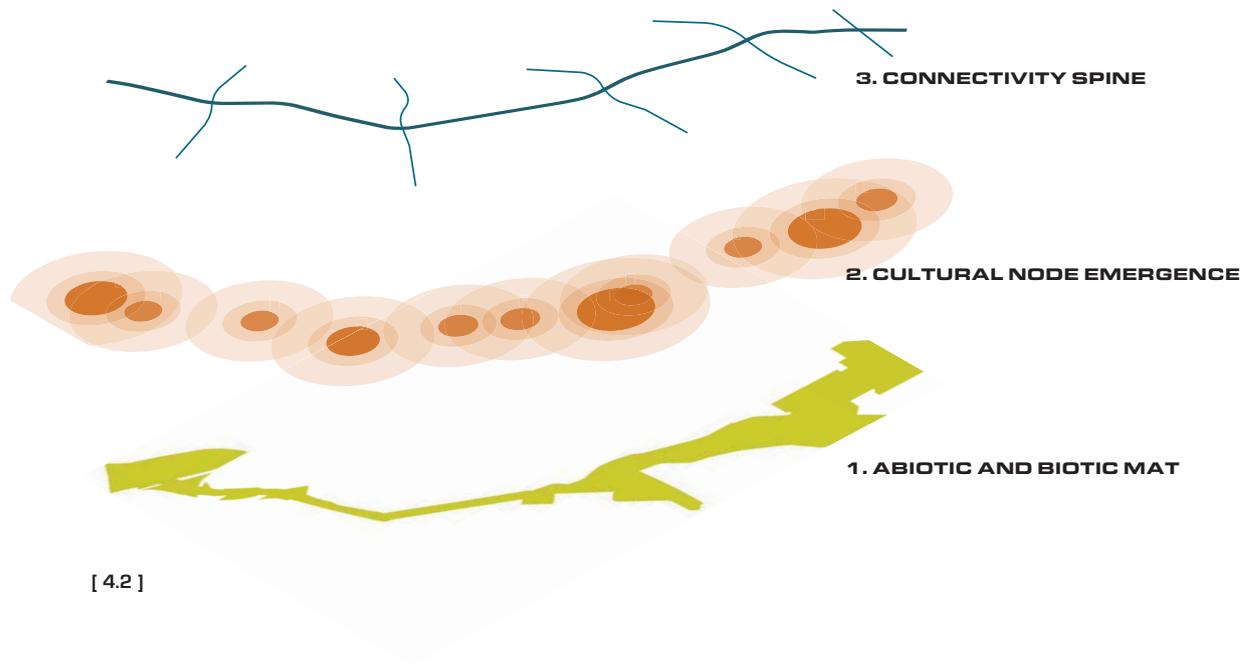
The site is first considered in terms of what would restore it to its highest abiotic and biotic potentials. This is derived from an understanding of ecosystem restoration and their corresponding ecological goods and services.

step 2: cultural node emergence

Cultural needs are then overlaid on the proposed abiotic and biotic mat, creating hybridized spaces that fulfill abiotic and biotic functions but respond to the cultural context. Nodes emerge and begin to inform a network of connectivity.

step 3: connectivity spine

Connections on the site feed into the primary spine defined by the river and the primary trail. Cultural nodes connect internally to the spine but also externally to the surrounding districts, parking areas, bike routes, entertainment centers, etc. In this way, circulation will meet functional concerns first and foremost.



4.2: Design Strategy. An abstract, diagrammatic representation of the design strategy for River North Greenway: Step 1: Abiotic and Biotic Mat, Step 2: Cultural Node Emergence, Step 3: Connectivity Spine. (Christie Murman)

metropolitan

At the metropolitan scale, River North Greenway functions as only a small segment of the larger network of greenways that connects the city. Therefore, the critical consideration at the metropolitan scale is the fluidity of the movement of pedestrians and wildlife throughout the corridor—the greenway functioning as a holistic and comprehensive system.

sites

district parks [DP]

District parks will serve as the primary destinations or attractors of potential users to the site. They should predominantly be supported by active recreation but opportunities for users who are seeking leisure or passive activities will be accommodated. District parks should incorporate the restoration of abiotic and biotic systems as frameworks for design. They should also be adaptive, supporting layers of activities through time.

pocket parks + plazas [PP]

Pocket parks and plazas will serve as secondary destinations within the site. The interest of these spaces should be more particular in terms of their scope, accommodating a smaller group of potential users. These spaces may potentially be driven by a proposed infill development, a specific historical remnant or site, or a particular activity such as a community garden or playground.

natural areas [NA]

Natural areas will emphasize the importance of abiotic and biotic functions within an urban context. These areas will draw the least amount of users but will provide a unique experience that may inspire and instill a sense of environmental ethic. These areas should have trails, observation decks, picnic shelters, and other amenities that allow users to interact with the space but not compromise the integrity of its natural ecosystems. In particular, natural areas could accommodate outdoor classrooms and art studios.

trails [T]

Trails within the site should provide for a diversity of users. A wide paved trail will accommodate most users but crushed rock trails for joggers should be provided as well as single-track trails and boardwalks, allowing access to parts of the site that may have otherwise been residual. In some cases these trails may come together to respect the River corridor or vulnerable habitats but in most cases these trails should braid across the site.

river [R]

The river and its corresponding wetlands and riparian banks not only provide habitat and protective cover for aquatic life but should also accommodate kayaks, canoes, and rafts as well as swimmers and fishers. Visual and physical river access is important in establishing a meaningful connection with this resource.

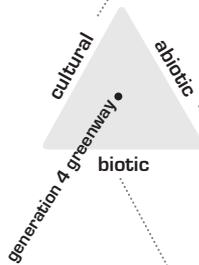
elements

The program palette was derived as a response to the biotic, abiotic and cultural goals established within the initial phases of the project and is shown in Figure 4.4. This ensures that the palette hosts the potential for the greenway to function as a holistic system or a dynamic mosaic. It is the composition of the elements, with an understanding of matrices as context, patches as destinations, and corridors as connections, that will ultimately allow the River North greenway to functionally efficiently and effectively as a cohesive system.

The program elements were then distributed to the palettes of the five primary compositional elements of the site scale: district parks, pocket parks and plazas, natural areas, trails, and the river. Bold program elements are those that exist in some form within the River North greenway.

By nature, a greenway is adaptive to its context and the desires of the residents within the corresponding neighborhoods, districts, and communities that interact with it. Therefore, site specific designs should draw from this palette in response to the context and desires of the people. Public input, obtained from the River North Greenway Master Plan, was accounted for within the development of this program palette as well as program from precedent studies [See Appendix C].

4.4: Elements Scale Program Palette. At the elements scale, the program represents pieces of a site that can integrate and interact in different forms. *(Christie Murman)*



- create an educational and interpretative experience
- provide a scenic aesthetic
- provide passive and active recreational opportunities
- utilize the site for entertainment purposes
- foster historic preservation and cultural heritage
- increase public safety
- expand capacity of trail network
- enhance presence of public art
- build upon and generate economic development
- engage community interaction and involvement
- respond to climatic conditions
- restore and protect the floodplain
- increase carbon sequestration capacities
- manage stormwater and improve water quality
- naturally provide for erosion management
- improve soil quality and nutrient levels
- increase air quality
- foster biodiversity
- increase and enhance wildlife habitat
- conserve resources through alternative energy
- allow for disturbance and successional regimes
- introduce food production

elements scale program palette



- Outdoor Classrooms
- Temporary Exhibit/ Installation Space
- Education/ Interpretive Signage**
- Wayfinding Signage**
- Path Embedded Wayfinding
- Observation Decks
- Lookout Towers
- Splash Pad
- Cognitive Playgrounds
- Picnic Shelters**
- Picnic Tables**
- Trash Receptacles**
- Lawn
- Whitewater Boating**
- Boat Launch**
- Boat Landing**
- Baseball Fields**
- Soccer Fields
- Basketball Courts
- Outdoor Entertainment Venue
- Industrial Remnant Re-Use**
- Entry Gateways
- Night Lighting
- Dog Stations
- River Access
- Bicycle and Pedestrian Bridges
- Boardwalks
- No-leash Trail and/or Park
- Paved Trail**
- Single-Track Trail
- Seating**
- Water Fountains
- Mileage Markers
- Interactive Sculpture
- Community Art Installations
- Outdoor Studios
- RTD FasTracks Rail Stops
- Trail/ Park Adoption
- Plaza
- Promenade
- Community Garden
- Urban Farm
- Backwater Wetland Pools
- Riffle-Pool Sequencing
- "Snag" Structures
- Grade Control Structures
- Emergent Benches
- Tree-Planting Program
- Cover Crops
- Wetlands**
- River Edge Wetlands
- Detention Ponds
- Rain Gardens
- Pervious Materials
- Wooded Riparian Banks**
- Terraced Banks**
- Short-Grass Prairie**
- Alternative Energy Fixtures

DISTRICT PARKS
POCKET PARKS
NATURAL AREAS
TRAILS
RIVER

05

DESIGN

This chapter presents design recommendations for the River North Greenway according to the design strategy. The concept and guiding principles will be reviewed before stratifying the site according to the specific design recommendations.

INTRODUCTION

The conceptual design of River North Greenway presented in this chapter is only one potential scenario of how the design strategy could play out through time. Due to the dynamic context and multiple fluctuating variables, it is not feasible to determine the ideal vision for the entire three mile corridor through time. Rather, the strategy herein becomes critical as a means to an end.

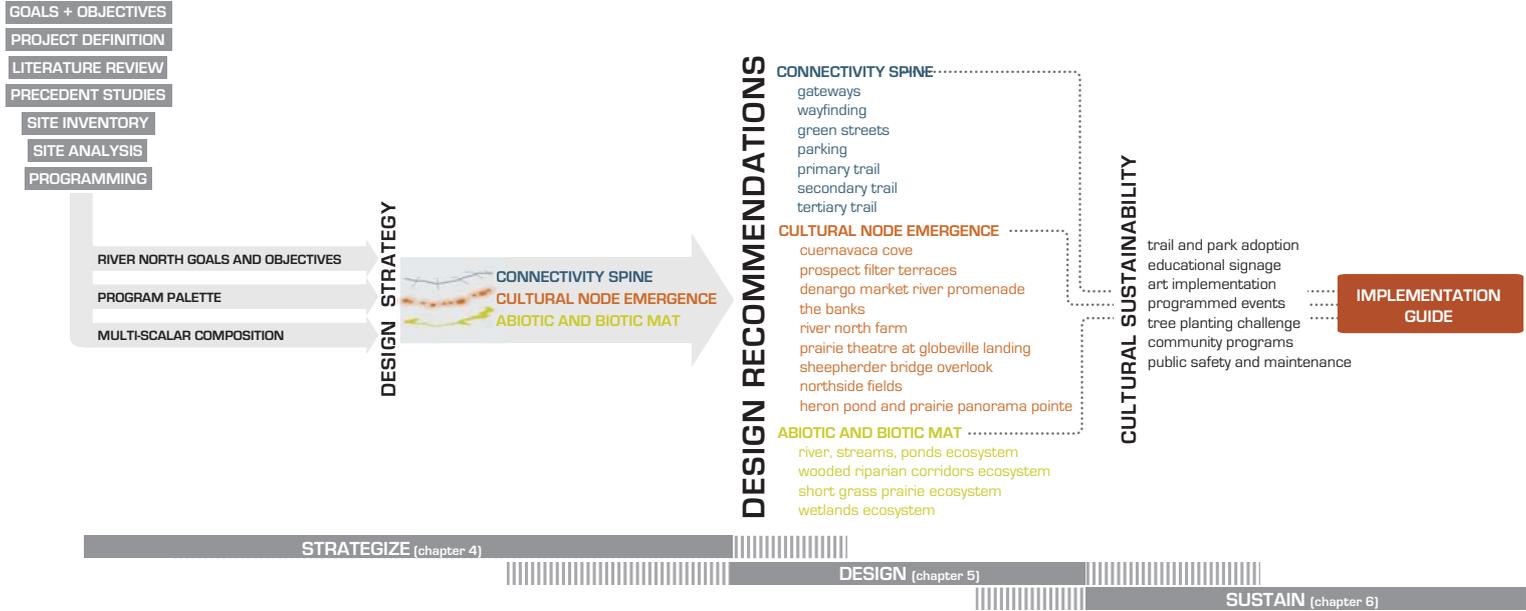
This design strategy provides a framework for an approach to the spatial design and development of the greenway that recognizes the dynamic of variability through time. With the greenway described as a “mosaic”, it is clear as there are multiple spaces that must integrate as a multi-scalar composition or system. Therefore, over time, it's the composition of the system as a response to the dynamics of the context and the site that should prevail.

Figure 5.1 represents the design development process for River North Greenway. As illustrated in Figure 5.1, the design strategy, design recommendations, and means for

sustaining are supported by the foundations established through the project development process. These foundational steps included: goals + objectives, project definition, literature review, precedent studies, site inventory, site analysis, and programming. The design strategy, presented in chapter 4, synthesized the project development process into a strategy for making design recommendations.

Therefore, this chapter presents the application of the design strategy specifically to River North Greenway. Resultantly, design recommendations for the greenway are made. Furthermore, this chapter introduces means of cultural sustainability as an overlay to the design recommendations.

The means of cultural sustainability will be described in detail within the next chapter as a strategy for the sustenance of the River North Greenway through time. An implementation guide will also be introduced as a framework for the development of the greenway.



[5.1]

5.1: Design Development Process. A visual representation of the design development process, illustrating the integration between the phases of strategizing, designing, and sustaining. *(Christie Murman)*

CONCEPT STATEMENT

With a vision grounded in a meaningful human experience, the River North Greenway is conceptualized as a dynamic mosaic; energizing a sustainable vitality for the corridor.

The dynamic mosaic is strategized according to three spatial realms: Abiotic and Biotic Mat, Cultural Node Emergence, and the Connectivity Spine. These three realms integrate and interact seamlessly as a functioning system of abiotic, biotic, and cultural functions.

River North Greenway is conceptualized as a corridor within the urban context of Denver that will promote multi-functionality and sustain through time. Priority is first given to restoration of abiotic and biotic functions within the site, grounding the design as an ecological corridor that provides ecological goods and services. With restored ecosystems as a preface, cultural nodes develop “identity” within the corridor and create

neighborhood, district, and city destinations. Connectivity is maximized not only within the corridor, but as infiltration into and out of the greenway. Furthermore, the greenway amenities proposed support a variety of human experiences for a multi-generational range of users with varied interest and motives for coming to and being within the River North Greenway.

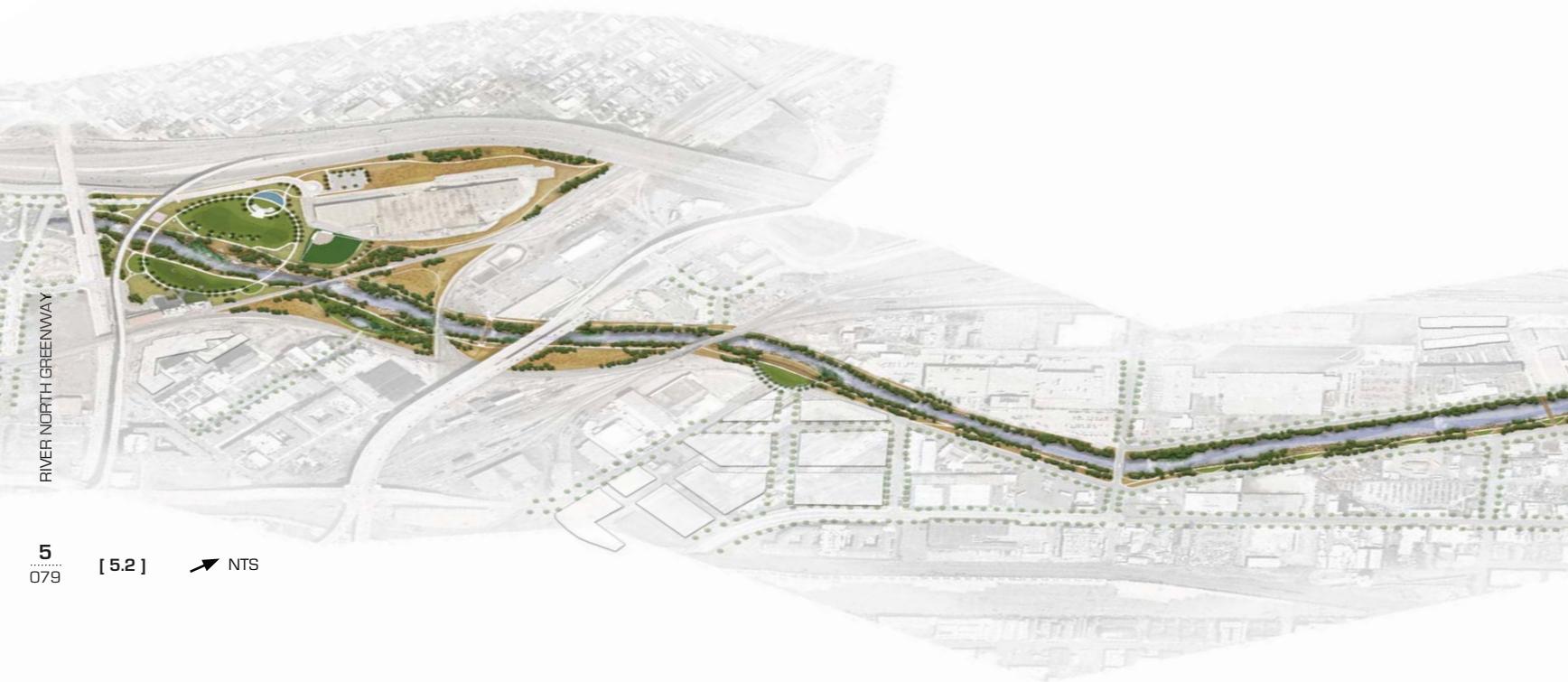
River North Greenway responds to the dynamics of its context yet catalyzes activity and development along the corridor; propelling the infiltration of infill up the corridor from the Central Platte Valley and revitalizing this post-industrial area as vibrant districts of activity.

This plan provides a vision for River North Greenway to not only propel the evolution of greenways but to sustain the momentum of the greenway movement in Denver well into the future.

GUIDING PRINCIPLES

01. Create hybridized spaces that layer the restoration of the abiotic and biotic systems with cultural destinations and circulation to promote **MULTI-FUNCTIONALITY** and long-term **SUSTAINABILITY**.
02. Develop a hierarchy of cultural nodes that create neighborhood, district and city **DESTINATIONS**. These nodes will respond and adapt to existing and contextual frameworks through time; propelling connections into, along, and out of the greenway.
03. Ensure greenway amenities support a variety of **HUMAN EXPERIENCES** for a multi-generational range of users with varied interests and motives for coming to and being within this stretch of the greenway.
04. Maximize **CONNECTIVITY** not only within the greenway, but infiltration into and out of the greenway. The greenway should be thought of in terms of a living system, supporting not only the movement of humans but also, wildlife, plant seeds, etc.
05. Develop a unique “**IDENTITY**” that fills a niche not supported by any other stretch of the extensive greenway network of Denver.
06. Protect and provide for the **SAFETY** of the user.
07. Involve and engage the **COMMUNITY** to instill a sense of ownership and adoption of the spaces and trails of the greenway, this will ensure long-term sustenance.

With a vision grounded in a meaningful human experience, the River North Greenway is conceptualized as a dynamic mosaic; energizing a sustainable vitality for the corridor.





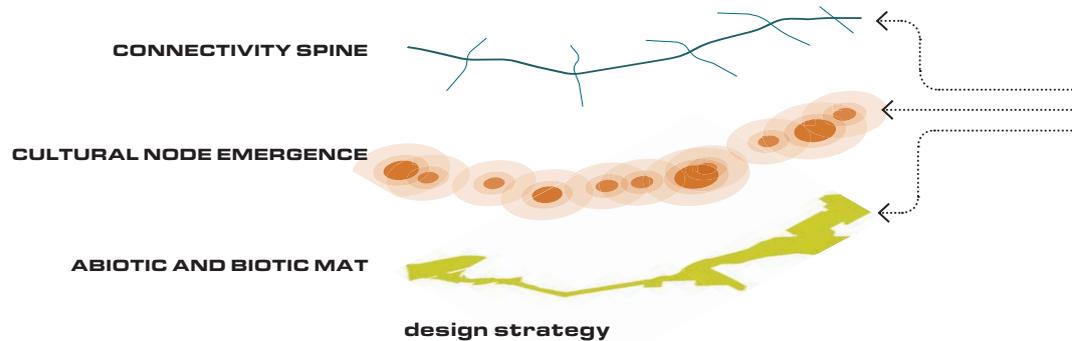
5.2: Illustrative Master Plan. This illustrative master plan represents a design visualization of one potential scenario for the future of the River North Greenway. There are many possible scenarios that could integrate existing conditions in addition to design recommendations through time. *(Christie Murman)*

DESIGN STRATEGY

As described in Chapter 4, the site inventory provides the basis for a synthesized analysis of opportunistic conditions that the River North site holds. By drawing together the inventory information that was presented in matrices as context, patches as destinations, and corridors as connections, a dynamic mosaic is strategized.

The dynamic mosaic can be envisioned within three realms: Abiotic and Biotic Mat, Cultural Node Emergence, and Connectivity Spine, shown conceptually in Figure 5.3. These three realms interact seamlessly as a functioning system of abiotic, biotic, and cultural functions.

Figure 5.4 illustrates site specific recommendations as per the design strategy. The abiotic and biotic mat, cultural node emergence, and connectivity spine will be described and discussed in detail, outlining the proposed recommendations specifically for River North Greenway.





CONNECTIVITY SPINE

CULTURAL NODE EMERGENCE

ABIOTIC AND BIOTIC MAT

design recommendations

5.3: Design Strategy. The design strategy is an abstracted representation of the development of the site, previously introduced in chapter 4. *(Christie Murman)*

5.4: Design Recommendations. Diagrammatic representations of the design strategy into specific design recommendations for River North Greenway 4, recommendations will be expanded on within the rest of the chapter. *(Christie Murman)*

STEP 1:

River North Greenway is considered in terms of restoring it to its highest abiotic and biotic potential. Considerations are primarily derived from an understanding of ecosystem restoration and resultant ecological goods and services.

ABIOTIC AND BIOTIC MAT

concept

The abiotic and biotic mat is a strategic means for restoring ecosystems and providing ecological goods and services. The abiotic and biotic functions are considered as a first priority within the design process, so as not to be compromised by cultural functions. A generation 4 greenway must equally emphasize abiotic, biotic, and cultural functions.

objectives

- Restore ecosystems as a means for increasing ecological goods and services.
- Increase and enhance wildlife habitat.
- Manage stormwater and improve water quality within the South Platte River.
- Foster biodiversity.

overview

The South Platte River, if void of urban development, would be a typical river corridor of the plains and a semi-arid climate. The riparian corridors would support the most dense

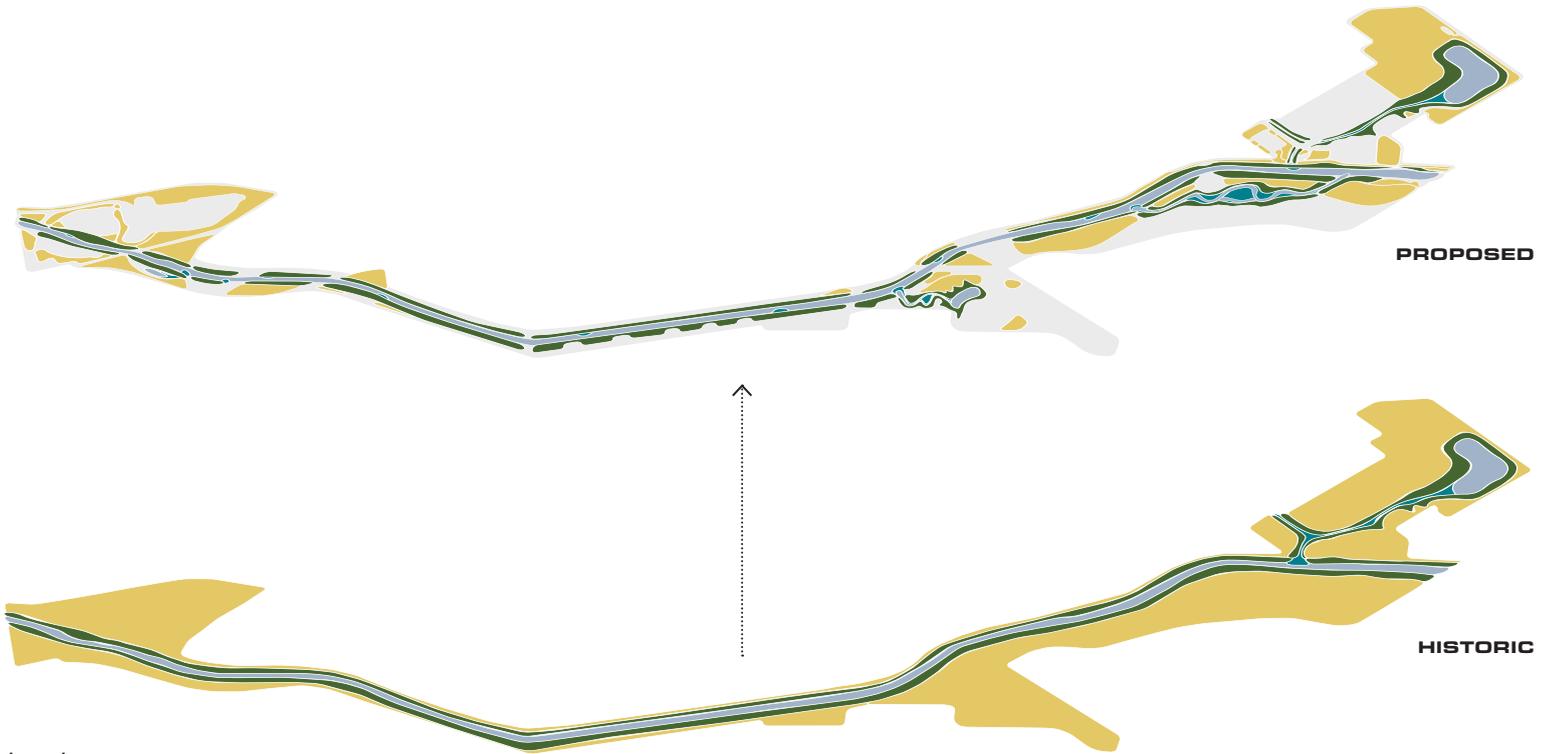
vegetation due to direct access to the limited water resource of the River. Beyond the wooded riparian banks, short-grass prairie, typical of the semi-arid plains, would stretch across the extensive floodplain. These historic conditions, within the site boundary, are illustrated in Figure 5.5.

