City of Citrus Heights

Creek Corridor Trail Project

Feasibility Report

Accepted by City Council
March 27, 2014

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Acknowledgments

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1 Executive Summary

1.1 Project Purpose

The Citrus Heights Creek Corridor Trail Project (CCTP) is a study of the major creek and SMUD utility corridors within the City of Citrus Heights with the primary purpose of determining corridor suitability for multi-use trails. The CCTP project arises directly from some of the earliest planning decisions that were made by the newly formed City of Citrus Heights.

The City was established in 1997 after a long legal battle for incorporation. By 2000, the City adopted its first General Plan, to guide the new City into the future. With development of the General Plan, the City has determined its own Goals, Policies, and Objectives to implement as the City continues to prosper.

Many of these broad goals are related to quality of life in the community, including policies that are intended to create new activities and features in the community that will improve overall quality of life. Several of these goals are also related to Open Space and recreation, including:

Goal 38: Establish a system of creekside trails, passive open space, and parks for public use.

Although this goal was identified in the City's first General Plan, a road map or plan for creating a system of creekside trails had not been identified at that time. In the early 2000's the City began the process to adopt its first Bicycle Master Plan, including identification of bicycle facilities along creek corridors. The Bicycle Master Plan identified potential locations along all City creeks; however, the feasibility, costs, design parameters, and maintenance requirements were unknown. Due to the unknowns associated with this approach, City Staff focused the Bikeway Master Plan towards on-street bike facilities, until such a time that the feasibility of creek trails could be explored in greater detail.

In 2011, the City also adopted its Greenhouse Gas Reduction Plan (GGRP), which calls for a variety of measures to reduce greenhouse gas emissions in the community. Alternative transportation modes, such as bicycling and walking, are identified in the GGRP as a key strategy.

In order to assess the feasibility of creekside trails called for in Goal 38 and in support of the GGRP, the City determined that a comprehensive approach to evaluating potential trail locations, including a robust community outreach component, was needed. In 2011, the City applied for and received funding for the development of the Creek Corridor Trail Project from the Sacramento Area Council of Governments (SACOG) Regional Bicycle and Pedestrian Funding Program with a local match from Measure A funds

In 2012 the City Council directed City Staff to proceed with the Creek Corridor Trail Project, including establishment of a project specific Trail Advisory Group (TAG).

1.2 Study Area

The City of Citrus Heights contains over 20 miles of creeks, including Arcade Creek, Cripple Creek, and Brooktree Creek. The open space encompassing the creek corridors varies from narrow ribbons to broad corridors over 100 feet in width. This land includes privately owned residential and commercial parcels, as well as land owned by public entities such as the City of Citrus Heights and Sunrise Recreation and Park District. Easements have been established in numerous locations on private property that provide for the potential use of the land for public trails. SMUD utility corridors in the east part of the City also provide opportunities for trails that could connect future trails along Arcade Creek and Cripple Creek, and eventually provide access to regional trails via the Folsom State Recreation Area. This study examines the City's creek corridors and the SMUD utility corridor for the feasibility of constructing multi-use trails in these locations. Equestrian trails, which would be separated from bicycle/pedestrian trails, are not formally studied as part of this effort. However, equestrian trails could be considered for certain areas of the City in the future based on demand and available space.

This report is the final product of the feasibly analysis. In the previously completed Background Analysis report, all corridor segments were analyzed to determine which had the greatest possibility to accommodate multi-use trails. The Background Analysis indentified over 80 discrete segments. Of these, 60 segments were found to merit further evaluation and are the focus of this report. Analysis of these segments included a variety of techniques and data sources including extensive field investigations; recent aerial imagery; GIS data on ownership, topography, streets, parcels, floodplain and floodway; and records of easements and parcel descriptions.

1.3 Public Engagement

The CCTP included an extensive public outreach component. The public outreach strategy was designed to actively engage all stakeholder groups with an interest in trail development, and to learn about their preferences, concerns, and ideas. A wide variety of outreach techniques were used, including two community meetings, a project web site, a Trail Advisory Group (TAG), key stakeholder interviews, an on-line survey, and presentations at Neighborhood Area meetings.

A diversity of viewpoints was compiled throughout the public engagement process. Many people expressed support for the future development of multi-use trails in the City's creek corridors, noting the recreation, transportation, and quality of life benefits. However, many people also noted concerns about potential safety issues, loss of privacy, impacts to the environment, and the fiscal implications of trail construction and maintenance. It will be critical for the City to respond to these concerns through good trail design and management practices, as well as a robust engagement with residents when new trail segments are proposed for construction.

1.4 Trail Priorities

The technical evaluation of trail feasibility conducted as part of this study found a significant amount of land within the

corridors suitable for trail development. Priorities for implementation are assigned to creek segments based on numerous criteria, including the recreation and transportation value of the segment, availability of public land or easements, and ease of construction. Approximately 4.2 miles of Priority 1 trails are identified. These include Arcade Creek from Crosswoods Park to Fair Oaks Boulevard, the SMUD utility corridor from Streng Avenue to Kenneth Avenue, and Cripple Creek through Mesa Verde High School. The cost in 2014 dollars to implement all Priority 1 segments is about $12.4 million.[1] About 67 percent of the proposed alignments are on public property. Another 24 percent are within public trail easements. Only about 9 percent are on private property.

Priority 2 segments total approximately 7.4 miles and include lower Arcade Creek, portions of the Arcade Creek tributaries, upper Cripple Creek from Old Auburn Road to Twin Oaks Avenue, lower Cripple Creek below Van Maren Lane, the lower Cripple Creek tributary (called Tributary 3 in this study), and portions of Brooktree Creek around Shadowcreek Park and between Hickorywood Way and El Sol Way. The cost in 2014 dollars to implement all Priority 2 segments is about $26.1 million. About 55 percent of the proposed alignments are on public property, with another 5 percent located within public trail easements. About 40 percent are on private property.

All remaining segments are assigned Priority 3, and total almost 5.1 miles. The cost in 2014 dollars to implement all Priority 3 segments is about $14.7 million. About 47 percent of the proposed alignments are on public property. Another 2 percent are within trail easements, and about 50 percent are on private property.

[1] Estimated costs include design, environmental compliance, and property or easement acquisition. Annual maintenance costs are not included.

1.5 Access Nodes

The value of a future trail network will depend in part on how easy it is for residents to access the trails from their neighborhoods and public locations. This study identifies 4 different types of access nodes, characterized by access to parking and the level of amenities located at the site. Over 25 node locations are identified in the study, ranging from neighborhood (Type A) through regional (Type D).

1.6 Engineering Considerations

Construction of a city-wide trail network is an ambitious undertaking with numerous engineering challenges. There are numerous locations where road crossings will need to be developed to implement a safe and meaningful network of connected trails. More than 40 specific crossings are identified for the entire network of creek and utility corridors. Each crossing treatment is also defined. Treatment options include:

- No crossing, where trail is discontinuous
- Non-signalized at-grade crossings (crossings at street level without a signal)
- Directed toward adjacent intersection or crossing (using existing crossing/intersection nearby)

- Signalized at-grade crossings (crossing at street level with signal)
- Grade-separated crossings

Creek crossings will also be needed as part of trail construction in order to align the trail to minimize environmental impacts and maximize accessibility. Approximately 25 creek crossings are identified in this study, with the length of the span and type of crossing (culvert or bridge) identified for each.

Other important engineering considerations addressed by this study include utility impacts, floodplain constraints, visibility, geology, topography, and creek hydrology. As detailed engineering get underway for any given trail segment, the conceptual alignments as shown in this report will be adjusted and refined to minimize impacts, reduce costs, and otherwise improve the trail function.

1.7 Design Standards

Since the trails addressed in this study will be implemented over many years, Design Standards are provided for various trail system elements. The guidelines will help direct future design to ensure uniformity and consistent quality in the construction of each segment within the network. Guidelines address issues such as trail geometry, signage, retaining walls, pavement markings, trail user safety, and property owner security.

1.8 Construction Funding

The future construction will be funded by a variety of sources, primarily through grant funding. The Feasibility Report prioritizes future trail construction by segment so that grant funds can be sought after and applied to the most important segments first. Because the type and location of the trails envisioned for the City of Citrus Heights will provide recreation and transportation benefits, the range of potential grant funding sources is diverse. There are a number of federal, state, and private programs that provide funding for trail projects. These include the various programs run by the Federal Highway Administration and funded by the federal fuel taxes. Caltrans, California State Parks, and SACOG also play a role in providing trails funding. Grant programs focused on community wellness, water quality, urban forestry, and environmental education may also be potential funding sources for aspects of the trail network.

1.9 Maintenance Costs

Basic trail maintenance includes activities such as vegetation management, replacing striping, litter control, and surface repairs. Data gathered from other communities in the region with trail networks similar to what is envisioned for Citrus Heights indicate that it currently costs between $3,000 and $4,000 each year to provide this basic maintenance per mile of trail. As trail segments are proposed for implementation, it will be necessary for the City to evaluate the specific maintenance costs for each segment and identify funding sources. A commitment to regular maintenance is essential for the safety

of trail users as well as residents whose homes are adjacent to the trails. Trail advocates can also participate in maintenance activities as volunteers and stakeholders.

1.10 Implementation

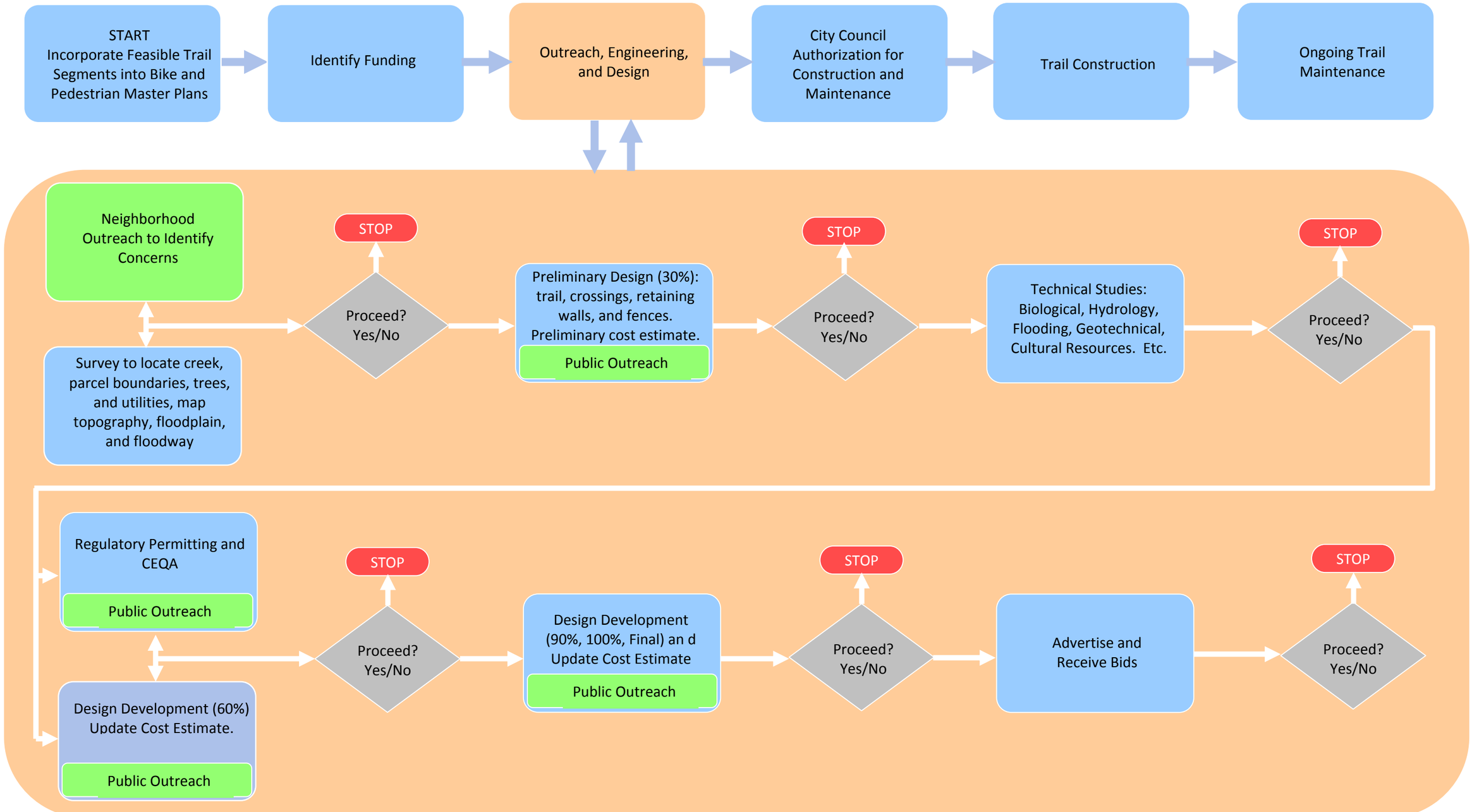
This report identifies over 16 miles of trails for potential implementation. Full implementation is a long-term vision, taking perhaps 20 years or more to complete, depending on availability of funding.

It is expected that Priority 1 trail segments will be implemented first, since these segments are largely on public land or easements and provide significant connections within the City. Implementation of the Priority 1 segments will provide the City with valuable information about best practices for construction, maintenance, and public safety before moving on to Priority 2 and 3 segments that may require new easements or acquisitions of private property. Once Priority 1 trails are constructed, Citrus Heights residents will be able to observe how the trails are being used, what they look like, and how they impact the creek corridors. This knowledge will help inform the public input process as Priority 2 and 3 trails are considered for implementation.

Before any individual trail segment can be constructed, there will need to be a careful, detailed analysis of funding and technical factors along with public input. Assuming that funding is available for trail implementation and maintenance, it is anticipated that it will take from 2 to 3 years to complete the full implementation process for a given segment of trail. There will be many points during the process at which the construction may be abandoned if unacceptable costs, impacts, or other constraints arise.

The implementation process will begin with neighborhood outreach to identify any concerns, concurrent with mapping and surveys to locate the creek, parcel boundaries, trees, utilities, topography, floodplain, and floodway. Preliminary design and technical studies will then be performed including biological and cultural resource assessments, tree surveys, geotechnical studies, and hydrological models to assess flood impacts. This information will be used to complete CEQA environmental analysis and to obtain the required federal, state, and local permits. Design development will continue with refinements as needed to respond to regulatory requirements. Public input opportunities will be incorporated throughout the environmental and design process.

Figure 1 - CCTP Implementation Process



2 Introduction

2.1 Overview

The Citrus Heights Creek Corridor Trail Project (CCTP) is a feasibility study of the major creek and SMUD Utility corridors within the City of Citrus Heights with the primary purpose of determining corridor suitability for multi-use trails (see Figure 2). Off-street, multi-use trails are desirable as a form of recreation and alternative transportation. Use of trails helps to improve health, reduce carbon emissions, increase appreciation for and understanding of natural resources, and reduce wear on local roadways by reducing vehicle miles traveled.

A multi-use trail is a trail that accommodates a range of transportation modes, including walking, jogging, biking, skateboarding, strollers, rollerblading, other non-motorized uses, and personal mobility devices

The suitability of a creek corridor for a multi-use trail is dependant upon both physical and social factors. Physical factors include landform, vegetation, and hydrologic characteristics such as topography, floodplains, corridor width, soil stability, erosion potential, and presence of sensitive flora or fauna. Social factors include land ownership patterns, presence or absence of existing informal trails, locations of desired destinations, regional connections, and community opinions about trails. A study of both physical and social factors is necessary to determine where trails should and should not be constructed in the future. This study will form the foundation for a long-range plan of trail development for the City of Citrus Heights.

A multi-use trail is typically a paved trail from 8-feet to 12-feet in width with 2-foot unpaved shoulders, physically separated from the street. Off-street trails are often preferred by trail users over on-street routes, possibly because they are thought to be more pleasant and safer, due to lower noise, distractions and potential for conflict with automobiles. Typical on-street routes include sidewalks and Class II and III bike lanes. A Class II bike lane consists of a striped, designated bikeway

located on a street. A Class III bike route provides for shared use between bicycles, pedestrians and automobiles[2].

Creek corridors are often primary candidates for off-street trails at locations throughout the United States and the world. Much of the available land in Citrus Heights has been developed, and the creek and utility corridors represent some of the only remaining large, connected open space areas. Land within the 100-year floodplain, which has typically been preserved and cannot be used for development, is often well suited for multi-use trails. Physical and social constraints noted above dictate the actual suitability based upon an analysis of factors developed within the broader study.

The City of Citrus Heights has over 20 miles of creek corridors within city limits, consisting of Arcade Creek and its tributaries. Arcade, Cripple, and Brooktree Creeks are the three primary waterways, into which a number of other named and unnamed tributaries flow, including Coyle, Mariposa and San Juan creeks. Cripple Creek joins Arcade Creek near the Greenback Lane bridge on the southwestern edge of the City, and Brooktree Creek joins just outside the city limits. Arcade Creek discharges into Steelhead Creek on the Ueda Parkway and thence into the Sacramento River near the confluence with the American River. The CCTP studied the three major creek systems and their primary tributaries, as well as the SMUD corridor from Wachtel Way to Tempo Park, because this corridor forms an important link between the headwaters of Arcade and Cripple Creeks and is also a significant open space system within the City. The study also examined a portion of Orangevale through which the SMUD corridor passes.

The CCTP is divided into a number of phases, as follows:

1. Community Engagement and Stakeholder Facilitation
2. Background Analysis, including the following subtasks
   2.1. Preliminary Screening
   2.2. Opportunities Analysis
   2.3. Constraints Analysis
   2.4. Background Analysis Summary Report, and
3. Feasibility and Trail Alignment Analysis

This report concludes the Feasibility and Trail Alignment Analysis phase. It combines the results of the Background Analysis with recommendations for specific trail alignments and priorities. This report also discusses General Plan policies, goals and objectives related to trails, and provides detailed cost estimates, designs guidelines, and implementation priorities.

[2] Caltrans Highway Design Manual, Section 1001.4. 2006.

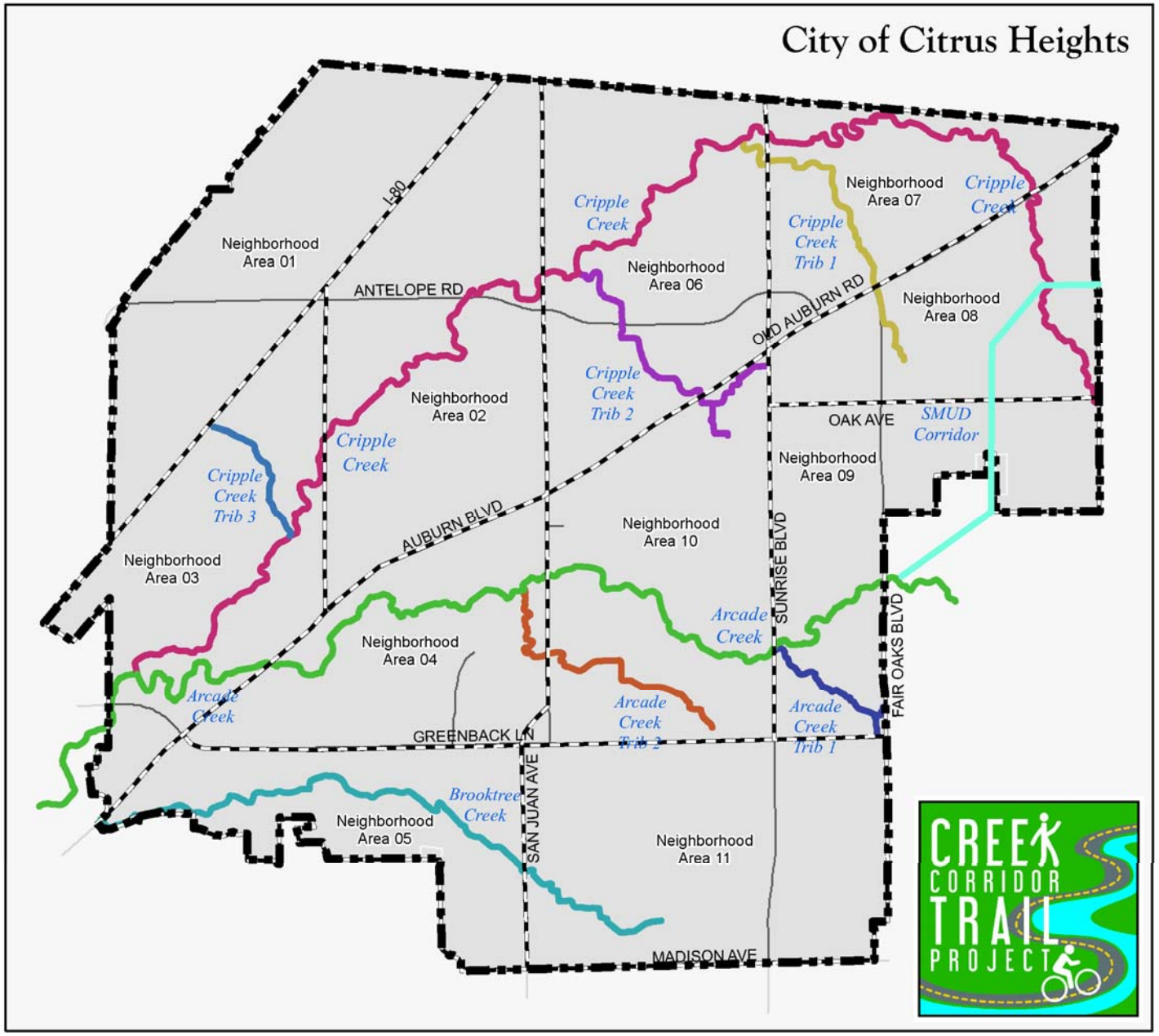


Figure 2 – Study Area

2.2 Goals and Objectives

Overall City goals for this project include the following:

- Improve mobility by creating new ways to travel between local destinations,
- Create Complete Streets designed for all users,
- Become more sustainable through improving air quality, reducing greenhouse gases and reducing traffic,
- Improve recreational opportunities,
- Enhance the natural environment through improving water quality, reducing flood risks and improving access to natural features, and
- Improve public health.

Additionally, the City of Citrus Heights has specific project goals and objectives for the CCTP. Goals are typically what you want to do, and objectives are how you are going to accomplish the goals. Specific goals involve connecting destinations to improving access, recreation and transportation choices, specifically:

- Provide improved connections to key destinations such as schools, shopping areas, neighborhoods, parks and other trail networks for pedestrians and cyclists,
- Improve access to the creek corridors for residents of all abilities,
- Increase the number of recreational facilities to more neighborhoods, and
- Improve transportation choices in the City.

Objectives for these goals involve conducting this feasibility study, involving the community in the various projects, and revising policy documents to incorporate new trails, as follows:

- Evaluate the feasibility of optimizing the existing creek and utility corridors by creating a multi-use trail network,
- Engage the community to fit the project within the context of the community, and
- Incorporate feasible trail segments into future policy documents, including the General Plan, the Pedestrian Master Plan, the Bikeway Master Plan, the Safe Routes to School Master Plan and the ADA Master Plan.

Additionally, The Citrus Heights General Plan includes the following polices related to trail-use:

- **Goal 29**: Plan, design, construct, and manage a Complete Streets transportation network that accommodates the needs of all mobility types, users, and ability levels.
- **Goal 34**: Preserve, protect, and enhance natural habitat areas, including creek and riparian corridors, oak woodlands, and wetlands
- **Goal 38**: Establish a system of creekside trails, passive open space, and parks for public use.
- **Goal 59**: Ensure that ample and appropriate parks and recreation facilities and programs are available to all residents.

3 Public Outreach

The Creek Corridor Trail Project included a robust community engagement program to gather input from Citrus Heights residents throughout the process. The engagement program included multiple ways of reaching out and involving the community throughout the project to ensure the final plan responds to community concerns and fits within the context of Citrus Heights. The following represents a summary of public engagement activities completed to date.

3.1 Trail Advisory Group (TAG)

A Trail Advisory Group (TAG) comprised of local stakeholders is assisting the project team to evaluate the creek and SMUD corridors for trail feasibility while ensuring any future trail system fits within the context of the community. The TAG was convened by the project team in order to include representatives from a variety of community groups and organizations. The TAG includes the following organizations:

- Neighborhood Association representatives (four representatives)
- Area 4 Agency on Aging
- San Juan Unified School District – Safe Routes to Schools
- Sacramento Area Bicycle Advocates
- WALK Sacramento
- Citrus Heights Regional Chamber of Commerce
- Sacramento Area Creeks Council
- Citrus Heights Neighborhood Watch
- Citrus Heights Collaborative

The project team hosted six TAG meetings throughout the process to receive input on opportunities and constraints, preliminary screening results, and potential trail segments. The first TAG meeting included an exercise to identify community values related to a trail system in Citrus Heights. The project team compiled the responses to develop the following community value goals, which were reviewed by the TAG:

- Create a system that is safe, accessible to all, and does not destroy the environment.
- Preserve the natural unspoiled beauty of the creek corridors by creating a trail that is the right size for the community.
- Avoid unfriendly or confusing trails and harm to wildlife.

The TAG also participated in two field walks. The first field walk was held in Citrus Heights to familiarize TAG members with the nature of the creek corridors, and to help them understand some of the opportunities and constraints. A second field walk was held in Folsom to view an established trail system, and to encourage TAG members to consider pros and cons of similar trails in the Citrus Heights community.

Figure 3 – TAG Members on Folsom Trails Field Trip

3.2 Stakeholder Interviews

In addition to formulating the Trail Advisory Group with representatives from numerous stakeholder groups, the project team used several other focused outreach strategies to encourage input from additional key stakeholders and gather input about the project. Personal interviews were conducted with SMUD staff to explore opportunities for trail development within their utility easement. Citrus Heights and Roseville real estate professionals were interviewed to better understand their perceptions on the impact of trails on property and resale values. Orangevale Recreation and Park District (ORPD) staff were also interviewed to discuss collaboration and ORPD's vision for trails within their service area. A workshop was held for children participating in the Citrus Heights Police Activities League to learn when they might use trails and potential destinations. At the Sunday Funday event, families with children were surveyed to learn their thoughts about potential pros and cons of creek corridor trails. These focused stakeholder outreach efforts allowed the project team to collect more targeted information related to the stakeholders' particular needs and preferences, and to gauge the consistency of the TAG member's perspective as compared to other stakeholders.

3.3 Neighborhood Area Presentations

Presentations were made to each of the eleven Neighborhood Associations twice during the project. This was done to ensure that residents were informed about the project status and direction, and to provide them with an opportunity to share their thoughts directly with the project team.

The first round of presentations occurred early in the project with the intention of introducing the scope of the effort and to highlight the future opportunities for public engagement. The second round of presentations was given after the Background Analysis Report was completed. At these meetings, the project team provided an overview of findings for creek corridors located in the specific Neighborhood Area. A presentation was also given that summarized some of the main areas of residents' concern and strategies to respond to these concerns.

This presentation focused on Public Safety, Maintenance, and Environmental Impacts.

3.4 Community Workshops

Figure 4 – First Community Open House Workshop

On May 14, 2013 the project team hosted a Community Open House that was attended by over 150 community members. Community workshop notification flyers were sent via e-mail to local jurisdictions, interested agencies, vicinity organizations, businesses, and interested individuals. In addition, over 8,500 notification postcards were mailed to residents who lived within 500 feet of the creek and SMUD corridors within the City limits. Additional notifications were sent through the REACH neighborhood associations, the City's e-notifier, and the project Trail Advisory Group. The workshop notice was also posted to the City's website and the project website, and was announced on the changeable message sign in front of City Hall for two weeks leading up to the workshop. The workshop was also publicized in a Sacramento Bee article about the project that appeared on the front page of the Our Region section the day before the workshop.

The purpose of the workshop was to introduce the project, its goals, the public engagement process, and to obtain initial input from the community to help inform the feasibility study. The open house format included various information stations where attendees could view graphics, maps, and other project information materials. Representatives from the City and the project consultant team were available to discuss the project and answer questions. Input gathered from the attendees included positive comments about the transportation, recreation, and quality of life benefits of a citywide trail system to concerns about trail and property owner safety, residential privacy, and environmental impacts.

A second Community Open House workshop was held on January 14, 2014. Over 150 community members attended the event. The workshop was preceded by the release of the Draft Feasibility Study and posting of the Online Engagement Tool on the City's website. Similar notification methods were used as with the first Open House.

The purpose of the workshop was to receive feedback from residents on all aspects of the study, including specific

alignment recommendations, priorities, design guidelines, etc. The project team and City Project Manager provided an overview presentation of the project progress, including strategies to address concerns raised by residents about various issues including safety, privacy, and environmental impacts. Attendees were encouraged to mark up maps of proposed trail alignments through their neighborhoods and talk with the project team about all aspects of the Draft Feasibility Study. An informational brochure describing the goals and overview of the project was provided, along with a Frequently Asked Questions (FAQ) flyer, and a comment card to provide input on the project. Comment cards could be turned in at the workshop, or returned via email, fax, or mail.

General comments gathered from the attendees restated many of the same concerns that had been raised throughout the earlier project outreach events, such as trail and property owner safety, residential privacy, flooding, property values, and environmental impacts. In addition, specific comments and questions about individual trail alignments were also provided as residents were able to look at the detailed maps showing property boundaries and the conceptual alignments. As a result of these comments, several trail sections were revisited and the alignments adjusted.

3.5 Community Survey

An informal on-line survey was implemented early in the project to better understand the initial perspective of community members about the benefits and perceived issues related to a community trail network within Citrus Heights. The survey also provided a way to check if the input from specific stakeholder interests was consistent with the larger community. The objective of an early survey was to inform the planning process and endeavor to fit the trail network within the community values and context of Citrus Heights. The survey received over 300 responses.

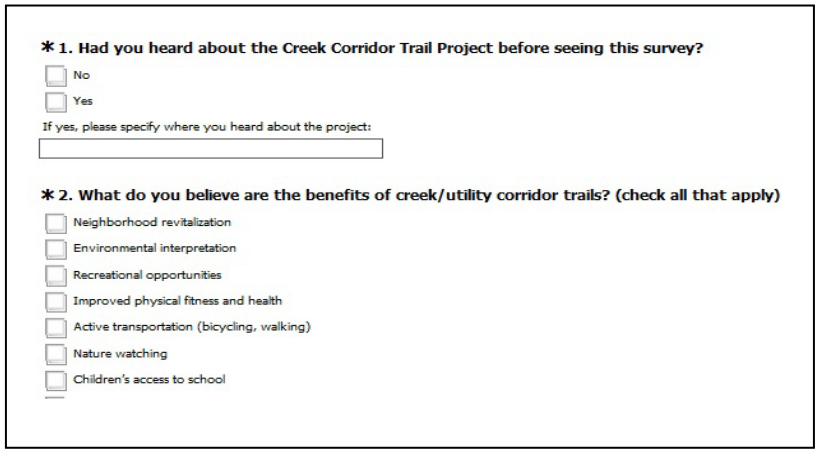


Figure 5 – Sample Online Survey Questions

A highlight of survey results is included below:

Benefits of Trails

A substantial portion of respondents stated that a primary community benefit of trails is for recreational or fitness purposes. In addition, many respondents (more than 200) stated that trails would offer opportunities for nature watching.

- More than 75 percent cited trails provide recreational opportunities

- More than 70 percent cited improved physical fitness and health
- More than 60 percent cited nature watching

A secondary community benefit of trails identified in the survey was providing additional transportation options

- 71 percent selected trails provide opportunities for active (walking, bicycling) transportation
- More than 50 percent identified reduced exposure to auto traffic

Concerns about Trails

The biggest concerns about trails that were cited were safety and security of nearby property owners and trail users. Safety and security for nearby property owners was cited by 70 percent of the respondents. More than 60 percent cited safety and security for trail users. A related concern, after hour's activity, was the third most cited concern (56 percent).

In addition, the survey allowed for respondents to add additional concerns. A substantial number of those comments included concerns about potential negative impacts to private property, including: the possibility of the City needing to secure large portion of private land for trail access, potential increase of vandalism, decrease in privacy for homeowners and changing the rural experience in certain neighborhoods.

Trail Usage

Of total survey respondents more than 80 percent said they would use the trails daily, often, or sometimes. Another 18 percent said that they would hardly ever or never use the trails.

3.6 Connections Articles

In addition to the in-person meetings and outreach with community members, the project team utilized the City's *Connections* publication to keep residents informed about the project. *Connections* is a newsletter distributed by the City to every address within the City limits. At the start of the project, an article introducing the project, the public engagement process, and the date of the first community workshop was placed in *Connections*. In addition, a few months after the initial workshop, a follow-up article ran detailing the workshop results and project progress.

3.7 Project Website

A project specific website was established early in the process to serve as a place for community members to easily access up to date project information. The website includes background information about the project and process, a project schedule, frequently asked questions, and all materials used at TAG and Community meetings. The website also includes contact information for questions about the project.

3.8 Online Public Engagement Tool

As part of the engagement process, the project team implemented an online public engagement tool to receive additional input from the community. The engagement tool was used to obtain site-specific input related to proposed trail segments within each neighborhood area. The tool also provided a further opportunity for the project team to verify the consistency of input received throughout the public process. The tool included graphic displays of the corridors to easily identify areas of opportunities and concerns and to allow community members to provide input on community values and goals for the trail system. Over 90 community members provided their feedback. Concerns expressed in their comments included:

- Safety and security for nearby property owners
- Concern for flooding
- Loss of privacy
- Loss of habitat for native animals
- Impacts to property values
- Cost of construction and funding for maintenance

Opportunities expressed in their comments included:

- Opportunity to create a sense of community
- Better connections to other community amenities
- Addresses a demand by residents to walk safely in their neighborhoods
- Increases opportunities for a healthy lifestyle
- Will help to attract younger families to Citrus Heights

3.9 Public Hearings

City staff and the project team provided updates to the Planning Commission and City Council throughout the process. At the conclusion of the study, staff and the project team presented the final Feasibility Study to the Planning Commission and the City Council for their review and acceptance.

4 Existing Conditions

4.1 Natural Resources

The condition of natural resources within the corridor ranges widely from relatively undisturbed to heavily modified. In general, the stream channel in Arcade and Cripple Creeks has not been significantly engineered and remains largely in a natural state, though incised due to urbanization. Brooktree Creek includes a segment in which the channel shape has been modified as well as armored with concrete. Creek channels on all three main branches have undergone incision, with the Arcade Creek main stem experiencing significant incision of 8 to 10 feet in some areas. This is particularly prevalent in lower segments and is primarily due to the urbanization of the watershed which resulted in increased impervious surfacing, higher stormwater flows and greater erosive forces on creek bed and bank. The main stem receives much of the runoff from the commercial areas around Greenback Lane between Fair Oaks Boulevard and Fountain Square Drive, which contribute significant amounts of runoff during storm events.

Cripple Creek has not been impacted as significantly as Arcade, probably due to the larger lot residential patterns in its middle watershed and corresponding lower percentage of impervious surfacing. Brooktree Creek is significantly incised downstream of the concrete section, possibly due to the effects of sediment-hungry, high-velocity water exiting the armored segment, but lower volumes of flow have generally resulted in less incision than on the Arcade Creek main stem. The channels in the upper watersheds of all three main tributaries are generally less incised and in better ecological condition than the lower segments.

Widths of the open space corridor also vary widely, from less than 100-feet in several areas along the main stem to over 600-feet in Stock Ranch Nature Preserve. Corridor widths generally grow wider as one moves from the upper to the lower watershed, which is expected since open space is usually set-aside based upon floodplain; however, width was a direct result of set-asides during development and thus varies according to land use, regulations in place at the time of development, market conditions and specific developer. The main stem generally has wider open space corridors than the tributaries, again likely related to flooding levels.

Riparian vegetation ranges from relatively open to sufficiently dense to prevent ready pedestrian access. Canopy coverage is generally related to corridor width, with wider corridors having more trees and undergrowth. As with corridor width, riparian condition was related to land use practices and open space set-asides.

4.2 Geology and Soils

Geology and soils are important factors to understand in determining suitability of an area for trails. Soil characteristics influence vegetation, erosion, slope stability, infiltration, stormwater runoff and requirements for retaining walls and bridge footings. If native soil is suitable for use as fill material, it can be used in trail construction to help meet ADA

requirements. If it is not suitable, import of engineered fill may be necessary. As with soils, the underlying geology also influences trail constructability. Geology determines wall and bridge footing depths, slope stability at depth and creek channel morphology. Due to higher stormwater discharge flows due to increased runoff from more impervious surfacing, many urban creeks, including Arcade Creek, have undergone a period of downcutting. This downcutting typically occurs until the underlying bedrock is reached, at which time excess erosive energy goes into channel widening until the creek reaches a new hydrologic balance based upon the increased flows.

All creeks, including those in urban areas, operate in a state of hydro-dynamic balance in which they move across their floodplains, eroding soils on the outside of meander bends and depositing it on point-bars on the inside of meanders further downstream. These erosive forces can create a range of problems in an urban context such as unstable slopes, damage to private property and structures, changes in channel capacity, and impacts to riparian vegetation. This geomorphic regime also poses challenges for trail systems located along creeks, particularly when trails are in proximity to those outside bends and unstable slopes. Stabilization of meanders may be required, preferably through the use of bioremediation techniques but in some cases requiring rip-rap or other bank armoring. Geology and soils will determine the rates of erosion and deposition, the degree of slope instability, and the possible solutions.

Major soil groups within the creek corridors include the following:

- Fiddyment Fine Sandy Loam,
- Fiddyment-Orangevale Complex,
- Fiddyment-Orangevale-Urban Land Complex,
- Fiddyment-Urban Land Complex,
- Liveoak Sandy Clay Loam,
- Urban Land, and
- Urban Land-Xerarents-Fiddyment Complex

The Fiddyment series is a moderately deep, well drained soil formed in material weathered from valley fill sediments from mixed rock sources. This soil has a strongly cemented claypan at 28 to 40 inches, which will form a perched water table during the rainy season. Soil is well drained with slow to medium runoff and very low permeability. Depth to water table is more than 80 inches. Erosion potential is slight to moderate and shrink-swell is moderate.

The Orangevale series consists of very deep, well drained soils formed in coarse textured alluvium derived predominantly from granitic rocks. Runoff is variable and permeability is moderate. Fiddyment-Orangevale complex is 55 percent Fiddyment and 30 percent Orangevale. Erosion potential of this complex is moderate.

Urban land is a term applied to developed areas where soil has been manipulated, disturbed or transported from its original configuration to the extent that the original characteristics are no longer present. Fiddyment-Urban Land Complex consists of 70 percent Fiddyment soils, 20 percent Urban Land Complex and 10 percent minor components (Kaseberg, Orangevale, Xererants and unnamed elements). Fiddyment-Orangevale-Urban Land Complex consists of 40 percent

Fiddyment, 25 percent Orangevale, 20 percent Urban Land and 15 percent minor components.

Xerarents are soils that do not have defined horizons because of deep mixing through plowing, spading or other methods of human modification. Xerarents are well mixed soils that have a xeric (very dry) soil moisture regime. Soils are well drained and formed of alluvium derived from granitic sources. Urban Land-Xerarents-Fiddyment Complex consists of 40 percent Urban Land, 30 percent Xerarent, 15 percent Fiddyment and 15 percent minor components.

The Liveoak series is a very deep, moderately well-drained soil formed in loamy alluvium from mixed sources. Soils are found on low alluvial terraces and in old distributary channels on low terraces. Runoff is negligible to low, and permeability is moderate. A seasonally high water table may occur as shallow as 11 inches below the surface for brief periods during intense storms and ranges from 11 inches to 65 inches during the rainy season. Erosion potential is slight.

4.3 Hydrology

The three creeks that compose the study area form the backbone of the hydrology within the City of Citrus Heights. Arcade Creek, Cripple Creek, Brooktree Creek and their tributaries carry surface water from the City's stormwater network into Steelhead Creek which discharges into the Sacramento River. Urbanization of the watershed has had significant impacts on the creek system, typically resulting in higher maximum stormwater peak flows and incised and widened stream channels.

The City contains over 23 miles of creeks, divided as shown in Table 1.

Table 1 – Creek Lengths

Creek	Length (miles)
Arcade Creek	6.1
Arcade Creek Tributary 1	0.8
Arcade Creek Tributary 2	1.5
Brooktree Creek	3.1
Cripple Creek	8.3
Cripple Creek Tributary 1	1.6
Cripple Creek Tributary 2	1.7
Cripple Creek Tributary 3	0.7

Cripple Creek is the longest creek in Citrus Heights, followed by Arcade Creek and then Brooktree Creek.

The areas of the three watersheds follow a similar trend. At 8.0 square miles, Cripple Creek and its tributaries occupy the most space within city limits. The Arcade Creek main stem and its tributaries encompass 4.6 square miles, and the Brooktree creek watershed covers 1.6 miles. Figure 6 illustrates the subwatersheds within the City.

Stream flow data for Cripple Creek and Brooktree Creek is not available, but the USGS maintains a gauging station on Arcade Creek downstream of the City limits (near Del Paso Heights). That gage recorded maximums flow between 1964 and 2012 from under 500 cubic feet per second (cfs) in 1976 to over 3500 cfs in 2006. Since the gauging station is downstream of the confluences, those flows included discharges from all three

creeks. Average monthly flows in 2012 ranged from 0.0 in June through September (the creek was dry) to 47 cfs in March. An examination of maximum daily flows for 2012 shows highs of 374 cfs in January, 349 cfs in March, and 486 cfs in April. Peak daily flows tapered off rapidly in late April to less than 1 cfs by May 13th and declining to zero by June 23rd.

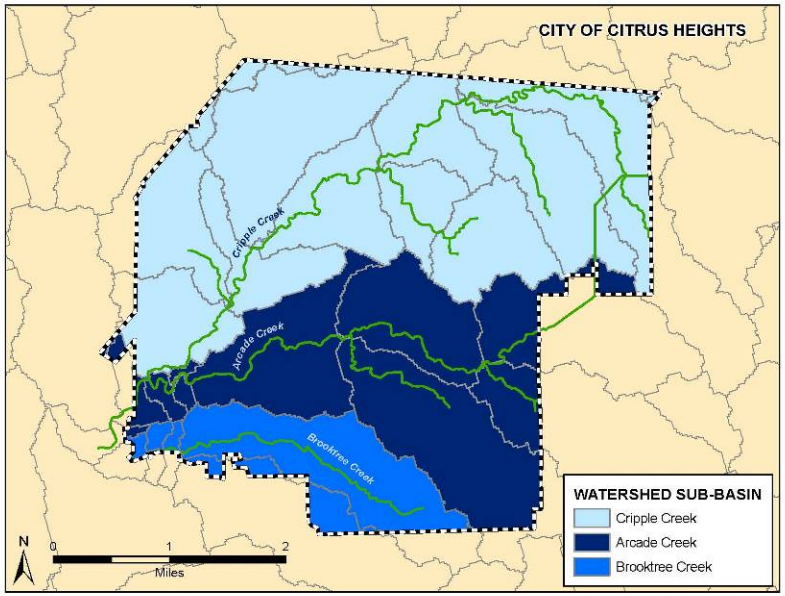


Figure 6 – Subwatersheds

4.4 Property Ownership

The portion of the study area in public ownership is 46 percent. The majority of this is owned by SRPD or the City, with remaining ownership by Sacramento County[3], SMUD and a number of other agencies. The portion of the total study area with trail/recreation easements is 11 percent, some of which overlaps with public ownership (primarily along Brooktree). The percentage of land in public ownership and easements for each waterway is shown in Table 2.

Table 2 – Public Ownership and Easements

Creek	Public Ownership	Easement	Public Ownership or Easement
Arcade Creek			
Mainstem	53%	21%	74%
Tributary 1	65%	0%	65%
Tributary 2	23%	0%	23%
Cripple Creek			
Mainstem	38%	9%	47%
Tributary 1	35%	0%	35%
Tributary 2	13%	0%	13%
Tributary 3	69%	0%	69%
Brooktree			
Mainstem	58%	9%	58%[4]

[3] In general, land owned by Sacramento County Department of Water Resources, Department of Parks and Recreation, and other departments is in the process of being transferred to the City of Citrus Heights. This land is considered City property for purposes of this study.

[4] Public ownership overlaps public easements on Brooktree.

In addition to easements specifically designated for trails and recreation, a number of other easements exist within the study area. Of these, utility easements are the most common and are usually compatible with trail usage. For example, SMUD generally supports the concept of trails within their easement included in the study area; however, they have specific design and approval criteria for any trails constructed within SMUD owned property or SMUD easements.

Public land ownership patterns varied for each of the main creeks: Public land was prevalent along the Arcade Creek main stem, with large sections in SRPD ownership through Tempo Park, Arcade Creek Park Preserve, Stock Ranch Nature Preserve and other holdings. Lower and upper segments of the Cripple Creek main stem remain in public ownership; however, the majority of the middle watershed between Auburn Boulevard and Garry Oak Drive lies on privately owned land. Brooktree Creek was a mix of public and private ownership.

4.5 Land Use

Land use within the City of Citrus Heights is primarily a mix of urban/suburban, with large areas of residential property intermixed with pockets of commercial. A 2009 Background Report to the General Plan indicated that residential land use within city limits occupied 84 percent of the City, with very low density residential at 13 percent, low density residential at 53 percent, medium density residential at 17 percent, and high density residential at 1 percent. General commercial was the next highest category at 10 percent, followed by public & open space at 3 percent each and business professional at 1 percent.

Commercial corridors follow Sunrise Boulevard, Greenback Lane, Auburn Boulevard and other arterials. Brooktree and Arcade Creek primarily flow through single-family and multi-family residential areas with typical suburban lot sizes. Cripple Creek also flows mainly through residential land uses, though lot sizes in its middle watershed, between Auburn Boulevard and Garry Oak Drive, are typically larger with more dispersed structures.

In general, Arcade Creek and lower Cripple Creek (downstream of Van Maren Lane) have more generous open space set-asides than Brooktree and upper Cripple Creek, although Cripple Creek between Garry Oak Drive and Old Auburn Road flows through a wide natural corridor, as does Brooktree Creek around Shadow Creek Park.

A number of parks and public open space areas occur along the creek corridors, such as Rusch Community Park along Cripple Creek; Sundance Park, Tempo Park, the Arcade Creek Park Preserve, Stock Ranch Nature Preserve, Van Maren Park and Crosswoods Park along Arcade Creek; and San Juan Park and Shadowcreek Park along Brooktree Creek. C-Bar-C Park and Northwoods Park along the SMUD corridor help provide connection between upper Cripple Creek and the Arcade Creek main stem. Future planned park sites along study area creeks include Matheny Way Park and Indian River Drive Open Space on Arcade Creek, Cherry Creek Park on Brooktree Creek, and Twin Creeks Park and Edgecliff Court/Cripple Creek Open Space on Cripple Creek.

The SMUD Utility Corridor forms a prominent feature within the City, angling northeast from the SMUD substation on Sunrise Boulevard across from the Arcade Creek Park Preserve

to a point east of Woodmore Oaks Drive, then heading north to C-Bar-C Park and bending around to the east to exit the City at Wachtel Way just north of Olivine Avenue. The corridor is primarily maintained in open space, although backyards have encroached into the corridor in a number of areas.

4.6 Existing Trails and Transportation

The City of Citrus Heights Bikeway Master Plan includes a network of existing and proposed Class 1, 2 and 3 bicycle routes throughout the City (Citrus Heights, 2008). Primary north-south bike routes include the following:

- Van Maren Lane/Dewey Drive: existing Class 2 from south city limits to Antelope Road;
- Sylvan Road/San Juan Avenue: existing Class 2 from south city limits to Auburn Boulevard/Old Auburn Road, proposed Class 2 along Auburn Boulevard to north city limits;
- Mariposa Avenue: proposed Class 2 from south city limits to Twin Oaks Boulevard, proposed Class 3 from Twin Oaks Boulevard to north city limits;
- Sunrise Boulevard: proposed Class 2 from south city limits to Oak Avenue and from Twin Oaks to north city limits, existing Class 2 from Oak to Twin Oaks;
- Fair Oaks Boulevard: proposed Class 2 from south city limits to Greenback Lane, existing Class 2 from Greenback Lane to Old Auburn Road;
- Wachtel Way: existing Class 2 from south city limits to Old Auburn Road.

Primary east-west routes include the following:

- Twin Oaks Avenue: Existing Class 2 from Auburn Boulevard to Sunrise Boulevard, proposed Class 2 from Sunrise Boulevard to just east of Charlotte Avenue, proposed Class 1 from just east of Charlotte Avenue to just west of Garry Oak Drive, proposed Class 2 from just west of Garry Oak Drive to Old Auburn Road;
- Antelope Road: existing Class 2 from west city limits to Zenith Drive, proposed Class 2 from Zenith Drive to Van Maren Lane, existing Class 2 from Van Maren Lane to Old Auburn Road;
- Auburn Boulevard/Old Auburn Road: proposed Class 2 from west city limits to Greenback Lane, existing Class 2 from Greenback Lane to Garry Oak Drive, proposed Class 1 from Garry Oak Drive to Robert Creek Court, proposed Class 2 from Robert Creek Court to east city limits;
- Greenback Lane: existing Class 2 from west city limits to Sunrise Boulevard, proposed Class 2 from Sunrise Boulevard to east city limits;
- Madison Avenue: proposed Class 2 from west city limits to east city limits.

Several additional existing and proposed Class 1 trails are located throughout the City. Primary connections are as follows:

- Stock Ranch Nature Preserve, existing
- Rusch Park, existing
- Tempo Park, existing
- San Juan Park, existing
- Carriage Oaks Elementary and Mesa Verde High Schools from Zeeland Drive to Lauppe Lane, proposed
- Arcade Creek Park Preserve, proposed
- Connecting proposed Class 2 on Navion Drive over Interstate 80 to proposed Class 2 on Tupelo Drive, proposed

Numerous other bike routes are identified in the Bikeway Master Plan forming connections between the primary routes and other destinations throughout the City. The majority of these are Class 2 routes, although some are Class 3. The Class 3's are typically on less heavily used streets.

In addition to the routes already discussed, several Complete Street projects have been completed or are currently underway throughout the City to make streets safer and more useable for non-automotive travel. Improvements along Antelope Road, Auburn Boulevard and Sunrise Boulevard include expansion and enhancement of sidewalks and bike lanes for a better experience for pedestrians and bicycle riders.

5 Opportunities & Constraints

5.1 Property Ownership

Property ownership affects trail suitability in the following progression from most preferred to least:

1. Public ownership, City or SRPD land
2. Other public ownership,
3. Private ownership with trail/recreation easement,
4. Private ownership without trail/recreation easement.

As discussed in the previous section, significant portions of the creek corridor are in public ownership and/or have recreation easements; however, a number of important connections will require purchase of easements or fee-title on private land. These will be discussed in detail in Section 7.

As properties in Citrus Heights that include creek corridors are proposed for future development or redevelopment, the City may condition approvals with a requirement for a trail easement or fee title dedication of land for trails depending on the feasibility and priority of the potential trail segment.

5.2 Natural Resources

The Citrus Heights creek corridors include some of the last remaining riparian habitat and native oak woodland in the City. All trails will need to be designed and managed to minimize impacts and retain habitat values by using techniques such as lighting controls, erosion prevention, revegetation, and separating human use from wildlife trails.

Stringent permitting actions are also mandated by federal and state resource agencies, and the City of Citrus Heights. Projects that may impact special status species and wetlands will require consultation and permitting by the U.S. Fish and Wildlife Service (USFWS) and the Army Corps of Engineers (ACOE). Riparian vegetation is protected by the California Department of Fish and Wildlife (CDFW), and impacts to riparian trees, shrubs or groundcover may require a permit from CDFW that specifies mitigation by creation or enhancement of riparian habitat either on-site or nearby. Native oaks greater than six inches diameter measured at breast height (DBH) are regulated by the City of Citrus Heights. The City requires a tree permit for impacts to native oaks of 6 inches DBH or greater or non-oaks 19 inches DBH or greater. Tree permits require mitigation for impacts on an inch-for-inch basis. For example, trail construction that requires removal of a 10-inch diameter native oak may be required to plant ten 15-gallon oaks (approximately 1 inch diameter) to make up for the impact.

5.3 Engineering Challenges

Due to the number of proposed trail alignments and varied nature of the terrain along each of the corridors, there is a diverse range of engineering challenges associated with each of the proposed trail corridors. These include the following:

- Location of trails within a floodplain and floodway
- Effects of geomorphology
- Creek crossings
- Geotechnical considerations
- Road crossings
- Terrain and physical constraints
- Utility impacts
- Visibility and safety
- Access and continuity

5.3.1 Floodplain and Floodway

A large portion of the proposed trail is located within the FEMA defined floodplain for Arcade Creek, Brooktree Creek and Cripple Creek. In several locations where the channel is not clearly defined the trail alignment will also be within a floodway. The floodway is the portion of the 100-yr floodplain including the channel and area adjoining the channel that is required to convey water downstream in a flood event. The Central Valley Flood Protection Board does not list these creeks within the project limits, and therefore they are not subject to the requirements of Title 23 Article 8.

Generally the majority of the proposed project improvements will be located outside the floodway for the various creek corridors. However for project improvements located in the floodway that would, upon construction, affect the hydrologic or hydraulic characteristics of a flooding source and thus result in the modification of the existing regulatory floodway, the effective Base Flood Elevations (BFEs), or the Special Flood Hazard Area (SFHA) will require a FEMA Conditional Letter of Map Revision (CLOMR), submitted prior to construction, and a Letter of Map Revision (LOMR) following construction.

The proposed trails are largely located within the 100-year floodplain as defined by the FEMA maps and will need to be evaluated for impacts both upstream and downstream of the project segment. Any improvements within the floodplain that result in a net rise in the 100-year water surface elevation of more than 0.1 ft, will be considered an adverse effect and require mitigation. During the design phase for each trail segment, a hydrology/hydraulic analysis will analyze the before and after condition for the 100-year storm event, to ensure water surface elevation (WSE) impacts are kept below the 0.1 ft threshold. It is anticipated that a Location Hydraulic Study will be completed for each bridge structure crossing a creek.

In general the proposed trails will closely follow the existing terrain minimizing any fill and cut slopes where possible. Where excavation is required the fill and cut areas will be balanced as far as possible to minimize hydraulic impacts and therefore secondary impacts. Retaining walls and stabilized slopes will be used to minimize the project footprint. In environmentally sensitive areas, other methods will be considered to stabilize the slopes including laying back the slopes, minimizing disturbance of existing vegetation, use of bio-solutions and plantings.

Cut-off walls and rock slope protection will be used to protect trail integrity. Per the City's adopted design standards, where the profile of the trail will be more than one foot below the 10-

year storm event water surface elevation, consideration will be given to constructing the trail of Portland cement concrete instead of asphalt.

5.3.2 Effects of Geomorphology

The geomorphology of the creek also needs to be considered when evaluating the proposed alignment. As discussed previously, in general, the stream channel in Arcade and Cripple Creeks has not been significantly engineered and remains largely in a natural state. Brooktree includes a segment in which the creek bed and banks have been concrete lined. The existing creeks exhibit signs of creep and meandering through history. The susceptibility of the creek to erode and meander will be studied further as more detailed analysis of the proposed trail alignment proceeds. In some locations, where the velocity of the creek flow or type of material along the creek bank make it likely that creek meandering and erosion will occur, the trail will need to be setback further from the creek where feasible, or the creek bank may require stabilization. In these cases, biotechnical or minimally invasive engineering solutions such as erosion control mats, log-toe or rock-toe protection, or other vegetative techniques, should be preferred over riprap, concrete or other engineered hard structures.

