Waller Creek Greenway Action Plan

Austin, Texas

Action Plan Report

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Prepared for: The Waller Creek Greenway Partnership

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Bicycle & Pedestrian Planning
Environmental Design
Landscape Architecture
Introduction

Waller Creek is an urban stream located in the heart of Austin, Texas. This community resource has been the object of numerous studies, development proposals and restoration efforts. For more than 50 years the community has searched for solutions that would lessen urban flooding, improve water quality, offer opportunities for recreation and alternative transportation, and enhance economic potential.

Today the landscape character of Waller Creek is a series of disjointed urban spaces. The hike and bike trail, the central feature of the corridor, is incomplete, and elements of this trail system are textbook examples of a design philosophy that was dominant in the 1970’s. During the 70’s, landscape architects and urban designers were primarily concerned with architectural geometry and urban form. Understanding how human behavior and perception affected the use of outdoor landscapes was an emerging element of the profession. Waller Creek exemplifies mistakes that were made and which have been perpetuated during the past 25 years of land use development within and adjacent to the creek.

The focus on geometry and urban form has produced a landscape that is difficult to manage and maintain, and which is regarded by many Austin residents as unsafe and undesirable for daily use. The hike and bike trail is more often used by the transient population than the taxpayers of the community. Waller Creek is an unfulfilled urban resource that requires a new design development philosophy in order to become a successful destination landscape within central Austin.
The Waller Creek Greenway Action Plan is a project of the Downtown Austin Alliance and the Waller Creek Greenway Partnership. The purpose of this Action Plan is to provide recommendations for future improvements to Waller Creek and surrounding properties. The key recommendations of this Plan take two forms: 1) design development recommendations for completing the existing hike and bike trail system, making stream channel improvements and enhancing the surrounding streetscapes; and 2) operations and management strategies for maintaining the urban greenway in a manner that makes it an amenity to the community.

The project scope includes an area of land bound on the north by Waterloo Park, to the east by Interstate 35, to the south by Town Lake Park and to the west by Trinity Street.

The central goal of this Action Plan is to serve as a guide for future development activities within the Waller Creek corridor. It is hoped that this document will serve both public and private interests for future development activities within the Waller Creek corridor.

**Planning Process**

The Downtown Austin Alliance commissioned Greenways Incorporated, a nationally recognized greenway planning and design firm from North Carolina, to complete this Action Plan. Greenways Inc. and the DAA worked with the Waller Creek Greenway Partnership, through a series of meetings, to define the scope of the project and determine the recommendations that are included within this Plan.
Key Recommendations

It is anticipated that changes to the character and landscape of Waller Creek will take time. This Action Plan does not propose the expenditure of large amounts of public capital to immediately transform the creek landscape. Rather, it is expected that changes will happen as public and private land uses adjacent to the creek are transformed.

It is also important to note that recommendations contained within this Plan are not intended to adversely impact the economic values of properties adjacent to Waller Creek. It is expected that the City of Austin will work in partnership with private landowners to encourage compatible and economically viable land use development throughout the Waller Creek corridor. In some cases, setback provisions outlined in this Plan may not be fully achievable due to the impact on private property. Flexibility is required in the application of the guidelines defined herein.

The Waller Creek Tunnel Project

Perhaps the most important recommendation within this Plan is for the successful completion of the Waller Creek Tunnel project. With the completion of the tunnel, many of the other recommendations in this Action Plan are possible. The tunnel project will ensure that a more predictable flow of stormwater is possible, and that the riparian environment will be enhanced. It will also make it possible for a diverse set of landscapes to be developed adjacent to the creek that can serve to enhance the function and usability of the Waller Creek Hike and Bike Trail system.

Figure C: The riparian landscape along Waller Creek will benefit from the installation of the Waller Creek Tunnel project. Flooding will be reduced, water quality will improve and plant and animal habitat will flourish.
Restoration of Stream Buffer

As an urban stream system, Waller Creek has been significantly altered from its natural condition. The human influenced landscape of today can be improved through the careful restoration of a stream buffer that will vary in width from 25 to 35 feet depending on location.

Development Setbacks

This Plan recommends the institution of building and development setbacks along Waller Creek to provide for continuity and balance in future land use development. The setbacks vary from 60 feet from center of stream bank in the lower portion of the creek to 40 feet from center of stream bank in the middle portion of the creek. Setbacks will help to frame the urban context of the creek landscape and offer enhanced development that can improve safety and security throughout the corridor.

Hike and Bike Trail Improvements

The City of Austin has recently spent more than a million dollars to build new sections of the Waller Creek Hike and Bike Trail and repair sections that were damaged by storms and neglect.

The completion of the hike and bike trail system is one of the most important recommendations in this Action Plan. To accomplish this, the City of Austin should partner with private sector interests to implement a three-tier trail system along the creek: a creek-side trail, a street level trail and a system of on-road bike trails and sidewalks. This system of trails will improve access to the resources of the Waller Creek corridor.
This trail system emphasizes a clearer purpose and function for trails which should result in ease of management and maintenance, and improved safety throughout the corridor.

**Streetscape Development**

The streetscapes that surround the Waller Creek corridor should be significantly enhanced in order to transform the corridor into a destination landscape. This Plan offers several options for future streetscape development that promote outdoor dining and a new aesthetic for streets within the Waller Creek corridor. It is anticipated that the recommendations in this Plan would be complementary to the Austin Downtown Development Guidelines and other future streetscape design recommendations for the project area.

**Waller Creek Greenway Signage Program**

A comprehensive signage program for the Waller Creek corridor would offer the simplest and most cost effective enhancement. Wayfinding throughout the corridor is currently difficult, especially for users of the hike and bike trail system. A coordinated set of signs would serve to offer direction and vital information for visitors and residents alike.

**Waller Creek Site Furnishings and Furniture**

In addition to a comprehensive signage program, this Action Plan recommends the use and installation of furniture and furnishings that would serve to create a unique aesthetic and character for the Waller Creek corridor. These would include bench seating, lighting, trash receptacles, drinking fountains and bollards.

*Figure E: Streetscapes in the Waller Creek corridor could be redeveloped to support outdoor dining and improved linkage to the Waller Creek Hike and Bike Trail.*

*Figure F: A comprehensive signage program will vastly improve wayfinding and navigation through the Waller Creek corridor.*
Implementation Strategy

Improved Maintenance and Management

Future maintenance and management of the Waller Creek corridor should be performed through a partnership between the City of Austin, adjacent landowners and the Downtown Austin Alliance. It may take time for all of the complementary roles to be agreed upon by all parties; however it is clear that the City of Austin alone cannot meet all of the maintenance and management needs for this community resource.

The City should examine the possibility of establishing a Waller Creek Greenway committee to advise the city on maintenance and management needs. This committee could also help to coordinate management activities between public and private sectors.

Funding Future Improvements and Maintenance

This Plan recommends the use of a Tax Increment Reinvestment Zone (TIRZ) to fund future improvements and maintenance of Waller Creek. A TIRZ can be combined with an existing Public Improvement District to fund capital improvements within the corridor. Additionally, the TIRZ could be governed by a local government corporation (LGC) which would satisfy the need for a Waller Creek Greenway committee. In addition, funds collected from the TIRZ would be based on the incremental increase in taxable property that would exist within a defined boundary surrounding Waller Creek. It may be desirable to use the boundary that was established for this Action Plan. Finally, additional funds could be leveraged from federal, state and other local sources to provide for a consistent funding stream for Waller Creek.
Waller Creek. The advantage of a TIRZ is that a constant level of funding could be generated in order to institute a more intensive maintenance, safety and security and management program.

Next Steps

This report provides a number of recommendations which will require further action on the part of the City of Austin, Waller Creek property owners and downtown businesses. The first action would be acceptance of the report by the City of Austin as a working document that can be used to guide future decisions associated with Waller Creek. As a working document, this report should be made available to all city departments and divisions that have a responsibility for development and management within Waller Creek. Second, the issue of funding and management should be addressed and resolved in a manner that is beneficial to the City and to the Waller Creek property owners. The recommendations provided herein deserve further attention and action. Third, physical improvements will continue to occur throughout the Waller Creek corridor. City agencies and private developers should use the design guidelines provided in this document to guide future construction activities. Finally, Waller Creek would greatly benefit from year round programming of events to showcase its potential as a destination landscape.

Please note: For a full copy of the Final Waller Creek Greenway Action Plan report, please contact the Downtown Austin Alliance.

Figure H: Near symphony square and the Marriott hotel, a mature Pecan tree arches over one of the more natural sections of Waller Creek.
Overview

The Waller Creek Greenway Action Plan is a project of the Downtown Austin Alliance and the Waller Creek Greenway Partnership. The purpose of this action plan is to provide recommendations for future capital improvements to Waller Creek and surrounding properties. These recommendations take two forms: 1) design development recommendations for the existing hike and bike trail, stream channel and other constructed elements within Waller Creek, and for streets and properties immediately adjacent to the Creek; and 2) operations and management strategies for maintaining the urban greenway in a manner that makes it an amenity to the community and adjacent properties. The scope of the study area is an area of land bound on the north by Waterloo Park, to the east by Interstate 35, to the south by Town Lake Park and to the west by Trinity Street.

The Waller Creek Greenway Partnership was established by the Downtown Austin Alliance to formulate this plan of action and carry out the recommendations defined herein. Greenways Incorporated (GW1), a nationally recognized greenway planning and design firm from North Carolina, has been retained by the DAA to work with the partnership in the preparation of this plan. Assistance was provided to Greenways Incorporated by the Texas field office of the Trust for Public Land. The Waller Creek Greenway Partnership and the City of Austin jointly provided funding for the preparation of this action plan.

Figure 1: A map of downtown Austin, TX illustrating the project study boundary for the Waller Creek Action Plan.
Historical Perspective

Ancient Native American campsites have been excavated along the Colorado River within what is now the City of Austin, Texas. Historical evidence indicates the area was very popular with the nomadic tribes. Beginning in 1683, the Spanish conducted a series of missionary expeditions into the region. Three Spanish missions moved from East Texas to the bluff overlooking Barton Springs and Zilker Park in 1730. In the 1800’s Josiah Pugh Wilbarger and Reuben Hornsby were leaders of early Anglo-American settlements located on the Colorado River in Eastern Travis County.

Early Development

Early Austin settlement was chiefly to the west, not south. The first documented settlement of Austin was by Jacob Harrell and his family in 1835. They set up camp on the North bank of the Colorado River near the present site of the Congress Avenue Bridge. In 1838 after the battle of the Alamo and San Jacinto, three other families joined the Harrell family. They named their settlement “Waterloo” in honor of the British victory over Napoleon twenty years earlier. In 1839, Waterloo became the state Capital and was renamed Austin, in honor of Stephen F. Austin, a leader of the early settlement effort in the territory of Texas. However, some Texans felt the location was too distant from the coast and too close to Mexico.

Austin’s Birth

In May of 1839, Edwin Waller was given the responsibility of laying out the town site for the new Capital. President Mirabeau Lamar chose Waller to supervise the surveying and sale of town lots, and the construction of public buildings at the new capital. Because Austin was located on the fringe of the Texas frontier, Waller was protected by a group of armed citizens as he began in earnest to carry out his new duties. As surveying teams were laying out the city, two men were scalped in an Indian raid, and they were buried on the East Side of Waller Creek between 9th and 10th streets. This became Austin’s first cemetery.