As it currently exists, the South Platte river is an 'entrenched, meandering' channel with high bank erosion rates. With only a .20% channel slope the River has high sediment deposition. Due to the urban encroachment, the River has little ability to maintain itself and has become highly entrenched and channelized, with little to no connection to the extensive floodplain it once had (Murman 2009). Given the current conditions, design recommendations can be proposed to improve and restore the River corridor and ecosystems to a more natural state, typical of its historic condition. These proposed ecosystems are shown in Figure 5.5.

The abiotic and biotic mat will be described

in terms of four ecosystem types: river, streams, and ponds, wooded riparian banks, short-grass prairie, and wetlands. Each ecosystem will be described in terms of objectives, recommendations, ecological goods and services, and plant species. Diagrams will illustrate where these ecosystems are proposed to exist within the holistic design master plan of River North Greenway.

In the next step, emergent cultural nodes will hybridize with the abiotic and biotic mat. This will allow the abiotic and biotic mat to not only service ecological processes but to also be responsive to cultural contexts.



legend

- river, streams, ponds
- wooded riparian banks
- short grass prairie
- wetlands

[5.5]

5.5: Abiotic and Biotic Mat. A diagrammatic representation of how ecosystems would exist within River North Greenway, before urban development, and the extraction of ecosystems from this mat according to design recommendations and the existing development constraints. *(Christie Murman)*

wooded riparian banks

Wooded riparian banks could line the river, streams, ponds, and wetlands (Figure 5.5 and 5.6). Wooded riparian banks are important in terms of edge habitat and protective cover for aquatic species. In addition, they provide natural bank stabilization during high flows versus the incorporation of unnatural concrete rubble and rip-rap as a means of bank stabilization.

general recommendations

- Retain and increase woody vegetation on banks to provide edge habitat, aquatic cover, and bank stabilization.
- Re-grade over-steepened banks to reduce de-stabilization potential during high flows and increase visual sight lines. A 3:1 slope is recommended.
- Introduce vegetated emergent benches at bankfull, to improve water quality and reduce flow velocities.

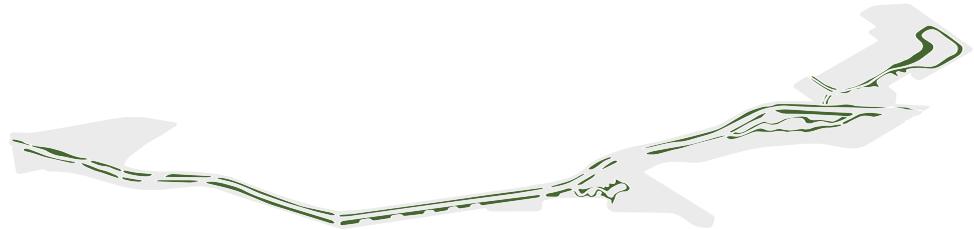
significant ecological goods and services

- Air Quality
- Climate Regulation
- Carbon Sequestration
- Flood Prevention
- Wildlife Refuge and Habitat
- Water Quality
- Nutrient Regulation
- Aesthetics
- Science and Education

[adapted from de Groot 2002]

potential plant palette

1) Cottonwood, 2) Willow Shrubs, 3) Hackberry, 4) Siberian Elm, 5) Box Elder, images shown in Figure 5.7. [Sources: Colorado Native Plant Society, Wildlife Department, Site Observations]



legend

- wooded riparian banks

➤ NTS

[5.6]



1

2

3

4

5

[5.7]

river, streams, ponds

The river, streams, and ponds (Figure 5.5 and 5.8) not only support the aquatic life that resides within the waters but the flora and fauna of the ecosystems that interact with the water. Therefore it is important to restore and maintain the river, streams, and ponds as the life veins of the site.

general recommendations

- Create a low flow channel that meanders between point bars to provide a riffle/pool sequencing for health of river and aquatic habitat.
- Provide grade control structures to counteract potential channel bed degradation and form a riffle/pool sequencing. Grade control structures can also provide whitewater recreation opportunities.
- Introduce “snag structures” that provide refuge and protective cover for aquatic species.

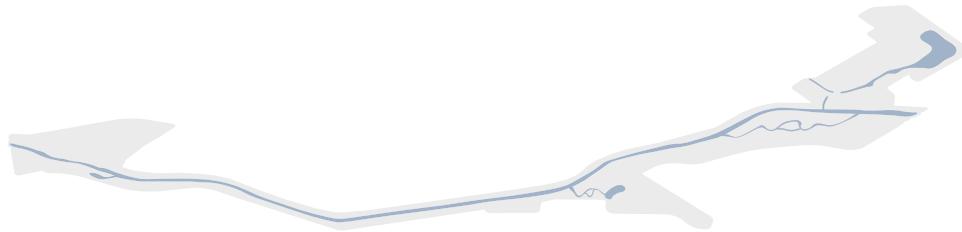
significant ecological goods and services

- Flood Prevention
- Wildlife Refuge and Habitat
- Aesthetics
- Science and Education

(adapted from de Groot 2002)

improvement palette

Riffle/Pool Sequencing, Snag Structures, Low-flow Channels, Grade Control Structures (Johnson 2008)



legend

- river, streams, ponds

↗ NTS

[5.8]

5.6: Wooded Riparian Banks Ecosystem. The wooded riparian banks ecosystem, existing and proposed, is diagrammatically represented for the River North Greenway. *(Christie Murman)*

5.7: Wooded Riparian Banks Plant Palette. The wooded riparian banks plant palette is visually represented, identifying some of the key species that comprise this ecosystem. *(Sources: Colorado Native Plant Society, Wildlife Department, Site Observations)*

5.8: River, Streams, and Ponds Ecosystem. The river, streams, and ponds ecosystem, existing and proposed is diagrammatically represented for the River North Greenway. *(Christie Murman)*

wetlands

Wetlands are important buffers to the river, streams, and ponds (Figure 5.5 and 5.9). It is critical to increase and restore river edge wetlands due to their primary function of cleansing water of pollutants, debris, and sediment. To naturally increase water quality of the South Platte River, it is especially important to consider introduction of wetlands in conjunction with existing stormwater outfalls.

primary recommendations

- Introduce river edge wetlands at storm drain outfalls to reduce introduction of urban pollutants into the South Platte River.
- Create backwater wetland pools as wildlife refuge and habitat.

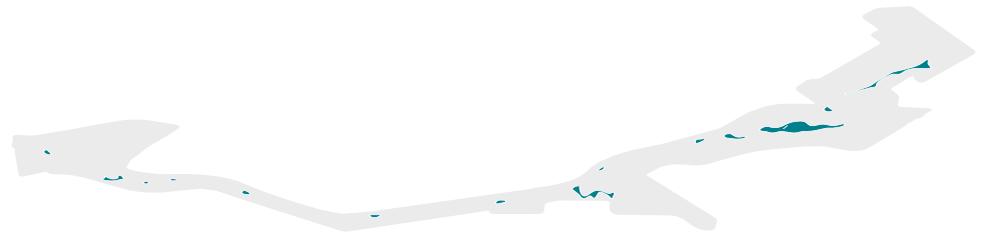
significant ecological goods and services

- Air Quality
- Climate Regulation
- Carbon Sequestration
- Flood Prevention
- Wildlife Refuge and Habitat
- Water Quality
- Pollution Control
- Aesthetics
- Science and Education

(adapted from de Groot 2002)

potential plant palette

1) Western Wheatgrass, 2) Prairie Cordgrass, 3) Switchgrass, 4) Indiangrass, 5) Fowl Mannagrass, 6) Big Bluestem, 7) Canada Wild Rye, 8) American Sloughgrass, images shown in Figure 5.10. (Colorado Native Plant Society, Wildlife Department, Site Observations)



legend

● wetlands

[5.9]



[5.10]

5.9: Wetlands Ecosystem. The wetlands ecosystem, existing and proposed, is diagrammatically represented for the River North Greenway. (Christie Murman)

5.10: Wetlands Ecosystem Plant Palette. The wetlands ecosystem plant palette is visually represented, identifying some of the key species that comprise this ecosystem. (Sources: Colorado Native Plant Society, Wildlife Department, Site Observations)



legend
 ● short grass prairie

➤ NTS

[5.11]



[5.12]

5.11: Short Grass Prairie Ecosystem. The short grass prairie ecosystem, existing and proposed, is diagrammatically represented for the River North Greenway. *(Christie Murman)*

5.12: Short Grass Prairie Plant Palette. The short grass prairie ecosystem plant palette is visually represented, identifying some of the key species that comprise this ecosystem. *(Sources: Colorado Native Plant Society, Wildlife Department, Site Observations)*

short grass prairie

The restoration of short-grass prairie patches (Figure 5.5 and 5.11) will bring an aesthetic to the site that is uncommon within metropolitan Denver. Prairie patches will bolster the biodiversity of the greenway and increase wildlife habitat to support a greater diversity of species. Because they are open, they allow views to the mountains, the skyline and a sense of safety that the enclosed River corridor cannot offer.

primary recommendations

- Convert excessive turf areas to low-maintenance, native short-grass prairie patches to conserve water and provide wildlife refuge and habitat.
- Reclaim interstitial, derelict spaces as low-maintenance, native short-grass prairie patches to establish additional habitat connectivity.
- Maintain the short-grass prairie at the Heron Natural Area through a fire regime.

significant ecological goods and services

- Air Quality
- Climate Regulation
- Carbon Sequestration
- Wildlife Refuge and Habitat
- Soil Quality
- Nutrient Regulation
- Aesthetics
- Science and Education

(adapted from de Groot 2002)

potential plant palette

1) Sand Dropseed, 2) Blue Grama, 3) Wheatgrass, 4) Sideoats Grama, 5) Switchgrass, 6) Little Bluestem, 7) Green Needlegrass, images shown in Figure 5.12. *(Colorado Native Plant Society, Wildlife Department, Site Observations)*

STEP 2:

Cultural needs are overlaid on the proposed abiotic and biotic mat, creating hybridized spaces that fulfill abiotic and biotic functions yet are responsive to the cultural context. Nodes emerge and begin to inform the connectivity.

CULTURAL NODE EMERGENCE concept

Cultural nodes emerge as a response to contextual conditions and are a means for activating the corridor. Each node services multiple functions, acts as a destination, and promotes a unique “identity”. Cultural nodes support a multi-generational range of users with varied interests and motives for coming to and being within the River North Greenway.

objectives

- Create neighborhood, district, and city destinations.
- Provide spaces that are flexible and multi-functional.
- Provoke a variety of human experiences.
- Promote unique “identity” for individual spaces.

overview

Through the process of site inventory, analysis, and programming, nine cultural nodes have been noted as reasonable recommendations for emergence and activation:

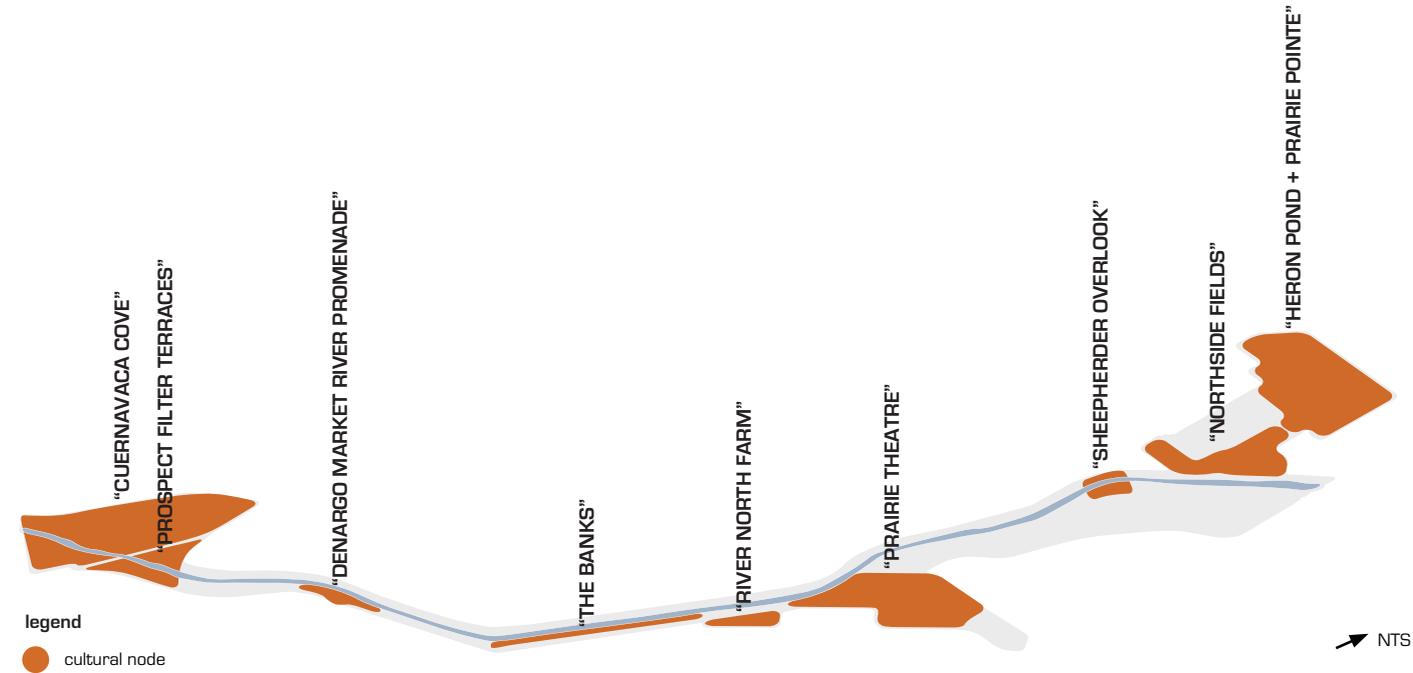
Cuernavaca Cove, Prospect Filter Terraces, Denargo Market River Promenade, The Banks, River North Farm, Prairie Theatre at Globeville Landing, Shepherders Bridge Overlook, Northside Fields and Heron Pond + Prairie Panorama Pointe. The location of these nodes are represented in Figure 5.13.

Each node will first be analyzed in terms of existing conditions. A concept for each node will then be described, followed by an outline of primary recommendations. Potential means of cultural sustainability that could be integrated within the nodes will be listed. The potential means for cultural sustainability, that will be described in Chapter 6, include: trail and park adoption, educational signage, art implementation, programmed events, tree-planting challenge, community programs, and public safety and maintenance. These means will be described in more detail in Chapter 6.

Finally, the primary recommendations will be referenced on a site plan and a photo montage

will visually represent and highlight potentials for the node.

In the next step, the connectivity spine will overlay the abiotic and biotic mat and cultural nodes. The spine will not only connect the greenway internally, but also externally to the surrounding urban context.



[5.13]

5.13: Cultural Node Emergence. Cultural nodes are proposed to emerge along River North Greenway, this diagram represents the location and theming of each. *(Christie Murman)*

“cuernavaca cove”

existing conditions analysis

The City of Cuernavaca Park has frameworks in place that have the potential to make this park a destination—open lawn, picnic shelter, kayak course, and a softball field. As the Prospect district continues to grow, this park space will become more and more coveted. The City of Cuernavaca Park should expand upon the activity of Central Platte Valley yet establish its own unique identity.

concept

“Cuernavaca Cove” (Figures 5.14, 5.15, and 5.16) is envisioned as a park that thrives on a diversity of activity. With a mix of recreational and educational opportunities, Cuernavaca Cove is a prime gateway to the River North Greenway from the Central Platte Valley. With views to the mountains and the Denver skyline, Cuernavaca Cove is a refreshing escape from the urban context.

primary recommendations

- Introduce educational elements such as a river classroom, boardwalk, and a wetland in conjunction with the stormwater outfall to engage the users with the South Platte River.
- Reduce turf by converting interstitial spaces to native short-grass prairie.
- Expand trail network particularly on west side of river. Introduce an entrance to the park from the existing Flour Mill Lofts.
- Introduce a playground or splash pad as a destination for the park that can integrate with the existing softball field.

cultural sustainability

- trail and park adoption
- educational signage
- programmed events
- community programs
- public safety and maintenance





[5.16]

5.14: Cuernavaca Cove Site Plan. The Cuernavaca Cove site plan illustrates the primary design recommendations. *(Christie Murman)*

5.15: Cuernavaca Cove Location Map. Cuernavaca Cove anchors the far southern end of River North Greenway and is an adaption of the existing City of Cuernavaca Park. *(Christie Murman)*

5.16: Cuernavaca Cove River Activation. Improvements to Cuernavaca Cove will heighten the connection between the park and the river, engaging users with the ecological processes of river edge wetlands and riparian corridor. *(Christie Murman)*

“prospect filter terraces”

existing conditions analysis

This residual space should be considered as a small gateway park into the greenway, especially for residents of the Prospect District. With a significant amount of infill in place and additional infill proposed, there is a residential base that would benefit from a connection to the River at this location. In addition, there is a depression or basin that exists as well as a storm drain outfall. These two elements could be integrated to become an ecological and educational asset.

concept

The “Prospect Filter Terraces” (Figures 5.17 and 5.18) offer a unique experience for the user. Functional yet aesthetic, the filter terraces would engage the users with ecological processes and provide an opportunity to observe the process of stormwater filtration. Furthermore, the space would serve as a gateway to the River North Greenway for the residents of the Prospect District with a proposed trail extension across the railroad tracks.

primary recommendations

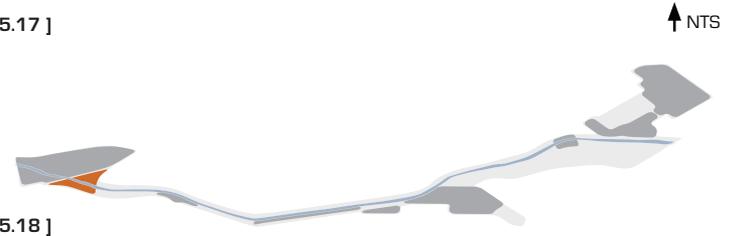
- Utilize existing depression on site as a detention basin that integrates with a system of filtration terraces and a river-edge wetland as a means of improving the quality of stormwater runoff entering the South Platte River.
- Introduce a boardwalk that interacts with the filtration terraces and river-edge wetlands, connecting the user with the ecological processes in a more intimate way.
- Extend an on-grade sidewalk to the residential infill of the Prospect District that exists across the railroad tracks from this space. This will enable a more fluid connection between Prospect and the River North Greenway and establish a gateway.

cultural sustainability

- trail and park adoption
- educational signage
- public safety and maintenance



[5.17]



[5.18]

5.17: Prospect Filter Terraces Site Plan. The Prospect Filter Terraces site plan illustrates the primary design recommendations. *(Christie Murman)*

5.18: Prospect Filter Terraces Location Map. Prospect Filter Terraces are located just to the north of City of Cuernavaca Park and to the west of the Prospect District. *(Christie Murman)*

“denargo market river promenade”

existing conditions synthesis

Given the cultural heritage and historical significance of the Denargo Market to the city of Denver, a small pocket park that conjoins the greenway with the Denargo Market redevelopment could be a unique opportunity. A storm drain outfall exists on the east bank of the River at this site and could be converted to become something more aesthetically and ecologically functional.

concept

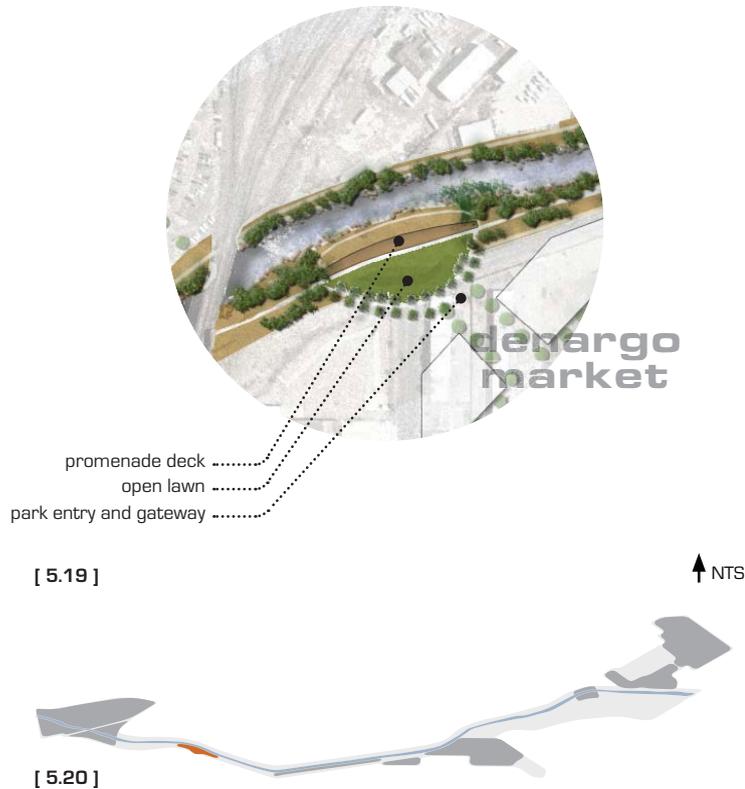
“Denargo Market River Promenade” (Figures 5.19 and 5.20) is envisioned as a small park that interacts with the river while maintaining an urban edge. The small lawn area would offer a space for relaxation while also opening up visual access between the proposed Denargo Market infill and the River. A promenade that expands out from the primary trail would provide benches for a view to the River as well as an aesthetic place of rest for the users of the trail.

primary recommendations

- *Provide an open lawn space that opens up a view down to the River from the proposed Denargo Market infill, as well as increasing visual sight lines from the primary trail that runs through the space.*
- *Introduce an promenade deck that acts as a shoulder to the primary trail that runs through the space.*
- *Connect trails to the proposed Denargo Market infill, establishing a gateway to the River North Greenway.*

cultural sustainability

- *educational signage*
- *programmed events*
- *public safety and maintenance*



5.19: Denargo Market River Promenade Site Plan. The Denargo Market River Promenade site plan illustrates the primary design recommendations. *(Christie Murman)*

5.20: Denargo Market River Promenade Location Map. The Denargo Market River Promenade exists within the southern portion of River North Greenway, just to the west of the historic Denargo Market area. *(Christie Murman)*

“the banks”

existing conditions synthesis

Currently a desolate and confined stretch of the greenway, this area has a need for the introduction of small spaces as a means to open up lines-of sight and break up the monotonous, constricted stretch of the corridor. Furthermore, as it exists this stretch of the greenway has no access points and is tightly framed by Ringsby Court on the west bank and Arkins Court on the east.