5.3.3 Geotechnical Considerations

In general, the terrain is fairly gently sloping throughout the corridor; however, there are segments along Arcade Creek where the banks adjacent to the creek are fairly steep. Cut and fill slopes are anticipated to be a maximum allowable of 2:1 (horizontal:vertical). In some areas where the existing slopes are steep and the area is constrained, use of soil nail or tie-back walls will be considered. Other locations would require reinforced concrete retaining walls. Depending on the type of wall and location of these walls, an architectural facing may be applied to the walls to improve the aesthetic quality of the walls and allow them to blend more naturally into the surrounding environment.

Footings for walls are anticipated to be standard footings. Piles are anticipated to be required for most bridge structures and rock slope protection would be required to protect the approach fills and abutments.

5.3.4 Terrain and Physical Constraints

There are several areas indicated on the project maps where the terrain adjacent to the creek and/or the creek banks themselves are very steep and the corridor is constrained. Most of the areas with steep terrain occur along Arcade Creek between Mariposa Avenue and Sayonara Drive. In addition there are several areas along all the creek corridors where the property boundaries are located in close proximity to the creek. For both of these scenarios, the proposed alignment requires several crossings of the creek.

In some areas where the existing slopes are steep and the area is constrained, use of retaining wall structures, including soil nail or tie-back walls may be appropriate. In other locations reinforced concrete retaining walls, wire mesh walls or gabion walls may be the most feasible option. Depending on the type of wall and location of these walls, an architectural facing may be applied to the walls to improve the aesthetic quality of the

walls and allow them to blend more naturally into the surrounding environment.

Where constraints make constructing a 10-foot trail infeasible, the minimum paved width may be reduced to 8 feet, and the shoulders may be reduced.

5.3.5 Utility Impacts

There are several utilities along the corridor that would require relocation or modifications during construction of the proposed trail. Sewer trunk lines run along portions of the Cripple Creek corridor. Where the proposed trail alignment crosses or parallels the sewer line, adjustments to the grade of manholes may be needed. Numerous other facilities including water, telecommunications and gas lines may also require relocation and/or adjustments of valves and manholes to grade. In particular relocation of utilities may be required to provide adequate vertical clearance where the trail is proposed to pass under the major arterial roadways including Sayonara Drive, Sylvan Road, Van Maren Lane, Auburn Boulevard, Indian River Drive and Greenback Lane along Arcade Creek and Broken Bow Drive and Bridgemont Way along Cripple Creek.

5.3.6 Access and Connectivity

Access to the trail for all users would be a key element of its success. Neighborhood access would be achieved from local streets crossing the trail and where other trails or pathways connect to the proposed trail. Each street crossing would be identified and directional signs would be placed at street intersections identifying destinations and distances along the trail and within the surrounding community.

Trailheads (parking areas with a formal trail entrance) would serve all trail users. Existing parking areas at existing parks such as Tempo, Van Maren and Rusch Park, would serve as trailhead parking as well. They would provide information about the trail and may have trail user facilities like restrooms, trash receptacles, information kiosks, water fountains, and benches. Refer to section 6.1 for specific access node locations.

5.3.7 Visibility and Safety

The proposed trail would meet current geometric standards for a 20 mph design speed. Maximum grades steeper than 5 percent will be allowed for specific distances defined in the bikeway standards. Safety railings or barriers would be constructed where walls or steep drop offs occur adjacent to the trail. Lighting will be considered where the trail passes through bridge undercrossings and box culverts. Removable bollards, gates and signage may be used to prohibit unauthorized vehicles and to close the trail during high water levels.

The trails will be designed to maximize exposure to the eyes of the public and avoid areas where visibility is restricted. Several access points would be provided to all the trail segments to provide alternative route options to users.

In locations where significant pedestrian activity is anticipated, consideration would be given to widen the shoulders of the trail or create a separate unpaved pedestrian walking path provided there is adequate publicly owned property available and impacts are not significant.

5.3.8 Creek Crossings

Based on field reviews the proposed trail alignment has identified several creek crossings for each of the creek corridors and tributaries. All bridges are subject to a permitting and review process to ensure they comply with FEMA regulations to prevent flood impacts (see section 5.3.1). The identified crossings included major crossings of Arcade Creek, Cripple Creek and Brooktree Creek and minor crossings of tributaries and drainage channels that feed these creeks. The 25 creek crossings under consideration are listed in Table 3.

Table 3 – Creek Crossings

Creek	Crossing No.	Span Length	Type of Crossing
Arcade	A02-C01	60 ft	Bridge
	A02-C02	60 ft	Bridge
	A03-C01	30 ft	Culvert
	A05-C01	80 ft	Bridge
	A05-C02	80 ft	Bridge
	A05-C03	60 ft	Bridge
	A05-C04	60 ft	Bridge
	A06-C01	60 ft	Bridge
	A06-C02	60 ft	Bridge
	A06-C03	60 ft	Bridge
	A07-C01	30 ft	Culvert
	A09-C01	80 ft	Bridge
	A09-C02	80 ft	Bridge
	A11-C01	60 ft	Bridge
	A12-C01	80 ft	Bridge
	A12-C02	80 ft	Bridge
	A12-C03	80 ft	Bridge
	A13-C01	80 ft	Bridge
	A13-C02	80 ft	Bridge
	A14-C01	80 ft	Bridge
	A16-C01	80 ft	Bridge
	A18-C01	30 ft	Culvert
	A18-C2	80 ft	Bridge
	A18-C3	80 ft	Bridge
	AT1-2-C01	60 ft	Bridge
	AT2-4-C01	60 ft	Bridge
Brooktree	B5-C01	30 ft	Culvert
	B6-C01	60 ft	Bridge
	B6-C2	60 ft	Bridge
	B11-C01	60 ft	Bridge
	B12-C01	60 ft	Bridge
	B12-C02	30 ft	Bridge
	B12-C03	30 ft	Bridge
	B12-C04	30 ft	Bridge
	B12-C05	30 ft	Bridge
	B12-C06	40 ft	Bridge
Cripple	C02-C01	50 ft	Bridge
	C04-C01	30 ft	Culvert
	C05-C01	30 ft	Culvert

Creek	Crossing No.	Span Length	Type of Crossing
	C06-C01	60 ft	Bridge
	C07-C01	30 ft	Culvert
	C07-C2	30 ft	Culvert
	C12-C01	60 ft	Bridge
	C18-C01	80 ft	Bridge
	C20-C01	40 ft	Culvert
	C23-C01	80 ft	Bridge
	C23-C2	80 ft	Bridge
	C24-C01	40 ft	Culvert
	C24-C2	80 ft	Bridge

5.3.8.1 Bridge Structures

As discussed previously, in general for longer spans bridges shall be prefabricated single span steel or wooden bridges supported on abutments located outside the floodway. The steel bridge structures are proposed to be a weathered steel finish to blend into the natural environment and reduce maintenance requirements. The soffit elevation would preferably be set 1 foot above the 100-year water surface elevation (WSE) to protect the integrity of the structure during the 100-year storm event, however as a minimum the bridge deck shall be set at the 10-year WSE and the bridge railings shall be designed to withstand the 100-year storm event.

Figure 7 – Prefabricated Truss Bridge

The following design criteria apply to the proposed bridges:

- Bridges should be at least as wide as the paved path and a minimum of 12 feet clear between railings. Narrower Bridges of 8 to 10-feet wide may be used if spans are short, expected volume is low, or other design constraints preclude a wider bridge.
- Bridge railings shall be a minimum of 48 inches in height
- Decking material shall be firm and stable
- Certain bridges may be required to accommodate fire and maintenance vehicles with a gross vehicle weight of 30,000 pounds where it is determined that fire access using the bridge will be required.

- The bridge deck shall be designed as a minimum to be above the 10-year water surface elevation.
- Where the soffit of the bridge is less than 1 foot above the 100-year water surface elevation (WSE) line, a hydraulic analysis is required to ensure no increase will occur in the water surface elevation.
- The bridge will be designed to minimize impacts to the existing creek and environment
- The bridge will be designed to not impede fish passage or constrict the floodway.

Where construction of a bridge above the 10-year water surface elevation is not deemed feasible, low flow bridges, culverts or weirs will be considered, provided such improvements do not result in a significant increase in the water surface elevation. Reinforced or pre-stressed concrete slab bridges are recommended for low flow options. Bridge railings should be designed to "break away" or to withstand flood flows, with hydraulic modeling assuming the railings assumed to be solid obstructions to creek flow.

5.3.8.2 Culvert Structures

Where drainage channels or seasonal streams would allow the construction of box culverts or drainage culverts, consideration of placing these facilities is an option. Close coordination with City environmental and stormwater staff, and review of environmental studies will be required to determine the feasibility of disturbing the existing drainage channel. Such culvert structures would generally be precast reinforced concrete box culverts or reinforced concrete pipes which could be placed efficiently and with minimal disturbance.

5.3.9 Road Crossings

The proposed trails encompass a significant portion of Citrus Heights resulting in numerous roadway crossings throughout the study area. Based on the proposed trail alignment, the path would cross these either at-grade or below-grade under existing bridges or through existing or new box culverts.

The recommended roadway crossing types are based on established industry standards, the California MUTCD, preliminary field investigations, and experience on similar existing facilities. The proposed crossing treatments can be broken into five categories:

- No crossing, where trail is discontinuous
- Non-signalized at-grade crossings (crossing at street level without a signal)
- Directed toward adjacent intersection or crossing (using existing crossing/intersection nearby)
- Signalized at-grade crossings (crossing at street level with signal)
- Signalized at-grade crossings
- Grade separated crossings

The recommended roadway crossing for each corridor is provided in Table 4 through Table 7. Locations of roadway crossings are shown in Figure 8 through Figure 11.

FIGURE 8

CREEK CORRIDOR TRAIL PROJECT

LEGEND

- Segment Start Point

Trail Feasability

- Good
- Poor

Other Routes

- Alternate Route
- Bike Lane/Trail (Existing and Proposed)
- Neighboring Community Bike Routes

Jurisdictions

- City of Citrus Heights
- Other Communities
- County Boundary
- SRPD/ORPD Parks

AT-GRADE CROSSINGS FOR ARCADE CREEK

FOOTHILL ASSOCIATES
ENVIRONMENTAL CONSULTING • PLANNING • LANDSCAPE ARCHITECTURE

PSOMAS

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CITRUS HEIGHTS CREEK CORRIDOR

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FIGURE 9

CREEK CORRIDOR TRAIL PROJECT

LEGEND

- Segment Start Point

Trail Feasability

- Good
- Poor

Other Routes

- Alternate Route
- Bike Lane/Trail (Existing and Proposed)
- Neighboring Community Bike Routes

Jurisdictions

- City of Citrus Heights
- Other Communities
- County Boundary
- SRPD/ORPD Parks

AT-GRADE CROSSINGS FOR BROOKTREE CREEK

B-RC-1 - NO CROSSING PLANNED

B-RC-2 - NO CROSSING TIE INTO (E) CLASS 2 BIKE LANES

B-RC-3 - NO CROSSING PLANNED

B-RC-4 - AT-GRADE CROSSING UNSIGNALIZED

B-RC-5 - NO CROSSING TIE INTO (E) CLASS 2 BIKE LANES IF B10 IS CONSTRUCTED

B-RC-6 - NO CROSSING TIE INTO (E) CLASS 2 BIKE LANES

B01, B02, B03, B04, B05, B06, B07, B08, B09, B10, B11, B12, B13

N

0 0.5 1 Miles

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CITRUS HEIGHTS CREEK CORRIDOR

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FIGURE 10

CREEK CORRIDOR TRAIL PROJECT

Placer County
Sacramento County
CITY OF ROSEVILLE
ANTELOPE
ANTELOPE NORTH RD
ROSEVILLE RD
ANTELOPE RD
AUBURN BLVD
OLD AUBURN RD
OAK AVE
KENNETH AVE
MARIPOSA AVE
SUNRISE BLVD
SYLVAN RD
FAIR OAKS BLVD
VAN MAREN LN
DEWEY DR
SAN JUAN AVE
GREENBACK LN
MADISON AVE
ORANGEVALE
FAIR OAKS
CARMICHAEL
80

Cripple Creek
Cripple Creek Trib 1
Cripple Creek Trib 2
Cripple Creek Trib 3
Arcade Creek
Arcade Creek Trib 1
Arcade Creek Trib 2
Brooktree Creek
SMUD Corridor

AT-GRADE CROSSING AT EXISTING SIGNAL C-RC-5
AT-GRADE CROSSING NO SIGNAL - C-RC-4
AT-GRADE CROSSING NO SIGNAL - C-RC-3
AT-GRADE CROSSING UNSIGNALIZED - C-RC-6
TIE INTO COMPLETE STREETS PROJECT - NO CROSSING C-RC-7
USE EXISTING SIGNALIZED AT GRADE CROSSING C-RC-8
AT-GRADE CROSSING WITH PED ACTIVATED SIGNAL - C-RC-2
AT-GRADE CROSSING AT EXISTING STOP CONTROLLED INTERSECTION CT2-RC-2
AT-GRADE CROSSING AT EXISTING SIGNAL CT1-RC-1
AT-GRADE CROSSING NO SIGNAL C-RC-1
AT-GRADE CROSSING WITH PED ACTIVATED SIGNAL - C-RC-9
AT-GRADE CROSSING WITH PED ACTIVATED SIGNAL - C-RC-10
C-RC-11 - UNDERCROSSING UTILIZING EXISTING BRIDGE
C-RC-12 AT-GRADE CROSSING, UNSIGNALIZED
C-RC-13 UNDER-CROSSING USING EXISTING BRIDGE
CT3-RC-2 AT-GRADE CROSSING, UNSIGNALIZED
CT3-RC-1 AT-GRADE CROSSING, UNSIGNALIZED
CT1-RC-2
CT2-RC-3
CT2-RC-1

C01 C02 C03 C04 C05 C06 C07 C08 C09 C10 C11 C12 C13 C14 C15 C16 C17 C18 C19 C20 C21 C22 C23 C24
CT1-1 CT1-2 CT1-3 CT1-4 CT1-5 CT1-6 CT1-7 CT1-8 CT1-9
CT2-1a CT2-1b CT2-2 CT2-3 CT2-4
CT3-1 CT3-2

LEGEND

- Segment Start Point

Trail Feasability

- Good
- Poor

Other Routes

- Alternate Route
- Bike Lane/Trail (Existing and Proposed)
- Neighboring Community Bike Routes

Jurisdictions

- City of Citrus Heights
- Other Communities
- County Boundary
- SRPD/ORPD Parks

N

0 0.5 1
Miles

AT-GRADE CROSSINGS FOR CRIPPLE CREEK

FOOTHILL ASSOCIATES
ENVIRONMENTAL CONSULTING • PLANNING • LANDSCAPE ARCHITECTURE
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CITRUS HEIGHTS CREEK CORRIDOR

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FIGURE 11

CREEK CORRIDOR TRAIL PROJECT

ANTELOPE

Placer County

Sacramento County

CITY OF ROSEVILLE

ORANGEVALE

FAIR OAKS

CARMICHAEL

ANTELOPE NORTH RD

ROSEVILLE RD

ANTELOPE RD

AUBURN BLVD

OLD AUBURN RD

OAK AVE

KENNETH AVE

VAN MAREN LN

MARIPOSA AVE

SUNRISE BLVD

SYLVAN RD

SAYONARA DR

FAIR OAKS BLVD

GREENBACK LN

DEWEY DR

SAN JUAN AVE

MADISON AVE

80

Cripple Creek

Cripple Creek Trib 1

Cripple Creek Trib 2

Cripple Creek Trib 3

Arcade Creek

Arcade Creek Trib 1

Arcade Creek Trib 2

Brooktree Creek

SMUD Corridor

S01

S02

S02

S03

S04

S05

S06

AT-GRADE CROSSING WITHOUT PED ACTIVATED SIGNAL S-RC-2

FUTURE AT-GRADE CROSSING WITH PED ACTIVATED SIGNAL S-RC-1

USE CROSSWALK AT (E) TRAFFIC SIGNAL AT MELVA ST S-RC-3

AT-GRADE CROSSING WITHOUT PED ACTIVATED SIGNAL S-RC-4

UNSIGNALIZED AT-GRADE CROSSING WHEN S06 IS CONSTRUCTED S-RC-5

LEGEND

- Segment Start Point

Trail Feasability

- Good
- Poor

Other Routes

- Alternate Route
- Bike Lane/Trail (Existing and Proposed)
- Neighboring Community Bike Routes

Jurisdictions

- City of Citrus Heights
- Other Communities
- County Boundary
- SRPD/ORPD Parks

N

0 0.5 1

Miles

AT-GRADE CROSSINGS FOR SMUD CORRIDOR

FOOTHILL ASSOCIATES

ENVIRONMENTAL CONSULTING • PLANNING • LANDSCAPE ARCHITECTURE

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CITRUS HEIGHTS CREEK CORRIDOR

Drawn By: MUB Date: 11/25/2013

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Table 4 – Recommended Roadway Crossings (Arcade Creek Corridor)

Corridor	Roadway/ Street Name	Crossing No.	Designation	Lane Designation[5] / Median	Road-way Width	Posted Speed	Approximate Average Daily Traffic (ADT)	Recommended Crossing Type / Alternative Crossing Type
Arcade Creek Corridor	Fair Oaks Boulevard	A-RC-1	Major Collector	BL/1NB/TWLTL/1SB/BL / TWLTL	60 ft	40 mph	16,800	Recommended: At-grade pedestrian activated signal and median island Alternative: Grade separated undercrossing south of existing culvert structure
	Sunrise Boulevard	A-RC-2	Arterial (Complete Streets)	BL/2NB/Median/2SB/BL / Raised Median	82 ft	40 mph	41,887	Recommended: Redirect users via two-way paved pathway to existing signal at Sayonara Drive Alternative: Undercrossing utilizing existing bridge structure Future Alternative: Overcrossing structure since the proposed undercrossing will not meet 10' clearance
	Sayonara Drive	A-RC-3	Local	BL/1NB/1SB/BL / No Median	36 ft	25 mph	1,500 (Est.)	Recommended: Undercrossing utilizing existing bridge structure Alternative: At-grade unsignalized crossing
	Mariposa Avenue	A-RC-4	Local	BL/1NB/1SB/BL / No Median	36 ft	30 mph	4,010	Recommended: At-grade unsignalized crossing Alternative: Undercrossing utilizing existing bridge structure
	Sylvan Road	A-RC-5	Arterial	BL/2NB/TWLTL/2SB/BL / TWLTL	66 ft	40 mph	28,400	Recommended: Undercrossing utilizing existing bridge structure Alternative: At-grade pedestrian activated signal and median island
	Cross-woods Drive (East)	A-RC-6	Local	1NB/1SB / No Median	42 ft	25 mph	1,500 (Est.)	Recommended: At-grade unsignalized crossing Alternative: Undercrossing requiring construction of new reinforced box culvert structure

[5] Legend: NB – Northbound Lane, SB – Southbound Lane, EB – Eastbound Lane, WB – Westbound Lane
TWLTL – Two-Way Left-Turn Lane
BL – Bike Lane, BL(F) – Future Bike Lane

Corridor	Roadway/ Street Name	Crossing No.	Designation	Lane Designation[5]	Road-way Width	Posted Speed	Approximate Average Daily Traffic (ADT)	Recommended Crossing Type
				Median				Alternative Crossing Type
Arcade Creek Corridor	Cross-woods Drive (West)	A-RC-7	Local	1NB/1SB	44 ft	25 mph	1,500 (Est.)	Recommended: At-grade unsignalized crossing
				No Median				Alternative: Undercrossing requiring construction of new reinforced box culvert structure
	Van Maren Lane	A-RC-8	Arterial	BL/2NB/2SB/BL	58 ft	35 mph	13,621	Recommended: Undercrossing utilizing existing bridge structure
				TWLTL/Striped Median				Alternative: At-grade pedestrian activated signal and median island
	Auburn Boulevard	A-RC-9	Arterial	2NB/TWLTL/2SB	62 ft	40 mph	23,900	Recommended: Undercrossing utilizing existing bridge structure
				TWLTL/Striped Median				Alternative: Redirect users via two-way paved pathway to existing signal at St Ives Lane/Halifax Street
	Matheny Way	A-RC-10	Local	1NB/1SB	36 ft	25 mph	750 (Est.)	Recommended: At-grade unsignalized crossing
				No Median				Alternative: At-grade pedestrian activated signal
	Indian River Drive	A-RC-11	Local	BL/1NB/1SB/BL	40 ft	25 mph	1,500 (Est.)	Recommended: Undercrossing utilizing existing bridge structure
				No Median				Alternative: At-grade pedestrian activated signal
	Greenback Lane	A-RC-12	Arterial (Complete Streets)	BL/3WB/Median/3EB/BL	90 ft	40 mph	49,796	Recommended: Undercrossing requiring construction of new reinforced box culvert under Greenback Lane
				Raised Median				Alternative: Redirect users via two-way paved pathway to existing signal at Indian River Drive
Arcade Creek Tributary 1	Fair Oaks Boulevard	AT1-RC-1	Major Collector	BL/1NB/1SB/BL	38 ft	40 mph	16,800	Recommended: Construct reinforced concrete box culvert undercrossing if warranted by projected users
				No Median				Alternative: Redirect users via two-way paved path & Class 2 BL to signal at Greenback Lane
Arcade Creek Tributary 2	Sylvan Road	AT2-RC-1	Arterial	BL/2NB/Median/2SB/BL	66 ft	40 mph	28,400	Recommended: Redirect users via two-way paved path & Class 2 BL to signal at Stock Ranch Road
				Raised Median				Alternative: At-grade pedestrian activated signal and median island
	Woodside Drive	AT2-RC-2	Local	1WB/1EB	30 ft	25 mph	130	Recommended: At-grade unsignalized crossing
				No Median				Alternative: At-grade pedestrian activated signal

Table 5 – Recommended Roadway Crossings (Brooktree Creek Corridor)

Corridor	Roadway/ Street Name	Crossing No.	Designation	Lane Designation Median	Roadway Width	Posted Speed	ADT	Recommended Crossing Type Alternative Crossing Type
Brooktree Creek Corridor	Mariposa Avenue	B-RC-1	Local	BL/1NB/1SB/BL No Median	42 ft	30 mph	3,012	Recommended: No crossing proposed, trail terminates at this location. Users connect to Class 2 BL Alternative: Not applicable
	San Juan Avenue	B-RC-2	Arterial	BL/2NB/TWLTL/2SB/BL TWLTL	64 ft	40 mph	23,711	Recommended: Redirect users via on street facilities & sidewalks from Spicer to signal at Chesline Drive Alternative: Not applicable
	Sperry Drive	B-RC-3	Local	1NB/1SB No Median	42 ft	25 mph	3,046	Recommended: No crossing proposed, trail reverts to on street facility. Users directed to Spicer Drive Alternative: Not applicable
	Brooktree Drive	B-RC-4	Local	1NB/1SB No Median	42 ft	25 mph	1,242	Recommended: At-grade unsignalized crossing Alternative: At-grade pedestrian activated signal
	Dewey Drive	B-RC-5	Arterial	BL/2NB/TWLTL/2SB/BL TWLTL	64 ft	40 mph	20,998	Recommended: No crossing proposed, trail reverts to on street facility. Users directed to Greenleaf Drive where consideration will be given to provide a pedestrian crossing. Alternative: At-grade pedestrian activated signal and median island
	Park Oaks Drive	B-RC-6	Local	1NB/1SB No Median	42 ft	25 mph	2,353	Recommended: At-grade unsignalized crossing Alternative: If segment to the east is not constructed then no crossing is recommended

Legend: NB – Northbound Lane, SB – Southbound Lane, EB – Eastbound Lane, WB – Westbound Lane
TWLTL – Two-Way Left-Turn Lane
BL – Bike Lane, BL(F) – Future Bike Lane

Table 6 – Recommended Roadway Crossings (Cripple Creek Corridor)

Corridor	Roadway/ Street Name	Crossing No.	Designation	Lane Designation[6]	Roadway Width	Posted Speed	ADT	Recommended Crossing Type
				Median				Alternative Crossing Type
Cripple Creek Corridor	Olivine Avenue	C-RC-1	Local	1WB/1EB	42 ft	25 mph	1,500 (Est.)	Recommended: At-grade unsignalized crossing
				No Median				Alternative: At-grade pedestrian activated signal
	Old Auburn Road	C-RC-2	Major Collector	BL/1NB/1SB/BL	36 ft	25 mph	14,300	Recommended: At-grade pedestrian activated signal, if trail is continued to the south
				No Median				Alternative: Redirect users via two-way paved pathway to existing signal at Twin Oaks Avenue
	Crestmont Avenue	C-RC-3	Local	1NB/1SB	40 ft	25 mph	2,148	Recommended: At-grade unsignalized crossing
				No Median				Alternative: At-grade pedestrian activated signal
	Twin Oaks Avenue	C-RC-4	Local	BL(F)/1WB/1EB/BL(F)	34 ft	25 mph	3,162	Recommended: No crossing until trail to the west is built
				No Median				Alternative: Direct users to future on-street facilities along Twin Oaks Avenue
	Sunrise Boulevard	C-RC-5	Arterial (Complete Streets)	BL/2NB/TWLTL/2SB/BL	74 ft	40 mph	35,052	Recommended: Redirect users via two-way paved pathway to existing signal at Twin Oaks Avenue
				TWLTL				Alternative: At-grade pedestrian activated signal with median
	Mariposa Avenue	C-RC-6	Local	1NB/1SB	36 ft	25 mph	2,923	Recommended: At-grade unsignalized crossing if trail is constructed along this segment
				No Median				Alternative: At-grade pedestrian activated signal
	Auburn Boulevard	C-RC-7	Arterial (Complete Streets)	BL/2NB/TWLTL/2SB/BL	68 ft	40 mph	24,537	Recommended: Redirect users via two-way paved pathway to existing signal at Grand Oaks Boulevard
				TWLTL				Alternative: No crossing if trail to east is not constructed. Tie into existing complete streets facilities.

[6] Legend: NB – Northbound Lane, SB – Southbound Lane, EB – Eastbound Lane, WB – Westbound Lane
TWLTL – Two-Way Left-Turn Lane
BL – Bike Lane, BL(F) – Future Bike Lane

Corridor	Roadway/ Street Name	Crossing No.	Designation	Lane Designation[6]	Roadway Width	Posted Speed	ADT	Recommended Crossing Type
				Median				Alternative Crossing Type
Cripple Creek Corridor	Antelope Road	C-RC-8	Arterial	BL/2WB/TWLTL/2EB/BL	68 ft	40 mph	29,832	Recommended: Use existing signal at Lauppe Lane
				TWLTL				Alternative: None.
	Calvin Drive	C-RC-9	Local	1WB/1EB	42 ft	25 mph	1,500 (Est.)	Recommended: At-grade pedestrian activated signal due to sight distance
				No Median				Alternative: At-grade unsignalized crossing
	Van Maren Lane	C-RC-10	Major Collector	BL/1NB/1SB/BL	40 ft	35 mph	13,600	Recommended: At-grade pedestrian activated signal, if trail is continued to the east
				No Median				Alternative: No crossing, direct users to Calvin Drive intersection
	Bridgemont Way	C-RC-11	Local	1WB/1EB	30 ft	25 mph	500 (Est.)	Recommended: Undercrossing utilizing existing bridge structure
				No Median				Alternative: At-grade unsignalized crossing
	Oak Lakes Lane	C-RC-12	Local	1WB/1EB	26 ft	25 mph	3,000 (Est.)	Recommended: At-grade unsignalized crossing
				No Median				Alternative: At-grade pedestrian activated signal
	Broken Bow Drive	C-RC-13	Local	1WB/1EB	26 ft	25 mph	200 (Est.)	Recommended: Undercrossing utilizing existing bridge structure
				No Median				Alternative: At-grade pedestrian activated signal

Legend: NB – Northbound Lane, SB – Southbound Lane, EB – Eastbound Lane, WB – Westbound Lane
TWLTL – Two-Way Left-Turn Lane
BL – Bike Lane, BL(F) – Future Bike Lane

Corridor	Roadway/ Street Name	Crossing No.	Designation	Lane Designation[7]	Roadway Width	Posted Speed	ADT	Recommended Crossing Type
				Median				Alternative Crossing Type
Cripple Creek Tributary 1	Old Auburn Road	CT1-RC-1	Major Collector	BL/2WB/TWLTL/1EB/BL	54 ft	35 mph	14,300	Recommended: Use existing traffic signal at Fair Oaks Boulevard.
				TWLTL				Alternative: None
	Shimmer River Lane	CT1-RC-2	Local	1NB/1SB	26 ft	25 mph	1,500 (Est.)	Recommended: At-grade unsignalized crossing
				No Median				Alternative: None
	Glen Tree Drive	CT1-RC-3	Local	1WB/1EB	26 ft	25 mph	1,500 (Est.)	Recommended: At-grade unsignalized crossing
				No Median				Alternative: None
Cripple Creek Tributary 2	Old Auburn Road	CT2-RC-1	Major Collector	BL/1NB/1SB/BL	36 ft	40 mph	17,623	Recommended: No crossing proposed since trail is discontinued to the south
				No Median				Alternative: None
	Mariposa Avenue	CT2-RC-2	Local	1WB/1EB	26 ft	25 mph	2,923	Recommended: Users directed to existing stop controlled at-grade crossing at Cook Avenue
				No Median				Alternative: None
	Antelope Road	CT2-RC-3	Arterial	BL/2WB/TWLTL/2EB/BL	66 ft	40 mph	23,700	Recommended: No crossing proposed since trail is discontinued to the south.
				TWLTL				Alternative: None
Cripple Creek Tributary 3	Twin Park Drive	CT3-RC-1	Local	1WB/1EB	26 ft	25 mph	500 (Est.)	Recommended: At-grade unsignalized crossing
				No Median				Alternative: At-grade pedestrian activated signal
	Navion Drive	CT3-RC-2	Local	1NB/1SB	36 ft	25 mph	2,000 (Est.)	Recommended: At-grade unsignalized crossing
				No Median				Alternative: At-grade pedestrian activated signal

[7] Legend: NB – Northbound Lane, SB – Southbound Lane, EB – Eastbound Lane, WB – Westbound Lane
TWLTL – Two-Way Left-Turn Lane
BL – Bike Lane, BL(F) – Future Bike Lane

Table 7 – Recommended Roadway Crossings (SMUD Corridor)

Corridor	Roadway/ Street Name	Crossing No.	Designation	Lane Designation Median	Roadway Width	Posted Speed	ADT	Recommended Crossing Type Alternative Crossing Type
SMUD CORRIDOR	Wachtel Way	S-RC-1	Major Collector	BL/1NB/1SB/BL No Median	36 ft	25 mph	6,545	Recommended: No crossing at this time. Trail ties into existing on-street facilities. Alternative: If trail is extended eastwards by Sacramento County recommend pedestrian activated signal
	Villa Oak Drive	S-RC-2	Local	1WB/1EB No Median	48 ft	25 mph	2,000 (Est.)	Recommended: At-grade unsignalized crossing Alternative: None
	Oak Avenue	S-RC-3	Major Collector	BL/1WB/TWLTL/1EB/BL TWLTL	60 ft	40 mph	11,231	Recommended: Redirect or tie into existing traffic signal at Melva Street Alternative: None
	Streng Avenue	S-RC-4	Local	1EB/1WB No Median	26 ft	25 mph	1,000 (Est.)	Recommended: At-grade unsignalized crossing Alternative: None
	Woodmore Oaks Drive	S-RC-5	Local	BL/1NB/1SB/BL No Median	42 ft	30 mph	4,453	Recommended: No crossing at this time until Segment S06 is constructed. Alternative: At-grade unsignalized crossing

Legend: NB – Northbound Lane, SB – Southbound Lane, EB – Eastbound Lane, WB – Westbound Lane
TWLTL – Two-Way Left-Turn Lane
BL – Bike Lane, BL(F) – Future Bike Lane

6 Design Guidelines for Trail System Elements

6.1 Access Nodes & Amenities

Access nodes are locations where the public can access the trail. They can range from simple neighborhood connections with no parking and minimal signage to large staging areas with parking, restrooms, kiosks, shade shelters, and play areas. Nodes may occur in conjunction with other public uses such as schools, parks, or civic spaces. They provide connections to the community as well as areas for recreation and information exchange through signage.

For the purposes this study, nodes are divided into four main types, as follows:

- Type A – Neighborhood access node with trailhead, bollards, and directional and rules signage. Parking is generally nonexistent.
- Type B – Neighborhood/Community access node with Type A amenities and on-street public parking. May also include a minimal level of site furnishings such as a pet waste station, trash receptacle, a bench for seating and/or additional signage.
- Type C – Community access node including Type A and B amenities with off-street parking. May include additional features such as benches, trash receptacles, interpretive and directional signage, interpretive kiosk, drinking fountain/pet water station, and/or picnic tables.
- Type D – Regional/Park access node. Includes the elements in the previous types in combination with a public park or other public facility with restrooms. May also have a shade shelter, play and fitness equipment, and other amenities.

All nodes should occur at places where the trail corridor intersects with or is adjacent to streets, with Type C and D nodes located on major streets. Existing locations that support Types B, C & D nodes as currently equipped as well as potential locations for future nodes are shown in Table 8 and Figure 12. Since Type A nodes would be located anywhere the trail is in proximity to a road, they have not been included in the table. Similarly, Type B nodes could occur at any location in which the trail is adjacent to a road with on-street parking, depending upon neighborhood preferences. Only those roads with a frontage on public land are included in the table. Unless more than one creek intersects a street, the node is indicated by the street name only.

Parking ordinances, signage, and enforcement will be used to ensure that trail related parking does not impact residential neighborhoods, and is managed safely at all nodes.

Table 8 – Access Node Locations

Type B	Type C	Type D
Van Maren Park Sundance Park Indian River Drive Park Oaks Drive Northwoods Park Newbridge Way Edge Cliff Court Crestmont Avenue. Bonnie Oak Way Twin Oaks Avenue at Garry Oak Drive Wickham Drive Van Maren Boulevard, Navion Drive	*Parks* Stock Ranch Nature Preserve Arcade Creek Park Preserve *Schools* Mesa Verde High School *Commercial* AC main stem at Auburn Boulevard, AT1 at Fair Oaks, Boulevard and Greenback Lane., AC main stem at Greenback Lane. Matheny at Greenback Lane.	Crosswoods Park Rusch Park Tempo Park C-Bar-C Park Madera Park
Potential Future Nodes		
Wachtel Way 7620 Orange Drive	Crestmont Avenue. 7620 Orange Drive Van Maren Lane.	

Defined by the presence of an off-street publicly accessible parking lot without restrooms, Type C nodes fall into three categories: 1) existing parks, 2) schools, and 3) commercial complexes with sufficient public parking that trail use is unlikely to impact businesses.

Node amenities should incorporate context sensitive design that is appropriate for the setting. Nodes located in natural areas, for example, might emphasize muted colors (greens, browns, beiges, etc.) for amenities. Structures such as kiosks, shade shelters, and restrooms might include bark texture overlays for vertical elements, while benches, trash receptacles, and play equipment may be themed with bark or rock textures and tree-like shapes. Nodes in commercial areas may use colors and patterns that tie in visually with surrounding structures and colors. However, node amenities should have some consistent design elements that help to unify the trail system, such as repeated logos, graphic styles, colors, or materials.

In all cases, benches should include center arms and be sized to discourage sleeping, and structures such as play areas and shade shelters should be designed to discourage overnight use. The use of art work by local artists may also be incorporated into node amenities to celebrate the unique character of the community.

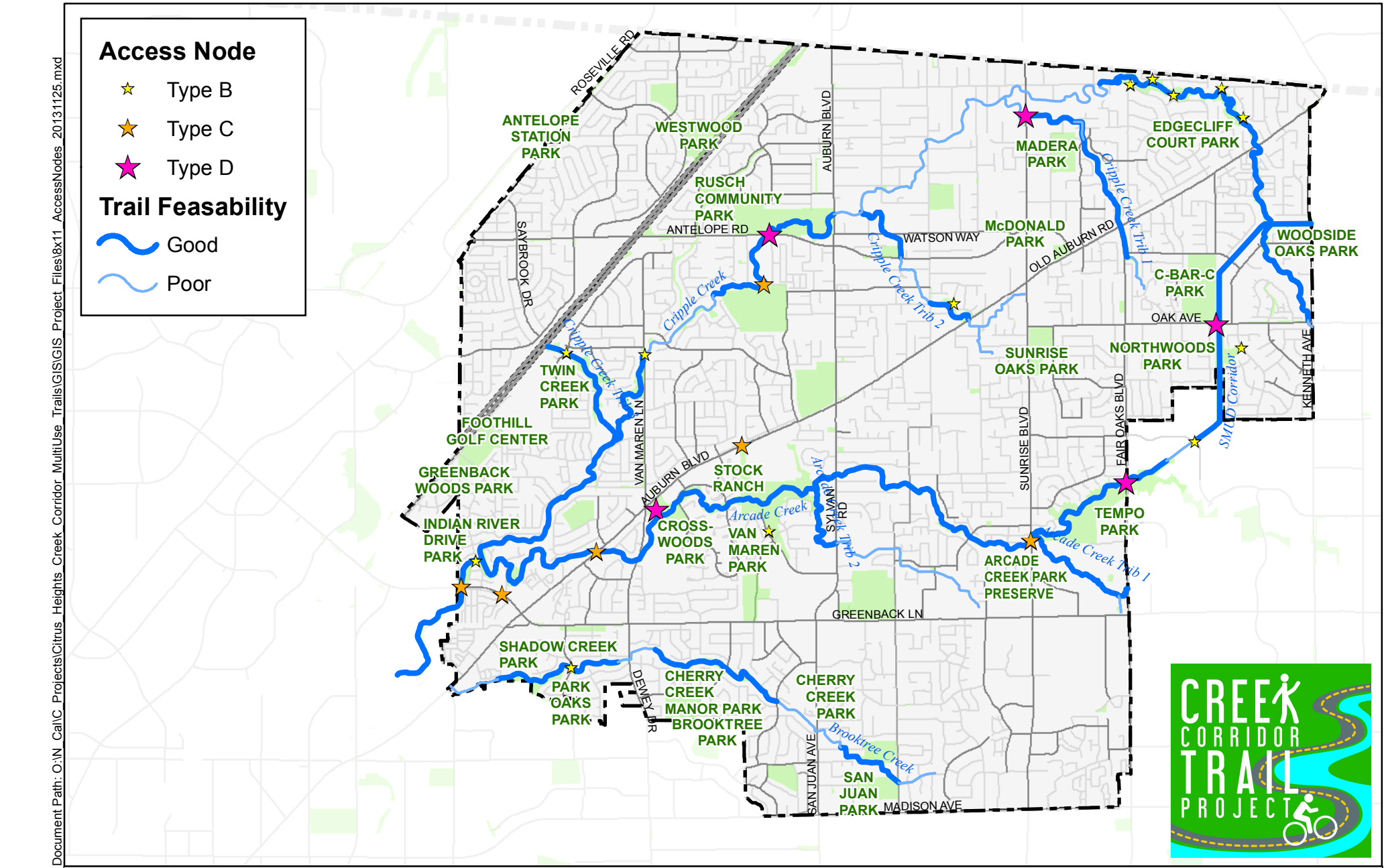
Parking lot and paved surfaces other than trails should employ Low Impact Development (LID) standards such as permeable pavement, water catchment swales and/or rain gardens with flush-curb roads or curb cut-outs to capture and clean stormwater run-off prior to discharge into the creek.[8] Open swales and permeable subsurface pipe are preferable for routing of stormwater than impermeable storm drains. If possible, storm drains should be configured to outlet to open-

[8] Per Sacramento Stormwater Quality Partnership guidelines.

air swales for pre-filtration prior to joining the main creeks. Longer swales are preferable to short segments.

If illuminated, staging areas shall comply with the Zoning Code. As allowed, LED lighting may be used for energy efficiency and bulb life. Individual fixtures should be configured to project downwards to minimize light pollution. Motion sensors capable of maintaining a low illumination level until detecting someone in close proximity may be utilized where cost allows. Lighting control systems are just coming on the market that allow fully-programmable control of light behavior, including variable on-off times by date, varying illumination levels, and other factors. These systems are currently limited to climate-controlled facilities, but as they're adapted to function outdoors, they may be considered for incorporation into lighted staging areas.

Materials with recycled content should be used where practical. Locally produced components should be preferred with consideration for transport distances applied to both materials and assembled product.


Access Node
Type B
Type C
Type D
Trail Feasability
Good
Poor
ROSEVILLE RD
ANTELOPE STATION PARK
WESTWOOD PARK
AUBURN BLVD
RUSCH COMMUNITY PARK
ANTELOPE RD
SAYBROOK DR
MADERA PARK
EDGECLIFF COURT PARK
Cripple Creek Trib 1
WATSON WAY
McDONALD PARK
OLD AUBURN RD
WOODSIDE OAKS PARK
Cripple Creek
Cripple Creek Trib 2
C-BAR-C PARK
OAK AVE
SUNRISE OAKS PARK
NORTHWOODS PARK
KENNETH AVE
SMUD Corridor
TWIN CREEK PARK
Cripple Creek Trib 3
VAN MAREN LN
FOOTHILL GOLF CENTER
FAIR OAKS BLVD
SUNRISE BLVD
GREENBACK WOODS PARK
AUBURN BLVD
STOCK RANCH
Arcade Creek
SYLVAN RD
TEMPO PARK
INDIAN RIVER DRIVE PARK
CROSS-WOODS PARK
VAN MAREN PARK
Arcade Creek Trib 2
ARCADE CREEK PARK PRESERVE
Arcade Creek Trib 1
GREENBACK LN
SHADOW CREEK PARK
PARK OAKS PARK
DEWEY DR
CHERRY CREEK MANOR PARK
BROOKTREE PARK
CHERRY CREEK PARK
Brooktree Creek
SAN JUAN AVE
SAN JUAN PARK
MADISON AVE
CREEK CORRIDOR TRAIL PROJECT
FOOTHILL ASSOCIATES
ENVIRONMENTAL CONSULTING • PLANNING • LANDSCAPE ARCHITECTURE
PSOMAS
© 2013
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1
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N
Other Features
Public Parcel
City of Citrus Heights
FIGURE 12
Access Nodes
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CITRUS HEIGHTS CREEK CORRIDOR
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Document Name: 8x11_AccessNodes_20131125

6.2 Trail Geometry and Cross-sections

The proposed multi-use trail, also known as a Class 1 Bikeway, will be designed in accordance with the latest editions of the California Department of Transportation (Caltrans) Highway Design Manual (Chapter 1000, Bikeway Design), the American Association of State Highway and Transportation Officials (AASHTO) Guide for the Development of Bicycle Facilities, and Bikeways standards adopted by the City of Citrus Heights.

The typical cross section for the separated trail shall be consistent with the standards for a two-way separated bike path and shall consist of a 10-foot wide paved path with 2-foot shoulders on either side of the path. However, in locations where space is constrained a narrower path may be constructed, not less than 8 feet in width.

Where a separated trail is not feasible bicycle users will be directed to alternative Class 2 and Class 3 Bikeways. These bikeways shall be in accordance with the standards specified in the Caltrans Highway Design Manual (HDM). Class 2 Bikeways, also known as bike lanes shall be on-street facilities that are demarcated in accordance with the latest edition of the California Manual of Uniform Traffic Control Devices (MUTCD).

The typical structural section for the separated multi-use trail shall be a minimum of 2 inches of hot mix asphalt on 4 inches of aggregate base, however the structural section will vary based on the supporting subgrade material and will be calculated using an assumed Traffic Index of 4.

Figure 13 – Typical 2-Way Paved Trail

The geometry of the trail will accommodate a 20 mph design speed, except where the downgrade is 4 percent or greater, where the design speed is 30 mph unless otherwise limited by site constraints. In general the maximum grade for the trail will be 5 percent; however, where steeper grades are unavoidable, a maximum grade of 8 percent will be used.

Where the trail is located in the City's 100-year floodplain, the profile elevation will be no more than one (1) foot below the 10-year storm event water surface elevation (10-WSE).

Exceptions to this requirement may be allowed where the trail goes under existing bridges to accommodate minimum vertical clearances. At these crossings, the path will have an elevation at least as high as the 2-year storm event water surface elevation (2-WSE). All segments of the trail that are below the 10-WSE will be constructed with Portland Cement Concrete, or other approved material, with toe protection to prevent the path from being undermined during flood events.

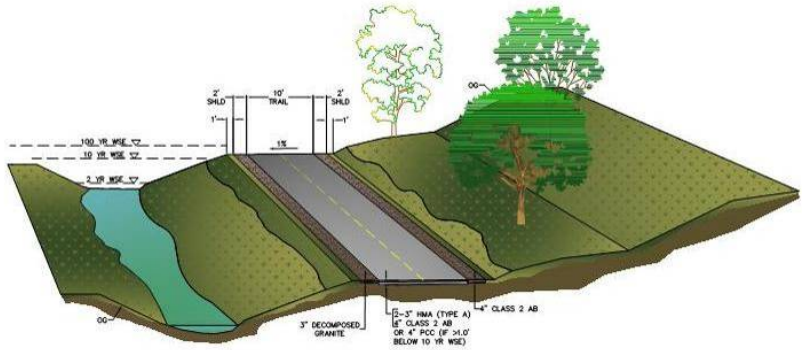


Figure 14 – Trail Section Elevation near Creek

6.3 Signage and Pavement Delineation

Signs will be an important aspect of the trail network, providing users with critical information about orientation, safety, and continuity of the trail system, as well as interpretation of natural resources. It will be important to provide sufficient signage to be helpful to the user without having a negative visual impact for trail users and adjacent property owners.

Signage for the trail system will include signs along the trail, at nodes and trailheads as well as signage at roadway crossings. The signs will include regulatory, warning, guidance, recreational, and interpretive signs.

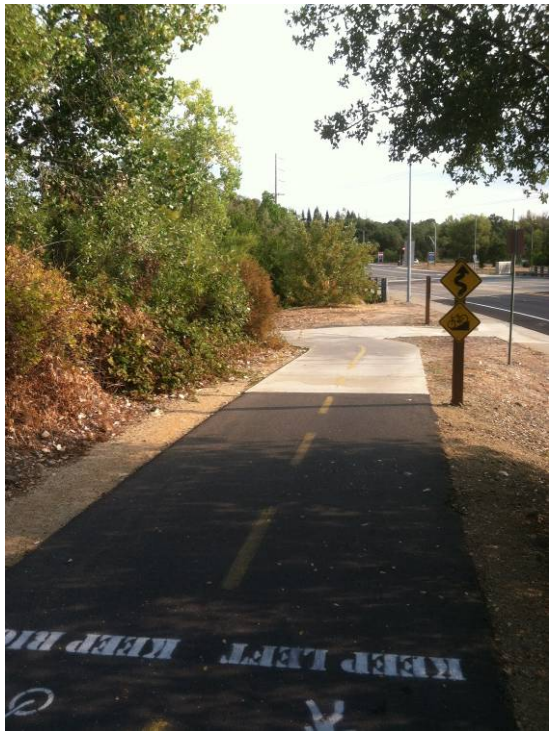


Figure 15 – Signage and Striping Direct Trail Users

6.3.1 Regulatory and Warning Signs

Regulatory signs include stop signs, speed limits, vehicle restrictions, weight limitations, and bike lane designations. Warning signs will warn users of geometric aspects including steep grades, sharp curves, bridge widths and height restrictions, pedestrian crossings, and stops ahead.

Roadway crossings will include regulatory and warning signs for both vehicles and trail users. Signing for trail users will include a standard "STOP" sign and pavement markings. Depending on the type of crossing this may include striped crosswalks, median refuge islands, pedestrian activated traffic signals, and detectable warning tiles. The type, location, and other criteria for signage and pavement delineation at all crossings are identified in the California Manual for Uniform Traffic Control Devices (CA MUTCD).

6.3.2 Guidance and Informational Signs

Path etiquette and other informational signs will be located at key nodes and trailheads. For consistency, a similar array of signs is proposed at each of these nodes. Informational signs may include emergency contact information, directional guidance signs, and distance marker signs. Street names, mileage markers, and place names are key elements that will be called out along the path. Street names should be called out at all path intersections with roadways.

Directional signs will call out key destinations along the path route including all parks, commercial areas, significant access nodes, and schools.

6.3.3 Interpretive Signs

Interpretive signs providing significant biological or cultural aspects will be located at selected locations throughout the path corridor. Key interpretive opportunities include:

- Environmental education about stream ecology, water quality, conservation, native plants and wildlife, riparian corridors, and the watershed
- Archeological and indigenous cultures information
- Historic neighborhood development
- Place name history

Figure 16 – Trail Signs for Nature Education

Table 9 below indicates the anticipated signs for the various elements comprising the trail.

Table 9 – Anticipated Signs

Trail Element	Sign Types	Description	MUTCD Number
Access Nodes	Restrictive Use Signs	No Motor Vehicles, Multi-Use Path Restrictions	R5-3, R9-7, R44<CA>
	Trail Etiquette and Rules	Bikes Yield to Pedestrians, Pedestrians Yield to Wheelchair Users, Hours, Leash and litter laws	R9-7, Local signs
	Informational/Orientation/ Guidance	Distance to next access node or distance to nearest regional trail map	D1-2c, D3-1, D10-1
	Emergency Information	Emergency contact information	
	Regional Maps	Regional trail maps may be displayed at Type D access nodes	Local signs
Road Crossings (unsignalized)	Stop/Yield sign	On approach to roadway crossings or start and end of trail segments	R1-1, R1-2
	Stop/Yield Sign Ahead	Where Stop sign is obscured	W3-1, W3-2
	Pedestrian Crossing Ahead Sign	On approach to crossing	W11-2
	Begin/End Bike Lane	On approach to roadway crossings or start and end of trail segments	R81, R81A <CA>, R81B<CA>
	Street Name	On approach to roadway crossings	D3-1
	No Parking Bike Lane	Keep crossings clear where trail crosses on-street parking	R7-9
	Pavement Markings	Stop, Stop Ahead	
	Crosswalk Striping		
Road Crossings (pedestrian activated signal)	Stop sign		R1-1
	Stop Sign Ahead	Where Stop sign is obscured	W3-1
	Signal Ahead Sign	Where Signal is obscured	W3-3
	Pedestrian Crossing Ahead Sign	On approach to crossing	W11-2
	Begin/End Bike Lane	On approach to roadway crossings or start and end of trail segments	R81, R81A <CA>, R81B<CA>
	Street Name	On approach to roadway crossings	D3-1
	No Parking Bike Lane	Keep crossings clear where trail crosses on-street parking	R7-9
	Instructions for Use of Signal	Push Button for pedestrian activated signal, Bikes Use Pedestrian Signal	R10-24, 26, R9-5

Trail Element	Sign Types	Description	MUTCD Number
	Pavement /Crosswalk Marking	Stop, Stop Ahead, Signal Ahead	
Road Crossings (Undercrossing)	Vertical Clearance	Where height is less than 10 feet	W34C<CA>
	Street Name	At roadway crossings where access ramps are provided or on undercrossing structure	D3-1
	Caution for wet conditions		W8-10, W8-10P
Trail	Informational/Orientation/ Guidance	Distance to next access node	D1-2c, D3-1, D10-1
	Speed limit signs		R2-1
	Pavement markings for speed and priority		
	Interpretive signs at select location		Local signs
	Turn and Curve Warning	Where existing conditions require sharper curves in trail	W1-2, W1-3, W1-4, W1-5
	Striping		
Class 2 Bikeways	Bike Route		D11-1
	Bike lane sign		R3-17
	Bike Lane Pavement Markings	Bike, Lane, Arrow, Bike Lane Symbol Without Person, Bike Lane Symbol With Person	A24D, A24A, A24C
Class 3 Bikeways	Share the road sign		W16-1
	Pavement Markings	Shared Lane Marking, where speed limit is below 35 mph	
Bridge Crossings	Weight	Vehicle weight limit for bridge crossings	R12-1, R12-2
	Vertical clearance		W34C<CA>, W12-2
	Horizontal clearance	Clearance, Narrow Bridge, Do Not Pass where applicable	W5-2
	Vehicle restrictions	No Motor Vehicles	R5-3
	Sight distance warnings		W1-2, W1-3, W1-4, W1-5
	Bridge Etiquette/Rules	Bikes Yield to Pedestrians, Pedestrians Yield to Wheelchair Users	R9-7, Local signs
	Pavement Markings		

6.3.4 Pavement Markings

Pavement markings for the trail may include path etiquette information, distance markers, regulatory information informing trail users of upcoming stop or yield conditions and speed restriction information. Pavement markings will also be required for on-street facilities delineating crossings. All pavement markings will be in accordance with the requirements set forth in the CAMUTCD.

6.4 Safety & Security

Safety and security is of primary importance on the trail system and should be addressed from two viewpoints: trail users and adjacent property owners/residents. Privacy and access management can help allay concerns of adjacent property owners. The need for privacy differs from person to person as well as varying by land use and even the part of the yard adjacent to the trail. Commercial and Professional Office land uses may want open access to the trail so that their workers can enjoy recreating or exercising during lunch hours or breaks, while private residences may want more of a separation between their yards and the trail. Fencing and vegetation screening provide methods of enhancing privacy of landowners in proximity to the trail as well as helping with access control. While some people may want a completely opaque barrier between themselves and the trail, others may want a more transparent fence so that they can appreciate the open space. Because of these differences, the City should seek input from adjacent land owners and residents before constructing a particular segment of trail to clearly identify their particular safety and security needs.

There are several safety and security concerns that were expressed most frequently in the public engagement process of this project.

- **Trail User Safety** - Concerns include the potential for harassment or assault especially in more secluded areas or after dark, and dangerous trail conditions such as uneven surfaces or hazardous trees. Strategies to encourage legitimate trail uses, good visibility, vegetation management, lighting in appropriate locations, and regular maintenance will help address these concerns.

Figure 17 – Sight Lines Make Safer Trails

- **Property Owner Security and Privacy -** Some people whose homes are adjacent to potential trail alignments expressed concerns about unlawful access to their property from trails and the potential for burglaries or assault. Some of this concern is related to the existing level of transient activity in some creek areas. Other residents are fearful that the trails will attract people with unlawful objectives. The Citrus Heights Police Department has provided input on this issue, noting that the presence of paved trails will greatly enhance their ability to patrol the creek corridors beyond what they are able to do now. Another related concern is the loss of privacy as creek corridors that are currently used informally are opened to public use. Visual and access buffers such as fences and vegetation may help address these concerns.
- **Wildfire** - Concerns were expressed about the potential for increased public activity in the creek corridors to increase the risk of wild fire that could threaten homes and habitat. As trails are implemented, strategies such as invasive plant removal, vegetation management, access controls, signage, and smoking ordinances can be used to reduce this risk. In addition, the development of paved trials will establish access routes for emergency responders and create fire breaks.
- **Nuisance Activities** – Nuisance activities by trail users such as excessive noise, graffiti, unleashed dogs, damage to vegetation, illegal parking, and vandalism are concerns for some residents. City ordinances addressing these behaviors must be accompanied by enforcement strategies such as signage, Neighborhood Watch, and police patrols.

The following guidelines provide various strategies and methods for addressing these safety and security concerns. Table 10 summarizes how the guidelines help address specific concerns.