With the aid of surveyor William Sandusky and a crew of two hundred men, Waller spent the period between April and July, 1839, surveying and dividing the area of land bounded by the Colorado River on the south, Austin’s current 15th street on the north, Waller Creek on the east and Shoal creek on the west. Waller’s 1839 street plan called for north-
south streets named for the major Texas rivers and the east-west streets named for the indigenous Texas trees. The northern-most street (now 15th street) was named North Avenue, the eastern-most street (now I-35) was named East Avenue, and the western-most street was named West Avenue. In 1887, the city renamed the east-west tree streets to numbered streets (1st through 15th streets). Waller’s well-conceived street plan for old Austin (1st through 15th Streets running east-west and the “river” streets running north-south) has survived largely intact to this day. Louis Horst, one of Austin’s earliest settlers. Although there was a gristmill located on the lower Waller Creek in the 1840’s, the lower area had begun to be semi-industrialized after the coming of Austin’s first railroad in 1871. In the 1860’s, water flowing in Waller was used to power machinery to manufacture Confederate cannons made from Mexican Brass, and barbed wire supposedly was first made along the creek. General George Custer, his family and staff used the Blind Asylum near the creek for temporary residence. The city’s first arched stone bridge crossed Waller in 1866 at Pecan Street (now east 6th street); some reports say the railroad entered Austin in 1871 over a new iron bridge at Pine (now east 5th street); and a bridge was built over Waller at East 12th in 1882 and used to haul pink granite to construct the new capital.

By 1874 Horst’s pasture was subdivided and sold, initiating a settlement period along Waller Creek that continued when the University of Texas opened in 1883. The university occupied both banks of the main branch of Waller Creek from 26th Street to 19th street.

News accounts through the years have recorded how suddenly Waller could turn ferocious. In 1873 a youngster described as an “Irish lad” made a quick stop at a privy on the bank of Waller, but while he was inside, the paper said, the creek rose so suddenly that he drowned. In 1915, in the second largest flood in nearly a century on the Colorado, 32 people drowned in Waller and Shoal Creeks, with spectators watching “corpses swirling” down those rampaging tributaries.

Figure 3: Historical photo of downtown Austin in 1883.
In 1938 a young Lyndon Baines Johnson walked along Waller Creek and decried the numerous “shanties” as “hot beds of crime...profits of the moment but community losses in the end.” Thirty-one years later, 27 people were arrested in a futile effort to save immense live oaks and cypress from being cut down along the banks of Waller Creek so Memorial Stadium could be enlarged. One of those arrested referred to it as the “people’s crick”.

The Bicentennial Project

In the Bicentennial year, 1976, Lady Bird Johnson led a tour of Waller Creek to dramatize the decision to spend millions of dollars to restore the creek, possibly to how it looked when President Lamar saw it – a “beautiful” stream of “permanent and pure water.”

The Waller Creek Bicentennial Project project required the hiring of consultants to prepare a plan, and in the summer of 1975, several firms were selected. The resulting plan involved considerations of traffic flow, economic stimulations, zoning patterns, flooding problems, biking trails and fair weather hiking trails, existing trees and green areas, residential possibilities and historic considerations, among other concerns. A citizen’s committee proposed by the Bicentennial interests and selected by Austin Parks and Recreation Department (PARD), worked with the consultants in the early stages of the plan. More money was requested in the December 1975 bond election, not only adding $1.5 million to Waller Creek’s development over the next several years, but also including nearly $8 million for creek-related parkland acquisition and development.

Concurrent with the planning of the lower ten blocks of Waller was the development of Symphony Square and Waterloo Park on the adjacent five blocks, an area which had been in the planning stages for several years. Symphony Square embodied all three concepts of the Bicentennial Trail project: restoration of four historic buildings on the creek; accessible by trail north toward the university and south toward downtown; and the development of cultural opportunities near the central city that were previously unavailable in that area.
Waller Creek and Austin Today

As the 20th century came to an end, Austin’s population was approximately 500,000, with the total metropolitan area consisting of 700,000 to 900,000 people. Austin is the 23rd largest city in the United States and has shown the second fastest growth rate (behind Las Vegas) for medium and large cities.

Austin’s city limits reach about ten miles east to west and about twenty miles north to south. Today principal Austin employers are high technology, light manufacturing, state government, and higher education.

Austin has a highly educated population, with about one-third of the adult residents having completed at least a bachelors degree. This is, according to the 1990 census, the highest level for any U.S city with at least 250,000 residents.

Rapid and often unplanned development, both institutional and domestic, has taken its toll on Waller Creek. One of the social consequences at the university was the Waller Creek riot of October 22, 1969, protesting destruction of trees and mutilation of the creek bed along San Jaccinto Boulevard south of 21st street, resulting from plans for the enlargement of Memorial Stadium. Dense urban development on the watershed of this small but easily flooded stream has necessitated careful monitoring of its flow by two gauging stations and continued study by hydrologists, making it a prototype of the small urban stream in the United States. Waterloo Park, Symphony Square, and Centennial Park have been completed as scenic-recreational areas along the creek, but already are in need of repair.

Waller Creek Watershed

Land development, urban infill and the urbanization of the lower Waller Creek Watershed began quickly after the community was established in the 1840’s. Upper watershed development began to flourish in the 1950’s with the suburban expansion typical of most American communities. Today, infill development continues and little greenspace is left throughout the watershed. This has had a dramatic impact on the Waller Creek stream channel, transforming the low flow channel into a raging torrent of polluted runoff during rainstorm events.

Watershed Erosion Assessment

In 1997, the City of Austin began an initiative that focused on the effects that high stream flows and erosion were having on creek bank failures, long term channel degradation, and associated impact to creek side residents and water quality. In the Waller Creek Watershed Erosion Assessment Report, stream inventory analysis concluded that there were no erosion threats to primary structure and/or

Figure 6: Nighttime view of downtown Austin skyline across Town Lake.
roadway. However, the report made numerous observations of erosion problems that have or will in the near future threaten existing fences, trees, retaining walls (undermined) and cause substantial loss of adjacent land. Within the watershed area the report noted that the major primary geomorphic problem ranges from creek widening and aggradation, with much of the study area stressed and in the state of adjustment as the creek tries to constantly adjust to impacts placed upon its watershed.

**Waller Creek Hike and Bike Trail**

In the spring of 1999 the Parks and Recreation Department (PARD) began a project to improve several sections of the Waller Creek Hike and Bike Trail in downtown Austin. Construction began in June 1999. The following is a summary of the individual sites that have undergone change (keyed to map in figure 8):

1. At this non-wheelchair accessible stretch of the creek in Waterloo Park the existing sidewalks were removed and walkways revised to improve access.

2. West of Symphony Square, south of Twelfth Street, the design called for installing a low-water crossing and steps leading from the parking lot to the creek.

3. At the Doyle House the ramp was made accessible, benches were replaced and a water fountain was installed.

4. Just south of Ninth Street a ramp was widened to conform to code and insure accessibility to the trail which, at this point, comes from creek level to street level.

5. Lighting was placed underneath the Seventh Street Bridge.

6. To improve security, lockable gates were installed on the existing Sixth Street tunnel so it could be locked at night.

7. Improvements will be made in Palm Park.

8. East of the Trask House additional trail, landscaping and benches follow Waller Creek at street level to Third Street.

![Figure 7: An aerial perspective illustration of the Waller Creek Watershed.](image-url)
9. A rest area has been installed south of the Convention Center.

10. A pedestrian bridge will be constructed just south of César Chávez, thereby making the trail continuous throughout.

11. A rest area has been created as well as kiosk improvements at the intersection of Town Lake and the mouth of Waller Creek.

New signage between Waterloo Park and Town Lake includes seven kiosks featuring maps of the trail, as well as signage on bridges with street identification and directions to landmarks (Symphony Square, Waterloo Park, Convention Center, etc.)

Figure 8: Illustrative map of Hike and Bike Trail Improvements completed by PARD in 1999.
Waller Tunnel Project

A 1996 study by the City of Austin developed a flood-management plan for the lower Waller Creek watershed (15th to Town Lake). A water quality master plan for the entire Waller Creek watershed was also prepared. Architectural review of the proposed improvements was conducted to ensure compatibility.

On May 2, 1998, the voters of Austin approved a bond proposition “authorizing the City of Austin to provide for the planning, acquisition, establishment, development, construction, and financing of the Convention Center/Waller Creek project and to impose a hotel occupancy tax at a maximum rate of two percent (2%) for the purpose of financing the venue project.” The proposed tunnel is expected to take approximately one year to design and two to three years to construct.

The tunnel will be 20 feet in diameter, 5,500 feet long and will intercept creek flows in Waterloo Park below 15th Street and discharge to Town Lake. The project will remove 42 commercial and residential structures and 12 roadway crossings from the 100-year floodplain.

The natural base flow (the sustained flow in a stream) of Waller Creek will be preserved and augmented by recirculation of water through the tunnel, a water quality benefit. The diversion of flood flows will allow development along the banks which is currently prohibited by floodplain ordinance.

In addition, the project will include stabilization of eroding stream banks from Fifth Street to Town Lake to protect properties and also improve water quality.

Figure 9: Illustrative aerial photo showing the route of the Waller Creek Tunnel project.
Evaluation of Natural Systems

Waller Creek is a vital ecological corridor that has experienced pollution and neglect on and off for more than 200 years. However, it is a resource worth protecting and reclaiming. It is after all the birthplace of Austin as laid out by Edwin Waller in the early 1800’s. The following describes some of the significant natural features and ecological systems present within the Greenway study area.

Waller and Shoal Creeks and the Colorado River bound the area first marked off for Austin’s city dwellers. Waller Creek, is located in central Travis County, rises at a point (30°20’N, 97°42’W) in Austin, Texas. It flows southward through attractively eroded banks of Cretaceous limestone for 6.6 miles to join the Colorado River (at 30°15’N, 97°44’W) in the dammed area known as Town Lake.

Native Landscape

Waller Creek is a shallow, spring fed, perennial waterway with headwaters located in the City of Austin, Texas. Much of the creek’s watershed is located solely within Austin’s City limits, and is currently at more than 60 percent impervious in cover.

The creek is in an area characterized by rolling terrain and expansive clay soils underlined with limestone. The physical makeup of the soils located within the corridor contribute to high runoff and flooding. Although situated in an urban area, the creek has a variety of vegetation, including oak and juniper trees. The creek provides shelter for an assortment of animal life such as turtles, snakes, crested herons, Mexican free-tailed bats, sunfish, and crayfish which were found along the entire creek corridor.

The creek is really a study of three distinctive zones, defined not only by their urban setting, but by the natural conditions present along the corridor. Because of the lack of information about native species found along Waller Creek, and the inaccessible steep slopes in some areas, this evaluation only seeks to report species in general terms. A more comprehensive delineation of the current species is needed for the entire corridor.

<table>
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<tr>
<th>Waller Creek Statistics</th>
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<tbody>
<tr>
<td>Drainage area – 3,650 acres (5.7 miles)</td>
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<tr>
<td>Existing imperious cover------- 64 percent</td>
</tr>
<tr>
<td>Stream Length--------------------- 6.6 miles</td>
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<tr>
<td>from Town Lake to headwaters</td>
</tr>
<tr>
<td>Elevation Difference-------------- 274’</td>
</tr>
<tr>
<td>From 702’ (head waters) to 428’ (at Town Lake)</td>
</tr>
<tr>
<td>Average Creek Bed Slope----------0.8%</td>
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Water Quality and Flooding

The Waller Creek corridor has a diversity of adjacent land uses that in turn lend diversity to the character of the creek itself. Adjacent uses range from commercial, light industrial, low density residential to high density residential to undeveloped lots, and underdeveloped parcels. Austin’s street and storm drain system uses natural channels for all urban runoff.