TAXI, currently one of the only infill projects existing on the banks of the River, would benefit from a stronger connection with the River. And finally, the energy of the River North Art District and infill should also be integrated with this space.

concept

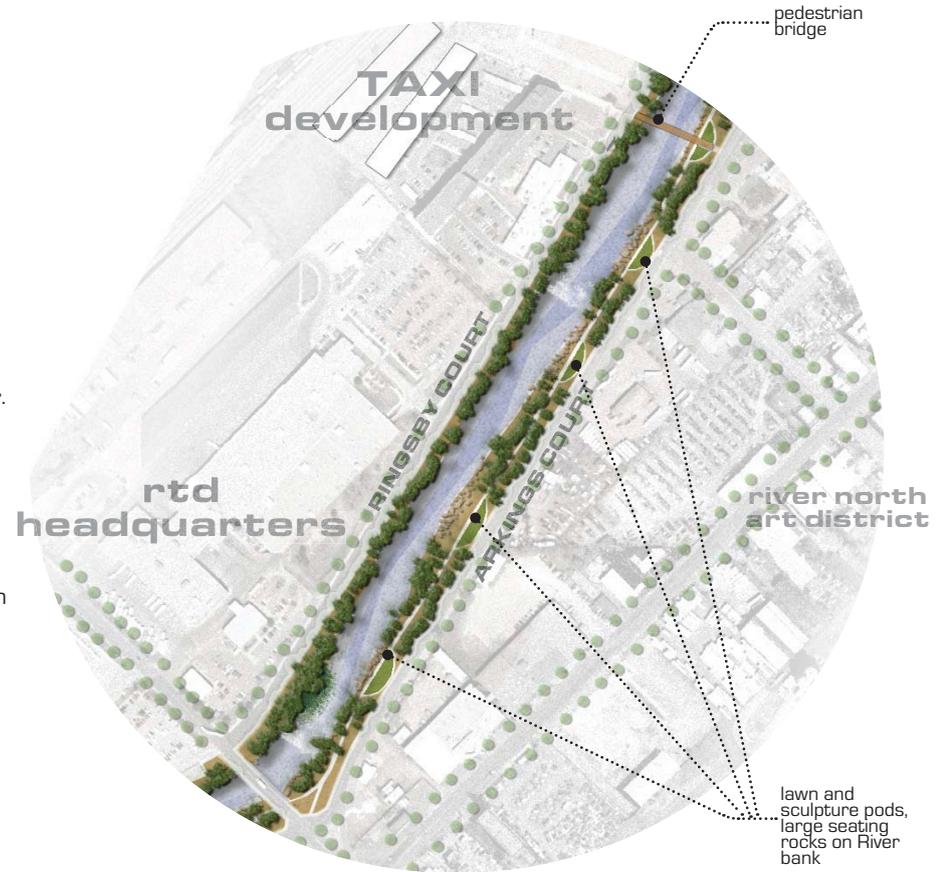
“The Banks” (Figures 5.21, 5.22, and 5.23) are envisioned as a vibrant series of small spaces. Bringing fresh life to this stretch of the greenway, “The Banks” will become places for rest and relaxation with an unobstructed view to the River. Visibility and access is increased and the user feels a sense of comfort and safety.

primary recommendations

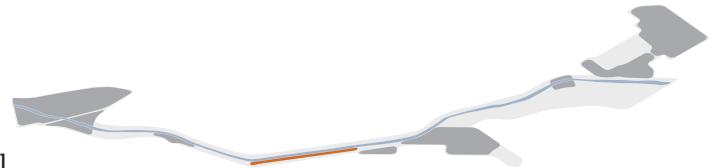
- Introduce five small lawn pods that would act as places for rest along the trail as well as a platform for temporary sculpture exhibits in correlation with the River North Art District. These pods would also permeate the edge and open up new access points to the greenway.
- Place large rocks along the bank of the River that correspond with the turf pods, users could sit on the rocks but they would also stabilize the river edge.
- Install a pedestrian bridge that connects TAXI directly to the east bank and also increases the permeability of this stretch of the greenway.

cultural sustainability

- trail and park adoption
- art implementation
- public safety and maintenance



[5.21]



[5.22]



[5.23]

5.21: The Banks Site Plan. The Banks site plan illustrates the primary design recommendations. *(Christie Murman)*

5.22: The Banks Location Map. The Banks are located just to the south of Globeville Landing Park and to the east of the RTD headquarters. *(Christie Murman)*

5.23: Lawn and Sculpture Pod. Lawn and sculpture pods that define the character of "The Banks", offer a place of rest, a platform for art implementation, and open up lines-of-sight within this constricted stretch of the corridor. *(Christie Murman)*

“prairie theatre at globeville landing”

existing conditions synthesis

Globeville Landing Park lacks the elements that could make this space a destination. Parking spaces, picnic tables, and a gazebo exist, but the space remains desolate. A sea of surface parking, primarily un-used, lies in between the park and the Denver Coliseum building, causing excessive stormwater runoff. However, with the proximity of the Denver Coliseum building and the proposed FasTracks rail station, this site has much potential.

concept

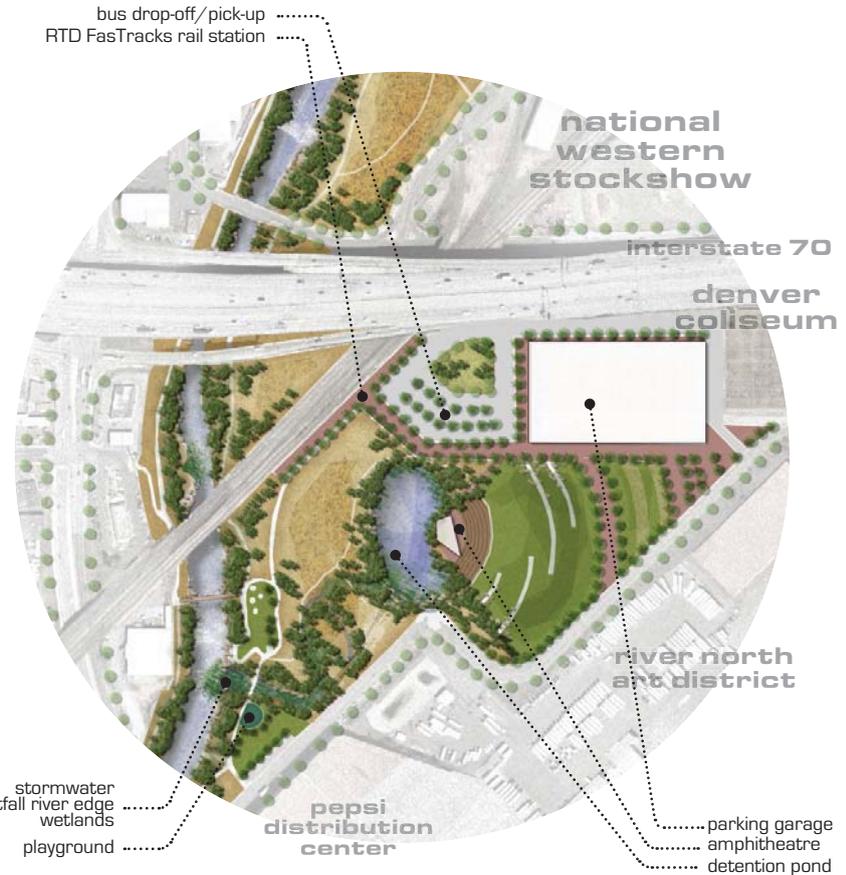
“Prairie Theatre at Globeville Landing” (Figures 5.24, 5.25 and 5.26) is envisioned as a metropolitan destination. Facilitating large-scale events, the amphitheater will provide an outdoor venue for the city of Denver. Supported by the proposed FasTracks rail station, pedestrians will easily be able to access the site. A natural park and pond will create a buffer between the amphitheater at the river, maintaining the integrity of Globeville Landing Park, yet diversifying the experiential composition of the site.

primary recommendations

- Introduce a large outdoor amphitheater to support downtown Denver, and correlate with the activity of Denver Coliseum. The amphitheater should be oriented to take in views of the mountains and the downtown skyline.
- Install a playground in correlation with the existing parking, picnic tables, and gazebo that supports cognitive play.
- Introduce a pond/detention basin as a means of collecting stormwater runoff.
- Convert existing storm drain outfall to a river edge wetland that also filters drainage from the pond/detention basin.
- Create a strong connection between the rail station, Coliseum, amphitheater, and Globeville Landing Park.
- Convert some of the existing turf area of Globeville Landing Park to natural short-grass prairie.
- Remove surface parking and replace with a smaller footprint parking garage.

cultural sustainability

- trail and park adoption
- art implementation,
- programmed events
- public safety and maintenance



[5.24]



[5.25]





[5.26]

5.24: Prairie Theatre at Globeville Landing Site Plan. Prairie Theatre at Globeville Landing site plan illustrates the primary design recommendations. *(Christie Murman)*

5.25: Prairie Theatre at Globeville Landing Location Map. Prairie Theatre at Globeville Landing conjoins the existing Globeville Landing Park and the surface parking lot of the Denver Coliseum building. *(Christie Murman)*

5.26: Amphitheater Concert Venue. A large amphitheater concert venue, that stitches together Globeville Landing Park, the proposed RTD FasTracks rail station, and the Denver Coliseum, could spark exciting opportunities for the City of Denver and provide a unique venue for the downtown Denver area. *(Christie Murman)*

“shepherdder bridge overlook”

existing conditions synthesis

The shepherdder bridge exists as a remnant of activities that used to exist in correlation with the National Western Stockshow. This historically-significant remnant could become a catalyzing seed for a park. The space on the east bank is currently used as a cattle tie-out area and parking during the stockshow event. These areas could be proposed for alternative activities when the stockshow is not happening.

concept

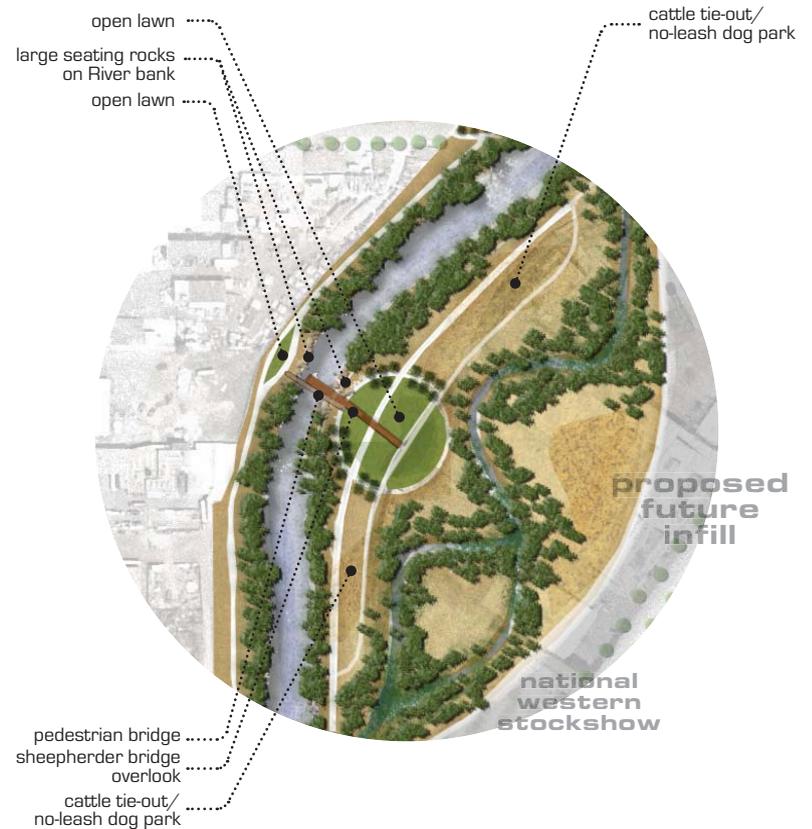
“Shepherdder Bridge Overlook” (Figures 5.27, 5.28 and 5.29) is conceptualized as a seed for the redevelopment of the east bank of the River. Anchored by the culturally significant shepherdder bridge that could be adapted into a pedestrian overlook and lookout, this site will be the core of a natural park that is used for cattle tie-out during the stock show and as a no-leash dog park throughout the remainder of the year. It will also be the core of a future infill project, introducing a more prominent population to the northern portion of the site.

primary recommendations

- *Adapt and re-use historic shepherdder bridge as an overlook and lookout.*
- *Provide a pedestrian bridge separate but in conjunction with the shepherdder bridge that allows for direct pedestrian access across the river.*
- *Place large rocks along the bank of the River underneath the shepherdder bridge. Users could sit on the rocks, but the rocks would also stabilize the river edge.*
- *Strategize as the seed for a larger natural park on the east bank and the core of a future infill project.*
- *Introduce a lawn area underneath the historic shepherdder bridge, allowing for a view of the structure and a space for leisurely recreation activities such as kite flying and frisbee.*
- *Seed the cattle tie-out area as a grazing pasture that when not utilized by the National Western Stockshow could be a no-leash dog park.*

cultural sustainability

- *educational signage*
- *community programs*
- *public safety and maintenance*



[5.27]



[5.28]



[5.29]

5.27: Shepherd Bridge Overlook Site Plan. The Shepherd Bridge Overlook site plan illustrates the primary design recommendations. *(Christie Murman)*

5.28: Shepherd Bridge Overlook Location Map. The Shepherd Bridge Overlook exists just to the west of the National Western Stockshow Complex and to the south of Northside Park. *(Christie Murman)*

5.29: Shepherd Bridge Overlook. The adaptive re-use of the historic shepherd bridge gives users a unique vantage of the river and connection with history. *(Christie Murman)*

“northside fields”

existing conditions synthesis

Northside Park has the potential to be a strong anchor for the north end of the site. With its intriguing history, revealed through the concrete structures that stand as remnants of the old sewage treatment plant for the City and County of Denver, users would be interested in learning more about the history of the site. But those structures and the open lawn do not serve as strong enough attractors or destinations to bring users up to this area. Sports fields or other forms of active recreation should be proposed for this area to stimulate use of this park and support the ethnically diverse population that lives in this area. The site is also difficult to access with limited parking via a “back entry”.

concept

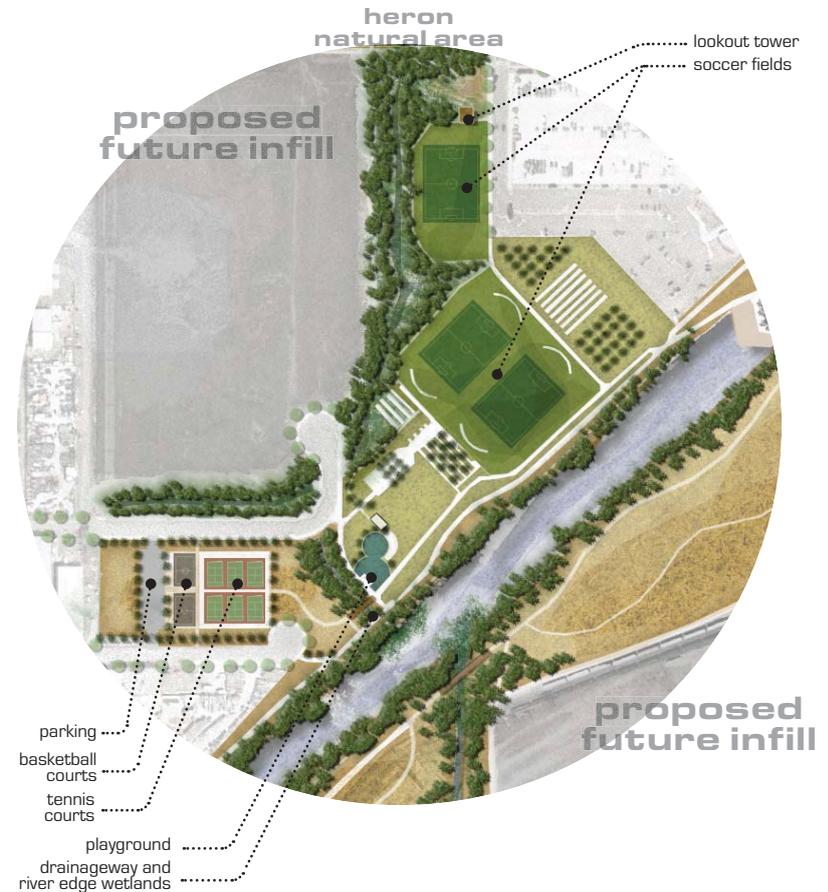
“Northside Fields” (Figures 5.30, 5.31 and 5.32) is envisioned as a highly active and vibrant park. Supportive of multiple sport opportunities, the park would also engage the user through the existing historic remnants of the sewage treatment plant and the wetlands that border the park on the west. Future infill should be considered for the west edge of the park, increasing the residential population within the northern portion of the River North Greenway site.

primary recommendations

- Provide soccer fields, tennis courts, and basketball courts, making this site a sports park destination and accommodating the ethnically diverse population.
- Build a playground in correlation with the sports fields, attracting another range of potential users.
- Introduce a lookout tower that offers views of the Heron Natural Area to the north, the sports fields and the view of the mountains to the west and the skyline to the south.
- Increase access to the site with parking for the sports fields from the west.
- Convert some of the existing turf area of Northside Park to maintained short-grass prairie and daylight drainage to river.

cultural sustainability

- trail and park adoption
- educational signage
- programmed events
- public safety and maintenance



[5.30]



[5.31]



[5.32]

5.30: Northside Fields Site Plan. Northside Fields site plan illustrates the primary design recommendations. *(Christie Murman)*

5.31: Northside Fields Location Map. Northside Fields exist at the northern end of the River North Greenway and are an adaption of the existing Northside Park. *(Christie Murman)*

5.32: Soccer Fields and Lookout Tower. Northside Fields will be activated by the diversity of sport and recreational activities, a lookout tower on this site could be an exciting opportunity to get great view of the Denver skyline, the mountains, and the Heron Natural Area just to the north as well as the activity of the park. *(Christie Murman)*

“heron pond and prairie panorama point”

existing conditions synthesis

The Heron Natural Area currently supports ponds, streams, wetlands, and riparian banks. In addition, the restoration of short-grass prairie is in process. However, it is detached from the greenway and resultantly intimidating to approach and interact with. Users should be able to access this site in a way that allows them to interact with nature unlike anywhere else within the River North Greenway, learning about the natural systems in the process.

concept

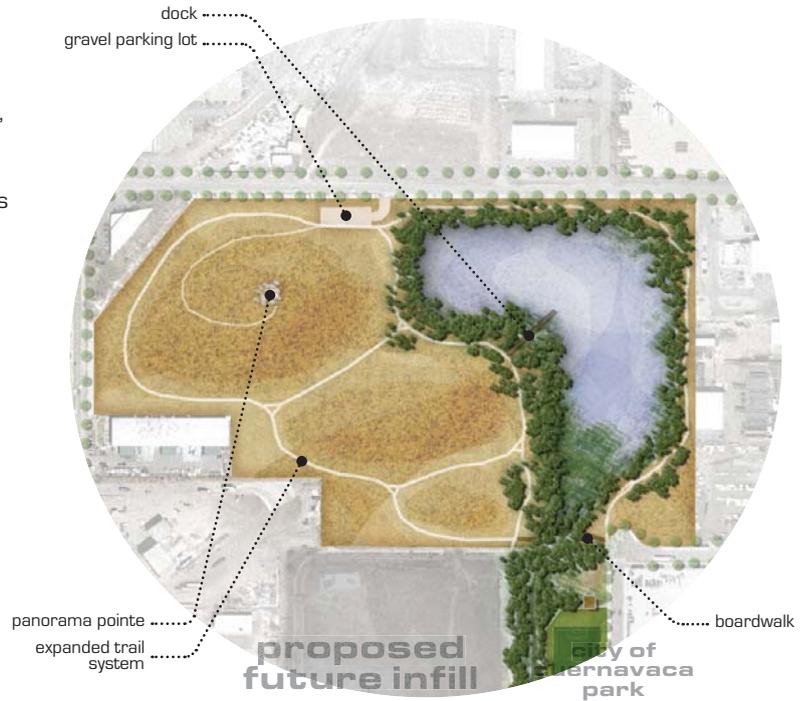
“Heron Pond and Prairie Panorama Point” (Figure 5.33 and 5.34) is conceptualized as a natural area that provides a sense of restoration to the user. With quiet trails, docks, boardwalks, council rings, and interpretive signage the site is prime for user engagement. A natural escape within the urban context, this park will be a treasured retreat for the surrounding population.

primary recommendations

- *Expand trail network to provide a more complete experience of the site, introducing trails along borders between ecosystem types and at the edges of the site.*
- *Introduce a dock and boardwalk as means for giving the user a more intimate experience with the site yet keeping the impact of the human user on the natural systems minimal.*
- *Consider the introduction of simple landform within the prairie, establishing a mound that would allow the user to get a view of the site as well as to give the site depth and interest.*
- *Allow the short-grass prairie portion of the site to be used as a no leash dog park.*
- *Provide interpretive signage and stations to engage the users with the processes of the ecosystems, and council rings as a space for small groups to assemble.*
- *Increase access to the site with a parking area accessible from the north edge of the site.*

cultural sustainability

- *educational signage*
- *art implementation*
- *community programs*
- *public safety and maintenance*



[5.33]



[5.34]

5.33: Heron Pond and Prairie Pointe Site Plan. Heron Pond and Prairie Pointe site plan illustrates the primary design recommendations. (Christie Murman)

5.34: Heron Pond and Prairie Pointe Location Map. Heron Pond and Prairie are located just to the north of Northside Park within the existing Heron Natural Area. (Christie Murman)

“river north farm”

existing conditions synthesis

With approximately an acre of potential green space, this derelict space could be rehabilitated to accommodate a second connection between the River North Art District and the greenway. There are already access points down into the greenway that exist on the west edge of this site. The bike route also runs adjacent to the north edge of this space. This space should be considered for community gathering opportunities specific to the River North District.

concept

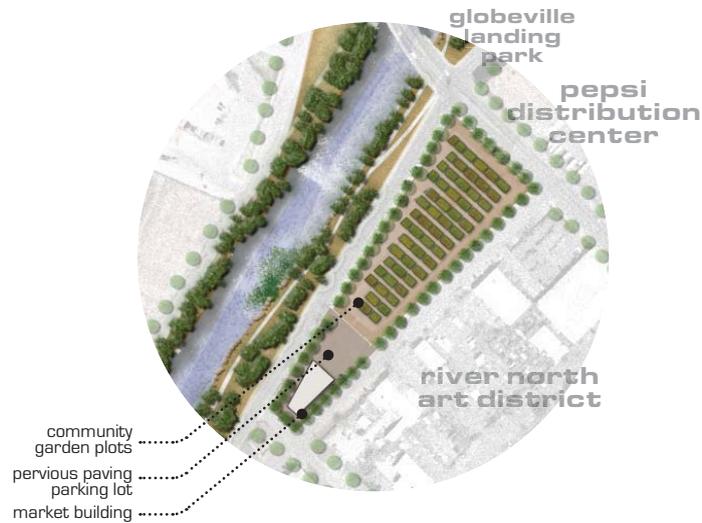
The “River North Farm” (Figures 5.35 and 5.36) is an exciting link between the River North Art District and the greenway. Supported by community garden plots and a small market place, the “River North Farm” would be a community destination and an opportunity for neighbors to interact and work together towards common goals. With no community garden in near proximity, the residents of the emerging River North Art District would be sure to embrace the garden.

primary recommendations

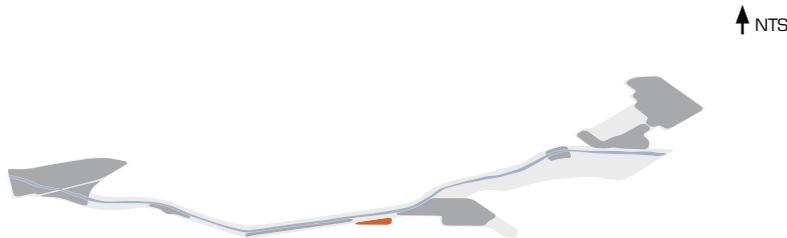
- *Rehabilitate this lot to become a community garden for the River North Art District.*
- *Introduce a shelter or building that would accommodate a farmers market or a seasonal fresh produce stand supplied by local growers as well as those of the community garden.*
- *Ensure a cross street connection between the community garden and an access point to the greenway.*

cultural sustainability

- *educational signage*
- *art implementation*
- *programmed events*
- *community programs*



[5.35]



[5.36]

5.35: River North Farm Site Plan. The site plan for River North illustrates the primary design recommendations. *(Christie Murman)*

5.36: River North Farm Location Map. River North Farm exists just off the greenway near Globeville Landing Park and to the south of the Pepsi Distribution Center. *(Christie Murman)*

STEP 3:



All connectivity on the site feeds into the primary spine, defined by the river and the primary trail. Cultural nodes connect internally to this spine but also externally to the surrounding urban context.

CONNECTIVITY SPINE

concept

The connectivity spine ensures fluid movement within River North Greenway. The spine is anchored by the primary circulation trail and the South Platte River, and complemented by secondary and tertiary trails and extensions into the urban context through additional access points and green streets. By utilizing the cultural nodes as the primary gateways into the site, circulation will become clearer and access points better advertised.

objectives

- Maximize connectivity not only within the greenway, but infiltration into and out of the greenway.
- Create a diversity of experiences through a variance of trail typologies and contexts.
- Increase access into the site, formulating a more permeable edge to the greenway.
- Improve the integration of the greenway with its urban context, extending green streets into the surrounding districts.