6.4.1 Fencing

Existing fencing that separates private property from the creek corridors varies widely throughout the City, from solid wood or concrete block structures to barbed wire and field fencing. While one fencing style will not be appropriate in all circumstances, the following recommendations should be considered when new fencing needs to be installed as part of trail construction to separate adjacent land uses and trails. Particular consideration needs to be given to how the fence placement and style of fencing will affect flood conveyance.

- **Open or Semi-private Fencing:** for residents wanting some degree of visibility between their property and the trail. Typical materials include wrought iron or anodized aluminum vertical-picket style composed of posts with stringers and vertical slats. Recommended height of four to six feet, depending upon amount of access control desired. Non-invasive, low water use vines such as California grape (*Vitus californica*) can be grown on the fence if additional privacy is desired, or a similar picket-style design with wider pickets in either aluminum or wood could be used.

Figure 18 – Open Picket Fencing

- **Opaque Fencing:** for residents wanting additional privacy and typically constructed of concrete, concrete block, masonry, or wood. Concrete and masonry structures are more expensive than wood, but last longer and have the additional benefit of noise attenuation. Attention should be given to create an attractive finish on concrete walls appropriate to the setting, particularly if the wall is adjacent to the trail. Another consideration when designing a wood wall is the potential for graffiti. Irregular surfaces such as those achieved on concrete walls by some formliners or veneer can reduce the potential for tagging by graffiti artists. Since opaque fencing is usually constructed for privacy, height will typically be 6-feet. Landscaping in front of the wall should also be considered to soften the visual effect and discourage graffiti.

Figure 19 – Graffiti-resistant Stone Veneer

Figure 20 – Solid Wood Fencing

6.4.2 Vegetation Management

Vegetation management can aid in safety by maintaining sight lines for trail users and adjacent properties, reducing fire danger, and installing plants that limit access where access is undesirable. Vegetation management actions should also take into consideration selective removal of species to preserve those that have habitat value, while accomplishing the desired safety objectives. While screening plantings may provide desirable visual barriers between residents and trail users, care should be taken in planting such barriers that they do not provide opportunity for people with criminal intent to hide where they can threaten trail users or adjacent properties. Vegetation adjacent to the trail and backyard fences should be managed such that a clear zone is maintained between two feet and six feet high for a distance of six feet from the trail or fence. These design practices are a key element of Crime Prevention through Environmental Design (CPTED). They will make it easier for police to maintain visual contact on the creek corridors and limit their appeal to criminals.

Plants can also be used for access control. California blackberry (*Rubus ursinus*) and California rose (*Rosa californica*) can discourage access to sensitive areas or private property. California blackberry should not be confused with Himalayan blackberry (*Rubus armeniacus*), which, while also being good for access control, is highly invasive and detrimental to riparian habitat value.

Near the trail, dead limbs and trees in poor health, as evaluated by an arborist, should be pruned and/or removed if they pose a danger to the safety of trail users. Fallen trunks can be left in the corridor if they are outside the floodway and are unlikely to mobilize in a flood event and pose a danger to downstream bridges or structures. Dead trees within the corridor that do not pose a danger to public safety may be left standing as habitat.

Vegetation management, along with access controls and ordinance enforcement, is also essential to limit fuels for potential wildfires. Practices include establishing shaded fuel breaks are key locations, invasive plant species removal, and maintaining a clear zone of at least 2 feet adjacent to the trail. Irrigated planter strips and the paved trails can also act as effective firebreaks.

6.4.3 Siting and Design

In addition to creation of barriers, location of the trail with respect to adjacent land uses can help alleviate some landowner concerns. Generally, trails should be located with as much buffer from private residences as possible, taking into account other site constraints such as location of floodplains and floodways, slopes, soil stability, protected vegetation, and easements. In general, unless constrained by physical factors, property boundaries or easements, trails should be no closer than 20 feet to a backyard fence.

Features such as play equipment and other structures should have an open design without enclosed areas that could be used for lurking or extended sheltering.

As mentioned previously, planting can be used as privacy screening, provided it does not compromise safety. Plantings within the corridor would preferably be native to the Sacramento Region, or if a larger palette is desired, native to northern California. In no cases should invasive plants,

defined as High or Moderate by the California Invasive Plant Council, be used. Evergreens are preferred over deciduous for year-round screening. Layered plantings of groundcover, shrubs, and trees form a more effective screen than a single type or row.

6.4.4 Lighting

Lighting can help increase safety of trail users and adjacent land uses at night. To avoid becoming a nuisance, lights should project downwards and comply with the Zoning Code. Motion sensor lights that operate at a low level but increase to a higher level when motion or a heat source is detected are preferable over static-level illumination, because of less potential for neighbors to consider the light a nuisance and better ability to deter unwanted night-time behavior.

Figure 21 – Lighting Directed onto Trail

6.4.5 Security Cameras

Security cameras can aid in improving safety in some areas. Cameras mounted on poles tall enough to resist vandalism and mounted with signage warning of their function can help in reducing criminal behavior, even if cameras are non-functional. Operational cameras can aid in police investigations and prosecution of criminal activities, which can aid in reducing overall crime rates or redirecting unlawful behavior elsewhere. Cameras are not inexpensive, however, and require electrical and wireless connections, so are more practical in focused areas with valuable resources, such as a park, or problem areas. Video surveillance can also raise issues of privacy, and so must be used cautiously.

6.4.6 Call Boxes

Even though many people now carry mobile phones with them wherever they go, installation of solar-powered call boxes at intervals along the trails can enhance user safety. Call boxes can be set up to directly access an emergency responder, saving valuable time in a critical situation. Their presence also acts as a deterrent to unlawful activity since they indicate to would-be criminals that a law enforcement presence is readily available.

6.4.7 Hours of Operation

Trails should be posted to be generally open from dawn to dusk; however, by their nature, people can use them at any time. Locking gates on parking lots can help to reduce after-hours use. In some locations, such as the Arcade Creek Park Preserve, lighting can be provided to allow use after dark. This

would be appropriate where after-hours destinations, such as restaurants or entertainment venues, are near residential areas.

6.4.8 Separation of Walking and Biking Trails

Where space exists, separate walking and biking trail can be provided to help reduce conflicts between pedestrians and cyclists. In this case, the width of the bike path can be reduced to eight feet and a separate four to six foot unpaved trail of stabilized decomposed granite provided for foot traffic. Paths should be separated by a landscape strip of three feet or wider and clearly marked at regular intervals as to the appropriate mode of travel. Paths should come together at street crossings.

Figure 22 – Use Separated Trail Lanes

Situations where this approach might be used include parks and other places where existing pedestrian paths are already in place and bicycle trails can be added separately.

6.4.9 Patrols

Citizen and police patrols can be effective at increasing security. Vegetation adjacent to roadways should be maintained such that police can look into the corridors from the streets to observe illegal activity. Where a paved trail is wide enough, law enforcement officers can drive on the trails if they suspect unlawful activity is occurring, being careful of the potential for pedestrians and bicycles. Where trails are narrow or the terrain prohibits automobile access, officers on bicycles can patrol the trails.

Citizen patrols similar to neighborhood watches can help in observing unlawful behavior and alerting law enforcement personnel of potential problems; however, such patrols should never put themselves into unsafe situations. Law enforcement is the responsibility of the police.

6.4.10 Emergency Vehicle Access

Trails with a width of 10 feet and wider can double as routes for emergency vehicles such as ambulances and fire apparatus. Emergency personnel can provide services for trail users as well as fire suppression in the open space corridors. Where not constrained by topography or other factors, trails should be designed to support emergency vehicles with appropriate turn radii and access points. Not all trails need to be designed for emergency vehicle access since access to creek corridors is also available in many locations from adjacent streets. Public

safety personnel will provide assistance in determining which trails will be designed for emergency vehicle access.

6.4.11 Signage

Signage should be posted at all access points indicating trail safety rules and regulations. Additionally, directional signs and maps should be provided at key locations to aid trail users in wayfinding. Directional signage should include location indicators such as nearest cross-streets to aid emergency and law enforcement personnel in finding people who need assistance. Additionally, mileage markers should be posted at periodic intervals along the trails.

6.4.12 Summary of Safety and Security Design Guidelines

Individual trail elements designed for safety and security often address multiple concerns. Table 10 provides a summary of the various elements, associated design guidelines, and the different safety and security concerns that may be addressed by each element.

Table 10 – Summary of Safety and Security Design Guidelines

Design Element	Design Guideline	Discussion	Safety Concern
Fencing	Utilize fencing where appropriate to create privacy and assist in access control	Fencing aids in preserving private space by functioning as a visual screen. Fencing can be opaque to completely block views, such a typical suburban backyard wood fence; semi-transparent to provide some degree of screening, such as partially-open wooden louvers; or transparent, such as ornamental wrought-iron fencing. In addition to aiding in privacy, fencing can form a barrier to assist with access control. Low 3' high fencing functions as a partial barrier, where high 6' tall fencing provides a more secure enclosure. Fencing is generally the responsibility of the land owner, unless specific agreements with the city state otherwise.	Privacy and Access Control - Property Owner Safety
Vegetation Management	Maintain vegetation such that a clear zone exists between 2' and 6' high adjacent to the trail	Maintaining a clear zone adjacent to the trail increases security for trail users and reduces areas where potential lurkers can hide.	Trail User Safety
	Maintain vegetation such that a clear zone exists adjacent to backyard fences	Maintaining a clear zone adjacent to backyard fences increases security for adjacent home owners since potential trespassers can be seen before they attempt to climb the fence.	Property Owner Safety, Wildfire
	Install vegetation that discourages trailblazing between trails and adjacent land uses	Some plants can discourage off-trail access due to the difficulty of moving through them. Thorny or twiggy plants usually work best in this capacity. Planting these species in areas with evidence of off-trail access can help to reduce this behavior.	Property Owner Safety, Wildfire
	Remove dead limbs or dead trees near the trail that pose a danger to trail users	Dead limbs or trees near the trail that could fall and injure trail users should be pruned or removed. Dead wood far enough away from the trail that it doesn't pose a safety hazard can be left in place, since it provides beneficial habitat to riparian fauna.	Trail User Safety, Wildfire

Design Element	Design Guideline	Discussion	Safety Concern
Siting and Design	Maintain as much separation between private residences and trails as practical	Unless limited by topography, vegetation or other factors, trails should be located as far from private lots and other sensitive land uses as is practical, with considerations of floodplain, floodway, protected riparian zones, water quality, and other environmental constraints. In general, unless constrained by physical factors, property boundaries or easements, trails should be no closer than 20 feet to a backyard fence.	Property Owner Privacy and Access Control
	Structures within the corridor should be open to the elements	Structures should not encourage extended sheltering or loitering by transients. With the exception of shade shelters, roofed structures should be permeable to rain. Benches should be five feet long or less unless center arms are included.	Property Owner and Trail User Safety, Nuisance Activity
	Utilize plantings for visual screening	Where not adjacent to trail or backyard fencing, layered evergreen vegetation can be used to form visual buffers between trails and private property, particularly in high use areas.	Property Owner Privacy
Lighting	Provide lighting consistent with zoning codes where feasible in areas where use is expected after daylight hours	Lighting can be effective at deterring some unlawful behavior, particularly if combined with motion sensors.	Property Owner and Trail User Safety, Nuisance Activity
Security Cameras	Provide security cameras in areas that are hot-spots for unlawful behavior	As with lighting, security cameras, whether functional or not, can discourage illicit activities if signed appropriately. Functioning cameras can also aid in law enforcement.	Property Owner and Trail User Safety, Nuisance Activity

Design Element	Design Guideline	Discussion	Safety Concern
Call Boxes	Provide call boxes periodically along the trail to enhance user safety	Call boxes provide areas where users who need assistance can contact emergency responders. Call boxes can also be a deterrent to unlawful behavior.	Trail User Safety, Nuisance Activity
Hours of Operation	Post hours of operation from dawn to dusk	Reducing after-hours use of trails can potentially reduce incidents of crime.	Trail User Safety, Nuisance Activity
Separation of Walking and Biking Trails	Where necessary and feasible, separate walking and biking trails	Creating separate, well marked trails reduces potential collisions between pedestrians and cyclists, who move at different rates of speed and may interfere with one another when sharing a combined trail.	Trail User Safety
Patrols and Emergency Vehicle Access	Manage vegetation adjacent to roads such that police patrols can view into the trail corridor	Maintaining vegetation clear around roadway crossings allows patrols utilizing the road to stop at trail crossings and view activities occurring within the corridor. This will also discourage crime in those areas with good visibility.	Trail User and Property Owner Safety, Nuisance Activity
	Develop paved trails of sufficient width to accommodate police cars	Creating paved trails of 10' wide or more allows patrol vehicles to use trails for access if they suspect unlawful activity is occurring. Additionally, emergency vehicles can utilize the trail for fire-fighting or medical response.	Trail User Safety, Nuisance Activity, Wildfire
	Consider police patrols on bicycles	In areas with extensive trails or populations of cyclists, police on bicycles can help in deterring crime and responding to unlawful incidents.	Trail User Safety, Nuisance Activity

Design Element	Design Guideline	Discussion	Safety Concern
	Encourage citizen patrols	Creating neighborhood patrols on the trails can enhance safety for both trail users and property owners.	Trail User and Property Owner Safety, Nuisance Activity
Signage	Post rules and regulations and directional signs and maps at key locations	Rules and regulations signage can help reduce user conflicts and undesirable behaviors. Directional signage helps with wayfinding and may reduce the likelihood of people getting lost.	Trail User and Property Owner Safety, Nuisance Activity

6.5 Creek Crossings

The bridges identified where the trail crosses the creeks will be designed in accordance with the requirements for pedestrian and bicycle bridges as specified in the latest edition of the AASHTO Bridge Design Standards and Caltrans Bridge Design Manual and Specifications.

In general, when Fire District access is required the minimum width of the trail bridges will be 12 feet with a minimum vertical clearance of 12 feet. Otherwise minimum clearances will be 10 feet. Fire District access requirements will be determined on a project by project basis with input from emergency medical responders. In some locations, fire and emergency responders may prefer to access the creek corridor via existing streets rather than using the trails.

Where bridges are designated as a fire/emergency access route, the bridge will be designed to support a minimum gross vehicular weight of 30,000 pounds. Where the trail is not required for fire access use and bridge loading is less than 30,000 pounds, the trail should be designed to accommodate a fire vehicle turn-around area on each side of the bridge and/or provisions for alternative access.

In general the creek crossings will be designed to minimize hydraulic and environmental impacts to the creeks.

Abutments will be placed on pile foundations, if scour is anticipated, or slab footings. The soffit elevation would preferably be set 1 foot above the 100-year water surface elevation (WSE) to protect the integrity of the structure during the 100-year storm event, however as a minimum the bridge deck shall be set at the 10-year WSE and the bridge railings shall be designed to withstand the 100-year storm event. At each crossing location a hydraulic analysis will be conducted to insure that during the 100-year storm event, the proposed improvements do not result in a rise in the 100-year WSE of more than 0.1 feet.

At locations where constructing a bridge deck at the 10-year water surface elevation is not feasible, low flow bridge structures may be required. These structures would be designed to be inundated under the 10-year or 100-year storm event.

Prefabricated single span steel bridges or prefabricated wooden bridge structures supported on abutments located outside the floodway are proposed where feasible. The steel bridge structures will have a weathered steel finish to blend into the natural environment and minimize maintenance. For consistency and continuity it is proposed to construct bridges of similar appearance and material types along each creek corridor.

In certain locations, where physical constraints or terrain make providing access to a crane to place the prefabricated bridge structures infeasible, consideration of other bridge types, including assembled-in-place or cast-in-place may be appropriate.

The following design criteria apply to the proposed bridges:

- Bridges should be at least as wide as the paved path and a minimum of 12 feet clear between railings if designed to accommodate vehicle traffic. Narrower bridges may be used in areas of restricted access.
- Bridge railings shall be a minimum of 48 inches in height
- Decking material shall be firm and stable
- Certain bridges may be required to accommodate fire and maintenance vehicles with a gross vehicle weight of 30,000 pounds where it is determined that fire access using the bridge will be required.
- The bridge deck shall be designed as a minimum to be above the 10-year water surface elevation.
- Where the soffit of the bridge is less than 1 foot above the 100-year water surface elevation (WSE) line, a hydraulic analysis is required to ensure no increase will occur in the water surface elevation.
- The bridge will be designed to minimize impacts to the existing creek and environment
- The bridge will be designed to not impede fish passage or constrict the floodway.

6.6 Road Crossings

The proposed trails encompass a significant portion of Citrus Heights resulting in numerous roadway crossings throughout the study area. Based on the proposed trail alignment, the path would cross these either at-grade or below-grade under existing bridges or through existing or new box culverts.

The recommended roadway crossing types are based on established industry standards, the California MUTCD, preliminary field investigations, and experience on similar existing facilities. The proposed crossing treatments can be broken into five categories:

- Grade separated crossings
- Signalized at-grade crossings
- Directed toward adjacent intersection or crossing
- Non-signalized at-grade crossings
- No crossing, where trail is discontinuous

6.6.1 Grade Separated Crossings

Grade separated crossings proposed for the trail network are mainly undercrossings. Overcrossings are generally considered less feasible options than bridge or culvert structures. In addition the existing terrain relative to the roadway elevation would require extended ramps to meet the maximum 5 percent grade requirements and it is anticipated that trail users may then use alternatives means to cross the roadway. All bridges will be designed in accordance with the requirements set forth in the latest edition of the AASHTO Bridge Design Standards and Caltrans Bridge Design Manual and Specifications.

6.6.1.1 Bridge Undercrossings

Several bridges already exist along the creek corridor, in particular along portions of Arcade and Cripple Creek. These bridges vary in width, span length and vertical clearance. In general the height to the soffit varies between 8 and 12 feet from the existing low flow channel. The current minimum vertical clearance Caltrans design standard for a trail is 10 feet,

however it is anticipated that this standard may need to be lowered to 8 feet in some locations to allow use of the existing undercrossings. Additional signage will be placed warning users of the reduced vertical clearance.

Any trail construction will require excavation of the existing embankment and use of the existing abutment walls or in some instances new tie-back retaining walls, to avoid impacts to the existing abutments. As illustrated below, depending on the location of the creek relative to the proposed trail, the creek side edge of the trail would require protection against erosion in the form of rock slope protection or a cut-off retaining wall. The proposed improvements would be designed to not reduce the cross sectional area under the bridge structure thereby minimizing any hydraulic impacts. The majority of the bridges include utilities attached to the side of the bridge which may require relocation to obtain the necessary clearance.

As illustrated by Figure 23, in certain locations where the alignment passes under existing bridge structures, retaining walls will be constructed and in some cases tie-back walls will be used to avoid impacts to the existing bridge abutments and maintain the integrity of the existing structure.

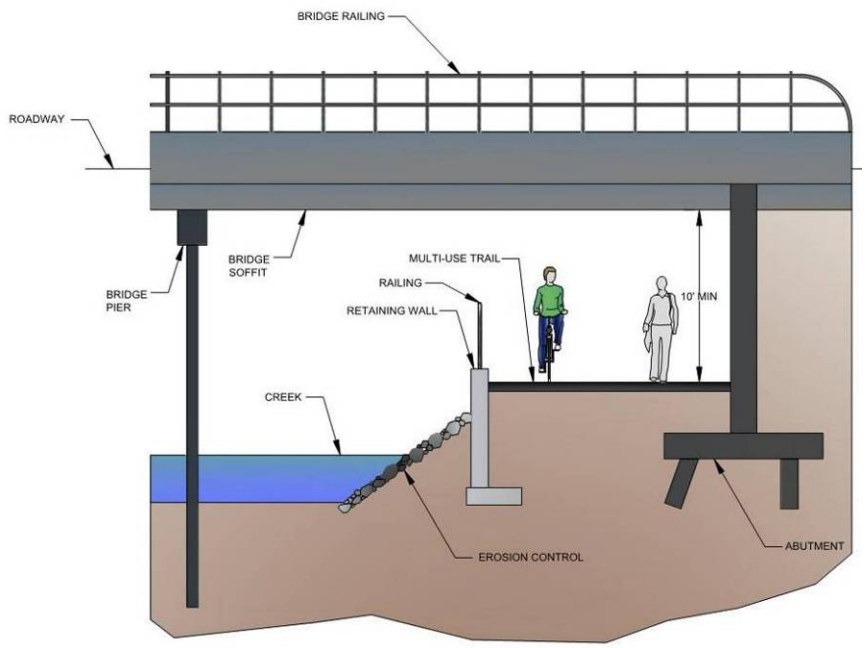


Figure 23 – Bridge Undercrossing

6.6.1.2 Culvert Undercrossings

Several reinforced concrete box culvert structures exist along the creek corridors. These culverts are single boxes or combination of two and three units and vary in width, length and height. The height of the culvert and/or the elevation of the roadway relative to the low flow channel dictate whether it is feasible to use the existing box culvert(s) to accommodate the proposed trail. Most of the culverts do not provide the preferred minimum 10-foot vertical clearance and the flow line

is set at or below the creek low flow elevation making their use during a 2-year storm event infeasible. Where the existing overcrossing structure consists of box culverts, in some locations a new reinforced concrete box culvert is proposed alongside the existing culverts, approximately 2 feet above the existing flowline to keep the trail above the low flow water surface elevation.

Figure 24 shows the construction of a new culvert adjacent to the existing structure set slightly above the low flow elevation, making the trail passable during smaller storm events.

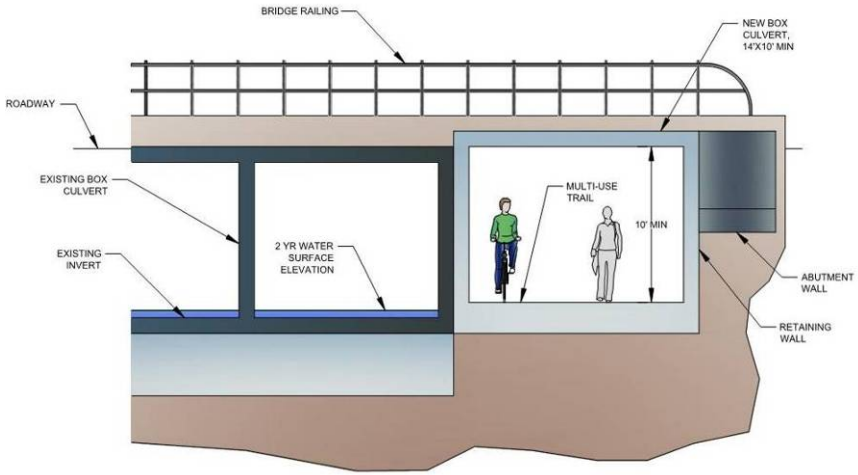


Figure 24 – Box Culvert Undercrossing Option

Where it is not possible to meet the 10 foot vertical clearance requirement, other options of reducing the minimum vertical clearance standard to 8 feet, placing a porous surface at the base of the culverts, or lowering one of the existing culverts to pass the low flow, will be considered.

6.6.2 At-Grade Crossing Options

The majority of the more than 45 road crossings considered as part of this project will be at-grade crossings. Proposed grade crossing options include use of existing traffic signals and crosswalks, new pedestrian activated signals and crosswalks, unsignalized mid-block crossings, redirecting trail users via two-way pathways to an adjacent signalized intersection and crosswalk. The proposed trail design for all at-grade crossings will be designed in compliance with ADA standards and meet the minimum requirements set forth in the CAMUTCD and Caltrans Highway Design Manual for Bikeways.

Each of these will be discussed in more detail below.

6.6.2.1 Existing Traffic Signal and Crosswalks

In locations where the trail alignment enters the crossing roadway near or at an existing signalized intersection, existing signalized crosswalks are proposed for crossing roadways. Minor improvements would be anticipated at some intersections to bring the existing signal up to current design standards to meet ADA requirements. This work may include upgrading curb ramps, modifications to the signals to include countdown signal heads and vibro-tactile pedestrian push buttons, and incorporating Type D detector loops immediately behind the limit line for bicycles.

Figure 25 – Existing Signalized Intersection

6.6.2.2 Pedestrian Activated Signal (At-Grade Crossing)

In locations where existing traffic volumes are moderate, primarily on collectors and major residential streets, and grade separation is determined to be infeasible, a new pedestrian activated traffic signal is proposed. The at-grade crossing will need to comply with the requirements set forth in the latest edition of the California MUTCD. To reduce the length of the crosswalk, sidewalk bulbouts may be feasible provided the impacts from these improvements to drainage, parking or existing on-street bicycle facilities can be mitigated to an acceptable level.

Several factors need to be taken into account when contemplating this option including:

- Traffic volumes – where ADT traffic volumes exceed 20,000 vehicles per day (vpd) use of grade separation should be considered.
- Speed – where 85th percentile speeds exceed 40 mph consideration of traffic calming measures may be warranted.
- Number of lanes –unsignalized crossings may be more appropriate for only two lanes of traffic; a pedestrian activated signal crossing is considered infeasible for more than four lanes.
- Width of roadway - may determine the need for signalization or construction of a refuge island
- Presence of a median - may provide pedestrian refuge area (Figure 26).
- Location of nearest existing intersection or crosswalk – may reduce the need for a new crossing and may make crossing undesirable due to impacts on traffic flow.

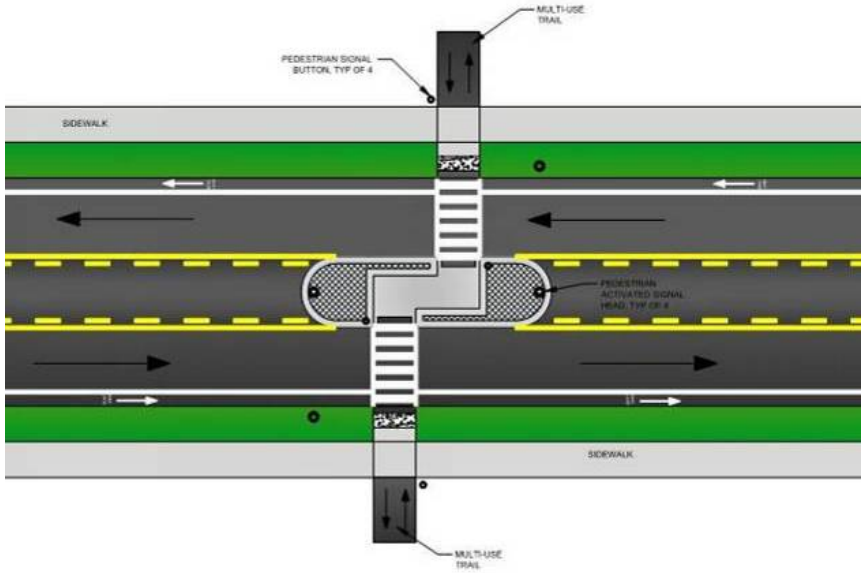


Figure 26 – Pedestrian Activated Signal

6.6.2.3 Unsignalized At-Grade Crossings

In locations where existing traffic volumes are low, primarily on local streets in residential areas and grade separation is determined to be infeasible, a new unsignalized at-grade crossing is proposed. The at-grade crossing will need to comply with the requirements set forth in the latest edition of the California MUTCD. To reduce the length of the crosswalk, sidewalk bulbouts may be feasible provided these improvements do not adversely impact drainage, parking or existing on-street bicycle facilities. Driver awareness may be enhanced using in-pavement lighting options, pavement markings, rapid flash beacons and raised median islands and/or sidewalk bulbouts.

Several factors need to be taken into account when contemplating this option including:

- Traffic volumes – where ADT traffic volumes exceed 5,000 vpd consideration of signalized crossing is warranted
- Speed – where 85th percentile speeds exceed 30 mph consideration of traffic calming measures or signalization may be warranted
- Number of lanes – where more than two lanes existing consideration may be given to signalized crossings
- Width of roadway - may determine the need for signalization or construction of a refuge island
- Presence of a median - may provide pedestrian refuge area
- Location of nearest existing intersection or crosswalk – may reduce the need for a new crossing and may make crossing undesirable due to impacts on traffic flow
- Sight distance – where the proposed crossing is located on a curve with poor sight distance consideration of signalized crossing is warranted

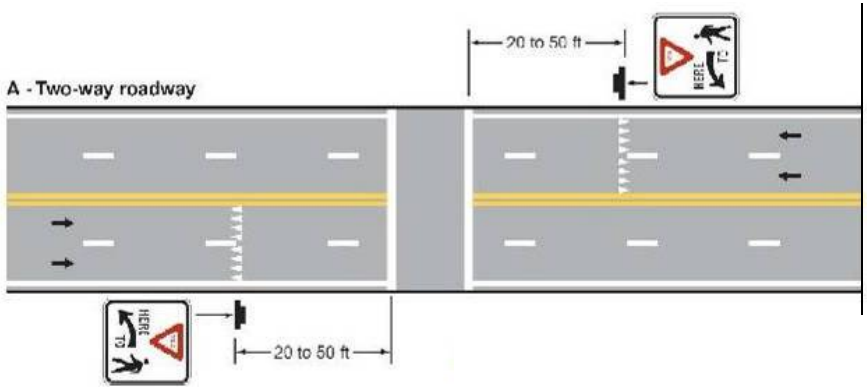


Figure 27 – Unsignalized At-Grade Pedestrian Crossing

6.6.2.4 Redirection of Trail Users to Existing Intersection Crossings

This type of treatment option is considered feasible where the proposed road crossing occurs fairly close to an existing signalized intersection and placing a new crossing is likely to impact existing traffic flow and increase delay, and grade separation is determined to be infeasible.

Several factors need to be taken into account when contemplating this option including:

- Availability of right-of-way – impacts to private property may make this option infeasible
- Impacts to utilities – if significant utilities will need to be relocated this may make this option economically infeasible
- Environmental impacts – if significant environmental impacts would occur as a result of the proposed improvements this option may be considered infeasible
- Distance to nearest existing crossing and presence of driveways – where the distance to the nearest driveway will make use of this facility limited or where driveways may pose a safety concern consideration may be given to other options

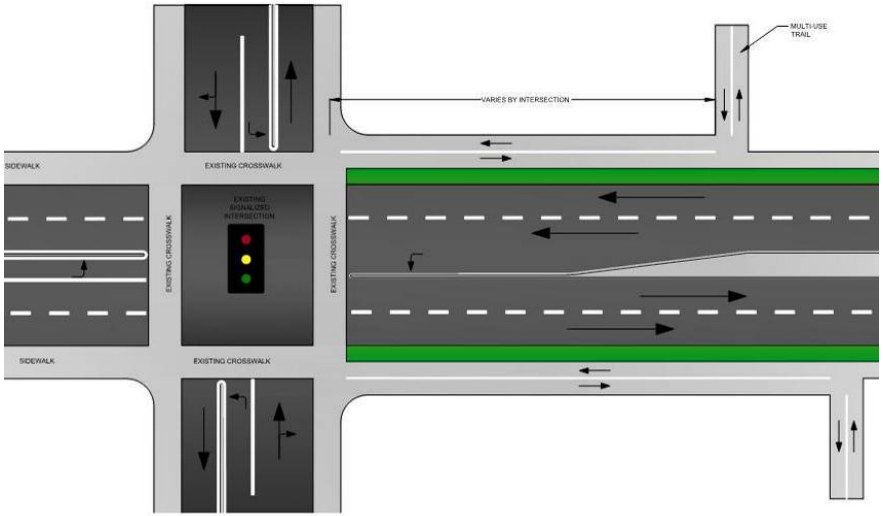


Figure 28 – Parallel Path to Next Signalized Crossing

The minimum trail width shall be 10 feet however where it is proposed to combine the trail with the existing sidewalk a minimum of 12 feet is required. In specific instances where the physical constraints make obtaining the minimum widths

unfeasible the minimum two-trail width shall be 8 feet provided this is separated from the existing sidewalk.

Where traffic volumes on the arterial street are significant, and the nearest existing crosswalk is up to 500 feet of the desired roadway crossing, redirecting trail users to that crossing is considered feasible. Where the distance exceeds 500 feet alternative crossings methods should be considered including installation of a pedestrian activated traffic signal or grade separation.

6.7 Retaining Walls

In general, the terrain is fairly gently sloping throughout the proposed creek corridors; however there are reaches along Arcade Creek where the banks adjacent to the creek are relatively steep. Cut and fill slopes are anticipated to be a maximum allowable of 2:1 (horizontal:vertical). In some areas where the existing slopes are steep and the area is constrained, use of retaining wall structures is anticipated.

Retaining walls and stabilized slopes will be used to minimize the project footprint and protect the integrity of the trail and adjacent property and structures. In environmentally sensitive areas, other methods will be considered to stabilize the slopes including laying back the banks, minimizing disturbance of existing vegetation, use of bio-engineered stabilization solutions and plantings.

It is anticipated that retaining walls of various types will be constructed as part of the proposed trail. These will include

- Concrete retaining walls – standard Caltrans type gravity walls,
- Concrete tie-back retaining walls – used in location where construction of regular walls is impractical and the integrity of bridge or structures is a concern,
- Concrete cut-off walls – used on the creek side of the trail where the trail is likely to be susceptible to flooding and erosion,
- Soil-nail walls – used in steep terrain where construction of standard concrete retaining walls is impractical,
- Rock/boulder walls – used for smaller stabilization situations (up to ~12 feet high) where a more natural appearance is required,
- Timber walls – used where the retaining volume is relatively small and where aesthetics of a wooden wall blend into the surrounding environment,
- "Hilfiker" type welded wire gravity walls - used for situations where a more natural appearance is required.

The choice of the type of wall will depend on the purpose of the wall, the amount of material to be retained, the constraints at the proposed location, the location of the wall relative to the creek, and aesthetic requirements.

The aesthetic appearance of all walls will be considered during design. In general all walls will be designed and constructed to blend into the natural environment. For example, concrete retaining walls could receive an architectural facing using a form liner to provide a natural rock appearance. Stone veneer may also be considered in areas where hydraulic gradients

allow. Aesthetic treatments should be selected for their anti-graffiti properties. Irregular and rough textures are preferred over smoother or more regular surfaces.

Figure 29 – Rock/Boulder Retaining Wall

The proposed improvements would be designed to not reduce or significantly increase the cross sectional area along the trail to minimize any hydraulic impact of the proposed improvements.

In certain locations where the alignment passes under existing bridge structures, retaining walls will be constructed and in some cases tie-back walls will be used to avoid impacts to the existing bridge abutments and maintain the integrity of the existing structure.

Footings for walls are anticipated to be standard footings. Additional geotechnical studies will be conducted during future project phases to confirm the appropriate wall type and footing.

Figure 30 - Concrete Formliner Retaining Wall

7 General Implementation Costs

Trail implementation has six primary cost components: 1) planning and design, 2) property/easement acquisition, 3) environmental compliance and permitting; 4) actual construction costs, 5) administrative and construction management, and 6) maintenance. Each of these categories is discussed briefly below.

7.1 Planning & Design

Costs to plan and design the trail include engineering, geotechnical, landscape architectural, and other professional fees. These costs can vary significantly depending upon constraints such as topography, number of creek crossings, location and type of staging areas, custom design elements and other factors. A one mile section of unlit trail with two creek crossings and moderate constraints with a construction cost around $1.5M might require 10 percent in design fees. Design fees do not necessarily follow a linear relationship to construction cost, however, and shorter sections usually require a higher percentage of the overall cost than longer sections. Similarly, a section with greater constraints, such as steep banks requiring retaining walls, crossings, or unstable soils, and/or having more involved design features, such as difficult street crossings, access nodes, lighting, interpretive signage, or play features, might be closer to 15 percent or 20 percent of total construction cost.

Additional technical studies may include a hydrology/hydraulic analysis for all segments of the trail within the 100-year floodplain. For each creek crossing and where the trail passes under an existing bridge structure, additional analysis will be required to confirm no significant impact on the 100-year water surface elevation. In some specific location a geomorphology study may be warranted where creek creep or excessive erosion may be anticipated based on visual observations, soil types, stream velocities and historic flooding data. A Stormwater Pollution Prevention Plan (SWPPP) will need to be prepared where the proposed project will disturb more than one acre of soil.

7.2 Acquisition

In order to locate a trail in areas where trails are desired but public access is not already secured, either through public ownership or a trail/recreation easement, the land must be purchased either through acquisition of fee-title or a trail easement. Any future land acquisition required for trail development must occur at going market rates. Costs can vary significantly from property to property based upon the size of the easement or portion of property under consideration, possible other beneficial uses, constraints to development, physical hazards such as floodplains, and many other factors.

A thorough market analysis was not done as a part of this study, but a brief examination of undeveloped land sales in the Citrus Heights area from March 2013 to July 2013 indicated

that prices ranged from a low of $127,622 per acre to a high of $428,553 per acre, with an average sales price of $244,644 per acre. These values are for developable parcels, and the majority of the trails proposed by this study will be passing through areas prohibited for development due to the presence of the floodplain, so the appraised values for land proposed for trails will likely be lower than the market value of developable parcels.

A city within the Sacramento region has recently purchased several properties and easements within the 100-year floodplain for a trail project. They paid approximately $119,500/acre and $328,000/acre for two in-fee acquisitions and $76,300/acre for a permanent slope easement (not including temporary construction easements). The parcels varied in size and were considerably smaller than an acre, with the higher unit cost being paid for the larger parcel. Their project has budgeted $3 per square foot for right-of-way acquisitions, which works out to about $130,700/acre. In this feasibility analysis, a cost of $150,000/acre will be used as a general cost for right-of-way acquisitions since property values are beginning to increase with the strengthening housing demand.

Easement acquisition values are lower than fee-title acquisitions and should be calculated based upon the proposed easement impact on the beneficial interests remaining with the landowner. Easement value should not exceed the underlying fee-simple value (Allen, 2001).

The City is required to obtain an appraisal of a property to be used as the basis for the easement or fee title purchase, and the City is prohibited from paying more than the appraised value.

7.3 Environmental Compliance and Permitting

Environmental compliance includes preparation of the CEQA and/or NEPA (if federal funding is utilized) documents and federal, state and local permits. Permits required to construct a trail within a creek corridor may include the following:

- Water Quality Certification, regulated by the Clean Water Act Sections 401 and available through the State Water Resources Control Board;
- Individual or Nationwide permit, regulated by the Clean Water Act Section 404 and obtained through the US Army Corps of Engineers;
- Section 7 or 10 Consultation with the U.S. Fish and Wildlife Agency and/or the National Marine Fisheries Service, if sensitive species are present, regulated by the Endangered Species Act; and
- Streambed Alteration Agreement, regulated by Section 1600 of the state fish and game code and obtained through the California Department of Fish and Wildlife, to name a few.

Additionally, as previously discussed, a tree removal permit from the City of Citrus Heights may be needed if native oaks over 6 inches DBH or other trees over 19” DBH are to be removed, and CDFW may require a riparian mitigation plan if native riparian vegetation will be impacted.

Projects such as bridges within a designated floodway will require a FEMA Conditional Letter of Map Revision (CLOMR), submitted prior to construction, and a Letter of Map Revision (LOMR) following construction.

These costs can vary widely depending upon impacts to the creek channel and riparian corridor, length of trail, degree of wetland impacts, degree of channel modification, if any, engineering challenges, road and creek crossings, and other factors. Permitting and CEQA costs can typically be estimated at 10-15 percent of the total project construction budget.

7.4 Construction

As with permitting costs, construction costs can vary widely based upon proposed improvements, market prices, and site conditions. Some of the major costs include construction of the trail itself, road crossings, creek crossings, clearing and tree removal, retaining walls and earthwork. Additionally, any new parking facilities proposed at trailheads can be a significant cost. Other potential costs include interpretive and directional signage, educational play equipment, exercise stations, benches and trash receptacles, tree and shrub planting, temporary or permanent irrigation, culverts over drainages, water quality, erosion control, and wetland mitigation costs. Utility relocations are anticipated at roadway crossing and may vary from minor relocations including adjusting facilities to grade, to significant relocations where underground facilities need to be moved to accommodate the trail passing under the roadway.

Costs for each component will be dependent on the following aspects:

- Size of the proposed construction project. Large, continuous segments would tend to result in lower average bid prices compared to small disjointed segments.
- Accessibility to the proposed project site. Where the proposed trail can be easily accessed and construction staging areas are located in close proximity to the work, average bid prices would tend to be lower.
- Location of the trail relative to the 10-year WSE will determine the need for PCC trail versus asphalt pavement. The PCC pavement is considerably higher than the asphalt concrete option.
- The type of terrain in which the trail is located would influence the amount of earthwork and need for retaining walls. Retaining walls comprise a significant portion of the cost, especially when aesthetic treatment is included.
- Vegetation would influence the amount of clearing, tree removal, tree mitigation and need for retaining walls. Some segments of the trail are located in fairly open areas and others will result in significant vegetation and tree removal to accommodate the trail.
- Constraints such as property boundaries, building structures and location of creek, which would influence the amount of earthwork and need for retaining walls
- The physical dimensions of existing bridge structures which will determine the feasibility of using the existing structure as a trail underpass and the need to construct retaining walls or new reinforced box culvert

structures adjacent to the existing structure.

Table 11 illustrates some of the common major construction costs in a trail project.

Table 11 – Typical Trail Construction Costs in 2013

Major Component	Detail	Range of Costs ($ x1,000)		Description
		Low	High	
Earthwork				
Excavation, per mile	Flat to difficult terrain	$40	$350	Steep terrain would require excavation of 10 ft high cut
Clearing and grubbing, per mile	Flat to difficult terrain	$10	$40	Steep terrain would require excavation of 10 ft high cut
Tree removal, per 10 trees	Numerous small trees to a few large trees	$5	$10	Would depend on the accessibility and size of trees
Trail Costs				
10' wide PCC Trail costs, per mile	4" PCC/4" AB	$275	$325	Dependent on accessibility, terrain and size of project
10' wide Asphalt Concrete trail costs, per mile	3" AC/4" AB	$150	$200	Dependent on accessibility, terrain and size of project
Roadway Crossings				
Undercrossing using existing bridge (60-100)	Retaining walls	$50	$80	Would require retaining walls either tie back or concrete walls and probably cut off walls and railings
Undercrossing with new box culvert (60-100 ft)	Assumed jacked on larger structures	$125	$250	Depends on traffic control, access and staging areas, utility relocations
Bridge overcrossing structure	60 ft to 120 ft	$750	$2,000	Depends on length of structure, terrain either side of bridge, traffic control, access
At-grade pedestrian activated signal	Includes bulb outs and median island	$50	$70	Width of road and traffic volumes would influence costs
At-grade pedestrian crossing - City street	Could include bulb outs	$30	$40	Width of road and traffic volumes would influence costs
At-grade pedestrian crossing – local access road	Could include bulb outs	$15	$25	Width of road and traffic volumes would influence costs
Creek Crossings				
Prefabricated steel bridge	60 ft to 100 ft span	$140	$240	Includes abutments and footings
Reinforced concrete box culvert	30 ft to 60 ft	$70	$110	Includes rock slope protection at approaches
Retaining Walls				
Tie-back walls, costs per 100 ft length	8 ft high wall	$70	$90	Will depend on accessibility, terrain, constraints
Cut-off walls, costs per 100 ft length	3 ft deep wall	$10	$20	Will depend on accessibility, terrain, constraints
Soil Nail walls, costs per 100 ft length	8 ft high wall	$60	$80	Will depend on accessibility, terrain, constraints
Concrete Walls, costs per 100 ft length	6 ft high wall	$20	$40	Will depend on accessibility, terrain, constraints
Rock walls, costs per 100 ft length	Retaining 10 ft	$10	$15	Will depend on accessibility, terrain, constraints

Major Component	Detail	Range of Costs ($ x1,000)		Description
		Low	High	
Site Management and Water Quality Management Plan				
Construction Site Management	Includes site and materials handling BMPs	2% of construc-tion costs	4% of construc-tion cots	Depends on size of the project and proximity to environmentally sensitive areas
Water Pollution Control	Requires SWPPP for >1 acre disturbance	2% of construc-tion costs	4% of construc-tion cots	Depends on size of the project and proximity to environmentally sensitive areas

7.5 Administrative and Construction Management

The City will administer the construction contract which will be a publicly bid contract. It is anticipated that the project will be phased and each contract will consist of a segment or combination of segments identified in this report. It is anticipated that additional public outreach will be required during the Plans, Specifications, and Estimates (PS&E) and construction phases of the project. The cost associated with this is included in the administrative costs estimated for each project segment. The City would normally commission the professional construction management service to oversee the management and inspection of the project construction. Typically administrative costs range from 2-4 percent of the estimated construction costs and construction management costs range from 10-15 percent.

7.6 Maintenance

Maintenance costs for trails depend upon a number of factors, including surfacing, ease of access for maintenance crews, vegetation density surrounding the trail, proximity of the trail to the creek and floodway and the number of creek crossings. Costs typically range from $3,000 to $4,000 per mile per year for basic maintenance on a 10-foot wide Class I trail. Basic maintenance includes inspections, sweeping, trash removal, tree and shrub pruning, mowing and basic repair. In addition to basic maintenance, trails require additional period maintenance such as signage repair, invasive species management, drainage repair, graffiti control, lighting repair (for areas of lit trails), and others. Asphalt trails should be slurry sealed every 7 to 10 years.

Trail maintenance may be combined with some types of creek corridor maintenance such as removal of hazard trees and repair of erosion hot-spots to reduce total maintenance costs within the creek corridor.

7.7 Funding

The future construction will be funded by a variety of sources, primarily through grant funding. This Feasibility Report prioritizes future trail construction by segment so that grant funds can be sought after and applied to the most important segments first. Because the type and location of the trails envisioned for the City of Citrus Heights will provide recreation and transportation benefits, the range of potential grant funding sources is diverse. There are a number of federal,

state, and private programs that provide funding for trail projects. These include the various programs run by the Federal Highway Administration and funded by the federal fuel taxes. Caltrans, California State Parks, and SACOG also play a role in providing trails funding. Grant programs focused on community wellness, water quality, urban forestry, and environmental education may also be potential funding sources for aspects of the trail network.

8 Recommended Alignments

During the Preliminary Screening and Background Analysis phases of this study, the proposed multi-use trail was divided into segments for each Creek corridor (Arcade, Brooktree and Cripple) and SMUD corridor network Each segment was individually rated based on various screening criteria developed to analyze potential suitability of the creek corridors for multi-use trails. This section describes in detail the preferred trail alignments for those segments that scored with a high or moderate priority rating in the Background Analysis report. Equestrian trails, which would be separated from bicycle/pedestrian trails, were not formally studied as part of this effort. However, equestrian trails could be considered for certain areas of the City in the future based on demand and available space.

Following the Preliminary Screening and Background Analysis tasks, the project team held a multi-day work session to re-segment the creeks into new reaches based upon the results of the fieldwork. Figure 31 shows the 80-plus final segments that were established. A separate trail alignment was analyzed for each segment of creek that was scored as having high or moderate potential for additional study during the Background Analysis task.

The final 60 recommended trail alignments were determined by performing an extensive examination and analysis of existing conditions, opportunities, and constraints, and evaluating the proposed trail against the project goals and objectives. Analysis of these segments included a variety of techniques and data sources including extensive field investigations; recent aerial imagery; GIS data on ownership, topography, streets, parcels, floodplain and floodway; and records of easements and parcel descriptions.

Prior to construction of any trail segment, an extensive community input and design refinement process will occur. Alignments represented in this report should be regarded as preliminary and may be adjusted during the future process to respond to additional site information and community concerns.

A preliminary estimate of costs was developed for each segment of the trail using the standard Caltrans 6-page cost estimate format, for planning purposes. This estimate includes estimated construction costs, utility relocations, and right-of-way acquisition costs as well as other costs associated with a project of this nature including project management, project approval and environmental document, design, construction management and support. The costs do not include annual maintenance costs.

Construction costs include the following:

- Trail Costs – costs associated specifically with constructing the trail including, clearing and grubbing, tree removal, earthwork, trail structural section, grade crossings, retaining walls, railing, fences, traffic control, drainage, rock slope protection, erosion and water pollution control, signing striping and lighting.

- Mobilization – mobilization costs associated preparatory work and operations for the establishment and removal of all office trailers, and other facilities necessary for work, on the project, and for all other work which must be performed prior to beginning work on the various items on the project site. These costs are generally assumed to be 10 percent of the estimated trail construction costs.
- Contingency – a contingency amount of 20 percent of trail construction costs is assumed to account for minor items of work and variances associated with estimating of work at a conceptual design phase.
- Structures – structure costs include all bridge structures identified for the project and listed in Table 3 - Creek Crossings. In general the bridges are anticipated to be pre-fabricated single span steel bridges. The costs include all footings, piles abutments, scour protection, railings and aesthetics that may be associated with bridge construction.

Other costs include the following:

- Utility Relocations – it is not anticipated that significant utility relocations will be required for construction of the proposed trail alignments. In general the trail can be realigned to avoid significant relocations. Some utility relocations are likely to be required at road crossings and where the trail is identified to pass under the existing roadway utilizing either the existing bridge structure or where construction of a new box culvert is proposed.
- Right of Way/Easement Costs – although a significant portion of the proposed trail alignment is located within publicly owned land or within trail easements there are portions that will require right of way acquisition or an easement. It has been assumed that the average trail right of way width would be 30 feet and, based on recent similar projects within the Sacramento region, an average cost of $150,000 per acre was assumed.
- Environmental Document – environmental approval for the project will be required under CEQA and perhaps NEPA if federal funding is earmarked for the construction portion of the project. An amount of 10 percent of the total construction costs is assumed to cover the costs of preparing and obtaining approval for the environmental document. This would include various technical studies required for environmental documentation and permitting.
- PS&E – the engineering design costs for the project are included in this item also known as Plans, Specifications and Estimate. An amount of 10 percent of the total construction costs is assumed to cover the engineering costs and preparing construction documents. These costs would be dependent on the number of segments and extent of the proposed project.
- Construction Management – the costs associated with overall control, management, coordination of the project construction are assumed to be 12 percent of the total construction costs.

- Inspection and Testing - costs associated with inspection services, materials and laboratory testing and quality control of the project are assumed to be 3 percent of the total construction costs.
- Administrative - it is expected that the City will administer the project from the Environmental Document phase through construction. These include costs for local agency staff to manage and administer the project, and for public outreach costs that can be anticipated for the project through construction.

The recommended improvements that follow correspond to the layout sheets included in this Feasibility Study. Segments eliminated from further feasibility analysis by the findings of the Background Report are listed in Table 12.

Table 12 - Creek Segments Eliminated from Feasibility Report

Creek	Segment
Arcade Creek Tributary 1	AT1-1
	AT2-1
	AT2-2
	AT2-3
Brooktree Creek	B01
	B03
	B04
	B09
	B10
	B13
Cripple Creek	C01
	C10
	C11
	C15
	C16
	C17
Cripple Creek Tributary 1	CT1-1
	CT1-6
	CT1-9
Cripple Creek Tributary 2	CT2-1a
	CT2-1b
	CT2-3
SMUD Corridor	S6

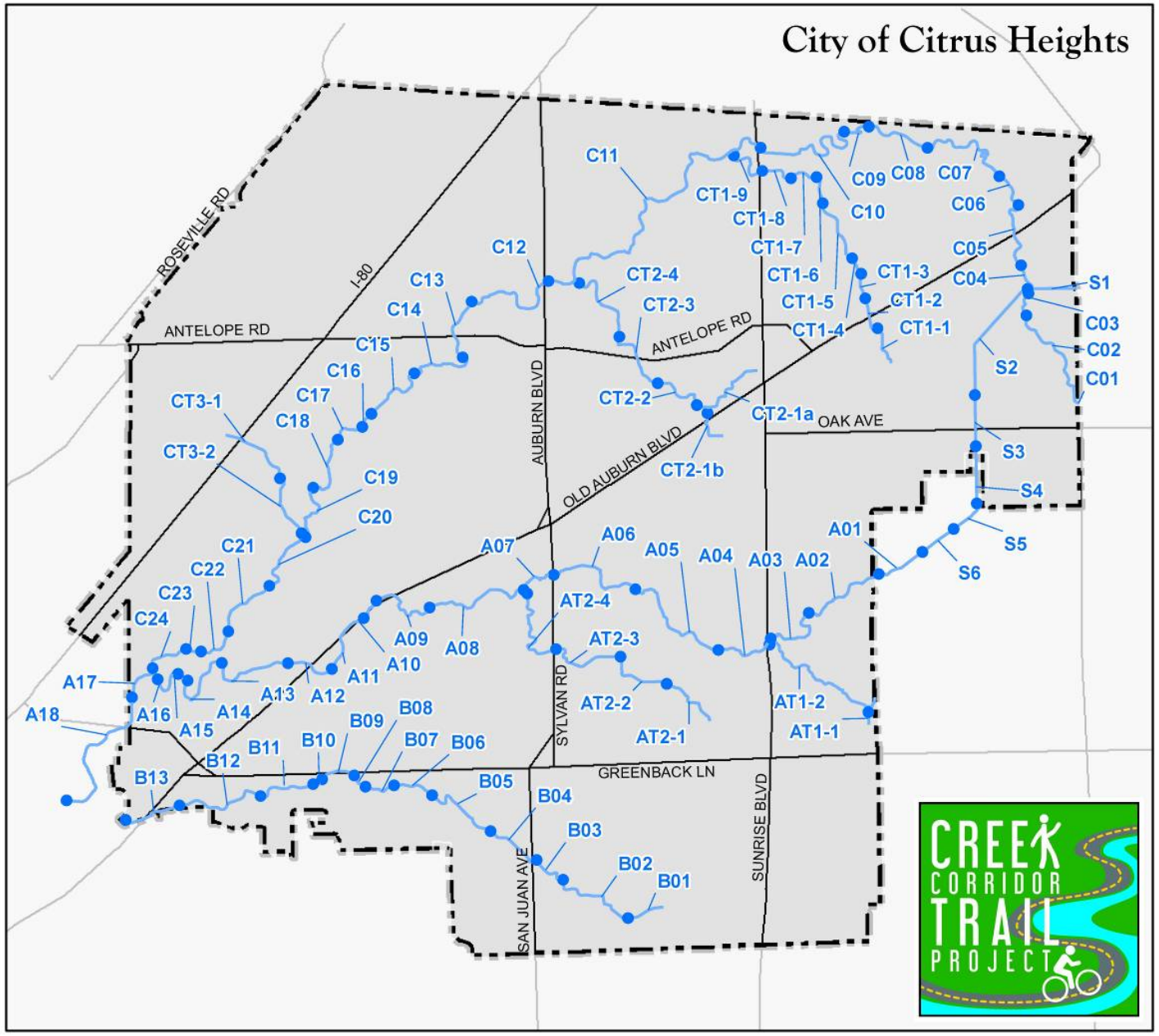
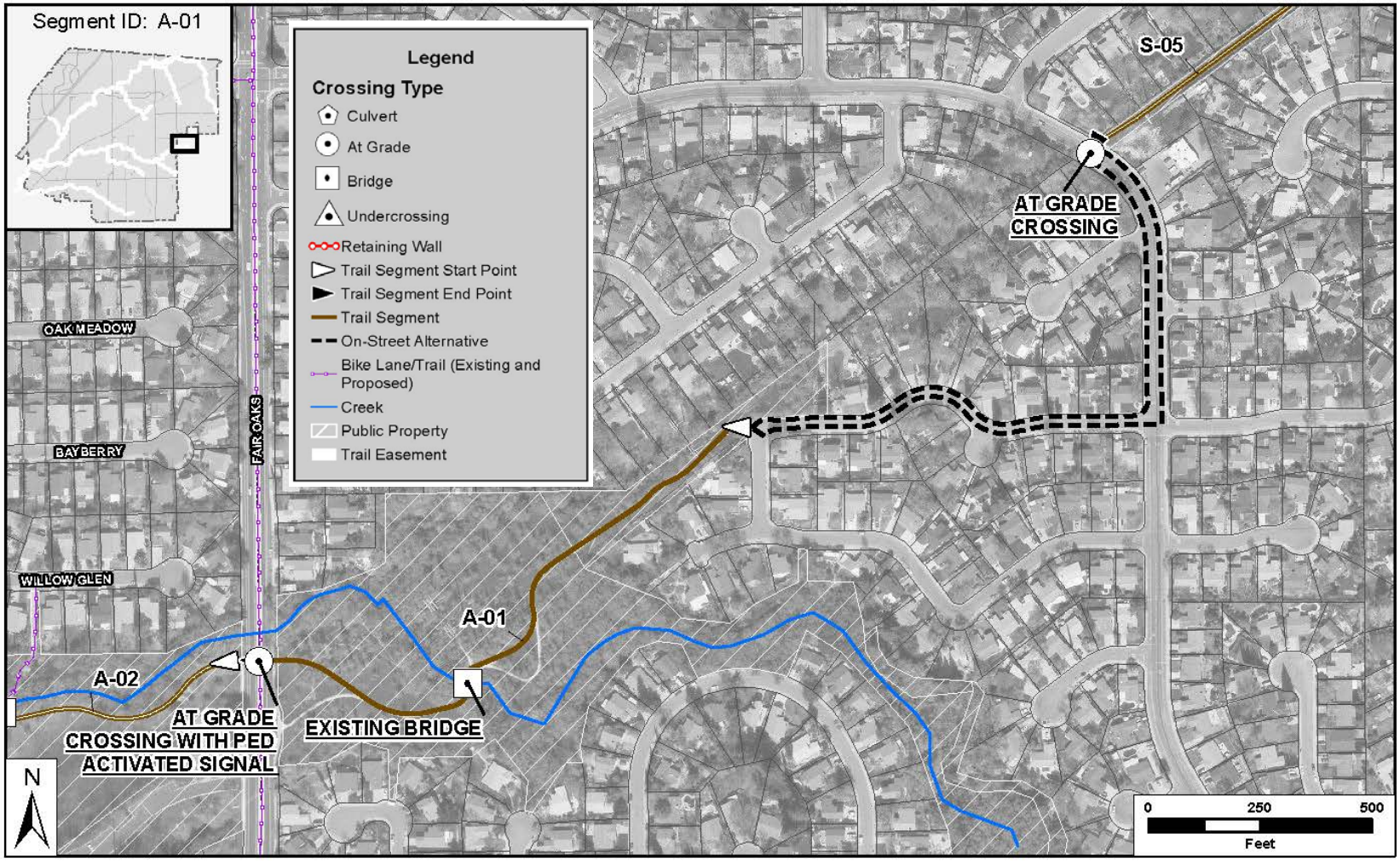


Figure 31 – Creek Segment Overview Map

8.1 Segment A01



Subwatershed: Arcade Creek	Segment ID: A-01	Start: Highwood Way Cul-de-sac	End: Fair Oaks Boulevard
LF Creek/Trail: 1299'/1476'	Number of Road Crossings: 1	Implementation Priority: 1	No. Potential Creek Crossings: 0

8.1.1 Preliminary Cost Estimate

Table 13 below shows a planning-level cost estimate for the recommended alignment as presented in this document. The costs do not include annual maintenance costs. The estimate is in year 2013 USD.

