Visioning the Allen Creek Greenway:

Designing a Path, Creating a Place

by

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Abstract

This report describes background, analysis, layout and design for the Allen Creek Greenway in Ann Arbor, Michigan. The authors define the greenway land use form as a linear park which fits within a large network of regional green infrastructure; examine the history of greenways and their strong public appeal; and describe the significant ecological, social, and economic benefits which the Allen Creek Greenway could bring to Ann Arbor. The report describes the preliminary layout and design for the Allen Creek Greenway along the Ann Arbor Railroad as well as conceptual open space designs for three city-owned parcels that occur along its length: the parcels at First St. and William St., 415 W. Washington St., and 721 N. Main St. GIS software was used to analyze existing site conditions so that the designs take into account the full complexity of the context including current land use, topography, and water movement. The proposed route is almost entirely within the Ann Arbor Railroad ROW, running from just south of the University of Michigan stadium to the Huron River, where it will connect to Washtenaw County's Border to Border trail, giving residents better access to regional greenspace. The greenway approximately follows the historic path of Allen Creek; the creek is now buried in a pipe. Because of this, most of the greenway is within the floodplain and a significant portion is within the floodway of the creek. There are federal restrictions on development within this designated flood area and thus the greenway is ideal because it is one of the few permitted uses. Because of the complexity of the greenway project, this report details a phased implementation plan, beginning with the creation of designated on-street routes. The Allen Creek Greenway, mentioned by name increasingly in city plans, has the capacity to serve as an anchor and a green amenity to the downtown core and provide a catalyst for economic and sustainable development in the surrounding area along its entire length.

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Table of Contents

List of Figures

Appendix II

Appendix III

Appendix IV

Introduction

Figure 1: Dining on Main Street, Ann Arbor, Michigan

Ann Arbor, Michigan, is a remarkable city and is widely recognized as a jewel of livable urban space and a desirable home for people of all ages (Ann Arbor Downtown Development Authority (DDA), 2010). Known for its abundance of trees, its world-class university, and its friendly residents, it inspires pride in its citizens to continually improve and imagine Ann Arbor as the best it can be. One group of citizens, the Allen Creek Greenway Conservancy, united several years ago around the vision of a green space stretching through Ann Arbor's core, a beautiful walking path and linear park running from the stadium to the downtown to the Huron River. The Allen Creek Greenway has been discussed for decades in city plans and the members of the Conservancy decided it was time this dream was brought to fruition. Many different people throughout the city have contributed their time and energy to the project, of which this practicum is the most recent effort.

The Allen Creek Greenway will connect the city along a green "spine" which takes advantage of the open space along the Ann Arbor Railroad right-of-way, following the historic path of the Allen Creek and sitting within its existing floodplain. This underdeveloped corridor is a remarkable opportunity for the city to establish a greenway: because federal floodplain regulations severely limit new growth along the floodway and even encourage the reduction of buildings which may impede floodwater flow, the greenway is one of very few encouraged uses for the space (City of Ann Arbor, 2007, p.67). Installation of the greenway would bring much needed green space into the downtown core, create a stronger connection between key parts of the community, help to address flooding and water quality issues within the Allen Creek valley, and provide other significant economic, ecological, and health benefits to the citizens of Ann Arbor.

History and Theory of Greenways

Definition

With the rise in public demand for greenways in the latter half of the 20th century, scholars have turned their attention to discussing what drives their appeal, analyzing their variety of structures, benefits, and challenges to their implementation. A variety of descriptions have been put forward to distinguish greenways from both city parks and greenbelts (Searns, 1995, p.68). Greenways are more linear in nature when compared with city parks, encouraging people to move within it and along it; whereas a greenbelt is a land use tool used to preserve open space, prime agricultural land, or control the growth patterns of an urban area by limiting sprawl on the outskirts of the city.

Ahern's definition anticipates much of what 21st century greenways have become, characterizing them as "networks of land containing linear elements that are planned, designed, and managed for multiple purposes including ecological, recreational, cultural, aesthetic, or other purposes compatible with the concept of sustainable land use" (p. 134). Inclusion of terms such as "planned", "designed", "managed", and "sustainable land use" all suggest that this vision of greenways is meant for land use professionals and academics, focusing on relatively high level, abstract concepts. However, the use of "network" and "linear" conjure the vision of a corridor of space running alongside or connecting cultural or natural assets. This addresses the idea of movement, which is central to greenways, but Ahern's definition does not make explicit the role of nature in the increasing demand for community greenways.

Searns gets to the heart of the matter in his definition, breaking the term down into its separate pieces and stating:

> 'Green' suggests areas that are left vegetated and in most cases appear—or at least strive to be—natural. The word 'way' implies movement, getting from here to there, from point to point. This is the important distinguishing feature of greenways—they are routes of movement-for people, for animals, for seeds, and, often, for water (p. 66).

This definition, more than Ahern's, speaks to the common person's experience of a greenway as a linear "natural" space, while still implying the deeper ecological characteristics that make this spatial form so profound. It is the hope of this paper that the theoretical background, analysis, and series of conceptual designs presented by the practicum team will provide inspiration and momentum for the establishment of a greenway that is true to the spirit of Ann Arbor.

History

Over the past 40 years, greenways have been built in hundreds of cities across the country, ranging in context and size from rural path systems to urban river corridors but always offering a wide range of benefits to users, residents, and visitors (Searns, 1995). Urban networks of greenspace have been advocated for much longer, however. Searns discusses three generations of greenways in his 1995 paper *The evolution of greenways as an adaptive urban landscape form*. He calls the first generation the "ancestral" generation, from the Roman streets that formed strong axes in their city planning to the wide, sweeping boulevards of Haussmann's Paris (p. 67). At the same time, in the 19th and early 20th century, Frederick Law Olmsted began to push linking green spaces within the United States, saying that, "'no single park, no matter how large and how well designed, would provide the citizens with the beneficial influences of nature"' (Benedict & McMahon, 2002, p. 13). When designing landscape plans for the University of California, Berkeley campus, he created a parkway between Berkeley and Oakland, which some scholars believe to be the prototype for greenways in the United States greenway (Bischoff, 1995, p. 318). Olmsted believed in the power of parks to improve the human condition and refine the common man; since that time, his conviction about the power of green space has been vindicated through numerous studies showing positive psychological effects from "nearby nature" (Kaplan, Ivancich, & De Young, 2007) (Groenewegen, van den Berg, de Vries, & Verheij, 2006) (Gobster & Westphal, 2004) (Rybczynski, 1999).

Searns points out, however, that much of the parkway system established by Olmsted still focused on using roads and main thoroughfares as the skeleton of the greenspace (p. 69). The second generation of greenways dates to between 1960 and 1985, differentiated by the shift to "trail-oriented, primarily recreational" projects which still pursued connection between city, suburban, and rural green spaces but with a strong emphasis on non-motorized travel (p. 67). In the 1930s, San Antonio, Texas created the Paseo Del Rio riverwalk, a project which continues to be a major tourist attraction. Though it utilizes the successful forms of previous parkways and boulevards, it is pedestrian oriented, paving the way for a conception of urban corridors such as rivers and railroads as new community amenities (Searns, 1995, p.68). Several decades later, Santa Clara County, CA, used the term "greenway" to describe a linear park plan, but the first modern greenway to be built was probably the Platte River Greenway, inDenver, Colorado (Searns, 1995, p.69). Championed by local leaders, it took from 1974—1982 to raise the funds and construct the 10 miles of non-motorized pathway and amenities along the river.

Figure 2: Paseo Del Rio riverwalk, San Antonio, Texas

Based on its overwhelming success as a community asset, the trail system has been expanded to stretch more than 160 miles around the city and is credited with inspiring the widespread greenway movement in the 1980s (Searns, 1995m p. 69-70).

Americans had come to see the value of bringing non-motorized trails out of the wilderness and into the urban realm, and public demand caused many second generation greenways to be installed across the country over the next 10 years. Once these greenways were constructed, it became clear that they had much more to offer the public than simply recreation opportunities. Writing in 1995, Searns posits the recent emergence of a third generation of "multi-objective" greenways, a vision that has since proven quite accurate (p. 72). These 21st century linear parks continue to provide green space for passive human activities such as socialization and contemplation, as well as more active engagement like walking, biking, and jogging. However, they also strive to address issues such as water quality, flood control, the movement of animals and plants, outdoor education, historic and cultural preservation, and even sustainable economic development (Searns, 1995, p. 72;) (Ahern, 1995, p 134).

Current Trends

Many of the human and natural benefits of greenways are needed in response to the lack of green space within America's increasingly large urban areas (Searns, 1995) (Kaplan, Ivancich, & De Young, 2007). As American cities have grown in the past 60 years, their planning and zoning has been driven by a reliance on automobile travel and the lower cost of developing new land (greenfields) rather than reusing existing developed spaces, resulting in sprawling land use throughout the country (US Environmental Protection Agency, 2011). This sprawl serves to either eliminate or fragment natural areas surrounding cities, as well as increasing theamount that people drive in their day-to-day lives. Both of these effects lead to a decrease in the quality of life for residents, as well as decreased water quality and an increase in air pollution (Benedict & McMahon, 2002).

Twenty-first century land use professionals have begun to embrace a type of land use planning called “smart growth” which attempts to tackle sprawl and its associated ills by encouraging re-use of vacant properties within a city as opposed to development of new land, promoting urban forms where people can “live, work, and play” in close proximity (Smart Growth America, 2010) (Shafer, Lee, & Turner, 2000, p. 164). The goal is reduced vehicle miles traveled (VMT), resulting in reduced greenhouse gas emissions, as well as increased vitality of natural areas. This would also save municipal governments significant money, as new development demands extension of infrastructure services, paid for in tax dollars, whereas in-fill development happens in areas where water, electricity, and sewers already exist (Benedict & McMahon, 2002). Greenfield development can actually serve to drive up taxes in order to pay for the new infrastructure installation, essentially causing tax payers to fund sprawling development which is against their best interests (Benedict & McMahon, 2002).

One tactic associated with smart growth is the planned inclusion of green spaces into urban areas as re-use of land is encouraged, ensuring access to the important green amenities for urban residents. Much work has been done to show the relationship of accessible green space to the quality of urban life. Herzele and Wiedemann note that use of (and therefore primary benefit from) greenspace is strongly correlated to its distance from people’s homes, suggesting that 400 meters (approximately ¼ mile) is the maximum distance greenspaces should be located from residences (2002). This accessibility of greenspace is particularly important in areas which wish to remain vibrant, attractive places to live for families or young professionals; couples with children are usually the first to leave an urban area for the suburbs, often seeking better access to parks and play spaces (Van Herzele & Wiedemann, 2003, p. 109). This desire for suburban homes is part of the driver of the sprawling land use seen today. Addressing the need for greenspace in urban areas can therefore serve to encourage continued residence in downtown cores, decreasing sprawl and vehicle miles traveled (De Ridder, et al., 2004).

While planning for parks is an essential role of every city planner, and particularly the twenty-first century smart growth planner, the public thinks of open space in a more broad sense, including “[r]iversides, waste places and scrubby bits, farmland, woodland, golf courses, cemeteries and squares in shopping centres [sic]” in their definition of open space (Van Herzele & Wiedemann, 2003, p. 112). These may be the reasons why modern greenways have been so successful: not only does their length place them in easy reach of a wide range of residents within a city, but their adoption of liminal spaces such as railroad corridors and urban riverbanks allows the exploration

of mysterious “in-between” places which capture the imagination. Returning to Searns’ conception of a greenway as its fundamental parts, the “green” and the “way”, one can see the driving attraction of the linear corridor is the “human fascination with following a path, be it a road, a trail, or even a story line. This is especially true if there is a sense of change, even mystery, and new experiences, perspectives and information are revealed sequentially along the way” (Searns, 1995, p. 66). Greenways are appealing because they draw the visitor along a path, inciting exploration, especially when it is a path through these marginal spaces created between other land uses. This gives designers and planners an opportunity to weave an ecological and historical narrative around these spaces, strengthening the greenway by tapping in to old community stories and creating new visions around the greenway.

National Examples

As shown by successful parks such as Central and Prospect Park in New York City, NY, the Emerald Necklace in Boston, MA, Cherokee Park and Park System in Louisville, KY, and Marquette, Jackson, and Washington Parks in Chicago, IL,, planning for open and green spaces has positive effects on the continued growth of urban areas. This same sustainable growth is desired by Ann Arbor and the implementation of an improved park system will help achieve this.

Figure 3: Eastern Parkway, Brooklyn, New York. Designed by Frederick Law Olmsted

The 1987 President’s Commission on the American Outdoors recommended the creation of “a living network of greenways” throughout the United States (Fabos, 1995). Trails are designed and built now because they serve as recreation and tourist attractions in the same way parks do. The need for routes of non-motorized transportation is becoming an increasing necessity and greenways provide a safe alternative to shared rights-of-way with vehicles. Cities all across America have been continuing to implement trail and greenway systems over the past several decades. Some of these successful trail systems include:

- St. Johns County Greenway, St. Johns County, FL
- Floyds Fork Greenway, Louisville, KY
- The Schuylkill River Trail, PA
- Little Miami Scenic Trail, Southwest, OH (Fig. 4)
- The Monon Trail, Indianapolis, IN
- Chattanooga River Walk, Chattanooga, TN
- Midtown Greenway, Minneapolis, MN
- Fanno Creek Greenway Trail, Portland, OR
- Springwater Corridor Trail, Portland & Boring, OR
- Cardinal Greenway, Eastern, IN

The support and desire for parks, greenways and active open spaces continues to grow with each passing day. In a study conducted by the National Sporting Goods Association (NSGA), the most popular recreational activity is exercise walking. Bicycle riding, hiking, running and jogging are also in the top 20 activities (WCPARC, 2010). Providing space for these activities in growing cities will continue to be important.

Figure 4: Little Miami Scenic Trail, Southwest Ohio

Benefits of Greenways

Up to this point, many large-scale effects of greenways have been discussed. Greenways also provide a multitude of specific benefits to their communities. For the past 40 years, greenways have sought to deliver significant social and cultural amenities, and in the past twenty years much work has been done to quantify the increases in well-being derived from greenway and greenspace use (Kaplan & Kaplan, 1989). Humans also benefit from the variety of "ecosystem services" which greenways provide, including significant potential stormwater and flood management services (Benedict & McMahon, 2002). Finally, society as a whole sees gains from the sustainable economic development frequently spurred by greenway installation in urban areas (Bole, di Cristino, Glover, & Kurath, 2005) (Gregor, 2010).

Social Benefits

Most successful greenway projects are started on a local level with grassroots support, projects that are by and for the people, underlining the importance of the Allen Creek Greenway Conservancy in current greenway planning efforts (Ahern, 1995, p. 133). The motivation behind such support is often the social benefits that such a trail would bring to local residents; Bischoff quotes L.H. Weir's mid-20th century classification of these into separate categories, including: "physical activities; constructive and creative interests; interests in learning about the natural world; [and] social interest to get together and mingle" (Bischoff, 1995, p. 318-319). Phrased another way, Bischoff sees greenways used for "Five E's": "environment, ecology, education, exercise, and expression" (Bischoff, 1995, p. 317). The concepts of "expression" and of social "mingling" are hard to quantify and often marginalized in academic study of greenways, but people's day-to-day experience of the greenway is what shapes their perception of it, and this experience is going to be primarily their aesthetic and social interaction within the trail space (Gobster & Westphal, 2004) (Shafer, Lee, & Turner, 2000). It has, however, been observed that greenway paths seem to "foster better personal, social exchanges" than other types of urban greenspaces (Bischoff, 1995, p. 320). This seems to be tied to the linear form of the space, encouraging movement along a path that brings people into contact on a regular basis. A study in the Netherlands found that people with less access to greenspace in their living environments tended feel lonelier, suggesting that for urban residents, green space can play a key role in the formation of social contacts and support networks (Maas, Verheij, Groenewegen, de Vries, & Spreeuwenberg, 2006).

The aesthetic impact of environments is also significant in terms of people's

reaction to them, and there has been a great deal of study examining what aspects of aesthetics make an impact on personal perception. Gobster and Westphal analyzed stakeholder reactions to the Chicago River corridor and found six interdependent dimensions by which greenways are judged by their users: cleanliness, naturalness, aesthetics, safety, access, and appropriateness of development (p. 148). Arguably, cleanliness and naturalness are part of the aesthetic experience for trail users, contributing to their perception of how attractive the space is and influencing their feelings of safety and appropriateness as well. There are ways of designing urban greenspace so that it is appealing to users, making it "neat" and contextually appropriate, while still maintaining a sense of "naturalness" and safety. This concept has been codified by Nassauer as "cues to care…[which] make the novel familiar and associate ecosystems that may look messy with unmistakable indications that the landscape is part of a larger intended pattern" (Nassauer, 1995, p. 167). Maintaining an urban greenway with these cultural cues in mind will ensure that the space is well-used and welcoming, allowing its social and physical benefits to be fully realized by its users.

As evidenced by the strong federal push encouraging physical exercise in both adults and children, Americans have a serious lack of options for physical activity in their everyday lives (Centers for Disease Control and Prevention, 2011). Obesity is on the rise in all age groups, perhaps related to the time people spend in their cars because of the sprawling structure of suburban American metropolitan areas (Centers for Disease Control and Prevention, 2011). As noted previously, people are most likely to use greenspace if it is within 400 meters of their homes; for children, this distance is even less because of modern safety concerns (Van Herzele & Wiedemann, 2003, p. 113). It is particularly important for children to have access to these opportunities for two reasons. First, the occurrence of childhood obesity is increasing at an alarming rate: the number of overweight children in the US has doubled since 1980, potentially caused in part by increasing time spent in passive, indoor play rather than active, outdoor play (Gill, 2011) (Coalition for Healthy Children). Much of the government campaign focused on getting active is centered around children, including the slogan "Get up and play an hour a day!" (Coalition for Healthy Children) (Let's Move!, 2012). Michigan has its own coalition to increase physical activity in children and adults, the Michigan Healthy Communities Initiative. This program advocates for a number of actions, including smart growth land use planning, that will allow Michiganders to become more active around their homes (Michigan Healthy Communities, 2010).

The second reason to emphasize children's need for greenspace access is the associated "nature deficit disorder" which comes with decreased play outside the

home (Gill, 2011) (Moss, 2012). Not a technical disorder, it is nonetheless a serious and growing concern in developed nations across the world as children lose touch with nature and the related joys and challenges which it presents to them. A lengthy report commissioned by the London Sustainable Development Commission summarizes the significant research to date on the implications of outdoor play and finds six major areas in which children benefit from exposure to urban greenspace: “improve[d] concentration, boost[ed] motor development, improve[d] mood, boost[ed] physical activity, [and] childhood visits to natural places are linked to positive adult views of the outdoors, [while] hands-on gardening activities improve nutritional attitudes and knowledge” (Gill, 2011, p. 20). Not only are these characteristics that will make children healthier, but they are qualities which will make them more likely to succeed and be productive and happy adults. Society benefits both from the decreased health costs associated with a healthier public and increased number of industrious and valuable community members. Greenways can play an important role in bringing these benefits to a wide variety of communities in urban areas through their linear reach and the networks of greenspace which they can create.

For all age groups, exposure to urban green spaces has been strongly correlated with improved well-being, stress reduction, and general perceptions of good health and quality of life, as well as the afore-mentioned physical health benefits (Maas, van Dillen, Verheij, & Groenewegen, 2009) (Shafer, Lee, & Turner, 2000). Many studies have shown that “urban open green spaces play an important part in offering town-dwellers a more stress-free environment, irrespective of sex, age or socioeconomic background. The results indicate that the more time people spend outdoors in urban open green spaces, the less they are affected by stress” (Grahn & Stigsdotter, 2003, p. 16) (Woo, Tang, Suen, Leung, & Wong, 2009). Studies have examined both day-to-day stressors as well as larger stress events and found noticeable reduction in both cases (van den Berg, Maas, Verheij, & Groenewegen, 2010). The results in some studies even indicate that visual experience of greenspace appreciably reduces stress levels, and these reduced stress levels in urban residents can lead to reduced crime levels in higher risk areas, providing another strong reason to significantly invest in accessible urban greenspaces such as greenways (Gobster & Westphal, 2004, p. 157) (Moss, 2012, p. 10). Kaplan and Kaplan have done foundational research on the topic of psychological benefits of “nearby nature” for the past twenty-some years supporting these claims; further discussion can be found in their book *The experience of nature: A psychological perspective* as well as ongoing publications (1989).

Ecological Benefits

Ecosystem Services

Wide recognition is now being given to the concept of "ecosystem services", contributions which natural areas make to the daily well-being of human society (The World Bank Group, 2009). These can come in many forms, some able to be valued monetarily and others less so; notable ones include "cleansing water, absorbing or processing carbon dioxide and other pollutants, producing oxygen and other beneficial compounds, controlling erosion, creating food, storing water, providing recreation, maintaining balance between competing systems" and many others, including the benefits listed in the previous section (Brown & Kellenberg, 2009, p. 59). Benedict and McMahon call ecosystem services "our nation's natural life support system," underlining how important these are to life around the globe (p. 12).

While greenways cannot provide all of these ecosystem services simultaneously, particularly if they are narrow corridors within an urban area, they do produce certain services beyond the social which are valuable contributions to their communities. Context often determines which services the greenway is able to contribute; the Allen Creek Greenway will primarily provide ecological ecosystem services such as improved species flows and water flows to Ann Arbor, but there are certainly others that may be added as the greenway is developed.

Landscape Ecology

Because of the inherently linear nature of greenways, they function as corridors which facilitate flows within a larger landscape matrix of land use types. This is conceptualized based on the landscape typology of Foreman's patch, corridor, and matrix landscape model from 1995 (as quoted in Opdam & Steingröver, 2008). Opdam and Steingröver give a succinct description of the "ecosystem network" concept which serves to define the ecological basis for many greenway benefits:

> An ecosystem network can be understood as a set of ecosystem patches… functionally linked by flows of organisms and by interaction with the landscape matrix in which it is embedded. Structural elements in the matrix, such as roads…may affect the density as well as the direction of flow…A network can function at a variety of spatial scales, depending on the scales at which the various species act (p. 71).

Greenways can provide more accessible movement opportunities for animal species but can also form habitat corridors which may aid the

movement of plant species. On a smaller scale, they can create micro-habitat patches within the urban core as well as important educational opportunities for residents and visitors regarding regional ecosystems.

Stormwater and Flood Water

Greenways also positively affect the flow of water within urban spaces, particularly stormwater and flood water. These will be discussed in more detail further on in relation to the specific greenway sites, as well. Traditional stormwater management techniques used by cities move stormwater across impervious surfaces and into storm drains where it is conveyed via pipe to the nearest body of water; this system, over time, has proven to have serious flaws (PlaNYC, 2008). The water collects contaminants and particulates as it moves across the impervious surfaces of streets and driveways; it picks up speed as it rushes towards the drains; it collects so quickly that it increases flooding potential in nearby water bodies (Hunter, 2010). New stormwater tactics, sometimes called Low Impact Development (LID), emphasize use of a distributed system of stormwater structures which allow the water to infiltrate through pervious groundcover close to where it falls as rain, often allowing plants to filter out and removing any contaminants it might have accumulated (Searns, 1995, p. 73). In addition, slowing down runoff increases the time to peak discharge of stormwater systems into nearby waterways which reduces stream bank erosion, channelization, and the risk of flooding (Hunter, 2010). Greenways give planners an excellent chance to engage in LID technology, both for stormwater treatment and for community education about ecosystem services (Searns, 1995, p. 73).

Another opportunity for water management provided by some greenways, including the Allen Creek Greenway, is the ability to impact flood control measures. Searns summarizes FEMA's policy succinctly: "Ideally, all land in the 100 year floodplain (area with a 1% chance of flooding in a given year) should be left undeveloped. This would leave room for …uses that can tolerate periodic flooding" (p. 74). This is obviously not the case in most major cities; however, as redevelopment plans are pursued, greenways present an ideal land use for areas prone to flooding because they can provide significant amenities while reducing built area and allowing floodwaters to flow unimpeded away from inhabited space (Benedict & McMahon, 2002) (Searns, 1995). See the analytical discussion in following sections regarding the specifics of this strategy for the Allen Creek Greenway.

Economic Benefits

Greenways are aesthetically, socially, psychologically, and ecologically attractive. These characteristics unify to turn them into prominent community amenities, increasing adjacent property values and spurring new development along the corridor (Searns, 1995, p. 77). In order to be consistent with the definitions put forth by Ahern and Searns, however, greenway planning must always balance the economic benefits with the social and ecological ones, ensuring that new greenway projects are "consistent with the concept of sustainable development, in that it is based on an assumed complimentary between nature protection and economic development" (Ahern, 1995, p. 134) (Searns, 1995). Certainly the increased marketability of adjacent properties can be important leverage when attempting to get a greenway project off the ground, but for truly sustainable (re)development, the focus should be on its use in community revitalization (Benedict & McMahon, 2002). Given Ann Arbor's pride in its vibrant downtown and local character, the Allen Creek Greenway will assuredly be implemented with this community commitment at its core.

Notably, an initial study has already been completed regarding the economic benefit the Allen Creek Greenway can bring to the city. Examining the proposed greenway route and future city land use plans as well as other major factors, the study found "a long-term benefit of about $37 million in 2005 dollars" (Bole, di Cristino, Glover, & Kurath, 2005). This benefit is based almost entirely on a "large predicted influx of property tax revenue from the redeployment of 13 major areas along the edge of the greenway" (Bole, di Cristino, Glover, & Kurath, 2005, p. 6). It concludes that the greenway must be planned comprehensively, taking into account adjacent context and other factors in order to generate these benefits (Bole, di Cristino, Glover, & Kurath, 2005). While this study does not value the ecosystem services and social benefits which the greenway will bring to the downtown, it is significant to note that ultimately, the project has the opportunity to generate revenue for the city rather than increasing spending. This, then, is the theoretical framework within which the Allen Creek Greenway situates itself.