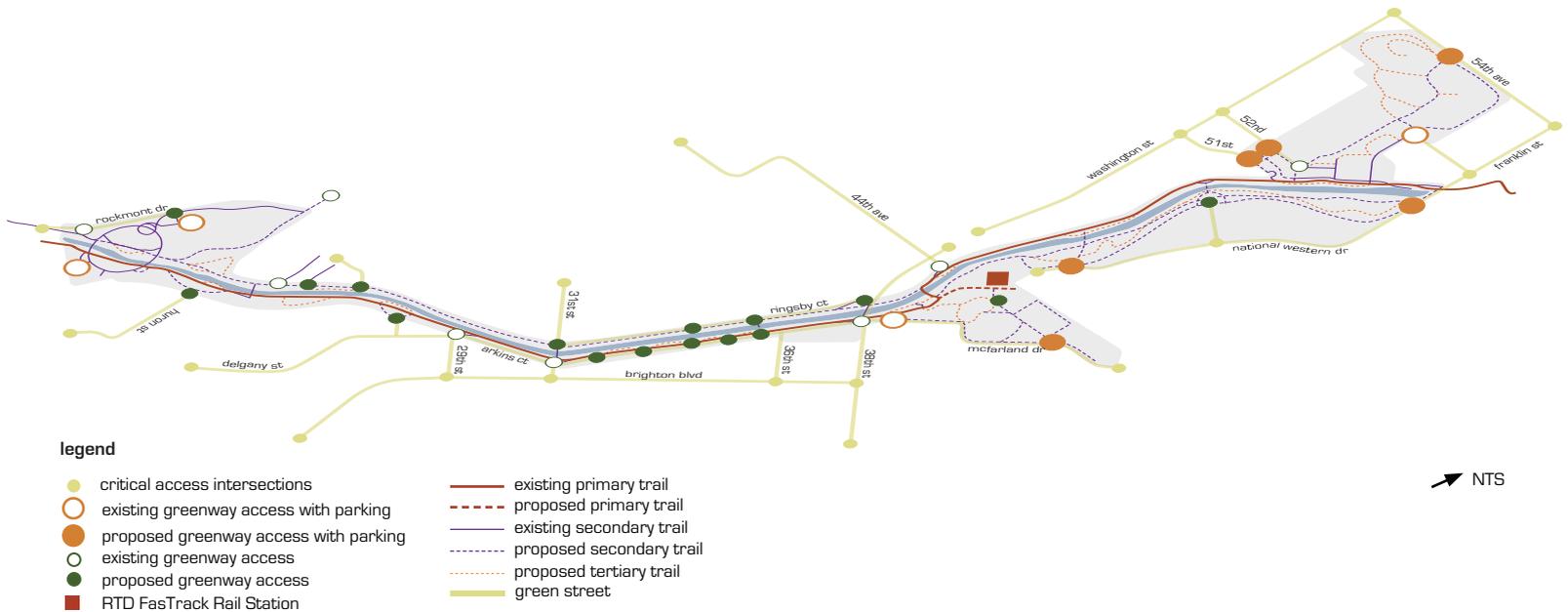
overview

The connectivity spine will be described in terms of access and a hierarchical trail system as shown in Figure 5.37. Access for the greenway will be defined by gateways, wayfinding, green streets, and parking. Potential gateway and wayfinding designs will be presented as well as recommendations specific to improving access.

The proposed hierarchical trail system, composed of primary, secondary, and tertiary trail typologies, is represented in Figure 5.37. The system utilizes the existing primary trail that threads the entirety of the corridor, prioritizes other existing trails on the site, and proposes additional trails in accordance with the holistic design master plan of River North Greenway. Each trail typology is described in terms of objectives, experience, and potential means of cultural sustainability as well as visually represented by a conceptual section.

Potential means of cultural sustainability that could be integrated within the connectivity spine

include: trail and park adoption, educational signage, art implementation, programmed events, tree-planting challenge, community programs, and public safety and maintenance. These means will be described in more detail in Chapter 6.



[5.37]

5.37: Connectivity Spine. The connectivity spine addresses access to the site as well as circulation within the site. *(Christie Murman)*

access

As it exists, access to the River North Greenway is limited and difficult to find, deterring potential users. Figure 5.38 represents recommendations for facilitating ease in the access of the greenway. Four specific means will be discussed in more detail: access gateways, wayfinding, green streets, and parking.

gateways

Gateways are proposed to occur at access points to the River North Greenway. The gateways would act as a means of noting the entry to the user and defining the River North Greenway as its own segment of the metropolitan greenway network.

Gateways could be as simple as a sign marking the entry as shown in Figure 5.40. A sign simply acknowledging the greenway would heighten the awareness of the users and begin to establish an identity for the greenway within the larger greenway network of the metropolitan area of Denver.

wayfinding

Limited wayfinding exists within the River North Greenway. Expanding the wayfinding into

a coordinated system of wayfinding signage, as shown in Figure 5.39, would benefit the user and strengthen the identity of the greenway. Signage to be included within the system would be: directional, informational, mileage marker, trail and park adoption, point of interest and entry gateway.

green streets

Green streets are proposed as connections between access points to the greenway and the critical access intersections within the urban context. The purpose of these streets would be to facilitate and provide for the comfort of the pedestrian as well as to be indicative of the proximity of the River North Greenway.

Green streets in simplest form are to include sidewalks, street trees, and bicycle lanes. Through time, on-street stormwater management practices could be incorporated. In addition, as infill continues to expand up into the surrounding context of the greenway, green streets should be highlighted as the primary streets for shops, cafes, and commercial activity that is conducive to the pedestrian.

parking

Access to the site should be emphasized for the pedestrian. However, due to the existing condition of industrial land use intermixed with emerging infill, automobile access to the site should also be a consideration. Additional parking has been notated particularly for the northern portion of the greenway. Figure 5.38 illustrates the existing and proposed parking in conjunction

5.38: Access. Access recommendations are diagrammatically depicted, primarily illustrating proposed access points and green streets that facilitate access to the greenway. *(Christie Murman)*

5.39: Wayfinding. A coordinated system of wayfinding signage would aid in familiarizing the user with the greenway as well as create a sense of identity for River North Greenway *(Christie Murman)*

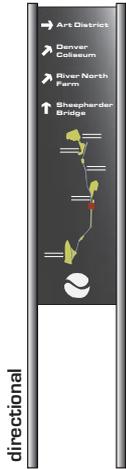
5.40: Gateway. A entry sign at access points to the greenway would begin to notate entry to the greenway and inform an identity for River North Greenway. It could also serve as a means for initially orienting the user. *(Christie Murman)*



legend

- critical access intersections
- existing greenway access with parking
- proposed greenway access with parking
- existing greenway access
- proposed greenway access
- RTD FasTrack Rail Station
- green street

[5.38]



directional



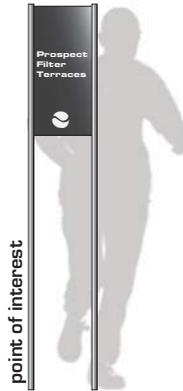
informational



mileage marker



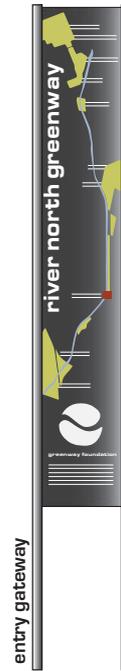
trail and park adoption



point of interest

[5.39]

[5.40]



entry gateway

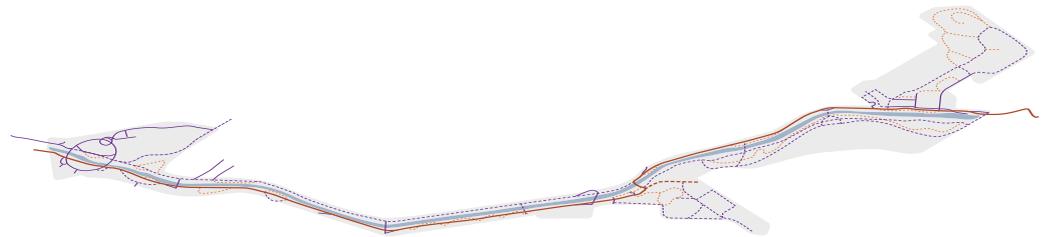
hierarchical trail system

A hierarchical trail system is established through the merge of existing trails with proposed trails. The system is to be composed of primary, secondary, and tertiary trails as shown in Figure 5.41.

The proposed hierarchical trail system will increase the connectivity of the greenway yet insure the site remains functional as a holistic system. Each trail type facilitates a different experience and connection with the greenway.

primary recommendations

- Add a secondary trail to the opposite bank of the primary spine to avoid segments of the greenway from being detached from the system.
- Add pedestrian bridges in conjunction with TAXI and the shepherd bridge to avoid long stretches of disconnect.
- Develop tertiary trails along river banks and within natural areas.



legend

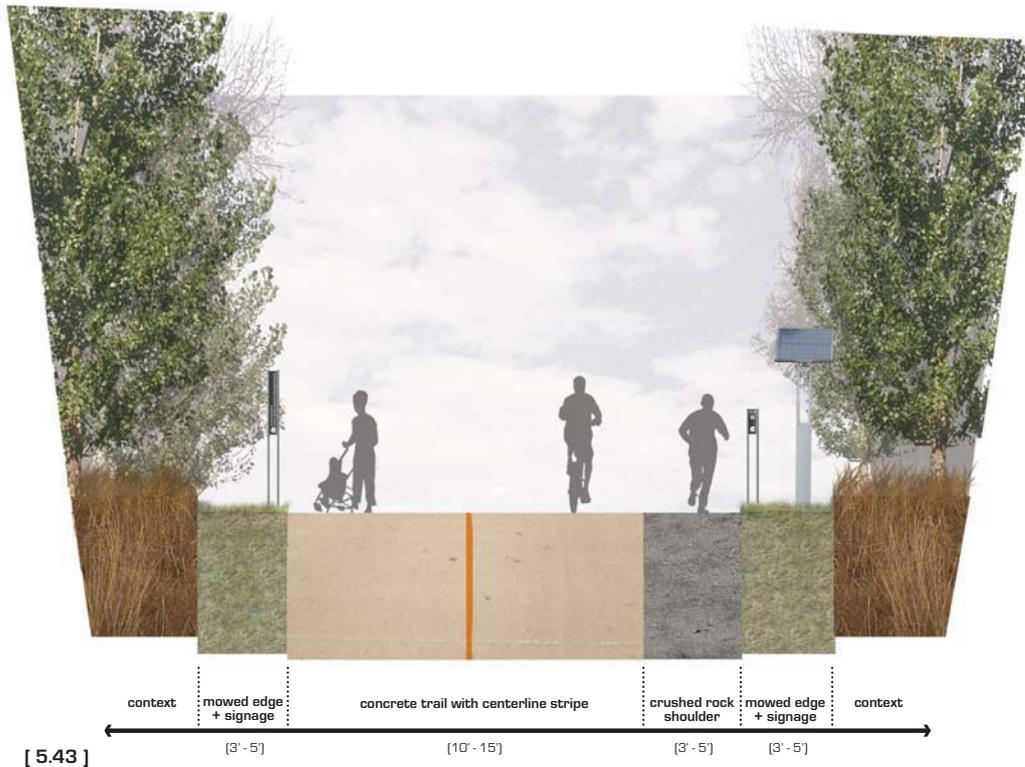
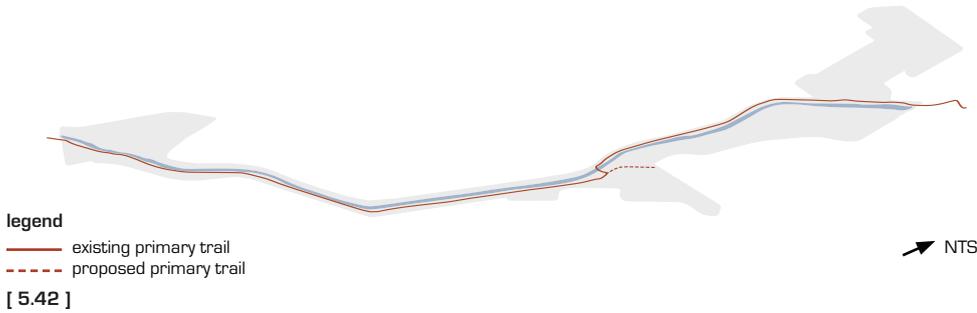
- existing primary trail
- - - proposed primary trail
- existing secondary trail
- - - proposed secondary trail
- proposed tertiary trail

[5.41]

5.41: Hierarchical Trail System. A hierarchical trail system, composed of primary, secondary, and tertiary trails would increase the connectivity of the site while facilitating a variety of experiences. *(Christie Murman)*

5.42: Primary Trail. The primary trail would support the heaviest pedestrian traffic. Primarily existing, this trail is the spine of connectivity for the greenway. *(Christie Murman)*

5.43: Primary Trail Section. A wide tinted concrete trail with maintained edges and appropriate wayfinding signage comprise the infrastructural frameworks of the primary trail. *(Christie Murman)*



primary trail

The primary trail (Figure 5.42) should facilitate smooth circulation of the greenway at the metropolitan scale. The primary traffic flow of the greenway is accommodated by this trail and therefore it hosts a diversity of users with varying modes of pedestrian-powered transport. This trail should be especially well-maintained and be supported by standard trail amenities such as benches, water fountains, mileage markers, and wayfinding signage. Figure 5.43 illustrates defining physical characteristics of the primary trail through a probable section.

experience

The experience on the primary trail would be stimulated by activity and a sense of community. The pedestrian would be comforted by the various trail amenities supporting a safe public environment.

cultural sustainability

- trail adoption
- educational signage
- art implementation
- programmed events
- public safety and maintenance

secondary trails

The secondary trails (Figure 5.44) provide circulation patterns that complement the linear flow of the primary trail. In addition, the secondary trails expand circulation within the cultural nodes and bring users to the primary trail from the greenway edge. The increase in trails within the greenway that are separate of the primary trail allows the user to determine their own course. Figure 5.45 illustrates defining physical characteristics of the secondary trails through a probable section.

experience

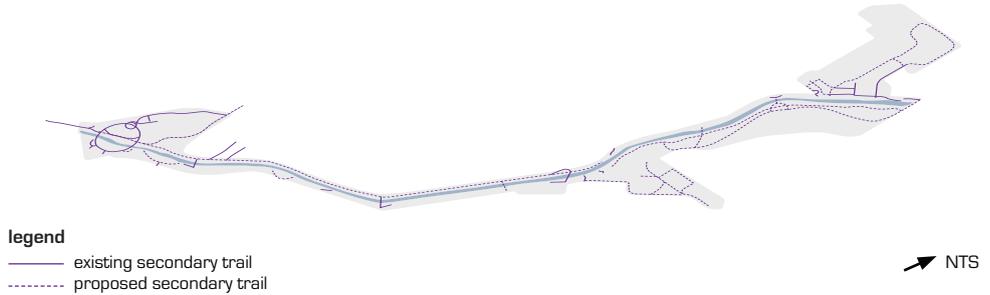
The experience on the secondary trail would be slower-paced than that of the primary trail. The separation from the primary activity would foster a peaceful environment, providing the user an opportunity to be more engaged with the natural surroundings.

cultural sustainability

- trail and park adoption
- educational signage
- public safety and maintenance

5.44: Secondary Trail. Secondary trails are a combination of existing and proposed circulation. The secondary trail network complements the primary trail spine and facilitates connection from the greenway access points to the primary spine. *(Christie Murman)*

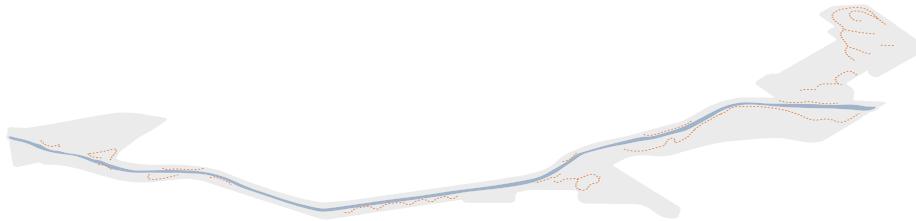
5.45: Secondary Trail Section. The tinted concrete or crushed rock secondary trails should be narrower than the primary spine, with a maintained edge to create a buffer from the context, provide an area for signage, and give users cues to care. *(Christie Murman)*



[5.44]



[5.45]



legend
 ----- proposed tertiary trail

[5.46]

➔ NTS

tertiary trails

The tertiary trails (Figure 5.46) offer the opportunity for a more intimate experience with the greenway. Weaving and threading through natural areas of the site, the user has the opportunity to explore more closely the ecological systems of the site, escaping the constraints of the constructed urban environment. Figure 5.47 illustrates defining physical characteristics of the tertiary trails through a probable section.

experience

The experience on the tertiary trail would be restorative, inspiring reflection and contemplation. A opportunity to interact more closely with nature would engage the user and stimulate a sense of exploration and adventure.

cultural sustainability

- community programs
- public safety and maintenance



[5.47]

5.46: Tertiary Trail. Tertiary trails support exploration and adventure, providing opportunity for more intimate interaction with the natural areas of the site. *(Christie Murman)*

5.47: Tertiary Trail Section. The crushed rock or compacted soil tertiary trails should have a maintained edge that creates a buffer between the user and the surrounding context and gives the users cues to care. The trail should be a narrow single-track trail. *(Christie Murman)*

“More than just parks or amenities, greenways represent an adaptation—a response to the physical and psychological pressures of urbanization.”

Robert Searns, 1995

06

SUSTAIN

This chapter discusses potential means for cultivating cultural sustainability. An implementation guide is also proposed as a tool for informing implementation decisions.

INTRODUCTION

A strategic plan has the ability to sustain through time. Ideas generated through the design development process are ultimately realized as funding becomes available. Therefore, the strategizing of the River North Greenway through time and the engagement and interaction of the community with the corridor is critical to the sustenance of the greenway.

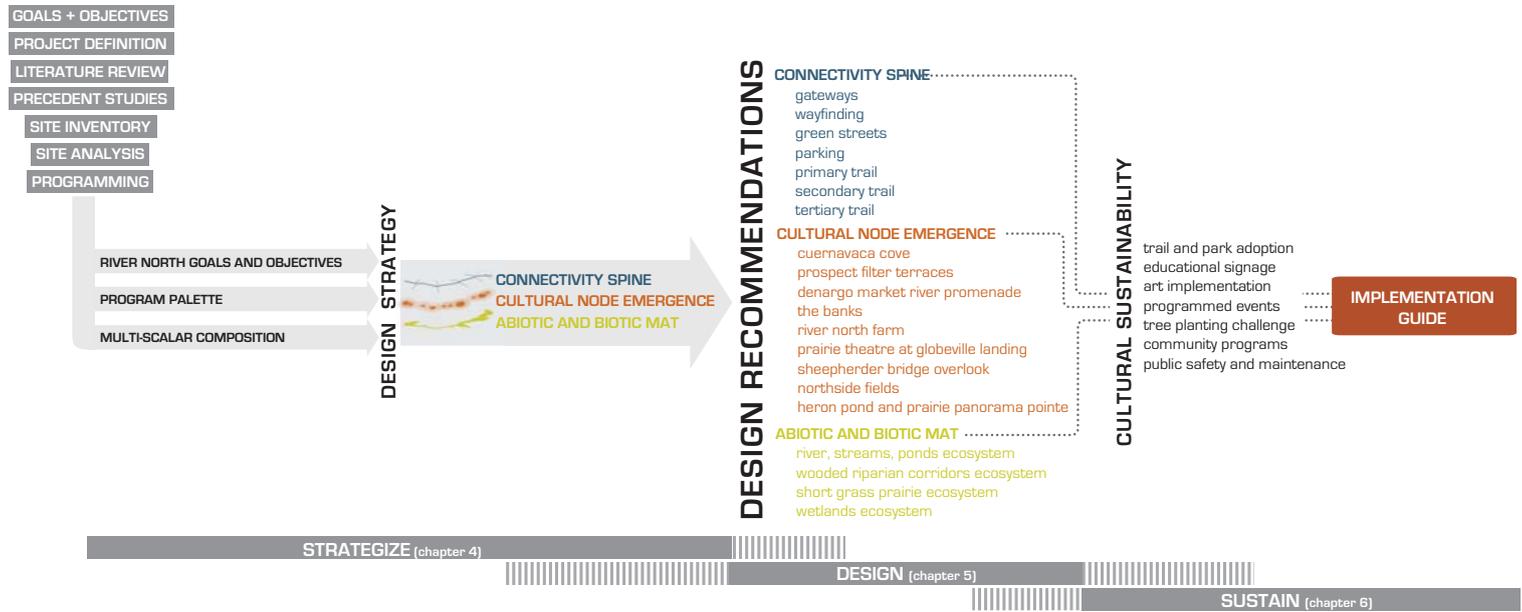
For the intent of this project, sustainability, is understood within the abiotic, biotic, and cultural realms. Abiotic and biotic sustainability is the ability of ecosystems to function as a natural system according to disturbance and successional regimes—ecological goods and services are resultantly provided. Cultural sustainability is inspiring significance and meaning for the human user, instilling a sense of ownership and responsibility for the sustenance of the greenway through time.

This chapter discusses potential means for cultivating cultural sustainability. An

implementation idea generator is also proposed as a tool for guiding implementation decisions.

Figure 6.1 represents the design development process for River North Greenway. As illustrated in Figure 6.1, cultural sustainability and the implementation guide represent the culmination of the project and are supported by the foundations established through the project development process as well as the design strategy and design recommendations. The ideas presented within this chapter act specifically as an overlay to the design recommendations and have been cross-referenced within chapter 5.

The next chapter will conclude the report and be a critical analysis of the project. The chapter will present a project summary, generation 4 greenway considerations, limitations, and future research potentials.



[6.1]

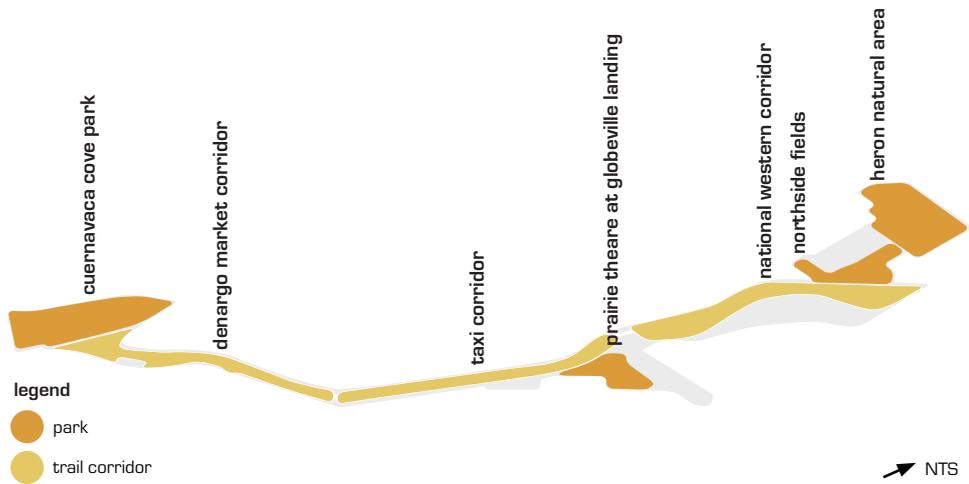
6.1: Design Development Process. A visual representation of the design development process, illustrating the integration between the phases of strategizing, designing, and sustaining. *(Christie Murman)*

CULTURAL SUSTAINABILITY

Cultural sustainability is inspiring significance and meaning for the human user, instilling a sense of ownership and responsibility for the sustenance of the greenway through time. There are many potential means for cultivating cultural sustainability: trail/park adoption, educational signage, art implementation, tree-planting challenge, programmed events, public safety and maintenance.

These means overlay and complement the spatial design of the greenway. They have been cross-referenced within Chapter 5, which describes one scenario of how River North could be designed according to the design strategy. More than spatial concepts, the ideas for potential means of cultural sustainability are most valuable, as the actual implementation location or processes of approach vary.

The potential means for cultural sustainability are described and discussed in the following pages. Recommendations represent an integration of existing and proposed conditions.