Table 13 – Preliminary Cost Estimate Segment A01

	Element	Costs x $1,000	Costs x $1,000
Construction	*Trail*	*314*	
	Structures	*96*	
	Mobilization (10%)	*31*	
	Contingency (20%)	*63*	
	Sub-Total Construction		**504**
Other Costs	*Utility Relocations*	*11*	
	Right of Way/Easements	*-*	
	Environmental Document (10%)	*51*	
	PS&E (10%)	*51*	
	Construction Management (12%)	*61*	
	Inspection/Testing (3%)	*16*	
	Administrative (3%)	*16*	
	Sub-Total Other		**206**
TOTAL COSTS			**710**

8.1.2 Design Elements

8.1.2.1 Trails

This segment lies within Sundance Park, which is owned and operated by the Orangevale Recreation and Park District (ORPD). Existing trails follow the creek through this segment, but are unpaved and do not meet Class I standard minimums. The recommended trail alignment starts at Highwood Way and generally follows the existing unpaved trail to a proposed at-grade crossing at Fair Oaks Boulevard, south of the existing Arcade Creek bridge. Quality of natural resources in this segment is high. Topography is generally flat. The corridor ranges from 400 feet to over 500 feet near Fair Oaks, narrowing to around 62 feet at its east end. ORPD would need to either consider upgrading the trail or managing uses within these segments consistent with existing trails. An existing bridge would need upgrading or replacement to bring it up to Class I standards. The existing trail connection at Highwood Way presents an opportunity to connect to the SMUD easement through on-street routes. The proposed trail lies entirely within publicly owned property and therefore no right of way or easement costs are anticipated.

8.1.2.2 Creek Crossings

The proposed trail follows an existing unpaved path which crosses an existing drainage channel via a steel railcar bridge with wooden deck members. It is proposed to keep the existing railcar bridge and increase its width to 12 feet using a wood deck supported on the existing railroad car and two new glulam beams with a wood picket rail fence. The option of replacing the existing bridge with a pre-fabricated steel or wooden bridge structure should be evaluated during detailed design of this

segment. Rock slope protection will be installed to protect the bridge abutments/footings.

8.1.2.3 Road Crossings

Due to the traffic volumes, number of lanes and good sight distance at this road crossing, it is proposed to install a pedestrian activated at-grade crossing at this location. The existing culvert dimension and depth of creek flowline make a grade separated structure infeasible.

8.1.2.4 Access Areas and Amenities

Access to this area primarily occurs from the Type D node at Tempo Park across Fair Oaks Boulevard to the west. Additionally, limited on-street parking is available on Fair Oaks adjacent to and north of the trailhead. Limited amenities occurring here might include warning, directional and rules signage, benches, trash receptacles and a pet waste station.

8.1.2.5 Visual Screening

The trail will largely follow the informal trail that runs through this park site, which is well screened with existing vegetation. With the exception of the eastern portion, the corridor is fairly wide, and the trail is well set back from the adjacent residential areas. The eastern 500-feet narrows to around 70 feet wide and runs between backyards. The City should work with adjacent residences to determine and implement desired level of screening, using either fencing upgrades or plantings, during the detailed design of this segment.

8.1.2.6 Access Control

Additional access control is not needed due to presence of park land.

8.1.2.7 Signage

Guidance/directional signs will be placed at Fair Oaks Boulevard and Highwood Way. Regulatory signage for trail users would be placed at the approach to Fair Oaks Boulevard requiring bicycle users to stop. Roadside signs will be placed on Fair Oaks Boulevard in accordance with the CA MUTCD. Regulatory and guidance signs will be placed at quarter mile intervals along the trail.

8.1.2.8 Retaining Walls

No significant retaining walls are anticipated along this segment.

8.1.3 Environmental Compliance

Permits needed for this segment may include CDFW Streambed Alteration Agreement and/or Clean Water Act 404 and 401 permits, as well as USFWS Section 7 consultation. If the existing bridge can be used with modifications and no additional wetlands will be impacted by the trail, permitting might be reduced to just consultation with CDFW for work within the riparian zone. CEQA will be required and potentially NEPA if federal funding is utilized.

The following permits are anticipated to be required for this segment of the trail:

- RWQCB - NPDES Permit

Permits that may be needed if work on bridge falls within bed and bank or OHWM:

- RWQCB - Section 401 Water Quality Certification
- Clean Water Act Section 404 Permit (ACOE)
- USFWS Section 7 Consultation

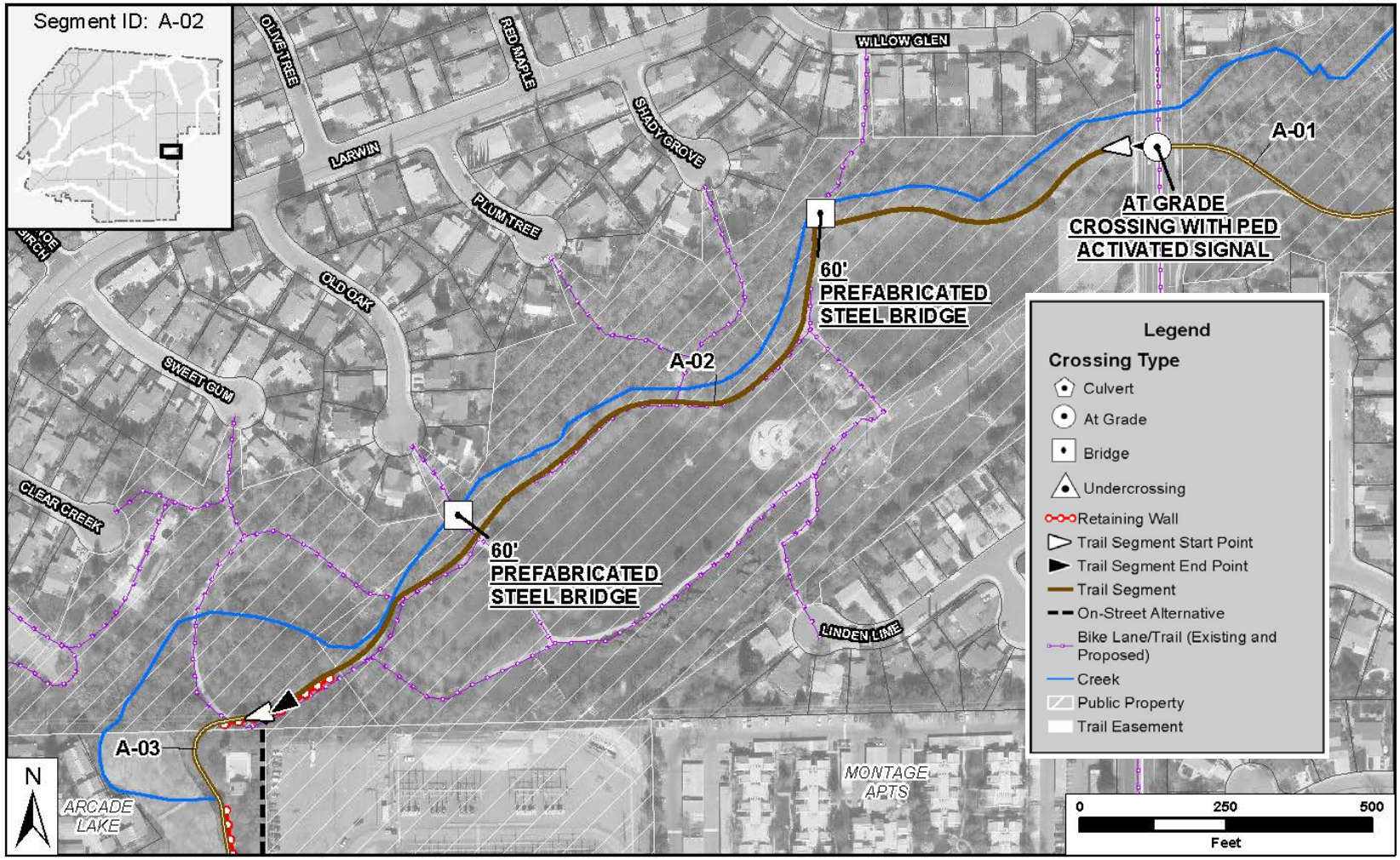
- CDFW - Section 1602 Streambed Alteration Agreement

8.1.4 Additional Technical Studies

The following additional technical studies are anticipated during the Project Approval/Environmental Document and Design Phases for this segment:

- Environmental Studies
  - Arborist Survey
  - Biological Assessment (BA)
  - Wetland Delineation
  - Noise Technical Memorandum
  - Air Quality Technical Memorandum
  - Natural Environment Study (NES)
  - Visual Resources – Technical Memorandum
  - Land Use and Community Impact – Technical Memorandum
- Geotechnical Analysis
- Hydrology/Hydraulic Analysis
- Storm Water Pollution Prevention Plan

8.2 Segment A02



Subwatershed: Arcade Creek	Segment ID: A02	Start: Fair Oaks Boulevard	End: Tempo Park Existing Trail
LF Creek/Trail: 2210'/2010'	Number of Road Crossings: 0	Implementation Priority: 3	No. Potential Creek Crossings: 0

8.2.1 Preliminary Cost Estimate

Table 14 shows a planning-level cost estimate for the recommended alignment as presented in this document. The costs do not include annual maintenance costs. The estimate is in year 2013 USD.

Table 14 – Preliminary Cost Estimate Segment A02

	Element	Costs x $1,000	Costs x $1,000
Construction	*Trail*	*447*	
	Structures	*210*	
	Mobilization (10%)	*47*	
	Contingency (20%)	*70*	
	Sub-Total Construction		**774**
Other Costs	*Utility Relocations*	*6*	
	Right of Way/Easements	*0*	
	Environmental Document (10%)	*78*	
	PS&E (10%)	*78*	
	Construction Management (12%)	*93*	
	Inspection/Testing (3%)	*24*	
	Administrative (3%)	*24*	
	Sub-Total Other		**303**
TOTAL COSTS			**1077**

8.2.2 Design Elements

8.2.2.1 Trails

This segment lies within Tempo Park, which is owned and operated by Sunrise Recreation and Park District (SRPD). Existing trails within the park are paved, though less than the standard Class I minimum width of 8'. The recommended trail alignment starts at the proposed at-grade crossing of Fair Oaks Boulevard and runs west to the existing paved path on the north side of Tempo Park, to just north of the existing SMUD sub-station facility. Quality of natural resources is high, with a healthy riparian buffer around the creek. The open space corridor is wide, encompassing the entire park, generally 400 to 600 feet. Slopes present few constraints to trail construction. The District would need to consider managing the trails for appropriate use, given their width, or upgrade them to full Class I standards. For the purposes of this report it is assumed that the existing trail will be widened to meet the standard 10 foot paved width. Numerous connections to the northern neighborhood are in place. Typically, these are connections to existing cul-de-sacs are low-flow crossings. A connection is also needed from the existing creek side trail to Fair Oaks Boulevard. The proposed trail lies entirely within publicly owned property and therefore no right of way or easement costs are anticipated.

8.2.2.2 Creek Crossings

The proposed trail is located south of Arcade Creek. There are no crossings planned within this segment. Four existing paved trail connections link the existing paved trail within Tempo Park to the neighborhood to the north. These connecting trails traverse Arcade Creek using low-flow crossings. During the preliminary engineering phase of this project the need to

replace these low flow crossings with prefabricated bridges will be further assessed. For the purposes of this report two of the four crossings are assumed to be replaced.

8.2.2.3 Road Crossings

There are no roadway crossings within this segment of the trail.

8.2.2.4 Access Areas and Amenities

Access to this segment is provided through SRPD's Tempo Park. Amenities within the park include restrooms, a large parking lot, play equipment, group picnic areas, and active and passive use areas. The park also contains a number of pathways connecting to adjacent cul-de-sacs, providing residents of those neighborhoods access to the trail system.

8.2.2.5 Visual Screening

The need for additional visual screening is not anticipated beyond that already present. A healthy riparian buffer separates active areas of the park from neighborhoods to the north, and the trail will be some distance from residences to the south.

8.2.2.6 Access Control

Since the trail is within a park, additional access controls are not needed.

8.2.2.7 Signage

Guidance/directional signs will be placed at Fair Oaks Boulevard. Regulatory signage for trail users would be placed at the approach to Fair Oaks Boulevard requiring bicycle users to stop. Guidance/informational signs will be included at each of the connection trails to the north. A general informational and regional trails map is proposed to be installed in Tempo Park. Regulatory and guidance signs will be placed at quarter mile intervals along the trail. If existing trails will connect to a wider multi-user trail, appropriate signage should be considered to ensure the safety of all trail users.

8.2.2.8 Retaining Walls

Retaining walls are anticipated along the north side of the SMUD property.

8.2.3 Environmental Compliance

The following permits are anticipated to be required for this segment of the trail:

- RWQCB - NPDES Permit
- City of Citrus Heights – Oak Tree Removal Permit

If existing low-flow structures are replaced with bridges, the following permits may be necessary:

- RWQCB - Section 401 Water Quality Certification
- Clean Water Act Section 404 Permit (ACOE)
- USFWS Section 7 Consultation
- CDFW - Section 1602 Streambed Alteration Agreement

8.2.4 Additional Technical Studies

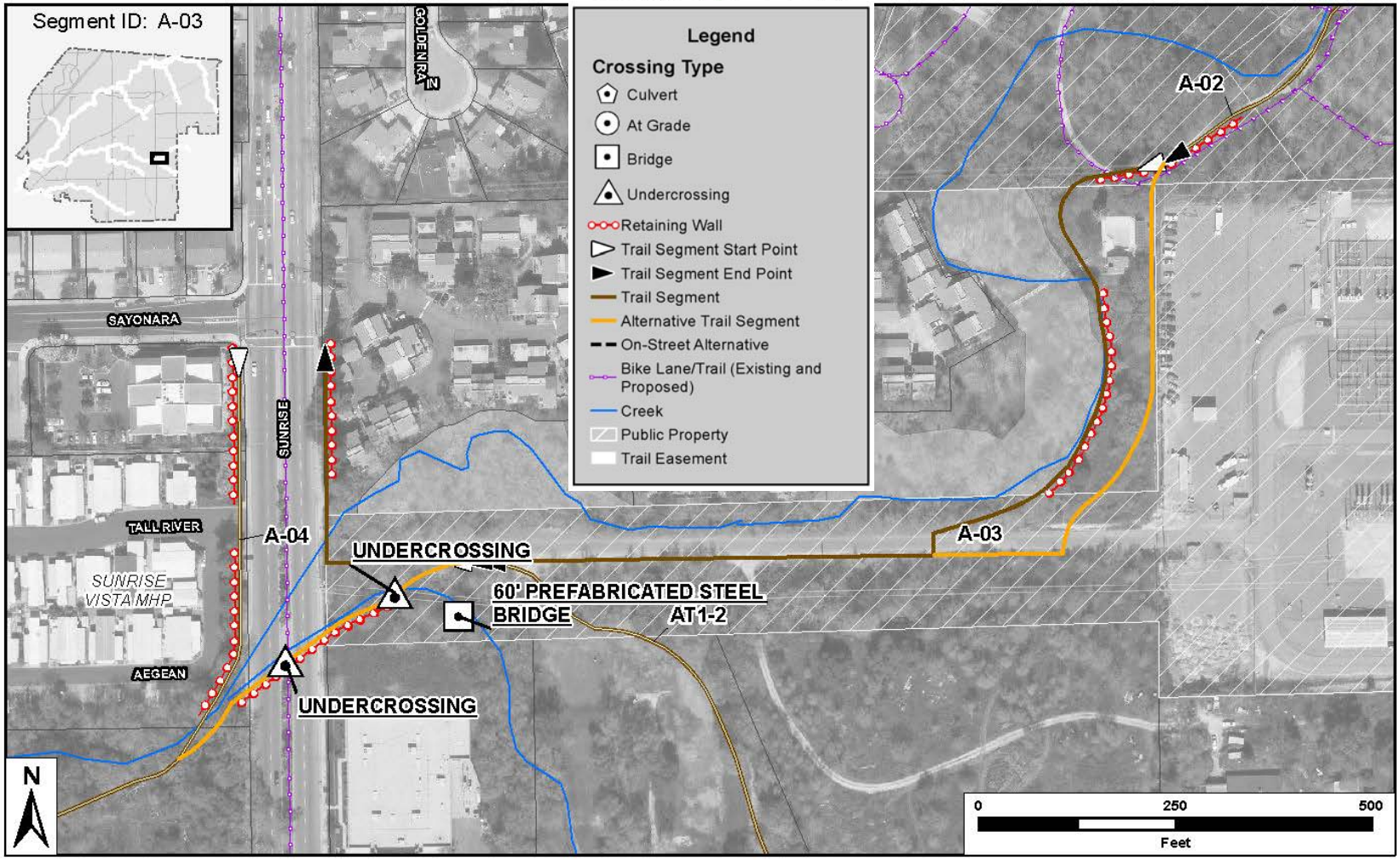
It is anticipated that the following additional technical studies will be completed during the Project Approval/Environmental Document and Design Phases of this project.

- Environmental Studies
  - Arborist Survey
  - Biological Assessment (BA)
  - Wetland Delineation

- Noise Technical Memorandum
- Air Quality Technical Memorandum
- Natural Environment Study (NES)
- Visual Resources – Technical Memorandum
- Land Use and Community Impact – Technical Memorandum

- Geotechnical Analysis
- Hydrology/Hydraulic Analysis
- Storm Water Pollution Prevention Plan

8.3 Segment A03



Subwatershed: Arcade Creek	Segment ID: A03	Start: Tempo Park Existing Trail	End: Sunrise Boulevard
LF Creek/Trail: 1897'/1532'	Number of Road Crossings: 2	Implementation Priority: 1	No. Potential Creek Crossings: 0

8.3.1 Preliminary Cost Estimate

Table 15 below shows a planning-level cost estimate for the recommended alignment as presented in this document. The costs do not include annual maintenance costs. The estimate is in year 2013 USD.

Table 15 – Preliminary Cost Estimate Segment A03

	Element	Costs x $1,000	Costs x $1,000
Construction	*Trail*	*600*	
	Structures	*0*	
	Mobilization (10%)	*63*	
	Contingency (20%)	*94*	
	Sub-Total Construction		**757**
Other Costs	*Utility Relocations*	*21*	
	Right of Way/Easements	*98*	
	Environmental Document (10%)	*76*	
	PS&E (10%)	*76*	
	Construction Management (12%)	*91*	
	Inspection/Testing (3%)	*23*	
	Administrative (3%)	*23*	
	Sub-Total Other		**408**
TOTAL COSTS			**1,165**

8.3.2 Design Elements

8.3.2.1 Trails

The recommended alignment for this segment runs from the end of the existing trail in Tempo Park, just north of the SMUD substation, behind an existing private pool complex, and along a SMUD access road to an undercrossing at Sunrise Boulevard. The cost estimate is for this alignment. Land is either owned by the public or covered by a trail easement. The largest challenge for this segment is the trail crossing of Sunrise Boulevard. The most economic practical alternative is probably via an on-street routing to the traffic light at Sayonara Drive. An undercrossing could be feasible and would provide the best continuity for the trail, but would require construction of a 90-foot long culvert/ tunnel that may be considered undesirable by trail users. In addition, the height of the culvert would not meet the 10 foot requirement and will probably only be a maximum of 8 feet high. Construction of a new bridge structure over Sunrise Boulevard is an option that could be considered in the future but would be the most expensive option.

In addition to the crossing, the SMUD station forms a barrier between Sunrise and Tempo Park. There is sufficient room between the SMUD station and the creek to locate a trail; however, a recreational outbuilding and pool belonging to the adjacent residential complex presents an additional challenge. A trail easement exists on the residential complex property that would avoid this outbuilding, but utilizing it would require two bridges. An undercrossing would also require an easement to be purchased from the adjacent landowner. Natural resources, corridor width and topography all rated moderate-high for this reach.

The proposed trail lies within private and publicly owned property, requiring right of way acquisition or easements for the trail through the privately owned property.

8.3.2.2 Creek Crossings

The proposed trail is located south of Arcade Creek. There are no crossings of Arcade Creek planned within this segment. A 30-foot long pre-fabricated reinforced concrete box culvert is proposed where the recommended alignment crosses a tributary to Arcade Creek and connects to the golf course (AT2).

8.3.2.3 Road Crossings

The recommended alignment crosses the existing SMUD access road where a striped at-grade crossing will be installed. To cross Sunrise Boulevard it is proposed to construct a two-way separated trail behind the sidewalk on both sides of Sunrise Boulevard. routing trail users to the crosswalk at the traffic signal at Sayonara Drive.

8.3.2.4 Access Areas and Amenities

Access to this segment is either through Tempo Park, a type D node, or via the Arcade Creek Park Preserve, a type C node, on the west side of Sunrise Boulevard. Due to the proximity of these two nodes, this segment will have minimal amenities, likely limited to directional & warning signage.

8.3.2.5 Visual Screening

Since the trail is on the opposite bank from the apartment complex, additional visual screening is not anticipated, unless SMUD wants screening between the trail and their substation.

8.3.2.6 Access Control

The existing SMUD fence should be sufficient to provide access control between the trail and the SMUD property. The trail should discourage trespass on the apartment property.

8.3.2.7 Signage

Guidance/directional signs will be placed at Sunrise Boulevard. Regulatory signage for trail users would be placed on the access ramps at the approach to Sunrise Boulevard requiring bicycle users to stop. Vertical clearance signs will be placed at the entrance to the undercrossing. Regulatory and guidance signs will be placed at quarter mile intervals along the trail.

8.3.2.8 Retaining Walls

Retaining walls are anticipated along the west side of the swimming pool complex to accommodate the trail on the east side of Arcade Creek. It is anticipated that a retaining wall and cut-off walls will be required where the trail passes under the existing Sunrise Bridge structure and on the access paths on the approach to Sunrise Boulevard.

8.3.3 Environmental Compliance

The following permits are anticipated to be required for this segment of the trail:

- RWQCB - NPDES Permit
- City of Citrus Heights Oak Tree Removal Permit

If the retaining wall adjacent to the pool complex falls within the creek Ordinary High Water Mark (OHWM), the following permits will be required

- RWQCB - Section 401 Water Quality Certification

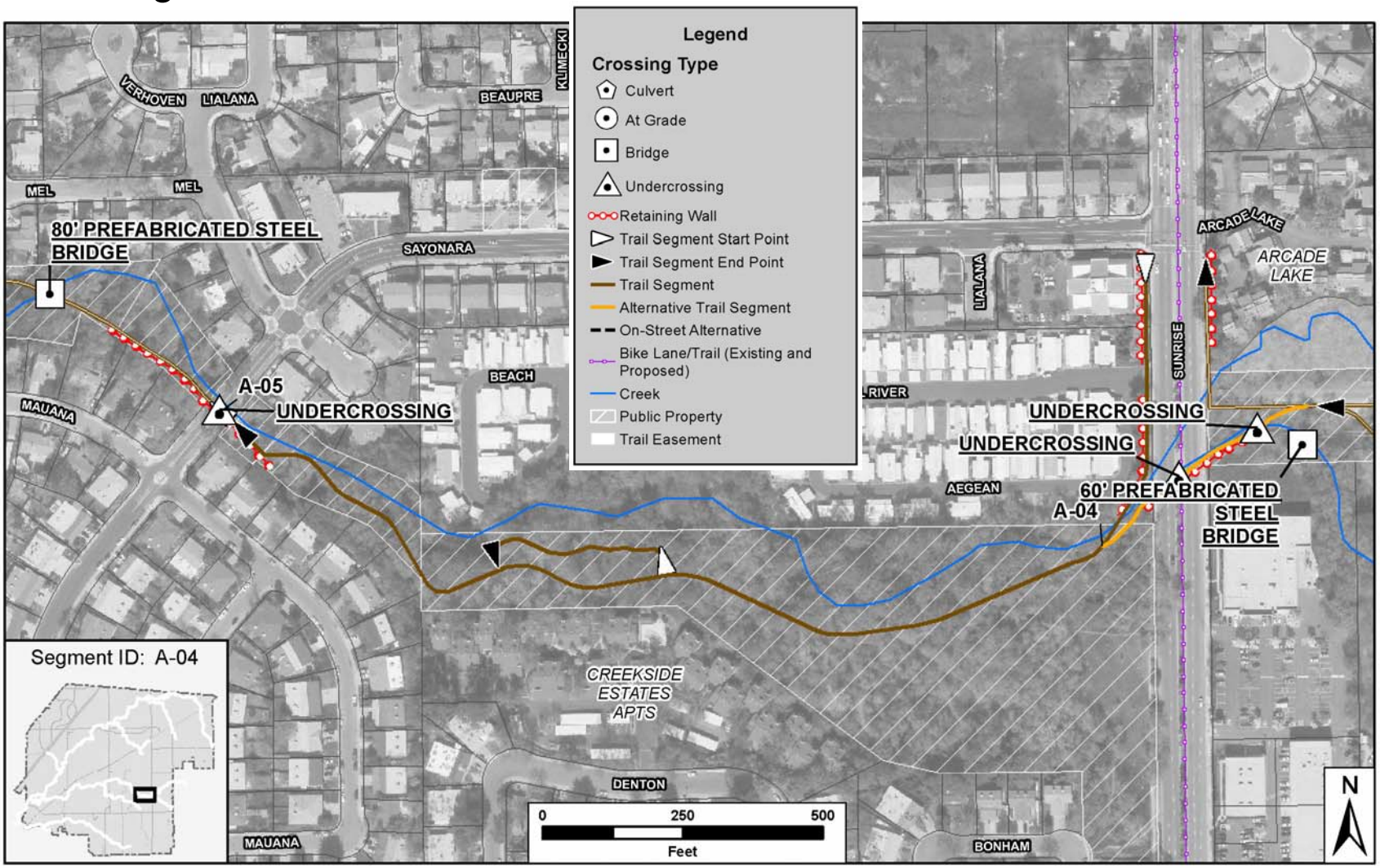
- Clean Water Act Section 404, ACOE
- CDFW - Section 1602 Streambed Alteration Agreement

8.3.4 Additional Technical Studies

It is anticipated that the following additional technical studies will be completed during the Project Approval/Environmental Document and Design Phases of this project.

- Environmental Studies
    - Arborist Survey
    - Biological Assessment (BA)
    - Noise Technical Memorandum
    - Air Quality Technical Memorandum
    - Wetland Delineation
    - Natural Environment Study (NES)
    - Visual Resources – Technical Memorandum
    - Land Use and Community Impact – Technical Memorandum
- Geotechnical Analysis
- Hydrology/Hydraulic Analysis
- Storm Water Pollution Prevention Plan

8.4 Segment A04



Subwatershed: Arcade Creek	Segment ID: A04	Start: Sunrise Boulevard	End: Sayonara Drive
LF Creek/Trail: 1597'/1760'	Number of Road Crossings: 0	Implementation: In process	No. Potential Creek Crossings: 0

8.4.1 Preliminary Cost Estimate

This project has been designed and is anticipated to be constructed by SRPD in spring/summer 2014.

8.4.2 Design Elements

8.4.2.1 Trails

This reach runs through the Arcade Creek Park Preserve, currently under development by the SRPD. The Park Preserve will contain a Class I multi-use trail from Sayonara to Sunrise with several 6-foot wide branching pedestrian paths and other recreational amenities. The Class I connection will generally be 12' wide with 2' shoulders; however, it narrows to 8' wide with 2' shoulders on the western end of the park due to topographic constraints. All of the land is in public ownership. Natural resources, corridor width and topography rated high-moderate for this reach. Additional native vegetation, greater development encroachment on the creek and steeper slopes led to the less suitable ratings in these areas.

8.4.2.2 Creek Crossings (Bridges, Culverts, etc.)

There are two creek crossings via bridges currently planned for this segment. Bridges will be 8' x 42' pre-fabricated structures constructed of corten steel with concrete decks.

8.4.2.3 Road Crossings

There are no roadway crossings within this segment.

8.4.2.4 Access Areas and Amenities

Access for this segment is from Sayonara (Type A node) and an 11 space parking lot within the Park Preserve itself (Type C node). Amenities include the parking lot, group picnic shelter, kiosk and interpretive signs, play and exercise equipment, lighting, benches and a drinking fountain.

8.4.2.5 Visual Screening

Due to the width of the park, density of local vegetation and topography, additional screening is not anticipated.

8.4.2.6 Access Control

Access is limited within the park to proposed trails. The apartment complex to the south has an existing fence. Himalayan blackberry is being actively controlled throughout the site, except for along the base of this fence to further discourage potential trespassers. The creek forms a barrier for properties to the north.

8.4.2.7 Signage

Guidance/directional signs will be placed at Sunrise Boulevard. Regulatory signage for trail users would be placed on the access ramps at the approach to Sunrise Boulevard requiring bicycle users to stop. Vertical clearance signs will be placed at the entrance to the undercrossing. Regulatory and guidance signs will be placed at quarter mile intervals along the trail.

8.4.2.8 Retaining Walls

Small retaining walls are planned in several locations throughout the park preserve where needed to meet trail and play element grades.

8.4.3 Environmental Compliance

The following permits are being secured for this project:

- RWQCB – NPDES & Section 401 Permit
- CDFW – Section 1602 Permit

- ACOE – Section 404 Permit
- USFWS – Section 7 Consultation

8.4.4 Additional Technical Studies

All technical studies have been completed for this segment.

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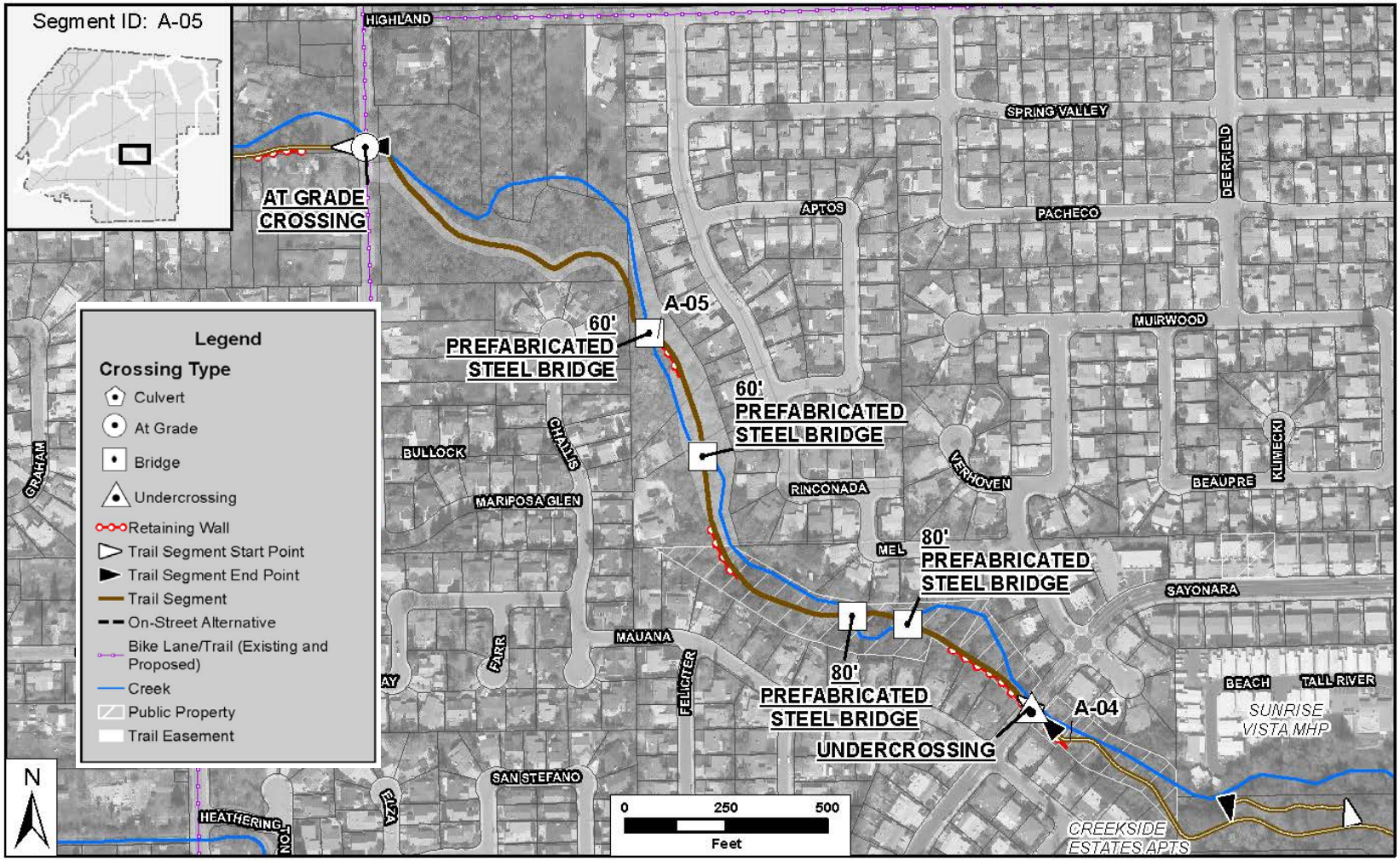
8.5 Segment A05



Subwatershed: Arcade Creek	Segment ID: A05	Start: Sayonara Drive	End: Mariposa Avenue
LF Creek/Trail: 3068'/2450'	Number of Road Crossings: 2	Implementation Priority: 1	No. Potential Creek Crossings: 4

8.5.1 Preliminary Cost Estimate

Table 16 below shows a planning-level cost estimate for the recommended alignment as presented in this document. The costs do not include annual maintenance costs. The estimate is in year 2013 USD.

Table 16 – Preliminary Cost Estimate Segment A05

	Element	Costs x $1,000	Costs x $1,000
Construction	*Trail*	*1088*	
	Structures	*672*	
	Mobilization (10%)	*114*	
	Contingency (20%)	*171*	
	Sub-Total Construction		**2,045**
Other Costs	*Utility Relocations*	*11*	
	Right of Way/Easements	*153*	
	Environmental Document (10%)	*205*	
	PS&E (10%)	*205*	
	Construction Management (12%)	*246*	
	Inspection/Testing (3%)	*62*	
	Administrative (3%)	*62*	
	Sub-Total Other		**944**
TOTAL COSTS			**2,989**

8.5.2 Design Elements

8.5.2.1 Trails

This section of the main stem of Arcade Creek starts at the undercrossing of Sayonara Drive and roughly follows the creek alignment crossing Mariposa Avenue as an at-grade crossing, just south of the existing Arcade Creek bridge. Ownership of the open space in this reach is either public or includes a trail easement. Natural resources and topography rated low-moderate in this segment due to steep banks and heavy native vegetation growth. Corridor width rated high-moderate, generally trending around 150-feet but opening up to over 400-feet east of Mariposa. Several creek crossings would likely be needed to avoid constraints.

The proposed trail lies within private and publicly owned property, requiring right of way acquisition or easements for the trail through the privately owned property.

8.5.2.2 Creek Crossings

There are four proposed crossings of the creek primarily due to steep terrain and constrained areas between the creek and residential property boundaries. The crossings are proposed to be pre-fabricated steel bridges with span lengths of between 60-80 feet.

8.5.2.3 Road Crossings

There are two roadway crossings within this segment. Due to the existing terrain it is proposed to utilize the existing bridge structure to allow the trail to cross under Sayonara Drive. Access ramps will be constructed although the height differential from the trail to the road is greater than 15 feet. An unsignalized at-grade crossing is proposed at Mariposa Avenue

due to the relatively low traffic volumes and good sight distance at this location.

8.5.2.4 Access Areas and Amenities

Access to this area is from two type A nodes: Mariposa Avenue and Sayonara Drive. Amenities should be limited to wayfinding, rules and warning signage.

8.5.2.5 Visual Screening

Even though the area is heavily wooded, corridor width and proximity to single-family homes will likely require some additional screening between the trail and private backyards, primarily in the segment between Sayonara Drive and Challis Court. Due to density of existing vegetation, buffer plantings or fence upgrades are unlikely to be needed on the opposite bank from the trail.

8.5.2.6 Access Control

Due to the proximity of residential homes, care should be taken in detailed design for this segment to locate the trail as far from private lots as possible. Buffer plantings of California blackberry and California rose could help in keeping people on the trail. Backyard fencing may be sufficient to discourage trespassing, but some upgrades will likely be needed.

8.5.2.7 Signage

Guidance/directional signs will be placed at Sayonara Dr and Mariposa Avenue. Regulatory signage for trail users would be placed on the access ramps at the approach to Sayonara Dr and Mariposa Avenue requiring bicycle users to stop. Vertical clearance signs will be placed at the entrance to the undercrossing. Regulatory and guidance signs will be placed at quarter mile intervals along the trail. Weight limitation warning signs and other regulatory will be placed on either side of all bridges crossing the creek.

8.5.2.8 Retaining Walls

Retaining walls are anticipated along the trail to minimize the trail footprint and property impacts. The majority of the retaining walls will be in the eastern half of this segment where the alignment traverses steep terrain and is located in constrained areas. It is anticipated that there will be approximately 1,500 feet of retaining walls.

8.5.3 Environmental Compliance

Due to the need for multiple bridges, the following permits are anticipated to be required for this segment of the trail:

- RWQCB - Section 401 Water Quality Certification & NPDES Permit
- CDFW - Section 1602 Streambed Alteration Agreement
- ACOE – Section 404 Nationwide Permit

If elderberry bushes, Valley Elderberry Longhorn Beetle, or other sensitive species are present along the corridor, Section 7 consultation with the USFWS will be needed.

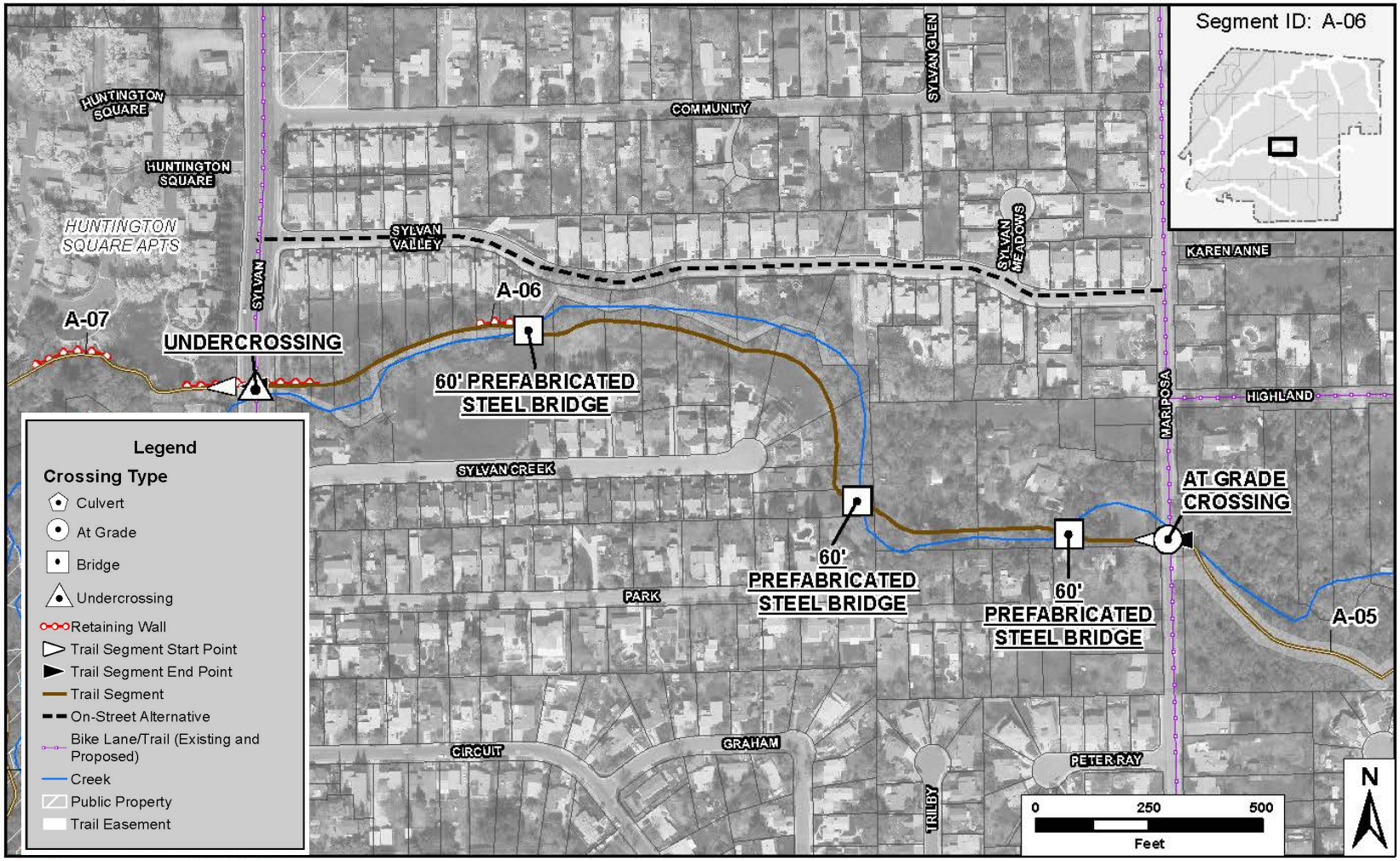
8.5.4 Additional Technical Studies

It is anticipated that the following additional technical studies will be completed during the Project Approval/Environmental Document and Design Phases of this project.

- Environmental Studies
  - Biological Assessment (BA)
  - Noise Technical Memorandum
  - Air Quality Technical Memorandum
  - Wetland Delineation

    - Natural Environment Study (NES)
    - Visual Resources – Technical Memorandum
    - Land Use and Community Impact – Technical Memorandum
- Geotechnical Analysis
- Hydrology/Hydraulic Analysis – Location Hydraulic Study
- Storm Water Pollution Prevention Plan

8.6 Segment A06



Subwatershed: Arcade Creek	Segment ID: A06	Start: Mariposa Avenue	End: Sylvan Road
LF Creek/Trail: 2568'/2434'	Number of Road Crossings: 1	Implementation Priority: 1	No. Potential Creek Crossings: 3

8.6.1 Preliminary Cost Estimate

Table 17 below shows a planning-level cost estimate for the recommended alignment as presented in this document. The costs do not include annual maintenance costs. The estimate is in year 2013 USD.

Table 17 – Preliminary Cost Estimate Segment A06

	Element	Costs x $1,000	Costs x $1,000
Construction	*Trail*	*770*	
	Structures	*432*	
	Mobilization (10%)	*81*	
	Contingency (20%)	*121*	
	Sub-Total Construction		**1,404**
Other Costs	*Utility Relocations*	*11*	
	Right of Way/Easements	*251*	
	Environmental Document (10%)	*141*	
	PS&E (10%)	*141*	
	Construction Management (12%)	*169*	
	Inspection/Testing (3%)	*43*	
	Administrative (3%)	*43*	
	Sub-Total Other		**799**
TOTAL COSTS			**2,203**

8.6.2 Design Elements

8.6.2.1 Trails

The reach of the trail starts at Mariposa Avenue and roughly follows the creek alignment crossing the creek once and passes under Sylvan Road on the north side of the creek. Much of the alignment passes through property that is primarily privately owned. Although much of it contains public trail easements, they may not be located in the areas most suitable for trails. As in the upstream reach, vegetation is dense and banks are steep. Corridor width is similar to that upstream, generally ranging from 150 to 300 feet, though constrained at the east end by a residence relatively close to the creek.

The proposed trail lies entirely within privately owned property, requiring right of way acquisition or easements for the trail.

8.6.2.2 Creek Crossings

There are three proposed crossing of the creek to minimize property impacts and switch the trail to the north bank prior to the Sylvan Road intersection. The crossings are proposed to be pre-fabricated steel bridges with span lengths of approximately 60 feet.

8.6.2.3 Road Crossings

There is one roadway crossing within this segment. To cross Sylvan Road it is proposed to construct the trail as an undercrossing on the north side of the creek, utilizing the existing bridge structure. The clearance to the bridge structure will be 9 feet which is less than the design standard and will require additional signage. Access ramps will be provided to tie into the sidewalks and on-street bike lanes along Sylvan Road.

8.6.2.4 Access Areas and Amenities

Access to this segment is from Mariposa Avenue, Sylvan Road and Sylvan Valley Way. Basic directional, rules and warning signs should be located at these crossings.

8.6.2.5 Visual Screening

Visual screening may be needed on the left bank between Park Drive and Sylvan Creek Court, where the trail skirts close to residential backyards on the outside of a meander bend. As in other areas, residents should be consulted on the degree of screening desired.

8.6.2.6 Access Control

Access control should occur through fencing and buffer plantings in the area noted above requiring visual screening. Bollards should be installed along Sylvan Valley Way to prevent unauthorized motor vehicle access to the trail.

8.6.2.7 Signage

Guidance/directional signs will be placed at Sylvan Road. Regulatory signage for trail users would be placed on the access ramps at the approach to Sylvan Road requiring bicycle users to stop. Vertical clearance signs will be placed at the entrance to the undercrossing. Regulatory and guidance signs will be placed at quarter mile intervals along the trail. Weight limitation warning signs and other regulatory will be placed on either side of all bridges crossing the creek.

8.6.2.8 Retaining Walls

Retaining walls are anticipated at specific locations along this segment of the trail where the alignment traverses steep terrain and is located in constrained areas. The purpose of the walls will be to minimize the trail footprint and property impacts. It is anticipated that a retaining wall and cut-off walls will be required where the trail passes under the existing Sylvan Bridge structure and on the access paths at this location.

8.6.3 Environmental Compliance

Due to the presence of the bridge and potential for retaining walls in the area noted under Visual Screening, the following permits are anticipated to be required for this segment of the trail:

- RWQCB - Section 401 Water Quality Certification & NPDES Permit
- ACOE – Section 404 Nationwide Permit
- CDFW - Section 1602 Streambed Alteration Agreement

If sensitive species are noted in the biological assessment, Section 7 consultation with USFWS will be needed.

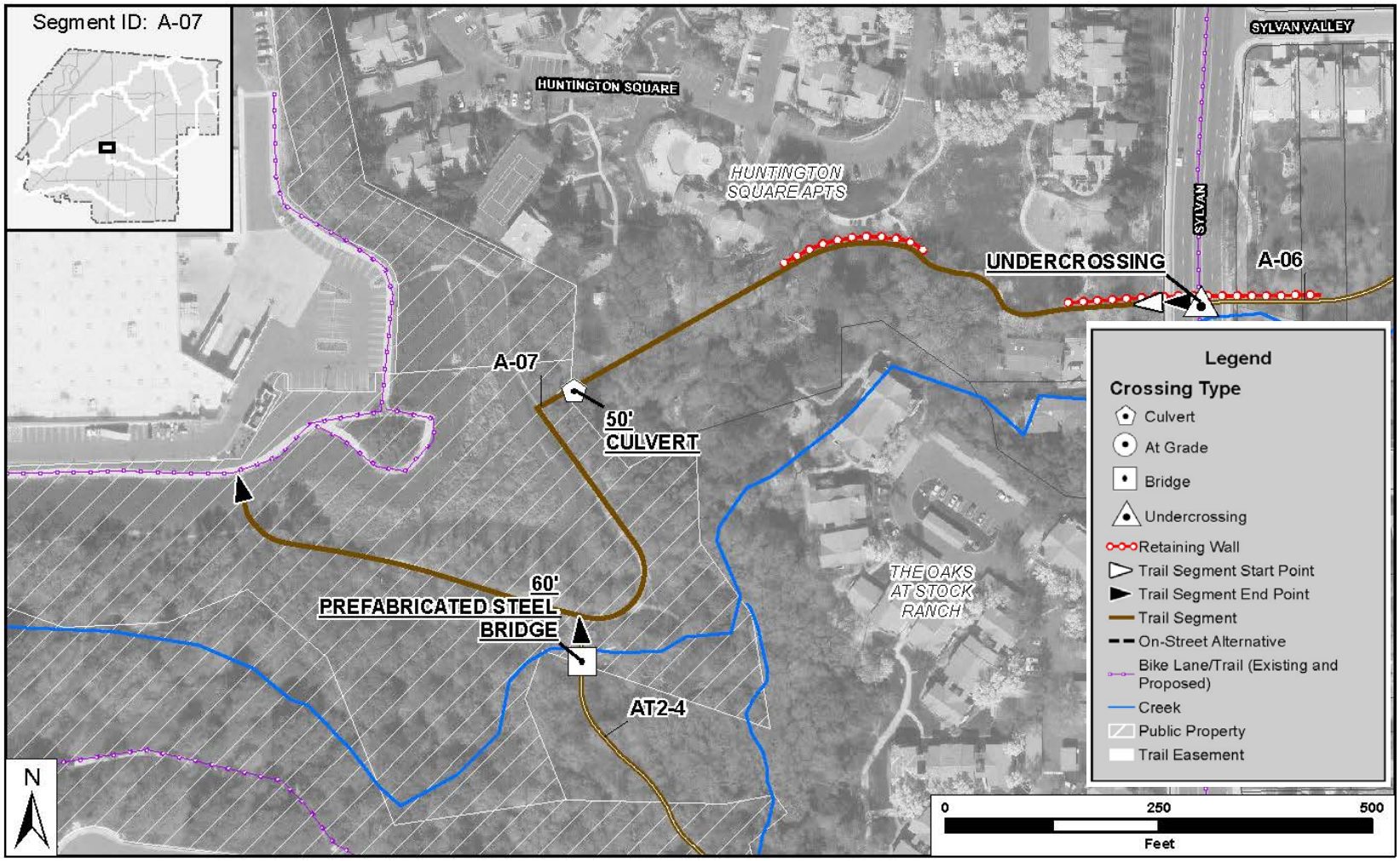
8.6.4 Additional Technical Studies

The following additional technical studies are anticipated during the Project Approval/Environmental Document and Design Phases of this project.

- Environmental Studies
  - Biological Assessment (BA)
  - Noise Technical Memorandum
  - Air Quality Technical Memorandum
  - Wetland Delineation
  - Natural Environment Study (NES)
  - Visual Resources – Technical Memorandum
  - Land Use and Community Impact – Technical Memorandum

- Geotechnical Analysis
- Hydrology/Hydraulic Analysis – Location Hydraulic Study
- Storm Water Pollution Prevention Plan

8.7 Segment A07



Subwatershed: Arcade Creek	Segment ID: A07	Start: Sylvan Road	End: Confluence with AT1
LF Creek/Trail: 1092'/1,615'	Number of Road Crossings: 0	Implementation Priority: 1	No. Potential Creek Crossings: 1

8.7.1 Preliminary Cost Estimate

Table 18 below shows a planning-level cost estimate for the recommended alignment as presented in this document. The costs do not include annual maintenance costs. The estimate is in year 2013 USD.

Table 18 – Preliminary Cost Estimate Segment A07

	Element	Costs x $1,000	Costs x $1,000
Construction	*Trail*	*470*	
	Structures	*0*	
	Mobilization (10%)	*49*	
	Contingency (20%)	*74*	
	Sub-Total Construction		**593**
Other Costs	*Utility Relocations*	*11*	
	Right of Way/Easements	*127*	
	Environmental Document (10%)	*60*	
	PS&E (10%)	*60*	
	Construction Management (12%)	*72*	
	Inspection/Testing (3%)	*18*	
	Administrative (3%)	*18*	
	Sub-Total Other		**366**
TOTAL COSTS			**959**

8.7.2 Design Elements

8.7.2.1 Trails

The recommended alignment starts at Sylvan Road and stays on the north side of the creek along the property line of Huntington Square Apartments. Much of this reach is privately owned, with the exception of the western portion within Stock Ranch Nature Preserve. Easement or fee title purchases would be required from adjacent property. Natural resources, corridor width and topography scored high-moderate. Some areas have heavy vegetation. Existing development west of Sylvan Road and north of the creek maintains the creekside in a managed state, with concrete trails and lawn. Existing informal trail connects private development to Stock Ranch Nature Preserve. No opportunities on south side of creek for trails due to encroaching development.

The proposed trail lies within private and publicly owned property, requiring right of way acquisition or easements for the trail through the privately owned property.

8.7.2.2 Creek Crossings

There is one proposed crossings of a drainage channel on the west side of the Huntington Square Apartments. A 30-foot long pre-fabricated reinforced concrete box culvert is proposed at this location.