Introducing the Greenway

The City of Ann Arbor already has strong support for the implementation of a greenway system. The City of Ann Arbor Parks and Recreation Open Space (PROS) Plan conducted community studies on what environmental issues should be the priority. The need for a greenway was listed high on the priorities list, with almost 80% of the survey participants feeling that a parks and recreation system was “extremely important” to one’s quality of life (City of Ann Arbor Parks and Recreation, 2011). The

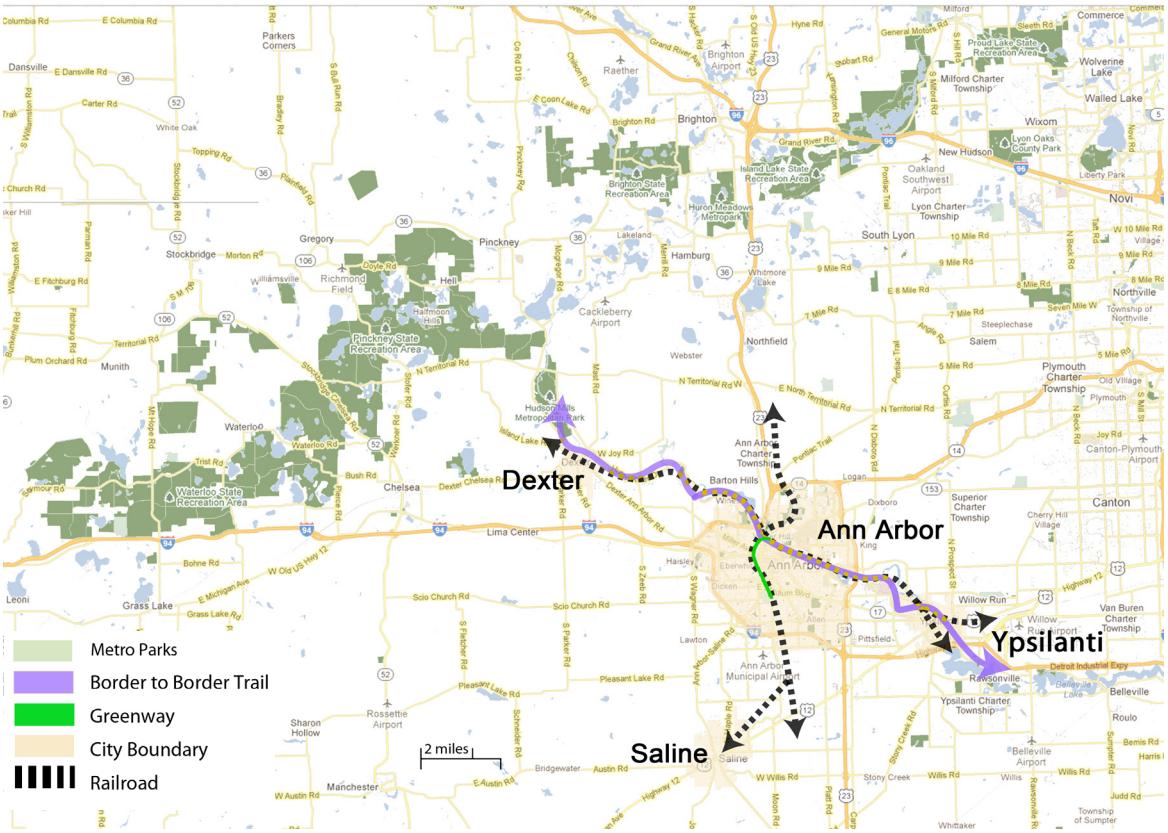


Figure 5: Connectivity of Allen Creek Greenway to neighboring communities and regional green space.

National Recreation and Park Association also conducted a study that shows that MI residents are more likely to participate in in-line skating than the national average. Again, this is an activity that would be well served by a paved path separated from the road. In another survey on the Border to Border trail in Washtenaw County conducted by Michigan State University, there were an estimated 114,000 users every spring and fall. This survey also showed that most of the users were adults, with the highest

percentage being between 41 and 60 years old. Of the users surveyed, 36% bicycled, 62% walked on the trail. Interestingly, 66% of the users did not use a vehicle to get to the trail. This means they either used some sort of public transit or they walked. This also means that many of the users are most likely local residents; this can be seen in the fact that 91% of the participants are Washtenaw- area residents and 44% of them live within 1 mile of the trail (WCPARC 2010). The high usage rates for this trail should help support the desired goal of a greenway being developed through Ann Arbor.

Allen Creek Greenway Task Force

In 2005 a task force was created by the city to develop recommendations for a greenway that would “roughly follow” the Ann Arbor Railroad right-of-way (Fig. 6). This greenway would connect to the Border-to-Border trail and include three city-owned parcels: the lot at the corner of First St. and William St., 415 W. Washington St., and 721 N. Main St. The Greenway Task Force did an extensive examination of the current conditions of each site and presented recommendations, which acted as guiding points for this project’s goals and were the basis for many of the design alternatives presented. Major points from the report are summarized below.

Figure 6: Route of the greenway overlaid on the Ann Arbor Railroad right-of-way

Current Site Conditions

The First and William parcel (Fig. 7) is currently a parking lot. The soil underneath this parking lot is believed to be contaminated

by arsenic and benzene. This means that if the asphalt is removed the soil will need remediation (p. 33). This site also has a piece of land that extends east, up the hill toward Ashley St.. There is significant grade change to get to this area and it was expressed as a possible scenic overlook (p. 33). This site is also within the floodway, so development would be restricted by federal regulations (p. 33).

The second parcel is located at the corner of First St. and W. Washington St., diagonally across Liberty St. from the First and William site (Fig. 8). The 415 W. Washington site is currently operating as a surface parking lot and was at one time a city maintenance facility that was supposed to be vacated in 2007; however, it appears to remain in use (p. 41). This site had past contamination from

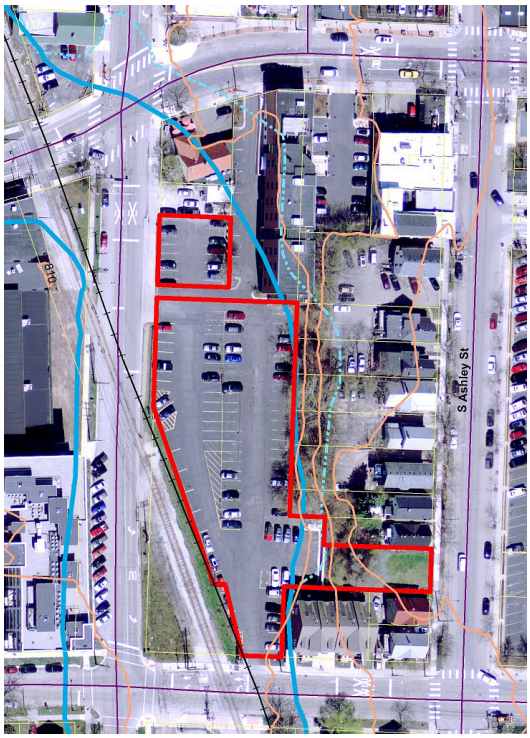


Figure 7: Boundary of first parcel at First St. and William St.

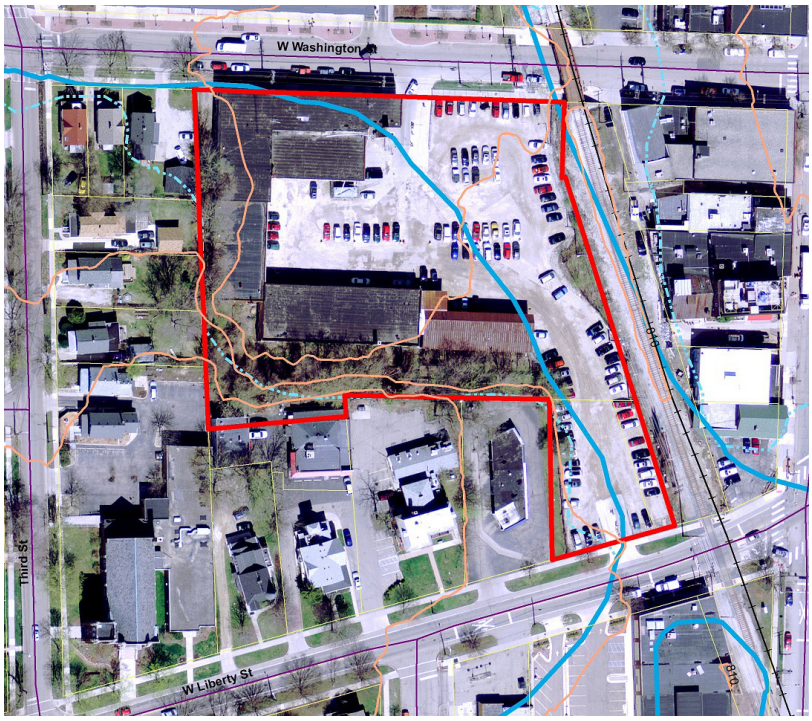


Figure 8: Boundary of second parcel at 415 W. Washington St.

underground gasoline storage tanks but has been partially remediated (p. 41). However, it was not remediated to residential cleanup standards and would need to have further investigation done before extensive public use of the site occurred. The site currently has three existing older buildings; the building along Washington St. is believed to be the most intact. This property also has some significant

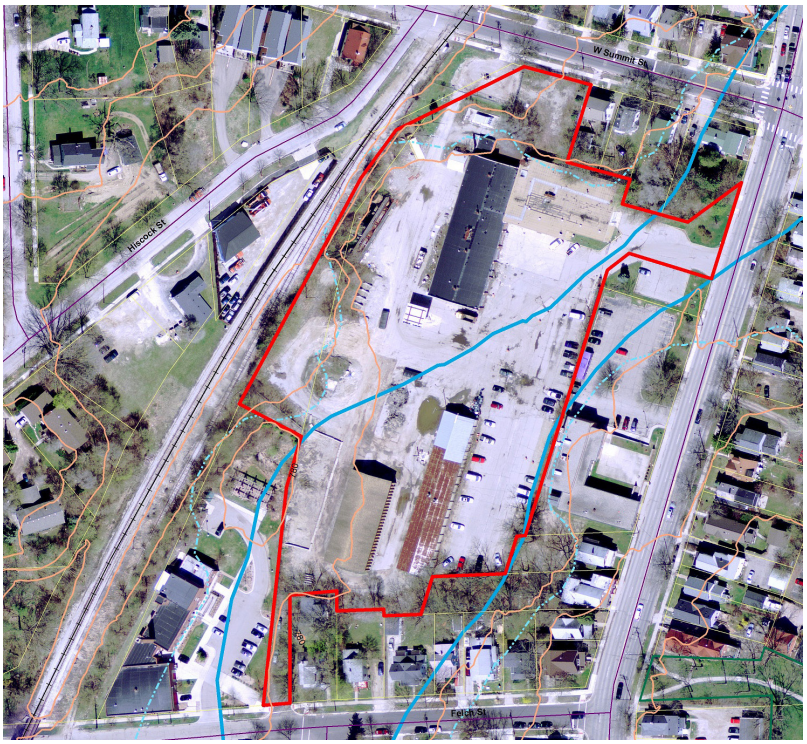


Figure 9: Boundary of third parcel at 721 N. Main St.

elevation change to the southwest where there is approximately 25 feet of drop. Like the First and William property, this site is also within the floodway and any new development would be restricted.

The third parcel of interest is located at 721 N. Main St. (Fig. 9). The site was previously a city maintenance garage and was also supposed to be vacated in 2007 (p. 57). It is still used for parking of city vehicles but the buildings are no longer inhabited. There are four main buildings on site and are all in poor condition. This site has been remediated and currently meets standards for unrestricted residential use (p. 57). This is the largest of the 3 sites and roughly half of the site is within the floodway, which means that the other half of the site could be redeveloped with structures with significantly fewer restrictions (p. 57).

Allen Creek & Flooding

The taskforce concluded that storing volumes of water beyond the bankfull event on the three City sites could interfere with flooding patterns and is not recommended by City staff. Controlling the bankfull storm event for the runoff from each site would provide water quality benefits without significantly exacerbating flood risks (p. 92-93).

Greenspace

The task force also addressed the issue of a lack of greenspace in the downtown area of Ann Arbor. Within the 270 acre Central Business District, the ratio of park and open space to people is lowest in the city (p. 18). The Allen Creek Greenway would address this by providing active recreation / non-motorized transportation greenspace, as discussed in the benefits section above.

Economic Impact

The economic impact of a greenway is and will be of great concern to many, especially if the three parcels are developed as park space instead of generating revenue for the city as paid parking lots. According to the task force's evaluation, edge properties to the Allen Creek Greenway could experience a rise in value if the Greenway is viewed as an amenity (p. 21). Greater density on these fringe properties could result in higher property values and TIF and property tax revenues. The task force also mentioned the Bole et al 2005 study which showed that the greenway could generate a $37 million return for the city over 30 years.

Ann Arbor Railroad & Rails With Trails

The siting of the Allen Creek Greenway along the railroad corridor was pre-determined by city planners and the Allen Creek Greenway Taskforce for several reasons, including best use of floodway land, but another important factor in this choice is the open land located along the railroad right-of-way. This provides an excellent corridor with strong linkages running from the south stadium area through the downtown to the river. However, this also proves to be somewhat challenging by bringing on an additional stakeholder, the Ann Arbor Railroad, which has less to gain from the greenway than the city and public. This type of project is called a "rail-with-trail" (RWT), which "describes any shared use path or trail located on or directly adjacent to an active railroad corridor" (Alta Planning + Design, 2002, p. i). According to the foundational study *Rails-with-Trails: Lessons Learned* funded by the US Department of Transportation in coalition with other federal agencies and conducted by the Alta Planning + Design group, there were around 65 RWTs across 30 states when the study occurred (2002). These provide valuable precedents for the Allen Creek Greenway, both in navigating the collaboration with the railroad as well as showing that these trails are not highly dangerous to trail users: the study was unable to find any claims or reports of accidents on the existing RWT across the country (Alta Planning + Design, 2002, p. VI).

Figure 10: Pedestrians utilizing Ann Arbor Railroad right-of-way as a path

Railroads nonetheless have serious and real concerns regarding installation of trails within their right-of-ways. Aside from lack of motivation to

pursue these projects because they do not usually generate revenue for the company, they are also concerned with preserving right-of-way space for future expansions and track maintenance needs, increasing trespassing potential which can cause injuries and increase liability for the railroad, and finally, “significant new populations of pedestrians close to the active track structure may result in additional stress on train crews seeking to ensure the safety of train movements,” something which is already a concern in densely populated downtown Ann Arbor (Alta Planning + Design, 2002, p. I). In order to get the railroad as a partner or at least a supporter for the Allen Creek Greenway, it is important to address these concerns early in the public design process.

One of the ways to get the railroad on board is to present them with benefits they will gain from the trail; there are many, ranging from RWT agreements which reduce liability costs, financial compensation in some form which might included funded maintenance or property improvements, increased observation of the track area by trail users which leads to reduced petty crime, and reduced trespassing through the provision of a legitimate path (Alta Planning + Design, 2002, p. IV). This last point is key for the Allen Creek Greenway, because there are hundreds of trespassers on the tracks during football season and other times. It is in the best interest of the Ann Arbor Railroad to reduce this repeated trespassing by the provision of well-designed, appealing trail along the railroad tracks (Alta Planning + Design, 2002, p. 10, 98).

One of the concerns repeatedly raised by railroads in regards to RWT projects is that a trail would “invite” the public into the right-of-way, potentially limiting the ability of railroads to consider them trespassers even if they deviate from the accepted path space (Alta Planning + Design, 2002, p. V). Railroads already pay significantly for liability insurance and with increasing use of the right-of-way, there are chances that trail users might be accidentally injured; therefore, it is important that any agreement made between railroad and trail group include “easement and license agreements that indemnify the railroad owner against certain or all potential claims…[as well as] the trail management entity provid[ing] or purchas[ing] comprehensive liability insurance” (Alta Planning + Design, 2002, p. V, VI). Purchasing insurance may involve considerable cost for the

Figure 11: Separation of a greenway from railroad tracks by fence

trail group but it is possible that a strong legal agreement along with city participation in the trail project can reduce the need for this cost (Alta Planning + Design, 2002).

While there are no national standards for RWT design, there are accepted guidelines based on other projects which can provide guidance for the Allen Creek Greenway. One of the major factors in designing a rail-with-trail is the train's speed and frequency of trips; this determines the setback distance of the trail away from the active tracks that must be maintained for safety purposes (Alta Planning + Design, 2002, p. 62). This has been a major consideration of the design team and will be discussed in the design section of this paper. Other factors that must be taken into account when designing a RWT include: separation techniques between the trail and railroad, from walls to fences to vegetation; topography of the right-of-way; sight distance for trains and trail users; and maintenance requirements of track and trail (Alta Planning + Design, 2002, p. 64).

Drawing specifically on this study in the conceptual designs for the Allen Creek Greenway, an important standard that drove the trail placement was the setback synthesized by the DOT study from precedent projects and regulations. According to the study,

> An RWT in a constrained area along a low frequency and speed train could be located as close as 3 m (10 ft) from the track centerline assuming that (a) the agency indemnifies the railroad for all RWT-related incidents, (b) separation (e.g., fencing or a solid barrier) is provided, (c) the railroad has no plans for additional tracks or sidings that would be impacted by the RWT, and (d) the RWT is available to the railroad for routine and emergency access (Alta Planning + Design, 2002, p. VII).

The practicum client organization, the Allen Creek Greenway Conservancy, was informed by the Ann Arbor Railroad that these tracks carry two trains a day, both constrained to travel more slowly than the 30 mph indicated by the RWT study because of the large number of road crossings in the downtown area (O'Neal, 2011). The right-of-way varies between 50' to 155', leaving a narrow but usable width in the downtown core. Therefore, the practicum team relied on these standards in the design of the trail, and encourages the public design process to do the same. Additionally, it will be essential to develop liability and insurance agreements to bring the railroad on board the project, as well as an education and outreach plan, maintenance plan, and security plan to ensure the success of the trail from both public and railroad points of view.

Government Support for the Allen Creek Greenway

WCPARC Master Plan Summary

The Washtenaw County Parks and Recreation Commission (WCPARC) is one of the key stakeholders and potential supporters of the Allen Creek Greenway. One of WCPARC's main goals is to support local efforts to improve non-motorized transportation within the county; this is achieved through their Connecting Communities Initiative which provides funding to projects that align with their mission and have high use potential (Washtenaw County Parks and Recreation Commission, 2010, appendix D, p.38). The greenway serves many of the functions outlined by the mission statement of the WCPARC, which is:

> to enhance the quality of life in the County by promoting a healthy lifestyle, efficiently providing high quality facilities and programs reflective of current and anticipated recreational needs of County residents and visitors – with particular emphasis on preserving fragile lands, water quality, wildlife habitat, creating pedestrian and greenway connections, and providing high quality services to those of all backgrounds (Washtenaw County Parks and Recreation Commission, 2010, p.8).

The Allen Creek Greenway will restore wildlife habitat within the city and also improve the water quality in Allen Creek, an urban tributary to the Huron River. Additionally, the greenway promotes healthy lifestyles and improves regional connectivity through access to WCPARC's Border to Border Trail (B2B) network. The B2B is a 35 mile, planned non-motorized trail network (now over halfway completed) that is designed to connect the communities of the county and provide recreational opportunities (Washtenaw County Parks and Recreation Commission, 2010, appendix D p.38-39). The B2B trail will connect to the greenway at the greenway's northern terminus, Argo Dam. This will effectively create a "green spur" from the B2B into the heart of Ann Arbor and significantly improve safe, non-motorized connectivity along the Huron River corridor. Additionally, there is the possibility of future connections between the B2B and the Pickney and Waterloo state recreation areas, two of the largest greenspaces in the lower peninsula of Michigan (Fig. 5). The greenway will provide non-motorized access to these unique green spaces directly from Ann Arbor's downtown core.

City Master Plans

The largest stakeholder and potential beneficiary of the Allen Creek Greenway is the City of Ann Arbor. The City is working to encourage concentrated activity

centers, mixed-use development, infill and densification in the downtown, as well as the creation of pedestrian- and bicycle-friendly environments (City of Ann Arbor, 2009b, p.18). The Allen Creek Greenway will be a major step towards activating the western edge of downtown, enhancing the pedestrian and bicycle orientation of the community, and will help facilitate mixed-use development, infill, and densification, as outlined in the discussion of smart growth in the Current Trends section. The City defines its mission in its main master plan:

> The City of Ann Arbor will be a dynamic community, providing a safe and healthy place to live, work and recreate. It will be a place where planning decisions are based, in part, on the interconnectedness of natural, transportation and land use systems. Natural systems, including air and water, natural features, native flora and wildlife habitats, will be improved and protected. It will be a place where the Huron River is a cherished part of the community and a focal point for recreation. Downtown will continue to be a vibrant part of the community that ties all parts of the city together. Transportation systems will include enhanced opportunities for public transit, extensive opportunities for alternative modes of travel and improved management techniques to reduce the impact of traffic on existing streets and neighborhoods. Land use systems will be compatible and complementary, and will include residential, recreational, commercial, office, educational, institutional and industrial uses, which will provide extensive choices in housing (including low cost housing), shopping, employment and recreational activities. Historically significant buildings and neighborhoods will be preserved. The quality of life in Ann Arbor will be characterized by its diversity, beauty, vibrancy and livability and ultimately will depend upon the positive interaction of these systems (City of Ann Arbor, 2009b, p.5).

The greenway would fulfill nearly all of these objectives, making it a key part of the future vision of Ann Arbor. To further elaborate on specific aspects of the City's goals and objectives for Ann Arbor, each area of focus has a master plan to guide development. The greenway's location, goals, and details are aligned with the goals and recommendations of multiple City of Ann Arbor master plans; in fact, some of the plans mention the Allen Creek Greenway by name.

Downtown Design (DDA)

Downtown Ann Arbor already has a strong image, identity, and pedestrian orientation, but the City is continuing to improve its image as "green and sustainable" (City of Ann Arbor, 2009a, p.20, 43). The Allen Creek Greenway is an opportunity to create a defining "green" feature of Ann Arbor that enhances its image, identity and pedestrian friendliness. The three underutilized, city-owned parcels in the downtown

area mentioned in the Allen Creek Greenway Taskforce document, the parking lot at First St. and William St., 415. W. Washington St., and 721 N. Main St., should be dedicated to the Allen Creek Greenway, particularly the portions of these sites in the floodway.

The Downtown Development Authority (DDA) is charged with promoting business, development, and regulating parking in a large area of downtown, and much of their regulatory area overlaps with the downtown segment of the greenway. One of the critical intersections between the greenway and DDA plans lays in the future land use plan, a zoning overlay district called the “downtown interface”. The purpose of this zone is to create a smooth transition between the residential area to the west and the downtown core (Fig. 53) (City of Ann Arbor, 2009a, p.29, 52). The centrality of the Allen Creek Greenway in the downtown interface zone creates potential for the greenway to serve as the “green” anchor and defining feature for the transition area.

Downtown District Character

The area surrounding the Allen Creek Greenway is defined by the City of Ann Arbor as the First Street Character District. The downtown plan describes it as follows:

> The First Street character area lies to the west of the Main Street and Kerrytown districts, and forms the eastern edge of the Old West Side Historic District. The topography forming the Allen Creek Valley with its flood plain, the buried/piped Allen Creek, the Ann Arbor Rail Road track with its historic, turn-of-the-century industrial architecture, and the proposed future Allen Creek Greenway, are distinct aspects of this district needing recognition during any First Street District proposed project design. The mixture of historic and non-historic residential and industrial architecture, and the valley land form, gives this area a distinct difference from other downtown character districts.
>
> The area is a mixed use linear district (north to south) that follows the railroad tracks’ older industrial railroad buildings, some of which have been converted into occupied industrial, construction, and other office uses, occasional art and dance studio activities, bars and nightclubs. The district also includes residential frame two and three story structures. The relatively quiet mixed-use neighborhood streets are highlighted by elevated train tracks with trestle bridges above east-west crossing streets from Washington Street north to Miller, and with wooden warehouse-like structures along the tracks, some of which are currently empty. The presence of the Allen Creek Flood Plain and the railroad track and its trestles are unique attributes worthy of design consideration.
>
> The district’s urban landscape largely consists of tree lined streets with relatively consistent lot spacing, and an occasionally vacant parcel. At times, a triangular shaped parcel caused by the orientation/alignment

> of the tracks is in contrast with the local streets. The future Allen Creek Greenway should be given design consideration as a potential element of all First Street Character District proposals (City of Ann Arbor 2011a, 41).

The First Street Character District is generally less developed than other portions of the City; the practicum team believes that this is mainly because of Allen Creek's extensive floodplain and floodway in the area, lack of railroad-centric light industry, and lack of green space. In addition, the Allen Creek Valley to the west of downtown is not as pedestrian friendly as it should be; the railroad currently creates a barrier that fragments the walkable street grid of the downtown area and the neighborhoods to the west. Creation of the Allen Creek Greenway addresses many of the issues surrounding the floodplain and floodway, can spur economic investment and development, and improves walkability and the existing non-motorized transportation network in Ann Arbor and beyond.

Transportation

Ann Arbor is working towards developing a transportation network that promotes the future land-use goals of the City. Providing a range of transportation options improves the ability of the system to meet the needs of all transportation users, from pedestrians, bicyclists, transit users, commercial truckers and motorists (City of Ann Arbor, 2009c, p.2-1). By integrating a variety of transportation options into the urban fabric, the City hopes to reduce greenhouse gas emissions, incorporate Low Impact Development (LID) into projects to help manage stormwater, and better facilitate the growth of Ann Arbor into the future (City of Ann Arbor, 2009c, p.2-7).