[6.2]

trail and park adoption

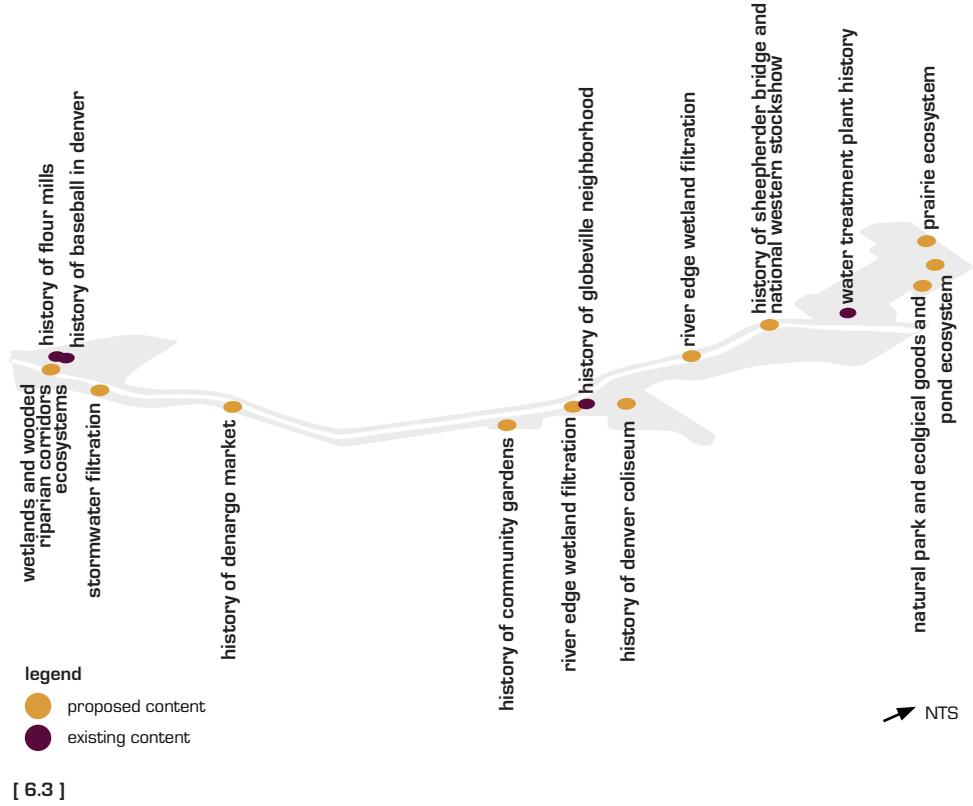
Trail and park adoption would offer the opportunity for local businesses, organizations (O40), or individuals to take on some responsibility for the maintenance of the greenway. River North “adopters” would be primarily responsible for litter clean-up. Signs would not only recognize the “adopters” but cue users as to the local investment and care for the greenway. Figure 6.2 illustrates how the greenway could be divided into segments for adoption based on parks and trail corridor.

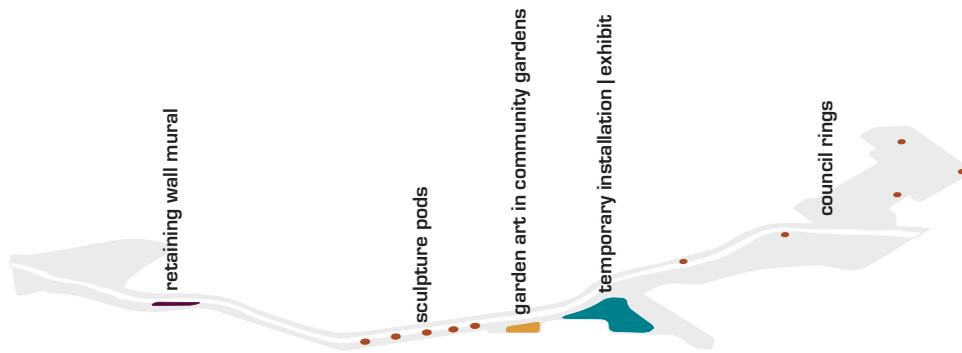
6.2: Trail and Park Adoption. Recommendations for appropriate division of the greenway to accommodate trail and park adoption. (Christie Murman)

educational signage

Educational signage is a positive means of engaging the user with the River North Greenway. As shown in Figure 6.3, some educational signage exists, but there is the potential for additional signage.

The proposed signage reflects the historical significance of the South Platte corridor as well as the ecological significance. The user should be informed about the natural processes of the River and corresponding ecosystems. It is important to educate the users as to the wild and messy nature of the ecosystems and the corresponding ecological goods and services rendered, imparting cues to the user to care about these environments. Figure 6.3 illustrates both existing and proposed educational signage content.





art implementation

Art implementation within the River North Greenway is a critical means for forming a connection with the surrounding art community of the River North district. There are multiple means for implementing art within the greenway. Figure 6.4 illustrates independent, Art on the River, contracted, and competition-based art installation potentials and accommodating spaces for such installations.

These potentials would vary with the development of the greenway through time but should be considered as an integral piece in the development of the River North Greenway.

legend

- independent
- Art on the River
- contracted
- competition

↗ NTS

[6.4]

6.3: Educational Signage. Existing signage is represented with the addition of proposed signage to diversify the breadth of information presented. *(Christie Murman)*

6.4: Art Implementation. Recommended spaces for art installations according to varied strategies for implementation. *(Christie Murman)*

programmed events

Programmed events are a means of activating the site and drawing potential users. Figure 6.5 represents potentials for programmed events. These events include festivals, small concert series, farmer's market, sports leagues and tournaments in correspondence with the cultural nodes developed within the design for River North Greenway.

tree planting challenge

Tree by Tree—The Mile High Million, is a tree planting program with the aim of adding one million new trees to the metropolitan area of Denver by the year 2025. The development of River North Greenway and corresponding green streets should correlate with this effort—benefiting not only the health of the River North Greenway corridor but contributing towards the betterment of the entire metropolitan area of Denver



[6.5]

6.5: Programmed Events. Recommendations for spaces in which programmed events could occur within River North Greenway. (Christie Murman)

community programs

There are many community programs that interact with the South Platte River within the Central Platte Valley district, as described in Chapter 3 on page 040. These activities could expand up into the River North district with the proposed design recommendations.

South Platte River Environmental Education Program (SPREE) would be able to utilize program elements such as council rings, tertiary trails, accessible banks, docks, and boardwalks for field days. **Art on the River** would have an opportunity to create a mural on a retaining wall along the trail near the Rail Yard Marketplace. The annual community clean-up effort to remove trash and debris along the banks and trails of the South Platte, called **River Sweep**, could expand the event to include the River North Greenway segment of the River.

public safety and maintenance

Public safety can be increased through the incorporation of specific design elements as well as the overall maintenance and upkeep of the greenway corridor. Security lighting at trailheads, emergency phones and call boxes along the trail, and trail patrols are means for deterring crime with the greenway corridor. Furthermore, adding educational signage, maintaining mowed edges, keeping litter picked up and removing graffiti will cue users that the greenway is an asset to the community and instill a sense of care.

River North Greenway should therefore be well managed and maintained, with permitted uses and trail rules. Public safety and maintenance measures, in accompaniment with the development and activation of the site, will insure that River North Greenway is well-used and sustained through time.

DEVELOPMENT THROUGH TIME

The development of the River North Greenway through time is responsive to numerous variables, such as funding, contextual site conditions, and current needs. These variables inevitably evolve and impact the trajectory of the design and development of the greenway. Therefore a standard, linear phasing plan is neither realistic nor feasible for River North Greenway. Rather, it is more critical to establish frameworks for making implementation decisions as variables change through time. These frameworks must provide guidance for present decisions yet remain adaptive to future indeterministic conditions.

However, like any development process, the single most determinant factor is the acquisition of funding. Jeff Shoemaker, Executive Director of the Greenway Foundation, describes the acquisition of funding and process of prioritization for implementation in an e-mail correspondence from March 2010:

1) Funding sources for the \$100 Million dollars of improvements to the South Platte River and its tributaries over the last 35 years have come

from countless sources - local, regional, state, federal, private, philanthropic, etc.

2) Funding/grants are, typically, directed/dedicated/restricted to the specific projects they've asked to fund - trail, park, bank work, channel work, playgrounds, natural areas, etc.

3) The second of the two master planning efforts - River South - was completed earlier this year. We also pursued and obtained a grant to take the two plans, combine them into an exec. summary and use that as the basis for a prioritization list for implementation. That effort will be occurring over the next 6-8 months. A good part of the decision factor, regarding "what gets done first to last" will be based on availability of funding - both type and expediency.

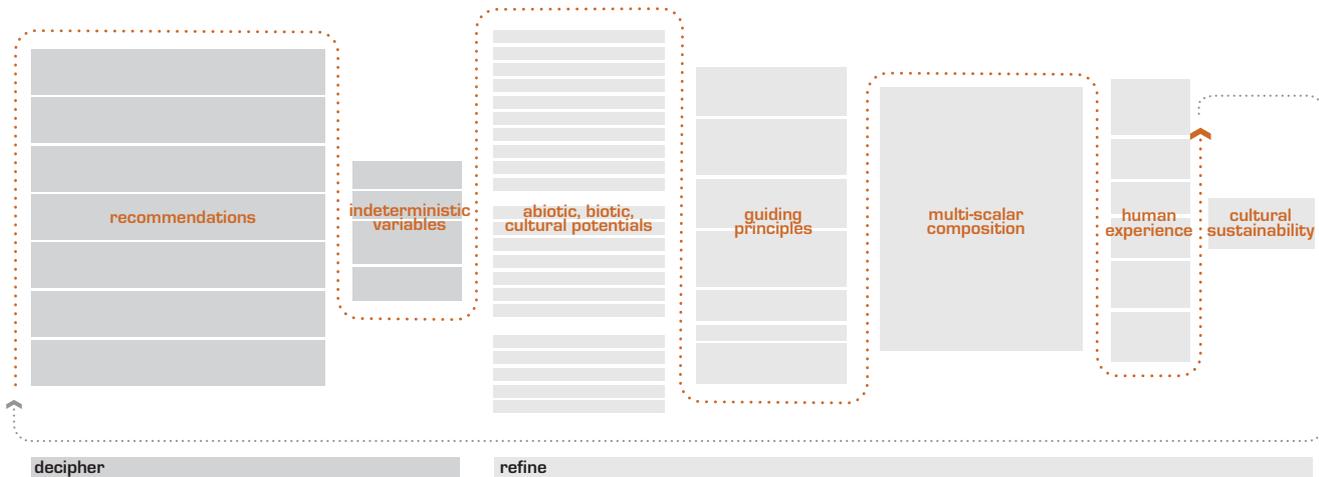
-Jeff Shoemaker, March 2010

Based off of this correspondence, a framework for the development of the River North Greenway has been generated. It is outlined according to the funding and grant types listed by Mr. Shoemaker and is to be used as

a tool for guiding the development of the River North Greenway.

Figure 6.6, represents the compositional frameworks of the implementation guide that will be presented in Figure 6.7, on page 125. The key components of the implementation guide include: current recommendations, indeterministic variables, abiotic, biotic, and cultural potentials, guiding principles, multi-scalar composition, human experience, and cultural sustainability. These components are divided according to two stages of the implementation decision-making process: decipher and refine. The decipher stage is the process of determining a project based on logistics and need. The refine stage is a process of adapting and aligning a project to fulfill and manifest the over-arching goals and frameworks of the River North Greenway. These two stages should work back and forth, seeking an integrated balance.

Figure 6.7, on page 125, expands the frameworks of Figure 6.6 to be inclusive of the criteria of each of the components.



[6.6]

6.6: Implementation Guide Frameworks. The frameworks to be used as a guide for implementing the master plan for River North Greenway through time. *(Christie Murman)*

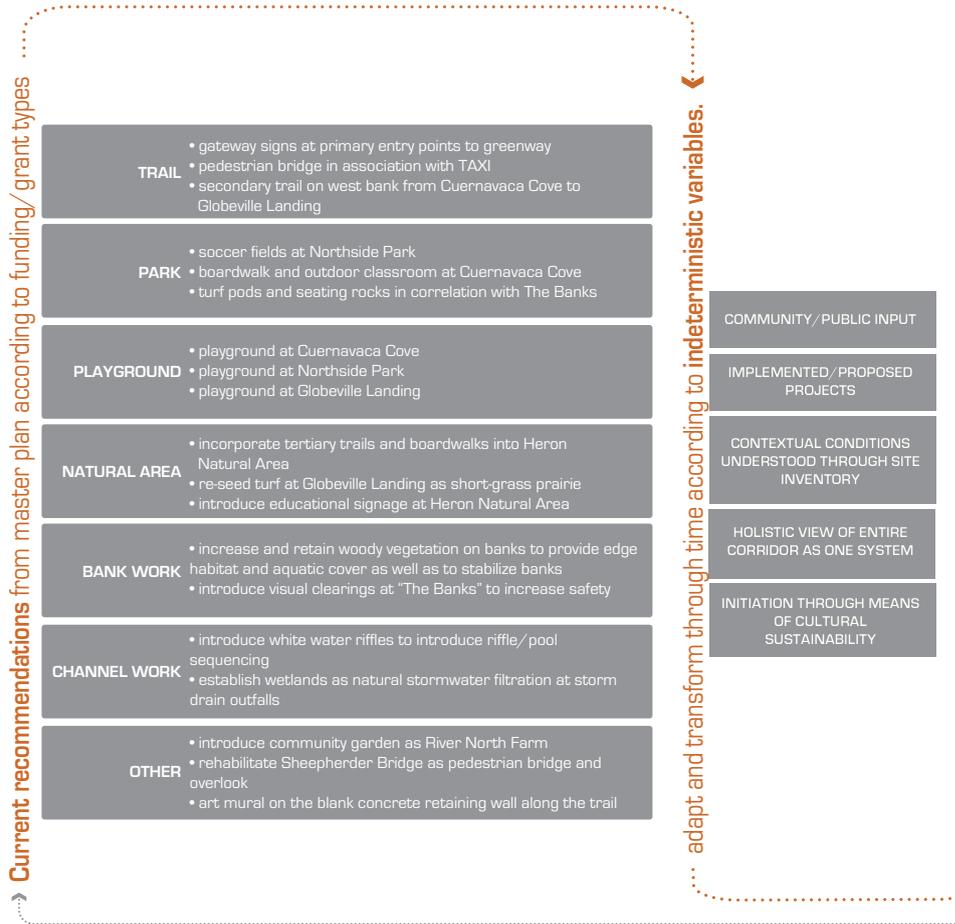
implementation guide

The implementation guide, illustrated in Figure 6.7, is a synthesis of my implementation philosophy, current recommendations, and critical development frameworks for the River North Greenway.

My implementation philosophy is represented by the orange text in Figure 6.7. It has been strategically phrased to become the titles of each individual component of the guide. As a whole, it reads as follows:

Current recommendations from the master plan, according to funding/grant types, adapt and transform through time according to indeterministic variables. Projects fulfill multiple abiotic, biotic, and cultural potentials, align with the guiding principles of the River North Greenway, and service multiple scales of greenway functionality in order to foster meaningful user experiences that cultivate cultural sustainability.

Current recommendations are organized according to the primary funding types and should be considered for implementation. The critical frameworks of the River North Greenway compose the remainder of the implementation guide and are to inform the holistic development of the greenway through time.



[6.7]

“The deeper message is the importance of a new form of linkage between ecology and culture, land and people, nature and humans.”

Richard Forman, 1996

07

REFLECT

This final chapter is a reflection on the Master's Report and resultant implications for greenway planning and design. It will first present a summary of the project, important considerations for greenway planning and design, limitations within the process, and future research potentials.

INTRODUCTION

This report represents the culmination of my educational experience at Kansas State University. In addition to the insight and knowledge gained on greenway planning and design through the strategic design of River North Greenway, the experience and insight gained throughout the process of completing this project will be invaluable as I move forward. This project allowed me to explore my interests, understand my design process, and most of all ascertain my core values within the practice of landscape architecture. Above all, I've learned most from my mistakes and a reflection on what could have been improved.

This final chapter is a reflection on the Master's Report and resultant implications for greenway planning and design. It will present a summary of the project, important considerations for greenway planning and design, limitations within the process, and future research potentials.

CONCLUSIONS

project summary

I have presented a potential framework for generation 4 greenways. Although I do not have the grounds do say that River North Greenway has for certain been strategized as a generation 4 greenway, I can say that a holistic framework approach to greenway design has been generated and could provide the basis for a more comprehensive understanding and realization of greenway potentials.

By utilizing the Abiotic, Biotic, and Cultural Resource Model and the spatial pattern language of landscape ecology theory, I was able to develop greenway frameworks that conceptualized the corridor as a system of interrelated components.

The application of the multi-scalar dynamics and the concept of a greenway as a mosaic allowed River North Greenway to be understood as simultaneously supporting a diversity of functions. The design proposed for the River North Greenway, based on the three step strategy of the abiotic and biotic mat, cultural node emergence, and connectivity spine, gave a realistic perception of the overlap and hybridization of multiple functions.

In addition, the proposition of means for cultural sustainability emphasized the importance of inspiring meaning and significance for human users that instills within them a sense of ownership and responsibility. An implementation guide was also generated to define project frameworks that should inform the development of the greenway through time.

As proposed, in this Master's Report, River North Greenway could become a complexity of cultural activity and abiotic and biotic health, balancing programmed space with the enhancement and restoration of ecosystems. It could transform the City of Denver, enriching the connection between the city and its river, the people and nature. With its rich history and present potential, River North Greenway can become a timeless piece of Denver's urban landscape, shaping meaningful human experiences and preserving nature within the built environment for future generations. In turn, it could propel the greenway movement towards a fresh, fourth generation.

generation 4 greenway considerations

Through the course of this project, I have noted critical considerations for the design and planning of a greenway that may begin to define generation 4 greenways. The first is the importance of greenway planners and designers to start with a holistic view of the potentials for a greenway. These potentials should be carefully organized within frameworks, such as the Abiotic, Biotic, and Cultural Resource Model. If the frameworks are set up from the beginning, it is likely that a greenway, throughout the course of its development, will be multi-functional and purposeful within the abiotic, biotic, and cultural realms.

Another major consideration should be the prioritization of abiotic and biotic goals by the greenway planner or designer. Through the process of community input and feedback, cultural concerns become the forefront of recommendations, but for a greenway that functions at its highest potential, cultural

concerns must be paired with abiotic and biotic concerns.

Furthermore, the theoretical bases of landscape ecology and urban ecology are strategic models for an approach to greenway planning and design. Grounded in spatial concepts, such as patches, corridors, and matrices, ecology has the potential to stage the greenway as a system that is dynamic and integrated. Literature has already begun to initiate the marriage between ecology and greenway planning, specifically with the research of Jack Ahern and Kristina Hill. This interest area holds much potential.

Finally, it is most important to understand that greenways are a large systematic network. A design decision within one segment of the corridor has the potential to impact the adjacent sites as well as miles downstream. Therefore, a greenway should be constantly re-evaluated through time as variables change, allowing the system to responsively adapt and transform.

limitations

There were many unpredicted challenges and limitations to this master's report and project. The primary challenge was the filtering of all the available literature and research on greenways

to a manageable dilemma and thesis. An even tighter study of greenways would have been beneficial in garnering more concise results.

Given the large scale of the site, it was difficult to articulate the variables and the resultant design decisions. It was also challenging, to define tangible outcomes for large corridor master-planning as well as design recommendations applicable to specific sites. What defines frameworks that can structure the development of the greenway through time yet remain adaptive and flexible to indeterministic variables and unknown funding?

Furthermore, landscape ecology served as a strong basis for theoretical exploration of the greenway but offered challenges in the visual articulation and representation of the concepts as applicable to the River North Greenway.

Finally, with so much potential applicable for a greenway corridor, the challenge becomes organizing all of the potential in a way that is manageable and easily understandable. I think the Abiotic, Biotic, and Cultural Resource Model was a concise way of handling this but there may be other means that could be even more efficient.

future research

There are many opportunities for further research as greenways will continue to evolve, adapt, and respond to the needs of our contemporary society through time. There are four primary platforms for further research that I've identified: generational development of greenways, greenway typologies analysis, evaluating the success of a greenway, and landscape ecology in accordance with greenway design.

Through the course of this project I was only able to briefly touch on the development of greenways through time and the three generational stages recognized by Robert Searns. Further development of the characteristics of these three generations of greenways could be informative to the development, definition and strategizing of a generation 4 greenway. Perhaps, the generations are more grounded in greenway typologies which could be a second topic for further research.

The strategy and development of River North Greenway would not be directly applicable to all greenways, as River North fits a unique typology that I would describe as an urban waterway greenway. There are many other typologies of greenways that could be explored and assessed

as to the varying potential of each. The emergent greenway typologies may include, rail-trail greenways, rural greenways, canal greenways, etc.

Furthermore, future research could investigate means for evaluating greenway success. This would most likely include a rigid study of the use of the greenway as well as a survey of greenway users. A more informed understanding of the public's perception of greenways could have a strong impact on the strategies behind greenway development that would ensure the greenway is well used and supports social, economic, and ecological benefits.

Finally, the marriage between landscape ecology and landscape architecture with specific regards to greenway design offers a host of potentials. In fact, I think the application of the spatial language and non-spatial concepts of landscape ecology to strategic greenway design is truly the seed of the generation 4 greenway.

Greenways are an evolving landscape form, adapting to the needs of humans through time. Therefore, research and exploration should evolve accordingly.

appendix A: **glossary**

This appendix presents key terms that are important in an informed understanding of the project scope of River North Greenway. Definitions have been referenced from literature.

A

abiotic non-living physical environment factors (Ahern 2007)

Abiotic, Biotic and Cultural (ABC) Model Comprehensive and inclusive model recognizes the needs and reciprocal impacts of humans on biotic and abiotic systems and processes (Ahern 2007)

B

bankfull Describes the incipient elevation on the bank where flooding begins, typically the bankfull stage is associated with the flow that just fills the channel to the top of its banks and at a point where the water begins to overflow onto a floodplain. (Rosgen 1996)

biotic biological factors (Ahern 2007)

C

change Within landscape ecology, the dynamics or alteration in spatial pattern and functioning over time. (Forman 1996)

corridor A strip of land of a particular type that differs from adjacent land on either side. (Hellmund 2006)

cultural human-based factors (Ahern 2007)

D

dynamic Pertaining to or characterized by energy or effective action; vigorously active or forceful; energetic. (www.dictionary.com)

E

ecology The study of the interactions among organisms and their environment. (Forman 1996)

ecosystem integrity The ability of an ecosystem to maintain essential ecological processes, functions, and structures and to adapt to spatial and temporal changes (Benedict 2006)

	ecological goods and services	The capacity of natural processes and components to provide goods and services that satisfy human needs, directly or indirectly.	(de Groot 2002)
	emergent benches	A vegetated bench at bankfull on the edge of the River channel, between 35' and 65' wide. Improve water quality, reduce flow velocities, and improve wildlife habitat.	(Johnson 2008)
F	functioning	Within landscape ecology, the movement and flows of animals, plants, water, wind, and energy through the structure.	(Forman 1996)
G	generation 4	Robert Searns outlines three distinct generations of greenways as they have evolved through time, but leaves the fourth generation open to interpretation and revelation as we progress into that next generation, generation 4.	(Searns, 2002)
	grade control structure	Counteract potential channel bed degradation and simulate the riffle/pool sequencing habitat structure.	(Johnson 2008)
	green infrastructure	Our world's natural life-support system—an interconnected network of waterways, wetlands, woodlands, wildlife habitats, and other natural areas; greenways, parks, and other conservation lands; working farms, ranches, and forest; and wilderness and other open spaces that support native species, maintain natural, ecological processes, sustain air and water resources, and contribute to the health and quality of life for communities and people.	(Benedict 2006)
		Protect greenspace for multiple objectives on equal grounds with gray infrastructure (i.e., roads, utility lines, etc.)	(Hellmund 2006)
	green street	Streets that emphasize infrastructure to support pedestrian activity, such as sidewalks, street trees, and bike lanes.	(Murman)

	greenway	Corridors of land and water (and networks of such corridors) designed and managed for multiple purposes, such as nature conservation, recreation, stormwater management, community enhancement, social equity, and scenery protection, with an overall aim of sustaining the integrity of the landscape, including both its natural (biophysical) and social components.	(Hellmund 2006)
L	landscape	A heterogeneous land area composed of a cluster of interacting ecosystems that is repeated in similar form throughout.	(Forman 1996)
	landscape ecology	The study of flows of organisms, energy, and materials through space, connects contemporary paradigms of ecology to the theoretical and practical concerns of landscape architecture.	(Hill 2005)
		The patterns of landscapes and the relationships of those patterns to ecological processes.	(Hellmund 2006)
	low-flow channel	Meanders between point bars and provides riffle/pool sequencing, eliminating the "flat" channel bed cross-section and providing increased structural diversity for aquatic species.	(Johnson 2008)
M	matrix	The most extensive and best connected element—the land use or land cover that predominates—in a landscape.	(Hellmund 2006)
		The dominant land cover type in terms of area, degree of connectivity and continuity, and control that is exerted over the dynamics of the landscape.	(Ahern 2007)
	mosaic	The overall structural and functional integrity of a landscape.	(Forman 1996)
	mosaic model	Used for describing and understanding the spatial configuration of landscapes, utilizes three fundamental landscape elements to define landscape structure: patches, corridors, and matrix.	(Ahern 2007)

P

multi-scalar to function at multiple scales (Murman)

patch A relatively homogeneous nonlinear area that differs from its surroundings. (Ahern 2007)

point bars Sediment deposition on one bank of the stream as a result of erosion on the opposite bank. (Rosgen 1996)

R

riffle/pool sequencing The natural sequence of the steeps (riffles) and flatter slopes (pools) in stream channels. (Rosgen 1996)

S

sense of place Our appreciation of the design elements, style, and materials that encompass the particular characteristics of a tree or house to a region, a nation, or the globe. (Lewis 1996)

snag structures Structures consisting of rock and tree limbs and trunks that are tethered together and anchored to the river bed so they remain in place during high flows. (Johnson 2008)

structure Within landscape ecology, the spatial pattern or arrangement of landscape elements. (Forman 1996)

sustainability Making sure present needs are met without compromising the needs of future generations; maintaining resources in such a way to be able to renew themselves over time or to keep in existence and supply with necessities. (Benedict 2006)

The degree to which our methods of using the life-support system will provide our descendants with as good a life as ours, or better; preserving or restoring the environment in which they live so as to be stable in the relationship of all parts of the system. (Lewis 1996)

appendix B: **literature review**

This appendix presents the review of key literature that was influential in the development of River North Greenway. These literature pieces in addition to other pieces not specifically reviewed within this section are referenced throughout the document.