8.7.2.3 Road Crossings

There are no roadway crossings contained within this segment.

8.7.2.4 Access Areas and Amenities

Access to this segment is from Sylvan Road, which has no on-street parking, and Stock Ranch Nature Preserve. The parking

lots at Huntington Square Apartments are privately owned and restricted to residents and guests. Amenities would be restricted to directional, warning and rules signage.

8.7.2.5 Visual Screening

Across from the existing residence on the east end of this segment, the trail is close to the creek and existing vegetation is somewhat sparse. If desired by the resident/owner of the private residence on the south side of the creek, additional buffer plantings on either side of the creek could be planted as a vegetated screen. Additionally, if desired by the apartment complex, visual buffer plantings could be installed between the trail and the complex, though given the open configuration of the existing trail, additional separation may not be desired.

8.7.2.6 Access Control

If desired by the apartment complex owner, a fence could be erected between the trail and the apartments, with a gate for resident and guest access to the trail system.

8.7.2.7 Signage

Guidance/directional signs will be placed at Sylvan Road. Regulatory signage for trail users would be placed on the access ramps at the approach to Sylvan Road requiring bicycle users to stop. Vertical clearance signs will be placed at the entrance to the undercrossing. Regulatory and guidance signs will be placed at quarter mile intervals along the trail.

8.7.2.8 Retaining Walls

Retaining walls are anticipated on the approach to the undercrossing of Sylvan Road and on the access paths at this location.

8.7.3 Environmental Compliance

Due to the presence of the drainage crossing and the likelihood of impacts to Waters of the U.S., the following permits are anticipated to be required for this segment of the trail:

- RWQCB - NPDES & Section 401 Permits
- ACOE – Section 404 Permit
- CDFW – Section 1602 Streambed Alteration Agreement

Additionally, if the biological opinion determines the presence or likely presence of sensitive species, consultation with the USFWS under Section 7 of the Endangered Species Act will be required.

8.7.4 Additional Technical Studies

It is anticipated that the following additional technical studies will be completed during the Project Approval/Environmental Document and Design Phases of this project.

- Environmental Studies
  - Biological Assessment (BA)
  - Noise Technical Memorandum
  - Air Quality Technical Memorandum
  - Wetland Delineation
  - Natural Environment Study (NES)
  - Visual Resources – Technical Memorandum
  - Land Use and Community Impact – Technical Memorandum
- Geotechnical Analysis
- Hydrology/Hydraulic Analysis
- Storm Water Pollution Prevention Plan

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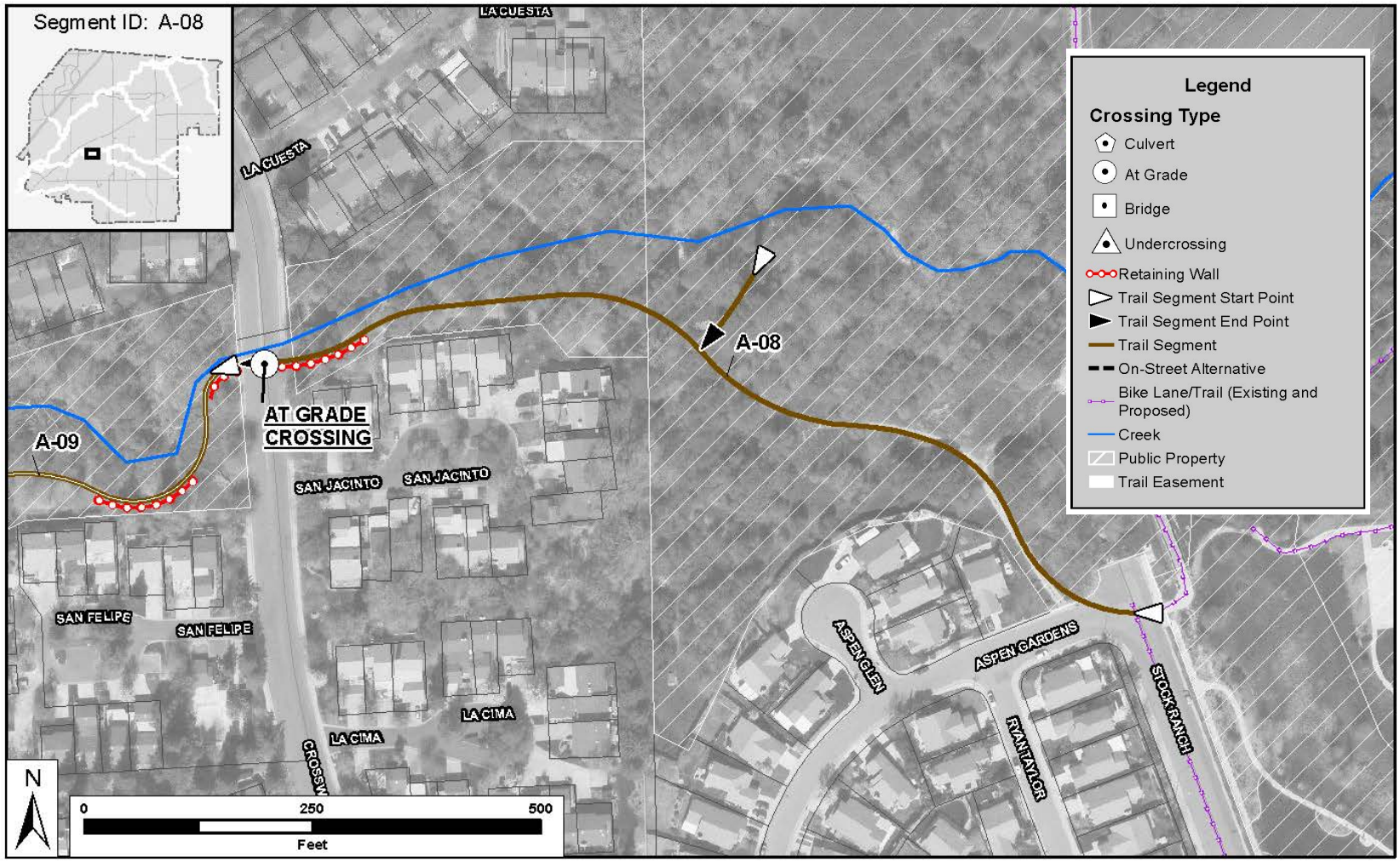
8.8 Segment A08



Subwatershed: Arcade Creek	Segment ID: A08	Start: Confluence with AT2	End: Crosswoods Circle East Bridge
LF Creek/Trail: 2630'/1618'	Number of Road Crossings: 1	Implementation Priority: 1	No. Potential Creek Crossings: 0

8.8.1 Preliminary Cost Estimate

Table 19 below shows a planning-level cost estimate for the recommended alignment as presented in this document. The costs do not include annual maintenance costs. The estimate is in year 2013 USD.

Table 19 – Preliminary Cost Estimate Segment A08

	Element	Costs x $1,000	Costs x $1,000
Construction	*Trail*	*386*	
	Structures	*0*	
	Mobilization (10%)	*41*	
	Contingency (20%)	*61*	
	Sub-Total Construction		**488**
Other Costs	*Utility Relocations*	*11*	
	Right of Way/Easements	*-*	
	Environmental Document (10%)	*49*	
	PS&E (10%)	*49*	
	Construction Management (12%)	*59*	
	Inspection/Testing (3%)	*15*	
	Administrative (3%)	*15*	
	Sub-Total Other		**198**
TOTAL COSTS			**686**

8.8.2 Design Elements

8.8.2.1 Trails

The recommended alignment along this segment starts at the west end of the Huntington Square Apartment complex and connects to the existing trail on the west side of the detention pond. The proposed new segment of the trail begins again at the south end of the Stock Ranch Nature Preserve Bridge over Arcade Creek and runs on the south side of the creek to a proposed at-grade crossing of Crosswoods Circle (East). This reach scored high in all categories. SRPD owns and maintains these parcels and natural resource constraints are low. Corridor width ranges from 600 to 800 feet within Stock Ranch Nature Preserve to just over 100 feet at Crosswoods Circle. Slopes are generally gentle. Existing paved trails form much of this segment through Stock Ranch Nature Preserve. The existing bridge can be utilized to transition the trail to the south side of the creek west of the preserve. An existing SRPD parcel connects Crosswoods Circle to the Stock Ranch Nature Preserve site. Potential opportunity exists for a scenic overlook spur trail west of the existing bridge. The proposed trail lies entirely within publicly owned property and therefore no right of way or easement costs are anticipated.

8.8.2.2 Creek Crossings

The existing bridge will be used to allow users to cross from the north to the south side of Arcade Creek.

8.8.2.3 Road Crossings

An unsignalized at-grade crossing is proposed at Crosswoods Circle East due to the relatively low traffic volumes and good sight distance at this location. It is not feasible to use the existing corrugated steel arch culvert as an undercrossing.

8.8.2.4 Access Areas and Amenities

This segment is accessed from the Type C node in the Stock Ranch shopping area, as well as Crosswoods Circle on the west end. On-street parking is feasible on Crosswoods Circle. Amenities available within the Stock Ranch Nature Preserve include interpretive and directional signage, a demonstration garden, a group picnic area, trash receptacles & benches and walking trails.

8.8.2.5 Visual Screening

No screening is anticipated within the Stock Ranch Nature Preserve area. Where the trail leaves Aspen Gardens Way, it runs close to a private residence. Screening may be needed at that location, if desired by the resident, and sufficient space exists for a vegetated buffer. Additionally, the trail runs through a wooded area with an open understory in back of homes on San Jacinto Court. Screening may be desired by residents of the Court along that stretch. Due to the narrowness of the SRPD easement in that area, an opaque fence may be a better solution than vegetation, however, proximity to the creek and likelihood of future flooding must be considered in the design.

8.8.2.6 Access Control

The residences discussed in the previous paragraph may desire fencing for access control. If so, the fencing could be designed to function as a visual screen, if that is also desired.

8.8.2.7 Signage

Guidance/directional signs will be placed at Crosswoods Circle, at the end of Stock Ranch Road, and at key locations along this segment of the trail where access nodes occur within Stock Ranch Nature Preserve. Regulatory signage for trail users would be placed on the access ramps at the approach to Crosswoods Circle requiring bicycle users to stop. Regulatory and guidance signs will be placed at quarter mile intervals along the trail.

8.8.2.8 Retaining Walls

Small retaining walls are anticipated on the approach to the grade crossing of Crosswoods Circle.

8.8.3 Environmental Compliance

Since this project will likely not result in impacts to Waters of the U.S., the following permits are anticipated to be required for this segment of the trail:

- RWQCB - NPDES Permit

If a biological assessment identifies wetlands in the segment from Crosswoods Circle to the southern bridge landing that cannot be avoided, Section 404 and 401 permits may also be necessary.

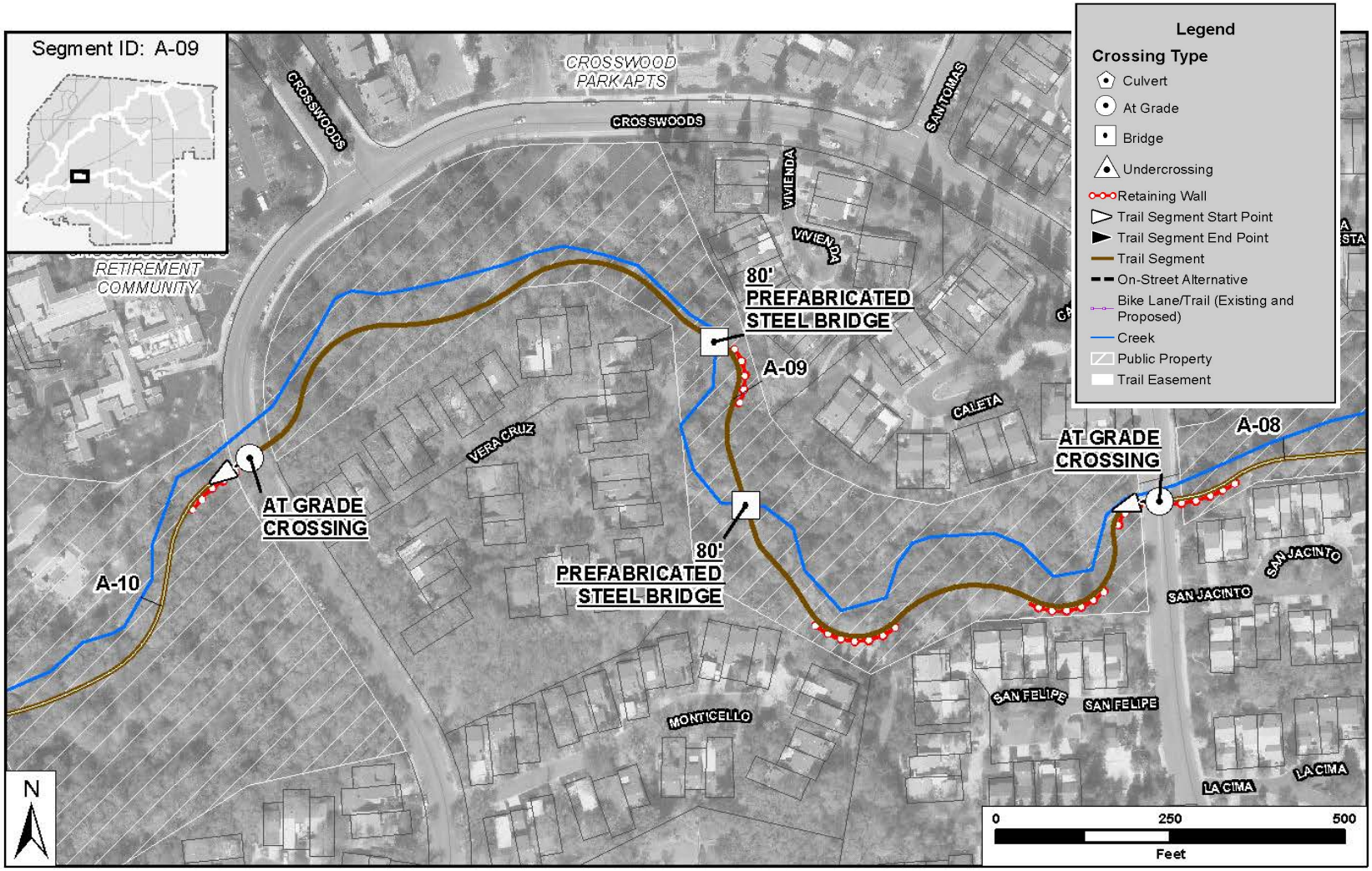
8.8.4 Additional Technical Studies

It is anticipated that the following additional technical studies will be completed during the Project Approval/Environmental Document and Design Phases of this project.

- Environmental Studies
  - Biological Assessment (BA)
  - Noise Technical Memorandum
  - Air Quality Technical Memorandum
  - Wetland Delineation
  - Natural Environment Study (NES)
  - Visual Resources – Technical Memorandum

    - Land Use and Community Impact – Technical Memorandum
- Geotechnical Analysis
- Hydrology/Hydraulic Analysis
- Storm Water Pollution Prevention Plan
- Geomorphology Study

8.9 Segment A09



Subwatershed: Arcade Creek	Segment ID: A09	Start: Crosswoods Circle East Bridge	End: Crosswoods Circle W. Bridge
LF Creek/Trail: 1894'/1895'	Number of Road Crossings: 1	Implementation Priority: 1	No. Potential Creek Crossings: 2

8.9.1 Preliminary Cost Estimate

Table 20 below shows a planning-level cost estimate for the recommended alignment as presented in this document. The costs do not include annual maintenance costs. The estimate is in year 2013 USD.

Table 20 – Preliminary Cost Estimate Segment A09

	Element	Costs x $1,000	Costs x $1,000
Construction	*Trail*	*605*	
	Structures	*384*	
	Mobilization (10%)	*63*	
	Contingency (20%)	*95*	
	Sub-Total Construction		**1,147**
Other Costs	*Utility Relocations*	*11*	
	Right of Way/Easements	*-*	
	Environmental Document (10%)	*115*	
	PS&E (10%)	*115*	
	Construction Management (12%)	*138*	
	Inspection/Testing (3%)	*35*	
	Administrative (3%)	*35*	
	Sub-Total Other		**449**
TOTAL COSTS			**1,596**

8.9.2 Design Elements

8.9.2.1 Trails

The recommended alignment starts at Crosswoods Circle (east) and generally runs south of the creek to a proposed at-grade crossing of Crosswoods Circle (west). However in order to remain within SRPD land, the proposed trail alignment briefly crosses to the north side of the creek via two bridges. As with the upstream reach, SRPD owns and manages the land within the creek corridor. Corridor width is generally approximately 200-feet. Crosswoods Circle crosses the creek on both ends using open-bottom culverts. This reach has some informal trails. The south bank on the west end of the reach is broad and flat and appears to be actively managed for vegetation control. Some areas within the reach will require more care in siting trails to minimize riparian vegetation impacts. The proposed trail lies entirely within publicly owned property and therefore no right of way or easement costs are anticipated.

8.9.2.2 Creek Crossings

There are two bridges proposed along this segment which will allow the trail to stay within publicly owned land. Once detailed topographic surveys have been completed, the need for additional creek crossings will be re-evaluated.

8.9.2.3 Road Crossings

An unsignalized at-grade crossing is proposed at Crosswoods Circle West due to the relatively low traffic volumes and good sight distance at this location. It is not feasible to use the existing corrugated steel arch culvert as an undercrossing.

8.9.2.4 Access Areas and Amenities

Segment is accessed via Crosswoods Circle. On-street parking is available. Amenities limited to directional, warning & rules signs.

8.9.2.5 Visual Screening

Vegetation is relatively dense, however, proximity of the trail to backyards throughout this segment may require visual screening in some locations, such as the west end, in which much of the understory appears to have been removed. Screening should be examined more closely in detailed design for this segment.

8.9.2.6 Access Control

As with visual screening and bridge structures, access control should be evaluated during detailed design, depending upon the desires of adjacent landowners. The west end of the segment is relatively open, and neighbors may desire fencing or other barriers to discourage trail users from wandering off of the path. Proximity of the trail to backyards throughout this segment may require new fencing or fencing upgrades.

8.9.2.7 Signage

Guidance/directional signs will be placed at Crosswoods Circle. Regulatory signage for trail users would be placed on the access ramps at the approach to Crosswoods Circle requiring bicycle users to stop. Regulatory and guidance signs will be placed at quarter mile intervals along the trail. Weight limitation warning signs and other regulatory will be placed on either side of all bridges crossing the creek.

8.9.2.8 Retaining Walls

Small retaining walls are anticipated on the approach to the grade crossing of Crosswoods Circle and in constrained areas near the bridge approaches.

8.9.3 Environmental Compliance

The following permits are anticipated to be required for this segment of the trail:

- RWQCB - NPDES Permit

If detailed design determines that bridges or retaining walls that encroach upon the OHWM are needed, or if the bio assessment locates wetlands or drainages that cannot be avoided, the following permits will be needed:

- ACOE – Section 404 Nationwide or Individual Permit
- RWQCB – Section 401 Water Quality Certification

If work is done within the defined bed and bank:

- CDFW – Section 1602 Streambed Alteration Agreement

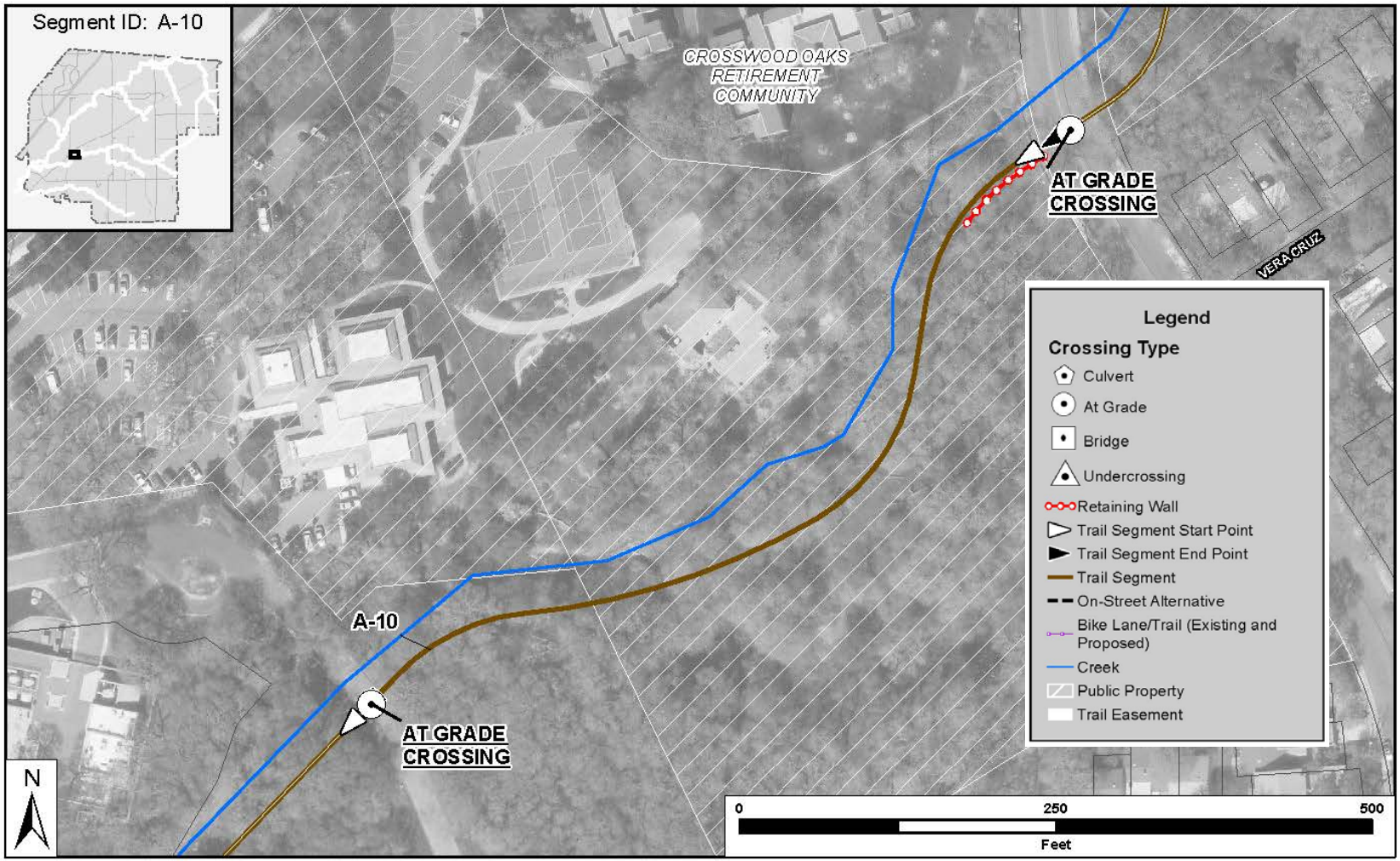
8.9.4 Additional Technical Studies

It is anticipated that the following additional technical studies will be completed during the Project Approval/Environmental Document and Design Phases of this project.

- Environmental Studies
    - Biological Assessment (BA)
    - Noise Technical Memorandum
    - Air Quality Technical Memorandum
    - Wetland Delineation
    - Natural Environment Study (NES)
    - Visual Resources – Technical Memorandum

    - Land Use and Community Impact – Technical Memorandum
- Geotechnical Analysis
- Hydrology/Hydraulic Analysis
- Storm Water Pollution Prevention Plan

8.10 Segment A10



Subwatershed: Arcade Creek	Segment ID: A10	Start: Crosswoods Circle W. Bridge	End: Crosswoods Park W. boundary
LF Creek/Trail: 560'/760'	Number of Road Crossings: 0	Implementation Priority: 1	No. Potential Creek Crossings: 0

8.10.1 Preliminary Cost Estimate

Table 21 below shows a planning-level cost estimate for the recommended alignment as presented in this document. The costs do not include annual maintenance costs. The estimate is in year 2013 USD.

Table 21 – Preliminary Cost Estimate Segment A10

	Element	Costs x $1,000	Costs x $1,000
Construction	*Trail*	*208*	
	Structures	*0*	
	Mobilization (10%)	*22*	
	Contingency (20%)	*33*	
	Sub-Total Construction		**263**
Other Costs	*Utility Relocations*	*11*	
	Right of Way/Easements	*-*	
	Environmental Document (10%)	*27*	
	PS&E (10%)	*27*	
	Construction Management (12%)	*32*	
	Inspection/Testing (3%)	*8*	
	Administrative (3%)	*8*	
	Sub-Total Other		**113**
TOTAL COSTS			**376**

8.10.2 Design Elements

8.10.2.1 Trails

This short reach primarily runs adjacent to Crosswoods Park on land owned by SRPD, from Crosswoods Circle (west) south of the creek to the park property boundary. Trail feasibility ranked high for corridor width and topography and high-moderate for natural resources due to somewhat dense native riparian vegetation. Existing paved trails at Crosswoods Park connect to bike lanes along Auburn Boulevard, which provides an alternate route in the event that access cannot be obtained for the downstream segment through the Christ the King Retreat Center (Segment A11). The proposed trail lies entirely within publicly owned property and therefore no right of way or easement costs are anticipated. A possible connection to the library parking lot would be provided by using the existing access controlled 20 foot wide bridge over the creek from the SASD pump station entrance road which currently leads to the church property and Vianney Retirement Village. The access control gate would need to be repositioned. As an alternative a new prefabricated steel bridge could be installed at the church property line to connect to the existing paved path and library parking lot.

8.10.2.2 Creek Crossings

No bridges are anticipated within this segment.

8.10.2.3 Road Crossings

No roadway crossings are anticipated within this segment.

8.10.2.4 Access Areas and Amenities

Access on the upstream end is via on-street parking on Crosswoods Circle (Type B Node). Access on the downstream

end is via Crosswoods Park (Type D Node). Amenities at Crosswoods Park include trails, play equipment, active sports areas, passive turf areas, restrooms, group picnic area, community center, nature area and parking. Additional amenities added might include kiosk with interpretive signage; warning, directional and rules signage.

8.10.2.5 Visual Screening

Left bank of creek is heavily wooded with no nearby residences. On right bank, visual screening is not needed adjacent to the park, and sufficient buffer exists between the proposed trail and Crosswood Oaks apartments that screening should not be necessary.

8.10.2.6 Access Control

Residents at Crosswood Oaks may desire fencing between the apartment complex and the trail. No fencing is needed adjacent to the park.

8.10.2.7 Signage

Guidance/directional signs will be placed at Crosswoods Circle. Regulatory signage for trail users would be placed on the access ramps at the approach to Crosswoods Circle requiring bicycle users to stop. Regulatory and guidance signs will be placed at quarter mile intervals along the trail.

8.10.2.8 Retaining Walls

Small retaining walls are anticipated on the approach to the grade crossing of Crosswoods Circle.

8.10.3 Environmental Compliance

Due to the fact that no creek crossings are proposed, the following permits are anticipated to be required for this segment of the trail, provided the biological assessment does not identify any Waters of the U.S. to be crossed:

- RWQCB - NPDES Permit

8.10.4 Additional Technical Studies

It is anticipated that the following additional technical studies will be completed during the Project Approval/Environmental Document and Design Phases of this project.

- Environmental Studies
  - Biological Assessment (BA)
  - Noise Technical Memorandum
  - Air Quality Technical Memorandum
  - Wetland Delineation
  - Natural Environment Study (NES)
  - Visual Resources – Technical Memorandum
  - Land Use and Community Impact – Technical Memorandum
- Geotechnical Analysis
- Hydrology/Hydraulic Analysis
- Storm Water Pollution Prevention Plan

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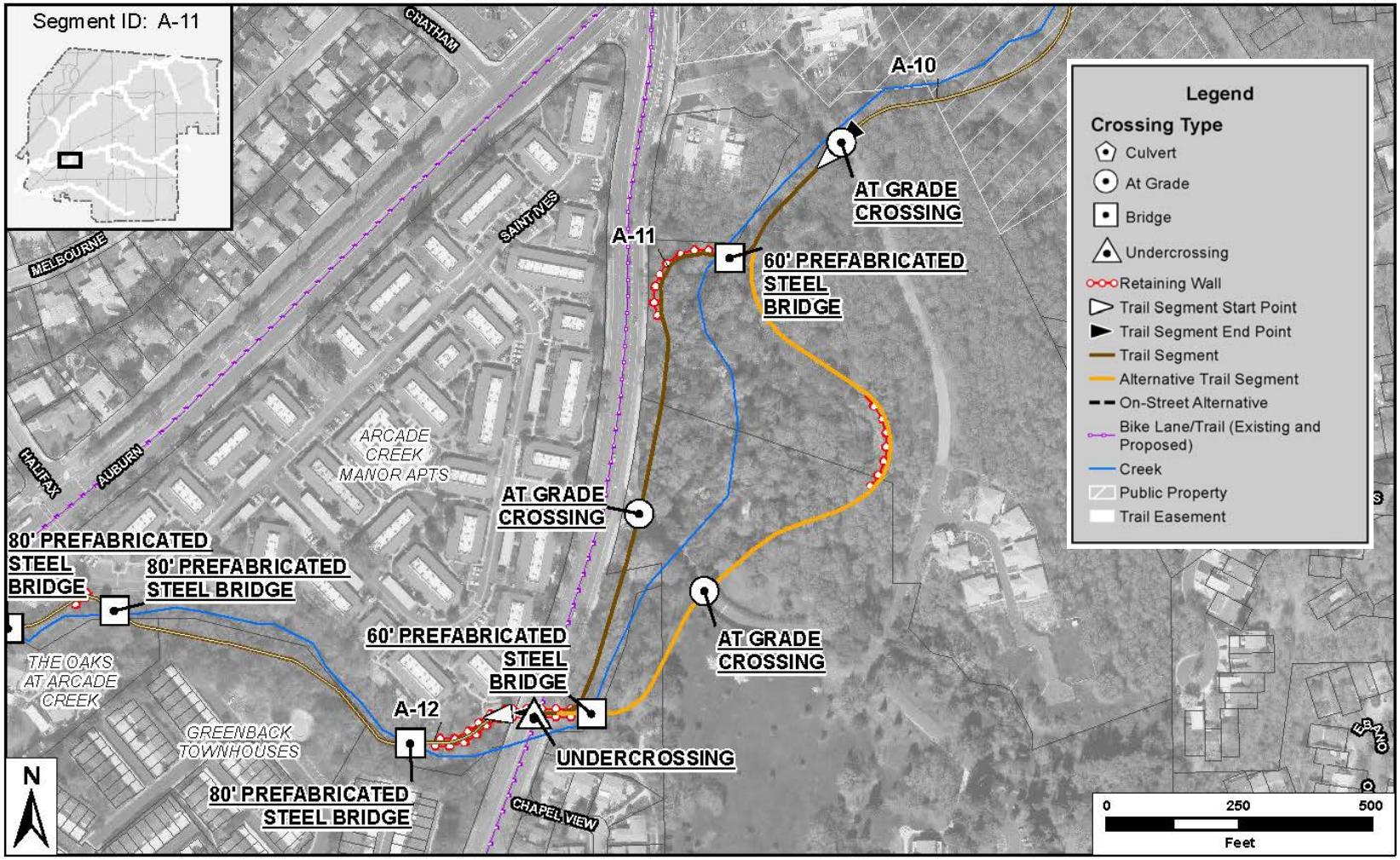
8.11 Segment A11



Subwatershed: Arcade Creek	Segment ID: A11	Start: Crosswoods Park west boundary	End: Van Maren Lane
LF Creek/Trail: 1662'/1410'	Number of Road Crossings: 2	Implementation Priority: 2	No. Potential Creek Crossings: 1

8.11.1 Preliminary Cost Estimate

Table 22 below shows a planning-level cost estimate for the recommended alignment as presented in this document. The costs do not include annual maintenance costs. The estimate is in year 2013 USD.

Table 22 – Preliminary Cost Estimate Segment A11

	Element	Costs x $1,000	Costs x $1,000
Construction	*Trail*	*506*	
	Structures	*144*	
	Mobilization (10%)	*53*	
	Contingency (20%)	*80*	
	Sub-Total Construction		**783**
Other Costs	*Utility Relocations*	*11*	
	Right of Way/Easements	*146*	
	Environmental Document (10%)	*79*	
	PS&E (10%)	*79*	
	Construction Management (12%)	*94*	
	Inspection/Testing (3%)	*24*	
	Administrative (3%)	*24*	
	Sub-Total Other		**457**
TOTAL COSTS			**1,240**

8.11.2 Design Elements

8.11.2.1 Trails

The recommended trail alignment starts at the Crosswoods Park west boundary and roughly follows the creek until just south of the Sacramento Regional County Sanitation District (SRCSD) property where it crosses to the west side of the creek to a proposed undercrossing of Van Maren Lane. The alignment also crosses the Church property access road just east of Van Maren Lane. This segment primarily crosses through the Christ the King Passionist Retreat Center. A small section of public land on the north could provide access to the library parking lot, which could double as an access node; however, both Van Maren and Auburn Boulevard are heavily travelled routes, and the preferred alternative would be to secure access through the Church property. Topography presents few challenges and the corridor ranges around 500-feet wide. Dense native riparian vegetation presents some challenges, but these are not insurmountable. . An alternative alignment remaining along the east side of the creek also appears to be feasible.

The proposed trail lies entirely within privately owned property, requiring right of way acquisition or easements for the trail.

8.11.2.2 Creek Crossings (Bridges, Culverts, etc.)

A bridge crossing is required just south of the SRCSD property to allow the trail to switch from the east side to the west side of the creek. It is anticipated that bridge will be approximately 60 feet in length and will be a pre-fabricated steel bridge.

8.11.2.3 Road Crossings

The recommended alignment crosses the existing Church entrance road where a striped at-grade crossing will be installed. It is proposed to construct the trail on the north side of the creek under Van Maren Lane utilizing the existing bridge structure. The clearance to the bridge structure will be 9 feet which is less than the design standard and will require additional signage. Access ramps will be provided to tie into the sidewalks and on-street bike lanes along Van Maren Lane.

8.11.2.4 Access Areas and Amenities

Access is from Van Maren Lane and Crosswoods Park. Amenities at Crosswoods Park are as described in A10. Van Maren Lane is not marked for parallel parking. Directional, rules & warning signage should be installed at Van Maren.

8.11.2.5 Visual Screening

Due to the density of vegetation in this area, screening is not anticipated; however, if access for the trail in this segment can be negotiated with the retreat center, they may desire additional visual screening to maintain privacy.

8.11.2.6 Access Control

As with visual screening, the Retreat Center may require fencing or other access control if they allow the trail through their property. This should be discussed further with them as part of negotiated access.

8.11.2.7 Signage

Guidance/directional signs will be placed at Van Maren Lane. Regulatory signage for trail users would be placed on the access ramps at the approach to Van Maren Lane requiring bicycle users to stop. Regulatory and guidance signs will be placed at quarter mile intervals along the trail. Vertical clearance signs will be placed at the entrance to the undercrossing. Weight limitation warning signs and other regulatory will be placed on either side of all bridges crossing the creek.

8.11.2.8 Retaining Walls

Small retaining walls are anticipated on the approach to the undercrossing of Van Maren Lane and under the bridge, cut-off walls and a retaining wall will be constructed.

8.11.3 Environmental Compliance

The following permits are anticipated to be required for this segment of the trail:

- RWQCB - NPDES Permit

No creek crossings or wetland impacts are anticipated with this segment, but only detailed survey and design will reveal specific drainages or storm drain outfalls that require crossing.

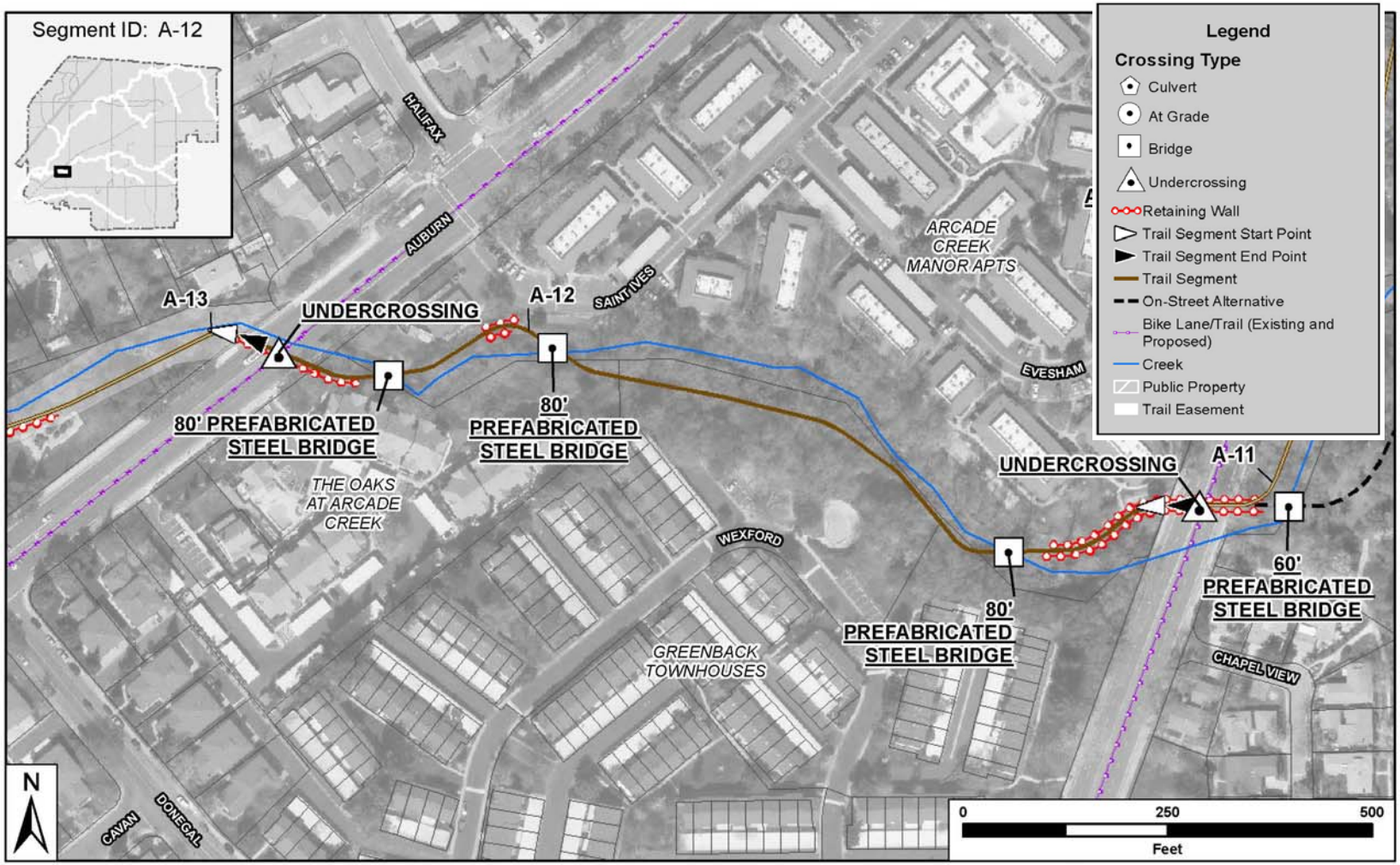
8.11.4 Additional Technical Studies

It is anticipated that the following additional technical studies will be completed during the Project Approval/Environmental Document and Design Phases of this project:

- Environmental Studies
    - Biological Assessment (BA)
    - Noise Technical Memorandum
    - Air Quality Technical Memorandum
    - Wetland Delineation
    - Natural Environment Study (NES)
    - Visual Resources – Technical Memorandum

    - Land Use and Community Impact – Technical Memorandum
- Geotechnical Analysis
- Hydrology/Hydraulic Analysis – Location Hydraulic Study
- Storm Water Pollution Prevention Plan

8.12 Segment A12



Subwatershed: Arcade Creek	Segment ID: A12	Start: Van Maren Lane	End: Auburn Boulevard
LF Creek/Trail: 1239'/1269'	Number of Road Crossings: 1	Implementation Priority: 2	No. Potential Creek Crossings: 3

8.12.1 Preliminary Cost Estimate

Table 23 below shows a planning-level cost estimate for the recommended alignment as presented in this document. The costs do not include annual maintenance costs. The estimate is in year 2013 USD.

Table 23 – Preliminary Cost Estimate Segment A12

	Element	Costs x $1,000	Costs x $1,000
Construction	*Trail*	*1,088*	
	Structures	*576*	
	Mobilization (10%)	*114*	
	Contingency (20%)	*171*	
	Sub-Total Construction		**1,949**
Other Costs	*Utility Relocations*	*11*	
	Right of Way/Easements	*131*	
	Environmental Document (10%)	*195*	
	PS&E (10%)	*195*	
	Construction Management (12%)	*234*	
	Inspection/Testing (3%)	*59*	
	Administrative (3%)	*59*	
	Sub-Total Other		**884**
TOTAL COSTS			**2,833**

8.12.2 Design Elements

8.12.2.1 Trails

This segment of creek runs from, the undercrossing at Van Maren lane along the north side of the creek to a proposed undercrossing of Auburn Boulevard on the south side of the existing bridge structure. The alignment runs through three fully developed private parcels and acquisition or easements would be required. Trail alignment is possible on both sides of the creek, but would require retaining walls, tree removal and widening of the existing bench on the left bank and significant retaining walls and two bridge crossings if located on the right bank. Topographic constraints are moderate and vegetation constraints are moderate to high. Corridor width ranges from just under 100 feet at the narrowest to around 200 feet at the widest. Existing walkways follow the creek on the right bank, which may be slightly preferable than the left due to vegetation and topographic constraints.

The proposed trail lies entirely within privately owned property, requiring right of way acquisition or easements for the trail.

8.12.2.2 Creek Crossings

Two 80 ft long bridge crossings are proposed just west of Van Maren Lane, to minimize impacts to the Arcade Creek Manor apartment facilities. Just east of Auburn Boulevard a third bridge is proposed to allow the trail to switch from the north side to the south side of the creek. It is anticipated that bridge will be approximately 80-100 feet in length and will be a pre-fabricated steel bridge.

8.12.2.3 Road Crossings

It is proposed to construct the trail on the south side of the creek under Auburn Boulevard utilizing the existing bridge structure. The clearance to the bridge structure will be 9 feet which is less than the design standard and will require additional signage. Access ramps will be provided to tie into the sidewalks and on-street bike lanes along Auburn Boulevard.

8.12.2.4 Access Areas and Amenities

Both ends of this segment are Type A nodes. Public parking is not available within the private communities on either side of the creek. Amenities are limited to directional, warning and rules signs.

8.12.2.5 Visual Screening

Due to the proximity of the trail to the residences on the right bank, visual screening is likely to be desired. Multi-layered vegetation is recommended to allow residents access to the trail at multiple points, although a semi-transparent fence could also be possible. For safety, maintain vegetation clearance on both sides of trail per design standards.

8.12.2.6 Access Control

Fencing may be desired between the trail and the residential properties to the north. Residents should be engaged in the design process to determine need, appropriate heights, style, and gate locations.

8.12.2.7 Signage

Guidance/directional signs will be placed at Auburn Boulevard and Van Maren Lane. Regulatory signage for trail users would be placed on the access ramps at the approach to Auburn Boulevard and Van Maren Lane requiring bicycle users to stop. Regulatory and guidance signs will be placed at quarter mile intervals along the trail. Vertical clearance signs will be placed at the entrance to the undercrossing. Weight limitation warning signs and other regulatory will be placed on either side of all bridges crossing the creek.

8.12.2.8 Retaining Walls

Retaining walls are anticipated on the approach to the undercrossing of Auburn Boulevard and Van Maren Lane and under the Auburn Road bridge, cut-off walls and a retaining wall will be constructed. It is anticipated that retaining walls will be required along outside of the trail for the majority of this segment of the trail, to minimize impacts to the adjacent property owners.

8.12.3 Environmental Compliance

Due to the creek crossing, the following permits are anticipated to be required for this segment of the trail:

- RWQCB - Section 401 Water Quality Certification & NPDES Permit
- CDFW - Section 1602 Streambed Alteration Agreement
- ACOE – Section 404 Nationwide Permit,

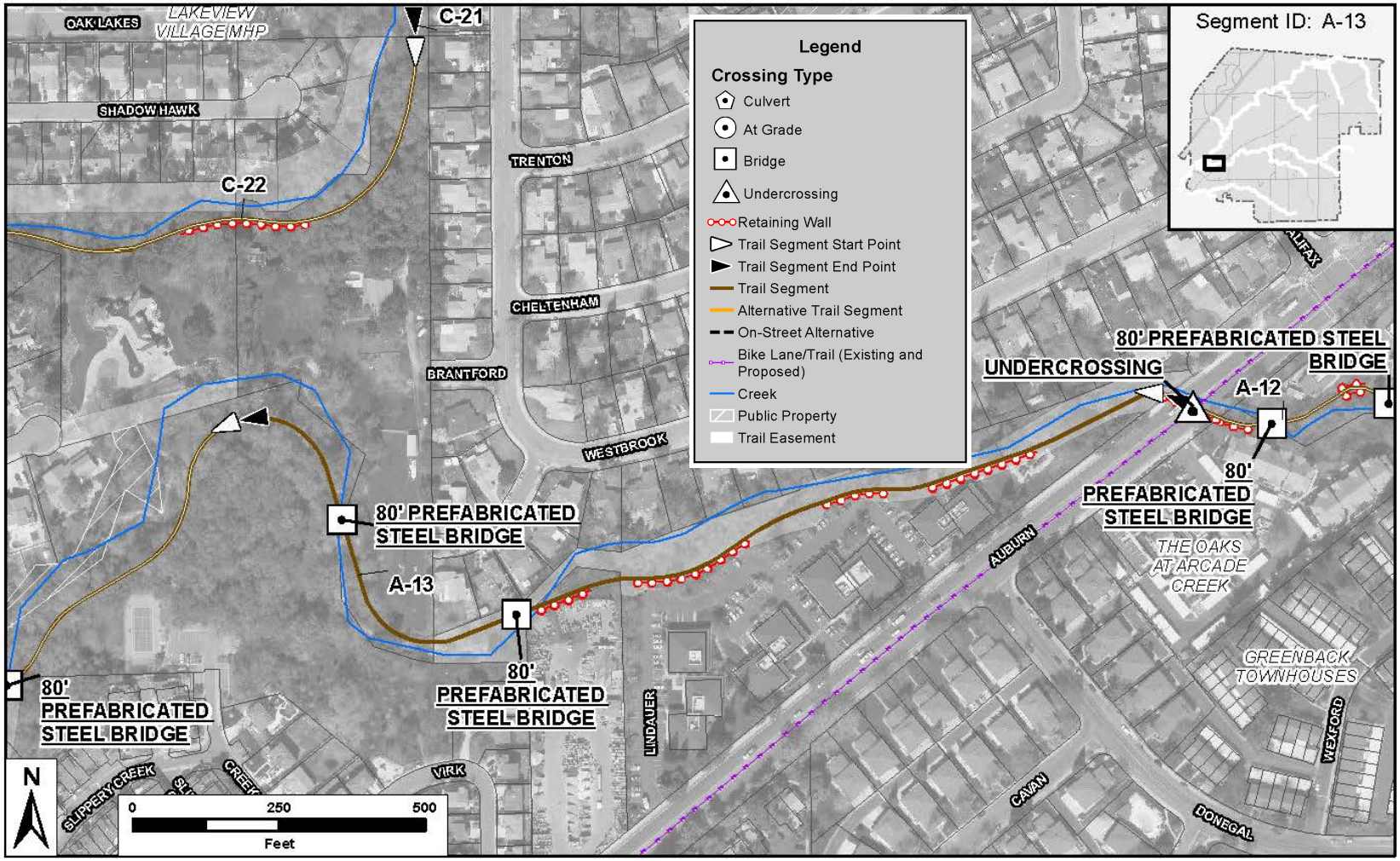
Sensitive species are not expected for this segment, but if such are found, consultation with USFWS will be necessary.

8.12.4 Additional Technical Studies

It is anticipated that the following additional technical studies will be completed during the Project Approval/Environmental Document and Design Phases of this project.

- Environmental Studies
    - Biological Assessment (BA)
    - Noise Technical Memorandum
    - Air Quality Technical Memorandum
    - Wetland Delineation
    - Natural Environment Study (NES)
    - Visual Resources – Technical Memorandum
    - Land Use and Community Impact – Technical Memorandum
- Geotechnical Analysis
- Hydrology/Hydraulic Analysis – Location Hydraulic Study
- Storm Water Pollution Prevention Plan

8.13 Segment A13



Subwatershed: Arcade Creek	Segment ID: A13	Start: Auburn Boulevard	End: Matheny Way cul-de-sac, E. end
LF Creek/Trail: 2147'/1905'	Number of Road Crossings: 0	Implementation Priority: 2	No. Potential Creek Crossings: 2

8.13.1 Preliminary Cost Estimate

Table 24 below shows a planning-level cost estimate for the recommended alignment as presented in this document. The costs do not include annual maintenance costs. The estimate is in year 2013 USD.

Table 24 – Preliminary Cost Estimate Segment A13

	Element	Costs x $1,000	Costs x $1,000
Construction	*Trail*	*446*	
	Structures	*384*	
	Mobilization (10%)	*47*	
	Contingency (20%)	*70*	
	Sub-Total Construction		**947**
Other Costs	*Utility Relocations*	*5*	
	Right of Way/Easements	*197*	
	Environmental Document (10%)	*95*	
	PS&E (10%)	*95*	
	Construction Management (12%)	*114*	
	Inspection/Testing (3%)	*29*	
	Administrative (3%)	*29*	
	Sub-Total Other		**564**
TOTAL COSTS			**1,511**

8.13.2 Design Elements

8.13.2.1 Trails

The recommended alignment starts at the undercrossing of Auburn Boulevard and remains on the south side of the creek. To minimize right of way requirements two bridges are proposed to cross over the creek in the vicinity of the A&A Stepping Stone storage yard. Public easement on east two-thirds of reach is generally adequate, except adjacent to A&A Stepping Stone storage yard. May require negotiation of right-of-way easement or significant retaining wall. Corridor width in this segment of the reach is about 100-feet. Landscape is open and maintained adjacent to the professional complex on Auburn Boulevard. Western one-third of reach has a trail easement on the north bank, which would require the bridge crossing at the stone yard. This would also provide a future opportunity to connect the proposed Arcade Creek Corridor trail to the proposed Cripple Creek Corridor trail. Width is adequate and topographic and vegetation constraints are few. Public trail easement connects to end of Matheny Way cul-de-sac. Opportunities for trail alignment appear to be greater on the south side of the creek; however, easement does not extend on the south side beyond the stone yard.

The proposed trail lies entirely within privately owned property. A trail easement exists along a portion of the corridor. The remainder will require right of way acquisition or additional easements for the trail.

8.13.2.2 Creek Crossings (Bridges, Culverts, etc.)

Two bridge crossings are required just west of A&A Stepping Stone storage yard where the area between the creek and the existing property boundary is very confined. It is anticipated

that both bridges will be approximately 80 feet in length and will be a pre-fabricated steel bridge.

8.13.2.3 Road Crossings

There are no roadway crossings within this segment.

8.13.2.4 Access Areas and Amenities

On-street parking does not exist along this area of Auburn Boulevard, and access to the downstream end of this segment is via the trail only, so amenities are limited to signage.

8.13.2.5 Visual Screening

Due to the proximity of the trail to the stone yard, visual screening may be desired at that location. Space is very restricted, so screening will likely take the form of a concrete block wall, which will also provide access control. The owner of the stone yard should be consulted during design to determine exact needs.

8.13.2.6 Access Control

In addition to access control at the stone yard, some level of separation may be desired by the business professional complex along Auburn Boulevard. If so, a low wrought-iron or anodized aluminum fence with gates for employee access may be appropriate. A low fence would help discourage trail users from using the office complex parking lot. Parking and access control signage should also be posted citing City codes.

8.13.2.7 Signage

Guidance/directional signs will be placed at Auburn Boulevard. Regulatory signage for trail users would be placed on the access ramps at the approach to Auburn Boulevard requiring bicycle users to stop. Regulatory and guidance signs will be placed at quarter mile intervals along the trail. Weight limitation warning signs and other regulatory will be placed on either side of all bridges crossing the creek.

8.13.2.8 Retaining Walls

Retaining walls are anticipated on the approach to the undercrossing of Auburn Boulevard. It is anticipated that retaining walls will also be required in the vicinity of the proposed eastern bridge crossing where the area is constrained between the property boundaries and the creek.

8.13.3 Environmental Compliance

Due to the potential for the bridges and/or retaining walls to encroach on the creek, the following permits are anticipated to be required for this segment of the trail:

- RWQCB - Section 401 Water Quality Certification and NPDES Permit
- CDFW - Section 1602 Streambed Alteration Agreement
- ACOE – Section 404 Nationwide Permit

If sensitive species are present, consultation with the USFWS under Section 7 of the Endangered Species Act would be necessary.

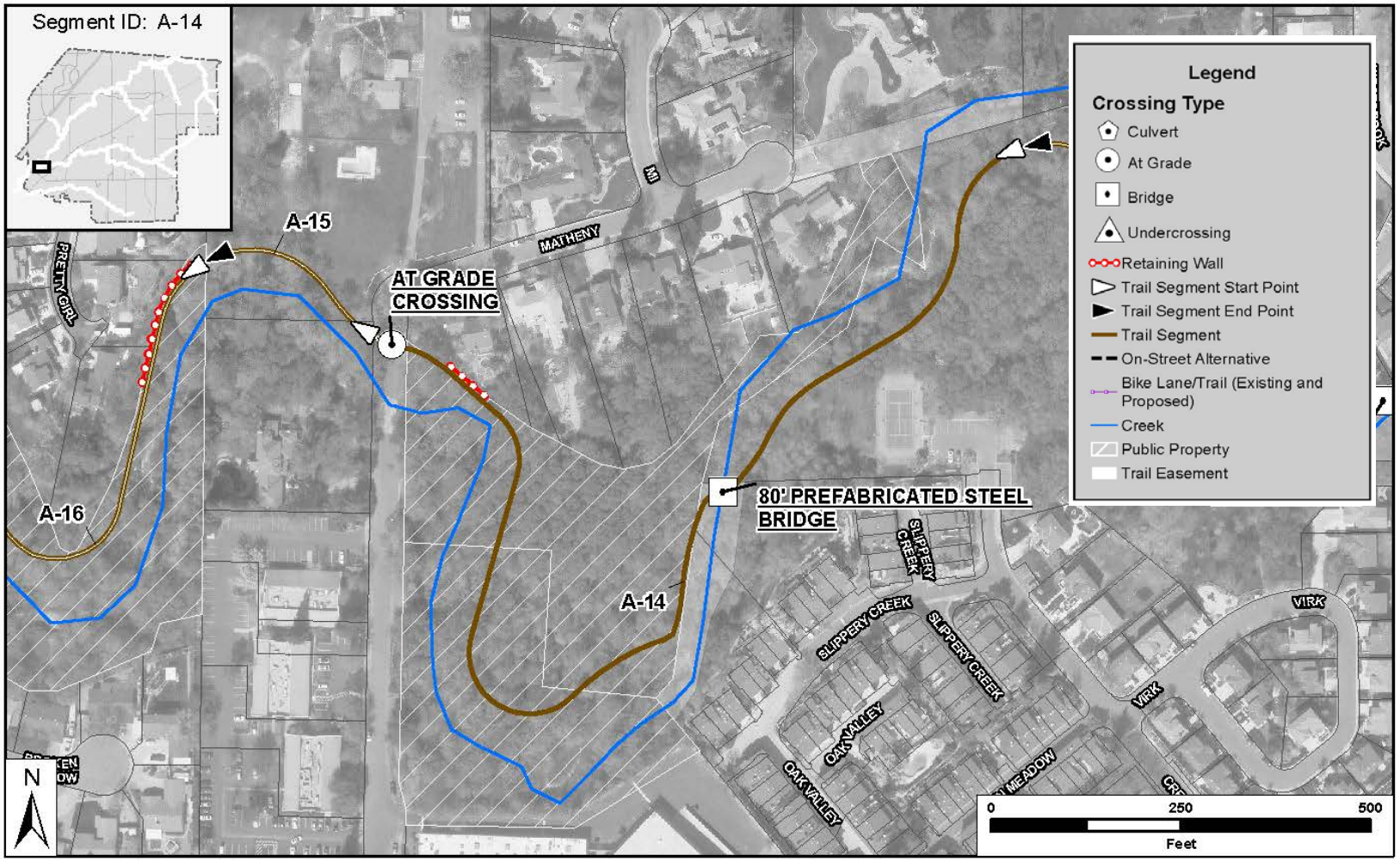
8.13.4 Additional Technical Studies

It is anticipated that the following additional technical studies will be completed during the Project Approval/Environmental Document and Design Phases of this project.