This ice plant in central Austin is right on the bank of Waller Creek. Some of the excess water from the plant can be seen draining into the creek.

Parking lots and supply buildings of the state capitol complex inhabit much of the Waller Creek watershed. Once a residential neighborhood, this entire area of central Austin has been transformed during the past twenty-five years.

Many of the city’s sanitary sewer lines have been buried beneath the natural stream channels. Since most of Austin sits atop rock formations that are expensive to excavate, using the stream channels to bury the sanitary sewer mains was economically expedient. The existing trail and drainage pipes have altered the natural flow in this densely developed area of the creek. Storm drains, some combined with sanitary sewers, also lead directly into Waller Creek and serve to degrade water quality. Many residents are unaware that materials dumped into roadside storm drains flow directly into the city’s rivers and streams.

The major source of pollution now comes from non-point sources that make up the adjacent area. With regard to Waller Creek, the non-point sources discharges originate from storm water runoff that comes into contact with pollutants. Sediment laden runoff comes from adjacent urban areas such as parking lots, newly constructed areas that do not have adequate erosion controlled protection, and areas that have been stripped of vegetation. Some examples of the debris and litter that are dumped into streams by intention or by accident are shown below.

![Image of debris](image)

Figure 10: Spring floods have swamped a newly installed low water bridge on the Hike and Bike Trail.

Very substantial pieces of debris frequently end up by the homeless people who live along the banks of Waller Creek.

The majority of the non-point source pollution into the creek can be controlled by the pipeline tunnel project that is slated to begin in the near future. Without the pipeline, Waller Creek will continue to be a patch work of futility. Even with the proposed pipeline in place, the creek will only be able to
reduce its current flood plain to the banks of the creek. The creek will still rise ten feet above the existing creek bed during heavy storm events. Recommendations will be made during the course of this study for controlling and preventing future damage in the context of the proposed flow regime during flood events.

**Waller Creek Soils**

The Waller Creek corridor meanders through a variety of soil associations that are described in the U.S. Department of Agriculture National Cooperative Soil Survey, in conjunction with the University of Iowa, [www.statlab.iastate.edu/soils](http://www.statlab.iastate.edu/soils) (February 1997). The general soil types of the project corridor are: Austin - Brackett - Stephen - Eddy - Frio - Houston Black - Tarrant. These soils are characterized by shallow to moderately deep soils that are moderately to well-drained, gently sloping to steep, moderately to slowly to very slowly permeable soils, calcareous loamy clay, interbedded with chalky limestone and marl, formed in marly loamy, calcareous, residuum limestone.

Figure 11 shows a representative pattern of soil associations for Waller Creek. Specifically, seven soil types make up the Waller Creek corridor. The soils are characterized where they exist in a typical cross section and by the following properties:

**Brackett, fine loamy:** These soils are very deep, well-drained, moderately permeable soils. Formation occurred in marly loamy earth interbedded with chalky limestone. These soils are on undulating uplands with slopes ranging from 1 to 40 percent; however, the dominant slope range is 1 to 12 percent. They are well drained, have rapid runoff, and are moderately permeable.

**Tarrant cobbly clay:** This soil is very shallow, well drained and runoff is low to moderate on slopes 1 to 20 percent and high on slopes 20 to 50 percent. These moderately slowly permeable soils are found on convex to plane slopes of ridgetops and breaks of erosional uplands. Slopes are mainly 1 to 8 percent, but some are as much as 50 percent. The soil formed in residuum weathered from limestone of the lower Cretaceous age, and includes interbedded chalks, marls, and marly earths.

**Eddy, gravelly clay loam:** This soil is shallow to very shallow, well drained; having rapid to medium runoff. These moderately slow permeable soils formed in
chalky limestone that are found on gently sloping to moderately steep uplands. Underlying rocks are predominantly of the Austin chalk formation. Slope gradients are predominantly 3 to 5 percent but they range from 1 to 20 percent.

**Austin, silty clay:** This soil is moderately deep, well drained, having medium to rapid runoff. These moderately slow permeability soils formed in chalk and interbedded marl and chalk, and is mostly of the Austin formation. In places, the soil formed in soft limestone. Austin soils are found on uplands with slope gradients mainly less than 5 percent, but range from 0 to 8 percent.

**Stephen, silty clay:** These soils are not a dominant feature of the Waller Creek corridor, but they do occur in association with others soils. They consist of shallow, well drained; having medium to rapid runoff; medium internal drainage, with slow permeability. The Stephen soils form on uplands, with surfaces plane to convex. Slope gradients are mainly less than 5 percent, but range from 1 to 8 percent. The soils formed in interbedded chalk, marl, or soft limestone rubble, mainly of the Austin Formation.

**Houston Black, at center of microdepression:** The Houston soils are found in association with Frio soils along or near creek beds. They consist of very deep, moderately well drained; having slow to rapid surface runoff; water enters the soil rapidly when it is dry and cracked, and very slowly when it is moist; permeability is slow. The soils are on nearly level to sloping uplands. Slopes range from 0 to 8 percent, but are mainly 1 to 3 percent. The soil formed in calcareous clays and marls mainly of the Taylor Marl geological formation. In places, the substrata are chalk or shales.

**Frio, silty clay:** The Frio soil is very deep, well drained and having slow runoff with moderately slow permeability. The soil is found on flood plains of major streams. These soils formed in calcareous loamy and clayey alluvium. The alluvium is derived mainly from soils that formed in limestone of the Cretaceous age. The slopes are commonly less than 1 percent, but range to 2 percent.

Waller Creek soils are currently labeled as ‘urban soils’ because they would tend to have been mixed during human occupation and settlement of the past 150 years and therefore are not a true representation of a particular class of soil. However, the soils previously described, do occur in isolated pockets that retain much of their characteristic.
Waller Creek Greenway Partnership

Waller Creek Characteristics

For the purposes of this Greenway study, there are three distinct characters or zones within the Waller Creek Greenway study area.

**Zone 1: Lower**
Town Lake to 5th street. This area consists of a fragmented natural landscape that has poor access to the lower water level. Bank erosion is prevalent due to high peak flow and poor maintenance.

**Zone 2: Middle**
Fifth street to 10th street. This area has a canyon effect where buildings like the Sheraton Hotel dominate the landscape. Access to the waters of Waller Creek are improved, however much of the stream channel is comprised of human structures.

**Zone 3: Upper**
Tenth street to Waterloo Park. This area blends the natural with the urban conditions that reflect the first two segments. Some of the best examples of good stream architecture are located in this zone (wall treatments, paving, tree wells and spatial qualities of the corridor).

Figure 12: For the purpose of the Greenway study, the consultant has divided Waller Creek into three distinct zones. Zone 1: Lower Creek; Zone 2: Middle Creek; and Zone 3: Upper Creek.
Zone 1: Lower Creek

The study area begins at the Town Lake Hike & Bike Trail. This area contains the most natural occurring remnants of the old landscape that once existed along Waller Creek. Large Oaks and willows line steep degraded banks. Many vines (such as poison ivy) line the top of banks. Species of trees that can withstand the frequent heavy flooding are prevalent. Native shrubs and trees include juniper, yucca, agarito, ill-scented sumac, and texas oak tree species. A few pecan and elm trees can be found scattered near the stream channel. Herbaceous vegetation is mostly limited by flood and/or slope conditions. Some Native Oaks are cabled and secured near the Convention Center.

Zone 1 is currently in a state of adjustment, with a high rate of geomorphic activity leading toward a new equilibrium of the creek bed alignment. This area is plagued by basal scouring on the outside of meander bends, exposed tree roots, and poor longitudinal sorting of creek bed material which in turn contributes to unnatural checkbeds being formed. Two hundred feet downstream from 1st street, the bridge footings are exposed and there is undercutting of an existing retaining wall. The banks are eroding along this edge and the bike path has been buried and undermined two feet at 1st Street. Silt is filling up on the outside bend up stream of 1st Street. At 3rd Street through 5th Street, the following structures were observed to be threatened or have the potential for future erosion problems: walls, fences, trees, trails, utility lines, yards, recreational amenities, etc.

The buildings that are found within zone 1 include: Austin Convention Center, private condos, apartment buildings, Palm Park, the Rainey Neighborhood, and Brush Square.

This section of creek is the least developed of the entire corridor; however, future development is proposed. An addition to the existing Convention center is being built, a new 800-room hotel will be adjacent to the Convention Center and the Mexican American Complex are in the planning stages. Also, a proposed mixed used development is proposed south of 5th Street.

Figure 13: High bank erosion is occurring along the lower portion of Waller Creek south of Chesar Chavez.

Figure 14: A possible development scenario for private land holdings south of Fifth Street.
Zone 2: Middle Creek

The second zone is located between 5th and 10th Streets, and begins at the locally famous water fountains of the Sheraton Hotel. Buildings that line the area are built to the edge of the creek. Retaining walls from the top of bank down to the creek bed form a canyon effect through this section of Waller Creek.

Native vegetation is sparse along this section of the creek. Existing vegetation includes introduced woody and/or vine species indicative of the long term regime of human disturbance. However, there has been an attempt to save and display native live oaks. Some are spectacularly situated within natural limestone tree wells. The best examples are cabled for stabilization. Unfortunately, there are numerous examples of trees that will be lost if cabling or other stabilization techniques are not enacted. As you exit this area there has been a meager attempt to plant trees and vegetation. Aquatic vegetation is generally confined to a very narrow margin within the creek bed. The narrow wetland species that occur are only those that can withstand the tremendous flood surges that frequent this area. The creek bed has been realigned and straightened from its natural flow regime by retaining walls and bridges that pass over the creek.

At the Sheraton between 5th and 6th Streets, the retaining wall for the bridge is being undermined and separated from its foundation. The channel area between sixth street and 9th Street consists of a rock bottom (both natural limestone and artificial stone), with the channel controlled by the use of structural walls. At 9th Street, basal scouring on the inside of the meandering bend is occurring, thus exposing tree roots. Upstream from the 9th Street bridge the retaining wall has failed. During heavy storm events, sand and debris blocks the existing trail where it is in close proximity to the creek. Because of the high amount of human encroachment and manipulation, the creek bed is stable (although artificial in many places), and in turn the rate of geo-
morphic activity has become somewhat stable. The urban character of the area consists of businesses that include the following: The Sheraton Hotel, Austin Police Department & Municipal Court, Stubb’s BBQ, Carl Dawood Reality, and Waller Creek Plaza.

**Zone 3: Upper Creek**

In the third zone Waller Creek is characterized by a mix of both urban and natural landscape features. The creek emerges from Waterloo Park as it exits the University of Texas campus. South of Waterloo Park the land uses are a combination of urban commercial landscapes surrounded by businesses and parking lots, intermingled with some of its lasting vestiges of natural beauty. The most dramatic landscape is Symphony Square which engulfs the creek on both sides. The centerpiece of this development is a theatre and stage that spans the creek. The Marriott Hotel also has significant frontage along Waller Creek; however, a sign along its privacy fence warns of dangerous conditions for hotel guests.

Waller Creek reveals its naturally occurring limestone outcrop in this zone. Vegetation along this section of the creek includes a sporadic and sparse mixture of magnificent live oaks and a few mesic adapted and/or disturbance tolerant species such as willows, chinaberrys, hackberry, and herbaceous vegetation. This landscape is limited to species tolerant of urban situations and able to withstand...
the frequent flooding that occurs within the creek corridor.

Figure 19: The Symphony Square outdoor theater is divided in two by Waller Creek.

Figure 20: An inviting and serene landscape greets users of the Hike and Bike Trail as it enters Waterloo Park.