The Allen Creek Greenway is an example of a non-motorized transportation facility which, according to the City of Ann Arbor (2009c, p.4-20), are "vital to the transportation network as witnessed by the 18% of commuters (compared to 1-2% nationally) that bike and walk to work or school within the city". Connecting to the B2B trail at Argo Dam will provide an additional layer of regional connectivity for city residents. According to the City of Ann Arbor (2007b, p.2), some of the specific benefits to the City and its residents that come from having a well-developed non-motorized transportation network include:

- Improved access to daily needs for those without a driver's license (young, elderly, and those with physical limitations)
- Enhanced economic viability of a community (vibrant and active communities attract businesses)
- Promotes healthy lifestyles and active living, reducing health care costs from inactivity

- Lessens the need for downtown parking spaces
- Strengthens the social fabric of the city by fostering pedestrian, social interactions between community members
- Reduces dependence of fossil fuels and foreign oil
- Improves quality of life by increasing air and water quality, and reducing noise pollution and greenhouse gas emissions

Ann Arbor has developed short and long term plans to improve the non-motorized transportation network; the plans range from adding new bike lanes and sidewalks to adding pedestrian-car crossing safety signals and improving transit service (Appendix II) (City of Ann Arbor, 2009c, p.4-2). The Allen Creek Greenway will represent a major step forward in non-auto-centric design that facilitates mixed-use infill development for the city while promoting connectivity between the region's green spaces.

Parks and Recreation

According to the City of Ann Arbor (2011b, p.3), residents who live in the Central Planning Area have significantly less access to parkland and open space than other residents of the city (Fig. 18). The greenway will greatly improve resident access to open space within the Central Planning Area because of its linear form that travels along the edge between residential areas and the downtown core. The Parks Department in Ann Arbor has stated that improving the connectivity of non-motorized transportation through urban areas, neighborhoods, and along creeks and the Huron River are given priority for development (City of Ann Arbor, 2011b, p.59, 92-93, 107)—these goals are some of the main goals of the Allen Creek greenway as well.

Anticipating the needs of the future is very important to the city (City of Ann Arbor, 2011b, p.60) and connectivity and access to open space will likely increase in importance as development continues, land becomes less available, and the population increases.

A survey was conducted in 2010 by the City Parks Department which indicated that respondents were interested in improving connectivity between parks within the city and the Border to Border trail (B2B) (City of Ann Arbor, 2011b, p.81). Additionally, "almost 80% of the survey participants felt the parks and recreation system was "extremely important" to one's quality of life"; approximately the remaining 20% felt that they were "somewhat important" (City of Ann Arbor, 2011b, p.86). The survey also indicated that walking, hiking, and bicycling along with the Huron River Greenway (B2B trail) were amongst the most popular and important activities for city residents (City of Ann Arbor, 2011b, p.118).

Natural Features

A vital component of vibrant cities is strong environmental stewardship; healthy natural systems promote high quality human life (City of Ann Arbor, 2004, p.4). The Allen Creek Greenway represents a collaborative effort that improves environmental quality, utilizes the landscape as infrastructure and highlights ecosystem services within the city. This point is underscored by the City's Natural Features Plan, which states:

> Sustaining the ecological health of the City and region requires cooperation between citizens and many other partners: governmental bodies, educational and other community institutions, businesses, media, volunteers, and environmental and other civic organizations (City of Ann Arbor, 2004, p. 4).

According to the City of Ann Arbor, woodlands were the primary pre-settlement land cover of the area (2004, p.26). The secondary land cover was oak savannas; prairies did exist but were less in this area. Areas along riparian corridors and in floodplain zones were typically wooded, wet meadows, or marshes (City of Ann Arbor, 2004, p.18). The greenway exclusively utilizes native plants to restore and support local ecologies between other flora and fauna —one of the key goals of the City of Ann Arbor (2004, p.6, 10). Another goal of the Natural Features Plan that the greenway supports is "fostering stewardship through education and outreach" (City of Ann Arbor, 2004, p.10). The greenway provides educational opportunities and highlights ecosystem services by providing interpretive signage at key locations, such as areas of brownfield re-development (phytoremediation), stormwater management (bioswales and rain gardens), and vegetation restoration.

Water Quality and Flooding

According to the City of Ann Arbor's Flood Mitigation Plan (2007, p.10), FEMA (Federal Emergency Management Agency) first began to map floodplains in 1974 and the first flood insurance rate maps were given to City Officials in 1982. The City of Ann Arbor has had three similarly sized major flooding events since the turn of the 20th century: 1902, 1947, and the most recent in 1968 (Fig. 15) (City of Ann Arbor, 2007, p.10). Much of Ann Arbor was developed prior to floodplain mapping and therefore has many properties that are at risk of flooding. In 2001, the City Planning Commission began to create official policies about how the City could reduce potential flooding and reduce potential flood damage (City of Ann Arbor, 2007, p.10). The main goals outlined by the report are as follows: minimize life endangerment, minimize property damage and loss, preserve market value of existing properties, improve water

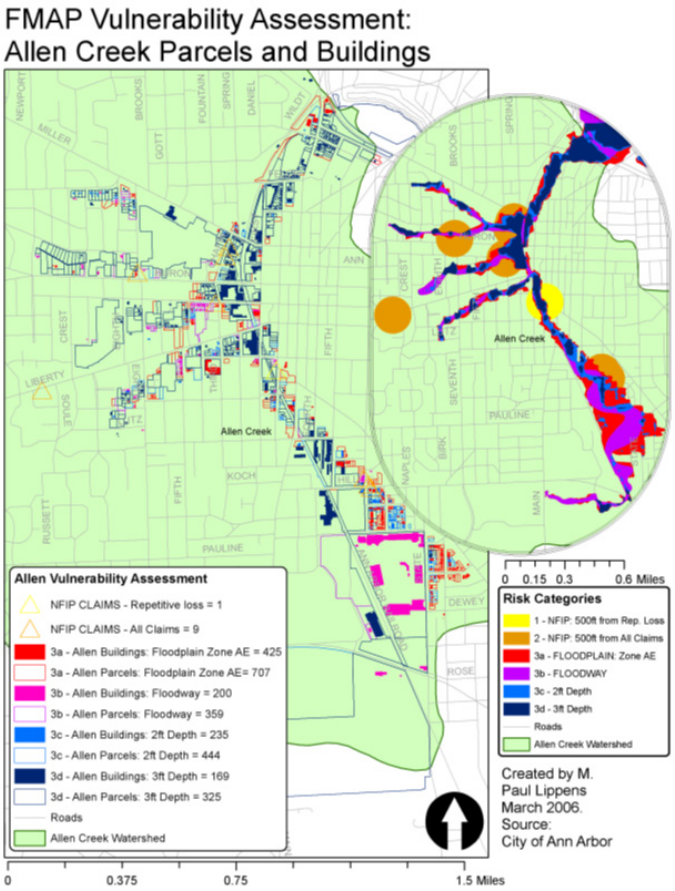


Figure 12: Vulnerability to flooding for properties within the Allen Creek watershed (City of Ann Arbor,2007a, p.25)

quality and ecological health of the creeksheds of Ann Arbor, reduce contamination in the Allen Creek Drain (a designated County Drain under the authority of the County Water Resources Commissioner's Office), create the Allen Creek Greenway in the floodplain, preserve neighborhood character, and limit development in the floodplain (City of Ann Arbor, 2007, p.10-11).

The defining water feature of the Ann Arbor area is the Huron River. Ann Arbor is divided into seven creeksheds that all eventually drain into the Huron River: Traver, Mallets, Miller, Allen, Honey, Swift Run, and Flemming (City of Ann Arbor, 2007, p.13). Each of these creeksheds (referred to as a watershed in this report) has an associated floodplain and floodway. The extent of flooding is often greater in urban areas because typical construction practices produce large amounts of impervious surface. When it rains, impervious surfaces make water "run off" more quickly than over natural surfaces, preventing the water from absorbing into the soils (City of Ann Arbor, 2007, p.13). This lack of absorption can cause pooling and, in a large rain storm, flooding. The more impervious surfaces in the area, the faster the stormwater moves into the floodplain and, on average, the greater the frequency of flooding (City of Ann Arbor, 2007, p.13).

The Allen Creek Greenway is located within the Allen Creek watershed. The Allen Creek watershed has the highest risk of the seven Ann Arbor watersheds for flooding (City of Ann Arbor, 2007, p.24). In fact, it has 60% of the parcels at highest risk for flooding within the city and has 84% of the structures within the floodplain (City of Ann Arbor, 2007, p.26). Allen Creek has a history of both flooding and water quality

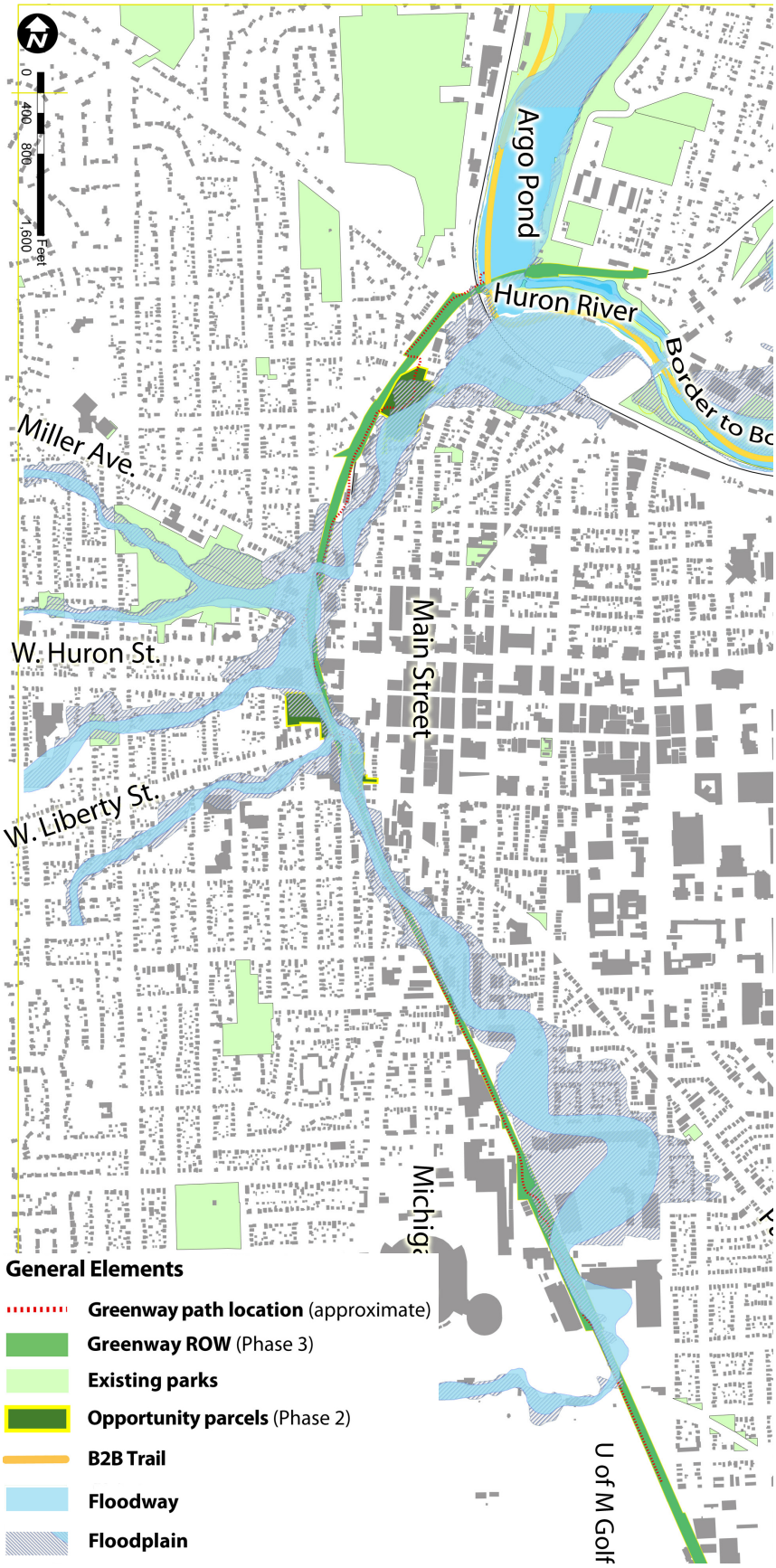


Figure 13: Floodplain and floodway location within the Allen Creek watershed; overlaid on greenway location.

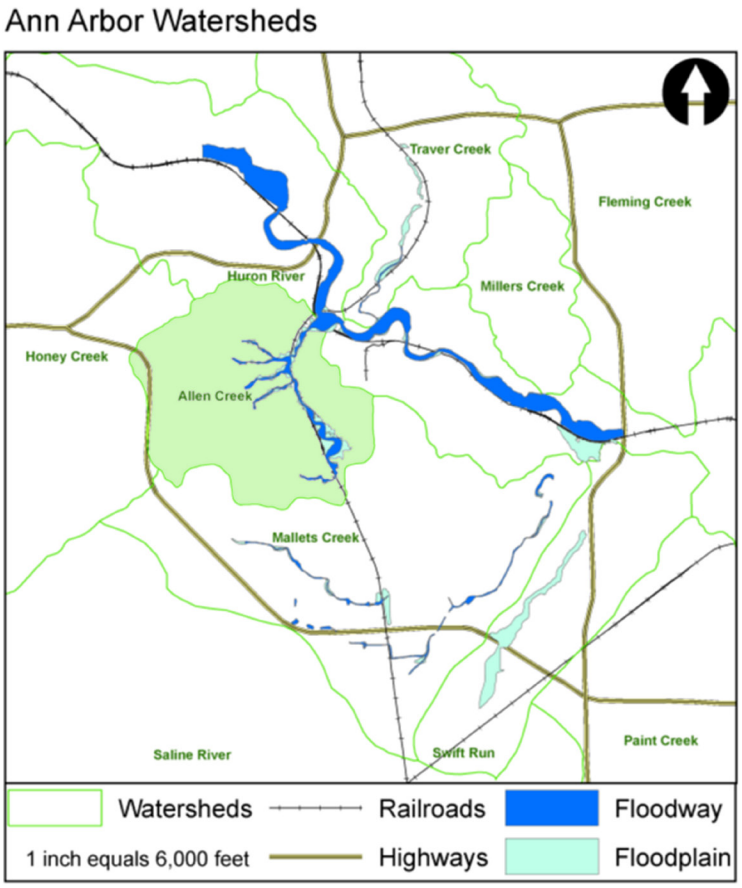


Figure 14: Location of Allen Creek watershed within Ann Arbor city limits (City of Ann Arbor,2007a, p.32)

issues; flooding became an issue because of increased development (increased impervious surfaces) and reduced vegetation to slow stormwater. Over time, the increase in development also washed contaminants into the Creek, impairing its water quality. According to the City of Ann Arbor, Allen Creek was buried in a pipe in the 1920's because it had essentially become an open sewer, filled with the waste of households and industry (tanneries, factories, breweries) and was prone to flooding (2007, p.14),. Putting the creek in a pipe solved the flooding problem in the short term, but as development continued, flooding and water quality degradation actually became exacerbated (City of Ann Arbor, 2007, p.14). As was previously mentioned, there were major flooding events in the Allen Creek watershed: one in 1902 (before the creek was buried), and two more in 1947 and 1968 (after the creek was buried).

One of the key strategies for improving water quality within Allen Creek is to create a zoning overlay district for the floodplain that would regulate land use within the floodplain (City of Ann Arbor, 2007, p.46). Another strategy to alleviate

Figure 15: Washed-out bridge from 1968 Allen Creek flood

flooding and improve water quality is to utilize the landscape as infrastructure; according to the City of Ann Arbor, protecting or creating natural features within the floodplain can provide stormwater conveyance and improve water quality (2007, p.53-54). These areas should include natural vegetation (trees, shrubs, grasses, etc.), and if space allows, swales, rain gardens, and other quantity and quality control structures, all of which the Allen Creek Greenway will provide.

Another option that could help facilitate both the development of the Allen Creek Greenway and mitigate flood hazards is the use of a TDR (Transfer of Development Rights) program. Typically used for open space and agricultural preservation on the outskirts of urban areas, the development rights are purchased from a "sending zone" and then transferred to a different area of the city, the "receiving zone" (City of Ann Arbor, 2007, p.58). One of the major advantages of a TDR program is that it can be used in combination with the aforementioned strategies and does not eliminate tax base from the City. For example, if the floodplain is zoned as a type of residential development and the floodplain zoning overlay district limits development type, a developer could transfer the development rights outside of the floodplain to allow for greater than normal development densities (increased FAR, or Floor Area Ratio) on a parcel in the receiving zone (to be determined by the City). One of the main challenges of using a TDR program is that it is not specifically enabled by the State statute and therefore faces the challenges associated with pioneering a land-use program in the State of Michigan (Machemer, P., et al., 2000, 0-2).

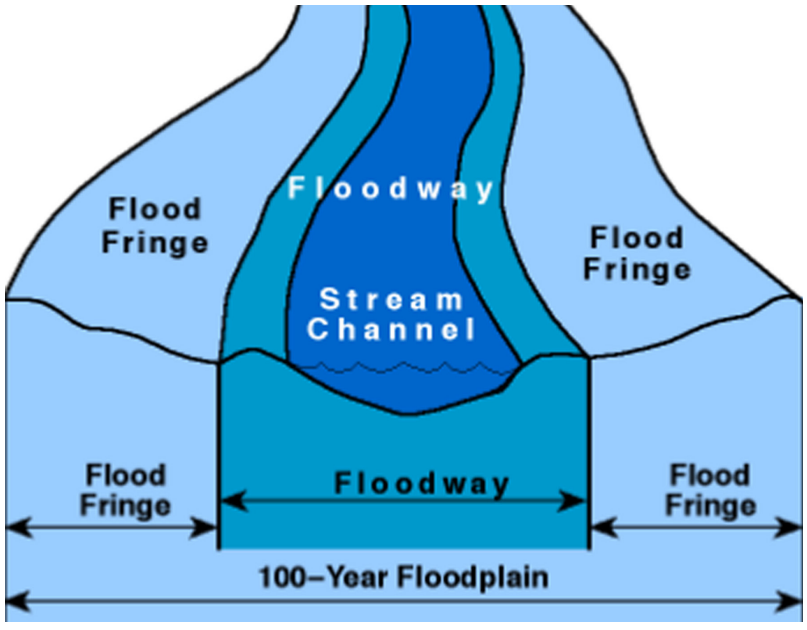


Figure 16: Cross-sectional diagram of FEMA flood terms
(City of Ann Arbor,2007a, p.11)

Analysis

Decisions and design choices made throughout this project were based on a variety of important characteristics of the existing and future conditions. Both city-wide and site specific analyses were performed to understand what the individual opportunity parcels and greenway as a whole could support and what level of development could be accomplished. To make these decisions, a combination of field observations, site visits and Geographic Information Systems (GIS) analysis were performed. The analyses examined a combination of sociopolitical, transportation and geological information. Design decisions were made by incorporating this information with the desires and stated program of the project client, the Allen Creek Greenway Conservancy. The Allen Creek Greenway is approximately 12,000 linear feet in length, intersects or is adjacent to a multitude of different land owners and stakeholders, and represents a major capital investment. This was recognized by the practicum team early on in the design process, leading to a phased development approach that breaks the comprehensive greenway vision into incremental, manageable pieces.

Some of the land use characteristics that needed to be understood when designing and laying out the greenway included items such as: parcel boundaries, rights-of-way, existing parks, land use and neighborhood character, roads, and the exact location of the rail line. These data were acquired in multiple forms but most useful was the GIS vector and raster data form from Washtenaw County, the Michigan Geographic Library, and the City of Ann Arbor.

Using GIS to compile this data, essentially making visual overlays, made it easy to view all the inputs at one time and make comprehensive decisions. For the layout of the greenway, possibly the most critical of all these data was the railroad right-of-way (ROW). The RR ROW had previously been identified by the Greenway Task Force as the desired route of the greenway through Ann Arbor. Unfortunately, RR ROW-specific shapefiles or location data was not available. Therefore, the ROW was created based on the parcel boundaries of properties along the RR. Using these properties, a ROW was created for the stretch of the railroad running through the city. The location of the rail line itself was available through both GIS data and visual analysis of high resolution satellite imagery.

GIS Analysis

Thanks to the previous work of the Greenway Task Force, the general area and route of the greenway had already been identified. One of the project's goals was to

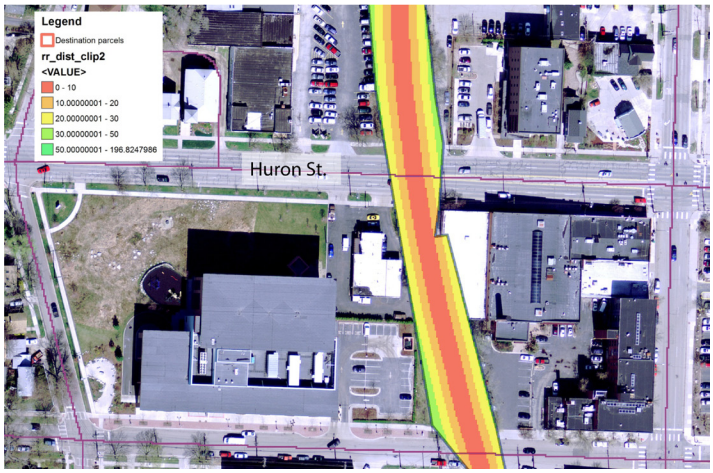


Figure 17: Example of GIS analysis: distance in ROW from active rail

look more closely at the RR ROW and actually determine where within the ROW the path should be located. This was accomplished by performing a GIS-based, least cost path analysis for the ROW and making adjustments based on field observations. The inputs or variables that were included were ROW width, distance from the center of the rail line, and topography. Using GIS, a friction (cost) surface was made for each of these inputs. The wider the entire ROW, the lower the cost, because there would be more room for the path (Fig. 17) . The closer to the rail line, the higher the cost, because there would be less room on that particular side for separation from the active rail. Topography was used to determine the steepness of slope within the ROW because building on level ground is easier than in areas with significant elevation change. These separate cost surfaces were then combined and given weighted influence on the final cost path. For instance, as the ROW width was given a greater percentage of influence, the other two cost surfaces had to decrease their influence. Combining these three cost surfaces and running a least cost path software tool, a series of cost paths were identified; this can be seen in the series crossing details showing three separate least cost paths which vary based on each factor's influence. (Fig. 19, 20, 21). The path options given from this GIS analysis were then adjusted based on judgments from the field to give the final location of the greenway path.

Identifying existing parks was important in order to show their proximity to the proposed greenway. There is a noticeable void of greenspace in the downtown area of Ann Arbor, as noted by the Greenway Task Force, and the addition of the three identified city-owned opportunity parcels and the greenway would significantly ameliorate this lack (Fig. 18).

The zoning and land use data was useful in determining the character of the areas bordering the greenway. This was particularly important when considering any type of development for the opportunity parcels. For example, it would not be sensible to locate a seven story parking structure next to a residential area. Both 415 West Washington and First and William are located more directly in the downtown core

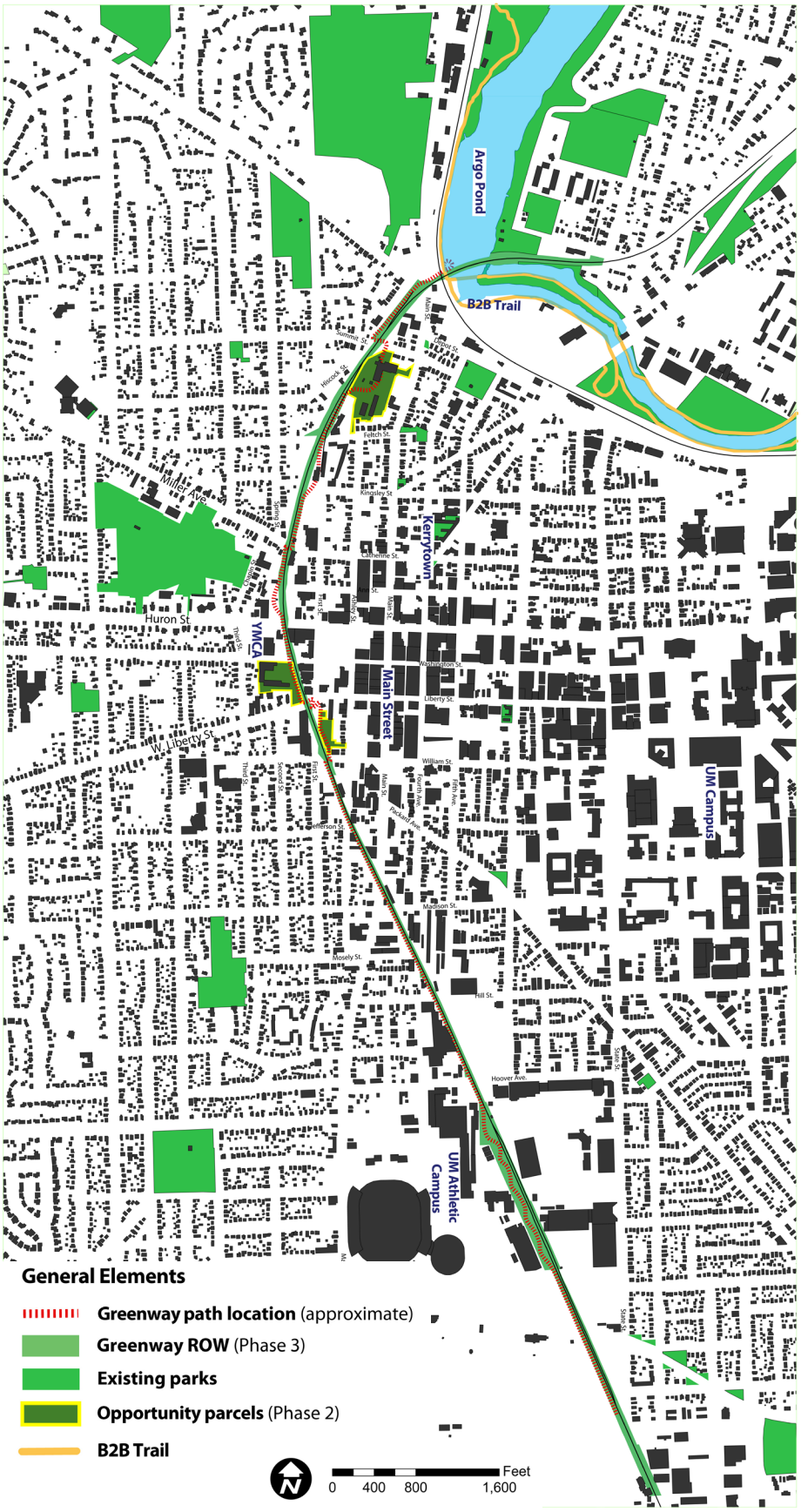
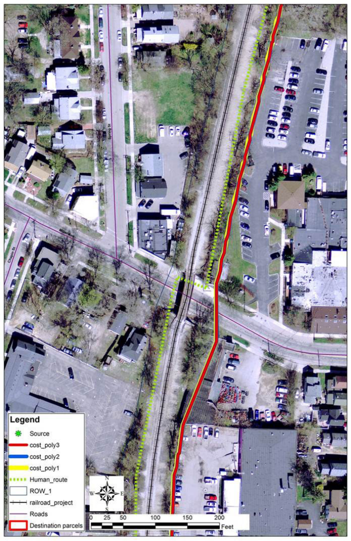
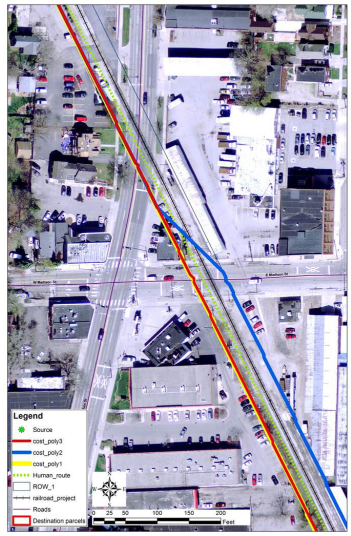


Figure 18: Location of parks in proximity to the greenway; note the lack of greenspace in the downtown core to the east of the greenway.