INTRODUCTION

The process of researching, gathering, and analyzing literature is a critical component to the development of a project with breadth and credibility. The process of literature mapping and literature review has been influential in the shaping of the River North Greenway master plan.

Following is an outline of the literature pieces reviewed in this section. These literature pieces in addition to other pieces not specifically reviewed within this section are referenced throughout the document and are influential in the development of the project. The reviews include the key information and quotes that are most significant to the development of River North Greenway.

LITERATURE REVIEW OUTLINE

Greenways in the USA: theory, trends, and prospects

Jack Ahern (2002)

Green Infrastructure for cities: The spatial dimension

Jack Ahern (2007)

Integration of landscape ecology and landscape architecture: an evolutionary and reciprocal process.

Jack Ahern (2002)

An ecological framework for the planning, design and management of urban river greenways

Lawrence Baschak (1995)

Greenways as Vehicles for Expression

Annaliese Bischoff (1995)

A typology for the classification, description, and valuation of ecosystem functions, goods and services.

Rudolf de Groot (2002)

Landscape Ecology Principles in Landscape Architecture and Land-Use Planning

Richard Forman (1996)

River North Greenway Master Plan

Greenway Foundation (2009)

Designing Greenways: Sustainable Landscapes for Nature and People

Paul Hellmund (2006)

Shifting Sites

Kristina Hill (2005)

Urban ecologies: biodiversity and urban design

Kristina Hill (2001)

Tommorrow by Design

Philip Lewis (1996)

Greenways for America

Charles Little (1990)

The evolution of Greenways as Adaptive Urban Landscape Form

Robert Searns (1995)

Constructing nature: the legacy of Frederick Law Olmsted

Anne Spirn (1996)

Blueprint Denver

(2002)

Greenprint Denver

<http://www.greenprintdenver.org>

LITERATURE REVIEWS

Greenways in the USA: theory, trends, and prospects.

Jack Ahern (2002)

Jack Ahern reviews the contemporary greenway movement, the three theoretical principles of greenways he puts forth correlate with the theoretical foundations of landscape ecology, the three principles are: the hypothesis of co-occurrence of greenway resources, inherent benefits of connectivity for humans and for biodiversity, and compatibility and synergy of multiple use(s) (36).

In other words, greenways represent an efficient and strategic method for protecting the most resources with the least amount of land, connectivity supports numerous biological, physical, and cultural landscape functions that are important for sustainability, and within a spatial network, greenways are planned and managed to support multiple compatible uses, assuring political support and its ability to sustain into the future (53-54).

“Greenways are a strategic planning concept that has evolved over the past century in the USA in response to changing environmental, cultural, political, and economic factors” (54).

Green Infrastructure for Cities: The spatial dimension

Jack Ahern (2007)

Jack Ahern offers critical insight in this article towards the application of landscape ecology principles in an urban environment, his discussion includes the following points.

Green infrastructure (greenway) plans apply

key principles of landscape ecology to urban environments, specifically a multi-scale approach with explicit attention to spatial pattern and process relationships, and an emphasis on connectivity. (267)

Landscape ecology provides a theoretical perspective and the analytical tools to understand how complex and diverse landscapes, including urban environments function with respect to specific ecological processes. (268)

He also brings to light a widely accepted model for landscape planning, the Abiotic, Biotic, and Cultural (ABC) resource model. “This comprehensive and inclusive model is consistent with the landscape ecology perspective that explicitly recognizes the needs and reciprocal impacts of humans on biotic and abiotic systems and processes” (268). “This broad, multipurpose, and multi-functional suite of ecological and cultural functions supports the broad principles of sustainability” (268).

Ahern believes the drivers of landscape ecology that are relevant to green urban infrastructure, such as greenways, for sustainable cities include: a multi-scaled approach with an explicit recognition of spatial pattern and process relationships and an emphasis on physical and functional connectivity. The multi-scaled approach involves assessment and planning of spatial configuration of landscape patterns and ecological processes at multiple scales, and how these patterns and processes interact. The pattern and process dynamic is arguably the fundamental axiom of landscape ecology because the spatial composition and configuration of landscape elements directly

determines how landscape function. Because landscape pattern and process are highly interrelated and interdependent, both must be understood to plan for sustainability. Connectivity is the relationship between landscape structure and function. It refers to the degree to which a landscape facilitates or impedes the flow of energy, materials, nutrients, species, and people across a landscape (269-270).

In addition, Ahern discuss the mosaic model as a means for describing and understanding the spatial configuration of landscapes. He evolves the thoughts of Forman and presents ideas about urban patches, urban corridors, and urban matrices. In terms of the development of the River North greenway, the adaptation of Forman's theoretical perspective will essential and Ahern offers an approach to the adaptation of such.

In conclusion, Ahern states that green urban infrastructure is an evolving concept to provide abiotic, biotic and cultural functions in support of sustainability while drawing from landscape ecology principles.

Integration of landscape ecology and landscape architecture: an evolutionary and reciprocal process.

Jack Ahern (2002)

"Landscape architecture is a professional field that is significantly focused on landscape pattern—the spatial configuration of landscapes at many scales. Landscape ecology has been defined as the study of the effect of landscape pattern on process across

a range of spatial and temporal scales. The logical reasons for integrating these two fields are clear and compelling, with a great potential to support sustainable landscapes through ecologically based planning and design" (311).

"The interaction of landscape ecology and landscape architecture holds great promise as a long-awaited marriage of basic science and its application; of rational and intuitive thinking; of the interaction of landscape pattern and ecological process over varied scales of space and time, with explicit inclusion of the "habitats," activities, and values of humans" (311).

Jack Ahern proposes three stages of the integration of landscape ecology and landscape design: 1. theory and principles 2. questions and dialogue 3. reciprocal integration. It is the five issues and challenges proposed within stage 3 that I wish to explore within the development of the River North greenway. These five issues are: the paradox of time, the positive potential of landscape change, the power of spatial concepts, physical expression of landscape processes, and the dilemma of uncertainty (315-318).

Overall, Ahern provides a well-structure argument for the integration of landscape ecology and landscape design as a progression towards sustainability.

An ecological framework for the planning, design and management of urban river greenways.

Lawrence Baschak and Robert Brown (1995)

This article by Lawrence Baschak is very useful in identifying the toll urban development takes on river corridors. "Urbanization involves large transformations of land, air, energy resources, and human populations" (211), these have a major ecological consequence for urban habitats. Natural areas are restricted to remnant patches and corridors due to traditional urban development, previously functioning ecosystems such as wetlands and grasslands have been separated from a supporting structure, natural areas become over utilized by recreational use and facility development, and remnant patches and corridors or developed into parks that lack the characteristics required to support the native species that originally inhabited the land (211).

This piece therefore reviews ecology and design in correlation to the protection, ecological enhancement, and design of urban natural areas, specifically urban river corridors.

Greenways as Vehicles for Expression

Annaliese Bischoff (1995)

In this journal article, Annaliese Bischoff expands upon the ideas of Phil Lewis who characterized greenways as environmental corridors, or 'E-ways'. 'E-ways' understood as supporting the main purposes of 1: environment 2: ecology 3: education and 4: exercise. Bischoff suggests that Lewis overlooked a potential fifth 'e' of expression.. She believes expression stems from cultural, social, personal, creative, political, cultural, religious, patriotic, historic or esthetic motivations.

“Encouraging more opportunities for expression can be helpful in two important ways. First, it can serve as one means of broadening the meaning of greenways, by adding to their richness. Second, this naturally extends the interest of the public in greenways and builds a wider, stronger, and more active appreciation of greenway efforts” (324).

Although the message of this article is fairly simple, I think it’s a critical aspect to keep in mind in order to instill a vitality and spirit in the greenway that will enable it to be socially sustainable. What engages the human user and inspires a response, experience or emotion—a connection?

A typology for the classification, description, and valuation of ecosystem functions, goods and services.

Rudolf de Groot, Matthew Wilson, and Roelof Boumans

Ecosystem functions can be defined as “the capacity of natural processes and components to provide goods and services that satisfy human needs, directly or indirectly” (3). A recognition and awareness of the wide range of ecosystem functions and their associated goods and services can support the argument for the restoration of natural and semi-natural ecosystems within an urban environment.

There is a very beneficial table within this paper that outlines goods and services of natural and semi-natural eco-systems according to regulation functions, habitat functions, production functions, and information functions (5).

Landscape Ecology Principles in Landscape Architecture and Land-Use Planning

Richard Forman, James Olson, and Wenche Dramstad (1996)

If ecology is generally defined as the study of the interactions among organisms and their environment, and a landscape is a mosaic of which particular local ecosystem and land-uses recur, then landscape ecology can become a useful and intriguing lens with which to approach any design problem.

It is at exactly the right spatial scale. It explicitly integrates nature and humans. Its principles work in any landscape, from urban to pastureland and desert to tundra. Its spatial language is simple, catalyzing ready communication... (11)

The deeper message is the importance of a new form of linkage between ecology and culture, land and people, nature and humans. (10)

What I appreciate most from Forman is his ability to perceive the landscape as a holistic system, a land mosaic. He describes three broad characteristics of structure, functioning, and change. “Landscape structure is the spatial pattern or arrangement of landscape elements. Functioning is the movement and flows of animals, plants, water, wind, material, and energy through the structure. And change is the dynamics or alteration in spatial pattern and functioning over time.” Within this structural

pattern are three types of elements—patches, corridor, and matrix—they are a means for understanding spatial pattern; the spatial pattern strongly controls movements, flows, and changes.

Therefore, River North greenway can be envisioned as a self-sustaining mosaic and also a piece of the larger regional mosaic, a configuration of patches, corridors, and matrices supporting movement, flows, and changes.

To summarize, Forman imposes the overall theoretical perspective of “spatial pattern matters” (69) and “context is usually more important than content” (69). I think an opportunity is to more adequately incorporate the human dynamic into the mosaic, not as a impediment but as a catalyst and critical component in the sustainability of the system.

River North Greenway Master Plan 2009

Greenway Foundation (2009)

The River North Greenway Master Plan is a valuable piece of literature for establishing a foundation to build my master’s project from. This document is described as “synthesiz[ing] the best ideas from citizens and stakeholders into a vision that the City can strive for with the same passion as we have in the Central Platte Valley, an area that has transformed from an eyesore into one of the most popular public places in Denver while serving as an economic stimulus for development and redevelopment.” In fact, this three mile stretch of the South Platte River Greenway known as River North “has not been the subject of any comprehensive park and

recreation planning effort “ until this document.

The document emphasizes that the redevelopment of River North is a huge opportunity for Denver to build upon the “renaissance” of the South Platte River Corridor. This will require strategic planning for an interconnected, well planned, and visually attractive use of River frontage; this is where my master’s project springs from.

The Master Plan set forth by the Greenway Foundation is built on three objectives: Healthy, Habitable, and Connected. These were developed early in the process with extensive input from City and Community stakeholders. A summary of public input from meetings in the planning process are included in the appendix and are highly valuable as well as population estimates. and baseline environmental issues and needs report put together by CDM.

Designing Greenways: Sustainable Landscapes for Nature and People.

Paul Hellmund and Daniel Smith (2006)

“Greenways can tie together and restore a significant measure of ecological function to what would otherwise be isolated natural areas and exposed waterways. They can bring nature and people into closer contact, providing regular opportunities to experiences and learn about nature close to home. And they can connect people to one another—both physically, as people use trails for recreation and transportation, and because greenways lend themselves to grassroots involvement and community collaboration. Finally, b y

providing for non-motorized transportation, raising environmental awareness, and strengthening civil society and grassroots participation, greenways have the potential to help promote sustainability at both local and global scales” (xii).

Paul Hellmund and Daniel Smith compile a piece of literature that touches on what seems to be nearly every potential aspect of greenway design. They state that greenway design should be “holistic, integrative, and contextual to achieve long-term [sustainable] results in a world with finite resources” (xii). They describe greenways as “corridors of land and water designed and managed for multiple purposes, such as nature conservation, recreation, stormwater management, community enhancement, social equity, and scenery protection, with an overall aim of sustaining the integrity of the landscape, including both its natural and social components” (3-4). A greenway is most effectively designed and managed when all of these dimensions are recognized and coordinated.

They stress the overall connectivity of the greenway in terms ecological and social functions and speak to the dynamics of landscapes as changing and interconnected. They propose that greenways that “greenways offer a strategic approach to conserving and enhancing landscape integrity by focusing on some of landscape’s most important connections and dynamics” (7).

Of special interest in this work, is their correlation of landscape ecology to greenway planning. They argue for the incorporation of social-ecological processes into landscape

ecology, stating that because landscape ecology is fundamentally spatial, landscape ecology can be a very useful tool in landscape planning. They say “it can help greenway designers understand how landscapes function” (44). “The basic concepts of landscape ecology relate to landscape structure, function, and change—that is, the significance of shape and pattern, ecological and social process, and the changes over time and space that are part of the landscape” (44). Anyone “who has the ‘attitude’ to approach our environment as a coherent system, as a kind of whole that cannot be really understood from its separate components only, is a landscape ecologist” (44).

Overall, there is a lot of really good information in this book making it a go to handbook for greenway design exploration.

Shifting Sites.

Kristina Hill (2005)

“Recent work in the ecological sciences seeks to envision landscapes as composed of shifting nodes of interaction, driven by dynamic temporal relationships rather than deterministic trend” (131).

“The notions of place and of the non-equilibrium ecological paradigm...are good reasons why both designers and scientists should reflect on them..as a pair. As shifts occur in significant elements of the theoretical framework of ecology, new metaphors will emerge that affect designers’ conceptions of place” (132).

Kristina Hill offers insight into contemporary ecological and design theory, she speaks to three large shifts in the science of ecology that have happened within the last thirty to fifty years: spatial scale shift, temporal scale shift, and pattern shift. “What all these theoretical shifts in the sciences might mean for design theory remains an open question...at the very least, collaborations between designers and scientists will occur on a renewed basis as new metaphors are sought and accepted as the basis for the development of theory” (134).

“Metaphors are fundamental to human thinking...in formal theory building, these abstractions appear to be vital to the human ability to form meaningful expectations about relationships and patterns” (135).

In expanding upon metaphoric value, Hill reviews the significance of ecological theory in providing a language for the integration of spatial and temporal patterns. She discusses the conceptualization of landscapes as “shifting mosaics”, driven by spatial and temporal patterns.

“By defining landscape ecology as the study of flows of organisms, energy, and materials through space, ecological theorists created a new conceptual bridge that can connect the contemporary paradigms of ecology to the theoretical and practical concerns of landscape architecture” (146).

Urban ecologies: biodiversity and urban design

Kristina Hill (2001)

Written in response to the Downsview Park competition, Kristina Hill argues for the incorporation of ecological thinking into urban design. A piece of the challenge set forth in the competition was to “design for fluctuations over time in ecosystem conditions and human use, while creating a significant cultural work in an urban space” (91).

Hill recognizes that “spatial patterns offer the most direct opportunity for urban designers and landscape architects to alter ecological relationships” and challenges designers to “propose patterns that influence complex processes over time, sometimes in unpredictable ways, by altering flows of organisms, material, and energy” (94). The task then becomes placing “functional goals for ecological processes side-by-side with the considerations of function for human use, aesthetic style, and ideology” (95).

How can this be done successfully? What would define success? Hill reviews some of the Downsview competition entries in terms of their response to “urban ecology”, her insight towards ecological frameworks or ‘scaffolding’ could be valuable in the development of River North.

Tomorrow by Design

Philip Lewis (1996)

Philip Lewis is known in the greenway circle for his bold, conceptual thinking, going as far as to create a sketch plan of a national greenway system. However, he is most commonly referenced for his term for greenways, “E-Way”.

In his book, *Tomorrow by Design*, he defines an E-Way as “an ecological, educational, environmental, aesthetic, exercise way: a corridor with a trail or pathway accommodating pedestrians, bicyclists, cross-county skiers, and other non-motorized use” (240).

Of particular interest to me in this book is his discussion on an integrated ethic for sustainability that merges a land ethic with a social ethic. Land ethic is most clearly articulated through Aldo Leopold and reverence and respect for the land while social ethics “encompass respect for human rights to fulfill basic needs” (23). “An integrated ethic is a solid foundation for how to approach in word and deed both people and the land that supports the life-support system” (24). The River North Greenway has an opportunity to pull these two ethics together.

He goes on to speak about our life-support system; quality of life; art, nature, and life; sense of place; and diversity. He summarizes, “when we have a life-support system that assures us of the basis for life, beautiful surroundings that enhance our behavior, a sense of place that provides comfort, and a rich and diverse environment where we have the freedom to be selective in our choices” we have an acceptable social ethic standard.

Greenways for America

Charles E. Little (1990)

Charles Little, a well known environmental writer, published one of the most well-known and influential books on greenways. He first defines a greenway:

greenway n. 1. a linear open space established along either a natural corridor, such as a riverfront, stream valley, or ridgeline, or overland along a railroad right-of-way converted to recreational use, a canal, a scenic road, or other route. 2. Any natural or landscaped course for pedestrian or bicycle passage. 3. An open-space connector linking parks, nature reserves, cultural features,, or historic sites with each other and with populate areas. 4. Locally, certain strip or linear parks designated as a parkway or greenbelt.

“Greenways are a testament to the need to protect our lands and keep them alive, healthy, and green. The community-based, democratic effort to bring greenways about is composed of hard-working, ordinary people who are dedicated to improving the quality of their everyday lives by preserving and connecting remnants of nature near their homes and workplaces” (xi).

“Greenways..should be seen as a beginning in a journey toward an environmental consciousness—a way for people to practice as well as to promote the protection of the ecosphere, starting at the edges of their shoes, a way for people to express “ a necessary land ethic,” in the phrase of Aldo Leopold for whom the land meant all the soils and waters phrase of Aldo Leopold for whom the land meant all the soils and waters and plants of the world and the ways in which these elements interact with one another” (202).

Little is an inspiration, he traces the roots of the greenway movement and brings to life inspiring stories from across the country, he clearly was integral in propelling the development and evolution of greenways towards where it is today. His first line most clearly describes the vision he had for the greenway movement:

“... citizen-led movement to get us out of our cars and into the landscape—on paths and trails through corridors of green that can link city to country and people to nature from one end of America to the other. It is a movement that is not as well known as it should be, for it holds much promise to make the places we live and work a great deal more livable and a great deal more workable” (3)

How can the community be engaged and interact with the design and realization of the greenway? How can the community take on a sense of ownership for the greenway?

The evolution of Greenways as Adaptive Urban Landscape Form

Robert Searns (1995)

“More than just parks or amenities, greenways represent a adaptation—a response to the physical and psychological pressures of urbanization” (67).

Searns takes a unique approach to tracing the evolution of greenways. He identifies three distinct stages or ‘generations’ that classify the general development pattern.

Generation 1: “The first generation of

greenways were not called ‘greenways’ as such, but they did provide the archetype for special, attractive, corridors weaving their way through the city. These were the landscape axes and boulevards of Europe” and the later parkways of the United States (67).” Though not always green, these spines became important urban features and are predecessors of modern greenways, offering many of the properties of axes as well as the benefits of amenity and adornment” (67). Later, Frederick Law Olmsted introduced the “functions of movement, use, vision, experience, and linkage in a conscious attempt to reintroduce nature into the city” (68). The greenbelt concept was important in shaping greenways to provide “relief and buffering of urban development” (68).

Generation 2: “It is the hike—bike path that fully defined the character of Generation 2 greenways as trail-oriented, automobile-free corridors” (69). Corridors such as “rivers , streams, shorelines, canals, and railroads” began to be utilized due to their pre-established swath through the landscape, gentle grades, and routes often going under or over barriers such as highways (70). “Trails have been around as long as humans...”but the urban greenway trail represents a special, more accessible, adaptation, a combination of the off-street bikeway concept, wilderness hiking trails, and Olmsted’s park walkways” (70). “Trails have not only facilitated linear parks and greenways”, they more importantly have “provided a new means of interface with nature for urban dwellers” (71).

Generation 3: “In addition to serving human needs”, that were so vital in generation 1 and 2, Generation 3 greenways introduce the “notions

of land and resource stewardship [as an] integral component” (72). Human infrastructure needs such as “water quality, erosion control and flood damage reduction...in conjunction with recreational and esthetic benefits, help strengthen the political-economic arguments for convincing the public to invest in corridors for wildlife” (73). Part of the spirit of Generation 3 greenways is the “ cooperative participation by all sectors of society” (78).

In his conclusion, Searns speaks to the evolution of greenways:

“...greenways reflect an adaptive response to very basic human needs. Through several centuries of industrialization, urbanization, and increasing human impact on the landscape, people have sought ways to find refuge, to have outdoor spaces that both soothe and entertain the psyche. Linked to this is the desire to remain connected with nature, to maintain a semblance of the ‘natural’ landscape in the urban setting” (78-79).

So come the big questions, how are the contemporary needs of our society propelling the evolution of greenways? Is it sustainability? What will generation 4 greenways be like?

Constructing nature: the legacy of Frederick Law Olmsted.

Anne Spirn (1996)

“Olmsted imitated “natural scenery” because he believed that contact with such scenery would improve human health” (106).

Anne Spirn explores the legacy of Frederick Law Olmsted. Of most interest to my project is her review of Olmsted’s work with The Fens and the Riverway in Boston in the late 1800’s. This series of projects was built in an attempt of establishing urban “wilderness”, forming a landscape system designed to accommodate the movement of people, the flow of water, and the removal of wastes. The function and appearance of the project was revolutionary, it was the “understanding of landscape processes applied to landscape restoration and human health, safety, and welfare that made the Fens and the Riverway so significant” (102-108).

“All landscapes are constructed. They are phenomena of nature and products of culture. there is always a tension in landscape between the reality and autonomy of the nonhuman and its cultural construction, between the human impulse to wonder at the wild and the compulsion to use, manage , and control...For the world is not infinitely malleable; nature may be constructed, but it is not only a construction” (113).

Blueprint Denver

Blueprint Denver is an integrated land use and transportation plan adopted in 2002 as a supplement to the Denver Comprehensive Plan 2000. It has three major themes: areas of change and areas of stability, multi-modal streets, and mixed-use development (Blueprint Denver). This document is useful in understanding the

long-term vision of the city and how the River North Greenway can integrate with that plan.

Greenprint Denver

The mission of Greenprint Denver is to “provide leadership and solutions to ensure a prosperous community where people and nature thrive” (Greenprint Denver). In conjunction with Greenprint Denver, the City and County of Denver developed a Climate Action Plan. This plan discusses ten priority strategies and actions to be taken by individuals, businesses, and city government to reduce Denver’s per capita greenhouse gas footprint by more than 10 percent relative to 1990 (Greenprint Denver). This web site and document informs strategies that will allow River North Greenway to complement the Climate Action plan agenda.

appendix C: precedent studies

This appendix looks at precedent studies that progress and enrich the development of River North Greenway. Two projects are explored in terms of their conceptual frameworks, design strategies, program elements and systems.