Figure 21: The Hike and Bike Trail is elevated above the creek bed for the first time within Waterloo Park.

Restoration of native plant communities featuring characteristic, and if possible, endemic species of the Austin Formation, may be possible with the completion of the Waller Creek Tunnel project. Restored areas need only be sufficiently large to include representative trees, shrubs, vines and herbs appropriate to the ecotype.

Land uses within this zone include the Marriott Hotel, Symphony Square, Rehabilitation Hospital of Austin, Waterloo Park and the University of Texas Campus.
Waller Creek Materials

In addition to different land use characteristics, the consultant has found that the three segments have unique and distinctive developed landscapes that can also be described through the trail paving, wall treatments, and bank treatments.

Zone 1- Lower Creek

The lower portion of the trail is the most naturalistic of all the areas within the greenway study corridor. The Waller Creek Hike and Bike Trail in this zone is composed of exposed aggregate concrete surface and has intersecting footpaths surfaced in crushed gravel. The trail is offset from the steep sides of the bank eliminating the need for handrails found elsewhere within the greenway but also serving to limit access to the stream bed. The kiosk area within Town Lake is walled in a similar detail to that found upstream at Waterloo Park. It is a wall of mortared-in-place limestone and has a washed aggregate surface within its half circle of paving.

Trail switchbacks just north of a proposed pedestrian bridge, designed to span Waller Creek, are unique to this segment. They are walled in large boulders approximately 6’by 6’ of larger brown hued limestone and are continued along the large retaining wall just south of this site. The railing detail for this area is a tight arrangement of square steel pickets and ornamentally capped posts.

The pedestrian creek crossing under the Cesar Chavez Bridge is a concrete isthmus that is designed for flooding. The center of this concrete crossing is grooved with water channels that serve to contain the normal water flow. These channels are covered in steel plates that can be pushed up during higher water preventing structural damage. The entire surface of the path is flat with no curbing to prevent racking of debris and possible damming of water. It does not possess the characteristics of any other part of the trail due to a lack of detailing with limestone or similar surface treatment.

Figure 22: The post and picket aluminum rail fence is commonplace along the lower section of the Waller Creek Hike and Bike Trail.
Zone 2 - Middle Creek

The middle section of Waller creek is highly urbanized. The trail has a more urban feel. The paving surface within this area is swept concrete edged on the west side with a tiered wall of dry stacked limestone and on the east by mortared-in-place limestone rowlocks and curbs. There are no railings or high walls separating the hike and bike trail from the creek, with the exception of the break away railings on the newly installed footbridge near the Austin police department. The paving changes here temporarily to a broken limestone paver that is very rustic in installation with jogs in the surface and raised corners. It is connected to the actual creek by a set of chipped limestone stairs allowing users to access a large natural outcropping of limestone. This feeling is completely opposite to the plaza area on the north side of the police department where there is a concrete tier jetting out into the water and perching on a limestone outcrop. It is open and there is a four-foot concrete wall that begins at the plaza and terminates down at the corner line of the parking garage. There it becomes square channeled steel fencing with a red lumber capping on top.

Upon crossing 7th Street, the character returns to a simpler, more open feeling with the walls and lack of railings and stays consistent until reaching the 6th street bridge area. Here the area turns into a more modern design. The paving is swept concrete. The walls are vertical limestone in some areas with exposed cast-in-place concrete in others. There is a plaza space within this area that is furnished with ultra modern seating and a bench that hugs the railing of the trail. All the lumber is painted red. This area is designed for flooding and has no unrestrained furnishings. The tree detail at the top of the entrance switch back is comprised of limestone terraces building up to street level where there is a large deck area built around a large caliper oak tree. It is railed in the same red lumber on top of square channel steel. There are enclosed planters within the terrace cavities, but they are currently not planted as a result of recent flooding.

At this point the trail crosses over to the east side of the creek via a bridge constructed out of 4 concrete piers that have narrow channels in between to allow the water to flow through at a higher rate of speed for ambient noise. There are no railings and the separations are not easily traversed via wheelchair. Bicyclists must dismount to cross. There is an additional element found here and nowhere else. This element is lighting for longer usage periods. The light poles are similar in style to the ones at the nearby Sheraton Hotel and conference center.

Figure 23: A variety of materials have been used in the area of the Sheraton Hotel to form the high walls along Waller Creek,
The underpass of the 6th street bridge enhances this portion of the trail because of its historical significance and unique spiral masonry. The 5th street bridge possesses similar masonry. Both bridges house native bats within their joints.

There is a physical divider in the connection between the Boiling Pot restaurant’s side of the trail with the Sheraton’s side of the trail by an iron gate that serves to lock the connecting tunnel. There is an architectural spiral staircase on the northern side that allows for users to have a connection after-hours. There is also a formal crosswalk to cross the road at the staircases. This brings users to the Sheraton Hotel area of the trail. Here the paving changes between exposed aggregate concrete, to an octagonal brick paver. The tree planting area is ringed with hewn limestone. The edges of the paving are the tops of the retaining walls that support the banks. Some of the stone facing has been washed away from the concrete walls. There is a lack of a sufficient railing between the planting area and the 25-foot drop to the creek. The rest of this portion is railed with the same square channel steel railing and wood capping.

There are two pedestrian bridges here, one is a wooden planked bridge for the actual trail, and then there is another pre-cast concrete bridge that runs underneath the sky bridge of the two Sheraton buildings. This bridge is intended for hotel guests and leads to the lobby of the hotel.

The trail stops running along the creek between the next two blocks but re enters the corridor via a connection near Palm Park and Ironworks Barbe cue. This area is paved in the same swept concrete and there are limestone edges in some areas, but predominately just a concrete edging.

Figure 24: North of the Sheraton Hotel, near the Austin Metro Police building, the “canyon” character of Waller Creek changes to a more accessible and open landscape.
Zone 3 - Upper Creek
The Waterloo Park portion of the trail has several distinctive styles in its materials and character. The majority of the pathway that skirts the edge of the creek does not have railings but rather limestone curbs that are approximately 8 inches high. They have channels removed at 10 feet intervals to allow water to drain from the trail in a slower manner. The outflows of the park’s vertical drains are pointed with the same limestone to blend in with the rest of the wall. The outflows of the gutters along the stairs in this area also have a series of limestone blocks to slow water flow and help breakup the surface.

There are three types of paving details within the waterloo section of the trail. The most common is exposed aggregate concrete with expansion grooves tooled in at regular intervals. The edging of the concrete is tooled with a semi-rounded profile. The second common material is decomposed gravel aggregate similar to granite filings or crushed pea gravel. It is not edged formally by any materials. The grass grows right into the edge. The third material is a simple swept concrete pathway found at the lower entrance of the park. It is bordered by a slight curb of cut limestone blocks and has an extruded aluminum handrail in compliance with current PARD standards. This portion runs along the western bank of Waller Creek.

The most unique feature of Waterloo Park is the grassed-over car bridge that connects the east and west sides of Austin. However, this bridge does not have a paved surface for 100% accessibility. The other bridge in Waterloo Park connects both sides of the trail and is a cast concrete understructure capped in limestone block. This makes the bridge appear to be of the older solid limestone construction.
Waller Creek Greenway Partnership

Issues and Concerns

Below is a summary of comments that were received during the first meeting of the Waller Creek Greenway Partnership in the spring 2000. Each of the partners in the Waller Creek Greenway Partnership were asked to share specific issues, concerns and recommendations regarding the current status of the Greenway corridor. This information provides the basis for formulating design, development and management recommendations for the corridor.

Comments from the Waller Creek Partners

Those partners that submitted issues both written and verbally during shareholders meetings, have been summarized within the following text.

There needs to be a balance between providing street furniture for trail users and preventing the homeless population from setting up residence in the creek channel. Traditionally Waller Creek has become an attractive place for homeless people to live.

There are currently some homeless people living along the Waller Creek Greenway, particularly in wooded areas, such as heavily vegetated stream banks south of the Convention Center. Within the lower section of the creek the homeless set five brush fires last year.

Enforcement by the city of a camping ban within Waller Creek is needed, and increased usage along under-utilized portions of the trail would resolve this issue.

Poorly lit areas along the trail make it unsafe. However, lighting plans for the Hike and Bike Trail should not disturb the night herons.

The 6th Street Tunnel gate is not working to keep people from using it as an outdoor toilet. Mostly because it is not properly managed. I would like to see the elimination of this access point. Keep the tunnel as a flood control device.

Get rid of 6th Street wooden trellis structures at street level to stop drug dealing. Also, more law enforcement is needed at the 7th Street bridge to stop drug dealing.

Fragmentation of maintenance by the City is causing some property to be left out of the loop. As an example, for the property next to Sid’s, the city has no access into this parcel. They can’t maintain it. Yet, when the city acquired the land for the Hike and Bike Trail, they said they would maintain it. There are others places in the lower section where landowners own land down to the middle of the creek and are not maintaining their land.

Here is my rating of bridges within the Waller Creek corridor from best to worse: 7th best, and 9th worse. We need to change the structures on bridges to reflect the character of the area. Fifth, 6th, and 7th Street bridges are historic bridges -- the 12th may also be historic.

One of the biggest issues is the high bank verses low bank character of the stream channel. How will
this be resolved.

The City of Austin is already looking at development guidelines for this area, such as removing buildings and adding others.

We need to make the hike and bike trail accessible to bike riders.

We should encourage outdoor retail vending on the walkways surrounding the creek to get people down on the trail.

Provide more access points from upper street level, with better definition. Define north side of 8th Street. Major access off of 6th Street from I-35 to Red River, this depressed area needs to be addressed.

New development will occur at the Convention Center. A new Hilton Hotel with at ground level restaurants, 700-car underground parking, and an 800-hundred bed hotel will be located between the creek and Brush Square.

The Police station and adjoining garage is causing erosion by channeling flow. They need to consider regrading this area.

We need to make the design simpler to increase pedestrian flow. An example would be the lower section near the civic center (3rd to 5th street), what will happen there? A "Riverwalk” and intense development is proposed, how will this look?

Palm Park needs to be redesigned. Bring people down to the creek’s edge by grading half of park to form natural slope that could be used as an outdoor amphitheater.

Figure 25: One common area of concern for all of the Waller Creek Partners is to make improvements to the creek channel that will promote increase safety, security and a more welcoming presence. The existing tunnel beneath 6th Street is a concern to many partners. Recently, the City of Austin installed locks on the gates leading to the tunnel.

Lot size work differently in each section.