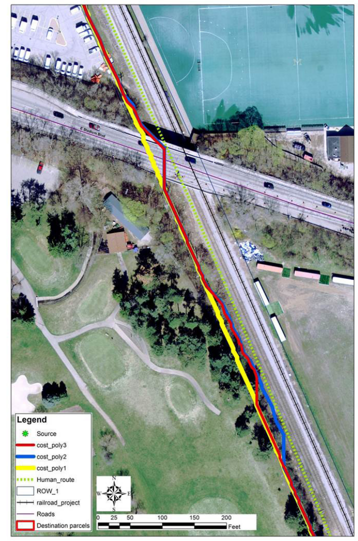


Figure 19: Least cost path example from northern portion of greenway
Figure 20: Least cost path example from downtown portion of greenway
Figure 21: Least cost path example for southern portion of greenway

and have residential areas to their west and the downtown shopping district to their east. The northern site, 721 N. Main, is not as close to the downtown district but is also characterized by residential areas to the west (Fig. 22). While the individual owners of each neighboring parcel did not have a great effect on the team's decision making, it is important to note that there are many bordering landowners. This will mean that for easements and possible off-site connections there will need to be many separate agreements.

Another aspect that was analyzed was the greenway's connection to different parts of the city. There are many on-street connection opportunities such as connecting to the Main Street shopping area, UM Campus or Kerrytown (Fig. 23). Marking these routes and making them highly visible could help bring more users to the greenway. It could also work in the reverse direction as people using the trail to commute then use it to access the downtown. As important as the existing land use background information was, it was not the overarching factor when determining if and how much to develop on any of the three parcels. The more important factor was the floodway and floodplain which will be discussed in the Geological section.

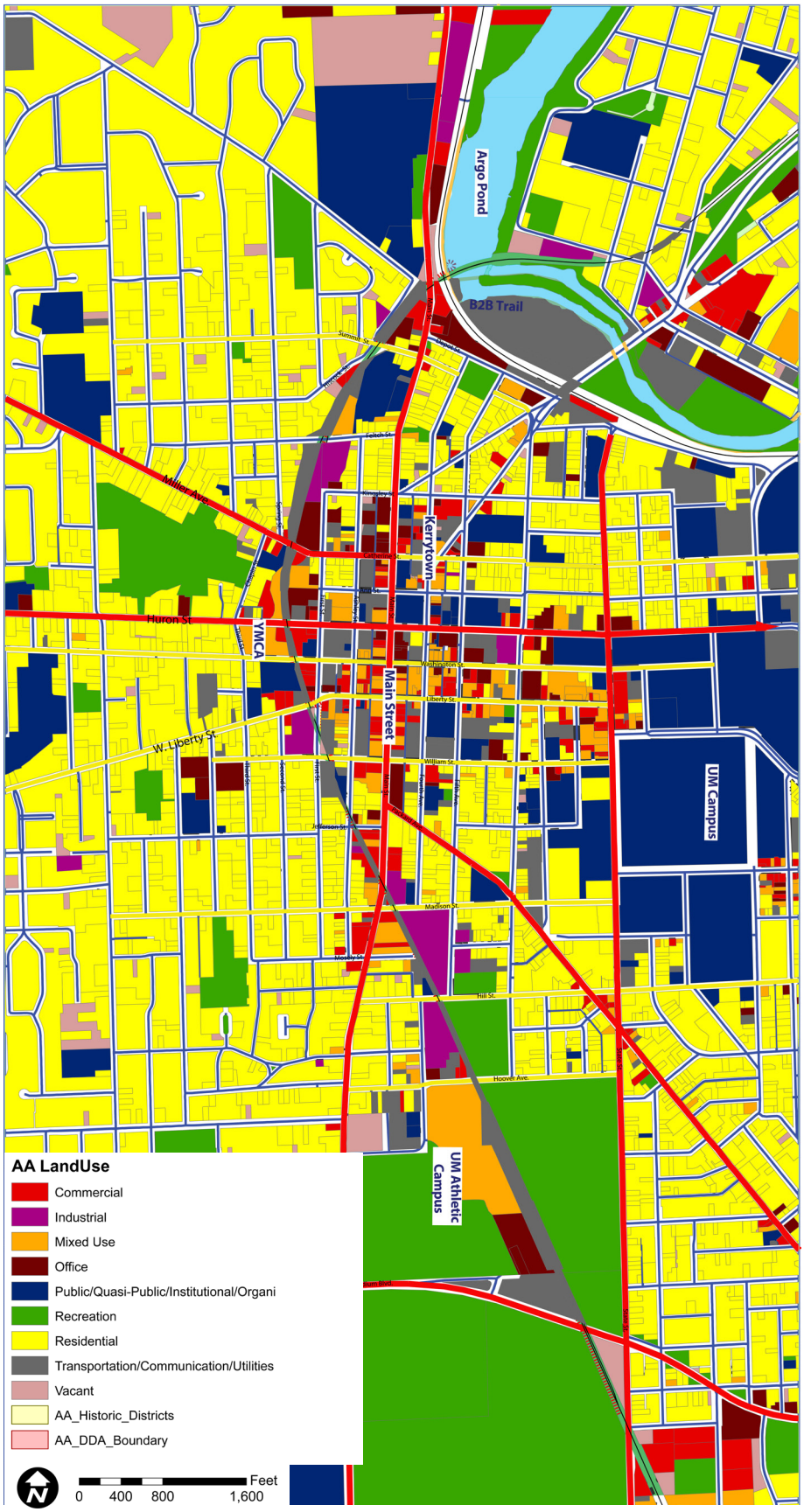
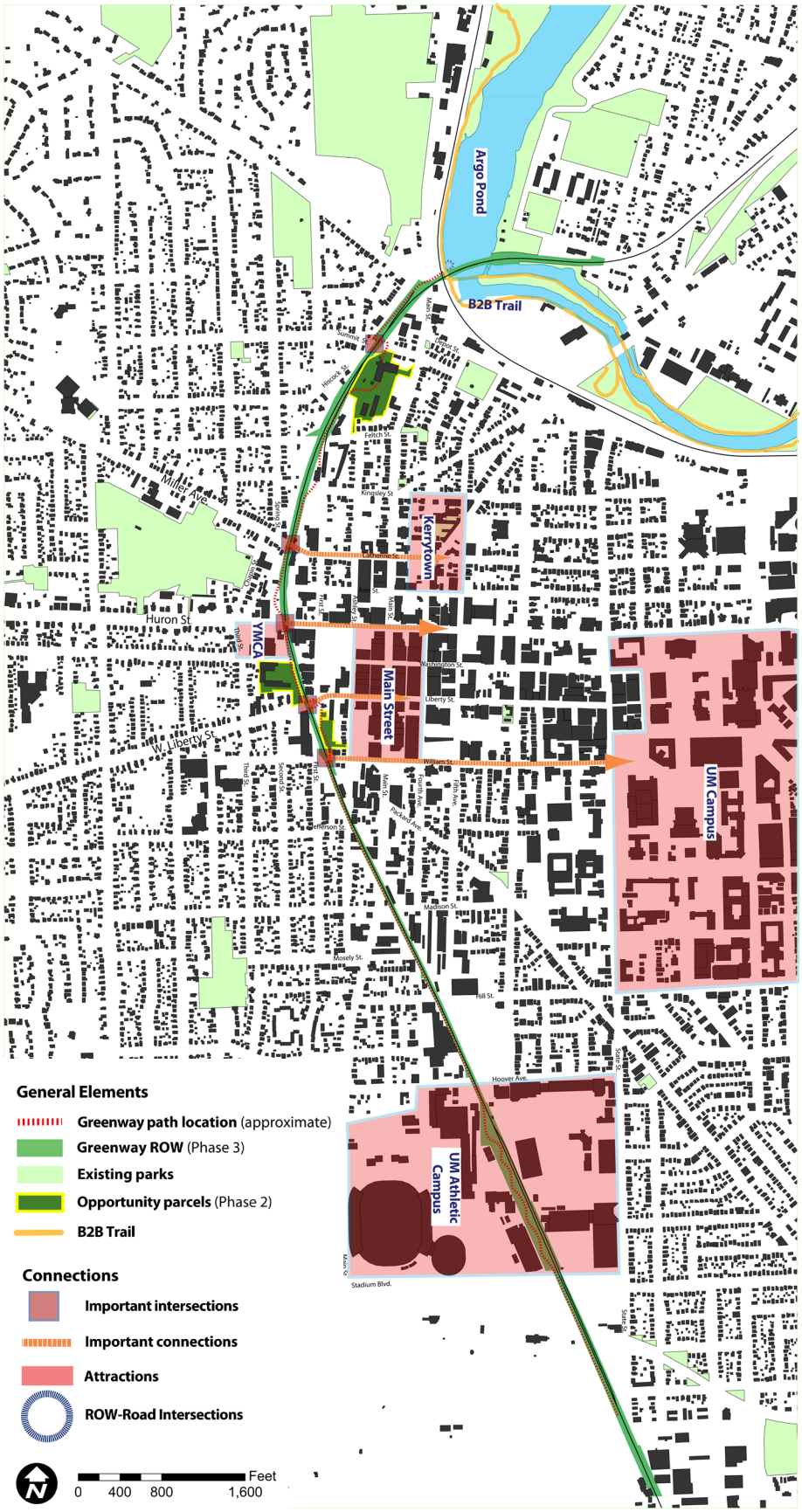


Figure 22: Aggregated Ann Arbor zoning categories adjacent to the greenway.

Figure 23: Connectivity between the greenway and significant Ann Arbor features, including the downtown, Kerrytown historic district, University of Michigan, and U of M athletic campus.



Transportation

The Allen Creek Greenway is more than just a connection between parks and greenspaces: it also will be a transportation route. One of the goals for the greenway is to provide a new route for non-motorized transportation into and out of the city. This non-motorized path would serve as both a recreational amenity to local residents and as a commuter route.

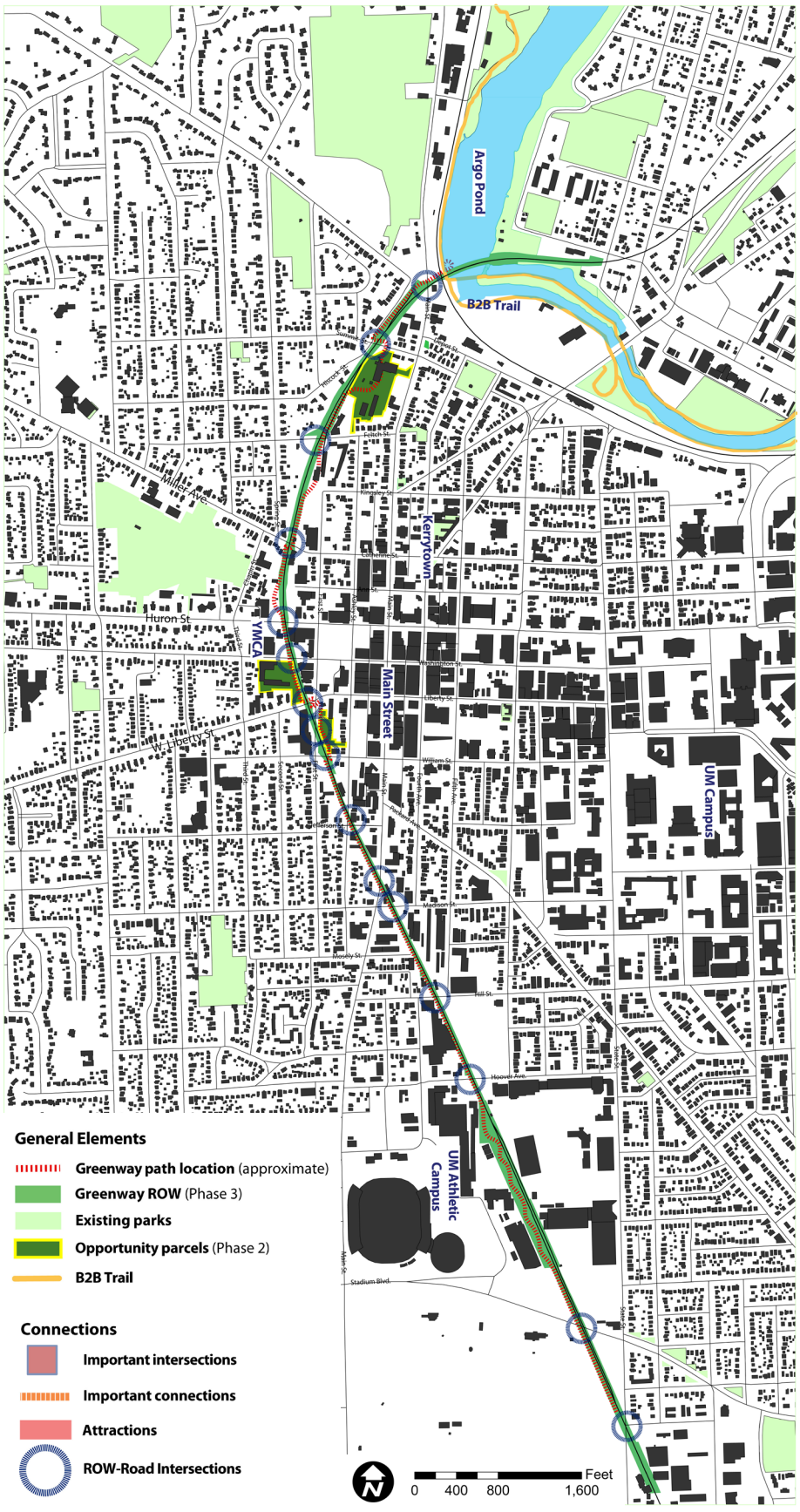
Figure 24: Downtown segment of the railroad at grade.

Figure 25: Northern segment of the railway elevated.

Another item that was considered when laying out the greenway were the existing roads, both county and city. The roads were important on two fronts. By using the RR ROW as the desired path for the greenway, the path must intersect roads (Fig. 26). This means that the interaction between the greenway and roads at intersections must be taken into consideration. When pedestrians have the potential to interact with vehicles, safety must be a priority. The varying topography of the city and the elevation change of the RR provided a variety of crossing types to examine, some crossed at grade (Fig. 24) and others running below the rails where the RR was on a bridge (Fig. 25). This means there will need to be multiple types of greenway/road intersection types. The RR ROW becomes elevated on a berm as it moves north toward the river so it can cross the river and N. Main St., creating these additional crossing challenges.

Traffic count information was also gathered from the Washtenaw Area Transit Study (WATS) for each of the roads that intersected the greenway and other major roads throughout the city. The roads were separated into 3 categories based on their

Figure 26: Road-greenway intersections



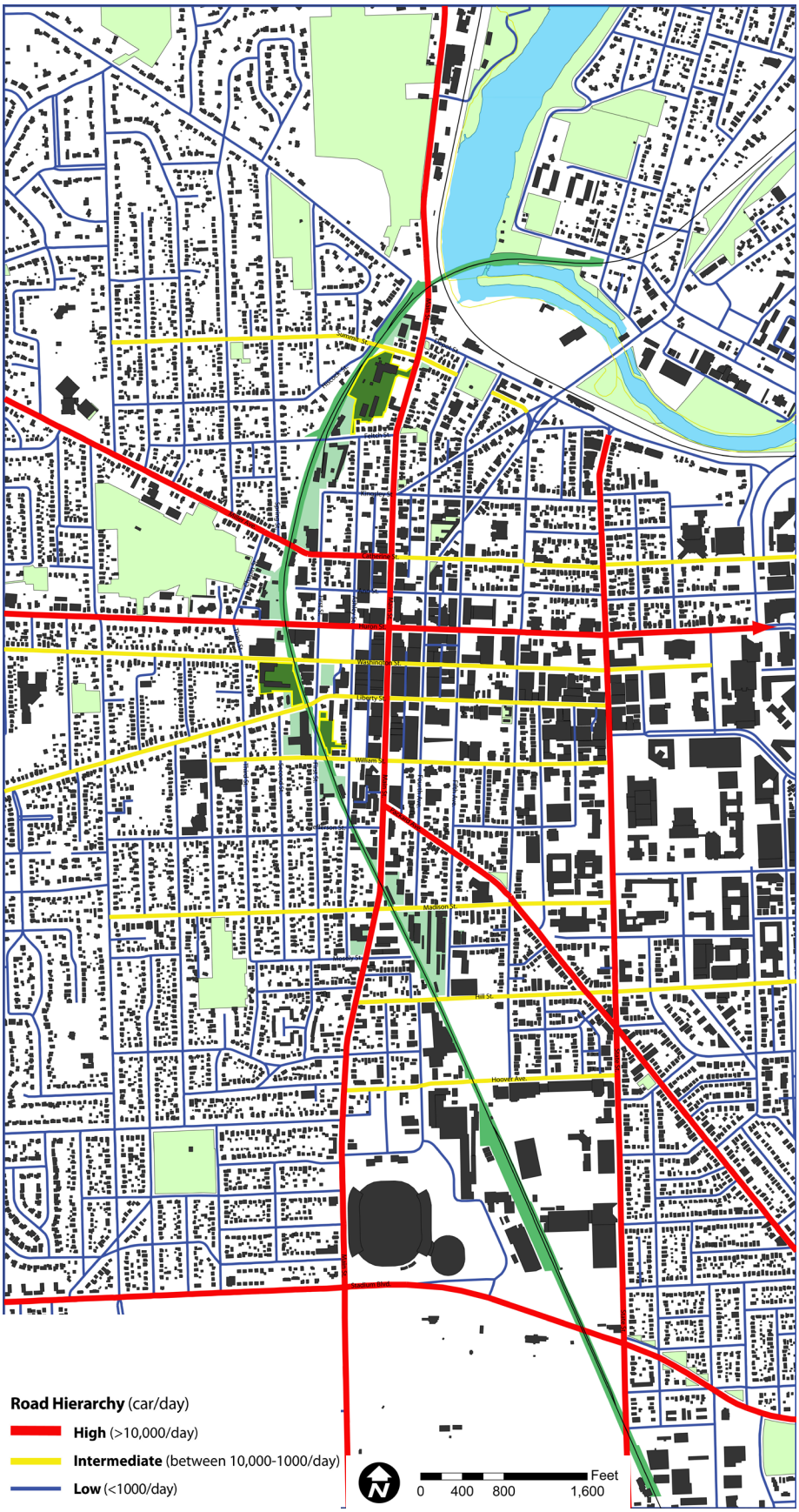


Figure 27: Diagram of road hierarchy in central Ann Arbor

traffic counts (Fig. 27). High volume roads had greater than 10,000 cars/day, intermediate roads between 10,000 and 1,000 cars/day and low volume roads less than 1,000 cars/day. This road hierarchy was important during the development of Phase 4 of the implementation plan.

The second important aspect of the roads and transportation analysis was the existing level of non-motorized traffic. Using the city's non-motorized transportation plan maps, it was easy to see the level of design and planning existing for each street and the level that is proposed. The streets vary from having bike lanes on both sides, shared use paths, signed as a bike route and still others only having sidewalks (See Appendix II for Non-motorized transportation plans).

Land Character (Greenway)

As the general location of the greenway was predetermined before this project, the geological information gathered was more for general knowledge than influences on the design decisions. The soil maps for the area mainly show urban soils, which means in many cases there is likely to be some level of contamination. This is also because the greenway is proposed as being within the RR ROW, where exhaust, oils and pesticide spray are likely to have been used. However, because the designs use a paved path, contamination is not a huge concern. Native plants and other special plant types could also be used along the trail to mitigate limited contamination.

The topography of the area was of interest for the greenway design because the steeper the slopes, the more difficult to traverse and to build on. These changes in elevation are why the RR becomes elevated on a berm as it moves north. This is also mentioned in the GIS analysis section.

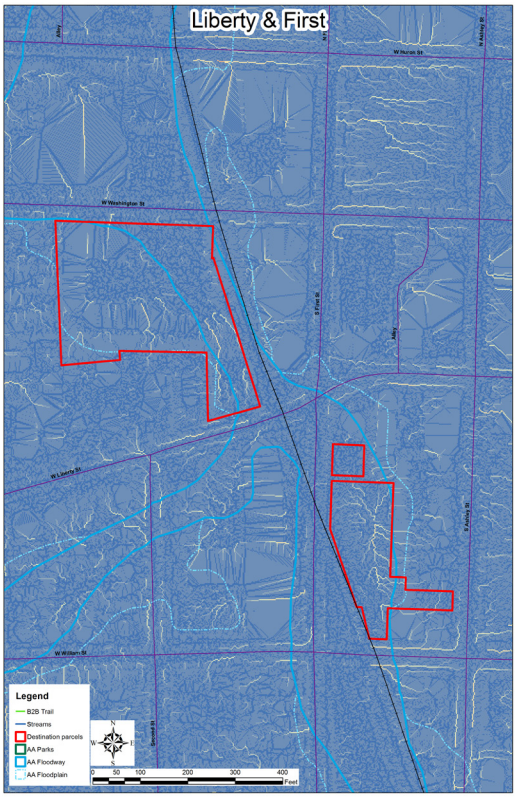
As has already been described in the Watershed Character section, the Allen Creek is significantly prone to flooding. This is important because, as previously described, the Allen Creek is diverted under the city in a culvert which roughly follows the RR ROW through the Allen Creek Valley, meaning that it is also prone to collecting more rainwater than other parts of the city. This also means that the floodway and floodplain expand from this area. According to current federal regulations, any development that is within a floodway must not increase flood height (FEMA, 2010). This restriction basically means that new structures would not be allowed in the floodway area. However, an engineering analysis should be conducted in most instances. As is evident from the review of the City Flood Management Plan, (see previous water quality section) the desired route of the greenway along the RR ROW falls almost completely within the floodway. This is particularly important to the

Conservancy because it means that most of the RR ROW and the opportunity parcels could not be developed in the future as anything else, making the greenway a great use for the space.

Land Character (Opportunity Parcels)

When looking at the three opportunity parcels, there were several types of data that were useful. The topographic information was necessary for site design and developing waterflow analysis for the sites. Using a digital elevation model (DEM) obtained from the Michigan Geographic Library, the topography was created. Both First and William and 415 W. Washington have areas with significant grade change that had to be dealt with. On First and William, the area extending to the east towards South Ashley Street is very steep and needed to be designed as a set of switchback ramps in order to be fully accessible to people with disabilities. On 415 W. Washington, the southwest corner of the site had a great deal of grade change that needed to be managed and several of the design options used this area as an amphitheater.

Using the DEM, a hydrologic flow analysis was performed for each site which showed where most of the water was accumulating on site (Figs. 28, 29).The lighter colors and white are areas that accumulate the most water. It was also important to note where the floodway was on each site as this determined the level of development that could occur. Both First and William and 415 W. Washington are completely within the floodway which means that they could not accommodate



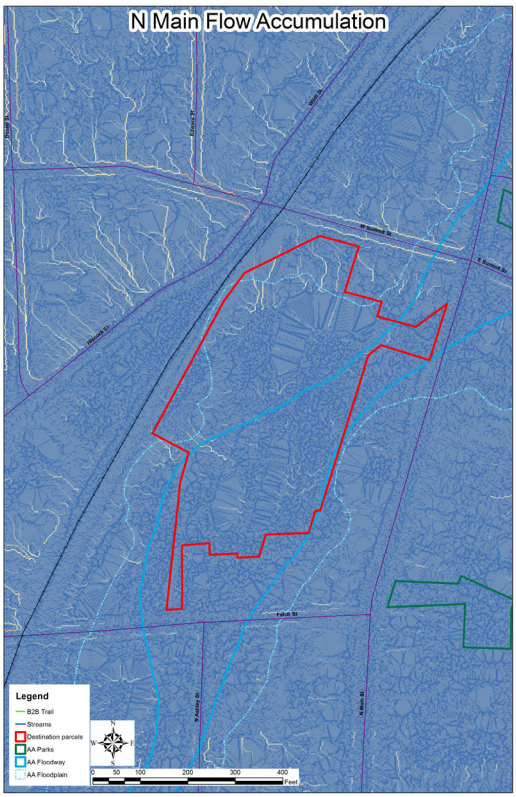


Figure 28: Hydrologic flow diagram for downtown parcels
Figure 29: Hydrologic flow diagram for northern parcel

traditional structures as they could potentially increase the flood heights. However, because 415 W. Washington has existing buildings, those buildings could be reused, and several of the design alternatives explored keeping some of the buildings. The 721 N. Main site is not completely in the floodway, which means that the designs could propose a structure in the development of the parcel. This parcel is also the largest of the three, potentially having room for a mixed-use structure to the west edge, which is out of the floodway. Because of its size, it could still provide open space to the east.