- Environmental Studies
    - Biological Assessment (BA)
    - Noise Technical Memorandum
    - Air Quality Technical Memorandum

    - Wetland Delineation
    - Natural Environment Study (NES)
    - Visual Resources – Technical Memorandum
    - Land Use and Community Impact – Technical Memorandum
- Geotechnical Analysis
- Hydrology/Hydraulic Analysis – Location Hydraulic Study
- Storm Water Pollution Prevention Plan
- Geomorphology Study

8.14 Segment A14



Subwatershed: Arcade Creek	Segment ID: A14	Start: Matheny Way cul-de-sac, E. end	End: Matheny Way
LF Creek/Trail: 1953'/1735'	Number of Road Crossings: 0	Implementation Priority: 2	No. Potential Creek Crossings: 1

8.14.1 Preliminary Cost Estimate

Table 25 below shows a planning-level cost estimate for the recommended alignment as presented in this document. The costs do not include annual maintenance costs. The estimate is in year 2013 USD.

Table 25 – Preliminary Cost Estimate Segment A14

	Element	Costs x $1,000	Costs x $1,000
Construction	*Trail*	*266*	
	Structures	*192*	
	Mobilization (10%)	*28*	
	Contingency (20%)	*42*	
	Sub-Total Construction		**528**
Other Costs	Utility Relocations	5	
	Right of Way/Easements	57	
	Environmental Document (10%)	53	
	PS&E (10%)	53	
	Construction Management (12%)	64	
	Inspection/Testing (3%)	16	
	Administrative (3%)	16	
	Sub-Total Other		**264**
TOTAL COSTS			**792**

8.14.2 Design Elements

8.14.2.1 Trails

The recommended alignment starts on the south side of the creek and transfers to the north side over a proposed bridge across Arcade creek and ends at a proposed at-grade crossing of Matheny Way, north of the existing Arcade Creek Bridge. Along this segment of the trail the left bank offers more trail opportunities due to corridor width and topography; however, public ownership is on right bank; therefore, preferred alignment is on the right. One bridge is anticipated to accomplish a northern alignment. It may be desirable to provide trail connection to the neighboring residential neighborhood and commercial buildings.

The proposed trail lies within private and publicly owned property, requiring right of way acquisition or easements for the trail through the privately owned property.

8.14.2.2 Creek Crossings

A bridge crossing is required to switch the alignment from the south to the north side of the creek where the property is publicly owned. It is anticipated that bridge will be approximately 80 feet in length and will be a pre-fabricated steel bridge.

8.14.2.3 Road Crossings

An unsignalized at-grade crossing is proposed at Matheny Way due to the relatively low traffic volumes and good sight distance at this location. Regulatory signs will be placed on the approach to Matheny Way requiring travel users to stop and restricting vehicle access. It is not feasible to use the existing

bridge structure to accommodate a trail undercrossing due to the restricted vertical clearance.

8.14.2.4 Access Areas and Amenities

Access to this segment is via the upstream trail and Matheny Way. Although Matheny Way is too narrow at this time for on-street parking, trail users could potentially use the public parking at the shopping center located at Auburn Boulevard and Greenback Lane. Trail amenities would be limited to directional, warning and rules signs.

8.14.2.5 Visual Screening

Although much of this trail segment is in public open space, the potential alignment does come close to several residential backyards on the north bank. Visual screening would be appropriate in those locations. Space appears to be sufficient for a vegetated buffer planting.

8.14.2.6 Access Control

As with screening, fence upgrades may be needed between the trail and residential backyards in two or three locations. Residents should be consulted on their needs and desires.

8.14.2.7 Signage

Regulatory and guidance signs will be placed at quarter mile intervals along the trail. Weight limitation warning signs and other regulatory will be placed on either side of all bridges crossing the creek.

8.14.2.8 Retaining Walls

Retaining walls are anticipated on the approach to the undercrossing of Auburn Boulevard. It is anticipated that retaining walls will also be required in the vicinity of the proposed bridge crossing where the area is constrained between the property boundaries and the creek.

8.14.3 Environmental Compliance

Due to the potential for the bridge to impact on the creek, and the need for rip-rap to protect the abutments, the following permits are anticipated to be required for this segment of the trail:

- RWQCB – Section 401 Water Quality Certification and NPDES Permit
- CDFW – Section 1602 Streambed Alteration Agreement
- ACOE – Section 404 Nationwide Permit

If sensitive species such as elderberry are present, consultation with the USFWS under Section 7 of the Endangered Species Act would be necessary.

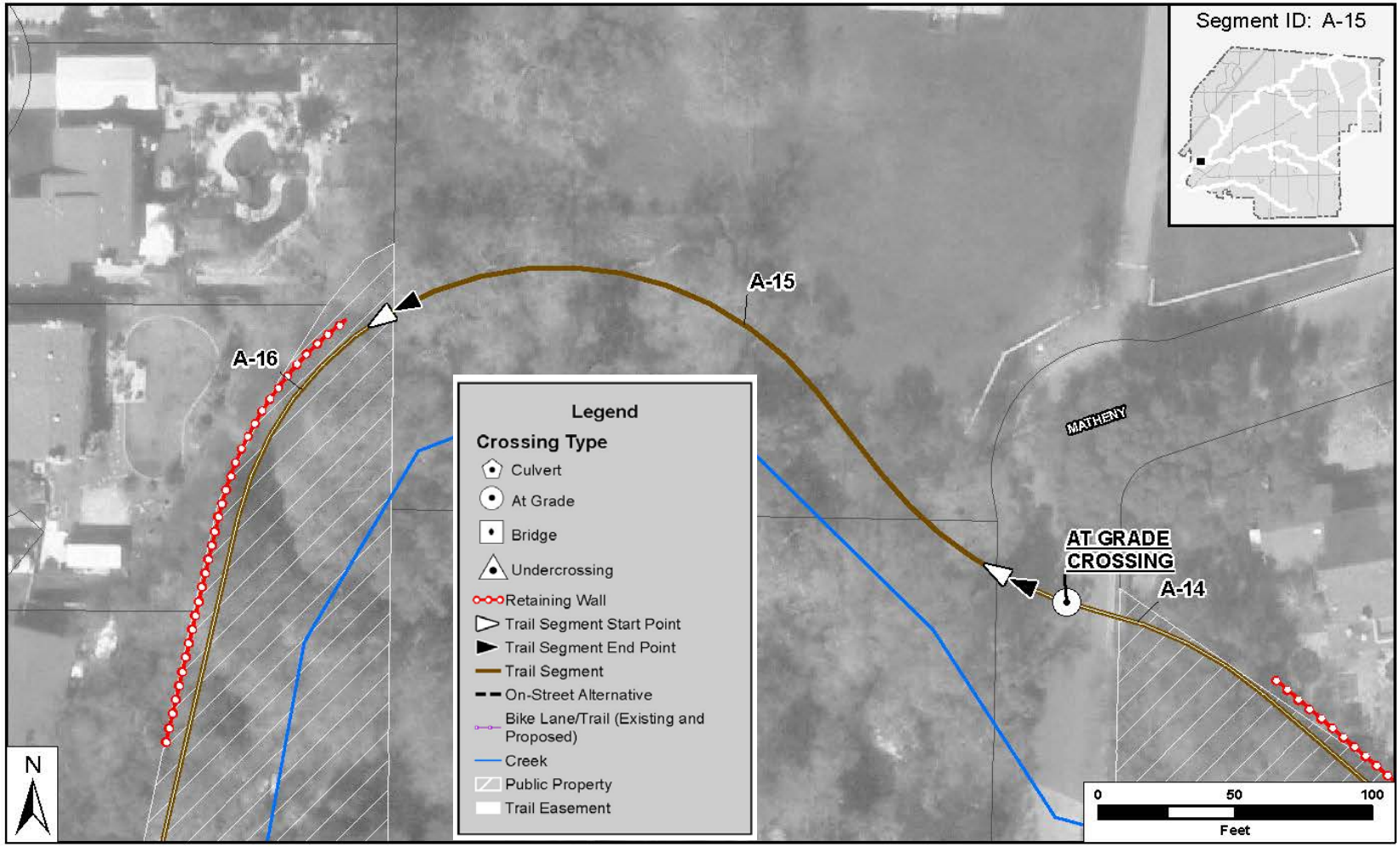
8.14.4 Additional Technical Studies

It is anticipated that the following additional technical studies will be completed during the Project Approval/Environmental Document and Design Phases of this project.

- Environmental Studies
    - Biological Assessment (BA)
    - Noise Technical Memorandum
    - Air Quality Technical Memorandum
    - Wetland Delineation
    - Natural Environment Study (NES)
    - Visual Resources – Technical Memorandum
    - Land Use and Community Impact – Technical Memorandum
- Geotechnical Analysis

- Hydrology/Hydraulic Analysis – Location Hydraulic Study
- Storm Water Pollution Prevention Plan

8.15 Segment A15



Subwatershed: Arcade Creek	Segment ID: A15	Start: Matheny Way	End: Matheny Way Park Site, E. boundary
LF Creek/Trail: 323'/272'	Number of Road Crossings: 0	Implementation Priority: 2	No. Potential Creek Crossings: 0

8.15.1 Preliminary Cost Estimate

Table 26 below shows a planning-level cost estimate for the recommended alignment as presented in this document. The costs do not include annual maintenance costs. The estimate is in year 2013 USD.

Table 26 – Preliminary Cost Estimate Segment A15

	Element	Costs x $1,000	Costs x $1,000
Construction	*Trail*	*88*	
	Structures	*0*	
	Mobilization (10%)	*9*	
	Contingency (20%)	*14*	
	Sub-Total Construction		**111**
Other Costs	*Utility Relocations*	*5*	
	Right of Way/Easements	*28*	
	Environmental Document (10%)	*12*	
	PS&E (10%)	*12*	
	Construction Management (12%)	*14*	
	Inspection/Testing (3%)	*4*	
	Administrative (3%)	*4*	
	Sub-Total Other		**79**
TOTAL COSTS			**190**

8.15.2 Design Elements

8.15.2.1 Trails

The recommended alignment runs north of the creek for this short segment. Locating a trail in this reach would require purchase of land or easements. Both sides of creek are privately owned. Corridor width and topography are adequate. Natural resource limitations are not significant.

The proposed trail lies entirely within privately owned property, requiring right of way acquisition or easements for the trail.

8.15.2.2 Creek Crossings

No bridge crossings are anticipated along this segment.

8.15.2.3 Road Crossings

No roadway crossings occur along this segment.

8.15.2.4 Access Areas and Amenities

Access to this segment is via Matheny Way and the future Matheny Way park site. Specific improvements have not been identified for this park, so future amenities are unknown at this time. At minimum, amenities should include directional, warning and rules signage.

8.15.2.5 Visual Screening

No visual screening is anticipated, though design of the park site should consider views into the park from the surrounding residences.

8.15.2.6 Access Control

Access control is not anticipated beyond that provided for the future park site.

8.15.2.7 Signage

Regulatory and guidance signs will be placed at quarter mile intervals along the trail.

8.15.2.8 Retaining Walls

Retaining walls are not anticipated along this segment.

8.15.3 Environmental Compliance

The following permits are anticipated to be required for this segment of the trail:

- RWQCB - NPDES Permit

8.15.4 Additional Technical Studies

It is anticipated that the following additional technical studies will be completed during the Project Approval/Environmental Document and Design Phases of this project.

- Environmental Studies
  - Biological Assessment (BA)
  - Noise Technical Memorandum
  - Air Quality Technical Memorandum
  - Wetland Delineation
  - Natural Environment Study (NES)
  - Visual Resources – Technical Memorandum
  - Land Use and Community Impact – Technical Memorandum
- Geotechnical Analysis
- Hydrology/Hydraulic Analysis
- Storm Water Pollution Prevention Plan

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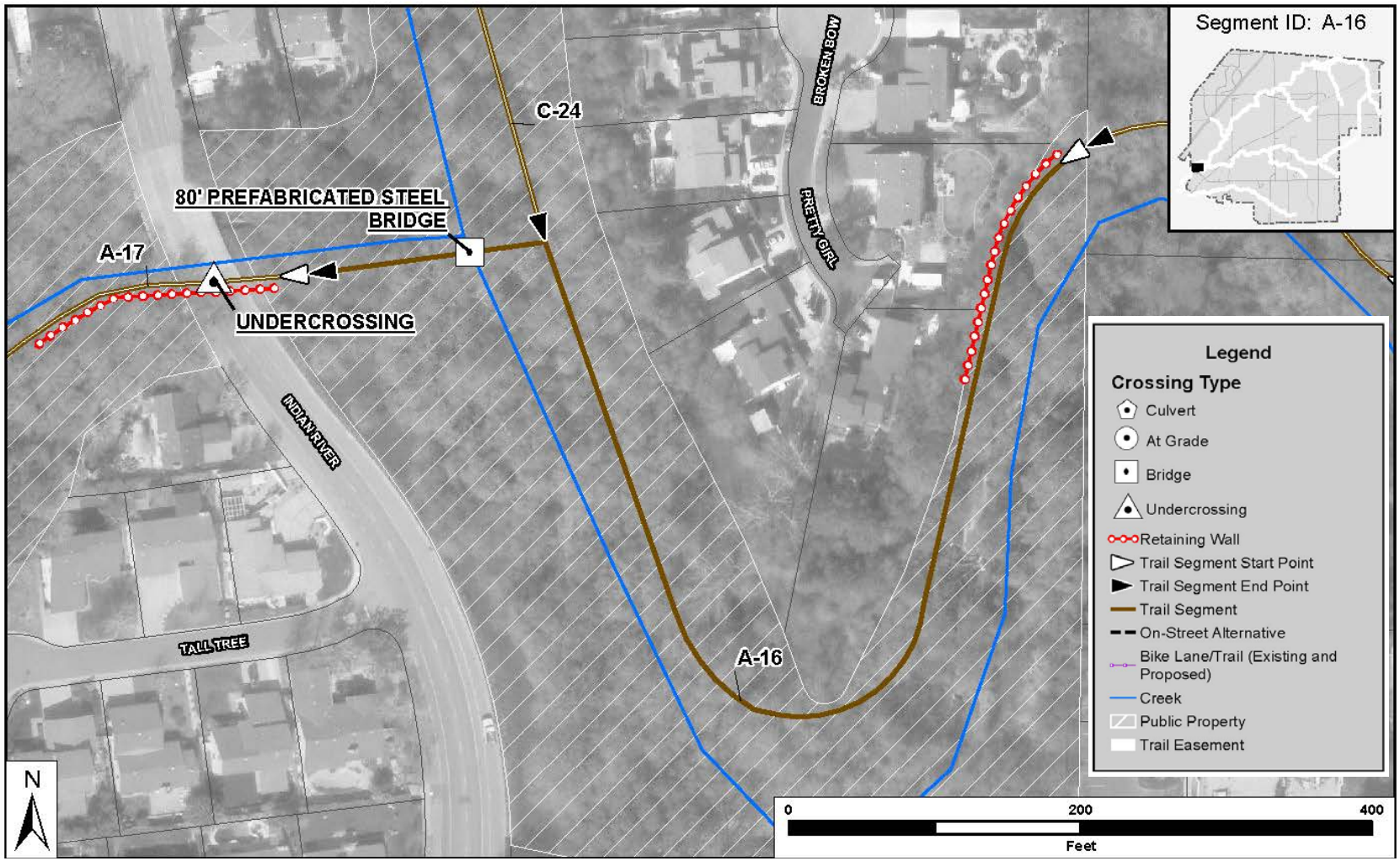
8.16 Segment A16



Subwatershed: Arcade Creek	Segment ID: A16	Start: Matheny Way Park Site, E. boundary	End: Confluence with Cripple Creek
LF Creek/Trail: 987'/1017'	Number of Road Crossings: 0	Implementation Priority: 2	No. Potential Creek Crossings: 1

8.16.1 Preliminary Cost Estimate

Table 27 below shows a planning-level cost estimate for the recommended alignment as presented in this document. The costs do not include annual maintenance costs. The estimate is in year 2013 USD.

Table 27 – Preliminary Cost Estimate Segment A16

	Element	Costs x $1,000	Costs x $1,000
Construction	*Trail*	*290*	
	Structures	*192*	
	Mobilization (10%)	*30*	
	Contingency (20%)	*46*	
	Sub-Total Construction		**558**
Other Costs	*Utility Relocations*	*5*	
	Right of Way/Easements	*-*	
	Environmental Document (10%)	*56*	
	PS&E (10%)	*56*	
	Construction Management (12%)	*67*	
	Inspection/Testing (3%)	*17*	
	Administrative (3%)	*17*	
	Sub-Total Other		**218**
TOTAL COSTS			**776**

8.16.2 Design Elements

8.16.2.1 Trails

The recommended alignment starts at the Matheny Park eastern boundary and initially stays on the north side of the creek but transfers to the south side via a proposed bridge structure. Property is owned and managed by SRPD. Corridor width ranges from 200 to 300 feet. Topographic constraints are minimal. Alignment could occur on either side, though impacts to riparian vegetation would be lesser on the left bank. A left bank alignment would also take advantage of open space access paralleling Indian River Drive with potential for on-street parking and provide an opportunity for an overlook, but it would also require an additional bridge over the creek. The Matheny Way Park Site is a future open space park in SRPD's Master Plan. This park would include trails and passive recreation opportunities consistent with a Class I trail system in this area. The trail in this reach would connect into a Cripple Creek trail system.

The proposed trail lies entirely within publicly owned property and therefore no right of way or easement costs are anticipated.

8.16.2.2 Creek Crossings

It is anticipated that one bridge crossing will be required to bring the alignment from the right bank to the left bank before proceeding downstream via the undercrossing at Indian River Drive that is part of segment A17. This bridge will be a pre-fabricated steel bridge with an approximate span length of 80 feet.

8.16.2.3 Road Crossings

No roadway crossings occur along this segment.

8.16.2.4 Access Areas and Amenities

Access to this segment will be through the future Matheny Park site and along Indian River Drive. On-street parking is available on Indian River Drive. Due to the ease of access and the available parking, additional amenities might be located here to complement those at Matheny Park, including interpretive signage, kiosk and creek overlook.

8.16.2.5 Visual Screening

Visual screening may be needed adjacent to backyards along Pretty Girl Court. Space should be sufficient for a vegetated buffer, however, a solid fence could be considered if additional access control was needed.

8.16.2.6 Access Control

As with screening, fence upgrades may be needed along the Pretty Girl Court backyards. If additional control was desired, native blackberry and rose could supplement fencing as part of the screening.

8.16.2.7 Signage

Guidance/directional signs will be placed at the confluence point. Regulatory and guidance signs will be placed at quarter mile intervals along the trail. Weight limitation warning signs and other regulatory will be placed on either side of all bridges crossing the creek.

8.16.2.8 Retaining Walls

Retaining walls are anticipated for portions of this segment where existing terrain and constrained areas occur.

8.16.3 Environmental Compliance

Due to the potential for the bridge to impact on the creek, and the need for rip-rap to protect the abutments, the following permits are anticipated to be required for this segment of the trail:

- RWQCB - Section 401 Water Quality Certification and NPDES Permit
- CDFW - Section 1602 Streambed Alteration Agreement
- ACOE – Section 404 Nationwide Permit

If sensitive species such as elderberry are present, consultation with the USFWS under Section 7 of the Endangered Species Act would be necessary.

8.16.4 Additional Technical Studies

It is anticipated that the following additional technical studies will be completed during the Project Approval/Environmental Document and Design Phases of this project.

- Environmental Studies
  - Biological Assessment (BA)
  - Noise Technical Memorandum
  - Air Quality Technical Memorandum
  - Wetland Delineation
  - Natural Environment Study (NES)
  - Visual Resources – Technical Memorandum
  - Land Use and Community Impact – Technical Memorandum
- Geotechnical Analysis
- Hydrology/Hydraulic Analysis – Location Hydraulic Study
- Storm Water Pollution Prevention Plan

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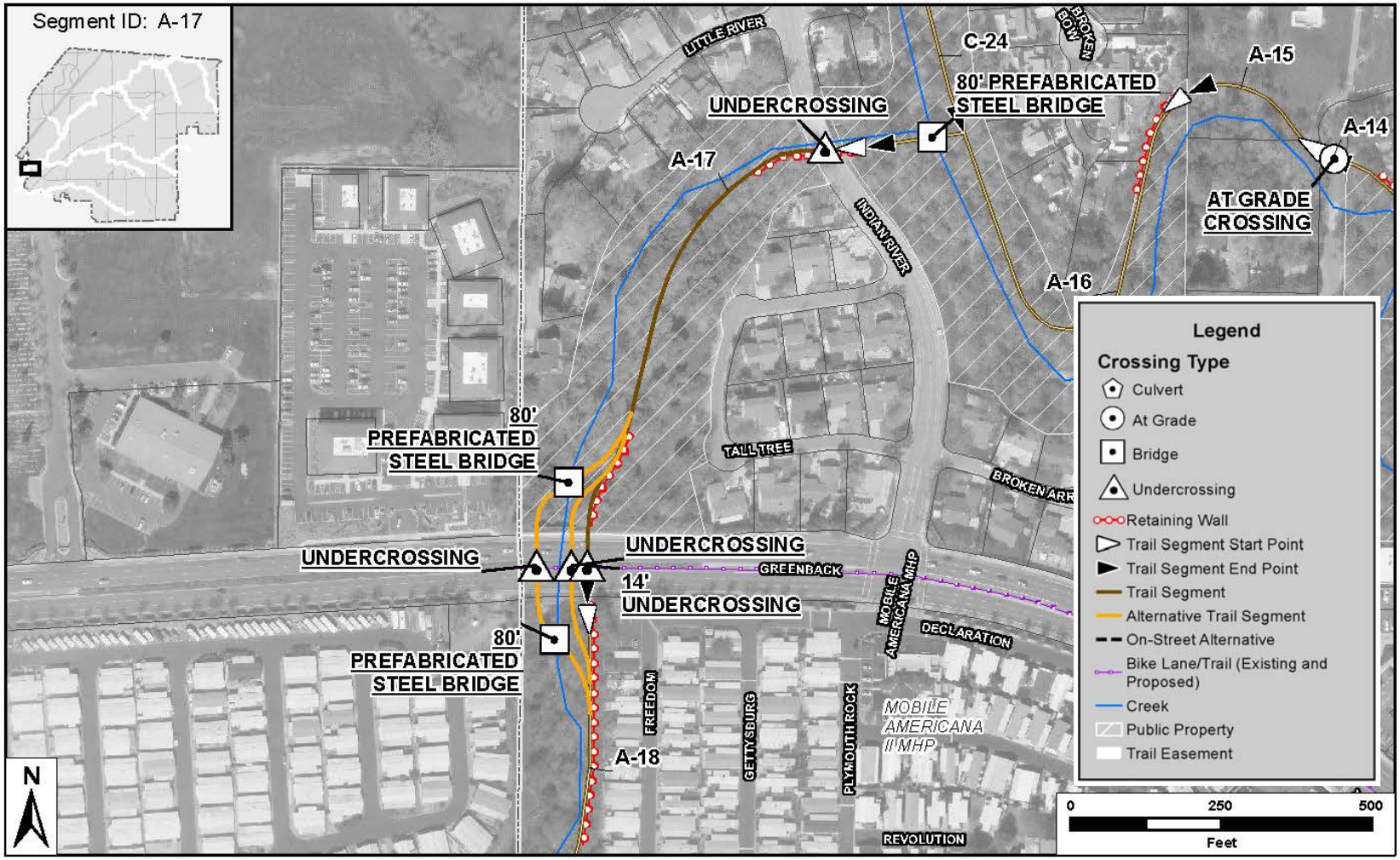
8.17 Segment A17



Subwatershed: Arcade Creek	Segment ID: A17	Start: Confluence with Cripple Creek	End: Greenback Lane
LF Creek/Trail: 1073'/1005'	Number of Road Crossings: 2	Implementation Priority: 2	No. Potential Creek Crossings: 0

8.17.1 Preliminary Cost Estimate

Table 28 below shows a planning-level cost estimate for the recommended alignment as presented in this document. The costs do not include annual maintenance costs. The estimate is in year 2013 USD.

Table 28 – Preliminary Cost Estimate Segment A17

	Element	Costs x $1,000	Costs x $1,000
Construction	*Trail*	*664*	
	Structures	*0*	
	Mobilization (10%)	*70*	
	Contingency (20%)	*105*	
	Sub-Total Construction		**839**
Other Costs	*Utility Relocations*	*11*	
	Right of Way/Easements	*-*	
	Environmental Document (10%)	*84*	
	PS&E (10%)	*84*	
	Construction Management (12%)	*101*	
	Inspection/Testing (3%)	*26*	
	Administrative (3%)	*26*	
	Sub-Total Other		**332**
TOTAL COSTS			**1,171**

8.17.2 Design Elements

8.17.2.1 Trails

The recommended alignment starts at the confluence of Cripple Creek and Arcade Creek and runs along the south side of the creek crossing under Indian River Drive and Greenback Lane with the existing bridge structures. Property in this reach is owned by SRPD. Steep grades on right bank and proximity of existing residential structures favor left bank for trail alignment. There are few constraints on left side. Corridor width is around 200 feet. Impacts to mature riparian vegetation should be avoidable. Greenback Lane crossing presents challenges.

The proposed trail lies entirely within publicly owned property and therefore no right of way or easement costs are anticipated.

8.17.2.2 Creek Crossings

It is possible to construct two pre-fabricated steel bridge across Arcade Creek to allow trail use on both sides of the existing undercrossing, facilitating traffic in both directions. The span length for these bridges is estimated to be 80 feet. A preferred option will be to widen the existing eastern opening to accommodate the trail, avoiding the double crossing of the creek and providing a safer, wider trail undercrossing.

8.17.2.3 Road Crossings

The recommended trail alignment will pass under the existing Indian River Drive bridge on the south side of the creek. It is anticipated that some excavation and retaining walls will be required to provide the required vertical clearance but remain above the low flow elevation. The recommended trail alignment will pass under the existing Greenback Lane bridge

by constructing a 14 foot wide box culvert on the eastern side or using the two existing 6 foot x 10 foot box culverts on both sides of the creek. It is anticipated that retaining walls will be required for the undercrossing and for the access paths up to Greenback Lane.

8.17.2.4 Access Areas and Amenities

Access to this segment occurs from on-street parking on Indian River Drive, on-street parking on Tall Tree Court, and Greenback Lane. No additional amenities are anticipated beyond trail signage.

8.17.2.5 Visual Screening

Visual screening is not anticipated to be needed. Only two residences have backyards in the vicinity of the proposed trail, and existing vegetation in those areas is dense.

8.17.2.6 Access Control

Additional access control beyond that provided by existing vegetation is not anticipated. If residences desire additional screening or access control, additional native riparian vegetation can be incorporated into detailed plan development.

8.17.2.7 Signage

Guidance/directional signs will be placed at Indian River Drive and Greenback Lane. Regulatory signage for trail users would be placed on the access ramps at the approach to Indian River Drive and Greenback Lane requiring bicycle users to stop. Clearance warning signs will be installed at the entrance to the Greenback Lane undercrossing. Regulatory and guidance signs will be placed at quarter mile intervals along the trail. Weight limitation warning signs and other regulatory will be placed on either side of all bridges crossing the creek.

8.17.2.8 Retaining Walls

Retaining walls are anticipated on the approach to the undercrossing of Indian River Drive and Greenback Lane. It is anticipated that retaining walls and cut off walls will be required under the existing Indian River Drive bridge structure to protect the integrity of the trail and the existing bridge abutments.

8.17.3 Environmental Compliance

Due to the potential for the bridge and stabilizing rip-rap associated with abutments upstream of Greenback Lane to impact Waters of the U.S., the following permits are anticipated to be required for this segment of the trail:

- RWQCB - Section 401 Water Quality Certification and NPDES Permit
- CDFW - Section 1602 Streambed Alteration Agreement
- ACOE – Section 404 Nationwide Permit

If sensitive species such as elderberry are present, consultation with the USFWS under Section 7 of the Endangered Species Act would be necessary.

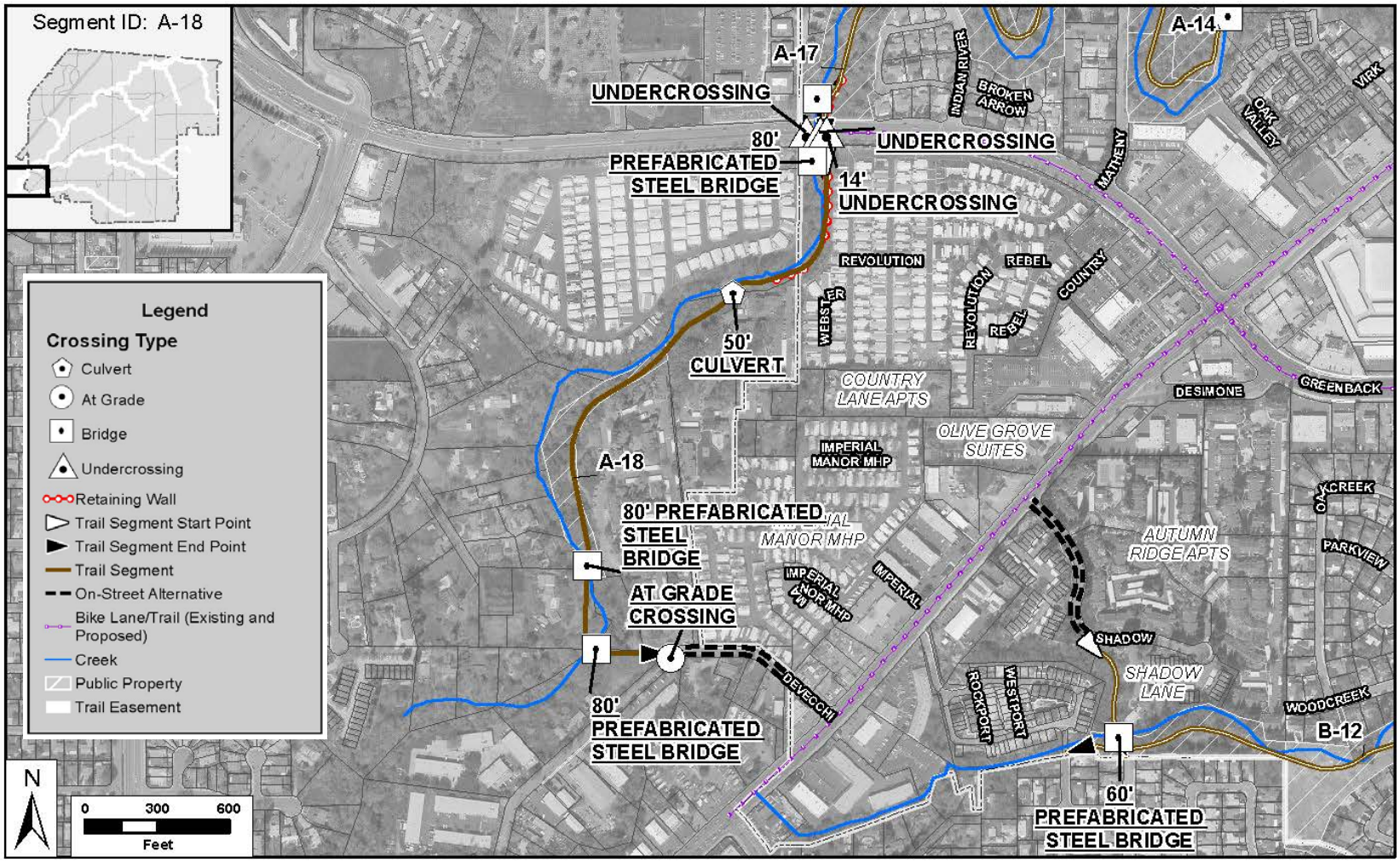
8.17.4 Additional Technical Studies

It is anticipated that the following additional technical studies will be completed during the Project Approval/Environmental Document and Design Phases of this project.

- Environmental Studies
  - Biological Assessment (BA)
  - Noise Technical Memorandum
  - Air Quality Technical Memorandum
  - Wetland Delineation
  - Natural Environment Study (NES)

    - Visual Resources – Technical Memorandum
    - Land Use and Community Impact – Technical Memorandum
- Geotechnical Analysis
- Hydrology/Hydraulic Analysis – Location Hydraulic Study
- Storm Water Pollution Prevention Plan

8.18 Segment A18



Subwatershed: Arcade Creek	Segment ID: A18	Start: Greenback Lane	End: Devecchi Avenue/ Rosebud Lane
LF Creek/Trail: 1185'/2980'	Number of Road Crossings: 0	Implementation Priority: 3	No. Potential Creek Crossings: 3

8.18.1 Preliminary Cost Estimate

Table 29 below shows a planning-level cost estimate for the recommended alignment as presented in this document. The costs do not include annual maintenance costs. The estimate is in year 2013 USD.

Table 29 – Preliminary Cost Estimate Segment A18

	Element	Costs x $1,000	Costs x $1,000
Construction	*Trail*	*880*	
	Structures	*384*	
	Mobilization (10%)	*92*	
	Contingency (20%)	*139*	
	Sub-Total Construction		**1,495**
Other Costs	*Utility Relocations*	*11*	
	Right of Way/Easements	*195*	
	Environmental Document (10%)	*150*	
	PS&E (10%)	*150*	
	Construction Management (12%)	*180*	
	Inspection/Testing (3%)	*45*	
	Administrative (3%)	*45*	
	Sub-Total Other		**776**
TOTAL COSTS			**2,271**

8.18.2 Design Elements

8.18.2.1 Trails

The recommended alignment follows the south side of Arcade Creek from Greenback Lane and runs between the creek and the apartment complex to the south. Near the west end of the segment the alignment crosses from the south to the north side of the creek and back again via two bridges, to avoid impacts to private properties. Private property through two medium density residential complexes would require easement. Corridor width is generally adequate. Topography generally feasible, but steep areas near Greenback may require retaining walls. Existing informal trails exist in this reach. Connection to Brooktree Creek may require bridges and easement connecting to Devecchi Avenue. A significant portion of this segment is outside the City limits and coordination will be required with Sacramento County. The segment is shown in the Sacramento County Bicycle Master Plan.

The proposed trail lies within private and publicly owned property, requiring right of way acquisition or easements for the trail through the privately owned property.

8.18.2.2 Creek Crossings

It is proposed to construct a pre-fabricated concrete box culvert over the existing drainage channel located west of Greenback Lane. The approximate length of the culvert will be 30 feet. There are two creek crossings proposed for the recommended alignment toward the west end of this segment. The span lengths for these bridges are estimated to be 80 feet.

8.18.2.3 Road Crossings

There are no roadway crossings within this segment. The segment terminates at Devecchi Avenue where the trail users will merge into Class 3 bike lanes on Devecchi Avenue. New curb, gutter and sidewalk are proposed along the east side of Devecchi Avenue to provide connectivity to Auburn Boulevard.

8.18.2.4 Access Areas and Amenities

Access to this segment will occur from Greenback Lane and Devecchi Avenue. Neither of these roads has on-street parking. Amenities will be limited to trail signage.

8.18.2.5 Visual Screening

The trail in this segment comes close to a number of residences along Freedom Lane, Webster Lane, Imperial Lane and streets internal to Hidden Oaks Apartments. In some areas, room for a vegetated buffer is quite narrow. It is likely that both fencing and vegetation will be needed in various areas to adequately screen adjacent residences. Input from neighboring residents should be sought when developing detailed plans to determine appropriate levels and treatments for screening.

8.18.2.6 Access Control

As with screening, different levels of access control will likely be desired for this segment, provided easements can be secured. Resident input should be solicited as to the desired level of access control. Due to space constraints, fencing is likely the better solution in this area.

8.18.2.7 Signage

Guidance/directional signs will be placed at Devecchi Avenue. Clearance warning signs will be installed at the entrance to the Greenback Lane undercrossing. Regulatory signage for trail users would be placed on the access ramps at the approach to Greenback Lane and at the start of the trail at Devecchi Avenue requiring bicycle users to stop. Regulatory and guidance signs will be placed at quarter mile intervals along the trail. Weight limitation warning signs and other regulatory will be placed on either side of all bridges crossing the creek.

8.18.2.8 Retaining Walls

Retaining walls are anticipated on the approach to the undercrossing of Greenback Lane and on the access paths up to Greenback Lane. West of Greenback Lane the recommended alignment passes through a very confined area for approximately 200 feet that will require a retaining wall and cut-off wall. Rock slope protection will be required at the bridge abutments.

8.18.3 Environmental Compliance

Due to the potential for the bridge and stabilizing rip-rap associated with abutments downstream of Greenback Lane to impact Waters of the U.S., the following permits are anticipated to be required for this segment of the trail:

- RWQCB - Section 401 Water Quality Certification and NPDES Permit
- CDFW - Section 1602 Streambed Alteration Agreement
- ACOE – Section 404 Nationwide Permit

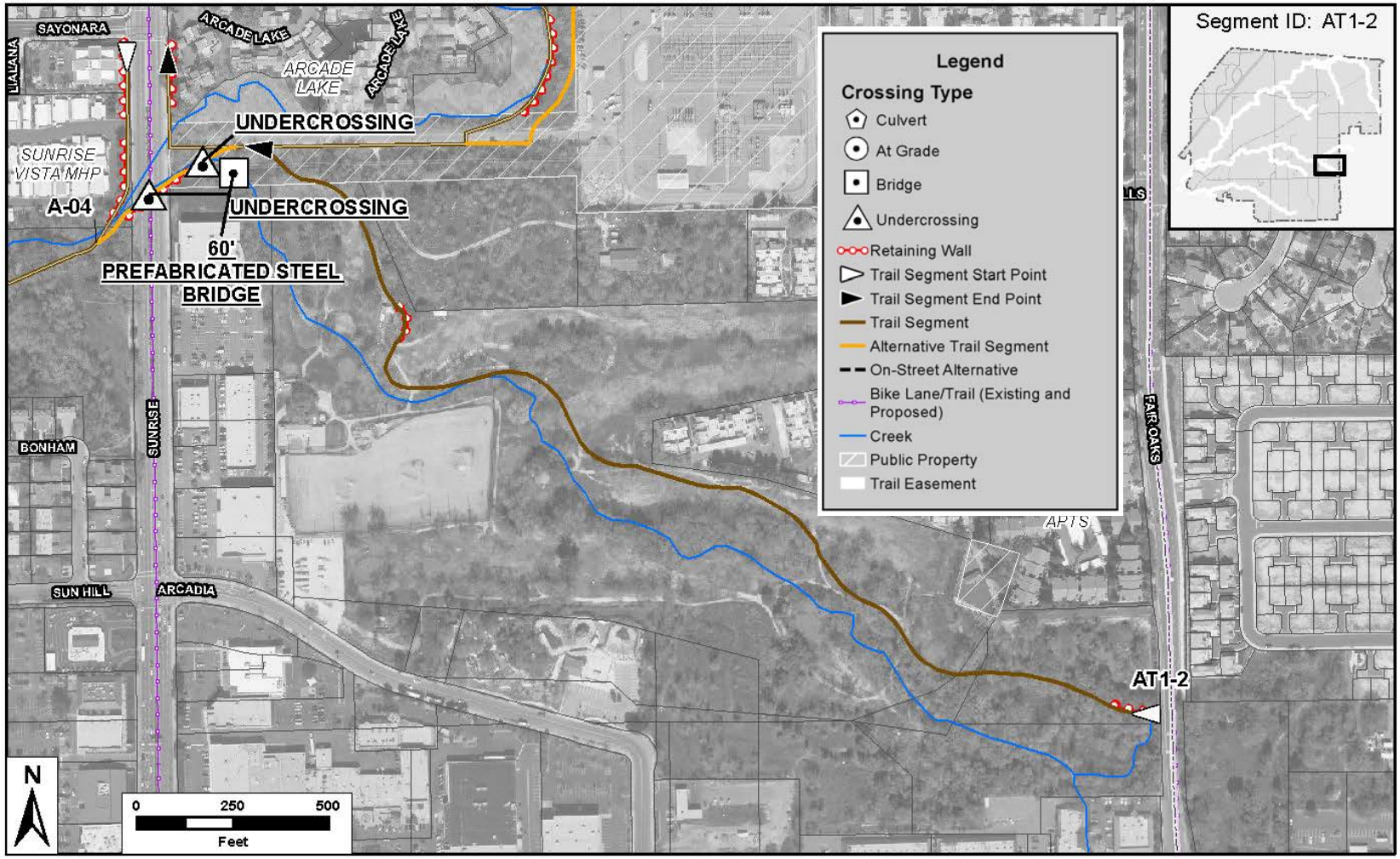
If sensitive species are present, consultation with the USFWS under Section 7 of the Endangered Species Act would be necessary

8.18.4 Additional Technical Studies

It is anticipated that the following additional technical studies will be completed during the Project Approval/Environmental Document and Design Phases of this project.

- Environmental Studies
  - Biological Assessment (BA)
  - Noise Technical Memorandum
  - Air Quality Technical Memorandum
  - Wetland Delineation
  - Natural Environment Study (NES)
  - Visual Resources – Technical Memorandum
  - Land Use and Community Impact – Technical Memorandum
- Geotechnical Analysis
- Hydrology/Hydraulic Analysis – Location Hydraulic Study
- Storm Water Pollution Prevention Plan

8.19 Segment AT1-2



Subwatershed: Arcade Creek	Segment ID: AT1-2	Start: Fair Oaks Boulevard	End: Confluence with main stem of Arcade Creek
LF Creek/Trail: 3819'/3305'	Number of Road Crossings: 0	Implementation Priority: 2	No. Potential Creek Crossings: 1

8.19.1 Preliminary Cost Estimate

Table 30 below shows a planning-level cost estimate for the recommended alignment as presented in this document. The costs do not include annual maintenance costs. The estimate is in year 2013 USD.

Table 30 – Preliminary Cost Estimate Segment AT1-2

	Element	Costs x $1,000	Costs x $1,000
Construction	*Trail*	*467*	
	Structures	*144*	
	Mobilization (10%)	*49*	
	Contingency (20%)	*74*	
	Sub-Total Construction		**734**
Other Costs	*Utility Relocations*	*11*	
	Right of Way/Easements	*35*	
	Environmental Document (10%)	*74*	
	PS&E (10%)	*74*	
	Construction Management (12%)	*89*	
	Inspection/Testing (3%)	*23*	
	Administrative (3%)	*23*	
	Sub-Total Other		**329**
TOTAL COSTS			**1,063**

8.19.2 Design Elements

8.19.2.1 Trails

The recommended alignment will initially start on the north side of the creek tributary and cross over to the south side via a proposed bridge. The final alignment will be highly dependent on discussions with the property owner and future plans for the existing golf course. The segment starts at Fair Oaks Boulevard and ends at the connection to the main trail just east of Sunrise Boulevard. There are also possibilities of additional access connections to Arcadia Drive to the south, depending on the final alignment. This reach flows through private property under a single ownership. Existing uses include a golf course, which has cleared areas that would minimize trail impacts on native vegetation. This area has informal trails throughout. Corridor is wide, 400+ feet, and generally flat. This may allow placement of the trail further away from the creek and/or incorporating mitigation for other trail segments in more constrained locations. Evidence was found of homeless encampments in this reach during fieldwork.

The proposed trail lies within private and publicly owned property, requiring right of way acquisition or easements for the trail through the privately owned property.

8.19.2.2 Creek Crossings

There is one crossing of the creek tributary proposed as part of the recommended alignment. The bridge is anticipated to be a pre-fabricated steel bridge with an approximate span length of 60 feet.

8.19.2.3 Road Crossings

There are no proposed road crossings within this segment.

8.19.2.4 Access Areas and Amenities

Upstream access is via Fair Oaks Boulevard, a Type A node. Downstream access is via Arcade Creek Park Preserve, a Type C node with parking, play and exercise equipment, interpretive & directional signage, kiosk, picnic equipment, parking lot, and other amenities. Additionally, access to the trail can be provided to commercial land uses along Greenback Lane.

8.19.2.5 Visual Screening

Since locating a trail in this segment requires negotiated access with the landowner, screening will need to conform to that required in the access agreement. While much of this area is in natural open space, the proposed trail will pass through a private golf course, and the owners may desire visual screening and access control between the trail users and golfers. Any trail development would need to consider ongoing golf course operations or future site developments.

8.19.2.6 Access Control

Fencing may be desired between the trail and the golf course. The golf course owner/manager should be consulted on access control requirements.

8.19.2.7 Signage

Guidance/directional signs will be placed at Fair Oaks Boulevard and at the connection point with the main Arcade Creek trail. Clearance warning signs will be installed at the entrance to the Fair Oaks Boulevard undercrossing. Regulatory signage for trail users would be placed on the access ramps at the approach to Fair Oaks Boulevard. Regulatory and guidance signs will be placed at quarter mile intervals along the trail.

8.19.2.8 Retaining Walls

Retaining walls are anticipated on the approach to the undercrossing of Fair Oaks Boulevard and on the access paths up to Fair Oaks Boulevard. Rock slope protection will be required at the bridge abutments.

8.19.3 Environmental Compliance

Due to the potential for the bridge and stabilizing rip-rap associated with abutments on the tributary to impact Waters of the U.S., the following permits are anticipated to be required for this segment of the trail:

- RWQCB - Section 401 Water Quality Certification and NPDES Permit
- CDFW - Section 1602 Streambed Alteration Agreement
- ACOE – Section 404 Nationwide Permit

If sensitive species such as elderberry are present, consultation with the USFWS under Section 7 of the Endangered Species Act would be necessary.

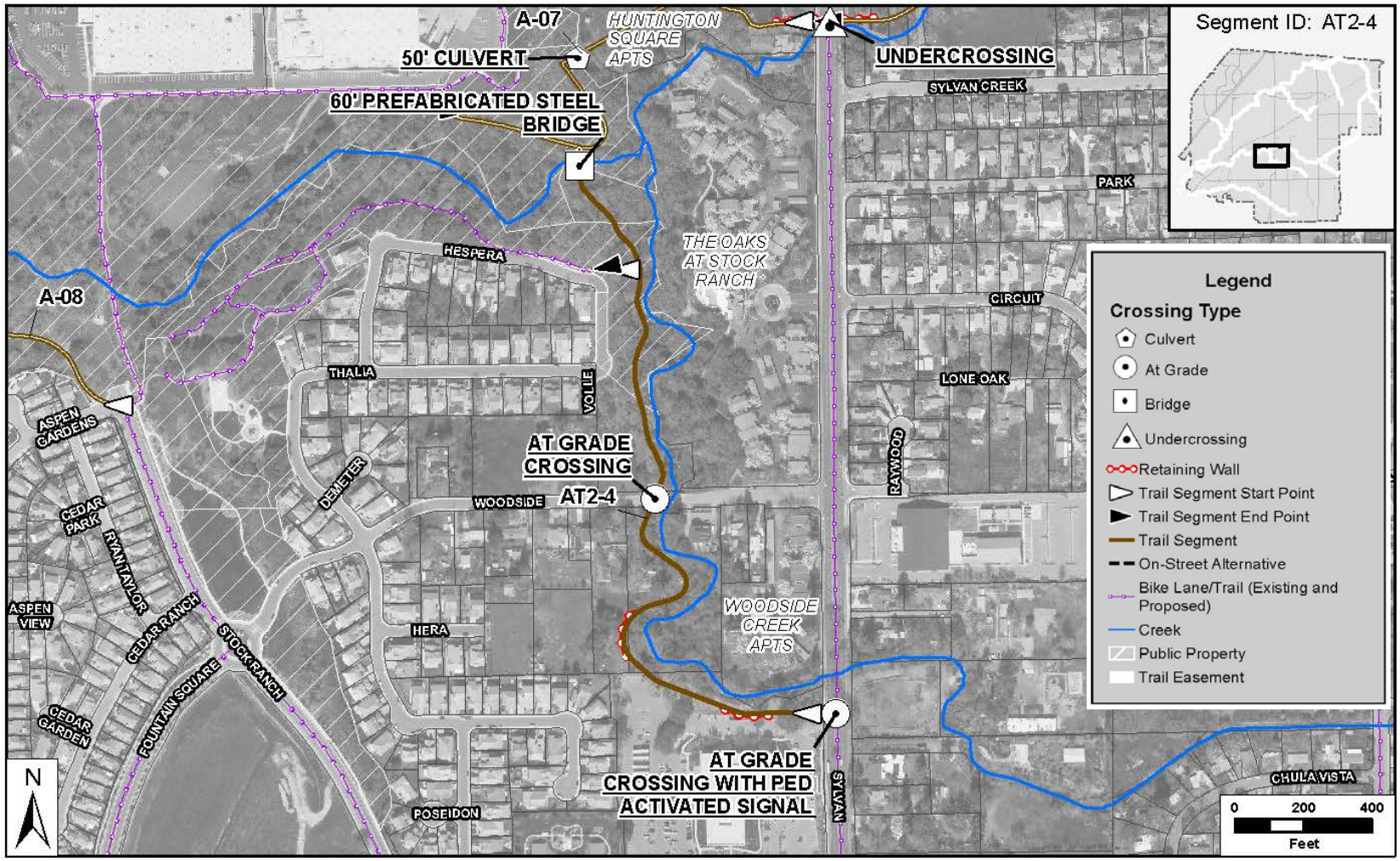
8.19.4 Additional Technical Studies

It is anticipated that the following additional technical studies will be completed during the Project Approval/Environmental Document and Design Phases of this project.

- Environmental Studies
    - Biological Assessment (BA)
    - Noise Technical Memorandum
    - Air Quality Technical Memorandum
    - Wetland Delineation
    - Natural Environment Study (NES)
    - Visual Resources – Technical Memorandum

    - Land Use and Community Impact – Technical Memorandum
- Geotechnical Analysis
- Hydrology/Hydraulic Analysis – Location Hydraulic Study
- Storm Water Pollution Prevention Plan

8.20 Segment AT2-4



Subwatershed: Arcade Creek	Segment ID: AT2-4	Start: Sylvan Road	End: Confluence with main stem
LF Creek/Trail: 2528'/2355'	Number of Road Crossings: 1	Implementation Priority: 2	No. Potential Creek Crossings: 1

8.20.1 Preliminary Cost Estimate

Table 31 below shows a planning-level cost estimate for the recommended alignment as presented in this document. The costs do not include annual maintenance costs. The estimate is in year 2013 USD.

Table 31 – Preliminary Cost Estimate Segment AT2-4

	Element	Costs x $1,000	Costs x $1,000
Construction	*Trail*	*429*	
	Structures	*144*	
	Mobilization (10%)	*45*	
	Contingency (20%)	*68*	
	Sub-Total Construction		**686**
Other Costs	*Utility Relocations*	*11*	
	Right of Way/Easements	*179*	
	Environmental Document (10%)	*69*	
	PS&E (10%)	*69*	
	Construction Management (12%)	*83*	
	Inspection/Testing (3%)	*21*	
	Administrative (3%)	*21*	
	Sub-Total Other		**453**
TOTAL COSTS			**1,139**

8.20.2 Design Elements

8.20.2.1 Trails

The recommended alignment will start at Sylvan Road and remain on the south side of the tributary, crossing over Woodside Drive as an at-grade crossing and continuing along the southwest side of the tributary. The alignment connects to the main Arcade Creek trail just south of the detention pond after crossing Arcade creek with a proposed pre-fabricated bridge. This reach passes through private property until it enters Stock Ranch Nature Preserve near its confluence with the main stem. Acquisition or easements from several owners will be needed. The corridor is wide with many informal trails north of Woodside Drive. Vegetation impacts could be moderate and require mitigation. Alignment would require easements or fee-title purchase. A steep cut bank south of Woodside may require armoring or a retaining wall. Topographic constraints are low, with the exception of the cut-bank area.

The proposed trail lies within private and publicly owned property, requiring right of way acquisition or easements for the trail through the privately owned property.

8.20.2.2 Creek Crossings

There is one crossing of the creek tributary proposed as part of the recommended alignment. The bridge is anticipated to be a pre-fabricated wooden or steel bridge with an approximate span length of 60 feet.

8.20.2.3 Road Crossings

An unsignalized at-grade crossing is proposed at Woodside Drive due to the relatively low traffic volumes and good sight

distance at this location. It is not feasible to use the existing bridge structure to accommodate a trail undercrossing due to the restricted vertical clearance.

8.20.2.4 Access Areas and Amenities

Access to this segment is from Sylvan Road on the east, Woodside Drive, and Stock Ranch Nature Preserve. Parking is available at Stock Ranch Nature Preserve. It is possible that limited shared parking could be negotiated from the office complex at Sylvan Road and Stock Ranch Road, if additional parking was desired. Without further improvement, on-street parking on Woodside Road is very limited or non-existent. Additional amenities available at Stock Ranch Nature Preserve include interpretive signage, picnic facilities and trails.

8.20.2.5 Visual Screening

Visual screening is not anticipated, but may be desired between the office complex and the trail. If so, a fence is probably a better solution than vegetation due to space constraints. The residential property on the west side of the creek at Woodside Drive may also want additional screening. In this case sufficient space is available for a vegetated screen.

8.20.2.6 Access Control

If access control is desired by the office complex, a low (3'-4') wrought iron or anodized aluminum fence should be installed, with gates for employee access to the trail system. Fencing at the residential property mentioned above may need upgrading to provide an effective barrier.

8.20.2.7 Signage

Guidance/directional signs will be placed at Sylvan Road and Woodside Dive and at the connection point with the main Arcade Creek trail. Regulatory signage for trail users would be placed on the approach to Woodside Drive and Sylvan Road requiring trail users to stop and restricting vehicle access. Regulatory and guidance signs will be placed at quarter mile intervals along the trail.

8.20.2.8 Retaining Walls

Retaining walls or bank stabilization is anticipated in the middle of the segment between Sylvan Road and Woodside Drive where the area between the creek and the property line is constrained. Rock slope protection will be required at the bridge abutments.

8.20.3 Environmental Compliance

Due to the potential for the bridge and stabilizing rip-rap associated with abutments within the Stock Ranch Nature Preserve to impact Waters of the U.S., the following permits are anticipated to be required for this segment of the trail:

- RWQCB - Section 401 Water Quality Certification and NPDES Permit
- CDFW - Section 1602 Streambed Alteration Agreement
- ACOE – Section 404 Nationwide Permit

If sensitive species such as elderberry are present, consultation with the USFWS under Section 7 of the Endangered Species Act would be necessary.