There is a need to look at individual blocks and setbacks for buildings.
Waller Creek Charrette Report
1998

In addition to the statements of the partnership, public consensus was generated during the Waller Creek Charrette in 1998. The charrette attempted to transform the surrounding blocks into a series of well defined neighborhoods so that Waller Creek would become a center of public activities. The unifying element was the recreational hike/bike trail along the Waller Creek. A summary of some of the relevant recommendations from the charrette are as follows:

- Improve the recreational trail for a mix of users that would provide multiple connections to the east and west.
- Build the storm water tunnel.
- Redevelop the Waller Creek corridor into distinct areas.
- Coordinate new projects for buildings, downtown streets, convention center, transit, drainage, recreation and landscape with a master plan based on charrette ideas.
- Overall vision is a dense, mixed use development. There are a lot of security issues in the creek now that would be resolved with more people present.
- The character of this area is an urban area.
- There is a need for pedestrian scale lighting.
- Parking for autos should not be parking garages unless they are above commercial or behind businesses.
- Underground parking suggested at the convention center; no more large garages.
- Maintenance is a big issue for this area of the central city.
- Architectural character should come from what is already there.
- Bridges should be art and focal points for the surrounding area; things become art instead of art on them.
- Create historic district with existing buildings near convention center; create historic Texas park
- Develop architectural and zoning regulations which encourage mixed use and appropriate site design.
Design Development Recommendations

Overview

The emphasis of the design development recommendations featured in this plan is to transform the Waller Creek Hike and Bike Trail from an underutilized resource to a community destination. To accomplish this, it is first important to realize that Waller Creek has been an urbanized stream corridor for at least the past 60 years. As such, the native habitat and landscapes that existed many years ago have been transformed into a fragile urban ecosystem that primarily serves as a stormwater channel for central Austin. Therefore, design development recommendations and solutions must respect the fact that human encroachment into the stream channel is a given, that ecological health is tenuous and highly dependent on clean water flow, and that interconnections between the stream channel and surrounding land uses are very important. With these facts defined, the consultant’s recommendations focus on several key design development elements:

- establishing a stream buffer appropriate for an urban stream condition;
- establishing appropriate setbacks for future land use development adjacent to the stream channel;
- defining points of public entry to the Waller Creek Hike and Bike Trail that serve to celebrate and unify the trail system;
- prescribing trail development standards that encourage compatible use throughout the corridor;
- encouraging streetscape development solutions for the landscapes that surround the stream corridor;

Figure 26: The Waller Creek Hike and Bike Trail at the condominiums on Waller Creek at Town Lake Park
• implementing a comprehensive signage program and wayfinding system for the Waller Creek corridor;
  • defining a complementary furniture and furnishings program for the Hike and Bike Trail to make it more of an attraction to urban residents; and
  • perhaps most importantly, operating an efficient and effective maintenance and management program for the Greenway corridor to ensure that it remains a community asset.

Urban Stream Buffer

Nationally, significant research, evaluation and experimentation has been taking place with respect to the establishment of vegetative buffers adjacent to urban streams. Communities are in either preserving or restoring vegetation along streams in order to improve the ecological health of urban streams, mitigate the effects of urban pollution, enhance aesthetics and reconstitute habitat for urban wildlife. Buffers vary in width from 15 feet to 100 feet for urban streams. The width is not yet based in science as much as on the amount of available land adjacent to streams. Based on the amount of information available today, it is difficult to determine the effectiveness of vegetative buffers. Nevertheless, many communities are implementing buffer programs and ordinances to protect their streams.

Waller Creek’s native landscape has been transformed through the years. Other than the limestone rock formations in certain sections of the creek, very little remains of what was once the native landscape setting. Furthermore, the vegetation currently situated on the creek bank, while native to the landscape, is in essence what has been allowed to exist despite

Figure 27: Where possible, a minimum 25 foot to 35 foot vegetative buffer should be established along Waller Creek to improve habitat for wildlife, mitigate the impact of pollution from stormwater runoff and enhance the aesthetics of the stream corridor.
heavy human encroachment. In other words, the riparian landscape that surrounds Waller Creek is heavily influenced by human control and is not native.

Given the fact that so much encroachment has occurred, it is recommended that the City of Austin and Waller Creek property owners work in partnership to establish a vegetative stream buffer along the creek that varies from 25 to 35 feet wide. In many sections of the creek, such a buffer may only be possible on one side of the creek -- typically opposite from where the current hike and bike trail is positioned. In a few sections of the creek, no buffer will be possible at all given the current urban development pattern. In the Waterloo Park landscape, a wider buffer is possible, and could be successfully integrated with the current hike and bike trail location.

In developing this buffer it will be necessary to use soil bioengineering techniques to establish stabilized stream banks (see details), it may also be necessary to rebuild entire sections of stream bank so that the proper slopes and vegetative cover can be established. The city and private property owners should stop using concrete retaining walls and sterile bands of rip rap or gabion wall systems to armor the creek banks. Soil bioengineering has been proven to be an effective structural substitute for these stabilization practices and will enable creekbank vegetation to coexist.

Finally, sunlight is required in order for vegetation to flourish along the banks of Waller Creek. In some sections of the creek, current development patterns prohibit adequate amounts of sunlight to reach the banks of Waller Creek. Future urban development by

Figure 28: The use of soil bioengineering is an effective substitute for concrete retaining walls, gabions and rip rap for slope stabilization within Waller Creek.
both the public and private sector should account for the penetration of sunlight into Waller Creek. It is recommended that a stepped or terraced architectural form be utilized to ensure that adequate sunlight can reach the creek banks. It is difficult to generalize what the terraced architectural form should look like, however, it should be a requirement of all future development projects to submit drawings and specifications that address and ensure adequate sunlight penetration into Waller Creek.

Creek Setbacks

The setback, or amount of land that is reserved for the undeveloped Waller Creek channel, is a very important issue. As defined earlier in this report, Waller Creek is a diverse urban stream corridor that is made up of several distinct landscape conditions. Creek setbacks should be flexible to account for the impact to individual parcels of land adjacent to the Creek. However, the goal is to create a uniform, functional and attractive stream corridor. Using the themes defined in the inventory report as a guide, the consultant is recommending the implementation of the following stream channel setbacks as a set of guidelines for future urban land use development. It is important to note that the application of creek setbacks is a guide. It is not the intention of creek setbacks to adversely impact the economic values of existing properties. Flexibility and discretion is required in applying these setbacks throughout Waller Creek. Some properties may be so greatly impacted by a setback as to have no future development value, and in this case the setback should be modified accordingly. Outside of the setback zone, other land development requirements

Figure 29: Existing setbacks vary throughout the project corridor. The Austin Police Department, for example, has been developed to the edge of the Waller Creek channel.
currently in place for the Waller Creek corridor would take effect.

Lower Creek Setback

Within the lower section of Waller Creek, defined as extending from Town Lake Park to 3rd Street, the objective of the urban setback is to respect the natural landscape characteristics that remain in this section. This section of the creek is undergoing some significant change, substantial deposition of sediment has covered a section of the Waller Creek Hike and Bike Trail, stream banks are being eroded by heavy stream flows, and a section of the Waller Creek Hike and Bike Trail has been undermined by stream erosion. The consultant recommends establishing a 60 foot setback from the center of the creek channel, maintaining a minimum of 120 feet of open space between buildings (see figures 30 and 31). The setback will allow for future retail, commercial and residential development to occur, while at the same time protecting the natural landscape of the Waller Creek Channel.

The consultant also recommends that landowners would be allowed to reshape the stream channel banks, in compliance with applicable local, state and federal laws governing such stream bank manipulation. The primary purpose of reshaping stream banks would be to reduce future erosion and improve public access to and use of the Waller Creek Hike and Bike Trail system.

In addition to the urban setback, the consultant recommends that action be taken to

Figure 30: Plan view of lower Waller Creek illustrating proposed setbacks

Figure 31: Cross section of lower Waller Creek illustrating proposed setbacks
stabilize the eroded stream channel utilizing soil bioengineering techniques where practical.

**Middle Creek Setback**

The middle section of Waller Creek is heavily urbanized and contains numerous creek bank encroachments. The objective of the urban setback is to encourage a more uniform future development condition, create opportunity for creekside retail and commercial development, improve public access and use of the creek corridor and improve the appearance of the creek corridor. The consultant recommends that the facades of future buildings be setback a minimum of 40 feet from the center of the stream channel, with 80 feet of open space between building facades (see figures 32 and 33). Additionally, building facades within the 40 foot centerline setback of Waller Creek should not exceed five stories in height. The consultant encourages a stepped back development strategy for buildings that exceed five stories.
Upper Creek Setback

The upper section of Waller Creek is largely comprised of the landscapes within Waterloo Park. This is the most natural landscape within the project corridor. As such, it is the recommendation of the consultant that this landscape be protected from future urban encroachments. Further, the stream channel could benefit from reinforcement using soil bioengineering techniques. This will help to reduce stream bank erosion and sedimentation of the stream channel.

Figure 34: Plan view of upper Waller Creek illustrating proposed setbacks

Figure 35: Plan view of upper Waller Creek illustrating proposed setbacks
Points of Public Entry to Waller Creek

The Waller Creek corridor has the potential to become a destination landscape for east central downtown Austin. One of the improvements that needs to be made in order for this to happen will be to redefine the points of public entry to the corridor. These entry ways should be both noticeable and inviting to the public. The older entry ways to the Waller Creek Hike and Bike Trail should be modernized and spruced up. New entry ways should be added to improve connectivity to surrounding landscapes and urban development.

The consultant recommends the use of wrought iron gates and decorative streetscape furnishings to create more noticeable and formal entries to Waller Creek. Additionally, signage and pavement markings can be used to make the public aware of the continuous Hike and Bike Trail. Finally, an identification program should be employed throughout the corridor so that users of the Hike and Bike Trail know where they are in relation to points of entry and desired destinations. The consultant recommends using the historic street names to further reinforce identity and location within the Waller Creek corridor.

Figure 36: A possible development scenario for points of entry to the Waller Creek Hike and Bike Trail.
Hike and Bike Trail Development

The Waller Creek Hike and Bike Trail should become the principal spine of movement and transportation through the Waller Creek corridor. Today, the trail system remains incomplete in some sections. It is also underutilized because of a variety of factors, including:

- perception that the Hike and Bike Trail is not a safe place to be;
- inability to easily bicycle along the entire length of the corridor;
- presence of homeless population;
- lack of consistent maintenance and management program.

Some of these factors can be corrected through design development. The consultant recommends that a consistent design development program be applied to all portions of the Waller Creek Hike and Bike Trail. The following text and graphic illustrations defines a set of specifications for construction of a creek side trail, street level trail system, and on-street bicycle and pedestrian facilities. These specifications should serve as guidelines for future development and redevelopment of Hike and Bike facilities within the Waller Creek Greenway corridor.

Creek Side Trail

The majority of what most Austinites will refer to as the Waller Creek Hike and Bike Trail exists as a creek side trail system. This system has been constructed over the past 25 years into the banks and stream channel of Waller Creek. Originally conceived as a multipurpose trail, the creek side trail varies in width from 6 foot wide to 10 foot wide. The creek side trail has been under assault for decades from the

![Figure 37: Design details for the creek side and street level trail system.](image)
natural forces of high volume water flows and streambank erosion. Efforts have been made to create a stable structural foundation for the creek side trail using concrete, mortared rock retaining walls, and gabions to offset the impacts from mother nature.

The consultant recommends the adoption of a new cross section for the creek side trail that would provide a more suitable trail width to support use by walkers and cyclists. In-line skating and skateboarding should not be allowed on the trail. Additionally, all support structures, including bridges, retaining walls, ramped entry areas should be developed to withstand the forces of nature. This may necessitate the installation of large-rock or stone retaining wall systems and the use of soil bioengineering to stabilize stream bank areas.

**Street Level Trail**

In addition to the creek side trail, a more formal "street level" trail system should be developed and added to the Waller Creek corridor. This street level trail would be developed on a parallel track with the creek side trail, on top of the banks of Waller Creek. This trail could be a series of outdoor plazas, terraces, promenades and walkways that are interconnected between developments to form an integrated system for pedestrian travel throughout the corridor. The street level trail system would be connected frequently to the creek side trail system with ramped accessible multi-use pathways. The street level trail system would also be connected to the surrounding urban streetscapes, roadways and pedestrian walkways throughout the Waller Creek corridor.
The consultant recommends that this street level trail system be developed with ample width in order to support specific site uses and pedestrian movement uses. The minimum width should be 12 feet, while the maximum width could be determined based on the adjacent land use and minimum setback requirements.