Contamination of these three sites was also a concern and had been previously studied by the greenway task force. The southernmost opportunity parcel, First and William, is still contaminated and is capped with the existing parking lot. Designs for this site would not allow percolation of collected water through the soil as this could transfer contaminates to the groundwater, so any rainwater treatment would have to involve remediation of the site first. However, areas of phytoremediation were proposed which would alleviate some of these contaminates on-site. The next site, 415 W. Washington is also partially contaminated. Although some remediation has occurred the site is not remediated to residential use levels. The northernmost site, 721 N. Main, is believed to be remediated to residential use levels. The remediation of this site allowed for designs with much larger bioswales and natural area plantings that the other two sites.

Stormwater Analyses

The City of Ann Arbor and Washtenaw County Water Resources Office are working to decrease the strain on the existing Allen Creek Drain (the buried pipe) by employing a LID (Low Impact Development) distributed system of stormwater strategies (Fig. 30) (Sheehan, H., et al., 2008, p.4, 30). A significant threshold for impervious surface cover at which water quality begins to

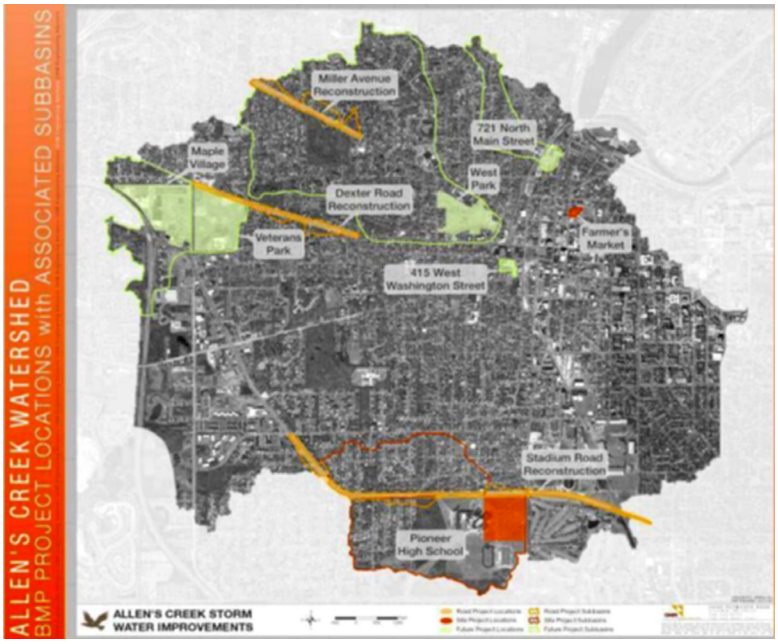


Figure 30: Map of low impact development (LID) stormwater management projects within the Allen Creek Watershed

(Sheehan, H, et al. 2008, p4)

severely degrade is 10% impervious cover (EPA, 2005, p. 47).

The estimated volume of water flowing through the Allen Creek Drain, a 7'x 9' box culvert (Fig. 32) during the 100-year rain event is approximately 2,100cfs (cubic feet per second), translating to 15,709 gallons per second (Allen Creek Greenway Task Force, 2007,p.41) (Sheehan, H., et al., 2008, p.38). This large volume of water traveling through the culvert suggests that the best strategy for reducing flood risks is to prevent the water from entering into the pipe in the first place. According to Sheehan et al., a general rule for achieving "significant flood reduction requires storage that is 5%-10% the size of the total contributing area" (2008, p.38). The Allen Creek Watershed is approximately 3,150 acres which includes 44% impervious surfaces (Fig. 31)(Sheehan, H., et al., 2008, p.38). This means that between 157.5 and 315 acres of land throughout the Allen Creek watershed need to be dedicated to flood reduction and water quality control; the best way to find that amount of space in such a developed area is to use a series of distributed, strategically located structures, a strategy employed by LID.

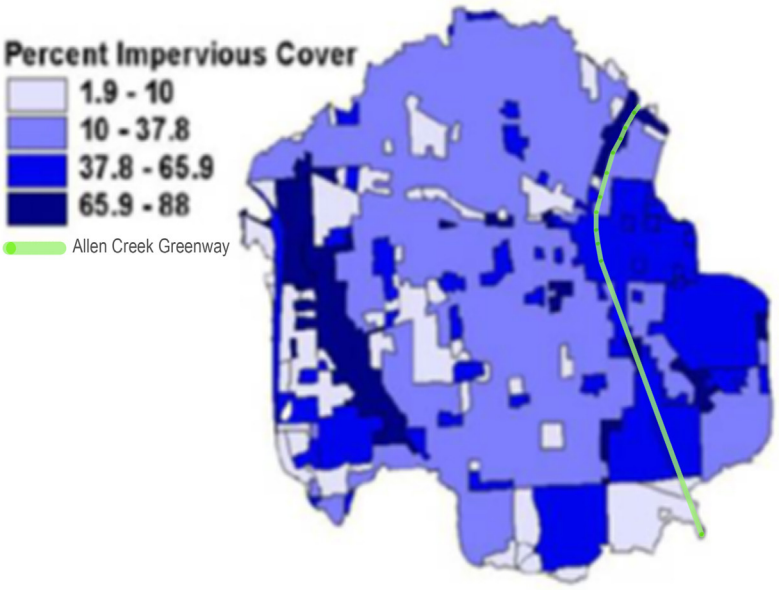


Figure 31: Impervious cover within the Allen Creek watershed (Sheehan, H, et al. 2008, p32)

Figure 32: Example of a box culvert

Using LID techniques, the practicum team made each of the three city-owned parcels runoff neutral by capturing and filtering, at minimum, the bankfull storm event for on-site runoff. The bankfull event was chosen because the three city-owned parcels receive direct runoff received from adjacent parcels

(Allen Creek Greenway Task Force, 2007, Appendix p.1). According to the Allen Creek Greenway Task Force, the bankfull event is the 1.5 year storm event, or 2.3 inches of rain in a 24 hour period (2007, Appendix p.1). The Task Force also indicates that flooding begins in Allen Creek with the bankfull event and that attempts at storing significant volumes flowing through the creek could have adverse effects on overall flooding patterns (2007, Appendix p.1). Another reason to focus on the distributed treatment strategy is to serve as a catalyst and precedent for Ann Arbor to illustrate how effective LID can be in controlling runoff volume and improving water quality. The remaining drainage areas should be retrofitted with additional LID structures that complement each other and provide volume reduction and additional filtration beyond what the three sites can provide.

First Street and William Street is the smallest of the sites, with a surface area of 1 acre; its maximum drainage area is 2.4 acres. However, because the site is contaminated with water-soluble arsenic and benzene, allowing stormwater to infiltrate through the soils could be detrimental to the larger groundwater table. The practicum team concurs with the phased approach to remediating this site presented by the Task Force; however, stormwater can still be collected by using impervious surfaces to direct water into an underground storage system to allow for full capture of the bankfull event. Using underground storage also maximizes the potential space for conversion to an urban garden plaza on such a small site while maintaining separation between the runoff and contaminated soils.

415 W. Washington has a total site area of 2.5 acres and a drainage area of 5.5 acres; this means that in order to achieve significant flood reduction storage, between 0.275 and 0.55 acres of the site need to be devoted to stormwater (Washtenaw County, 2007, p.1). The practicum team was easily able to achieve two times bankfull storage on 415 W. Washington through a vegetated swale system for on-site runoff that also provides contaminant filtration.

721 N. Main is larger than 415 W. Washington (5.1 acres) but has a much larger drainage area of 70 acres (Washtenaw County, 2007, p. 1). To have significant flood storage on 721 N. Main it would require between 3.5 and 7 acres of land area. The practicum team took this information, in combination with discussions with the City of Ann Arbor's water resource planners, and chose to directly capture the bankfull event through the swale and rain garden system. The remaining drainage area should be accommodated through use of LID techniques upstream. The practicum team's analysis and conclusions are supported by those of Washtenaw County (2007, p.1).

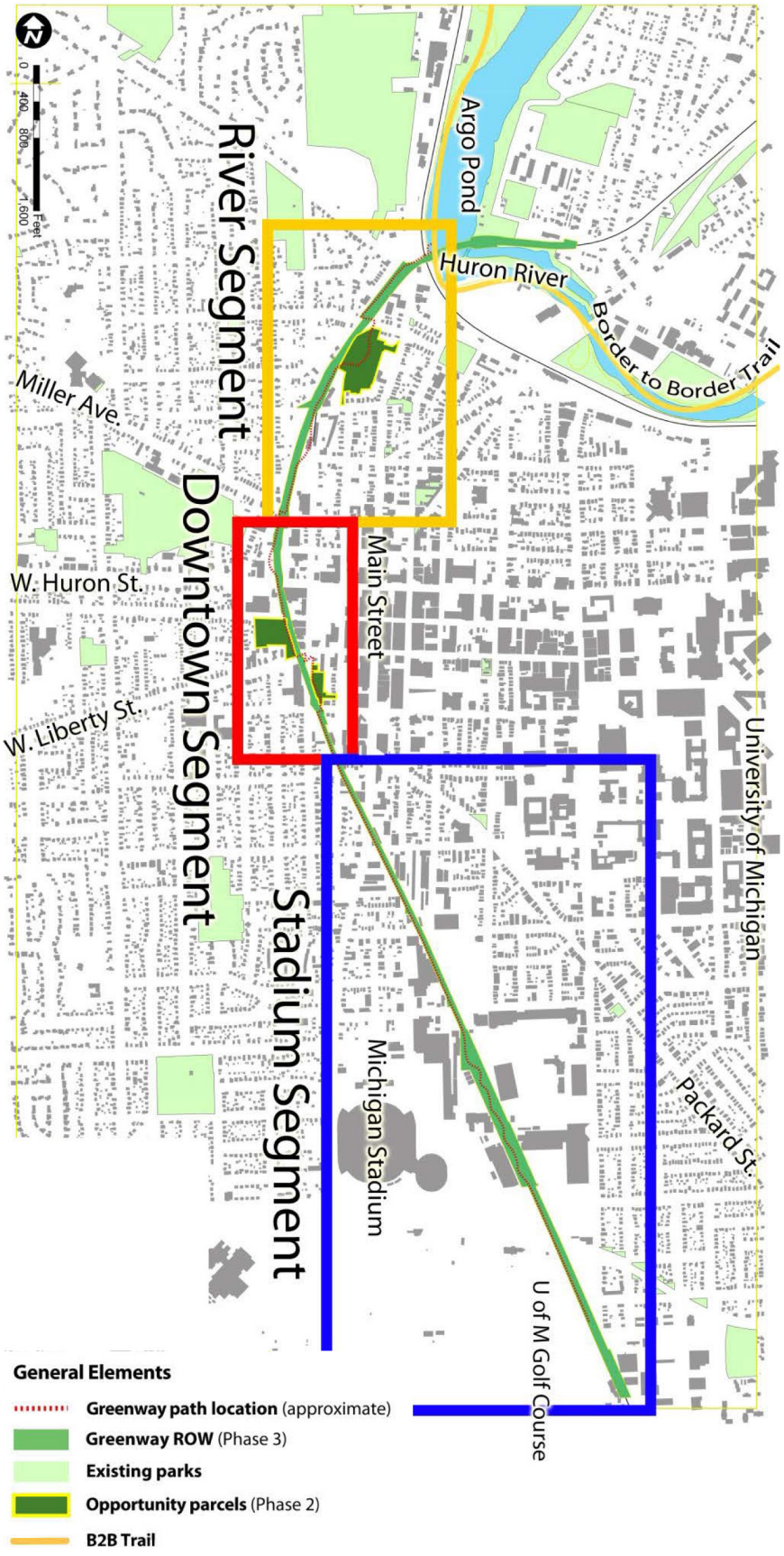


Figure 33: Segments of the Allen Creek Greenway

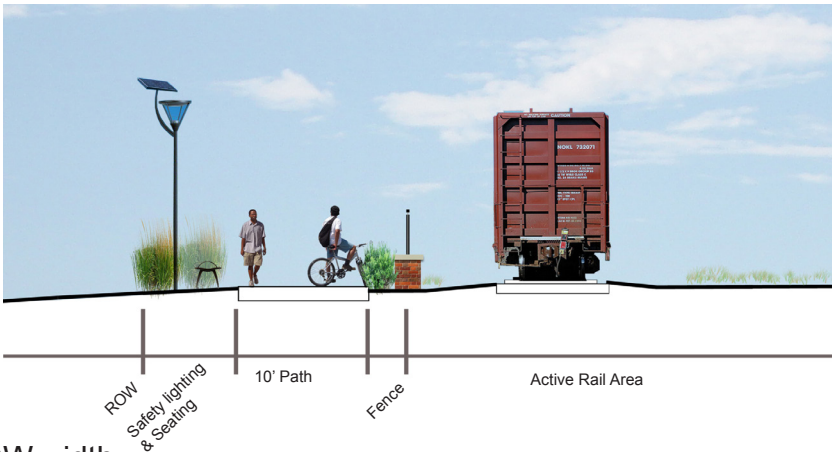
Design Concepts for the Greenway Experience

Greenway Corridor: Right-of-Way Descriptions and Designs

The width of the entire proposed route was examined using the RR ROW identified through the GIS software. The ROW of the RR varies throughout the city, which is how the final proposed location of the greenway was partially decided. Because the ROW width along the RR changes so frequently, there will need to be several different combinations of planting strips, pavement widths and barrier types to accommodate the available space. The ROW widths vary even within blocks and for this reason, a set of standard plans were developed for sections of the Greenway using average ROW widths. For the length of the greenway (2.3 miles), a set of reoccurring design elements would be used that help to give it a unifying character. These would consist of the same bench types, solar lighting, either a fence or a wall/fence combination, and similar plant species. Maintaining a standard character with other items such as signage, pavement markings and trash/recycling receptacles will also help to give a certain unified quality to the greenway.

Stadium Segment

The south part of the greenway between Stadium Blvd. and Hoover Ave. is the widest area of the entire greenway. Moving north along the greenway the ROW becomes much narrower. The average ROW width between Hoover and Jefferson, identified as the Stadium segment, is approximately 55', which allows for less separation from the active rail area. As can be seen in (Fig. 34, 35), a combination wall/fence was proposed that allows for a physical separation but does not create a visual barrier.



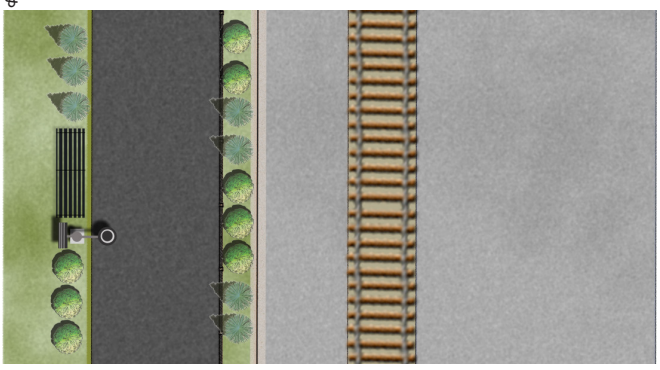


Figure 34: Section of a typical trail layout in the Stadium segment. Total ROW width 55'

Figure 35: Plan of a typical trail layout in the Stadium segment.

Native plants would be used along the edges of the path to help soften the wall and create a more appealing space. A 10’ paved path is also shown which would allow for room to pass in both directions.

Turntable Park

Within the RR ROW to the south, near the UM Athletic campus, there exists an area that is wider than anywhere else along the greenway, thanks to several abandoned railroad tracks and an old turntable. This area has a ROW of approximately 155’. Within this area it was proposed that in addition to a simple path, the wider ROW could be used as more of an expanded linear park space (Figs. 36, 37). Trees are proposed in rows following the existing and abandoned tracks, with breaks occurring in these rows to create more open area for passive enjoyment. The abandoned tracks

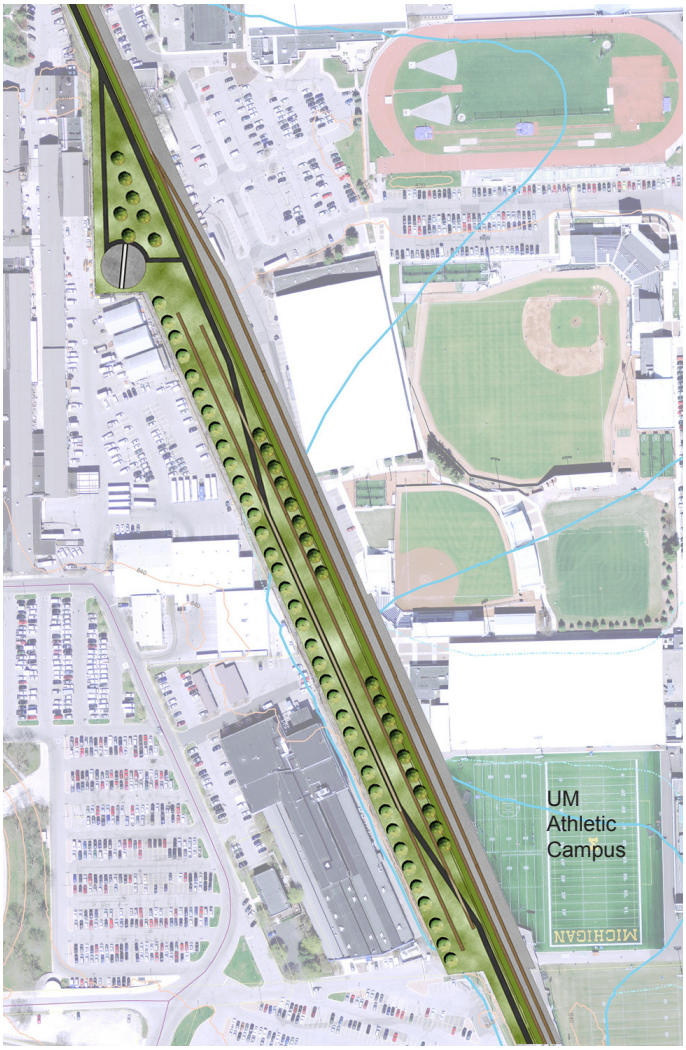
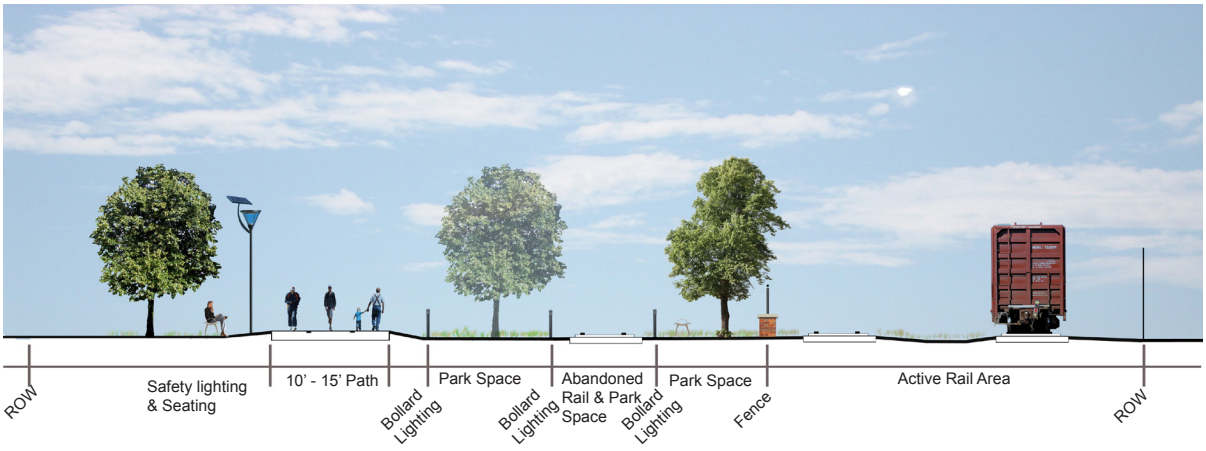


Figure 36: Plan of Turntable Park in the Stadium segment.
Total ROW width 155’
Figure 37: Section of Turntable Park.



were left in the ground and even running through the path in one segment to incorporate the history of the area into the trail. The greenway path itself, which could be as wide as 15’ in this area, veers in and out of the rows of trees to make the space more interactive. The straight lines of the trees, rail tracks and path are meant to mimic the action of trains passing each other. The turntable to the north of the park is also incorporated and it was thought this area could be used as more of a sitting and patio area. The reoccurring greenway elements can again be seen in the park. These consist of providing benches along the path, using solar lighting, planting native plants where at all possible to help with aesthetics and the degraded environment of the ROW, and also using a hard wall/fence combination to separate the park and trail space from the active rail area. The wall/fence combination was important to provide the physical separation needed for safety but also allow vision out of the space so that the user did not feel too confined while on the greenway.

Downtown Trail Section

The downtown section of the trail deals with dense land use and narrow right-of-way widths and berm heights; identified as the area between Jefferson and Miller, it has an average ROW width of 65’-85’ and presents a new challenge as the railroad is becomes elevated on a berm partway through this section (Figs. 38, 39). The RR increases in elevation as it moves north past William St. so that it can cross N. Main St. and Argo Pond. The berm within the ROW is slightly problematic because even though the ROW width may be greater than needed at the bottom of the berm, the elevation creates even less room to work with for the path itself. A potential solution to this is an easement that could allow an

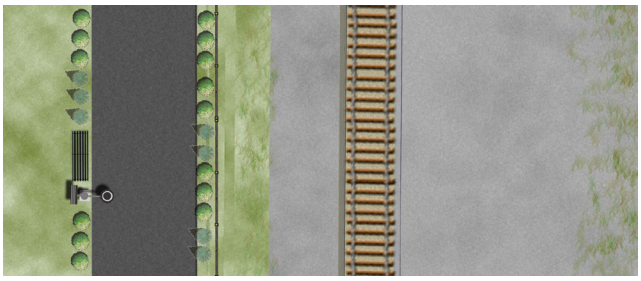
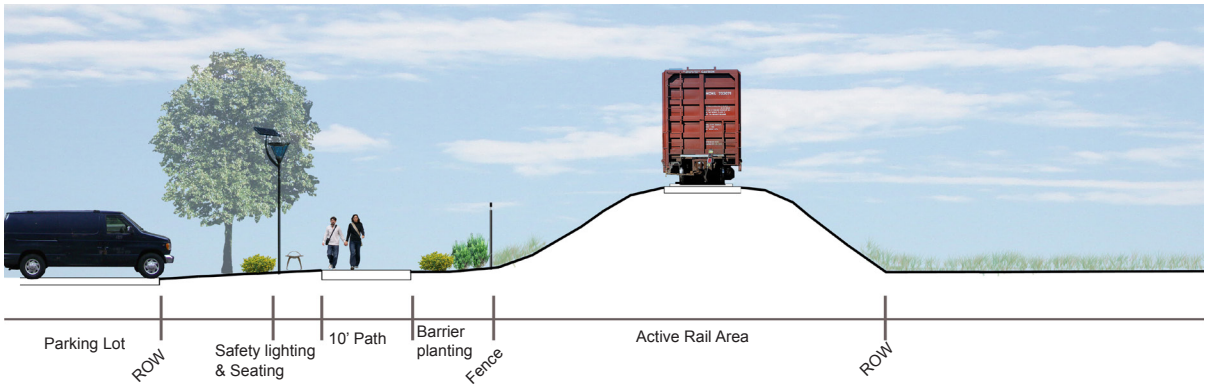


Figure 38: Plan of a typical trail in the downtown segment . Total ROW width 68’-85’.

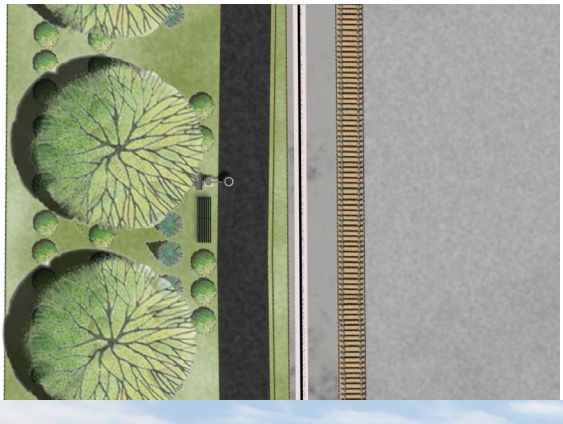
Figure 39: Section of a typical trail in the downtown segment .



expansion of greenspace into unused property adjacent to the railroad. In this segment a fence is proposed because it would take up less space than a fence and wall combination. However, using the wall/fence combination as a partial retaining wall for the berm would actually allow for more room as the bottom of the berm could be shifted slightly. Again, designs through this section propose a 10’ path and planting strips on each side. As the ROW width changes along the route the planting strips can widen or narrow accordingly.

River Trail Segment

The River segment runs from Miller to N. Main St., where it reaches the Huron River, Argo Dam, and the Border to Border trail. This segment has an average ROW of 110’ (Fig. 40, 41). The RR in this area is elevated; however, on the west side of the tracks the berm meets grade with the bordering neighborhood. There is a significant portion of this segment to the east that is an active rail area and could not be used for the greenway. The wider ROW allowed for more plantings and even some trees. Planting sections that are particularly focused with seasonal interests would add valuable character to the trail. The path in this segment would again be 10’ and the typical reoccurring design features can be seen.