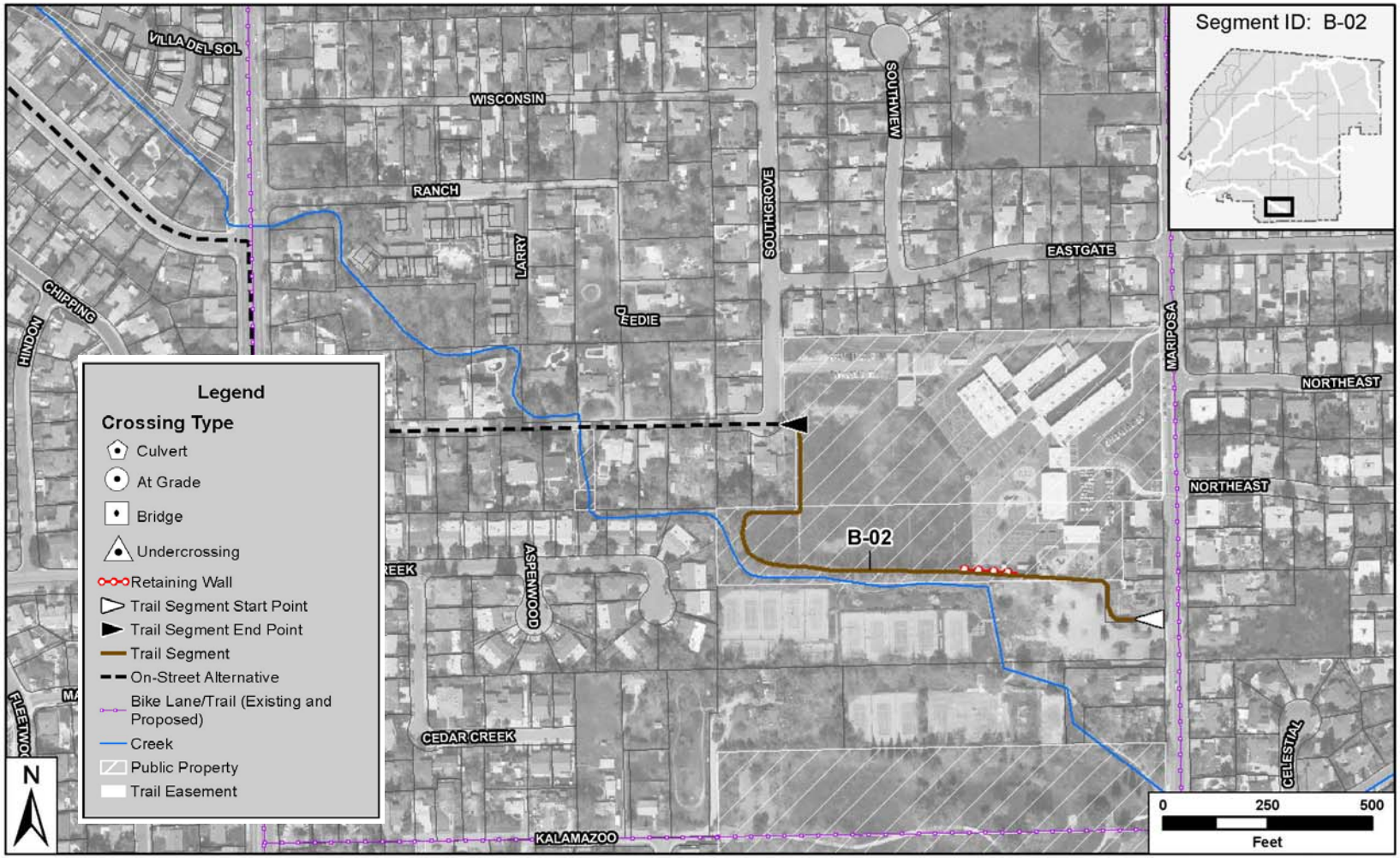
8.20.4 Additional Technical Studies

It is anticipated that the following additional technical studies will be completed during the Project Approval/Environmental Document and Design Phases of this project.

- Environmental Studies

    - Biological Assessment (BA)
    - Noise Technical Memorandum
    - Air Quality Technical Memorandum
    - Wetland Delineation
    - Natural Environment Study (NES)
    - Visual Resources – Technical Memorandum
    - Land Use and Community Impact – Technical Memorandum
- Geotechnical Analysis
- Hydrology/Hydraulic Analysis – Location Hydraulic Study
- Storm Water Pollution Prevention Plan

8.21 Segment B02



Subwatershed: Brooktree Creek	Segment ID: B02	Start: Mariposa Avenue	End: Wells Avenue
LF Creek/Trail: 2209'/1545'	Number of Road Crossings: 0	Implementation Priority: 3	No. Potential Creek Crossings: 0

8.21.1 Preliminary Cost Estimate

Table 32 below shows a planning-level cost estimate for the recommended alignment as presented in this document. The costs do not include annual maintenance costs. The estimate is in year 2013 USD.

Table 32 – Preliminary Cost Estimate Segment B02

	Element	Costs x $1,000	Costs x $1,000
Construction	*Trail*	*356*	
	Structures	*0*	
	Mobilization (10%)	*37*	
	Contingency (20%)	*56*	
	Sub-Total Construction		**449**
Other Costs	*Utility Relocations*	*5*	
	Right of Way/Easements	*27*	
	Environmental Document (10%)	*45*	
	PS&E (10%)	*45*	
	Construction Management (12%)	*54*	
	Inspection/Testing (3%)	*14*	
	Administrative (3%)	*14*	
	Sub-Total Other		**204**
TOTAL COSTS			**653**

8.21.2 Design Elements

8.21.2.1 Trails

The recommended alignment will start at Mariposa Avenue where the trail ties into the existing sidewalk somewhere between Skycrest Elementary School and the abandoned tennis club entrance. The specific connecting point depends on availability of land north or south of the several residences located between the school and the abandoned tennis club property. The recommended trail alignment will remain on the north side of the creek and roughly follow the creek to the east end of Wells Avenue. At this point, the trail would transition to on-street bike lane and sidewalk. The corridor is very narrow, approximately 60-feet in some areas; however, a trail is feasible if access can be secured through the Skycrest Elementary School property and the Sacramento County parcel adjacent to Wells Avenue. The trail would be close to private property structures and would require access through four parcels (approximately 300 feet). Alternate route follows Mariposa to San Juan Park to Kalamazoo Drive utilizing existing trails through San Juan Park.

The proposed trail lies within private and publicly owned property, requiring right of way acquisition or easements for the trail through the privately owned property.

8.21.2.2 Creek Crossings

There are no creek crossings proposed along this segment.

8.21.2.3 Road Crossings

There are no roadway crossings within this segment. It is anticipated that if this segment is constructed that Wells Avenue will be improved through to San Juan Avenue to

accommodate trail users. The improvements will include signage for Class 3 Bikeway and curb gutter and sidewalk on the north side of the road.

8.21.2.4 Access Areas and Amenities

There are no access nodes identified for this segment. However, access via the Skycrest Elementary School property might provide an opportunity for a Type A node in the future.

8.21.2.5 Visual Screening

Visual screening may be desired between the residents and the trail. If so, a fence or vegetation may be used depending on available space.

8.21.2.6 Access Control

If access control is desired between the residences and the trail, the same fence or vegetation used for visual screening may be used depending on available space.

8.21.2.7 Signage

Guidance/directional signs will be placed at Mariposa Avenue and Wells Avenue. Regulatory signage for trail users would be placed on the approach to Mariposa Avenue and Wells Avenue requiring trail users to stop and restricting vehicle access. Regulatory and guidance signs will be placed at quarter mile intervals along the trail. A general informational and regional trails map is proposed to be installed in San Juan Park.

8.21.2.8 Retaining Walls

No retaining walls are anticipated along this segment.

8.21.3 Environmental Compliance

Due to the lack of bridges, Corps of Engineers and CDFW permits should not be needed unless specific wetland resources are identified in the biological assessment. The following permits are anticipated to be required for this segment of the trail:

- RWQCB - NPDES Permit

8.21.4 Additional Technical Studies

It is anticipated that the following additional technical studies will be completed during the Project Approval/Environmental Document and Design Phases of this project.

- Environmental Studies
  - Biological Assessment (BA)
  - Noise Technical Memorandum
  - Air Quality Technical Memorandum
  - Wetland Delineation
  - Natural Environment Study (NES)
  - Visual Resources – Technical Memorandum
  - Land Use and Community Impact – Technical Memorandum
- Geotechnical Analysis
- Hydrology/Hydraulic Analysis
- Storm Water Pollution Prevention Plan

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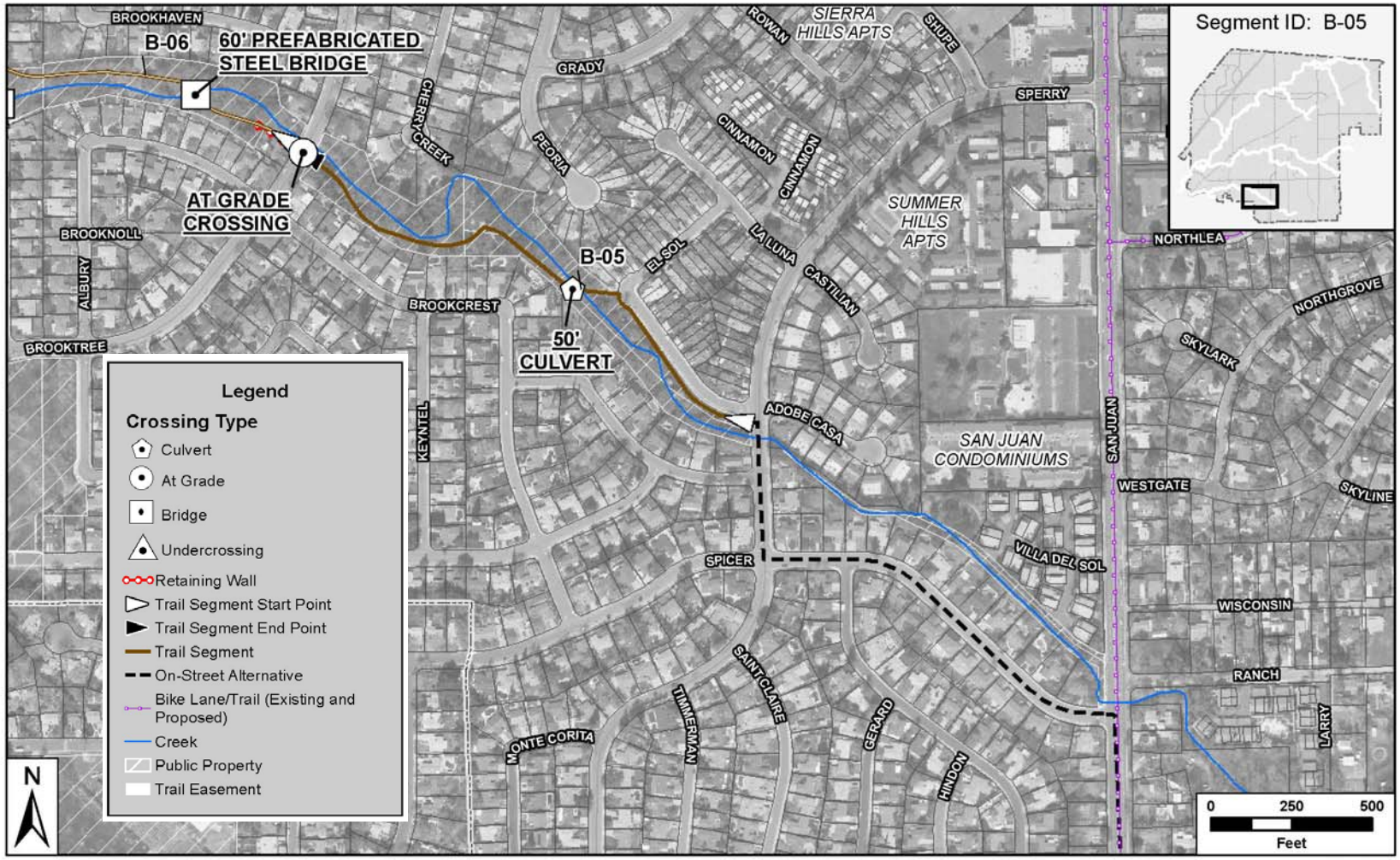
8.22 Segment B05



Subwatershed: Brooktree Creek	Segment ID: B05	Start: Sperry Drive	End: Brooktree Drive
LF Creek/Trail: 2045'/1794'	Number of Road Crossings: 1	Implementation Priority: 2	No. Potential Creek Crossings: 1

8.22.1 Preliminary Cost Estimate

Table 33 below shows a planning-level cost estimate for the recommended alignment as presented in this document. The costs do not include annual maintenance costs. The estimate is in year 2013 USD.

Table 33 – Preliminary Cost Estimate Segment B05

	Element	Costs x $1,000	Costs x $1,000
Construction	*Trail*	*340*	
	Structures	*0*	
	Mobilization (10%)	*36*	
	Contingency (20%)	*54*	
	Sub-Total Construction		**430**
Other Costs	Utility Relocations	5	
	Right of Way/Easements	-	
	Environmental Document (10%)	43	
	PS&E (10%)	43	
	Construction Management (12%)	52	
	Inspection/Testing (3%)	13	
	Administrative (3%)	13	
	Sub-Total Other		**169**
TOTAL COSTS			**599**

8.22.2 Design Elements

8.22.2.1 Trails

The recommended alignment will start at Sperry Drive and follow a proposed separated trail along the south side of El Sol Way before entering the SRPD greenway along an existing footpath. The alignment then crosses Brooktree Creek via a bridge structure to the south side of the creek and follows an existing unpaved path on the south side of the creek to a proposed at-grade crossing at Brooktree Drive. The corridor is owned by SRPD. Existing informal trail leads from El Sol Way to Brooktree Drive. Corridor width generally over 100 feet. Topographic constraints are slight. Some riparian impacts would be necessary but could be mitigated. One bridge crossing would likely be needed. Open space along south side of El Sol Way provides opportunity for off-street trail paralleling the roadway.

The proposed trail lies entirely within publicly owned property and therefore no right of way or easement costs are anticipated.

8.22.2.2 Creek Crossings

There is one creek crossing proposed along this segment requiring a box culvert with an approximate length of 50 feet.

8.22.2.3 Road Crossings

An unsignalized at-grade crossing is proposed at Brooktree Drive due to the relatively low traffic volumes and good sight distance at this location. It is not feasible to use the existing bridge structure to accommodate a trail undercrossing due to the restricted vertical clearance.

8.22.2.4 Access Areas and Amenities

Upstream access is via Sperry Drive and El Sol Way. Limited on-street parking is available along El Sol Way. Downstream access is from Brooktree Drive. Amenities should be limited to signage.

8.22.2.5 Visual Screening

Vegetation is relatively dense through this segment, but the corridor is not wide and backyards front onto it. The trail will likely pass close to backyards in several locations, and screening may be needed. Sufficient space should be available for vegetation screening.

8.22.2.6 Access Control

As with visual screening, access control may be needed in areas where the trail is close to backyards. New fencing, fencing upgrades, and vegetated control will all be appropriate methods for keeping trail users on the path.

8.22.2.7 Signage

Guidance/directional signs will be placed at Sperry Drive and Brooktree Drive. Regulatory signage for trail users would be placed on the approach to Brooktree Drive, El Sol Avenue and Sperry Drive requiring trail users to stop and restricting vehicle access. Regulatory and guidance signs will be placed at quarter mile intervals along the trail.

8.22.2.8 Retaining Walls

No retaining walls are anticipated along this segment. Rock slope protection will be required at the bridge abutments.

8.22.3 Environmental Compliance

Due to the bridge crossing and abutment rip-rap, the following permits are anticipated to be required for this segment of the trail:

- RWQCB - Section 401 Water Quality Certification and NPDES Permit
- CDFW - Section 1602 Streambed Alteration Agreement
- ACOE – Section 404 Nationwide Permit

If sensitive species such as elderberry are present, consultation with the USFWS under Section 7 of the Endangered Species Act would be necessary.

8.22.4 Additional Technical Studies

It is anticipated that the following additional technical studies will be completed during the Project Approval/Environmental Document and Design Phases of this project.

- Environmental Studies
  - Biological Assessment (BA)
  - Noise Technical Memorandum
  - Air Quality Technical Memorandum
  - Wetland Delineation
  - Natural Environment Study (NES)
  - Visual Resources – Technical Memorandum
  - Land Use and Community Impact – Technical Memorandum
- Geotechnical Analysis
- Hydrology/Hydraulic Analysis – Location Hydraulic Study
- Storm Water Pollution Prevention Plan

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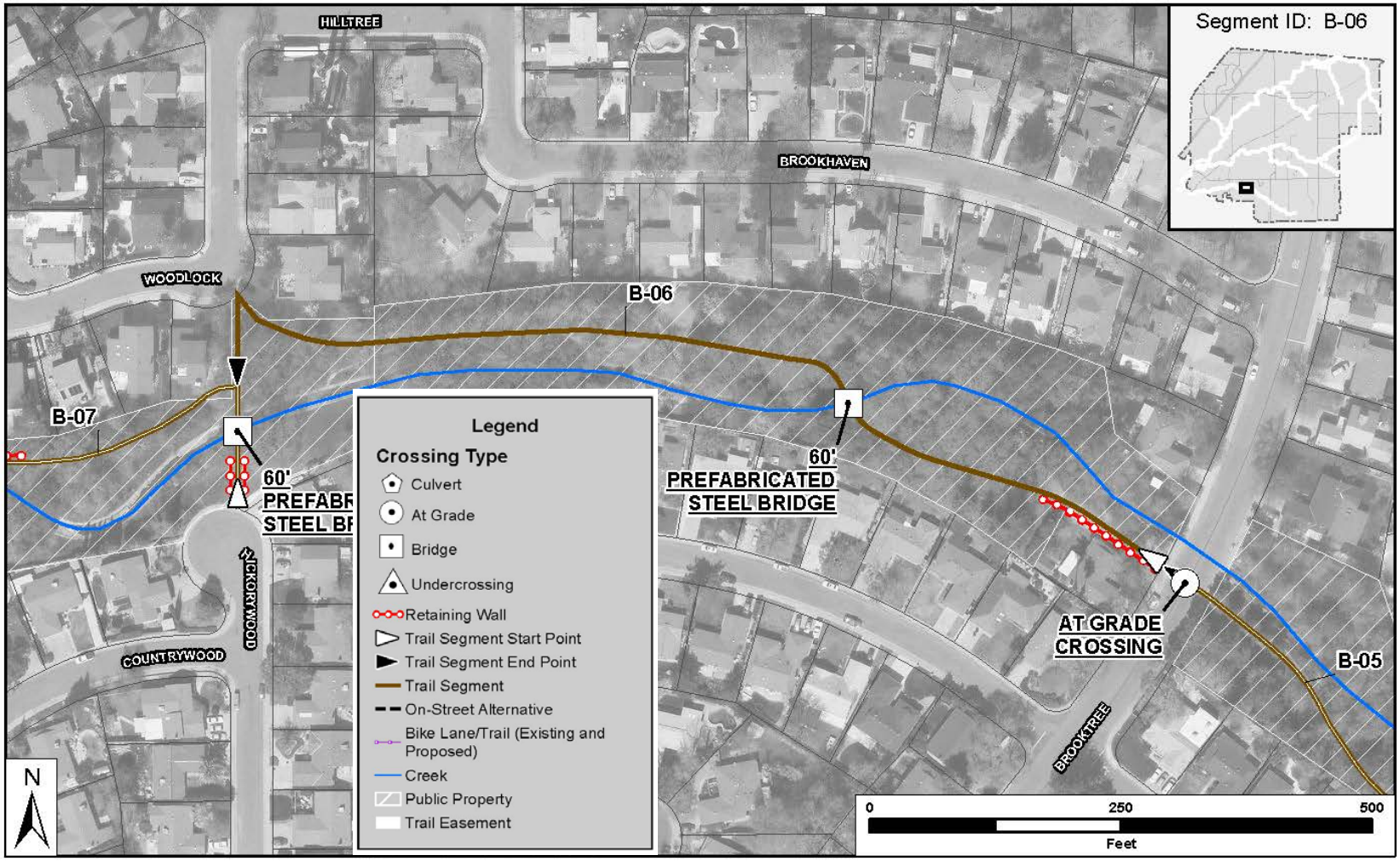
8.23 Segment B06



Subwatershed: Brooktree Creek	Segment ID: B06	Start: Brooktree Drive	End: Hickorywood Way
LF Creek/Trail: 1036'/1221'	Number of Road Crossings: 0	Implementation Priority: 2	No. Potential Creek Crossings: 2

8.23.1 Preliminary Cost Estimate

Table 34 below shows a planning-level cost estimate for the recommended alignment as presented in this document. The costs do not include annual maintenance costs. The estimate is in year 2013 USD.

Table 34 – Preliminary Cost Estimate Segment B06

	Element	Costs x $1,000	Costs x $1,000
Construction	*Trail*	*311*	
	Structures	*288*	
	Mobilization (10%)	*33*	
	Contingency (20%)	*49*	
	Sub-Total Construction		**681**
Other Costs	*Utility Relocations*	*5*	
	Right of Way/Easements	*-*	
	Environmental Document (10%)	*69*	
	PS&E (10%)	*69*	
	Construction Management (12%)	*82*	
	Inspection/Testing (3%)	*21*	
	Administrative (3%)	*21*	
	Sub-Total Other		**267**
TOTAL COSTS			**948**

8.23.2 Design Elements

8.23.2.1 Trails

The recommended alignment starts at Brooktree Drive and initially runs south of the creek to a bridge crossing to the north side where the trail continues to Woodlock Way. A second bridge connects the trail to Hickorywood Way on the south side of the creek. Existing informal trail runs from Brooktree Drive to Hickorywood Way, continuing onto upstream reach with an additional neighborhood connection to Woodlock Way. Land is owned by SRPD and the City of Citrus Heights. Two bridges would likely be needed in this segment to follow the informal path and avoid proximity to private properties. The majority of the channel is concrete lined. Corridor width ranges from 100 to 150 feet. Maintenance road on east end provides access to creek.

The proposed trail lies entirely within publicly owned property and therefore no right of way or easement costs are anticipated.

8.23.2.2 Creek Crossings

There are two creek crossings proposed along this segment requiring bridge structures with an approximate span length of 60 feet each.

8.23.2.3 Road Crossings

There are no roadway crossings along this segment.

8.23.2.4 Access Areas and Amenities

Access to this segment is from Hickorywood Way downstream and Brooktree Drive upstream. On-street parking is limited in both locations. Amenities are limited to trail signage.

8.23.2.5 Visual Screening

Given the trail proximity to backyards, some visual screening will likely be desired by residents. Screening with native vegetation should be preferred over fencing.

8.23.2.6 Access Control

The trail is generally sufficiently wide that access control should be provided by existing vegetation; however, additional upgrades, fencing or vegetation planting may be needed in some locations.

8.23.2.7 Signage

Guidance and directional signs will be placed at Hickorywood Drive, Woodlock Way and Brooktree Drive. Regulatory signage for trail users would be placed on the approach to Brooktree Drive, Hickorywood Drive and Woodlock Way requiring trail users to stop, and restricting vehicle access. Regulatory and guidance signs will be placed at quarter mile intervals along the trail.

8.23.2.8 Retaining Walls

No retaining walls are anticipated along this segment. Rock slope protection will be required at the bridge abutments.

8.23.3 Environmental Compliance

Due to the bridge crossings and abutment rip-rap, the following permits are anticipated to be required for this segment of the trail:

- RWQCB - Section 401 Water Quality Certification and NPDES Permit
- CDFW - Section 1602 Streambed Alteration Agreement
- ACOE – Section 404 Nationwide Permit

If sensitive species such as elderberry are present, consultation with the USFWS under Section 7 of the Endangered Species Act would be necessary.

8.23.4 Additional Technical Studies

It is anticipated that the following additional technical studies will be completed during the Project Approval/Environmental Document and Design Phases of this project.

- Environmental Studies
  - Biological Assessment (BA)
  - Noise Technical Memorandum
  - Air Quality Technical Memorandum
  - Wetland Delineation
  - Natural Environment Study (NES)
  - Visual Resources – Technical Memorandum
  - Land Use and Community Impact – Technical Memorandum
- Geotechnical Analysis
- Hydrology/Hydraulic Analysis – Location Hydraulic Study
- Storm Water Pollution Prevention Plan

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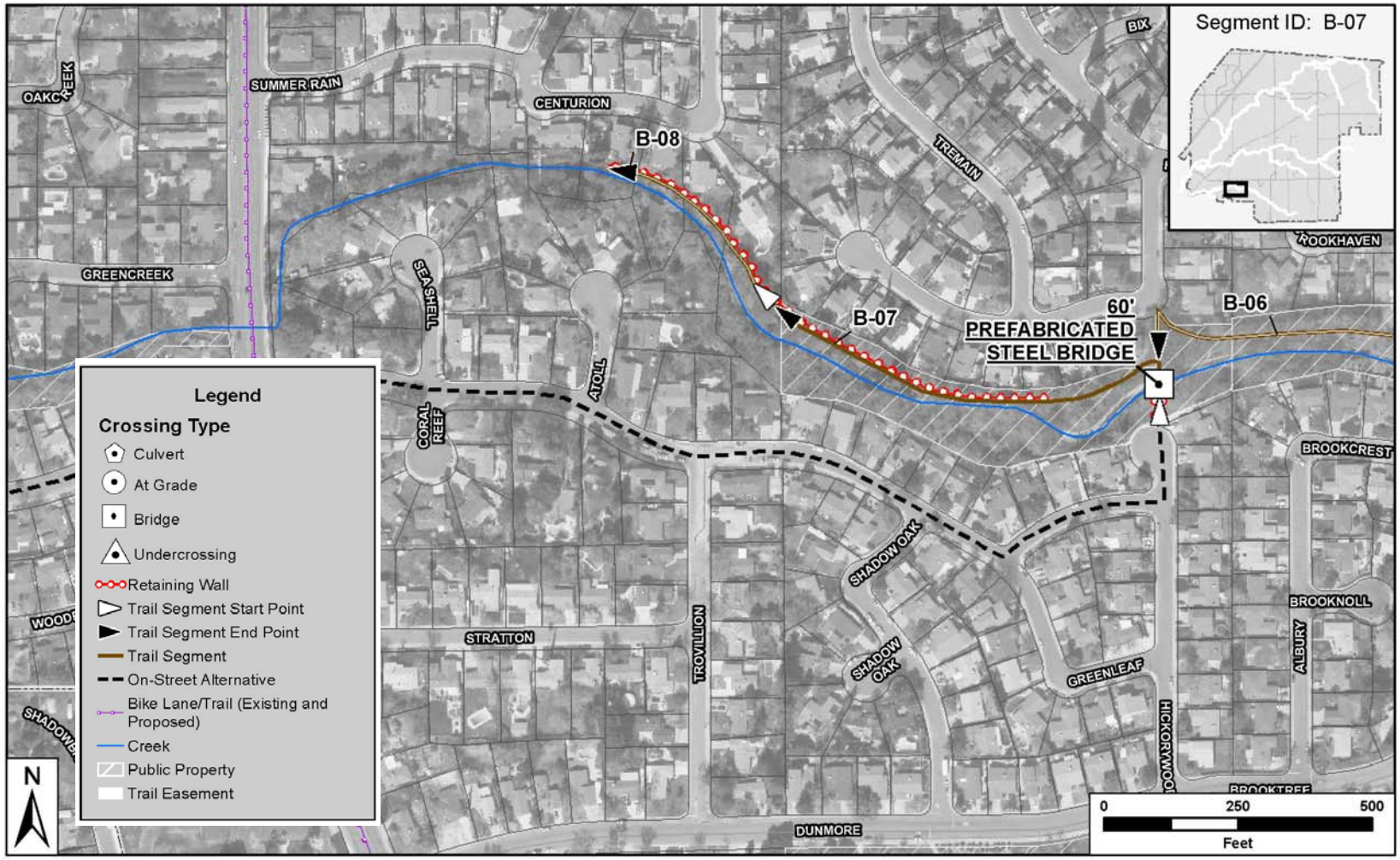
8.24 Segment B07



Subwatershed: Brooktree Creek	Segment ID: B07	Start: Hickorywood Way	End: SRPD Parcel, west boundary
LF Creek/Trail: 762'/781'	Number of Road Crossings: 0	Implementation Priority: 3	No. Potential Creek Crossings: 0

8.24.1 Preliminary Cost Estimate

Table 35 below shows a planning-level cost estimate for the recommended alignment as presented in this document. The costs do not include annual maintenance costs. The estimate is in year 2013 USD.

Table 35 – Preliminary Cost Estimate Segment B07

	Element	Costs x $1,000	Costs x $1,000
Construction	*Trail*	*391*	
	Structures	*0*	
	Mobilization (10%)	*41*	
	Contingency (20%)	*62*	
	Sub-Total Construction		**494**
Other Costs	*Utility Relocations*	*3*	
	Right of Way/Easements	*-*	
	Environmental Document (10%)	*50*	
	PS&E (10%)	*50*	
	Construction Management (12%)	*60*	
	Inspection/Testing (3%)	*15*	
	Administrative (3%)	*15*	
	Sub-Total Other		**193**
TOTAL COSTS			**687**

8.24.2 Design Elements

8.24.2.1 Trails

The recommended alignment would be on the north side of the creek starting from opposite Woodlock Way running west to the publicly owned property boundary. This reach passes through public land owned by SRPD. Corridor width is adequate, and a topographic bench adjacent to the concrete-lined channel would support a trail. This segment has local recreational value, even though potential to connect west of Dewey Drive is questionable due to property ownership and narrow corridor constraints in B08 and B09.

The proposed trail lies entirely within publicly owned property and therefore no right of way or easement costs are anticipated.

8.24.2.2 Creek Crossings

There are no creek crossings proposed along this segment.

8.24.2.3 Road Crossings

There are no roadway crossings along this segment.

8.24.2.4 Access Areas and Amenities

Access to this segment is limited to Hickorywood. On-street parking is very limited. Given the lack of a downstream connection, this trail will likely be utilized primarily by local residents.

8.24.2.5 Visual Screening

Due to the narrowness of the trail corridor, some visual screening may be desired by adjacent property owners. Fencing upgrades are preferred over vegetation due to space constraints and lack of irrigation.

8.24.2.6 Access Control

Access in this segment is primarily contained within backyard fences. Fencing upgrades may be needed in some areas.

8.24.2.7 Signage

Guidance/directional signs will be placed at the start of this segment near Woodlock Way indicating a discontinuous trail to the west. Regulatory and guidance signs will be placed at quarter mile intervals along the trail.

8.24.2.8 Retaining Walls

Minor retaining walls are anticipated along this segment due to the confined creek bank.

8.24.3 Environmental Compliance

Due to the lack of crossings, Section 404 and 401 permits are not anticipated. Given the narrowness of the corridor, the trail may be considered to be within "bed and bank" of the creek. If so, an SAA with CDFW may be required. The following permits will also likely be required for this segment of the trail:

- RWQCB - NPDES Permit

8.24.4 Additional Technical Studies

It is anticipated that the following additional technical studies will be completed during the Project Approval/Environmental Document and Design Phases of this project.

- Environmental Studies
  - Biological Assessment (BA)
  - Noise Technical Memorandum
  - Air Quality Technical Memorandum
  - Wetland Delineation
  - Natural Environment Study (NES)
  - Visual Resources – Technical Memorandum
  - Land Use and Community Impact – Technical Memorandum
- Geotechnical Analysis
- Hydrology/Hydraulic Analysis
- Storm Water Pollution Prevention Plan

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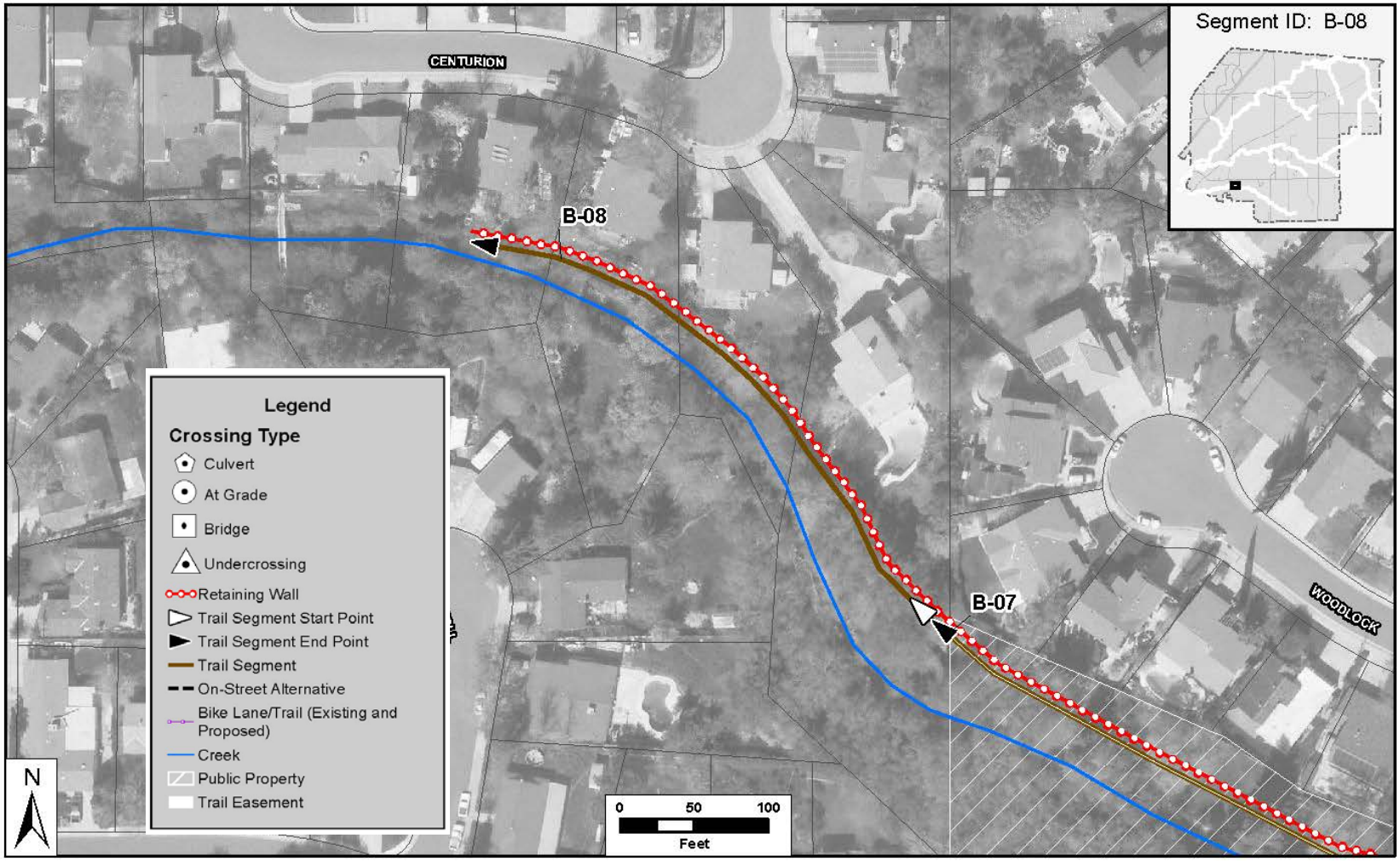
8.25 Segment B08



Subwatershed: Brooktree Creek	Segment ID: B08	Start: SRPD Parcel, west boundary	End: Atoll Court
LF Creek/Trail: 417'/420'	Number of Road Crossings: 0	Implementation Priority: 3	No. Potential Creek Crossings: 0

8.25.1 Preliminary Cost Estimate

Table 36 below shows a planning-level cost estimate for the recommended alignment as presented in this document. The costs do not include annual maintenance costs. The estimate is in year 2013 USD.

Table 36 – Preliminary Cost Estimate Segment B08

	Element	Costs x $1,000	Costs x $1,000
Construction	*Trail*	*296*	
	Structures	*0*	
	Mobilization (10%)	*31*	
	Contingency (20%)	*47*	
	Sub-Total Construction		**374**
Other Costs	*Utility Relocations*	*3*	
	Right of Way/Easements	*43*	
	Environmental Document (10%)	*38*	
	PS&E (10%)	*38*	
	Construction Management (12%)	*45*	
	Inspection/Testing (3%)	*12*	
	Administrative (3%)	*12*	
	Sub-Total Other		**191**
TOTAL COSTS			**565**

8.25.2 Design Elements

8.25.2.1 Trails

The recommended alignment would be on the north side of the creek starting at the SRPD western property boundary and ending opposite Atoll Court. This reach is on private land. Width and topography would support a trail; however no access exists to the west. Channel is concrete-lined. Parcel is heavily wooded.

The proposed trail lies entirely within privately owned property, requiring right of way acquisition or easements for the trail.

8.25.2.2 Creek Crossings

There are no creek crossings proposed along this segment.

8.25.2.3 Road Crossings

There are no roadway crossings along this segment.

8.25.2.4 Access Areas and Amenities

Access to this segment is via the upstream trail only. There is no downstream outlet.

8.25.2.5 Visual Screening

As with the upstream segment, visual screening may be desired by adjacent residents, however, given the lack of a downstream connection, traffic on this trail should be light.

8.25.2.6 Access Control

Access control is provided primarily by residential backyard fences. Some upgrades may be desired.

8.25.2.7 Signage

Guidance/directional signs will be placed at the end of this segment near Atoll Way indicating a discontinuous trail to the west. Regulatory and guidance signs will be placed at quarter mile intervals along the trail.

8.25.2.8 Retaining Walls

Minor retaining walls are anticipated along this segment due to the confined creek bank.

8.25.2.9 Environmental Compliance

Due to the lack of crossings, Section 404 and 401 permits are not anticipated. Given the narrowness of the corridor, the trail may be considered to be within "bed and bank" of the creek. If so, an SAA with CDFW may be required. The following permits will also likely be required for this segment of the trail:

- RWQCB - NPDES Permit

8.25.3 Additional Technical Studies

It is anticipated that the following additional technical studies will be completed during the Project Approval/Environmental Document and Design Phases of this project.

- Environmental Studies
  - Biological Assessment (BA)
  - Noise Technical Memorandum
  - Air Quality Technical Memorandum
  - Wetland Delineation
  - Natural Environment Study (NES)
  - Visual Resources – Technical Memorandum
  - Land Use and Community Impact – Technical Memorandum
- Geotechnical Analysis
- Hydrology/Hydraulic
- Storm Water Pollution Prevention Plan

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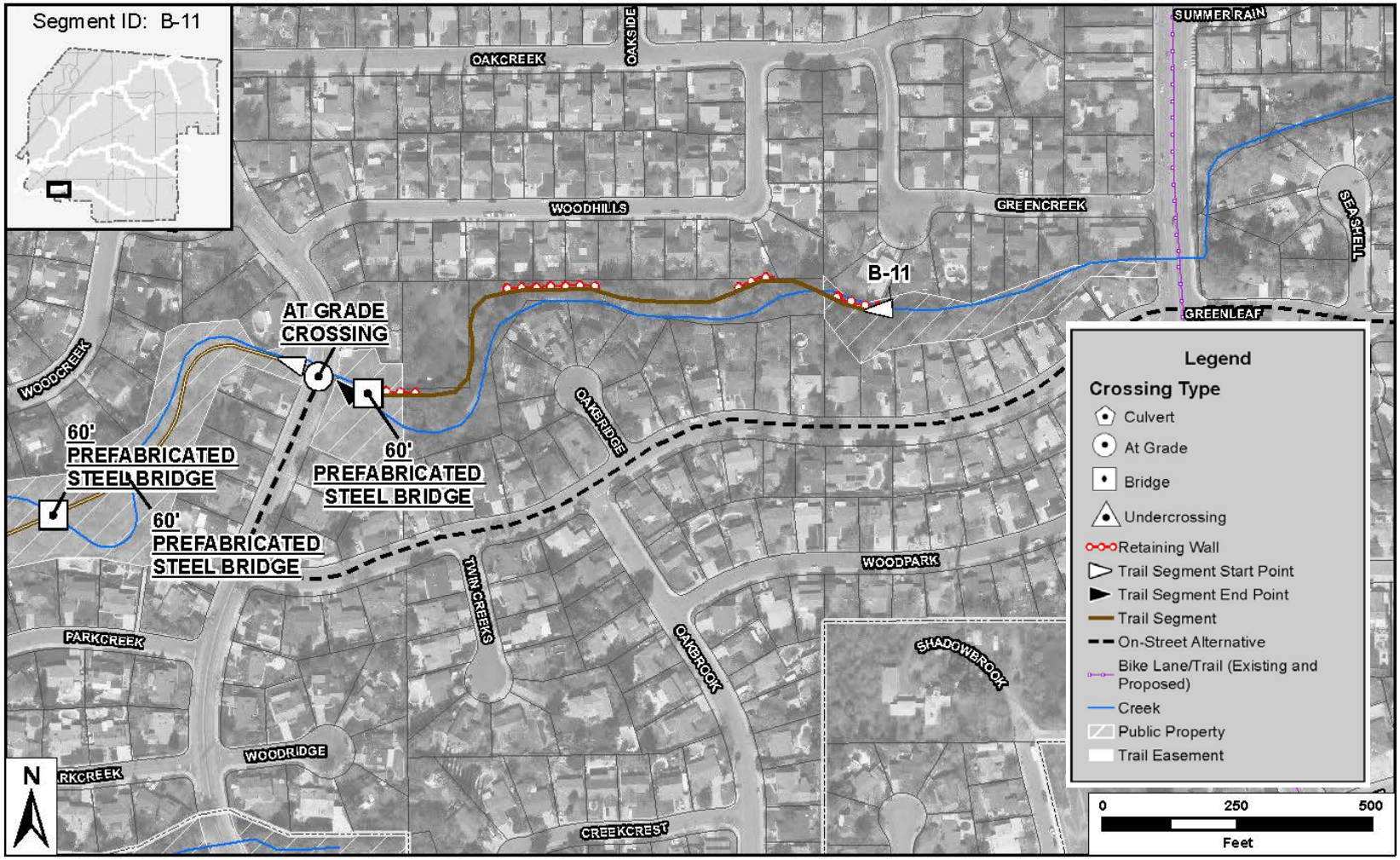
8.26 Segment B11



Subwatershed: Brooktree Creek	Segment ID: B11	Start: 325’ west of Dewey Drive	End: Park Oaks Drive
LF Creek/Trail: 1486’/1207’	Number of Road Crossings: 1	Implementation Priority: 3	No. Potential Creek Crossings: 1

8.26.1 Preliminary Cost Estimate

Table 37 below shows a planning-level cost estimate for the recommended alignment as presented in this document. The costs do not include annual maintenance costs. The estimate is in year 2013 USD.

Table 37 – Preliminary Cost Estimate Segment B11

	Element	Costs x $1,000	Costs x $1,000
Construction	*Trail*	*413*	
	Structures	*144*	
	Mobilization (10%)	*43*	
	Contingency (20%)	*65*	
	Sub-Total Construction		**665**
Other Costs	*Utility Relocations*	*5*	
	Right of Way/Easements	*97*	
	Environmental Document (10%)	*67*	
	PS&E (10%)	*67*	
	Construction Management (12%)	*80*	
	Inspection/Testing (3%)	*20*	
	Administrative (3%)	*20*	
	Sub-Total Other		**356**
TOTAL COSTS			**1,021**

8.26.2 Design Elements

8.26.2.1 Trails

If a solution to the property constraint on the segment east of this segment is found, the recommended alignment would start on the north side of the creek 325 feet west of Dewey Drive and roughly follow the creek until just east of Park Oaks Drive where a bridge crossing would transfer the alignment to the south side where an at-grade crossing of Park Oaks Drive would be constructed. This reach consists primarily of private land, with SRPD owned parcel on west end adjacent to Park Oaks Drive. Width and topography are adequate for trail, and the corridor is wooded; however, constraints on adjacent upstream reach (B10) make this segment useful solely for neighborhood recreational purposes, unless the City purchased a residential parcel (or portion thereof) in reach B10 to connect into Meadowcreek Way or Glencreek Court.

The proposed trail lies within private and publicly owned property, requiring right of way acquisition or easements for the trail through the privately owned property.

8.26.2.2 Creek Crossings

There is one proposed creek crossing just east of Park Oaks Drive. The approximate bridge span length would be 60 feet.

8.26.2.3 Road Crossings

An unsignalized at-grade crossing is proposed at Park Oaks Drive due to the relatively low traffic volumes and good sight distance at this location. It is not feasible to use the existing bridge structure to accommodate a trail undercrossing due to the restricted vertical clearance.

8.26.2.4 Access Areas and Amenities

Currently, access is only available at the downstream end on Park Oaks Drive. On-street parking is available. Minimal amenities will be available at this Type B node.

8.26.2.5 Visual Screening

This narrow corridor between backyards will likely need some additional screening, including fencing or vegetation, between the trail and backyards.

8.26.2.6 Access Control

Access control is provided through backyard fences. Upgrades may be desired.

8.26.2.7 Signage

Guidance/directional signs will be placed at Park Oaks Drive. Regulatory signage for trail users would be placed on the approach to Park Oaks Drive requiring trail users to stop and restricting vehicle access. Regulatory and guidance signs will be placed at quarter mile intervals along the trail. Weight limitation warning signs and other regulatory will be placed on either side of all bridges crossing the creek.

8.26.2.8 Retaining Walls

Minor retaining walls are anticipated along this segment due to the confined creek bank. Rock slope protection is anticipated to protect the bridge foundations.

8.26.2.9 Environmental Compliance

Due to the proposed bridge crossing and abutment rip-rap, the following permits are anticipated to be required for this segment of the trail:

- RWQCB - Section 401 Water Quality Certification and NPDES Permit
- CDFW - Section 1602 Streambed Alteration Agreement
- ACOE – Section 404 Nationwide Permit

If sensitive species such as elderberry are present, consultation with the USFWS under Section 7 of the Endangered Species Act would be necessary.

8.26.3 Additional Technical Studies

It is anticipated that the following additional technical studies will be completed during the Project Approval/Environmental Document and Design Phases of this project.

- Environmental Studies
  - Biological Assessment (BA)
  - Noise Technical Memorandum
  - Air Quality Technical Memorandum
  - Wetland Delineation
  - Natural Environment Study (NES)
  - Visual Resources – Technical Memorandum
  - Land Use and Community Impact – Technical Memorandum
- Geotechnical Analysis
- Hydrology/Hydraulic Analysis – Location Hydraulic Study
- Storm Water Pollution Prevention Plan

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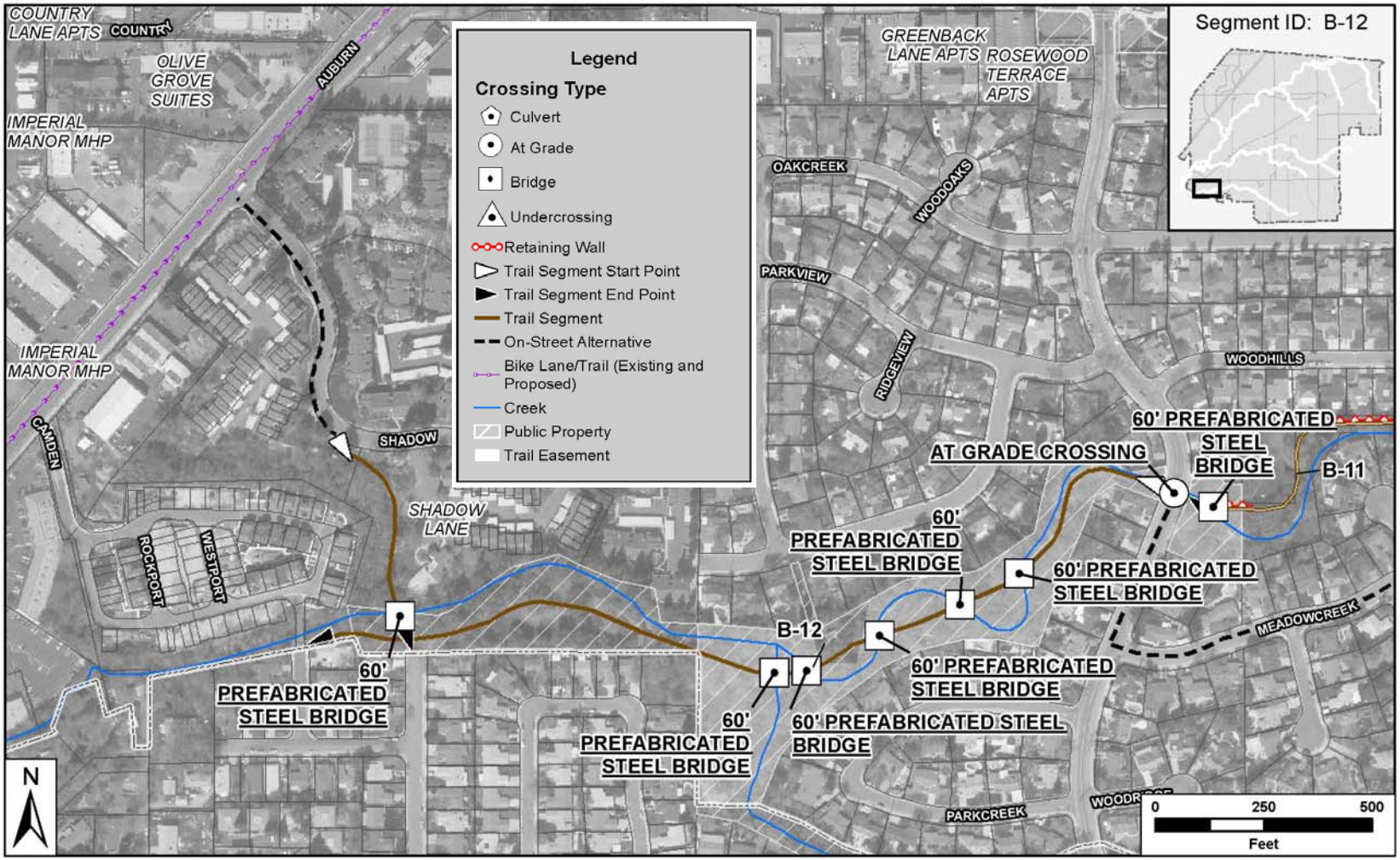
8.27 Segment B12



Subwatershed: Brooktree Creek	Segment ID: B12	Start: Park Oaks Drive	End: Higgins Street
LF Creek/Trail: 2336'/2799'	Number of Road Crossings: 0	Implementation Priority: 2	No. Potential Creek Crossings: 1

8.27.1 Preliminary Cost Estimate

Table 38 below shows a planning-level cost estimate for the recommended alignment as presented in this document. The costs do not include annual maintenance costs. The estimate is in year 2013 USD.

Table 38 – Preliminary Cost Estimate Segment B12

	Element	Costs x $1,000	Costs x $1,000
Construction	*Trail*	*454*	
	Structures	*456*	
	Mobilization (10%)	*48*	
	Contingency (20%)	*71*	
	Sub-Total Construction		**1,029**
Other Costs	*Utility Relocations*	5	
	Right of Way/Easements	*60*	
	Environmental Document (10%)	*103*	
	PS&E (10%)	*103*	
	Construction Management (12%)	*124*	
	Inspection/Testing (3%)	*31*	
	Administrative (3%)	*31*	
	Sub-Total Other		**457**
TOTAL COSTS			**1,486**

8.27.2 Design Elements

8.27.2.1 Trails

The recommended alignment for this segment starts at Park Oaks Drive and remains on the south side of the creek. The alignment will tie into Higgins Street and Woodleigh Drive on the west end just outside the city limits. A proposed creek crossing opposite Woodleigh Drive will connect the trail to the north side of the creek to Shadow Lane. All but the westernmost 100-feet of this reach and the Shadow Lane connection is within Shadowcreek Park, which is owned and operated by SRPD. Existing unpaved trails run throughout the park. Corridor width ranges from approximately 70-feet near Higgins Street to over 200 feet in several areas. Topography is generally conducive to trails, except for the easternmost 100-feet downstream of Park Oaks Drive, where an outside meander bend is undercutting the bank adjacent to a residential lot at 6017 Park Oaks Drive. A retaining wall would be needed in this location to support a trail; however, some form of bank stabilization will be required anyways, and the solution should be designed to accommodate a trail. The three existing low-flow crossings will be replaced with new bridge structures.

The proposed trail lies within private and publicly owned property, requiring right of way acquisition or easements for the trail through the privately owned property.

8.27.2.2 Creek Crossings

Four bridge crossings are proposed within Shadowcreek Park where the creek meanders through this area. A new bridge is proposed where the trail crosses the tributary to the south, named Coyle Creek. There is an additional creek crossing proposed opposite Woodleigh Drive to connect the trail to the north side of the creek and possibly connect the trail to Shadow

Lane. The approximate bridge span length would be 30 - 40 feet.

8.27.2.3 Road Crossings

There are no roadway crossings along this segment.

8.27.2.4 Access Areas and Amenities

Shadowcreek Park provides access to this segment. Parking is limited to on-street along Park Oaks Drive. Existing amenities are limited to informal trails, though trail-associated upgrades could include benches, trash receptacles, pet waste stations and interpretive and other signage.

8.27.2.5 Visual Screening

Informal trails currently run throughout this segment, and current screening by fences and vegetation appears to be adequate.

8.27.2.6 Access Control

Additional access control is not anticipated for this segment.

8.27.2.7 Signage

Guidance/directional signs will be placed at the entrance node from Higgins Street, Woodleigh Drive, Park Oaks Drive and from Shadow Lane if the trail is extended to the north. Regulatory signage for trail users would be placed on the approach to Higgins Street, Woodleigh Drive, Shadow Lane and Park Oaks Drive requiring trail users to stop and restricting vehicle access. Regulatory and guidance signs will be placed at quarter mile intervals along the trail. A general informational and regional trails map is proposed to be installed in Shadowcreek Park. Weight limitation warning signs and other regulatory will be placed on either side of all bridges crossing the creek.

8.27.2.8 Retaining Walls

For the easternmost 100-feet downstream of Park Oaks Drive, where an outside meander bend, the creek is undercutting the bank adjacent to a residential lot at 6017 Park Oaks Drive. A retaining wall would be needed in this location to support a trail and bank stabilization will be required. Rock slope protection is anticipated to protect the bridge foundations.

8.27.3 Environmental Compliance

Due to the proposed bridge crossing, abutment rip-rap, possible upgrades to the low-flow crossings, and slope stabilization along the eastern end of the segment, the following permits are anticipated to be required for this segment of the trail:

- RWQCB - Section 401 Water Quality Certification and NPDES Permit
- CDFW - Section 1602 Streambed Alteration Agreement
- ACOE – Section 404 Nationwide Permit

If sensitive species such as elderberry are present, consultation with the USFWS under Section 7 of the Endangered Species Act would be necessary.