**On-Street Bike/Ped Trails**

The Waller Creek corridor would benefit from a comprehensive system of linked walkways and bicycle facilities. This would help to direct and facilitate the movement of local residents and visitors to the core facility, the Waller Creek Hike and Bike Trail. It would also greatly aide in offering users an alternative to using the creek side or street level trail system to complete a desired trip through the corridor. Finally, this system should link with the proposed light rail system proposed for 4th Street and the proposed Cross-Town Bikeway.

Many of the streets surrounding and extending through the Waller Creek corridor can and in some cases do support both pedestrian and bicycle travel. Some streets require a minimum level of upgrade to enhance both modes of travel. The consultant recommends that most streets be treated as on-road bicycle routes, and be signed or designated as appropriate to support this use. Since the bicycle is regarded as a “vehicle” under the laws of Texas, bicycles have as much right to use the roadway pavement as any other vehicle. However, some cyclists may not feel comfortable sharing the road with trucks and cars. For these cyclists, the off-road creek side offers an alternative to complete a north-south trip through the corridor. In addition, the consultant recommends that the city consider installing

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Figure 38: On-street bicycle facility without on-street parking.

Figure 39: On-street bicycle facility with on-street parking.
bicycle lane facilities on Red River and Trinity Street to facilitate bicycle movement through the corridor. For east-west movement within the corridor, the consultant recommends that the city consider 5th Street and 10th Street as candidates for bicycle lane facilities.

Most of the streets throughout the Waller Creek corridor are developed with sidewalks on both sides. Some of the streets that are near the Waller Creek stream channel are bordered by street trees. The addition of these trees creates a more inviting and pleasant atmosphere for pedestrians. It also establishes a human scale. Many of the streets within the Waller Creek corridor could greatly benefit from the addition of street trees and the consultant recommends that the City of Austin give serious consideration to a program that would involve installing street trees throughout the Waller Creek corridor.

Many of the sidewalks within the Waller Creek corridor are in need to repair. Also, the addition of a signage system will greatly aid in wayfinding and travel through the corridor. The city should inventory the sidewalks that are in need of repair, or those that should be installed, in order to create a unified system of walkways throughout the Waller Creek corridor.

**High Span Bridge over Waller Creek**

The southern section of the Waller Creek Hike and Bike Trail remains incomplete. The existing trail system that begins on the west side of Waller Creek at the Austin Civic Center and extends south of Cesar Chavez about 1500 feet to its present terminus. The hike and bike trail begins again on the east side of Waller Creek and continues south to Town Lake Park. The gap in this system is a resol-
tion for crossing Waller Creek. The creek banks are extremely high at this location and will require a high span bridge. Currently land ownership makes it difficult to affordably complete the installation of a bridge.

Currently, a private developer is in discussions with the city to design and install a high span bridge in this location as part of an overall development proposal within the lower Waller Creek area.

15th Street Bridge

It may be possible and desirable to extend the Waller Creek hike and bike trail beneath the 15th Street bridge. This extension would require an engineering and hydrology study to determine the impact of building a trail into the creek bed of Waller Creek. The extension would provide a below grade crossing of 15th Street and eliminate conflicts between motorists and hike and bike trail users. The extension would offer improved access to the University of Texas campus. The city should work in partnership with the university to determine the feasibility and benefit of extending the Waller Creek trail system into the UT campus.

Figure 41: The 15th Street Tunnel. (Photo by Chris Riley)
Streetscape Development

In the Downtown Austin Design Guidelines, the city concludes:

“The major focus is on the streetscape environment which affects the pedestrian. This includes all the elements that can make a pedestrian comfortable such as sidewalks, street trees, street furniture, and the facade of the building.”

Within the Waller Creek corridor, some streetscapes offer good opportunities to enhance and improve the function and appearance of building, sidewalk and roadway. To accomplish this, it will be necessary to develop the streetscape in a manner that can support a broad diversity of uses, from “window” shopping to outdoor cafes. The City of Austin recommends that enhanced streetscapes include street furniture, such as bench seating, trash receptacles, telephones, water fountains, outdoor clocks, kiosks, cafe tables and pedestrian scale lighting. The use of these materials should serve to unify the local streetscape landscape and enhance the adjacent buildings and businesses. The city also recommends that streetscapes be improved with street trees and other landscape plantings. The city also encourages the use of local artisans in the design and development of streetscape furniture and furnishings.

The consultant recommends three possible streetscape development scenarios for the Waller Creek corridor. The first development scenario provides for a narrow, sidewalk based development, with a parallel parking bay on the adjacent roadway. The parking bay is separated from the sidewalk by a landscape
planting strip. This will most likely be the popular developed condition throughout the Waller Creek corridor. This development scenario primarily supports “window” browsing and a direct connection with street traffic. The total width required for this development is 6 to 13 feet.

The second development scenario provides for a broad outdoor cafe style appearance with the sidewalk built on the outer edge of the cafe area. The cafe and seating areas would be developed against the facade of the building, and are separated from the sidewalk with a pedestrian scale street lamp, kiosk and furnishings area. The sidewalk is again separated from the parallel parking bay with a landscape planting strip. The total width required for this development is 12 to 26 feet.

The third development scenario is a variation of the second scenario, with the cafe area and sidewalk landscapes flipped so that the sidewalk is against the building facade and the cafe is adjacent to the parking bay.
Waller Creek Signage Program

A signage system for the Waller Creek corridor is perhaps the most important missing element in the landscape. For local residents and visitors alike, it is difficult to understand where you are and where you want to go within the corridor, especially if you are on the Hike and Bike trail system. The consultant recommends that development and installation of a comprehensive system of signage that would include major and minor entry signs, directional, regulatory and interpretive signs, and bollard signs that can provide useful information to users including miles traveled and location of trail amenities such as phones or drinking fountains.

Major Entry Signs

The consultant recommends that the signage system be constructed of materials that can reflect the heritage of the Waller Creek corridor and early Austin development. Native limestone, wrought iron and weathered wood would be used to construct the base for all signs. Austin Park and Recreation Department signage standards would be used for all symbols and lettering on each sign.

Major entry signs would be positioned at each end of the Hike and Bike Trail system, in Waterloo Park on the northern end and at the intersection of Town Lake Park and the Waller Creek Hike and Bike Trail. Also, at key intersections in the middle of the project corridor, such as major retail, commercial or office landscapes, major entry signs would be installed. Major entry signs contain maps of the entire corridor, listing of rules and regulations, symbols that define permitted uses and other important information.
Minor Entry and Interpretive Signs

Minor entry signs would be located at all entry areas that do not have major entry signs. They will contain maps of more localized information, symbols of permitted uses and other information that will be helpful to trail users.

Interpretive signs would be located throughout the corridor. The intent of these signs is to provide information about historical events and land uses within the corridor, or provide educational information about the natural resources of the corridor.

Directional Signs

Directional signs will describe the location of major destinations throughout the corridor and provide both direction and distance to these destinations. Directional signs will contain symbols and text.

Regulatory Signs

Regulatory signs include stop, yield, warning and speed limit signs, as examples. These would be posted throughout the corridor on the Hike and Bike Trail, at key locations on the street level trail system and at intersections with roadways.
Site Furnishing/Furniture

The Waller Creek Greenway corridor could be greatly improved in terms of its function and appearance with a complement of furniture and furnishings. The consultant recommends that the city and private landowners consider the installation of the following furniture group throughout the corridor. The installation and use of such furniture should be subject to enforcement by the city with respect to loitering and drug laws. It is not the intent of this recommendation to create areas where homeless people and/or drug dealers will congregate. All of the furniture has been selected to pick up both an historic and rugged outdoor theme. The furniture reflects the early development period of Austin, and yet is practical and comfortable for a downtown urban setting.

Bench Seating

Decorative urban city park style benches made of wrought iron and wood are very appropriate for the Waller Creek corridor. These benches can be customized in short lengths to discourage their use as sleeping berths for homeless people. The makeup and materials used to build the benches will ensure their longevity in the hot and humid Austin climate.

Lighting

Pedestrian scale lighting is critically important to the Waller Creek Greenway corridor. Distinctive lighting fixtures can serve to unify the landscape character and offer a signature feature for the corridor. The consultant has developed a special lighting fixture recommendation for the...
Waller Creek Greenway Partnership

Waller Creek corridor that is made from materials indigenous to the Austin landscape. The wrought iron theme present in other structures and furnishings would be part and parcel of the lighting fixture.

**Trash Receptacles**

Decorative iron trash receptacles add to the furniture group and help to solidify the function and look throughout the corridor. These receptacles are easy to service and are tough enough to withstand the urban conditions throughout the project corridor.

Trash receptacles can be placed at major and minor entrances to the Hike and Bike trail, at streetside cafes and other key public areas throughout the corridor.

**Safety Bollards**

Iron safety bollards will have application within many different landscapes throughout the corridor. With chains attached, the bollards can be used to separate uses. As an independent feature, they can be used to limit access by unauthorized vehicles, and they can be decorative fixtures used to accent other landscape elements.
**Drinking Fountains**

Drinking fountains on an urban trail system are a real plus, especially in a climate like Austin. The consultant is recommending the installation of these heavy duty, cast iron, urban fountains. These would typically be located at major entry points, some minor entry areas and in other key street level trail locations. The location of potable water lines within the Waller Creek corridor will influence the position of these fountains.

**Wall Mounted Clocks**

An optional piece of hardware that can greatly enhance the Waller Creek corridor would be wall mounted or pole mounted outdoor clocks. Many decorative clocks are possible, the consultant has selected a clock that would fit with the character of other landscape features throughout the corridor.
Maintenance and Operations

The maintenance and management of the Waller Creek Greenway may be the most important element of this Action Plan. Many of the current problems associated with the greenway can be addressed and resolved through a comprehensive and coordinated management plan.

It is clear that the City of Austin cannot alone successfully manage the Waller Creek Greenway corridor. One of the primary purposes of this Action Plan is to recommend an alternative management strategy for the Greenway. The following text addresses this issue in a broad context, and makes specific recommendations for improving public safety and security, and implementing a comprehensive program for maintenance of the greenway.

Public Safety and Security

Making the Waller Creek Hike and Bike Trail and surrounding landscapes a safer and more secure environment is one of the primary goals of this Greenway Action Plan. To accomplish this, it is recommended that the principles and practices of Crime Prevention Through Environmental Design (CPTED) be employed throughout the greenway project. The CPTED principles influence the way in which the greenway corridor is designed, developed, managed and maintained. Originally conceived in the 1970’s, CPTED principles are in practice by law enforcement officials, design professionals and property managers across the nation. There are four key elements of CPTED:

- Natural surveillance
- Natural access control
- Territorial reinforcement
- Maintenance

Natural surveillance refers to the ability of an individual to enter a landscape and quickly survey his/her surroundings to determine a level of comfort and personal safety. Greenway trails can be designed to maximize natural surveillance. The easiest way to accomplish this is clear sight lines a couple hundred feet in front of and to the rear of any given position along a trail. Additionally, wooded areas adjacent to trails should be thinned of understory growth a distance of 15 feet from the edge of the trail clear zone.

Natural access control refers to the ability of an individual to find a comfortable point of ingress and egress to a particular landscape. Access varies for individuals and by activity. For example, the ingress and egress of a bicyclist will be much different for that of a pedestrian. However, the needs of a pedestrian are those that should be addressed. Similarly, men and women may find different levels of comfort with the spacing of access points to a trail environment. The comfort level of women should be the controlling factor. As defined
by the issues and concerns section of this report, several Waller Creek Greenway Partners feel that access to and from the hike and bike trail is inadequate.