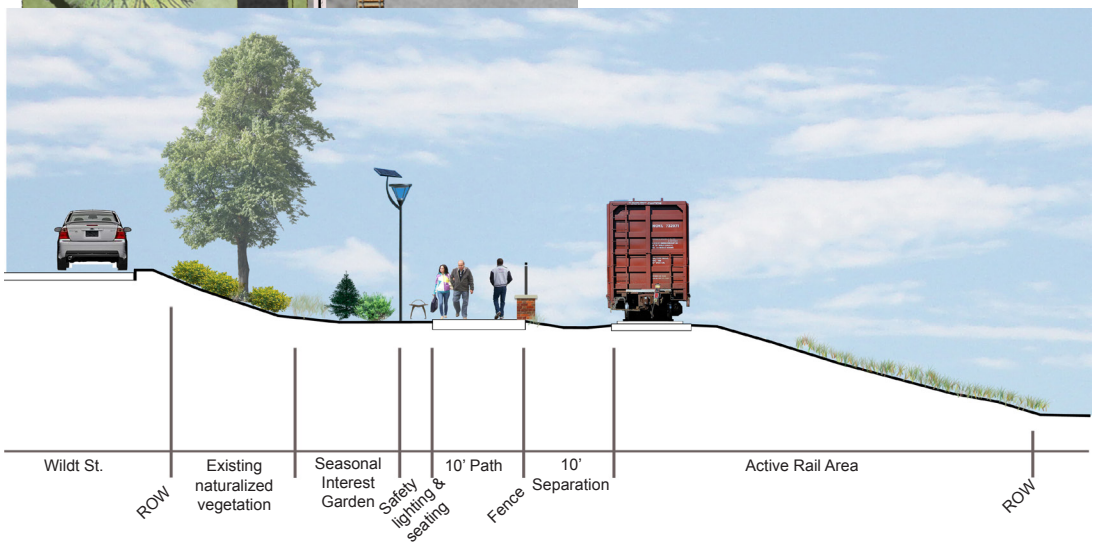


Figure 40: Plan of a typical trail layout within the River segment. Total ROW width 110’.
Figure 41: Section of a typical trail layout within the River segment.

Site Design: First St. and William St.

The design for the parcel at the intersection of First St. and William St. is designed to highlight phytoremediation, improve accessibility, and create an urban pocket park (Fig. 42, 43). As it exists now, the slope from Ashley St. down to First St. does not allow for easy access for persons with even minor physical limitations. To solve this issue this design proposes a series of planter boxes and retaining walls that create a ramped series of switchbacks. The defining feature of this design is a plaza space with a series of planter boxes filled with flowering plants and trees and a picnic patio with tables for downtown workers and trail users to enjoy. Additionally, a large area of the site is dedicated to an interpretive phytoremediation garden. This area is not to be used for recreation but will demonstrate how plants can be used to remove contamination from the soil. To the north is a small splash fountain for children. This would be water at ground level which would allow it to be an open plaza during the winter.

Figure 42: Site plan for First and William.

Figure 43: Section for First and William

Site Design: 415 W. Washington St.

Because of the lack of significant green space in the downtown core, this space includes a lawn planted with native grasses and large trees (Fig 44, 45). The unused buildlings are removed to bring the site into compliance with floodway requirements. A large raingarden stretches along western edge of the greenway path. The soils on this site are relatively clean, making this an appropriate space for rainwater infiltration.

A number of rotating outdoor community art exhibits bring excitement to the site. Terraced gardens would incorporate blooming plants along the railroad berm which begins at the southern edge of the site, beautifying a potentially overwhelming site feature. Finally, the large hill at the southwest corner of the site provides an occasion for the construction of an amphitheater which utilizes the grade change. This would create a community-focused space for outdoor movies, performances, and events which can bring life and energy to the space and potentially generate some revenue for the city.

Figure 44: Site plan for 415 W. Washington

Figure 45: Section for 415 W. Washington

Site Design: 721 N. Main

721 N. Main is the largest of the three city-owned parcels identified for inclusion into the greenway (Fig. 46, 47). Since a large portion of this site is outside of the floodway, the practicum team chose to site a potential mixed-use building to support residential and commercial uses, providing an exciting node of activity on-site. The floodway portion of the site was mostly restored to an oak barrens land cover to provide habitat for native plants, pollinators, and birds. The barrens area also serves to absorb and slow stormwater runoff in the event of a large rainstorm. The main stormwater capture structure on this site takes the form of two large rain gardens that are connected by a bioswale to provide water filtration, conveyance, and bank-full storage for the site. The Ann Arbor Community Center is adjacent to 721 N. Main which creates a unique opportunity to foster community interaction while letting residents enhance their “green thumbs” through community gardens—community based urban agriculture plots have been steadily increasing in popularity throughout the city.

Figure 46: Site plan for 721 N. Main

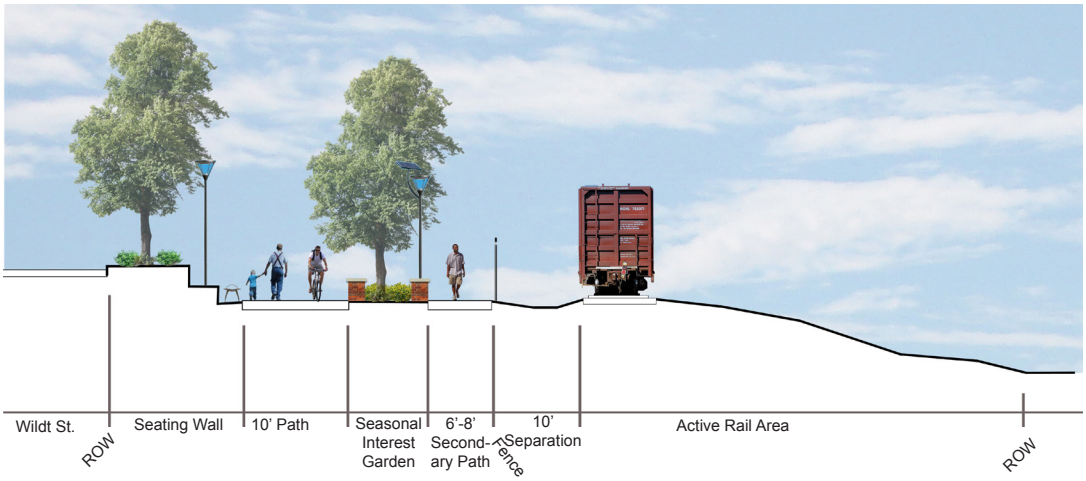
Figure 47: Section for 721 N. Main

Spur Park

Spur Park is designed to serve as a gateway for those entering and exiting Ann Arbor via the Border to Border (B2B) trail along the Huron River Greenway (Fig. 48, 49). This section of linear park is similar in form to the Turntable Park on the southern end of the Allen Creek Greenway in that it incorporates an existing, abandoned set of railroad tracks into a secondary pathway, has ample space for increased vegetation, and employs the characteristic site elements of the linear parks (bollard lighting and the wall/fence combination). The abandoned track in this section is the remnant of the connection between the Ann Arbor Railroad and the Norfolk-Southern Railroad (Amtrak currently uses this line).

Figure 48: Site plan for Spur Park

Figure 49: Section for Spur Park. Total ROW width 110’.



North Main Crossing

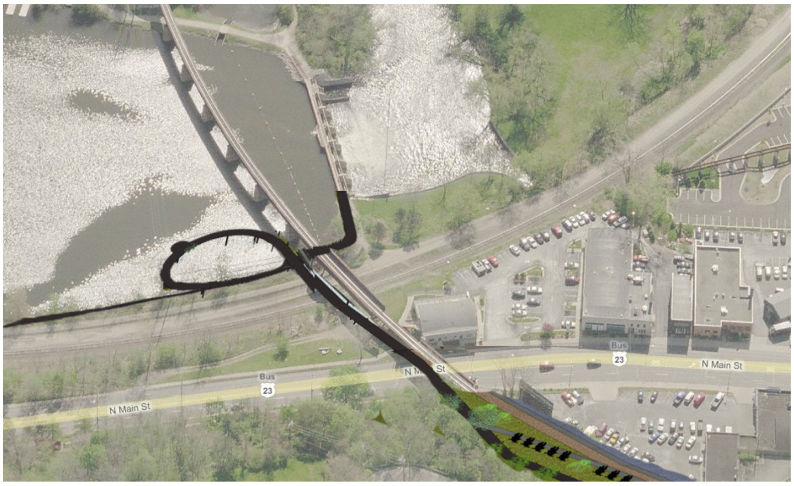


Figure 50: Proposed bridge crossing N. Main and Norfolk Southern railroad tracks.

Figure 51: Example of proposed spiral pedestrian bridge

The northern end of Spur Park is a gateway to Ann Arbor and the point at which the Allen Creek Greenway can connect into the regional trail network (the B2B trail). In order to safely make this connection, however, one must overcome three major obstacles: the crossings of N. Main St, the Norfolk-Southern Railroad, and the significant vertical elevation change, while maintaining accessibility for everyone. The practicum team chose to address all three of the challenges with a single solution, a pedestrian bridge (Fig. 50). This bridge would run parallel to the existing railroad bridge, capitalizing on the existing elevation at the northern end of the Spur Park. Once traversing N. Main St. and the Norfolk-Southern Railroad, the bridge will ramp down in a helical form and land at the existing grade of the B2B trail. Because there is limited land to work with on the north side of the Norfolk-Southern Railroad, in order to maintain proper track clearance, the bridge would have to extend over Argo Pond. This extension over the water would have minimal impacts on environmental quality and would provide a scenic vista for pedestrians on the greenway. Finally, the B2B trail currently uses Argo Dam as a crossing point to access the B2B on the opposite side of the river. As it is now, the crossing does not foster pedestrian connectivity across the river because of its access points, usable width, and surface material. The practicum team recommends making modifications to the walkway on top of the dam to make it accessible and friendly to wheeled devices (strollers, rollerblades, etc.).

Next Steps: Phased Implementation

As previously mentioned, the practicum team is aware that the goals for the greenway outlined in this paper will require a phased installation approach in order to be implemented (Fig. 52). Using GIS software, field observations, and research into the socio-political and historical context of the greenway site, described above, four phases of development were decided. Phase 1 is the immediate implementation of a signed street route for bicycles and pedestrians which would raise awareness of the plans for the Allen Creek Greenway. When developing the street routes for Phase 1, existing conditions of the streets were important. Phase 1 was meant to be an option that could be done immediately through the use of existing bike routes, sidewalks and simple signage and stencils on sidewalks and roads. This phase would give the greenway some important publicity in the community and could help gain support for the actual greenway. The team developed several options for street routes and selected the route farthest to the west as preferred because it follows the path of the future greenway the closest and comes nearest to the three opportunity parcels. The street options could either use the Broadway Bridge to connect to the Border to Border (B2B) trail to the north or go along N. Main and connect to the B2B trail using an access road by the canoe livery at Argo Pond. To the south Packard Rd. was chosen as the terminus/connection for the street routes because it has existing bike routes in both directions. These street route options could act as a starting point for the greenway and also become separate designated trail segments once the greenway is developed.

Phase 2 is the acquirement of the three opportunity parcels. These three properties, First and William, 415 W. Washington and 721 N. Main, were identified by the Allen Creek Greenway Task Force to be the best city owned-parcels for the Conservancy to acquire. As this process had already started before the culmination of this project, parts of this phase could happen relatively quickly. The development of these three properties will create much needed open and green space in the downtown area. It will also act as a publicity boost to gain support for the greenway. The development of these three parcels will help to make the greenway more than a path: it will join outdoor spaces that have multiple uses and make them all stronger through this connection.

Phase 3 is the implementation of the greenway within the RR ROW. This means that the RR, City, and Conservancy will have reached an agreement regarding installation of the path, whether this be an easement or some other type of agreement. The team realizes that this phase could be broken into many different pieces and it may need to be for management and financing purposes. It may be necessary to

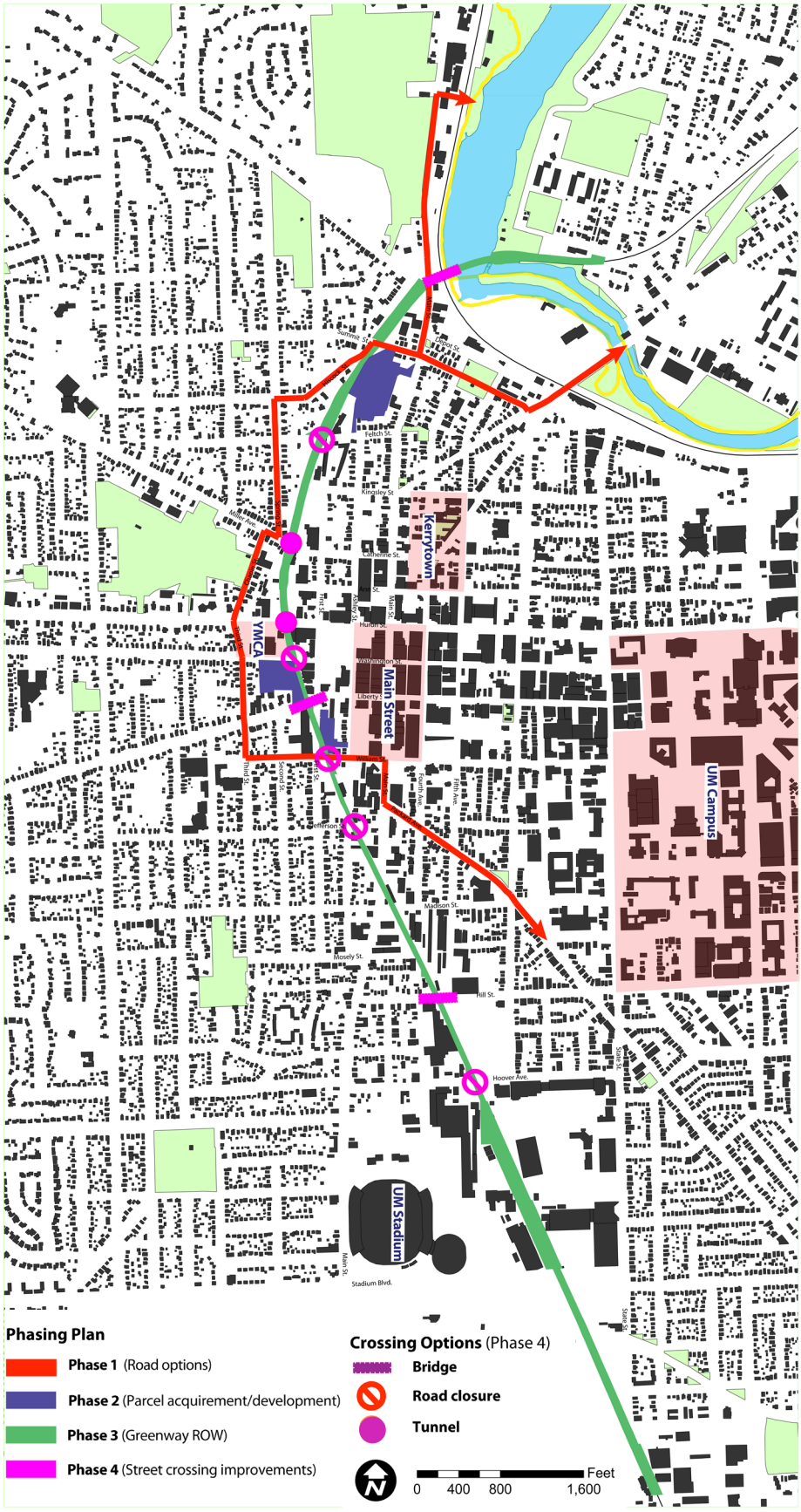


Figure 52: Diagram of proposed installation phases of the Allen Creek Greenway

develop the greenway starting at one end or the other so that it acts as an extension to the connecting trail. One strong development option would be to begin at the north end, connecting to the Border-to-Border trail, and working south. The development of the 3 parcels could also be done in this manner.

The transportation data was also important when developing Phase 4 crossing improvements. Based on the road hierarchy developed from the WATS, each crossing was studied to determine the best improvement option (Fig. 52). Pedestrian crossings for the greenway on higher and intermediate traffic roads were usually proposed as a tunnel or bridge. This way the pedestrian gained the most separation from the vehicles. This also was justified because closing most of these roads would cause too great of change in traffic patterns. The lower volume road crossings were proposed to either stay as they are with signage improvements or have a road closure. The roads that were selected to be closed were those that would not create huge changes in traffic patterns. These improvements may be several decades in the future but it was decided that these three types of crossing improvements would create a greatly improved experience while traveling on the greenway.

Conclusion

In an urbanized area such as Ann Arbor, finding contiguous land that is centrally located within the city to construct a greenway is uncommon. The current land use framework of the corridor formed by the railroad ROW, with typically lower levels of development (compared to adjacent areas), specific hydrologic functions, and close proximity to some of the most vibrant areas of the city, presents a unique opportunity for urban infill projects, as suggested by the DDA's Downtown Transition Zone plan and Bole et al's 2005 economic impact study. These infill projects will be anchored by the Allen Creek Greenway and will enhance the characteristics of Ann Arbor that make it such a great place to live: economic vitality, high quality of life, environmental quality, and cultural vibrancy.

Water systems are highly interconnected; water quality and volumes in tributaries have significant influence on greater streams, rivers, and lakes. The increased urbanization around Allen Creek has resulted in impaired water quality and the highest risk of flooding within the city limits. Because it outlets into the Huron River, the defining natural feature of the area, one of the most important functions of the Allen Creek Greenway is to promote healthy hydrology in the Allen Creek watershed, thereby improving the quality of the greater river network. Locating the greenway within the floodplain and floodway of the Allen Creek watershed provides a buffer zone around the buried creek that reduces water volumes entering the pipe, filters contaminants out of surface runoff, and significantly reduces the risk of potential damage and property loss in the event of a flood. According to the City of Ann Arbor (2007, p.67) "most floodplain managers would agree that the best use for the floodplain is open space".

The open space created by the greenway serves more functions than promoting natural hydrology. Open space allows for portions of this highly disturbed area to be restored to pre-settlement land cover types, including: oak barrens, mixed hardwood forest, and prairie. Natural vegetation in these systems provides habitat for a range of flora and fauna which promotes biodiversity and increases the City's ecological resiliency and ability to adapt to a shifting climate.

The greenway serves as open space that is well connected to the larger landscape matrix and ecologically diverse, as well as highlighting ecosystem services and promoting health and well-being for the City's residents through active and passive recreation opportunities. As noted earlier in this report, open space has been shown to improve cognitive function and wellbeing by providing a greater sense of connection to nature. Interpretive signs located throughout the greenway will enhance this connection to nature by illustrating precisely how the greenway system and its

components improve urban ecology and thereby quality of life and human health.

A critical component of improving human health and well-being through the Allen Creek Greenway is non-motorized transportation. The greenway provides recreational opportunities for bicycling, walking, jogging, and many other activities that improve physical health. Creating an off-road pathway means improved safety by minimizing interactions with automobiles. As noted in the Alta Planning + Design study, there are many instances of rails-with-trails that do not decrease pedestrian safety. In fact, by providing a clear pathway to use, safety is actually improved. Connecting the greenway to the B2B trail will create a green spur into the heart of Ann Arbor, promoting regional non-motorized connectivity. Strong transportation networks are often key drivers of urban form along the corridors they create.

The City of Ann Arbor is a strong supporter of mixed use development, which is made stronger by non-motorized transportation and walkability. Ahern and Searns indicate that greenways spur sustainable development along their length; the City should provide zoning that promotes mixed use and walkability along the greenway and within the downtown core. The Allen Creek Greenway is mentioned by name in numerous City master plans like the DDA's downtown plan (Fig. 53). The greenway is a centrally located feature in the DDA's future downtown interface and would anchor and encourage the intent of the zoning overlay district (gradual change in scale through reduced FARs) (Fig. 54). The practicum team recommends that the City go beyond encouraging the development of the greenway and begin to implement zoning to facilitate its development. For example, zoning overlays could encourage an open floodway, restrict new development in the floodplain, and even zone the land of the floodplain to be mixed-use or residential. The purpose of zoning the land to mixed-use

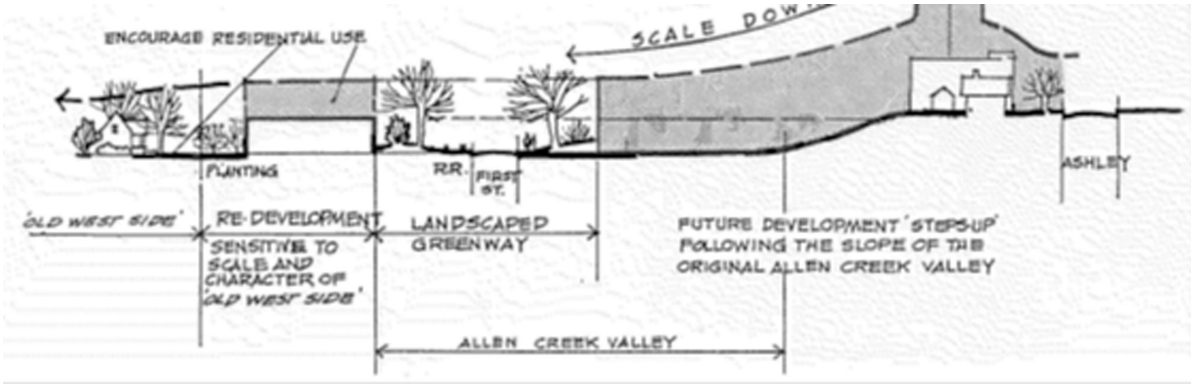


Figure 53: Cross-section of the greenway in relation to the downtown interface zone density changes and the topographic change of the Allen Creek valley.
(City of Ann Arbor,2009a, p.29)

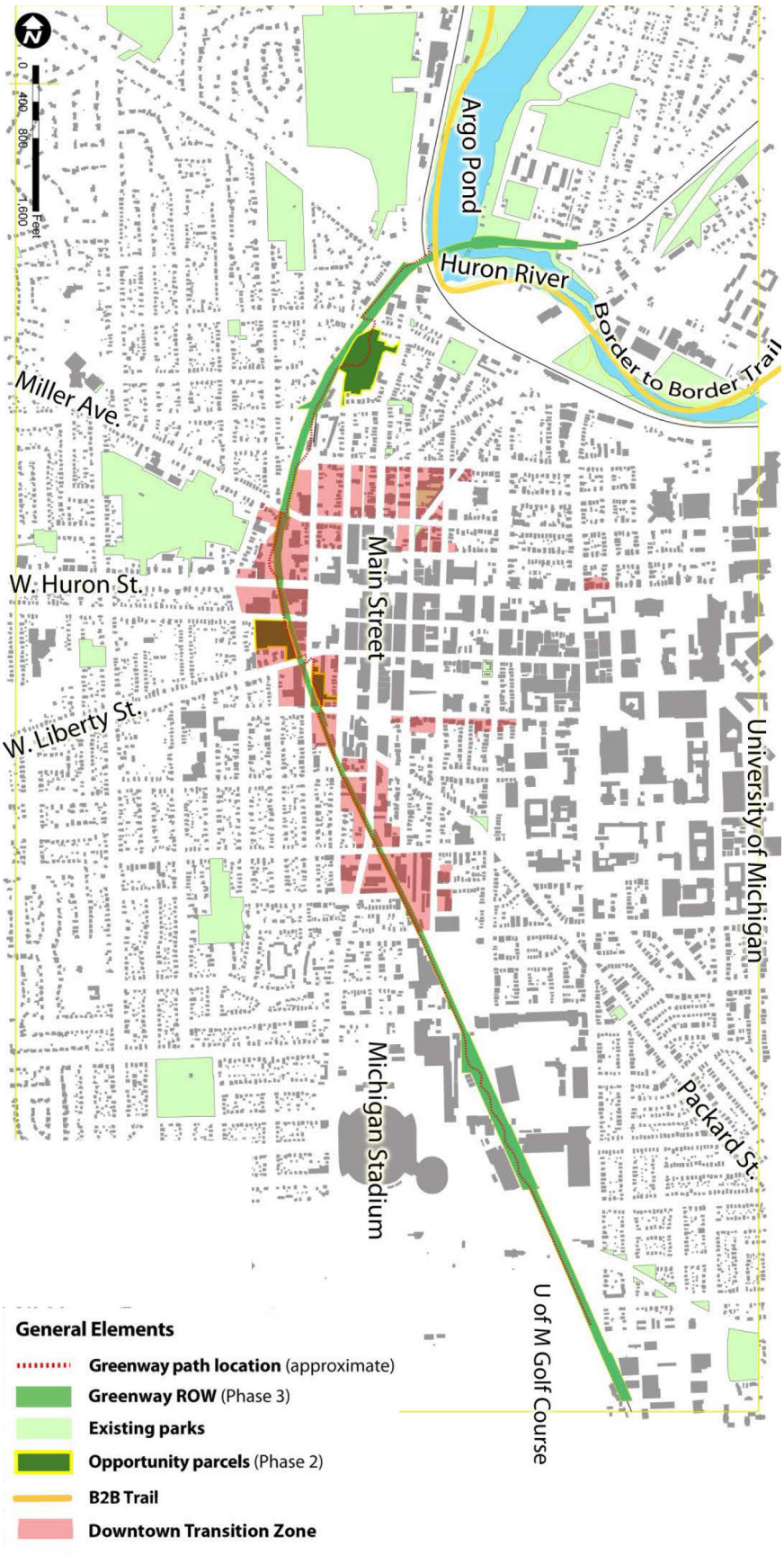


Figure 54: Diagram showing the centrality of the Allen Creek Greenway route to the DDA's downtown interface zone

or residential would provide greater incentives for the aforementioned TDR program. The City could designate strategically located areas in the downtown to act as the receiving zones for the development rights from the floodplain and interface zone's reduced FARs to maximize economic return while promoting open space in the Allen Creek valley.

In order to move the Allen Creek Greenway further through its development it is important to set major milestones for the planning process in combination with progressive policy and zoning from the City of Ann Arbor. The practicum team has outlined four of these milestones that each represent a large step towards a realized vision of the greenway in the phasing section. The four phases (on-street routes, city owned parcel development, trail installation within the railroad ROW, and improved pedestrian crossings) represent manageable, incremental steps towards construction of this complex, multi-jurisdictional amenity. One of the most important questions that still remains is: where should development of the greenway begin? There are three obvious answers to this question: the northern section, middle section, and southern section. However, the team's research has shown that there are two options that would work best, the northern end or the southern end.