INTRODUCTION

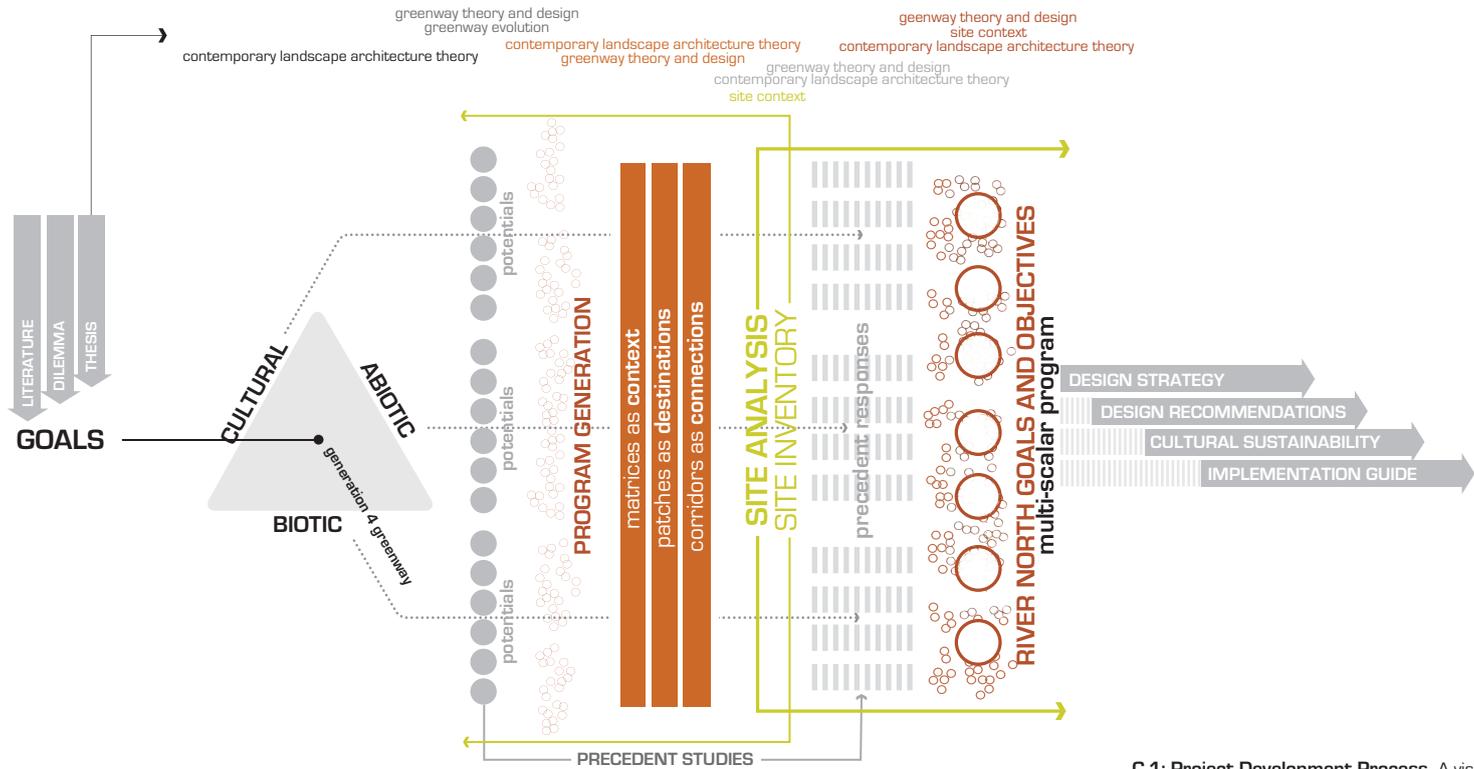
Precedent studies are critical in the development to a project. There is so much work and research available to expand the breadth and credibility of a project. Figure C.1 abstractly represents the project development process. Precedents are reviewed in this chapter.

As represented in Figure C.1, precedent studies are intended to be generative in terms of program and design development. The precedents are reviewed in terms of how the overall abiotic, biotic, and cultural goals set forth for the project were approached through programmatic responses.

In addition, the driving concept of the project as well as specific strategies in terms of patches as destinations, corridors as connections, and matrices as context will be discussed. Furthermore, graphic

representation will be looked at for the project. The conclusion will synthesize the key information obtained from the precedent that can parallel the development of the River North Greenway.

Additional precedents, not specifically documented within this report, have been utilized to generate and inform the development of the River North Greenway.



[C.1]

C.1: Project Development Process. A visual representation of the project development process is presented in this diagram, this appendix will describe precedent studies. Precedent studies are critical as a link between theory and design—generating ideas for a strategy of approach. (Christie Murman)

FLOYDS FORK GREENWAY MASTER PLAN

project information

location and size:

Louisville, Kentucky
4,000 acres stretched over 19 miles

date designed/planned:

2008

designers:

Wallace, Roberts & Todd

client:

21st Century Parks, Inc:

guiding principles:

- create a remarkable and creative combination of greenways, trails, and parklands of the highest quality standard
- provide for conservation of natural resources and for environmental sustainability
- foster creation of a well-used and well-loved community resource
- create a valuable recreational resource that is welcoming, inclusive, and serves a wide variety of needs and interests
- develop facilities for The Fork that are safe, effectively maintained, and economical to operate
- integrate on-going regional planning efforts, surrounding land uses, neighborhoods, proposed private development and public infrastructure improvements to create a symbiotic relationship between The Fork and its environs (WRT).

relevance

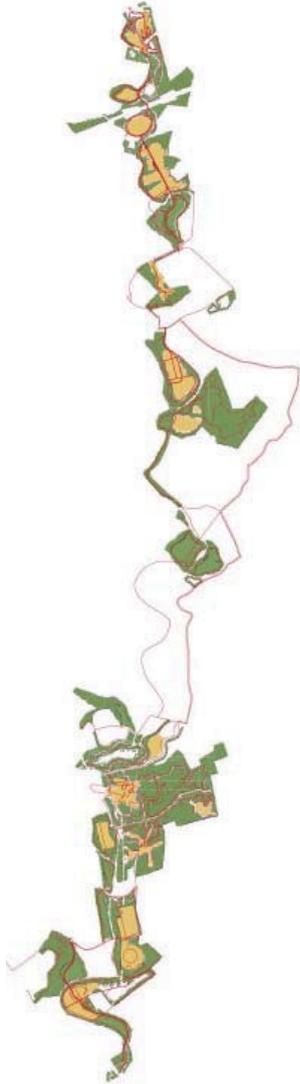
The Floyds Fork Greenway Master Plan or 'The Fork' is founded in the legacy of Frederick Law Olmsted, dedicated to bringing "nature into neighborhoods." Similar to the role of the Greenway Foundation within Denver, CO, 21st Century Parks is a visionary non-profit organization, dedicated to the development of an unprecedented park system within Louisville, KY (WRT).

The master plan expands the vision of Olmsted, striving to unite people and nature in a co-existence that equally provides for both. The task is ultimately the same for the River North Greenway, how to effectively enhance nature and the ecological quality of the river corridor while providing the destinations and connectivity that will accommodate a diversity of users and activities.

Wallace, Roberts, and Todd are especially visionary in their scope and approach to sustainable design. This is an important piece to consider in terms of reclaiming and restoring the degraded and industrial state of the River North site to functioning ecosystems that support biodiversity, enhance wildlife habitat, and render ecological benefits or services.

As a 2009 ASLA Honor Award in Planning and Analysis, it is evident that this plan has much to be learned from. Therefore, The Fork can serve as a precedent for the River North Greenway in several ways, including but not limited to: the overall concept and approach to a large scale greenway master plan, specific strategies in terms of patches as destinations, corridors as connections, and matrices as context, programmatic responses, and graphic representation techniques.

C.2: The Fork Concept. The concept for The Fork is driven by four themes: sustainability, connectivity, framework and "pods", and experience. (Source: WRT)



[C.2]

concept

There are four conceptual themes that organized The Fork’s proposed improvements and implementation recommendations:

- 1. SUSTAINABILITY
- 2. CONNECTIVITY
- 3. FRAMEWORK AND “PODS”
- 4. EXPERIENCE

These themes are briefly discussed below and diagrammatically illustrated in Figure C.2.

sustainability

Sustainability as described in relation to The Fork is:

- environmental and cultural stewardship
- social equity through universal access and the provision of diverse recreation amenities
- creation of community gathering spaces
- economic stability through viable programming and revenue generating features (WRT).

The enhancement of existing ecosystems and re-establishment of new ecosystems in The Fork are the driving design pieces towards sustainability. The ecosystems employed are forest, grassland and meadow, sustainable agriculture, wetlands, riparian buffer and tributary stream restoration, and habitat patches and corridors.

Each of these ecosystems were understood to have correlating benefits or services, these were outlined per ecosystem. Ecosystem benefits included improved water quality, stabilized slopes, improved air quality, increased carbon

sequestration, improved habitat, and reduction of heat island effect among others (WRT).

connectivity

Connectivity was considered in terms of pedestrian, vehicular, and habitat. The primary pedestrian spine is a multi-purpose trail while diversified paths complement it. There is also a water trail that supports canoe use. Habitat connectivity is primarily served through the riparian corridor (WRT).

frameworks and pods

Frameworks include recreational, environmental, and infrastructure features. Recreational features include elements such as trails, gateways, canoe launches and landings, vista points and community parks. Environmental features include elements such as riparian buffers, wetlands, meadows, reforestation, and habitat improvement. Infrastructure features include elements such as bridges, utilities, and park operations facilities (WRT).

These frameworks support the pods, which are understood to be open spaces that will be programmed through time. These uses could include athletic facilities, demonstration farms, outdoor performance venue, a sculpture park, an arboretum or botanical garden, among others (WRT).

experience

To create varied experiential qualities for the user, The Fork is considered in terms of separate landscapes, or “rooms”. Each room has unique characteristics and functions that provide different experiences for the users (WRT).

strategies

patches:: destinations

The Fork is thought of in terms of separate landscapes or “rooms”, each with unique characteristics and functions. These rooms are shown in Figure C.3. These rooms are linked by corridors or the system-wide circulation system. Together, the rooms and corridors are set within the larger context of the landscape or the “yard”.

The rooms become the destination spaces of the greenway, incorporating cultural activities as well as ecosystem improvements. Although these are considered community parks, they clearly have an “identity” that has the potential to create a more meaningful experience to the user that comes to these spaces.

Each room is considered first in terms of its role within the larger system. They are of varying sizes serving as cultural destinations as well as a piece of the overall ecosystem structure. Each room is then developed more specifically at a site scale. “Pods” discussed as a driving concept are incorporated at this scale, recognizing where activity nodes have the potential to be located and what those could include. Furthermore, ecosystem enhancements are considered more specifically in terms of specific strategies at the site scale (WRT).

corridors:: connections

Connectivity is a driving concept of The Fork. It is addressed in terms of vehicular, pedestrian, and habitat connectivity. Roads inform where the

gateways to the site are insure the site is easy to access and well-known. But of primary concern is the connectivity throughout the site of pedestrian trails.

The trail system is structured in loops, with the 12’ multi-use Louisville Loop serving as the spine of the system. Smaller loops will employ varying trail types, they are known as signature trails, excursion trails, hiking trails, and water trail.

Signature trails have more irregular alignments and immersive natural qualities and are to provide a distinctive experience. They are most likely to be considered within the refined development of a “room”. Excursion trails provide secondary and tertiary levels of access to features within the Fork. Hiking trails provide a more immersive and secluded experience, these will be narrow and wind through areas that are not suitable for high pedestrian impact. The water trail is to accommodate canoe use, with launches and landings along the way. Launches accommodate vehicular access while landings are take out/put in spaces along the way.

Habitat is planned to be connected through a mosaic of forest, meadow and riparian habitats as well as the corridor formed by the 300’ riparian buffers that correspond with Floyds Fork (WRT).

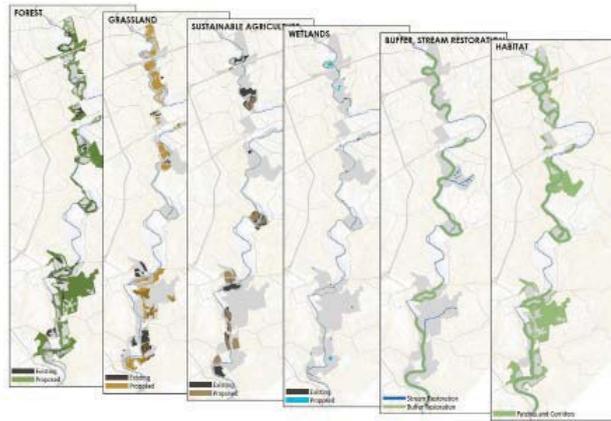


[C.3]

C.3: “Rooms” of The Fork. The Fork is thought of in terms of separate landscapes or “rooms”, each with unique characteristics and functions. (Source: WRT)

C.4: Ecosystem Improvements. The enhancement or re-establishment of ecosystems—forest, grassland, sustainable agriculture, wetlands, riparian buffer/stream restoration, and habitat—result in ecosystem benefits. (Source: WRT)

C.5: Sustainable Strategies. Sustainability strategies have been identified for The Fork, primarily deriving from ecosystem improvements. (Source: WRT)



[C.4]

Water Quality	Habitat	Resource Conservation	Energy	Community
<ul style="list-style-type: none"> • Riparian Buffers • Bioswales • Rain Gardens • Upland Reforestation • Ground Water Recharge • Porous Pavement • Rainwater harvesting 	<p><u>Enhancement</u></p> <ul style="list-style-type: none"> • Reforestation • Meadows • Wetlands • Corridors • Patches <p><u>Protection</u></p> <ul style="list-style-type: none"> • Threatened Species Preservation 	<p><u>Natural</u></p> <ul style="list-style-type: none"> • Natural resource preservation • Cultural • Adaptive re-use <p><u>Material</u></p> <ul style="list-style-type: none"> • Recycling center • Compost facility • Nursery • Use local materials 	<p><u>Conservation</u></p> <ul style="list-style-type: none"> • Bus service • Shuttles • Hybrid Fleets • Reduced Mowing <p><u>Generation</u></p> <ul style="list-style-type: none"> • Solar Panels • Geothermal • Biofuel 	<ul style="list-style-type: none"> • Diverse Activities • Gathering places • Local economic benefits • Cultural heritage • Agricultural services

[C.5]

matrices:: context

The larger context of the landscape for The Fork is considered the “yard”. The yard is inclusive of system-wide improvements and the overall composition, in particular ecosystem improvements.

Figure C.4 illustrates the ecosystem improvements that form the background matrix for the site: forest, grassland, sustainable agriculture, wetlands, riparian buffer/ stream restoration, and habitat. The enhancement or re-establishment of these ecosystems in turn results in ecosystem benefits such as water quality, stabilized slope, carbon sequestration, minimized erosion, improved habitats, and improved recreational and educational resources, among others.

Therefore, ecosystem improvements are an efficient strategy in making the site as sustainable as possible. Figure C.5 shows the primary sustainability strategies identified for The Fork. Although many of the strategies derive from ecosystem improvements, its equally important to recognize the potential strategies for sustainability within cultural facets, such as community gathering places and diversified activities. These strategies inform the overall development of the site as a holistic system.

The background matrix of the site is also informed by the intention for education and interpretation, The Fork as a work of art, and The Fork as an integrated open space network. These pieces aid in the development of the overall composition of the system.

Finally, the economic viability of the site will ensure that this site sustains into the future. The plan has already received significant support in term of public and private funding and is catching attention nation-wide. There is no-doubt that this will become a major asset for the city of Louisville (WRT).

response

Program responses for The Fork, in terms of elements and systems, were compiled and organized according to the goals of the cultural, abiotic, and biotic realms developed at the beginning of the project (Figure C.6). The program listed is not intended to be an extensive and complete list of all the program of the project, but rather a generative list, informing potential programmatic responses for the River North greenway.

synthesis

The Floyds Fork Greenway Master Plan is visionary in its approach to greenway design and theory. Grounded in the ideals of Olmsted yet inspired by the values of our contemporary society, The Fork certainly pushes the potentials and strategizing of a greenway towards generation 4.

It's clear that sustainability is a driving factor in all aspects of the design, building on Olmsted's ideal of bringing nature to the city and people. Furthermore, place-making is important within such a large site and has been addressed through the ideating of 'rooms', each with unique character and identity.

Program is diversified and responds to recreational and cultural needs yet is grounded in ecosystem improvements and cultural heritage. Graphics are visually stimulating, attracting the digitally oriented as well as those interested in craft and artistic value.

Although this project is larger in scope and scale than the River North Greenway and is not yet built, the ideals and strategies are parallel. The Fork is working ahead of development, preserving nature to give back to the people as density surges. The River North Greenway contrasts in that the nature of the site has been compromised by industry, however, the enhancement and re-establishment of semi-natural ecosystems will be a driving concept much like The Fork.

In conclusion, The Floyds Fork Greenway Master Plan is truly a visionary plan that offers valuable strategies in terms of propelling the evolution of greenways.

	GOALS		FLOYDS FORK PROGRAM ELEMENT AND SYSTEM RESPONSES
CULTURAL FUNCTIONS: human-based factors	Create an Educational and Interpretive Experience	P	interpretive and wayfinding signage, "special places", agricultural legacy, forest management, geology, geomorphology, ecological change, wetland,
	Provide a Scenic Aesthetic	M, P	ecosystem enhancements, vista points, observation towers, flower gardens
	Provide a Diversity of Passive and Active Recreational Opportunities	P, C	athletic fields, wildflower walks, birding/wildlife viewing, star gazing, dog park, volleyball, tennis, basketball, lawn bowling, soccer, football, softball/baseball, concessions, equipment rental, disc golf, ultimate frisbee, skating, canoeing/kayaking, fishing platforms/cleaning stations, kite flying, model airplane flying
	Utilize the Site for Entertainment Purposes	P	outdoor performance facilities, digital wi-fi,
	Foster Historic Preservation and Cultural Heritage	M, P	heritage farms, historic structures, heritage interpretation
	Increase Public Safety	M, P	night lighting
	Expand Capacity of Trail Network	C	universal access, gateways, boardwalks, tunnels and land bridges, excursion trails,
	Enhance Presence of Public Art	P	environmental art program, art center/ classes, sculpture, landform
	Build Upon and Generate Economic Development	M, P	carbon credits, piece of Louisville development strategy
ABIOTIC FUNCTIONS: physical environment factors	Engage Community Interaction and Involvement	M	community gathering spaces, community gardens
	Respond to Climatic Conditions	M	four-season activity
	Restore and Protect the Floodplain	P, C	wetlands, 300' minimum riparian buffer
	Increase Carbon Sequestration Capacities	M	ecosystem benefit, tree nursery
	Manage Stormwater and Improve Water Quality	P, C	filter terraces, biofiltration wetland, bioswales, rain gardens, upland reforestation, ground water recharge, porous pavement, rainwater harvesting
	Naturally Provide for Erosion Management	C	forests, riparian buffer
	Improve Soil Quality and Nutrient Levels	M	ecosystem benefit
	Increase Air Quality	M	ecosystem benefit
BIOTIC FUNCTIONS: biological factors	Foster Biodiversity	P	forests, grasslands, meadows, wetlands, riparian buffer, threatened species preservation
	Increase and Enhance Wildlife Habitat	P, M	19 species of mammals, 138 species of birds, 450 species of native plants, 25 species of reptiles and amphibians, 40 species of fish, 17 species of rare freshwater mussels,
	Conserve Resources through Alternative Energy	P	recycling center, compost facility, nursery, solar panels, geothermal, reduced mowing, potable water, bus stops
	Allow for Disturbance and Successional Regimes	M	
	Introduce Food Production	P	sustainable agriculture demonstration farms, orchards, community gardens

[C.6]

C.6: Program Elements and System Responses. Program responses for The Fork were compiled and organized according to the goals of the cultural, abiotic, and biotic realms developed at the beginning of the project. (Source: WRT)

TRINITY RIVER CORRIDOR DESIGN GUIDELINES

project information

location and size:

Dallas, TX
2,300 acres stretched over 9 miles

date designed/planned:

2008

designers:

Wallace, Roberts & Todd

client:

City of Dallas

guiding principles:

- a landscape that is at once ecologically viable, education, offering diverse opportunities for recreation and exercise, and functioning as a connective tissue between adjoining communities
- a landscape that provides a high degree of ecological service, from carbon sequestration, water recycling and bio-filtration, to the production of energy from renewable resources
- a landscape that restores access and beauty to the Trinity River, and enhances the floodplain as an expression of the Texas Blackland Prairie
- a landscape that integrates infrastructure—power transmission, transportation, flood protection and conveyance—within the context of ecology and recreation

- a landscape that embraces art, from the conception of landforms and its material quality to the provision of venues for major works—permanent and temporary.

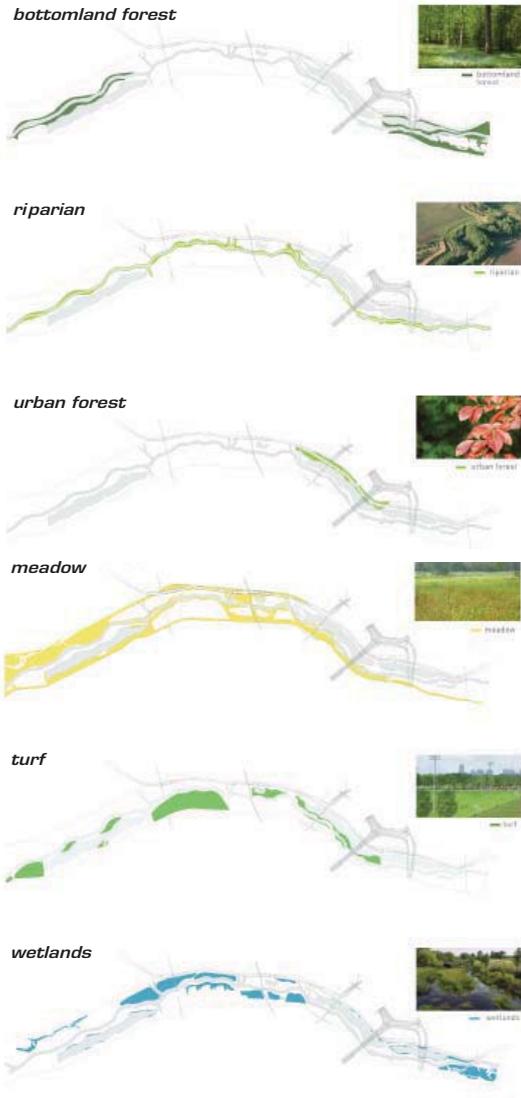
relevance

The Trinity River Corridor Design Guidelines establish the frameworks for a long-term implementation of a linear urban park. Although, it is not specifically termed a greenway, it functions very much the same, as a linear, connective element in the urban fabric. Utilizing the river corridor, it is essential long-term green infrastructure for the City of Dallas.

The plan is rooted in sustainability and incorporates art as a critical component of the design. It is progressive in its goals and objectives, recognizing ecological services as a guiding principle. It was awarded a 2009 ASLA Honor Award.

Although the site is larger than River North and varies in context, as a master plan and design guidelines document it offers a range of information from site planning down to materiality that is critical to consider for a greenway to function as a multi-scalar component of the landscape.

It also offers channel stability strategies for the improvement of the Trinity River that could be effective for the South Platte River that runs through the River North site.



[C.7]

C.7: Ecotypes. Ninety percent of the site will be dedicated to newly made landscape eco-types: riparian, urban forest, meadow, turf, and wetlands. (Source: ASLA)

concept

The concept is to create a didactic landscape unlike any other: where art and sustainability will coexist throughout the built form, advancing the city's most progressive goals and values, where infrastructure will be rendered green infrastructure, where vastness will be sensed and understood alongside the minute, and where Dallas will rediscover and redefine itself (ASLA).

strategies

matrices:: context

The background context of the site will primarily be composed of self-sustaining, educational, viable and high ecologically functioning landscapes reflecting native landscapes of the region (ASLA). Ninety percent of the 2,300 acres will in fact be dedicated to newly made landscape eco-types as stratified in Figure C.7. These eco-types are bottomland forest, riparian, urban forest, meadow, turf, and wetlands.

Due to the entire park being subject to periodic flooding, about 80 percent of the park area is reserved for native, low-maintenance landscapes that can naturally withstand flood events. More than 12,000 proposed canopy trees will directly support hydrologic control of downstream flood velocities (ASLA).

patches:: destinations

As design guidelines, much of the design process related to patches as destinations was oriented to the development of strategies for cohesive implementation over time. Taking design down to site scale and materiality.

Figure C.8 illustrates the three-part “Trinity Specific” public art program. It is conceived to unfold and evolve over a time. The three parts respond to site and scale in different ways. Part 1 is comprised of site-specific works, implemented biannually. Part 2 will be a major permanent piece for the Central Island, this piece will most-likely become an ‘identifying’ element for Dallas. Part 3 will include multiple “council circles”, placed throughout the site to encourage contemplation and education. Each is envisioned to be designed by a different artist (ASLA).

Another piece of the design guidelines were material palettes. In response to the multi-scalar dynamic of greenways, its important to remember that greenway design must go beyond spatial arrangement and establish frameworks for the character of the site elements. It is at this scale that the human user interacts with the space and has the potential to be impacted. Figure C.9 specifically outlines materials to be used for paving of roads and trails, parking lots, promenades and plazas as well as retaining walls. The palette is intended to meet the characteristics of “attractive, durable, sustainable and locally sourced” (ASLA).