_Territorial reinforcement_ refers to the ability of the landscape to support its intended purpose, and thereby reinforce appropriate activity. An underdesigned and poorly developed landscape will not encourage appropriate activity, and may encourage inappropriate uses. In the case of the Waller Creek Greenway, the lack of territorial reinforcement is serving as an invitation for inappropriate activity, including nesting for the homeless and vandalism. This lack of reinforcement is also serving to turn away potential users of the greenway who want to go for a bike ride, walk during lunch or jog on the weekends. At times the Waller Creek Greenway landscape, has a degraded appearance which tends to leave the impression that no one is caring for the landscape. For example the smell of urine in the 6th Street tunnel is a deterrent to use. This is a perfect environment for inappropriate and undesirable uses to occur.

_Maintenance_ refers to a regularly scheduled, comprehensive program that keeps a landscape from becoming degraded. Waller Creek would benefit from a more frequent routine management program.

Some of these criteria will in fact be implemented by virtue of the design recommendations contained within this plan. Other criteria will need to be met through new programming of maintenance and management activities. An adopt-a-greenway program (AGP) is recommended as one approach to better management of the greenway. It is recommended that AGP agreements be executed with businesses, corporations and neighborhoods that are adjacent to the corridor. Additionally, it is also recommended that the Downtown Austin Alliance (DAA) and the Austin Parks and Recreation Department enter into a series of partnership agreements with other city agencies to better manage the resources of the greenway.

**Trail Safety and Security Program**

In order to provide reasonable and ordinary safety measures, the City of Austin should develop and implement a Safety and Security Program for the Waller Creek Greenway. This program should consist of well defined safety and security policies; the identification of trail management, law enforcement, emergency and fire protection policies; the proper posting, notification and education of the trail user policies; and a system that offers timely response to the public for issues or problems related to safety and security. PARD, the Waller Creek Partnership and DAA will need to coordinate the safety and security of the trail with local law enforcement officials, Adopt-a-Trail organizations, and others. Important components of the Safety and Security Program should include:
• establishment of a safety committee or coordinator
• preparation of a greenway safety manual for agency staff and volunteers
• establishment of user rules and regulations
• development of greenway emergency procedures
• preparation of a safety checklist for the greenway
• preparation of a greenway user response form
• a system for accident reporting and analysis
• regular maintenance and inspection program
• site and facility development and review
• public information program
• employee training program for safety and emergency response
• ongoing research and evaluation of program objectives

Hours of Operation

The Waller Creek Greenway will be operated similar to other Austin park and greenway facilities, open for public use from sunrise to sunset 365 days a year, except in those areas where the trail corridor is lighted for nighttime use. All lighted areas of the trail should be posted with specific permitted and non-permitted uses. It is recommended that individuals who are found to be using these facilities in violation of the posted Hours of Operation be treated as trespassers. Violations for trespassing should be enforced in accordance with appropriate local laws.

Trail User Rules and Regulations

One of the emerging issues in greenway management is multi-user conflict. Typically, these conflicts are caused by overuse of a trail; however, other factors may include poorly designed and engineered trail alignments, inappropriate user behavior, or inadequate facility capacity. The most effective use management plan is a well conceived program that provides the individual user with a Code of Conduct for the trail, sometimes called a Trail Ordinance. Several multi-use trail systems across the United States have adopted such ordinances for public use. The following rules have been adapted from a collection of the most popular found on greenway systems throughout the United States. Rules should be displayed in brochures and on information signs throughout the greenway.

Be Courteous: All trail users, including bicyclists, joggers, walkers, individuals in wheelchairs, skateboarders and skaters, should be respectful of other users regardless of their mode of travel, speed or level of skill. Respect the privacy of adjacent landowners - STAY ON THE TRAIL!
Keep Right: Always stay to the right as you use the trail, or stay in the lane that has been designated for your user group. The exception to this rule occurs when you need to pass another user.

Pass on the Left: Pass others going in your direction on their left. Look ahead and behind to make sure that your lane is clear before you pull out and around the other user. Pass with ample separation. Do not move back to the right until you have safely gained distance and speed on the other user. Faster traffic should always yield to slower and on-coming traffic.

Give Audible Signal When Passing: All users should give a clear warning signal before passing. This signal may be produced by voice, bell or soft horn. Voice signals might include “Passing on your left!” or “Cyclist on your left!” Always be courteous when providing the audible signal - profanity is unwarranted and unappreciated.

Be Predictable: Travel in a consistent and predictable manner. Always look behind before changing position on the trail, regardless of your mode of travel.

Control Your Bicycle: Inattention, even for a second, can cause disaster — always stay alert! Maintain a safe and legal speed at all times.

Don’t Block the Trail: When in a group, which may or may not include pets, use no more than half the trailway, so as not to block the flow of other users. If your group is approached by users from both directions, form a single line, or stop and move to the far right edge of the trail to allow safe passage by these users.

Yield when Entering or Crossing Trails: When entering or crossing a trail at uncontrolled intersections, yield to traffic already using the other trail.

Don’t Use this Trail Under the Influence of Alcohol or Drugs: It is illegal to use this trail if you have consumed alcohol in excess of the statutory limits, or if you have consumed illegal drugs. Persons who use a prescribed medication should check with their doctor or pharmacist to ensure that it will not impair their ability to safely operate a bicycle or other wheeled vehicle.

Clean-up Your Litter: Please keep this trail clean and neat for other users to enjoy. Do not leave glass, paper, cans or any other debris on or near the trail. Please clean up after your pets. Pack out what you bring in — and remember to always recycle your trash.
Keep Pets on Leashes: All pets must be kept on a secure and tethered leash except in the “Leash Free Zones” so designated along the greenway. Failure to keep your pet tethered in non-leash free zones may result in fines.

Vegetation Removal: It is illegal to remove vegetation of any type, size, or species from the greenway. Please contact the Austin Parks and Recreation Department should you have concerns about noxious weeds, poisonous vegetation, dying or dead vegetation, or other vegetation growth in the greenway.

Use the Buddy System: Always use the trail system with a friend!

Always exercise due care and caution when using the trail!

Trail Management and Maintenance

The DAA and the Austin Parks and Recreation Department should develop a specific action plan for maintenance and management of the Waller Creek Greenway corridor. The primary objective of this maintenance and management plan would be to assure that the public’s health and safety are protected during normal use of the facility. The greenway should be formally maintained in a clean, safe, and usable condition like all other parks and greenways in the City. Greenway lands should be maintained in a natural condition to the largest extent possible, so that they may fulfill multiple functions — passive recreation, alternative transportation, stormwater management and wildlife habitat. Vegetation management will require close coordination with public and private utility companies which hold leases over the corridor for the maintenance of telephone, power, water, sewer, stormwater and natural gas lines.

Routine maintenance should include the removal of debris, trash, litter, incompatible human-made structures, and other foreign matter. Removal of native vegetation should be done with discretion; removal of exotic species should be accomplished in a systematic and thorough manner. The objective in controlling the growth of vegetation should be to maintain clear and open lines of sight along the edge of the trail, and eliminate over hanging vegetation that could occur due to natural growth, severe weather or other unacceptable conditions.

All vegetation should be clear cut a minimum distance of three (3) feet from each edge of the trail. Selective clearing of vegetation should be conducted within a zone that is defined as being between three (3) to ten (10) feet from each edge of the trail. At any point
along the trail, a user should have a clear, unobstructed view, along the centerline of the trail, 200 feet ahead and behind his/her position. The only exception to this policy should be where terrain or curves in the trail serve as the limiting factor. Appropriate agencies should be responsible for the cutting and removal of vegetation. Removal of vegetation by individuals other than those persons employed by designated agencies should be deemed unlawful and subject to fines and/or prosecution.

Trail surfaces should be maintained in a safe and usable manner at all times. Rough edges, severe bumps or depressions, cracked or uneven pavement, and vegetation occurring in the tread of the trail should be removed and replaced in such a manner that the trail surface is maintained as a continuous, even, and clean surface. The City should strive to minimize the number of areas where ponding water occurs, however, the City should not be held liable for public use through areas of casual or ponded water.

Typical greenway maintenance activities include the following:
- drainage channel maintenance (4 x per year)
- debris removed from trail tread (24 x per year)
- mowing a 5-foot grass safe zone along trail (24 x per year)
- pickup and removal of trash and debris (24 x per year)
- weed control and vegetation management (12 x per year)
- minor repairs to furniture and safety features (as needed)
- police officer patrol (weekly)
- supplies for the labor force (annual)
- coordination of local and regional activities (annual)
- equipment fuel, repairs and replacement parts (annual)
- bridge inspection and maintenance activities (annual)

Police/Park Ranger Patrol and Emergency Response System

In order to provide effective patrol and emergency response to the needs of trail users and adjacent property owners, it may prove helpful to execute a model inter-agency management agreement for the Waller Creek Greenway between the DAA, Austin Parks and Recreation Department (PARD), the Austin Police

Figure 55: A cyclist is prevented from using the Waller Creek Trail due to event programming in Waterloo Park. New management strategies are needed to ensure the safe use of the Waller Creek Hike and Bike Trail.
Department, Austin Fire Department and emergency response agencies.

The agreement should define a cooperative law enforcement strategy for the trail based on jurisdictional considerations, capabilities of different departments and services typically needed for the greenway. PARD should work with the cooperating agencies to deliver drawings that illustrate points of access to the trail, provides design details for making these access points safe, secure and accessible to law enforcement officials, and defines where a system of emergency phones are located. It may also be desirable for the Waller Creek Greenway to be given a formal address system. Signs could be erected at major street intersections providing the address of that portion of the greenway trail.

The agreement should also define an emergency response system in conjunction with appropriate local fire stations and paramedic units. An emergency response system should define which agencies respond to 911 calls from the emergency phones, and should also provide easy to understand routing plans and access points for emergency vehicles. Local hospitals should be notified of these routes so that they may also be familiar with the size and scope of the project. The entire trail should be designed and developed to support a minimum gross vehicle weight of 6.5 tons to allow emergency vehicle access.

Risk Management and Liability
The development, management, and operation of the Waller Creek Greenway must be carefully executed in order to provide a resource that protects the health, welfare, and safety of the public. Liability problems most often occur when a facility has been under-designed for the intended volume of use; when management of the facility is poor; or when unexpected accidents occur because the trail manager failed to recognize the possibilities of a potentially hazardous situation. To reduce the exposure to liability, the City of Austin should have in place a complete maintenance program that provides the appropriate duty or level of care to trail users and a risk management plan that appropriately covers all aspects of the trail.

Adopt-a-Greenway Program
An adopt-a-greenway program (AGP) is one of the best ways to manage greenway lands and facilities. A specific AGP form has been developed by Greenways Incorporated for the Waller Creek Greenway and is provided in the appendix of this master plan report. For the Waller Creek Greenway, it is recommended that an AGP agreements be established for each of the businesses, corporations, landowners, institutions and neighborhood associations that are situated adjacent to or in close proximity to the Greenway corridor. AGP agreements will specify who does what, where and how. Typically, AGP agreements can be executed between a private organization and either DAA or the City of Austin.
For all segments of the greenway, it is recommended that DAA and PARD establish AGP agreements with the businesses and residential neighborhoods that lie adjacent to the corridor. One suggestion would be to have some of the businesses that have property that abuts the Greenway agree to extend their routine maintenance and management operations to the center of the stream channel. It may be necessary for these businesses to receive some basic instruction on stream channel maintenance from the Drainage Utility Department.