Beginning in the center at First and William or 415 W. Washington has the advantage of being highly visible and having high use potential because of its proximity to the downtown core. However, the downtown segment is not recommended as the starting point because it has the narrowest ROW widths, making path construction more challenging and possibly requiring access easements. Additionally, between Madison St. and Miller Ave., there are many intersections with roads as the planned path approaches the downtown area, creating a rapid sequence of "stop-and-go" for greenway users (especially difficult on bicycles because of their faster speeds). Lastly, this section lacks in connectivity to the regional trail network and runs the risk of becoming two typical parks (First and William and 415 W. Washington) instead of a part of a larger, linear park system.

One starting point would be the northern end of the greenway that contains the connection to the B2B trail, Spur Park, and 721 N. Main St. The major strengths of starting on the northern end are: a wide ROW to construct the trail, potential development of 721 N. Main, and promotion of regional connectivity through the B2B trail. This connection would likely draw the support of Washtenaw County Parks and Recreation while creating a non-motorized gateway to the city. Additionally, if funding is available to construct the pedestrian bridge to traverse N. Main St. and the Norfolk-Southern Railroad, it would create a highly visible landmark for the city and the Allen Creek Greenway.

Another starting point would be the southern end of the greenway by Turntable Park and the football stadium. Starting on the southern side has the disadvantage of not directly connecting into the B2B trail; however, this option is strong because it likely has the greatest amount of support from the Ann Arbor Railroad to minimize high-volume, regular trespassing on the tracks during sporting events at the University of Michigan's football and basketball stadiums. Additionally, it has the widest typical ROW available for path development which improves the perception of safety from the railroad and is the simplest for construction. An additional benefit of this section being developed first is that it would get the University of Michigan to be part of the critical first step. The design team has perceived a great deal of local support for the greenway project, but it seems as if many of the stakeholders are waiting for someone else to "make the first move". If the University, a major employer and landowner in the city, is part of the first step, it is likely that other stakeholders will be more inclined to provide services, funding, and support to move the project towards complete construction.

The Allen Creek Greenway has been in the making for over three decades and has built strong support from local governments and the citizens of Ann Arbor. It is the hope of the practicum team that this report and associated design recommendations add to the growing body of research and studies by producing a comprehensive vision for the entire length of the greenway that can be used to gain additional support from the key stakeholders. With the potential prominence of the greenway as a recreational amenity and sustainable economic development generator, the design team believes that the next step should be to gain wide spread public support and knowledge of the project and its benefits. One of the best ways to do this is by including the citizens of Ann Arbor early on in the design process with a design charrette or other means. Strong public support for the greenway is an excellent way to urge one of the key stakeholders to take the crucial first step in commitment to what should be a defining feature of Ann Arbor. The Allen Creek Greenway is nearly two and a half miles of multi-functional landscape infrastructure and a cultural amenity that represents a critical step towards enhancing the city's sustainability, economic development, and cultural vitality, now and into the future.

Appendix I: Glossary of Terms

Bankfull- The amount of water that a water feature, like a creek, can hold within the stream channel before it overflows to flood stage. Allen Creek reaches bankfull stage with the 1.5 year storm or 2.3 inches of rainfall in a 24 hour period.

Baseflow- The base amount of water flowing through a hydrologic feature from groundwater seepage; typically stream flow is comprised of baseflow in combination with surface runoff.

Box culvert- A culvert is a device used to channel water; a box culvert is enclosed, rectangular in shape and often made of concrete.

Brownfield- A federal designation of property on which the expansion, redevelopment, or reuse may be complicated by the presence or potential presence of a hazardous substance, pollutant, or contaminant. Contamination is often in the soil or groundwater and frequently from former industrial or commercial uses; can also include contaminated structures.

Catchment Area- The limits of an area that all drains to a single location, typically used to describe a specific site.

Contaminants and pollutants- May include hydrocarbons, heavy metals, chlorides, excess nutrients from fertilizers, suspended solids (solid particles from construction and erosion), and bacteria.

Contaminant Loading- The process by which runoff that has ‘washed’ surfaces picks up contaminants, measured by concentration of contaminants.

Corridor- A landscape ecology term referencing narrow areas of similar land cover, such as meadows under power lines or vegetated streambanks, which contrast with the surrounding land use and form pathways for flows of living creatures and / or inorganic material.

Cues to care- Visual cues in the landscape which symbolize the presence of human intention and can serve to alter people’s perception of the landscape.

Ecosystem services- Benefits humans obtain from ecosystems; they can range from food production to cleansing water to psychological well-being. Some can be quantified monetarily.

Design Storm- A modeled storm used when designing and sizing a stormwater

structure; used to predict frequency, volume, peak flows, amount of runoff, and storm duration. Often referred to as the x-year storm, for example a 100 year storm is a storm intensity that has a 1% chance of occurring every year.

Digital elevation model (DEM)- A raster file containing precise elevation point data at regularly spaced, horizontal intervals, which can be used for a range of modeling and analysis functions.

First flush- Initial surface stormwater runoff after a rain event that has been found to contain the highest concentrations of contaminants because it 'washes' all of the urban surfaces, picking up contaminants and carrying them into receiving water bodies.

Floor area ratio (FAR)- The ratio of the total floor area of buildings on a certain location to the size of the land of that location.

Floodplain- The area of land adjacent to a water body that has the potential to flood during a certain frequency rain event (i.e. the 100 year floodplain is the limits of flooding for the 100 year design storm).

Floodway- Federally defined area around a waterbody that must be reserved in order to discharge the base flood without cumulatively increasing the water surface elevation more than a designated height. Communities must regulate development in these floodways to ensure that there are no increases in upstream flood elevations (FEMA).

Green space- Any space which is primarily vegetated and provides aesthetic, ecological, or cultural value based on its vegetated cover.

Greenbelt- A belt of recreational parks, farmland, or uncultivated land surrounding a community; often preserved through use of land use zoning or other regulatory tools.

Greenway—Linear green spaces which often connect to larger regional green networks; can be urban or rural but often follow other linear landscape features.

Groundwater Recharge- Percolated water that reaches the level of the groundwater table, replenishing the natural supply of water in the soil's pore space.

GIS- Geographic Information Systems, computer software that allows the operator to perform complex analyses using spatially-based data

Hydrology- The processes that describe how water is distributed and moves through a specific area.

Impervious/Impermeable Surface- Surfaces such as roads, roofs, parking lots, and compacted soils that have a very low infiltration capacity and produce a large volume of runoff.

Infill- The use of vacant land and property within a built-up area for further construction or development, especially as part of a neighborhood preservation or increased density program.

Infiltration- The process by which water enters into the upper horizon (layer) of soil.

Infiltration Capacity- Measured by the infiltration rate, determines how much water can be infiltrated per hour.

Landscape matrix- The general character of a landscape in contrast to a specific patch or corridor of land cover.

Low Impact Development (LID)- Techniques that mimic natural hydrology, minimize site disturbance, and utilize a decentralized approach to control water quality and quantity; examples include porous paving and rain gardens.

Mixed-use development- Development which allows or encourages more than one type of use in a building or set of buildings. For example, retail on the first floor, commercial office space on the 2nd and 3rd floors, and residential space on the upper floors of a building.

Non-Point Source Pollution- Pollution that comes from dispersed sources (i.e. cars slowly leaking fluids on the road over time).

Non-Motorized Transportation- Any form of transportation that is propelled only by human power (bicycles, rollerblades, walking, jogging, etc.)

Open space-Urban areas which are predominantly open and undeveloped; usually synonymous with urban green space.

Overflow Preventer- A structure that is designed to prevent overflow and flooding from a LID structure.

Outfall- The discharge point of the stormwater system where water is released, often into a larger water body.

Patch-A significant area of land which shares the same land cover or landscape characteristics in contrast to the larger landscape matrix; often connected by corridors of similar land cover to other patches.

Parkway-A significantly landscaped wide road or highway.

Peak Flow- The point during a precipitation event where the storm intensity has peaked and the maximum amount of water is being conveyed through the stormwater system or a natural system (river, stream, etc.).

Percolation- The process by which water that has infiltrated into the soil continues to move downward via gravity.

Pervious/Permeable Surface- A surface that allows water to infiltrate, resulting in minimal runoff.

Point Source Pollution- Source of pollution that emanates from a specific area (i.e. leaking underground tank or industrial outflow pipe).

Pre-settlement Conditions- The characteristics and qualities that would describe the land before humans caused significant disturbance to it.

Rail-with-Trail (RWT)- A trail which follows an existing, active rail line; often located within the right-of-way.

Right of Way (ROW)- In the case of a railroad, it is the land on which they own the title in order to lay permanent tracks; ROW can also be used to describe an easement.

Runoff- Water from a precipitation event that does not infiltrate into the soil and flows over the surface of the land.

Smart Growth- urban planning techniques that concentrates growth in the center of a city to avoid urban sprawl; often utilizes the idea of creating areas in which people can “live, work, and play” in order to symbolize the benefits of this land use typology.

Sprawl- Land use expanding from a more dense urban core into a surrounding rural landscape which is often driven by large lot development, causing an inefficient use of land compared to the services offered. Only navigable by motorized transportation.

Stormwater- Any precipitation that hits a surface (rain, snowmelt, etc.), in the built environment. It needs to be managed to prevent flooding due to large quantities of impervious surfaces.

Stormwater Structures- Designed and constructed facilities that serve different functions in managing stormwater (i.e. rain gardens, permeable pavement, bioswales, typical curb and gutter systems, etc.).

Sustainable-Something which can be maintained indefinitely (for the long term) at the same rate. In this case it refers to actions or objects which do not decrease future generations' ability to perform the same actions or obtain the same materials.

Tax Increment Financing (TIF)- A mechanism that allows local governments to use future projected taxes to finance current infrastructure investments.

Transfer of Development Rights (TDR)- Provisions in a zoning law that allow for the purchase of the right to develop land located in a sending area and the transfer of these rights to land located in a receiving area.

Urban Soils- Soils in urbanized areas can be comprised of a range of materials beyond the parent soils; they have often been excavated and filled many times, mixing the soil horizons together. Often they have also been compacted (decreasing infiltration capacity); these vary greatly and require site specific testing for accurate information.

Watershed- The collective area typically defined by topography in which all precipitation that lands within it drains into a common water body (lake, river, stream, creek). Watersheds are typically linked together by a high order stream. For example, the Allen Creek watershed is a sub-watershed within the Huron River watershed.

Zoning Overlay District- A set of land use regulations that apply in addition to the typical zoning; this is often used to achieve specific functions within the greater land use framework.

Appendix II: Non-Motorized Transportation Maps

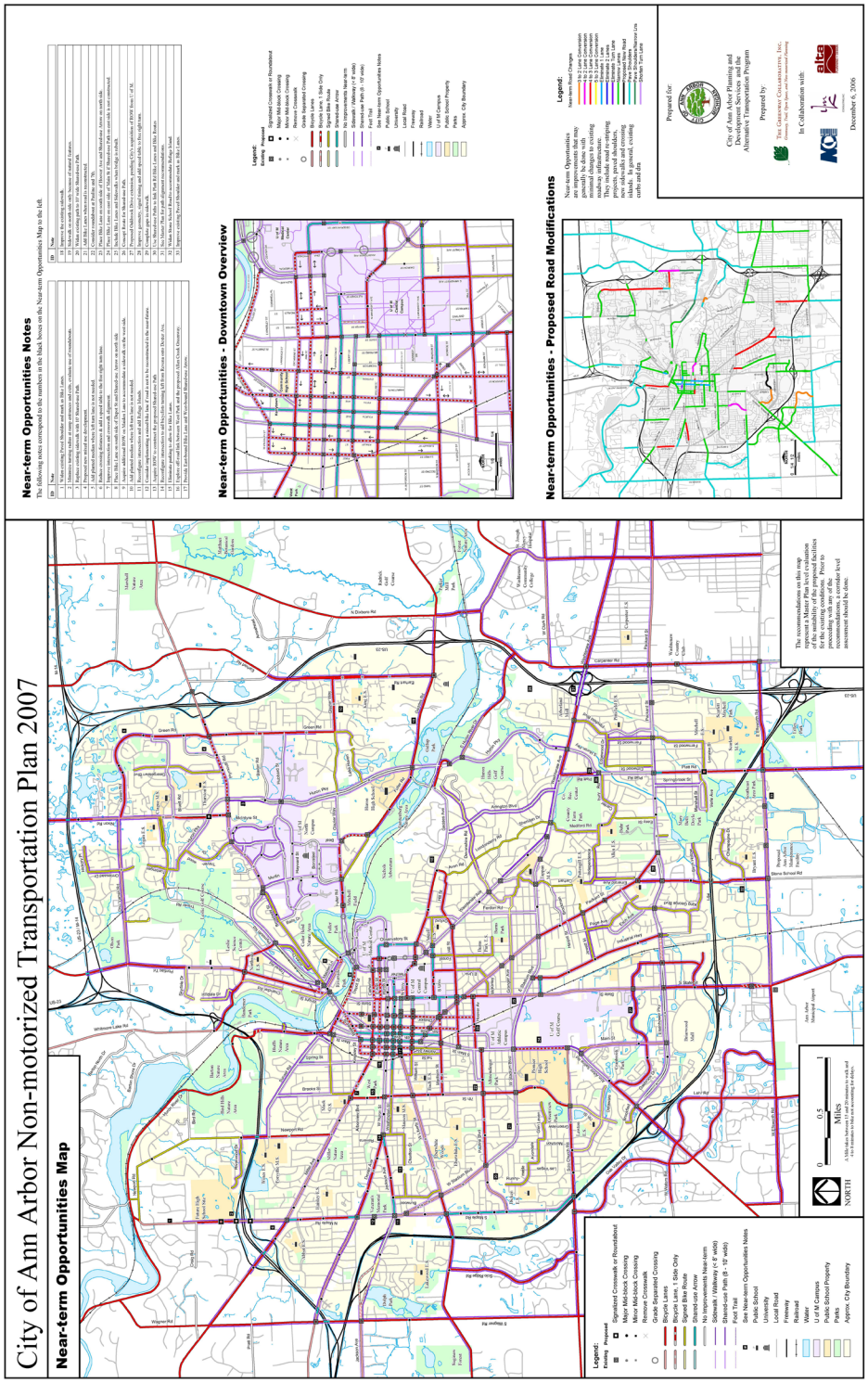


Figure 55: City of Ann Arbor Non-motorized Transportation Near Term opportunities plan 2007

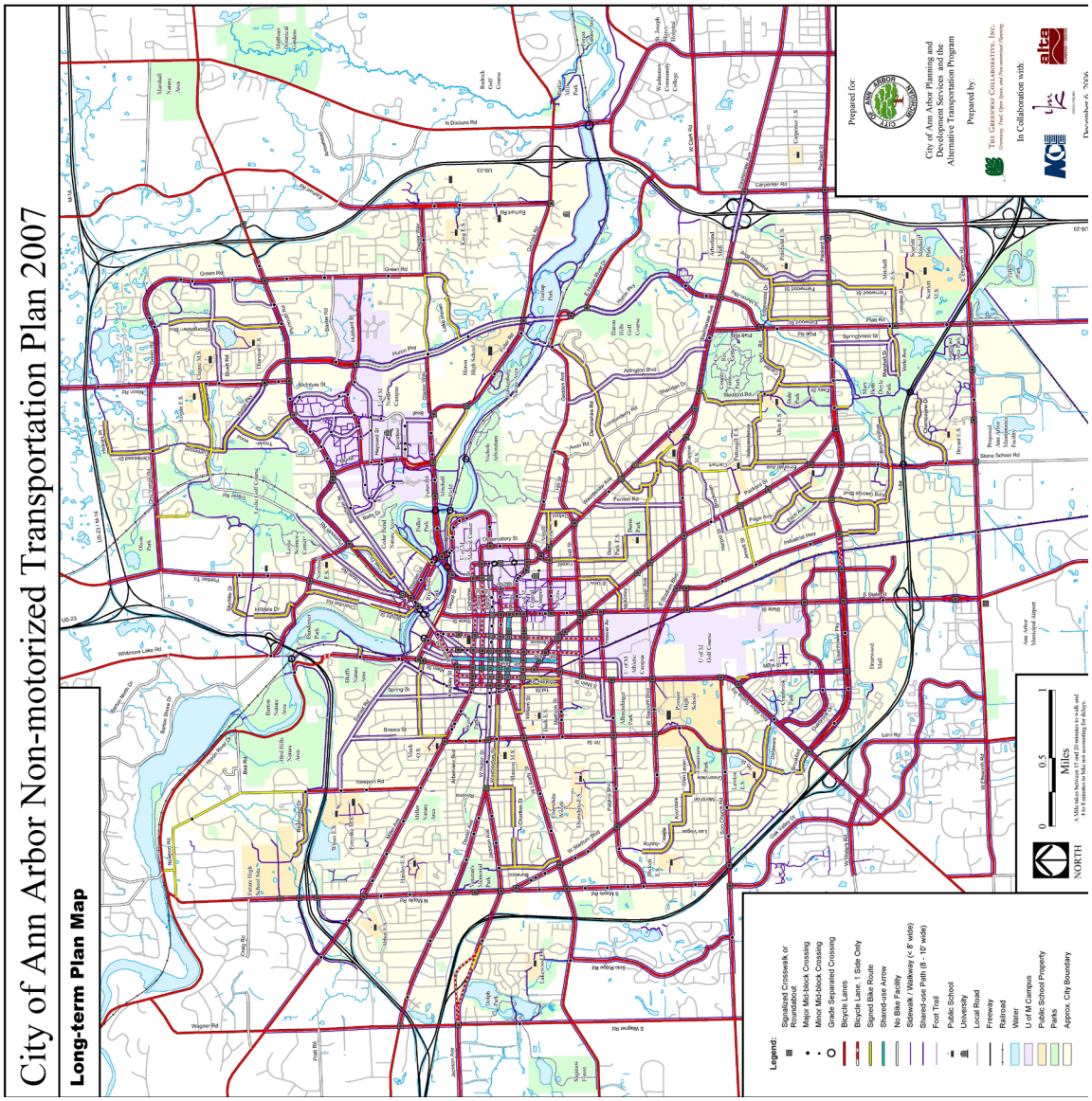


Figure 56: City of Ann Arbor Non-motorized Transportation Long term Opportunities Plan 2007

Appendix III: Design Alternatives

Throughout the design process, the practicum team received valuable feedback from the Allen Creek Greenway Conservancy regarding site programming and site designs. The practicum team created three design alternatives for each parcel based on site analysis, field observation, different site uses and features desired. This appendix represents the original designs created for each opportunity parcel, First and William, 415 W. Washington, and 721 N. Main. The final designs presented in the body of the report were chosen based on feedback from the Conservancy and project advisors and strive to incorporate the best site features from the alternative designs into a single, unified site design. It should be emphasized that these designs are purely conceptual, meant to inspire dialogue and excitement as planning for the greenway moves into the public realm.

First St. and William St.

1st Alternative:

This alternative for the parcel at the intersection of First St. and William St. is designed to highlight phytoremediation, improve accessibility, and create an urban pocket park. As it exists now, the slope from Ashley St. down to First St. does not allow for easy access for persons with even minor physical limitations. To solve the issue of accessibility between these two streets, this design proposes a series of planter boxes and retaining walls that create a ramped series of switchbacks. The defining feature of this design is a plaza space with a series of planter boxes filled with flowering plants and trees. Additionally, there is a large area of the site that is dedicated to be an interpretive phytoremediation experience. This area is not to be used for recreation but is there to demonstrate how plants can be used to remove contamination from the soil. The western edge of the site houses a bicycle storage facility. To the north is a small plaza space for food carts or a similar low input, mobile business. This alternative also explores the potential for an elevated greenway path to traverse the complex intersections created by First St., Liberty St. and the Ann Arbor Railroad. It is important to note that the design intent is not dependent on the elevated section of greenway. The main benefit of using an elevated greenway is safety by reducing interactions between cars, pedestrians, and trains. It also allows for uninterrupted flow of traffic along the greenway for improved connectivity to 415 W. Washington.

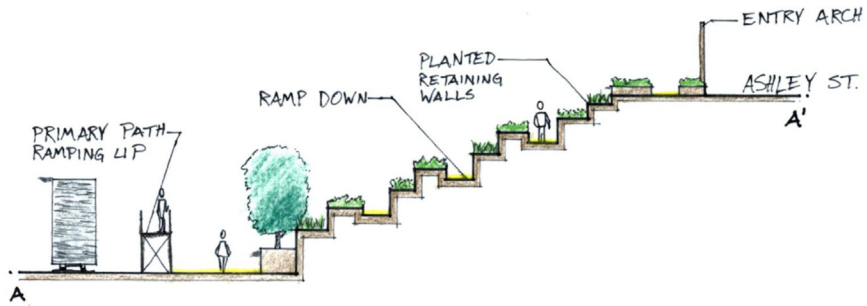
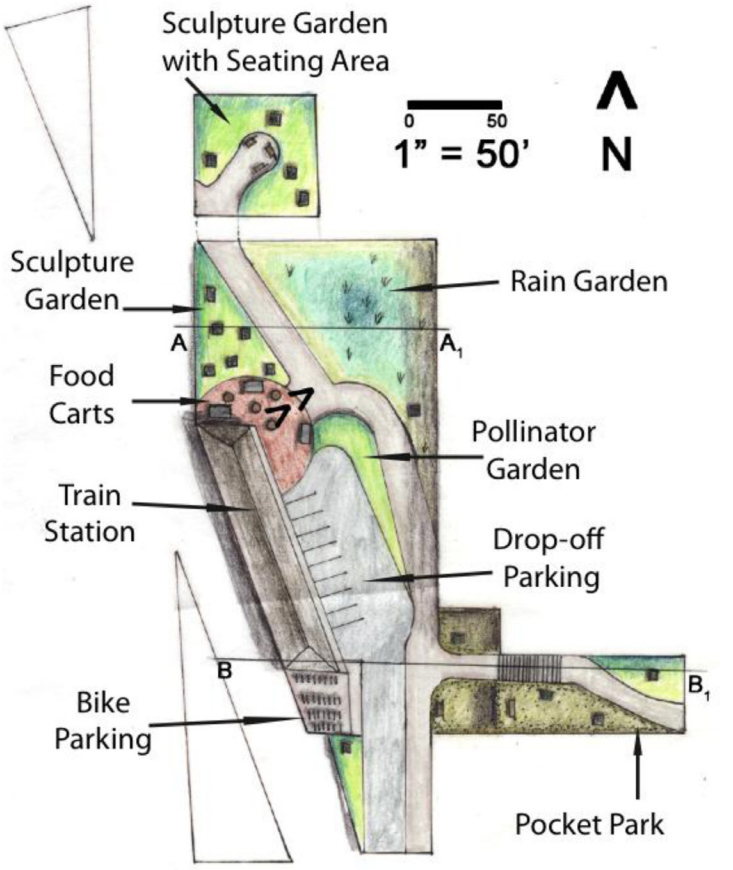


Figure 57: 1st alternative site design for First and William
Figure 58: Perspective
Figure 59: Section A

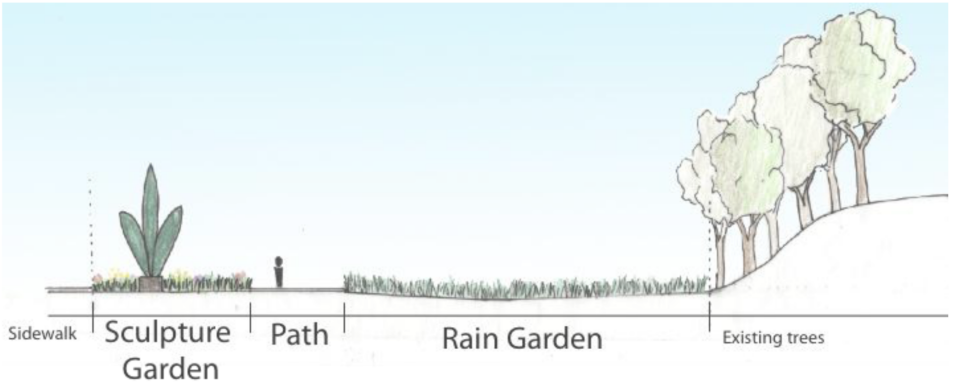
2nd Alternative:

This design looked at the potential to expand the transit options in the downtown core. The train station in this design would need to comply with floodway building restrictions, such as raised pilings and open walls to allow free flow of floodwater. Installation of the train station would require a parking lot for drop-offs and pick-ups; additionally, bike racks would provide multi-modal access to the station. A plaza located adjacent to the station would provide picnic area for trail users, downtown residents, workers, and visitors. Food carts could be located here to provide refreshment opportunities without increasing built space within the floodway. Finally, a pocket park off of Ashley St. would connect the site to the downtown more fully; the steep grade would allow an overlook into the rest of the site and an exciting place to watch trains.

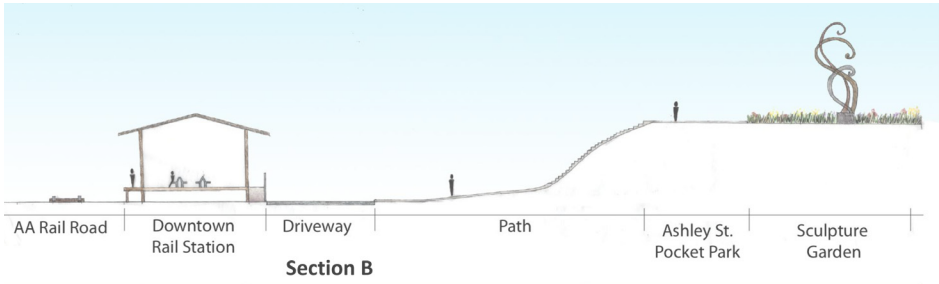
The planting on the site would be prairie plants to attract butterflies and birds. Sculptures would be placed throughout these natural areas to add structure and excitement. These art pieces would be constructed by local artists, rotating to allow a wide exposure of artists on the site as well as strong community ownership of the space. On the northwest corner of the site, the steep hill provides an opportunity for rainwater collection in a raingarden, vegetated by native wetland plants. However, there is concern about this placement as the site is currently contaminated with heavy metals and would have to be remediated in order to allow rainwater infiltration.