Part 1: Temporary and Sustainable Works

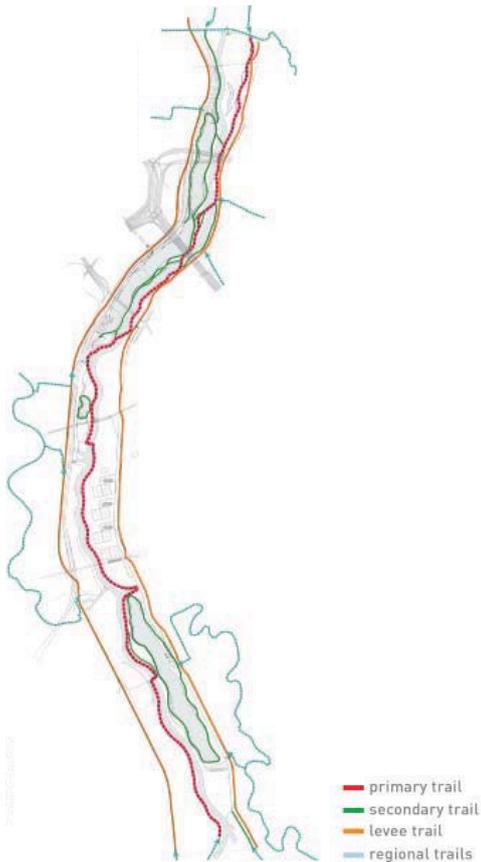


Part 3: Council Circles

[C.8]

Paving - Roads and Trails		Retaining Walls & Abutments	
	<ul style="list-style-type: none"> Concrete, broom finish Park Roads, Levee Top Trail Highest fly-ash content possible 9 inches thick 		<ul style="list-style-type: none"> Lueders Limestone - veneer Promenade wall/other walls Quarried locally
	<ul style="list-style-type: none"> Concrete, tinted, broom finish Primary Trail Highest fly-ash content possible 6 inches thick 		<ul style="list-style-type: none"> Solar Panels - facing Promenade wall/other walls Energy generated will be sent back to the grid
	<ul style="list-style-type: none"> Flexi-Pave Secondary Trail FlexiPave porous pavement made of 100% recycled tires, aggregate rock - binding agent www.kibus.com 		<ul style="list-style-type: none"> Green Wall - facing Promenade wall/other walls Appropriate, locally adapted plants will be specified gsky green wall system to be used www.g-sky.com/
	<ul style="list-style-type: none"> Decomposed Local Granite Equestrian Trail Decomposed granite, 3/8" size Texas pink granite, sourced within 200 miles Binder to be used to stabilize 		<ul style="list-style-type: none"> Lueders Limestone - boulders Armoring and abutments Quarried locally - possibly from on site

[C.9]



[C.10]

C.8: Public Art. A three part "Trinity Specific" public art program was proposed to unfold and evolve over time. *(Source: ASLA)*

C.9: Materiality. Materials were specified for use of road and trail paving, parking lots, promenades and plazas, and retaining walls. *(Source: ASLA)*

C.10: Trail Network. Ninety percent of the site will be dedicated to newly made landscape ecotypes. *(Source: ASLA)*

corridors:: connections

The corridors that define Trinity River include the trail network (Figure C.10) and the river corridor.

The trail network is envisioned as a hierarchy of paths and trails providing access to spaces within the site and beyond to regional trail linkages. The site trails consist of a single primary trail and smaller secondary trails. The primary trail will be 20' wide concrete trail (ASLA). Regional trail linkages establish connections into and out of the site. These regional trails will provide the primary pedestrian access to the site.

Improvements to the river corridor are a large piece of the design guidelines. The improvements are intended to increase channel stability, by naturalizing the existing straight, trapezoidal river form while accommodating park features and incorporating the influences of geomorphic controls and processes. The improved channel is proposed to facilitate recreational uses and enhance fish and wildlife habitat through improved aquatic and riparian conditions (ASLA).

River channel meanders, emergent wetlands and multi-level riparian terraces are proposed as part of the larger scheme to improve water quality and to establish a viable end-to-end wildlife corridor (ASLA).

response

Program responses for the Trinity River, in terms of elements and systems, were compiled and organized according to the goals of the cultural, abiotic, and biotic realms developed at the beginning of the project (Figure 4.17). The program listed is not intended to be an extensive and complete list of all the program of the project, but rather a generative list, informing potential programmatic responses for the River North greenway.

synthesis

The Trinity River Design Guidelines are a progressive vision for the river corridor and its corresponding amenities. Offering the co-existence of sustainability and art as a conceptual framework, the plan proposes unique design elements and strategies.

Although it is not specifically termed a greenway it is similar in composition and its role in the urban landscape of Denver to a greenway, functioning as linear infrastructure for abiotic, biotic, and cultural functions.

Eco-types establish the background context of the site, creating a native low-maintenance landscape that offers opportunities for recreation and education. Cultural program is integrated into the ecotype matrix as flex fields and parks with particular program such as playgrounds and sport fields. Spaces are considered in terms of materiality and implementation strategies. A hierarchy of trail corridors network the human user across the site and improved river corridors increase abiotic and biotic functions as well as provide for recreational opportunities.

In conclusion, the Trinity River Design Guidelines offer important insight for River North design strategy, specifically in terms of cohesive implementation over time.

GOALS		FLOYDS FORK PROGRAM ELEMENT AND SYSTEM RESPONSES	
CULTURAL FUNCTIONS: human based factors	Create an Educational and Interpretive Experience	P	everything is floodproof (mobile restroom units, shade structures), green product concessions
	Provide a Scenic Aesthetic	M, P	ecosystem enhancements, vista points, observation towers, flower gardens
	Provide a Diversity of Passive and Active Recreational Opportunities	P, C	athletic fields, jogging, walking, equestrians, commuter cyclists, stepped stone terraces
	Utilize the Site for Entertainment Purposes	P	amphitheatre
	Foster Historic Preservation and Cultural Heritage	M, P	stepped stone terraces reminiscent of chalky limestone shoals that exist as a geologic substrate and enticed early settling
	Increase Public Safety	M, P	night lighting
	Expand Capacity of Trail Network	C	public transit facilities, promenade, greenwall, materiality
	Enhance Presence of Public Art	P	site specific temporary works, permanent work, 12 "council circles" commissioned by local artists, landform, "Trinity Specific" Public Art Program
	Build Upon and Generate Economic Development	M, P	anchor transformation of Dallas
Engage Community Interaction and Involvement			
ABIOTIC FUNCTIONS: physical environment factors	Respond to Climatic Conditions	M	floodproof amenities
	Restore and Protect the Floodplain	P, C	reestablishment of stream meanders, low-maintenance landscapes that can withstand flood events, emergent wetlands, multi-level riparian terraces
	Increase Carbon Sequestration Capacities	M	eco-type enhancements
	Manage Stormwater and Improve Water Quality	P, C	emergent wetlands, multi-level riparian terraces, perched cypress wetland ponds
	Naturally Provide for Erosion Management	C	bioengineered bank/terrace with vegetation + stone
	Improve Soil Quality and Nutrient Levels	M	eco-type enhancements
BIOTIC FUNCTIONS: biological factors	Increase Air Quality	M	12,000 canopy trees
	Foster Biodiversity	P	native or naturalized plant communities and species of the Texas Blackland Prairie landscape
	Increase and Enhance Wildlife Habitat	P, M	prairie grasses, wetlands, riparian buffers, bottomland woodland
	Conserve Resources through Alternative Energy	P	public transit facilities
	Allow for Disturbance and Successional Regimes	M	eco-type enhancements
Introduce Food Production			

[C.11]

C.11: Program Elements and System Responses. Program responses for the Trinity River were compiled and organized according to the goals of the cultural, abiotic, and biotic realms developed at the beginning of the project. (Christie Murman, Source: ASLA)

references

- Ahern, Jack. 2007. "Green Infrastructure for cities: The spatial dimension." In *Cities of the Future Towards Integrated Sustainable Water and Landscape Management*, ed. Validimir Novoty and Paul Brown, 267-283. London, UK: IWA Publishing.
- Ahern, Jack. 2002. "Greenways in the USA: theory, trends, and prospects." In *Greenways as Strategic Landscape Planning: Theory and Application*, Jack Ahern, 34-55. Wageningen University.
- Ahern, Jack. 2002. "Integration of landscape ecology and landscape architecture: an evolutionary and reciprocal process." In *Greenways as Strategic Landscape Planning: Theory and Application*, Jack Ahern, 311-319. Wageningen University.
- Ahern, Jack. 1995. "Greenways as planning strategy." In *Greenways: The beginning of an international movement*, ed. Julius Fabos and Jack Ahern, 65-80. Netherlands: Elsevier Science.
- ASLA 2009 Professional Awards. "Trinity River Corridor Design Guidelines." <http://www.asla.org/2009awards/632.html>. (accessed Septemeber 25, 2009)
- Baschak, L.A. and R.D. Brown. 1995. "An ecological framework for the planning, design and management of urban river greenways." In *Greenways: The beginning of an international movement*, ed. Julius Fabos and Jack Ahern, 211-226. Netherlands: Elsevier Science.
- Benedict, Mark A. 2006. *Green Infrastructure: Linking Landscapes and Communities*. Washington D.C.: Island Press.
- Blevins, Jason. "The South Platte: A River's Rebirth." *Denver Post*, July 15, 2007.
- Blueprint Denver. 2002. <http://www.denvergov.org/planning/BlueprintDenver/tabid/431883/Default.aspx>. (accessed December 1, 2009).
- Bischoff, A. 1995. "Greenways as vehicles for expression." In *Greenways: The beginning of an international movement*, ed. Julius Fabos and Jack Ahern, 317-326. Netherlands: Elsevier Science.

City and County of Denver. www.denvergov.org. (accessed August 28, 2009).

City Wild. <http://www.citywild.org>. (accessed November 16, 2009).

Colorado Native Plant Society. <http://www.conps.org>. (accessed November 18, 2009).

Denver GIS. <ftp://dggisftp.denvergov.org>. (accessed September 11, 2009).

Denver Infill. <http://www.denverinfill.com>. (accessed October 28, 2009).

Erickson, Donna. 2006. *Metrogreen: connecting open space in North American cities*. Washington D.C.: Island Press.

Fabos, Julius Gy. and Jack Ahern, ed., 1995. *Greenways: The Beginning of an International Movement*. Amsterdam: Elsevier Science B.V., reprinted from the Journal: Landscape and Urban Planning, volume 33, Nos. 1-3.

Flink, Charles A. and Robert Searns. 1993. *Greenways: a guide to planning, design, and development.*, ed. Loring Schwartz. Washington D.C.: Island Press.

Forman, Richard, Wenche Dramstad, and James Olson. 1996. *Landscape Ecology Principles in Landscape Architecture and Land-Use Planning*. Washington D.C.: Island Press.

Greenprint Denver. <http://www.greenprintdenver.org>. (accessed December 2, 2009).

de Groot, Rudolf, Matthew Wilson, and Roelof Boumans. 2002. "A Typology for the classification, description and valuation of ecosystem functions, goods and services." Available from: http://www.uvm.edu/giee/publications/deGroot_et_al.pdf. (accessed December 4, 2009).

The Greenway Foundation. <http://www.greenwayfoundation.org>. (accessed August 3, 2009).

- Hellmund, Paul C. and Daniel S. Smith. 2006. *Designing greenways: sustainable landscapes for nature and people*. Washington D.C.: Island Press.
- Hill, Kristina. 2001. "Urban Ecologies: Biodiversity and Urban Design." In *Downsview Park Toronto*, edited by Julia Czerniak, 91-101. Prestel.
- Hill, Kristina. 2005. "Shifting Sites." In *Site Matters*, ed. Carol Burns and Andrea Kahn, 130-155. Great Britain: Taylor and Francis Books, Inc.
- Johnson, Ted and Travis Bogan. 2008. River North Corridor of the South Platte River - Baseline Environmental Issues and Needs. In *The River North Greenway Master Plan*, appendix. The Greenway Foundation.
- Kisling, Jack. "The South Platte History: Through thick and thin, river shaped region." *Denver Post*, June 26, 1996.
- Lewis, Philip. 1996. *Tomorrow by Design: a regional process for sustainability*. Canada: John Wiley & Sons, Inc.
- Little, Charles E. 1990. *Greenways for America*. Baltimore, MD: John Hopkins Press.
- McHarg, Ian. 1992. *Design with Nature*. Canada: John Wiley & Sons, Inc.
- MetroDenver. <http://www.metrodenver.org/living-here/climate>. (accessed November 16, 2009).
- Murman, Christie. 2009. "A Case Study: River North Reach of the South Platte River." Completed for LAR 741 Fluvial Systems, instructed by Timothy Keane.
- National Map Seamless Server. <http://seamless.usgs.gov/index.php>. (accessed October 28, 2009).
- Pena, William M. and Steven A. Parshall. 2001. *Problem seeking: an architectural primer, fourth edition*. New York: John Wiley & Sons, Inc.

The Piton Foundation. <http://www.piton.org>. (accessed October 28, 2009)

River North Greenway Master Plan (RINO). 2009. Available from: <http://www.denvergov.org/Portals/626/documents/RINO.pdf>. (accessed August 28, 2008).

Rosgen, Dave. 1996. *Applied River Morphology*. Pagosa Springs, CO: Wildland Hydrology, 1996.

Searns, Robert M. 2002. "Greenways: where from, where to." Available from: <http://www.greenwayteam.com/GreenwayEvolution.pdf>. (accessed August 28, 2009).

Searns, Robert M. 1995. "The evolution of greenways as an adaptive urban landscape form." In *Greenways: The beginning of an international movement*, ed. Julius Fabos and Jack Ahern, 65-80. Netherlands: Elsevier Science.

Spirn, Anne. 1996. "Constructing Nature: The Legacy of Frederick Law Olmsted." In *Uncommon Ground: Rethinking the Human Place in Nature*, ed. William Cronon, 91-113. Harcourt Brace & Company.

SPREE: South Platte River Environmental Education. <http://www.spreeweb.org>. (accessed November 16, 2009).

Urbanas, Ben and Jeff Shoemaker. "Reclaiming South Platte River: 30 Years of Progress." Available from <http://www2.ing.puc.cl/AguasLluvias/sem1/Restauracion%20del%20Rio%20South%20Platte.PDF>. (accessed October 25, 2009).

USDA. "Ecosystem Services." <http://www.fs.fed.us/ecosystemservices>. (accessed November 16, 2009).

Wallace, Roberts, and Todd (WRT). 2008. The Floyds Fork Greenway Master Plan.

Wildlife Department. "Shortgrass Prairie Region." Available from: <http://www.wildlifedepartment.com/cwcs/ApprovedOKCWCSShortgrassPrairie.pdf>. (accessed 28 November 2009).

concept statement

With a vision grounded in a meaningful human experience, the River North Greenway is conceptualized as a dynamic mosaic, energizing a sustainable vitality for the corridor.

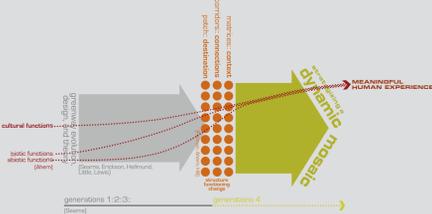
The dynamic mosaic is strategized according to three spatial realms: Abiotic and Biotic Mat, Cultural Node Emergence, and the Connectivity Spine. These three realms integrate and interact seamlessly as a functioning system of abiotic, biotic, and cultural functions.

River North Greenway is conceptualized as a corridor within the urban context of Denver that will promote multi-functionality and sustain through time. Priority is first given to restoration of abiotic and biotic functions within the site, grounding the design as an ecological corridor that provides ecological goods and services. With restored ecosystems as a preface, cultural nodes develop "identity" within the corridor and create neighborhood, district, and city destinations. Connectivity is maximized not only within the corridor, but as infiltration into and out of the greenway. Furthermore, the greenway amenities proposed support a variety of human experiences for a multi-generational range of users with varied interests and motives for coming to and being within the River North Greenway.

River North Greenway responds to the dynamics of its context yet catalyzes activity and development along the corridor, propelling the infiltration of infill up the corridor from the Central Platte Valley and revitalizing this post-industrial area as vibrant districts of activity.

This plan provides a vision for River North Greenway to not only propel the evolution of greenways but to sustain the momentum of the greenway movement in Denver well into the future.

project trajectory

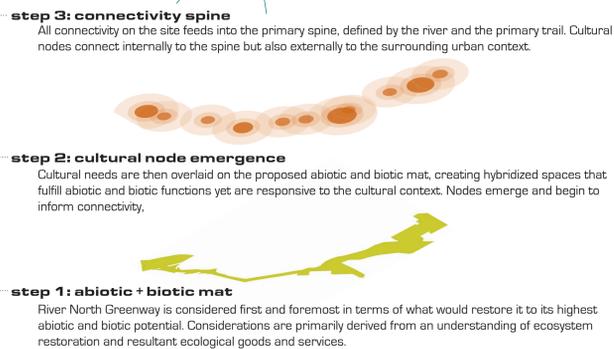


guiding principals

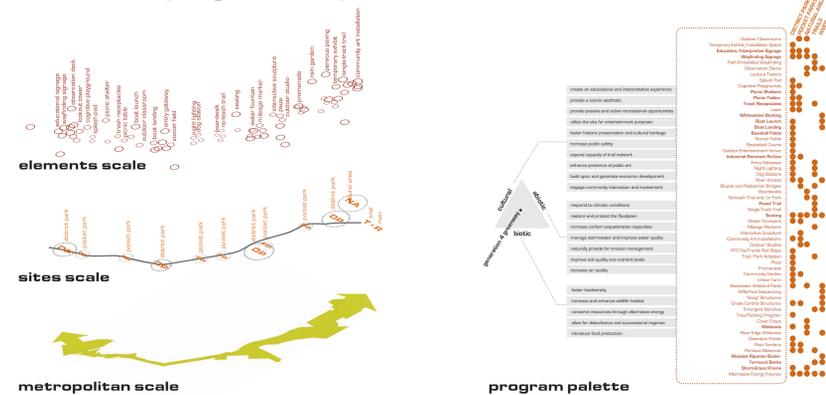
01. Create hybridized spaces that layer the restoration of the abiotic and biotic systems with cultural destinations and circulation to promote **MULTI-FUNCTIONALITY** and long-term **SUSTAINABILITY**.
02. Develop a hierarchy of cultural nodes that create neighborhood, district and city **DESTINATIONS**. These nodes will respond and adapt to existing and contextual frameworks through time, propelling connections into, along, and out of the greenway.
03. Ensure greenway amenities support a variety of **HUMAN EXPERIENCES** for a multi-generational range of users with varied interests and motives for coming to and being within this stretch of the greenway.
04. Maximize **CONNECTIVITY** not only within the greenway, but infiltration into and out of the greenway. The greenway should be thought of in terms of a living system, supporting not only the movement of humans but also, wildlife, plant seeds, etc.
05. Develop a unique **"IDENTITY"** that fills a niche not supported by any other stretch of the extensive greenway network of Denver.
06. Protect and provide for the **SAFETY** of the user.
07. Involve and engage the **COMMUNITY** to instill a sense of ownership and adoption of the spaces and trails of the greenway, this will ensure long-term sustenance.

STRATEGIZE

three-step design approach



multi-scalar program composition



DESIGN

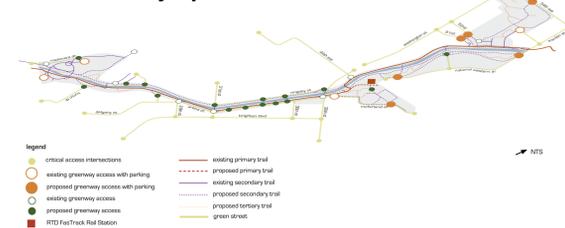
abiotic + biotic mat



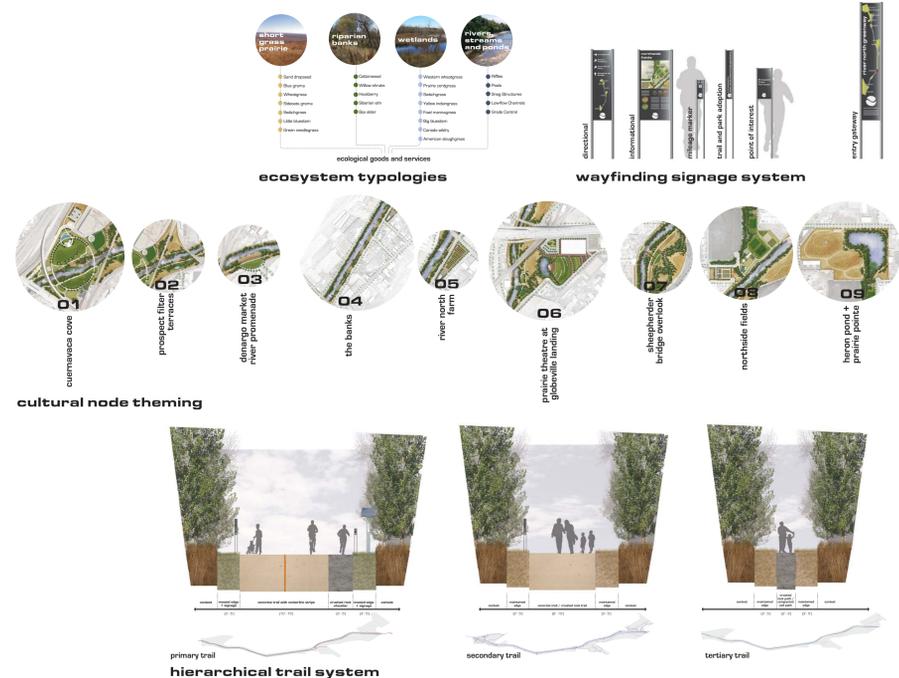
cultural node emergence



connectivity spine



recommendations



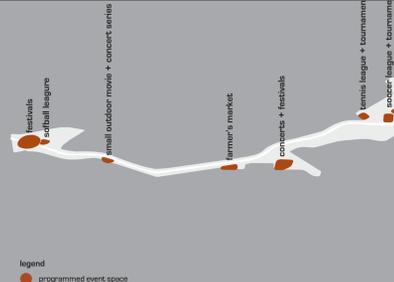
SUSTAIN

cultural sustainability

01. public safety and maintenance
02. community programs
03. tree-planting challenge



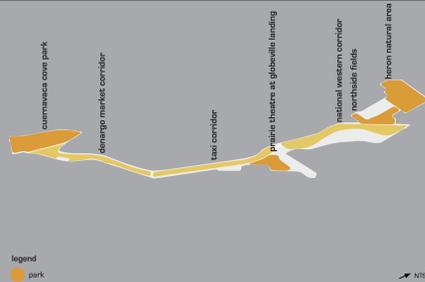
04. art implementation



05. programmed events



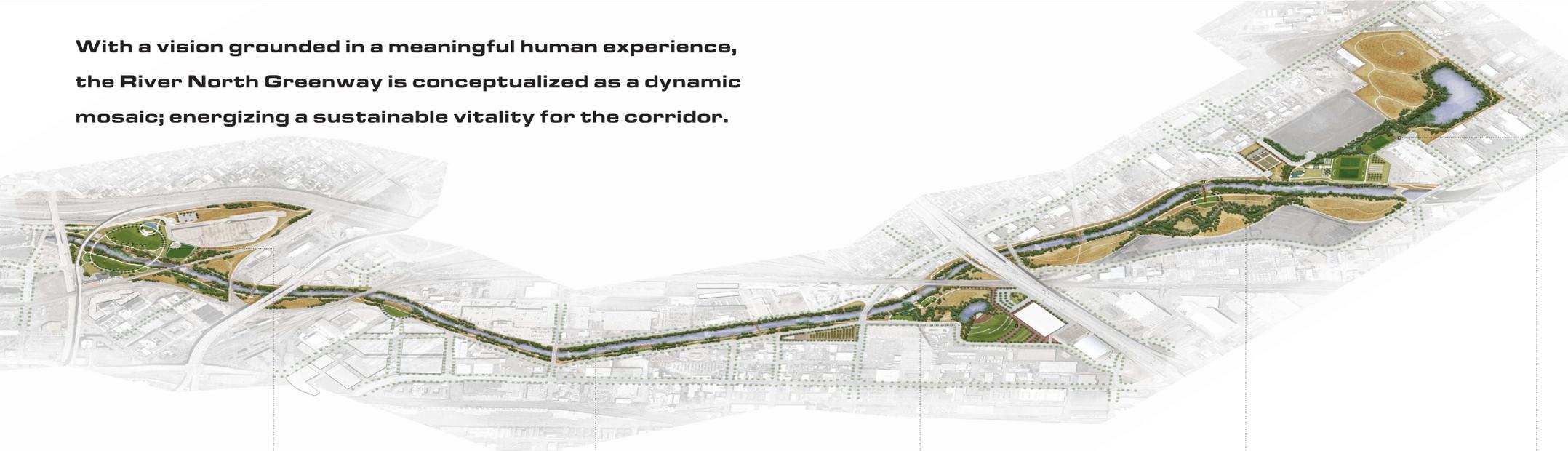
06. educational signage



07. trail/park adoption

RIVER NORTH GREENWAY strategizing a generation 4 greenway as a dynamic mosaic

With a vision grounded in a meaningful human experience, the River North Greenway is conceptualized as a dynamic mosaic; energizing a sustainable vitality for the corridor.



character visualization