**Inter-Agency Agreements**

Agreements between city agencies may also be helpful to the overall management and maintenance of the Waller Creek Greenway. Such agreements can spread the burden for maintenance and management among several agencies, providing a more effective solution. Typically, these agreements assign responsibilities based on the normal, ordinary and routine activities of a particular agency. The agreements then define the frequency of the activity, a key contact person, and process for quality control.

It is recommended that the city consider establish inter-agency agreements for the Waller Creek Greenway to address issues such as stormwater management, repair to trail tread, maintenance of lighting, clean up of sidewalks and bikeways that lead to the greenway, bridge maintenance, and other relevant facility issues.
Estimate of Development Costs

It is not possible to accurately estimate all of the future development costs for future improvements to the Waller Creek Greenway. Many of the recommendations that are featured in this plan are likely to be accomplished by the private sector, as part of other development initiatives such as housing, office or commercial land development projects. The City of Austin is likely to act as more of a partner in future development of the Greenway facilities. Most of the trail facility has been successfully built out, with the exception of the linkage needed in Lower Waller Creek. Therefore, the following provides a listing of costs associated with some of the individual elements that are represented in this Action Plan.

Hike and Bike Trail Improvements

The installation of new trails, retaining walls, trail furniture and signage is defined as follows:

- Concrete Trail Construction $300,000/mile
- Park Bench Seating $500 per bench
- Light Fixtures $750 per fixture
- Trash Receptacles $450 per receptacle
- Safety Bollards $300 per bollard
- Major Entry Sign $2,000 per sign
- Minor Entry Sign $1,000 per sign
- Directional Sign $750 per sign
- Regulatory Sign $750 per sign

Streetscape Improvements

The installation of streetscape trees, walks, signage and other elements is defined as follows:

- Streetscape Trees $500 per tree
- Park Bench Seating $500 per bench
- Light Fixture $750 per fixture
- Trash Receptacles $450 per receptacle
Soil Bioengineering Costs

The installation of stone and riparian plant material most often associated with soil bioengineering projects is defined as follows:

- **Stone**
  - 24” diameter $45.00 per ton
  - 30-36” diameter $50.00 per ton
- **Root Wad** $120.00 per foot
- **Live Branch Layering** $20.00 per foot
- **Tree Plantings**
  - 1” caliper tree $95.00 per tree
  - 2-3’ container $20.00 per tree
  - 1-2’ container $18.00 per tree
- **Live Stakes** $3.00 per stake
- **Live Fascines** $20.00 per foot
- **Coir Fiber Roll** $25.00 per foot
- **Herbaceous Seeding** $0.50 per square yard

Maintenance and Management Funding

Maintenance of the Waller Creek Greenway is one of the central issues in the preparation of this Action Plan. Currently, the primary responsibility for maintaining all property within the Greenway rests with the Austin Parks and Recreation Department. It is the goal of this Action Plan to diversify the responsibility and financial burden associated with maintenance and management.

In fact, maintenance of greenway facilities can be divided into two primary concerns: 1) routine, or those activities that occur with greater frequency, and 2) remedial, or those activities that occur less frequently but generally are more expensive and labor intensive. This Action Plan supports the concept of spreading the routine activities among public and private partners, in order to obtain a higher quality management program, and to reduce the financial burden associated with a single-agency based program.

The purpose of this section is to define typical routine maintenance activities, their level of frequency and applicable costs. These cost estimates are based on national greenway industry standards as compiled by Greenways incorporated. The frequency level is based on number of times per year in which the activity is performed, and is provided in parenthesis after the activity. Again, these costs do not take into account the cost savings that would be realized through an Adopt-A-Greenway Program (AGP), nor do they account for other partnership opportunities that have been defined by this Action Plan.
<table>
<thead>
<tr>
<th>Description of Activity</th>
<th>Estimated Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sweeping/blowing debris off trails system (24)</td>
<td>$2,400</td>
</tr>
<tr>
<td>Trash pick up and disposal (24)</td>
<td>$2,400</td>
</tr>
<tr>
<td>Weed control (12)</td>
<td>$1,200</td>
</tr>
<tr>
<td>Mowing a 3-foot safe zone on both sides of trail (26)</td>
<td>$3,200</td>
</tr>
<tr>
<td>Drainage and creek channel clean up (6)</td>
<td>$1,200</td>
</tr>
<tr>
<td>Minor repairs to trail furniture (as needed)</td>
<td>$500</td>
</tr>
<tr>
<td>Supplies (annual cost)</td>
<td>$250</td>
</tr>
</tbody>
</table>

**Total Annual Maintenance Costs Per Mile of Trail** $11,150
Funding of Development

Capital improvements for the Waller Creek Greenway can be funded through a variety of public and private resources. The following text describes some of the resources that can be used to fund improvements to the project corridor.

Transportation Equity Act for the 21st Century (TEA-21)
The City of Austin has used TEA-21 (ISTEA was predecessor) grants for construction activities within other greenway projects throughout the community and can make use of these funds for future improvements to Waller Creek. These funds are provided to the City from the Texas Department of Transportation, usually as an 80 percent federal/state and 20 percent local funding split. The 20 percent local match can come from a variety of sources and can include in-kind services.

City General Obligation Bond Funds
The City of Austin has also made available money from General Obligation Bond funds to construct improvements within Waller Creek. The city can continue to appropriate these funds as they are made available through voter referendums for use in the Waller Creek project corridor.

Drainage Utility Department
The Drainage Utility Department is constantly working with Waller Creek to clean up erosion problems and make other improvements to the Waller Creek channel and surrounding lands. These improvements should be coordinated with other activities within the Greenway.

Tax Increment Reinvestment Zone
The following description of a Tax Increment Reinvestment Zone was provided by the Downtown Austin Alliance based on a meeting with Bob Randolph of Vinson and Elkins.

A tax increment reinvestment zone (TIRZ) is a method for having a long-term commitment to investment in a particular sub-area of a city. TIRZ can be used to finance various projects within communities, but are most often used on infrastructure investment projects. Improvements to the Waller Creek corridor would qualify. In Texas, a TIRZ can be set up in one of two ways: 1) a city can create a TIRZ on its own initiative, or 2) a city can create a TIRZ in response to a petition from property owners within the proposed zone. Each method has different legal requirements and restrictions.

If the petition is submitted, it must represent at least 50% of the assessed value of properties in the zone. If the city establishes the TIRZ from a petition, the city would create...
a TIRZ board composed of nine members. Of these, 5 members are appointed by the City, 1 by the State Senator, 1 by the State Representative and 1 by each of two other participating jurisdictions such as the County or School District. Eligible board members must be a resident, property owner or employee or agent of a property owner within the zone.

A city can dedicate all or part of the future tax increment to the TIRZ. Since a city would be able to spend the increment from general revenue, there is little incentive to set up a TIRZ unless there is another jurisdiction participating. Realistically, this must be Travis County because state law makes it very difficult for a school district to participate.

A Public Improvement District (PID) can be combined with a TIRZ. For example if the project consists of building sidewalks, the PID can be set up so that the assessment is proportional to the frontage of each property. A TIRZ can be set up so that the tax increment offsets the assessment. If the tax increment turns out to be larger than expected, then the assessment on the property can be smaller. If the City advances the money, then the assessment is structured as a contingent liability that will only come into play if the tax increment is smaller than expected.

In conjunction with the TIRZ, the City can create a local government corporation (LGC) that can have the same board of directors as the TIRZ. The LGC is a nonprofit corporation that can issue bonds, can spend funds from the TIRZ, and specifically, can contract with a nonprofit such as The Downtown Trust for management services. Council appoints the Board of the LGC and approves the annual budget and any bonds. The Board does not have to be the same as the TIRZ Board, but it is much simpler if the same people are on both Boards.

The simple way to get a TIRZ in place would be to set it up as a limited purpose TIRZ that is contiguous with the PID. The purpose would be to build Great Streets, with expenditures limited to that purpose. If the County agrees to the concept, the City can consider a petition of the local landowners with a Preliminary Project Plan and Preliminary Feasibility plan. If the City Council approves the TIRZ and the LGC, then the TIRZ Board can create the final project plan for final Council approval. If the TIRZ is in place by 12/31/2000, then the first increment would be available in 2002. The funding can be used as matching money for grants received, as well as for incentive grants provided to developers, and for specific projects.
Maintenance and Management Funding

Nationally, greenway and trails maintenance funding has been supported, traditionally, by public sector resources. The burden for maintaining the Waller Creek Greenway should be spread among several different public and private sector partners. For example, if businesses whose property abuts the greenway would agree to partner with the City of Austin to maintain the stretch of greenway that extends from property line to property line, this could serve to reduce annual maintenance costs for the greenway. This can extend to neighborhood associations and non-profit organizations.

Another opportunity to financially support the maintenance and management of the Waller Creek Greenway would be to establish a greenway trust fund, perhaps as an account within another existing trust fund. This fund could seek to raise a specified dollar amount as a principal balance. This money would then be invested and the interest from the investment would be used to offset the cost of annual maintenance. A local bank might agree to work with the Downtown Austin Alliance or the City of Austin to manage the investment account. The other benefit of the trust fund is that in the event of catastrophic damage to greenway facilities, the principal balance could be used to make emergency repairs. Thus, the trust fund has a dual purpose.
Greenway Action Plan

Overview

The following text defines actions and activities that should be undertaken during the next three calendar years to complete capital improvements for the Waller Creek Greenway. Additionally, management recommendations are provided for each year. It is hoped that as a result of the public-private partnership that has been established, significant improvements to the Waller Creek Greenway will be realized, and the project study area will be transformed into the community asset that was envisioned more than 25 years ago.

Action Item 1: Acceptance of Action Plan

This Plan was prepared for the Waller Creek Greenway Partnership. The City of Austin is one of the partners, along with Waller Creek property owners and downtown businesses. It is important that these groups accept the recommendations and guidelines defined within this plan. The Austin City Council should take actions appropriate to accept this Plan and instruct city agencies to implement the recommendations that are appropriate. It is also important that city agencies work in partnership with property owners and businesses to implement the design development philosophy expressed within this Plan.

Action Item 2: Define Fixed Source of Funding

Financial support for the recommendations within this Plan is absolutely essential. Several funding sources have been identified within this Plan. The most intriguing involves the establishment of a Tax Increment Reinvestment Zone for the Waller Creek corridor. The Austin City Council should request a more thorough examination of this funding method to determine if this can provide a fixed source of funding for both capital development and operations/maintenance.

Action Item 3: Define Maintenance and Management Plan

A partnership approach between the City of Austin and private property owners and businesses will be essential for successful maintenance of the Waller Creek corridor. A specific management program should be defined by the City and the private sector to address and resolve maintenance and management issues associated with the Creek landscape. This Plan outlines several operational issues that should be defined through this partnership approach.
Action Item 4: Physical Improvements to Waller Creek Corridor

The Waller Creek hike and bike trail will most likely be completed through a partnership between the City and private sector development interests. The public and private sector should embrace the concepts for a three-tier trail system defined in this Plan and implement this system as development takes place throughout the Waller Creek corridor. The current creek-side trail system south of Cesario Chavez will most likely be constructed by the private sector. The City of Austin should focus its efforts on making other elements of the creek-side trail bicycle friendly. The street level trails will most likely be developed by private sector concerns. While the on-street bicycle and pedestrian improvements should be the concern of the city.

Action Item 5: Event Programming

Waller Creek will reach its full potential as a destination landscape once the facilities along the creek become programmed with activities. Public and private sector organizations should work in partnership to host a variety of different events along the greenway throughout the year. Programming will provide the public with repeated positive exposure to the creek environment and improve the public's perception of the Waller Creek corridor.