Perspective from food carts toward rain garden



Section A

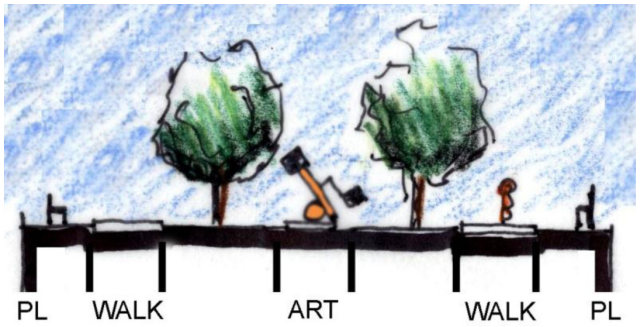


Section B

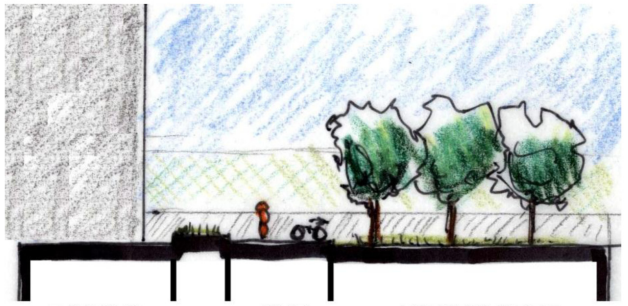
Figure 60: 2nd alternative site design for First and William
Figure 61: Perspective
Figure 62: Section A
Figure 63: Section B

3rd Alternative:

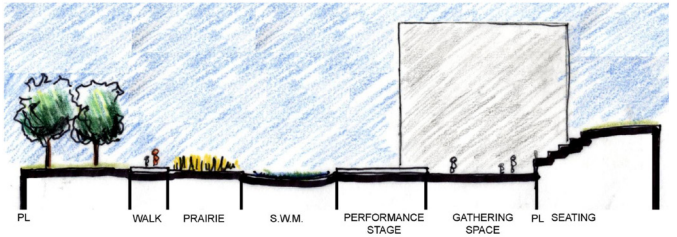
The main design element for this alternative for the First and William site is the large gathering area and performance stage. This alternative would also use the elevation change to the east of the site for seating for the performance stage. This area would be multi-purpose and could contain picnic tables and other seating for use during non-event times. A pocket park was designed that would allow access through the site to Ashley St. to the east and would require long ramps or switchbacks to be accessible. This option also included areas of prairie introduction and open green space. Native plants would be used in all planting areas. Bioswales and infiltration were not proposed because of the existing contamination on site.



SECTION A



SECTION B



SECTION C

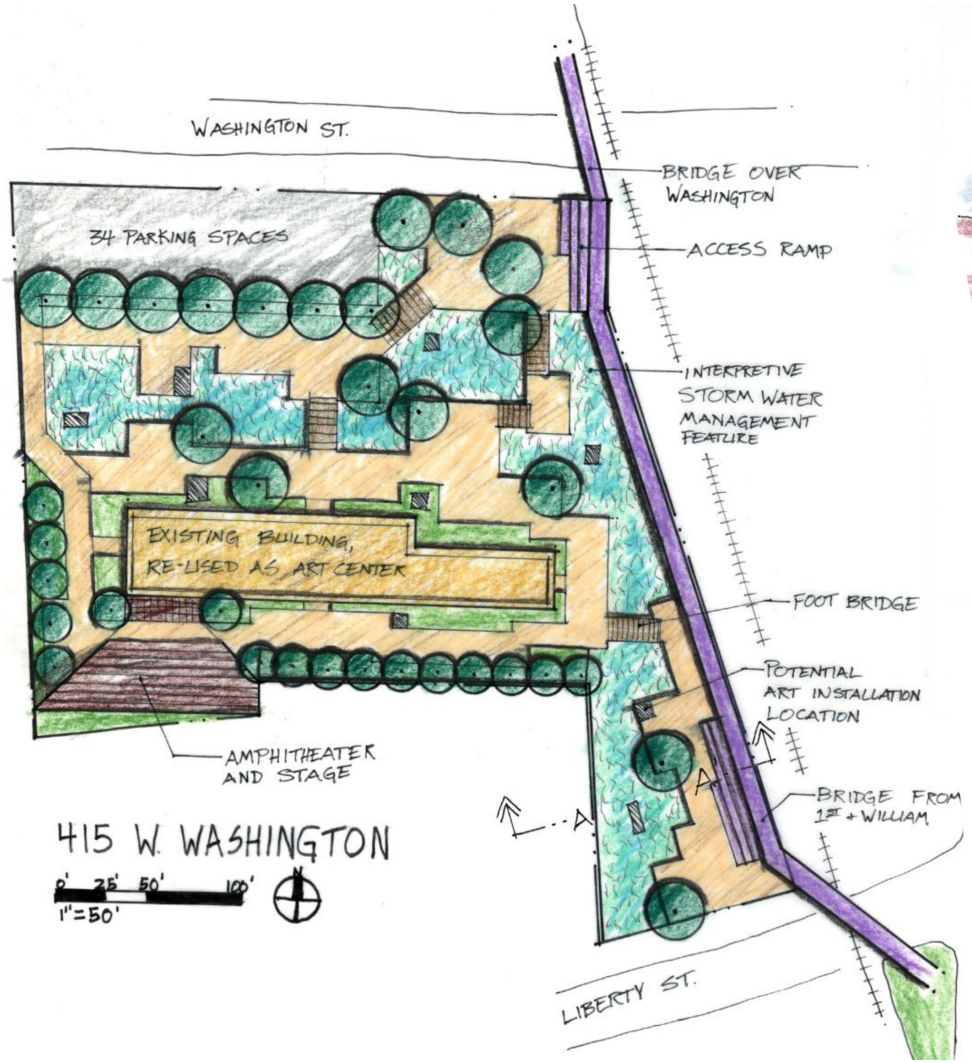
Figure 64: 3rd alternative site design for First and William
Figure 65: Section A
Figure 66: Section B
Figure 67: Section C

415 W. Washington St.

The second opportunity parcel in the downtown segment sits diagonally north across First St. from the First and William lot, presenting significant opportunities for synergy between the two spaces.

1st Alternative:

One option for developing 415 W. Washington is to convert the existing southern building and re-purpose it for an appropriate use; there have been on-going discussions with a local art group to make it an art center. To go with the theme of the art center, an amphitheater has been built into the steep slope in the southwest corner of the site and uses the building as a backdrop. This design also explores the possibilities of creating an elevated greenway path (continued from First and William Alternative #1) with access points to get down to site level. It is important to note that the design intent is not dependent on the elevated section of greenway. The elevation does improve pedestrian safety at both intersections but at the cost of limited accessibility to the site. The driving force behind this design is the creation of a stormwater management interpretive experience. Creating an extensive rain garden system that is interwoven with the plaza in combination with appropriate signage allows visitors to understand how native plants can improve water quality, control on-site flooding, and improve site aesthetics. Interspersed throughout the site are also potential locations to include permanent or rotating art displays.



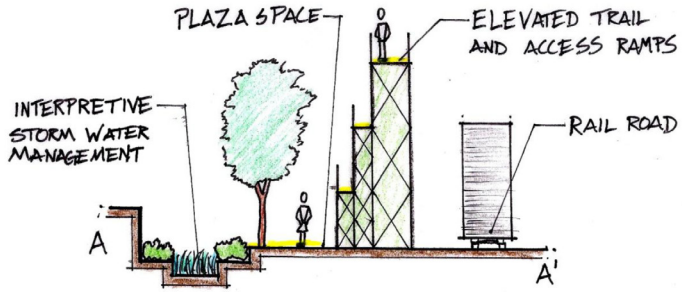
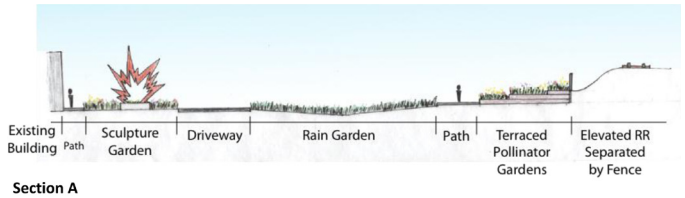


Figure 68: 1st alternative site design for 415 W. Washington
Figure 69: Perspective
Figure 70: Section A

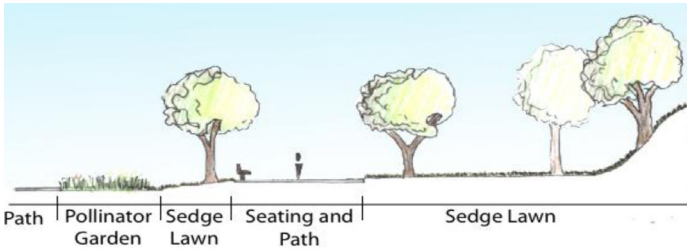
2nd Alternative:

This design alternative preserves the northwest building on the site, proposing its conversion to a community space, potentially as the Ann Arbor Art Center. Parking would need to be allocated for this use, kept close to the building to avoid disrupting the rest of the site. Continuing on the sculpture garden motif presented in the First and William design alternative #2, this design locates a number of outdoor art exhibits throughout the site.

Because of the lack of significant green space in the downtown core, this space chooses to emphasis a park-like atmosphere on much of the site, including a lawn planted with native, low maintenance grasses and large native canopy trees such as oaks and maples. A large raingarden stretches along western edge of the greenway path. Because the soils on this site are relatively clean, this is a more appropriate use of rainwater infiltration, but specific soil samples would need to be taken to ensure its appropriate placement. Terraced gardens would incorporate blooming plants along the railroad berm which begins at the southern edge of the site, beautifying a potentially overwhelming site feature. Finally, the large hill which constrains the southwest corner of the site provides a remarkable occasion for the construction of an outdoor amphitheater which utilizes the grade change. This would create another community-focused space on the site, working in synergy with the art center but not dependent on it. An amphitheater would offer opportunities for outdoor movies, performances, and events which can bring life and energy to the space and potentially generate some revenue for the city.



Section A



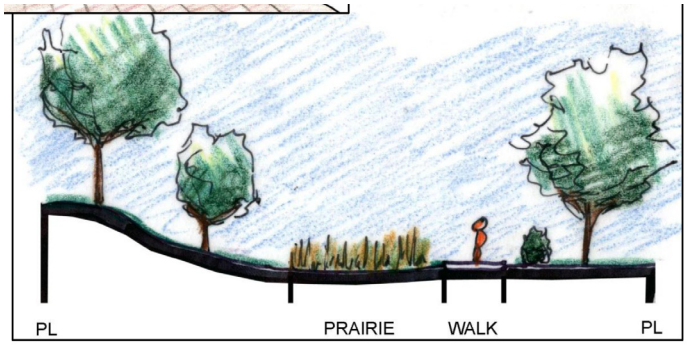
Section B

Perspective of amphitheater and beyond

Figure 71: 2nd alternative site design for 415 W. Washington
Figure 72: Section A
Figure 73: Section B
Figure 74: Perspective

3rd Alternative:

This option for 415 W. Washington left all of the existing buildings. This was based on the idea that the buildings would be repurposed and restored aesthetically. The new use of the buildings would require a parking area which was proposed along W. Washington St., allowing for a patio and art display area in the courtyard between the buildings. The greenway path would enter the site from the south and meander in and out of introduced prairie and stormwater management areas. This flowing path would carry over the character from the 3rd alternative for the First and William site. The area to the southwest behind the existing buildings has been heavily planted and designed with a retaining wall to stabilize the steep slope and provide more space. This area could act as more of a private gathering space for offices in the buildings on site.



SECTION A

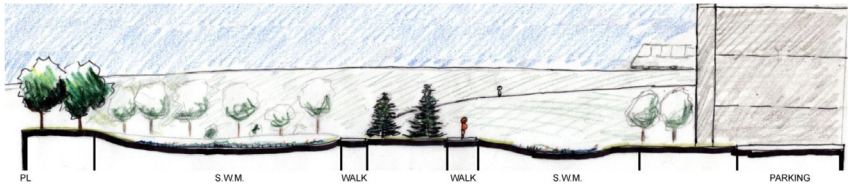
Figure 75: 3rd alternative site design for 415 W. Washington
Figure 76: Perspective
Figure 77: Section A

721 N. Main

1st Alternative:

The main feature of this alternative is the mixed-use building on site, able to be located here because this is the only site of the three opportunity parcels that is not entirely in the floodway, providing opportunity for some revenue generation for the city. This option also includes surface parking and an attached parking structure to serve the mixed-use building. An extensive system of stormwater management has been proposed between the parking lot and the more open area to the east. There are formal plantings interspersed with prarie to give the southeastern part of the site a true park feeling. It was also important to create a strong pedestrian connection between the mixed use area and the neighboring Ann Arbor Community Center. The path in this option diverges to the south as one section climbs the berm to get up to grade on the RR and connect with the future greenway path. It also traverses along the eastern edge and connects to N. Main St., where street routes could be used to connect to the Border-to-Border trail.

Figure 78: 1st alternative site design for 721 N. Main
Figure 79: Perspective
Figure 80: Section A



SECTION B

2nd Alternative:

This site contains enough land outside of the floodway to allow for a building to be sited. This design includes a small commuter rail station with supporting businesses because it provides the closest connection to the current Amtrak station on Depot St. (within a five minute walk). One of the interesting on-site features to be included into the building is a small section of elevated railroad track, which could potentially become a balcony or overlook. The majority of the site would be a short-grass prairie to provide habitat for pollinators, birds, and small mammals. For seasonal interest and a quiet space to enjoy a nice day, a small garden filled with ornamental natives has been included in the south central portion of the prairie. Stormwater is managed on site through native re-vegetation and a wet meadow area. To promote a sense of community, small urban agriculture plots have been included adjacent to the Ann Arbor Community Center.

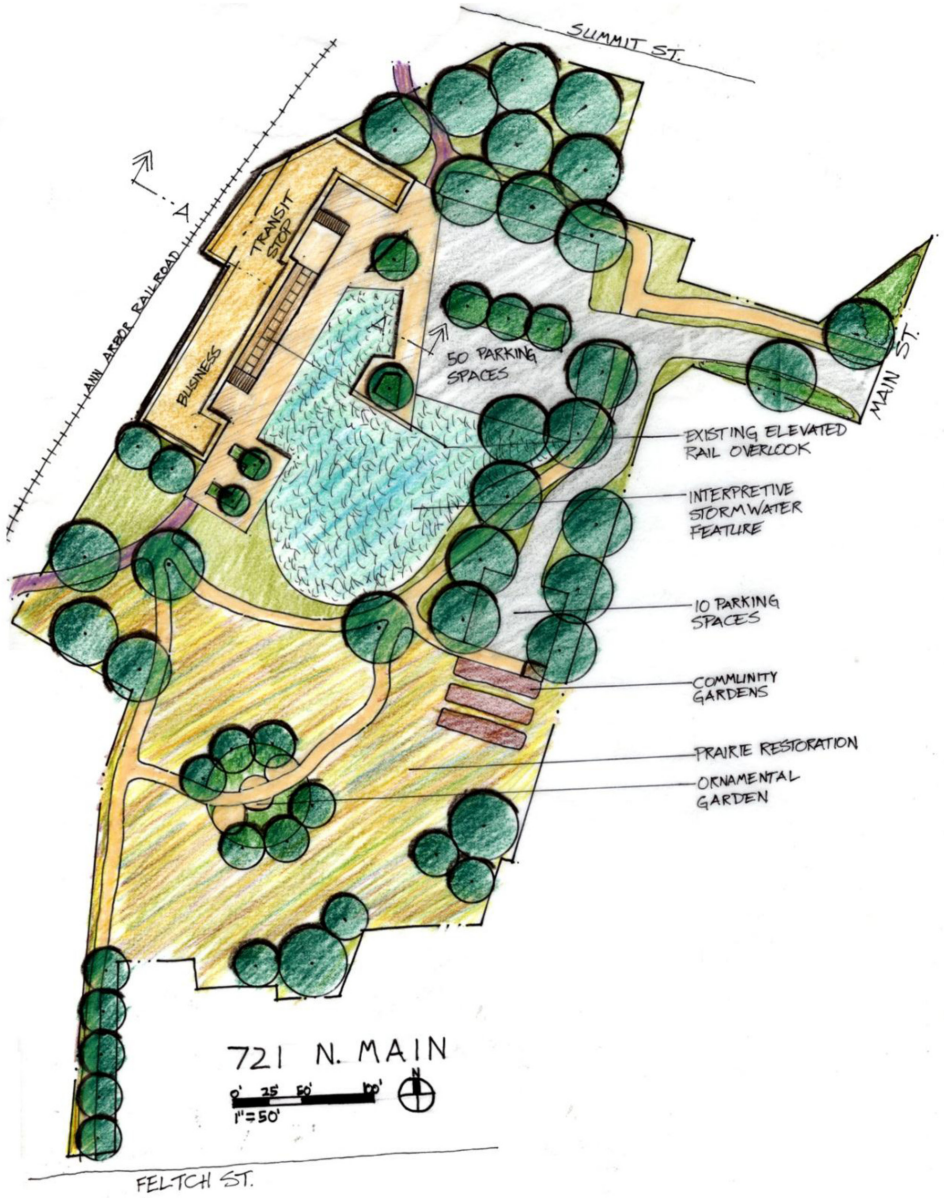
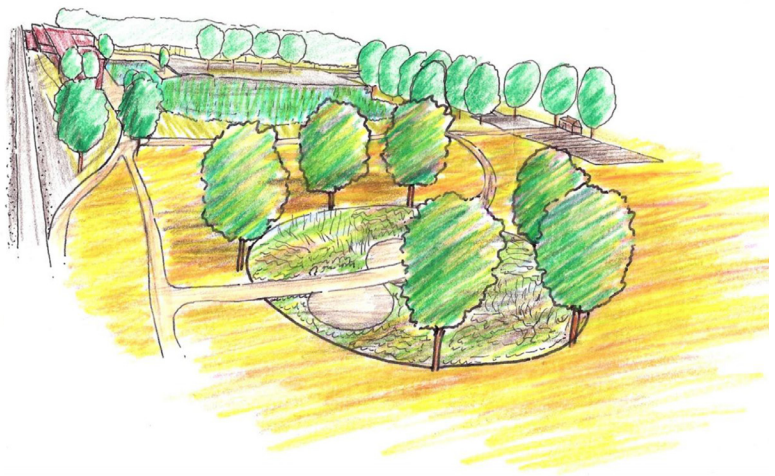
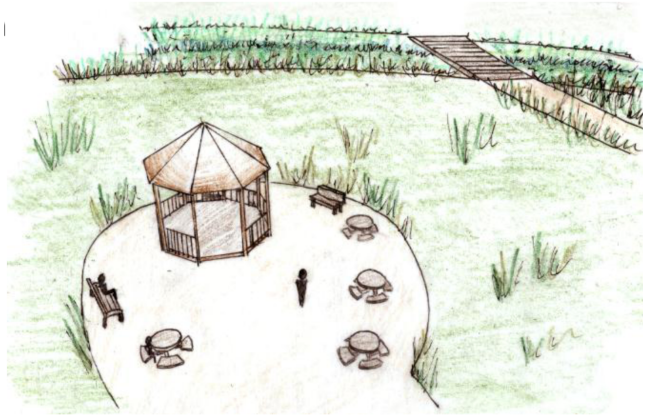


Figure 81: 2nd alternative site design for 721 N. Main
Figure 82: Perspective



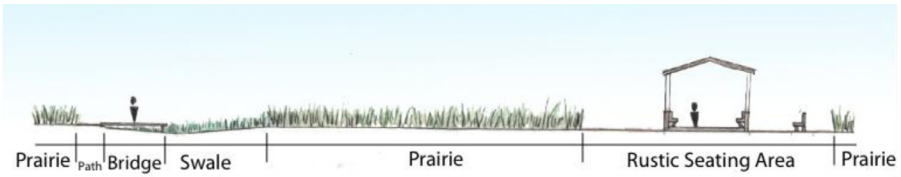
3rd Alternative:

This design focuses on native habitat restoration and passive recreation opportunities. A large patch of prairie would offer pollinator and bird habitat as well as opportunities for contemplation and personal restoration. A large bioswale would collect stormwater on the site and provide education opportunities. In the northwestern portion of the site would be shorter native grasses and trees which would allow for more human-centered recreation space such as basketball courts or other ideas. A small parking area would allow access for trail visitors to the larger greenway as well as the site. Finally, a community garden adjacent to the Ann Arbor Community Center would provide a wonderful community-building space as well as a chance to engage community members and children in hands-on learning about where their food comes from.

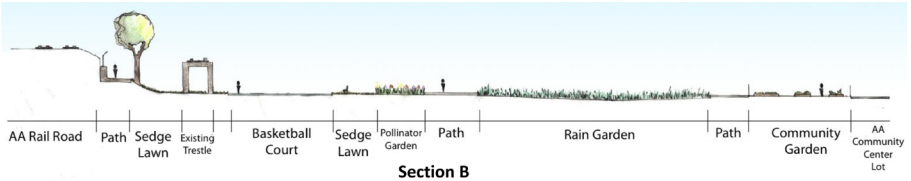


Bird's eye view of the rustic seating area

Figure 83: 3rd alternative site design for 721 N. Main
Figure 84: Perspective
Figure 85: Section A
Figure 86: Section B



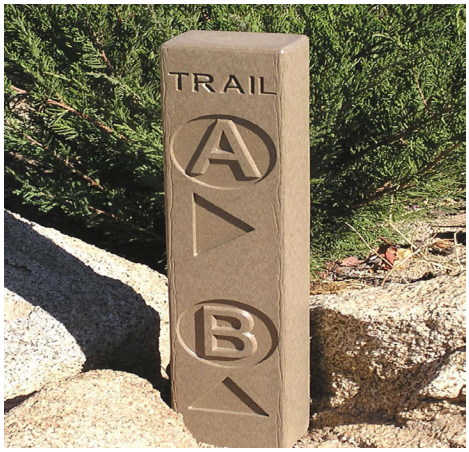
Section A



Section B

Appendix IV: Site Amenity Precedents

Figures 87-95: Examples of site feature which could be used along the entire length of the greenway to set a unified character as it moves through the different districts in central Ann Arbor.



Appendix V: Existing condition site photographs

Figure 96: Ann Arbor Railroad tracks near U of M athletic campus, facing south. Note the additional track to the right; this would be the site of Turntable Park.

Figure 97: Parking lot at the corner of First St. and William St., facing south.

Figure 98: Unused building and parking on 415 W. Washington lot, facing west.

Figure 99: Ann Arbor railroad tracks downtown, facing north. Note the narrow right-of-way compared to southern track section.

Figure 100: Abandoned buildings on 721 N. Main lot, facing west.

Appendix VI: About the Authors

Ariel Shaw

Originally from southern Indiana, Ariel grew up with a love of wild places which she has carried into her current work as a landscape architect. She received her Bachelor of Arts in English and anthropology from Kenyon College; these majors allowed her to refine her writing and analytical skills as well as explore a broad swath of human nature.

After graduating, she worked with the Michigan Environmental Council (MEC) as their land use and energy associate. Here she gained experience collaborating with stakeholders on smart growth and stormwater management projects; she also educated policymakers on the benefits of renewable energy and energy efficiency in preparation for the passage of state energy legislation. Following her time at MEC, she apprenticed for a season on a small organic vegetable farm in southeast Michigan.

While pursuing her masters of landscape architecture program with University of Michigan, she spent her summers with community garden nonprofits in Boston and San Francisco, engaging in horticulture and garden design. This strengthened her commitment to both food justice and urban green space initiatives. She hopes to continue in this field following graduation when she moves to San Francisco.

Jordan Sebastian

Jordan is originally from the foothills of the Appalachian Mountains in southeastern Kentucky. Having spent the better portion of his life on a farm, he acquired a unique perspective on how people interact with their surrounding landscapes. This interest in environmental interaction and design pushed him into the field of landscape architecture and he received a Bachelor of Science in this field from the University of Kentucky.

Jordan has taken part in several different summer internships including design and planning work for the UM Matthaei Botanical Gardens and Arboretum as well as working at the University of Kentucky's State Botanical Garden and Arboretum. He has also been a landscape architect intern for SmithgroupJJR in Ann Arbor, MI.

His participation in planning a regional trail system for the Bluegrass Region of Kentucky (Beyond the Legacy project) was an invaluable opportunity. From conducting public meetings and creating presentations, to dealing with stakeholder and public officials concerns, the experience created even more of a desire for creating safe, usable spaces for people. Jordan hopes to continue his desire for creating pleasing public spaces after graduation.

Peter Sanderson

Peter first discovered a passion for plants as a teenager in Ann Arbor, MI, when he began working in a local nursery. Later, he began working in residential landscape construction for a local landscape architect. Coupling his construction experience with his plant knowledge and creative personality, he found a career path in landscape architecture. Peter attended Michigan State University (MSU) where he received a Bachelor of Landscape Architecture in 2008. Following graduation from MSU, Peter was a design intern at Pollack Design Associates (PDA). There he was able to learn from Peter Pollack, FASLA, who introduced him firsthand to the concepts of ecological design and inspired him to attend the University of Michigan for a Master of Landscape Architecture degree with a focus on ecological design.

At the University of Michigan, his main areas of concentration have been ecological design of the urban environment with an emphasis on using LID (Low Impact Development) to feature stormwater as a site amenity. Additional areas of interest include: walkable design, non-motorized transportation and wayfinding, and the human perception of the built environment. Peter also twice enjoyed the privilege of helping to teach the ecological planting design studio as a Graduate Student Instructor. Additionally, he completed independent research using GIS that analyzed implementation strategies for LID on southeast side of Detroit. Currently, he is working as a planning intern with Washtenaw County Parks and Recreation where he has learned a great deal about regional non-motorized transportation networks and planning through experience with the County's Border to Border (B2B) trail. After graduation, Peter plans to continue his pursuits in landscape architecture and ecological design of urban spaces.

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http://www.a2gov.org/gis/Pages/default.aspx

MI Geographic Data Library
http://www.mcgi.state.mi.us/mgdl/

Washtenaw Area Transportation Study
http://trafficcounts.miwats.org/

Washtenaw County GIS
http://www.ewashtenaw.org/government/departments/gis