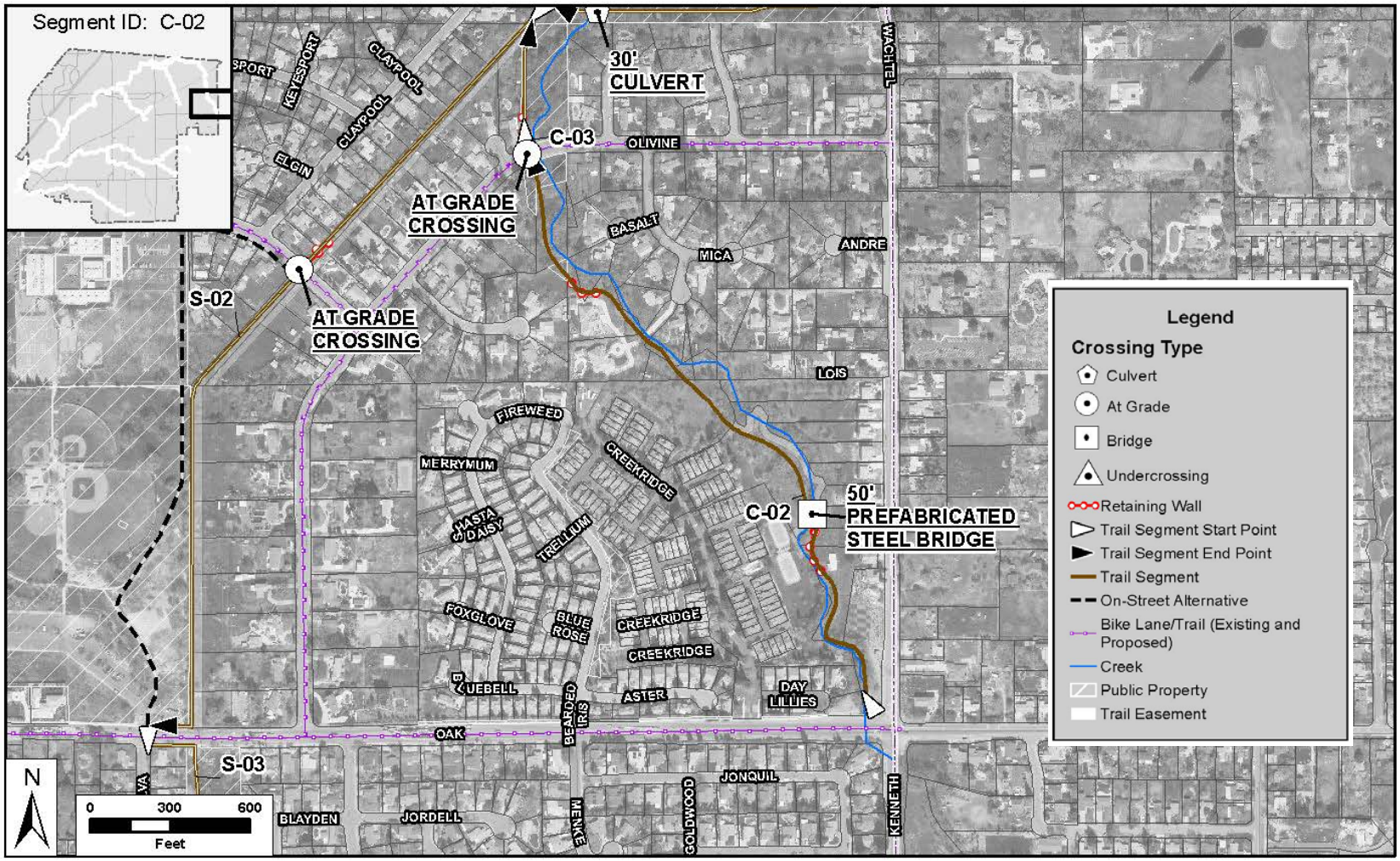
8.27.4 Additional Technical Studies

It is anticipated that the following additional technical studies will be completed during the Project Approval/Environmental Document and Design Phases of this project.

- Environmental Studies
    - Biological Assessment (BA)
    - Noise Technical Memorandum

    - Air Quality Technical Memorandum
    - Wetland Delineation
    - Natural Environment Study (NES)
    - Visual Resources – Technical Memorandum
    - Land Use and Community Impact – Technical Memorandum
- Geotechnical Analysis
- Hydrology/Hydraulic Analysis – Location Hydraulic Study
- Storm Water Pollution Prevention Plan

8.28 Segment C02



Subwatershed: Cripple Creek	Segment ID: C02	Start: Oak Avenue	End: Olivine Avenue
LF Creek/Trail: 2871'/2756'	Number of Road Crossings: 2	Implementation Priority: 3	No. Potential Creek Crossings: 1

8.28.1 Preliminary Cost Estimate

Table 39 below shows a planning-level cost estimate for the recommended alignment as presented in this document. The costs do not include annual maintenance costs. The estimate is in year 2013 USD.

Table 39 – Preliminary Cost Estimate Segment C02

	Element	Costs x $1,000	Costs x $1,000
Construction	*Trail*	*531*	
	Structures	*120*	
	Mobilization (10%)	*56*	
	Contingency (20%)	*84*	
	Sub-Total Construction		**791**
Other Costs	*Utility Relocations*	*5*	
	Right of Way/Easements	*274*	
	Environmental Document (10%)	*80*	
	PS&E (10%)	*80*	
	Construction Management (12%)	*95*	
	Inspection/Testing (3%)	*24*	
	Administrative (3%)	*24*	
	Sub-Total Other		**582**
TOTAL COSTS			**1,373**

8.28.2 Design Elements

8.28.2.1 Trails

The recommended alignment for this segment starts at Oak Avenue on the north side of the creek, crossing to the south via a bridge just east of the private driveway off of Aplite Court. From there the alignment remains on the south side of the creek through to Olivine Avenue where an at-grade crossing is proposed. Public access easement is on one quarter of the segment. The remainder is privately owned, but most structures are relatively far from the creek. Reach is heavily wooded, with some existing informal trails. Minor topographic constraints. Trails in this reach could be a useful neighborhood amenity, with increasing benefit once ORPD constructs upstream segments. Easements would be required between Lois Lane and Olivine Way in proximity to existing homes.

The proposed trail lies within private and publicly owned property, requiring right of way acquisition or easements for the trail through the privately owned property.

8.28.2.2 Creek Crossings

There is one proposed creek crossing just east of the private driveway off of Aplite Court to switch the trail from the north to the south side. This crossing may be a prefabricated steel or wooden bridge or may be achieved with a culvert since the flows in the creek at this location are anticipated to be small. The approximate bridge span length would be 40-60 feet.

8.28.2.3 Road Crossings

There is an unsignalized at-grade crossing proposed along this segment at the existing private driveway entrance off of Aplite Court. A second unsignalized at-grade crossing is proposed at

Olivine Avenue due to the relatively low traffic volumes and good sight distance at this location. It is not feasible to use the existing bridge structure to accommodate a trail undercrossing due to the restricted vertical clearance.

8.28.2.4 Access Areas and Amenities

Access to this segment is from Oak Avenue, Wachtel Way, and Olivine Avenue. Limited on-street parking is available on Olivine and Oak Avenues. Additionally, residents of the Creekridge community may desire access to the trail system from within their community. Amenities include basic signage (discussed later in this section).

8.28.2.5 Visual Screening

Visual screening will likely be needed in several locations where the trail is close to homes on Aplite Court, Basalt Court and Zancanaro Court.

8.28.2.6 Access Control

Fencing or fence upgrades may be needed between the trail and private residences along this section. Additionally, being a gated community, the Creekridge development may want a fence between the development and the trail.

8.28.2.7 Signage

Guidance/directional signs will be placed at the entrance from Oak Avenue and Olivine Avenue. Regulatory signage for trail users would be placed on the approach to Oak Avenue, the private entrance driveway and Olivine Avenue requiring trail users to stop and restricting vehicle access. Regulatory and guidance signs will be placed at quarter mile intervals along the trail. Weight limitation warning signs and other regulatory will be placed on either side of all bridges crossing the creek.

8.28.2.8 Retaining Walls

Small retaining walls are anticipated where the trail passes through constrained areas between the creek and private property to minimize right of way impacts. Rock slope protection is anticipated to protect the bridge foundations.

8.28.3 Environmental Compliance

Due to the proposed crossing, the following permits may be required for this segment of the trail:

- RWQCB - Section 401 Water Quality Certification and NPDES Permit
- CDFW - Section 1602 Streambed Alteration Agreement
- ACOE – Section 404 Nationwide Permit

If sensitive species such as elderberry are present, consultation with the USFWS under Section 7 of the Endangered Species Act would be necessary

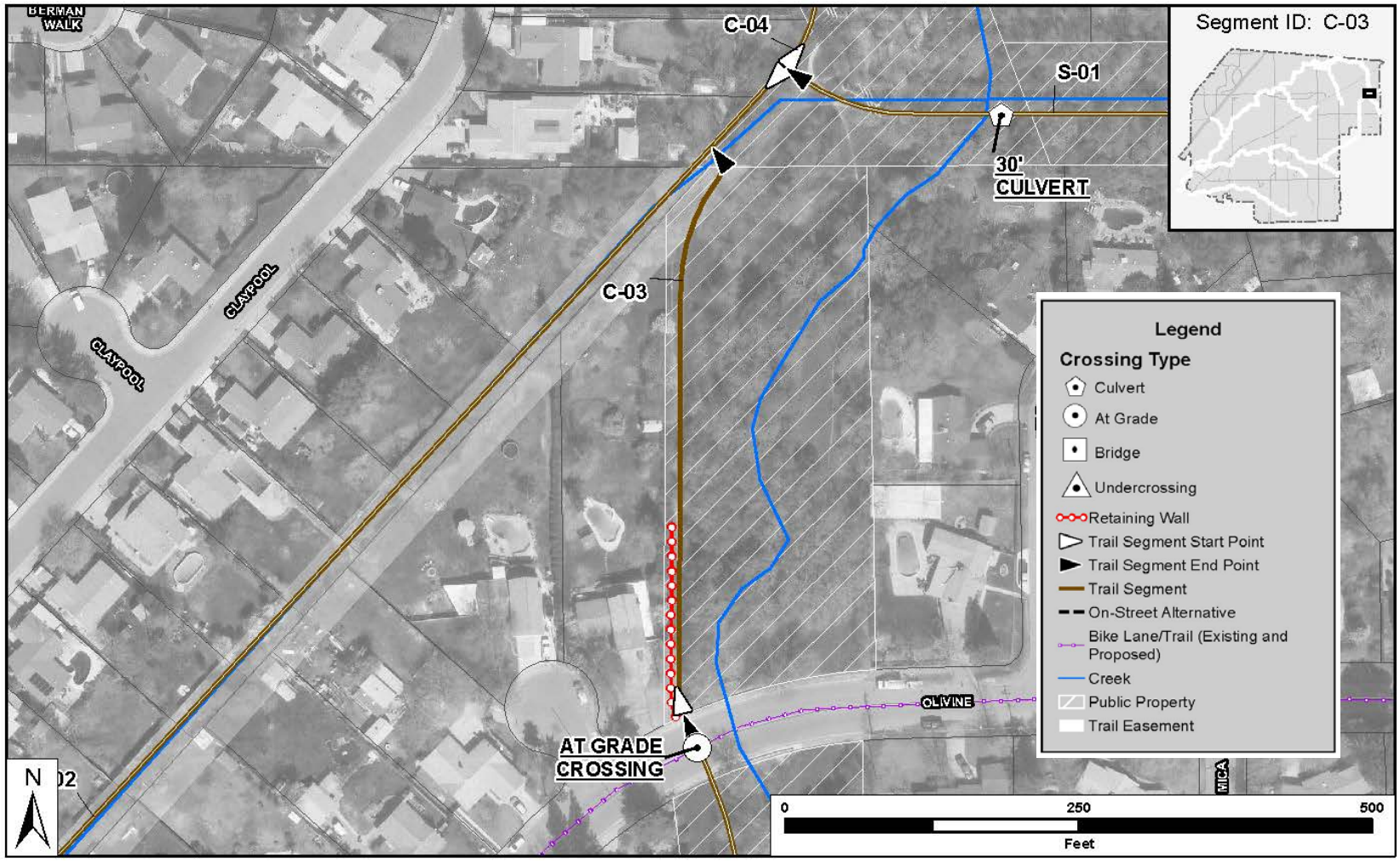
8.28.4 Additional Technical Studies

It is anticipated that the following additional technical studies will be completed during the Project Approval/Environmental Document and Design Phases of this project.

- Environmental Studies
  - Biological Assessment (BA)
  - Noise Technical Memorandum
  - Air Quality Technical Memorandum
  - Wetland Delineation
  - Natural Environment Study (NES)
  - Visual Resources – Technical Memorandum
  - Land Use and Community Impact – Technical Memorandum
- Geotechnical Analysis

- Hydrology/Hydraulic Analysis – Location Hydraulic Study
- Storm Water Pollution Prevention Plan

8.29 Segment C03



Subwatershed: Cripple Creek	Segment ID: C03	Start: Olivine Avenue	End: SMUD Corridor
LF Creek/Trail: 629'/495'	Number of Road Crossings: 0	Implementation Priority: 3	No. Potential Creek Crossings: 0

8.29.1 Preliminary Cost Estimate

Table 40 below shows a planning-level cost estimate for the recommended alignment as presented in this document. The costs do not include annual maintenance costs. The estimate is in year 2013 USD.

Table 40 – Preliminary Cost Estimate Segment C03

	Element	Costs x $1,000	Costs x $1,000
Construction	*Trail*	*130*	
	Structures	*0*	
	Mobilization (10%)	*14*	
	Contingency (20%)	*20*	
	Sub-Total Construction		**164**
Other Costs	*Utility Relocations*	*5*	
	Right of Way/Easements	*-*	
	Environmental Document (10%)	*17*	
	PS&E (10%)	*17*	
	Construction Management (12%)	*20*	
	Inspection/Testing (3%)	*5*	
	Administrative (3%)	*5*	
	Sub-Total Other		**69**
TOTAL COSTS			**233**

8.29.2 Design Elements

8.29.2.1 Trails

The recommended alignment for this segment starts at Olivine Avenue and runs along the west side of the creek, following an existing unpaved footpath to the SMUD corridor. Land is publicly owned by SRPD or the City with existing informal trails west of the creek. Topography is flat. Corridor width is roughly 100-feet. Riparian vegetation is dense, but utilizing the existing informal trail alignment would minimize impacts. This reach forms an important connector to both Cripple Creek and the SMUD corridor for Hidden Meadows, Farmette Hills, and Creekridge neighborhoods.

The proposed trail lies entirely within publicly owned property and therefore no right of way or easement costs are anticipated.

8.29.2.2 Creek Crossings

There are no creek crossings proposed within this segment.

8.29.2.3 Road Crossings

There are no roadway crossings within this segment.

8.29.2.4 Access Areas and Amenities

The SMUD corridor and Olivine Avenue provide access to this segment. Limited on-street parking is available at Olivine. Amenities are limited to signage.

8.29.2.5 Visual Screening

The proposed trail skirts close to the western edge of this corridor following the backyard fences of several residences. The need for additional screening should be evaluated as part of the detailed design of this segment.

8.29.2.6 Access Control

As with screening, the condition of and need for improvements to existing fences should be evaluated during detailed design of this segment.

8.29.2.7 Signage

Guidance/directional signs will be placed at the entrance from Olivine Avenue. Regulatory signage for trail users would be placed on the approach to Olivine Avenue requiring trail users to stop and restricting vehicle access. Regulatory and guidance signs will be placed at quarter mile intervals along the trail.

8.29.2.8 Retaining Walls

Small retaining walls are anticipated where the trail passes through constrained areas between the creek and private property close to Olivine Avenue.

8.29.3 Environmental Compliance

Due to the lack of crossings, Section 404 and 401 permits are not anticipated. An SAA should not be needed since the trail is not proposed within stream bed and bank. The following permits will likely be required for this segment of the trail:

- RWQCB - NPDES Permit

8.29.4 Additional Technical Studies

It is anticipated that the following additional technical studies will be completed during the Project Approval/Environmental Document and Design Phases of this project.

- Environmental Studies
    - Biological Assessment (BA)
    - Noise Technical Memorandum
    - Air Quality Technical Memorandum
    - Wetland Delineation
    - Natural Environment Study (NES)
    - Visual Resources – Technical Memorandum
    - Land Use and Community Impact – Technical Memorandum
- Geotechnical Analysis
- Hydrology/Hydraulic Analysis
- Storm Water Pollution Prevention Plan

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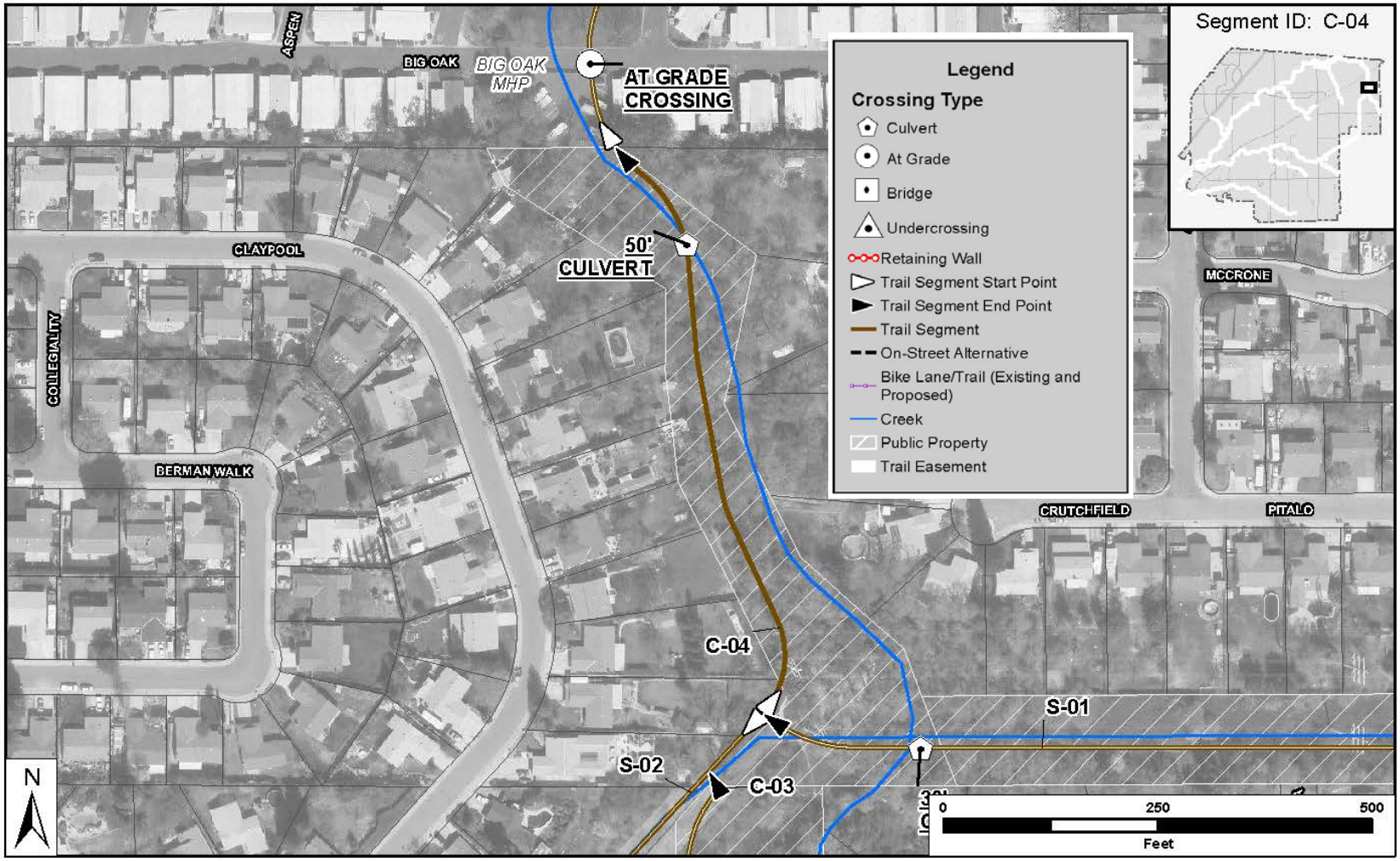
8.30 Segment C04



Subwatershed: Cripple Creek	Segment ID: C04	Start: SMUD Corridor	End: City Parcel, north boundary
LF Creek/Trail: 811'/717'	Number of Road Crossings: 0	Implementation Priority: 3	No. Potential Creek Crossings:1

8.30.1 Preliminary Cost Estimate

Table 41 below shows a planning-level cost estimate for the recommended alignment as presented in this document. The costs do not include annual maintenance costs. The estimate is in year 2013 USD.

Table 41 – Preliminary Cost Estimate Segment C04

	Element	Costs x $1,000	Costs x $1,000
Construction	*Trail*	*178*	
	Structures	*0*	
	Mobilization (10%)	*19*	
	Contingency (20%)	*28*	
	Sub-Total Construction		**225**
Other Costs	Utility Relocations	3	
	Right of Way/Easements	-	
	Environmental Document (10%)	23	
	PS&E (10%)	23	
	Construction Management (12%)	27	
	Inspection/Testing (3%)	7	
	Administrative (3%)	7	
	Sub-Total Other		**90**
TOTAL COSTS			**315**

8.30.2 Design Elements

8.30.2.1 Trails

The recommended alignment for this segment starts at the connection point with the SMUD corridor trail and runs along the west side of the creek to the City property boundary. The trail would terminate at this boundary unless a connection to Old Auburn Road through private property is achieved. Land is in public ownership on both sides of the creek. Corridor width is adequate (60 feet minimum). Heavily wooded with occasional openings. Few topographic constraints. Trail in this reach would be of limited value, primarily functioning as a local recreational resource, unless connection could be made through downstream reach C05 to Big Oak Drive to Old Auburn Road.

The proposed trail lies entirely within publicly owned property and therefore no right of way or easement costs are anticipated.

8.30.2.2 Creek Crossings

There is one proposed creek crossing just south of the Big Oak Mobile Home Park property boundary. The approximate span length of this pre-fabricated steel bridge is 60 feet.

8.30.2.3 Road Crossings

There are no roadway crossings within this segment.

8.30.2.4 Access Areas and Amenities

This segment is accessed from the SMUD corridor. There is no access at the north end unless a connection can be negotiated with neighboring property owners at Big Oak Drive.

8.30.2.5 Visual Screening

Vegetation in this area is dense; however, screening should be evaluated between the trail and the homes to the west as part of detailed design for this segment.

8.30.2.6 Access Control

Residences along Claypool Way should be approached regarding the desire for additional access control and visual screening. The creek and native vegetation form a barrier to control access to the east.

8.30.2.7 Signage

Guidance/directional signs will be placed at the connection point with the SMUD Corridor trail. Regulatory and guidance signs will be placed at quarter mile intervals along the trail.

8.30.2.8 Retaining Walls

No retaining walls are anticipated along this segment.

8.30.3 Environmental Compliance

Due to the proposed crossing, the following permits may be required for this segment of the trail:

- RWQCB - Section 401 Water Quality Certification and NPDES Permit
- CDFW - Section 1602 Streambed Alteration Agreement
- ACOE – Section 404 Nationwide Permit

If sensitive species such as elderberry are present, consultation with the USFWS under Section 7 of the Endangered Species Act would be necessary

8.30.4 Additional Technical Studies

It is anticipated that the following additional technical studies will be completed during the Project Approval/Environmental Document and Design Phases of this project.

- Environmental Studies
  - Biological Assessment (BA)
  - Noise Technical Memorandum
  - Air Quality Technical Memorandum
  - Wetland Delineation
  - Natural Environment Study (NES)
  - Visual Resources – Technical Memorandum
  - Land Use and Community Impact – Technical Memorandum
- Geotechnical Analysis
- Hydrology/Hydraulic Analysis
- Storm Water Pollution Prevention Plan

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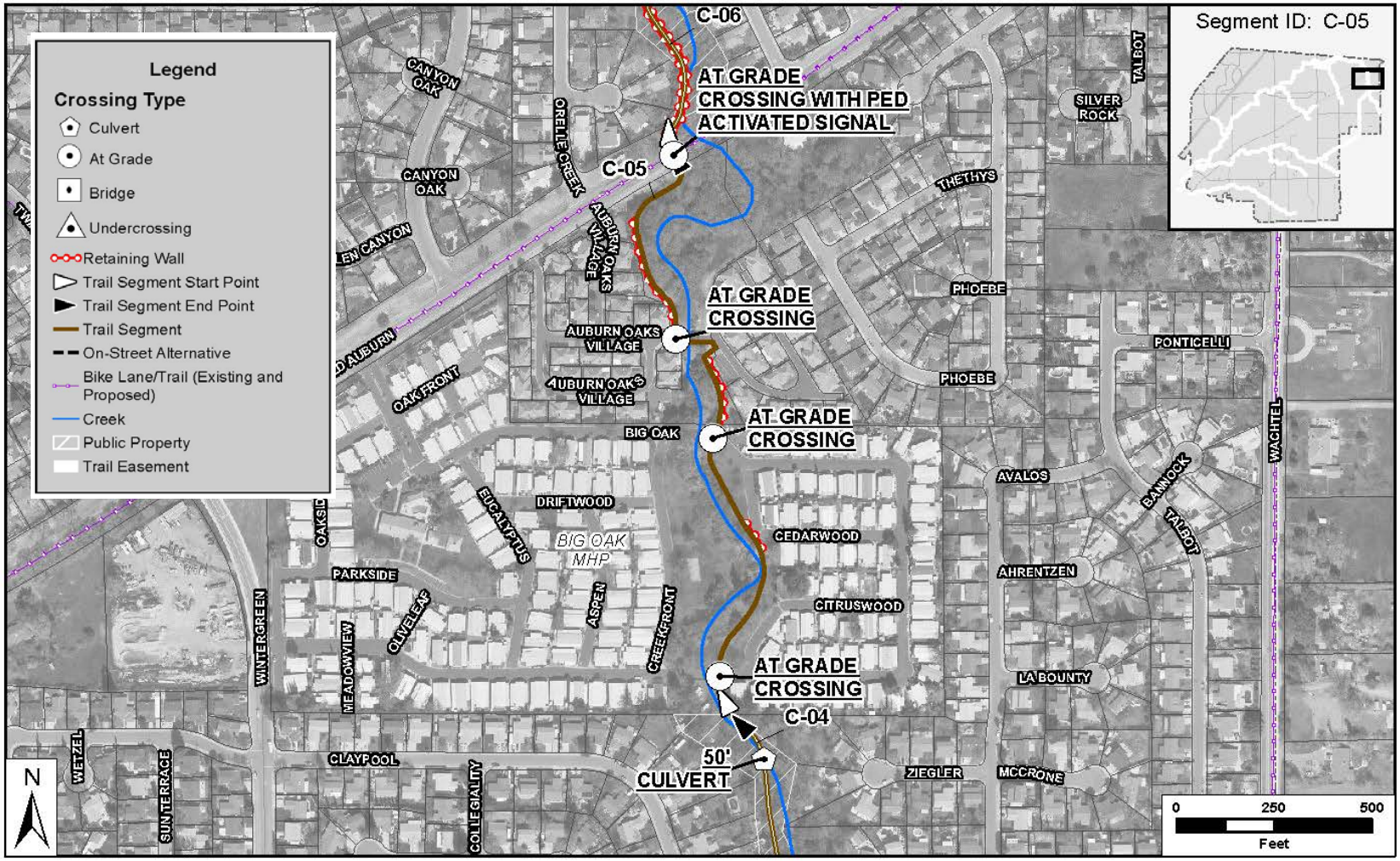
8.31 Segment C05



Subwatershed: Cripple Creek	Segment ID: C05	Start: City Parcel, north boundary	End: Old Auburn Road
LF Creek/Trail: 1892'/1735'	Number of Road Crossings: 4	Implementation Priority: 3	No. Potential Creek Crossings: 0

8.31.1 Preliminary Cost Estimate

Table 42 below shows a planning-level cost estimate for the recommended alignment as presented in this document. The costs do not include annual maintenance costs. The estimate is in year 2013 USD.

Table 42 – Preliminary Cost Estimate Segment C05

	Element	Costs x $1,000	Costs x $1,000
Construction	*Trail*	*675*	
	Structures	*0*	
	Mobilization (10%)	*71*	
	Contingency (20%)	*106*	
	Sub-Total Construction		**852**
Other Costs	*Utility Relocations*	*11*	
	Right of Way/Easements	*179*	
	Environmental Document (10%)	*86*	
	PS&E (10%)	*86*	
	Construction Management (12%)	*103*	
	Inspection/Testing (3%)	*26*	
	Administrative (3%)	*26*	
	Sub-Total Other		**517**
TOTAL COSTS			**1,369**

8.31.2 Design Elements

8.31.2.1 Trails

The recommended alignment for this segment starts at the City property boundary and crosses to the east side of the creek via a bridge, just south of Big Oak Drive where it enters Big Oak Mobile Home Park property. At-grade crossings are proposed over Big Oak Drive (twice). The trail remains on the east side until Auburn Oaks Village Lane where the existing bridge would be used to cross back to the west side of the creek. From there the alignment runs on the west side of the creek to a pedestrian activated at grade crossing of Old Auburn Road. This reach flows through private land owned by two landowners: Big Oak Mobile Home Park and Auburn Oaks Village. Segment within the Big Oak Mobile Home Park is maintained as a landscaped area by the mobile home park. Segment within Auburn Oaks Village is identified as common area. Stream banks in this reach are moderately steep. Connection to upstream reach would require ROW/acquisition through an RV storage yard within the mobile home park and Auburn Oaks Village.

The proposed trail lies entirely within privately owned property, requiring right of way acquisition or easements for the trail.

8.31.2.2 Creek Crossings

There are no creek crossings proposed within this segment.

8.31.2.3 Road Crossings

There are three unsignalized at-grade roadway crossings within the Big Oak Mobile Home Park property at Big Oaks Drive (twice) and Auburn Oaks Village Lane. At Old Auburn Road

it is proposed to install a pedestrian activated signal to accommodate the at-grade crossing, only if the trail is continued to the south and north of Old Auburn Road. It is not feasible to use the existing bridge structure on Old Auburn Road to accommodate a trail undercrossing due to the restricted vertical clearance.

8.31.2.4 Access Areas and Amenities

Access to this segment occurs through the upstream trail, Big Oak Drive (private), Auburn Oaks Lane (private) and Old Auburn Road. The trail will tie into the Class I bike trail being constructed by the City of Citrus Heights along the north side of Old Auburn Road. Amenities include trail signage (rules, directional and warning).

8.31.2.5 Visual Screening

If access can be negotiated for this segment, screening should be dictated by the access agreements. The Big Oak Park community may want to maintain the open nature of the existing trails, and the Auburn Oaks Village Lane may desire more privacy screening. These communities should be engaged in the detailed design of this segment.

8.31.2.6 Access Control

Access Control will depend upon the desire of the communities noted above and any negotiated access agreements.

8.31.2.7 Signage

Guidance/directional signs will be placed at the at-grade roadway crossings and at Old Auburn Road. Regulatory signage for trail users would be placed on the approach to Big Oak Drive, Auburn Oaks Village Lane and Old Auburn Road requiring trail users to stop and restricting vehicle access. Regulatory and guidance signs will be placed at quarter mile intervals along the trail. Weight limitation warning signs and other regulatory will be placed on either side of all bridges crossing the creek.

8.31.2.8 Retaining Walls

Retaining walls are anticipated in constrained areas just south of Big Oak Lane and on the approach to Old Auburn Road. Rock slope protection is anticipated to protect the bridge foundations.

8.31.3 Environmental Compliance

Due to the lack of crossings, Section 404 and 401 permits are not anticipated. An SAA should not be needed since the trail is not proposed within stream bed and bank. The following permits will likely be required for this segment of the trail:

- RWQCB - NPDES Permit

Should the retaining walls encroach upon the creek bed and bank, additional permits will be required.

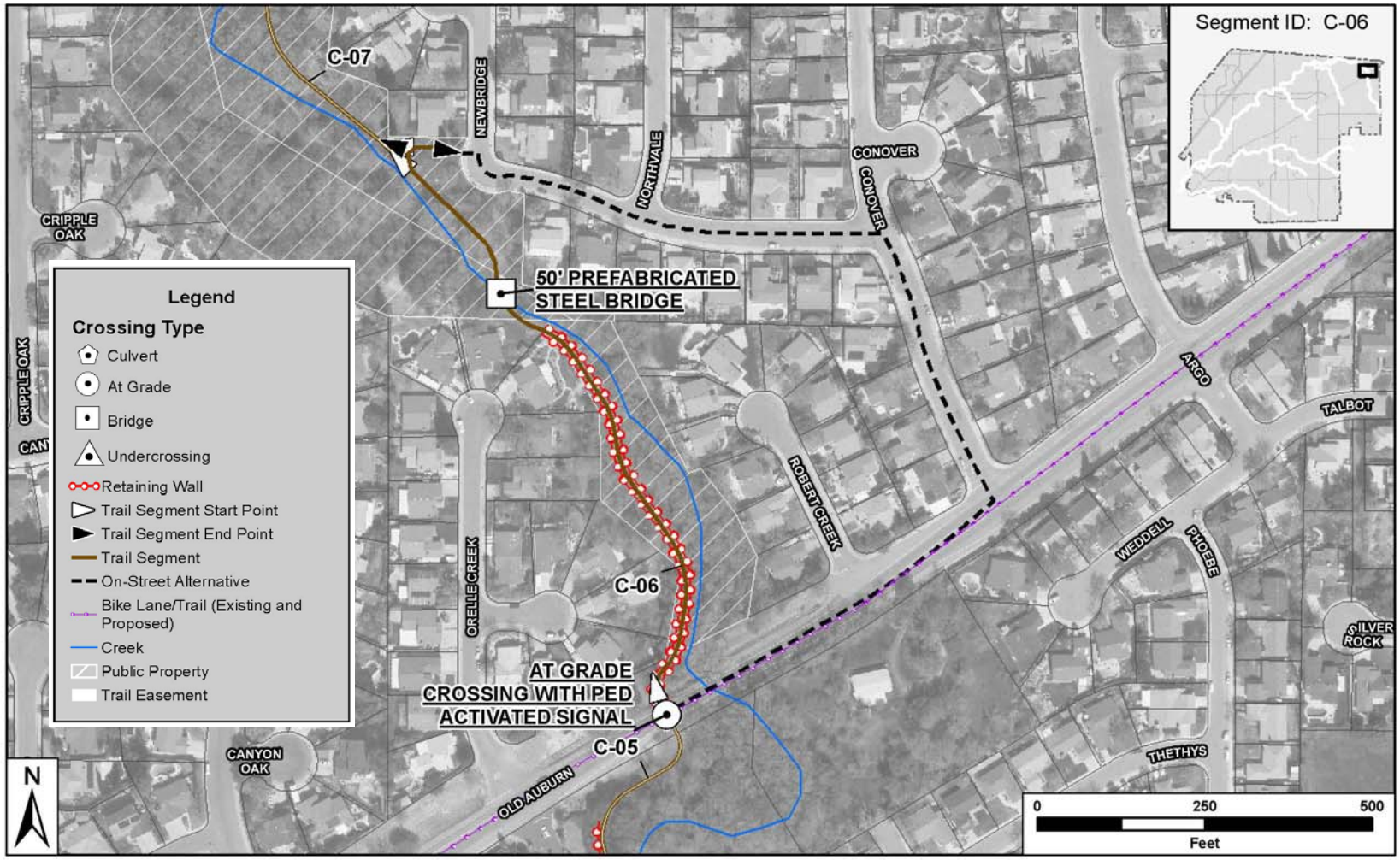
8.31.4 Additional Technical Studies

It is anticipated that the following additional technical studies will be completed during the Project Approval/Environmental Document and Design Phases of this project.

- Environmental Studies
  - Biological Assessment (BA)
  - Noise Technical Memorandum
  - Air Quality Technical Memorandum
  - Wetland Delineation
  - Natural Environment Study (NES)
  - Visual Resources – Technical Memorandum

    - Land Use and Community Impact – Technical Memorandum
- Geotechnical Analysis
- Hydrology/Hydraulic Analysis – Location Hydraulic Study
- Storm Water Pollution Prevention Plan

8.32 Segment C06



Subwatershed: Cripple Creek	Segment ID: C06	Start: Old Auburn Road	End: Newbridge Way
LF Creek/Trail: 934'1068'	Number of Road Crossings: 0	Implementation Priority: 2	No. Potential Creek Crossings: 1

8.32.1 Preliminary Cost Estimate

Table 43 below shows a planning-level cost estimate for the recommended alignment as presented in this document. The costs do not include annual maintenance costs. The estimate is in year 2013 USD.

Table 43 – Preliminary Cost Estimate Segment C06

	Element	Costs x $1,000	Costs x $1,000
Construction	*Trail*	*767*	
	Structures	*144*	
	Mobilization (10%)	*81*	
	Contingency (20%)	*121*	
	Sub-Total Construction		**1,113**
Other Costs	*Utility Relocations*	*11*	
	Right of Way/Easements	*-*	
	Environmental Document (10%)	*112*	
	PS&E (10%)	*112*	
	Construction Management (12%)	*134*	
	Inspection/Testing (3%)	*34*	
	Administrative (3%)	*34*	
	Sub-Total Other		**437**
TOTAL COSTS			**1,550**

8.32.2 Design Elements

8.32.2.1 Trails

The recommended alignment for this segment starts at Old Auburn Road on the west side of the creek through a very constrained area requiring retaining walls. A creek crossing is anticipated to shift the alignment to the east side to facilitate a connection to Newbridge Way. This reach is publicly owned by the City. Creek banks are steep and area is heavily wooded, but trail appears feasible with two or more crossings and retaining walls. Alternate on-street route would follow Old Auburn to Conover to Newbridge. The City will be constructing a multi-use trail parallel to Old Auburn Road in 2014, providing connectivity to this segment.

The proposed trail lies entirely within publicly owned property and therefore no right of way or easement costs are anticipated.

8.32.2.2 Creek Crossings

There is one proposed creek crossing, just south of Newbridge Way. The approximate span length of this pre-fabricated steel bridge is 60 feet.

8.32.2.3 Road Crossings

There are no roadway crossings within this segment.

8.32.2.4 Access Areas and Amenities

The segment is accessed via the Class I bike trail being constructed along Old Auburn Road and Newbridge Way. Limited on-street parking is available on Newbridge. Basic trail signage will be installed on this segment.

8.32.2.5 Visual Screening

Some additional screening may be required between the trail and homes on Orelle Creek Court, Robert Creek Court and Newbridge Way. Due to spatial constraints, fencing is probably more appropriate for screening than vegetation.

8.32.2.6 Access Control

The creek, existing vegetation and backyard fencing are the primary mechanisms of keeping users on the trail. Vegetation is currently relatively dense. Fencing should be evaluated during detailed design and residents consulted regarding access control and screening preferences.

8.32.2.7 Signage

Guidance/directional signs will be placed at Old Auburn Road. Regulatory signage for trail users would be placed on the approach to Old Auburn Road requiring trail users to stop and restricting vehicle access. Regulatory and guidance signs will be placed at quarter mile intervals along the trail. Weight limitation warning signs and other regulatory will be placed on either side of all bridges crossing the creek.

8.32.2.8 Retaining Walls

Substantial retaining walls are anticipated for approximately 300 feet in the constrained area between the creek and property boundary, just north of Old Auburn Road. Rock slope protection is anticipated to protect the bridge foundations.

8.32.3 Environmental Compliance

Due to the proposed crossing, the following permits may be required for this segment of the trail:

- RWQCB - Section 401 Water Quality Certification and NPDES Permit
- CDFW - Section 1602 Streambed Alteration Agreement
- ACOE – Section 404 Nationwide Permit

If sensitive species such as elderberry are present, consultation with the USFWS under Section 7 of the Endangered Species Act would be necessary.

8.32.4 Additional Technical Studies

It is anticipated that the following additional technical studies will be completed during the Project Approval/Environmental Document and Design Phases of this project.

- Environmental Studies
  - Biological Assessment (BA)
  - Noise Technical Memorandum
  - Air Quality Technical Memorandum
  - Wetland Delineation
  - Natural Environment Study (NES)
  - Visual Resources – Technical Memorandum
  - Land Use and Community Impact – Technical Memorandum
- Geotechnical Analysis
- Hydrology/Hydraulic Analysis – Location Hydraulic Study
- Storm Water Pollution Prevention Plan

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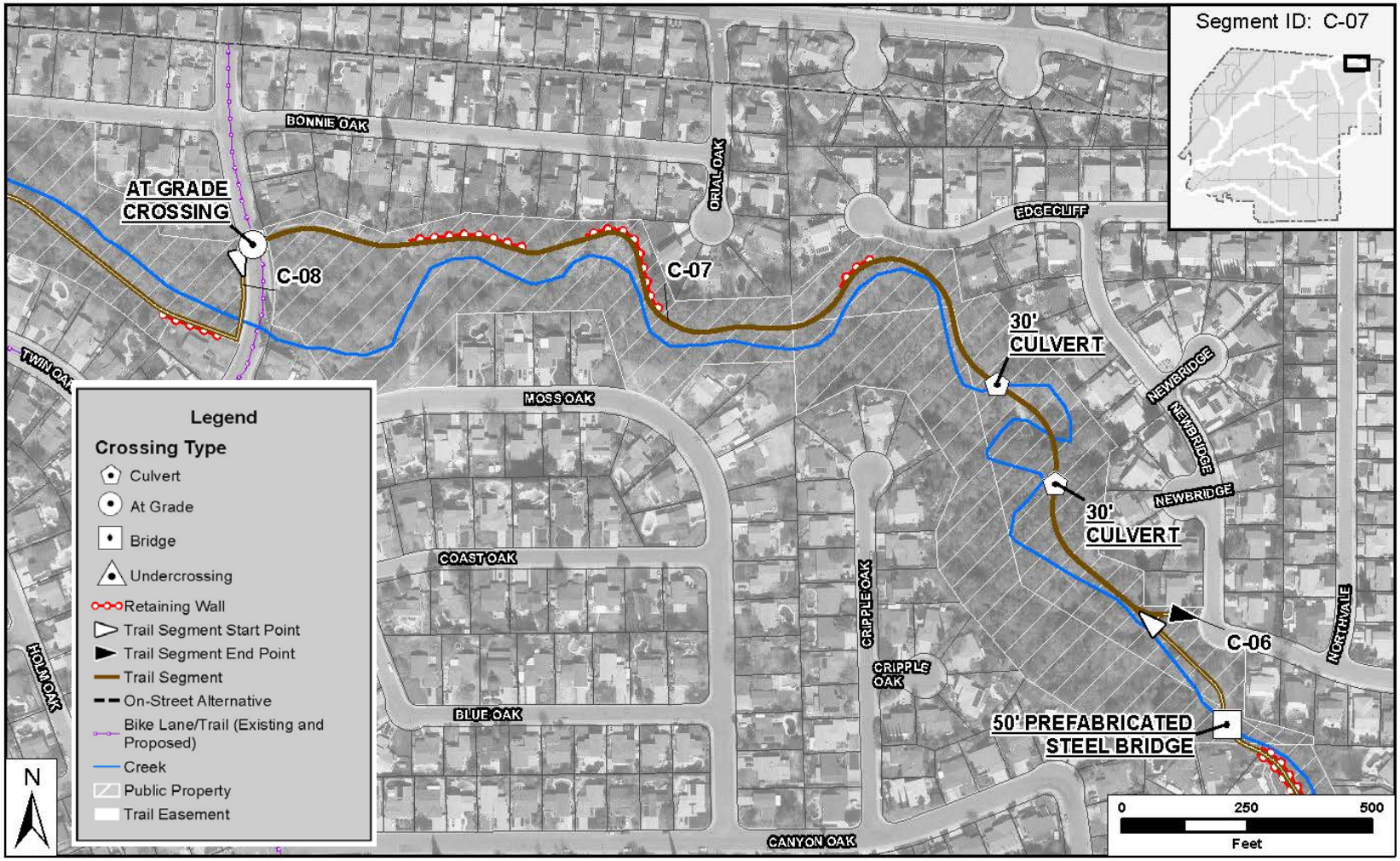
8.33 Segment C07



Subwatershed: Cripple Creek	Segment ID: C07	Start: Newbridge Way	End: Crestmont Avenue
LF Creek/Trail: 3065'/2486'	Number of Road Crossings: 1	Implementation Priority: 2	No. Potential Creek Crossings: 2

8.33.1 Preliminary Cost Estimate

Table 44 below shows a planning-level cost estimate for the recommended alignment as presented in this document. The costs do not include annual maintenance costs. The estimate is in year 2013 USD.

Table 44 – Preliminary Cost Estimate Segment C07

	Element	Costs x $1,000	Costs x $1,000
Construction	*Trail*	*859*	
	Structures	*0*	
	Mobilization (10%)	*90*	
	Contingency (20%)	*135*	
	Sub-Total Construction		**1,084**
Other Costs	*Utility Relocations*	*5*	
	Right of Way/Easements	*-*	
	Environmental Document (10%)	*109*	
	PS&E (10%)	*109*	
	Construction Management (12%)	*131*	
	Inspection/Testing (3%)	*33*	
	Administrative (3%)	*33*	
	Sub-Total Other		**420**
TOTAL COSTS			**1,504**

8.33.2 Design Elements

8.33.2.1 Trails

The recommended alignment for this segment starts at the connection point with Newbridge Way, on the north side of the creek. The alignment briefly crosses the creek twice via two bridges or culvert structures and continues west to a proposed at-grade crossing at Crestmont Avenue. Land within this reach is publicly owned by SRPD and the City. Existing informal trails run through this reach, crossing the creek twice. Topography is generally flat, and tree impacts could be minimized by utilizing much of the existing trail. Crossings could be avoided or minimized by locating the trail on the right bank. Corridor width ranges from 100 to 250 feet. Informal recreational uses, including a BMX bike course, were in evidence at the time of the field visit. An additional crossing of the creek may be considered to connect the trail to Moss Avenue to the south.

The proposed trail lies entirely within publicly owned property and therefore no right of way or easement costs are anticipated.

8.33.2.2 Creek Crossings

There are two creek crossings proposed within this segment. For the purposes of this report these crossings have been identified as culvert crossings. During the next phase the type of crossing will be assessed in greater detail. An additional crossing may be considered to connect to Moss Oak Avenue.

8.33.2.3 Road Crossings

An unsignalized at-grade crossing is proposed at Crestmont Avenue due to the relatively low traffic volumes and good sight distance at this location. It is not feasible to use the

existing bridge structure to accommodate a trail undercrossing due to the restricted vertical clearance.

8.33.2.4 Access Areas and Amenities

Access to this segment is through Crestmont Avenue, Edgecliff Court and Newbridge Way. An additional connection could be made to Moss Oak Avenue. Limited on-street parking is available on Newbridge Way and Crestmont Avenue. Additionally, SRPD owned property at Edgecliff Court has the potential to be developed into a future passive-use nature park site. Amenities appropriate for this segment include trail signage. Additional amenities such as benches, trash receptacles, a pet waste station and interpretive signage could be appropriate if additional improvements are made in the future.

8.33.2.5 Visual Screening

The open space corridor is wide, and vegetation is relatively dense throughout this segment. Additional screening is not anticipated, but should be evaluated further during detailed design.

8.33.2.6 Access Control

Access control beyond that provided by existing vegetation and fencing is not anticipated.

8.33.2.7 Signage

Guidance/directional signs will be placed at Newbridge Way and Crestmont Avenue. Regulatory signage for trail users would be placed on the approach to Crestmont Avenue requiring trail users to stop and restricting vehicle access. Regulatory and guidance signs will be placed at quarter mile intervals along the trail.

8.33.2.8 Retaining Walls

No retaining walls have been identified along this segment however rock slope protection is anticipated to protect the integrity of the proposed box culverts.

8.33.2.9 Environmental Compliance

Due to the two proposed crossings, and associated abutments and channel stabilization, the following permits may be required for this segment of the trail:

- RWQCB – Section 401 Water Quality Certification and NPDES Permit
- CDFW – Section 1602 Streambed Alteration Agreement
- ACOE – Section 404 Nationwide Permit

If sensitive species are identified in the biological assessment, consultation with the USFWS under Section 7 of the Endangered Species Act will be necessary.

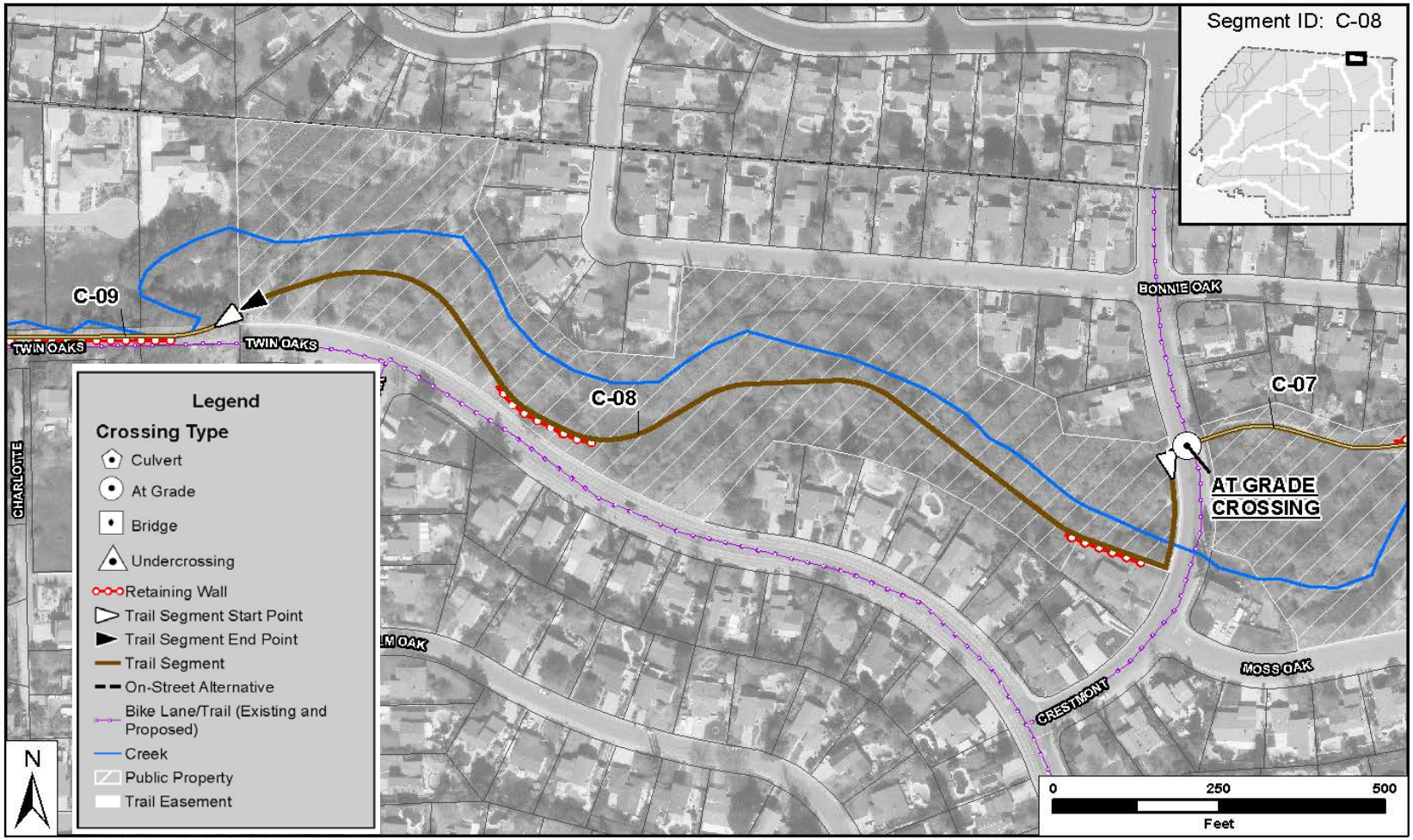
8.33.3 Additional Technical Studies

It is anticipated that the following additional technical studies will be completed during the Project Approval/Environmental Document and Design Phases of this project.

- Environmental Studies
  - Biological Assessment (BA)
  - Noise Technical Memorandum
  - Air Quality Technical Memorandum
  - Wetland Delineation
  - Natural Environment Study (NES)
  - Visual Resources – Technical Memorandum
  - Land Use and Community Impact – Technical Memorandum

- Geotechnical Analysis
- Hydrology/Hydraulic Analysis
- Storm Water Pollution Prevention Plan

8.34 Segment C08



Subwatershed: Cripple Creek	Segment ID: C08	Start: Crestmont Avenue	End: Dept. Water Resources parcel W. boundary
LF Creek/Trail: 1670'/1804'	Number of Road Crossings: 0	Implementation Priority: 2	No. Potential Creek Crossings: 0

8.34.1 Preliminary Cost Estimate

Table 45 below shows a planning-level cost estimate for the recommended alignment as presented in this document. The costs do not include annual maintenance costs. The estimate is in year 2013 USD.

Table 45 – Preliminary Cost Estimate Segment C08

	Element	Costs x $1,000	Costs x $1,000
Construction	*Trail*	*373*	
	Structures	*0*	
	Mobilization (10%)	*39*	
	Contingency (20%)	*59*	
	Sub-Total Construction		**471**
Other Costs	*Utility Relocations*	*5*	
	Right of Way/Easements	*-*	
	Environmental Document (10%)	*48*	
	PS&E (10%)	*48*	
	Construction Management (12%)	*57*	
	Inspection/Testing (3%)	*15*	
	Administrative (3%)	*15*	
	Sub-Total Other		**188**
TOTAL COSTS			**659**

8.34.2 Design Elements

8.34.2.1 Trails

The recommended alignment for this segment starts at Crestmont Avenue and follows an existing unpaved footpath along the south side of the creek to the Sacramento County Water Resources property boundary. Land is publicly owned by the Sacramento County Department of Water Resources. Existing trails run from Crestmont Avenue to Twin Oaks Avenue. Generally few topographic or vegetation constraints except for outside meander bend adjacent to Twin Oaks Avenue, which could require retaining wall. Corridor ranges from 150 to 300 feet wide.

The proposed trail lies entirely within publicly owned property and therefore no right of way or easement costs are anticipated.

8.34.2.2 Creek Crossings

There are no creek crossings proposed within this segment.

8.34.2.3 Road Crossings

There are no roadway crossings within this segment.

8.34.2.4 Access Areas and Amenities

Eastern access to this segment is from Crestmont Avenue. Where the trail alignment borders on Twin Oaks Avenue, a connection will be provided to the on-street facilities along Twin Oaks Avenue and south following Gary Oak Drive. On-street parking is available along Twin Oaks Avenue. Amenities would be limited to basic signage.

8.34.2.5 Visual Screening

Existing fencing provides screening between the backyards of homes along Twin Oaks Avenue and the informal trail running through this area. Existing fencing should be evaluated during the detailed design phase and recommendations formulated for retaining or upgrading fencing. Additional buffering west of these backyards is not anticipated.

8.34.2.6 Access Control

Access control is provided by existing fencing. Detailed design should assess adequacy of existing fencing for preventing off-trail trespass.

8.34.2.7 Signage

Guidance/directional signs will be placed at Crestmont Avenue and at the connection tie-in point with Twin Oaks Avenue. Regulatory signage for trail users would be placed on the approach to Crestmont Avenue requiring trail users to stop and restricting vehicle access. Regulatory and guidance signs will be placed at quarter mile intervals along the trail.

8.34.2.8 Retaining Walls

Just east of Gary Oak Drive the proposed alignment passes through a constrained area between the creek and Twin Oaks Avenue. This area will require retaining walls and cut-off walls and bank stabilization.

8.34.3 Environmental Compliance

Since no creek crossings are proposed, anticipated environmental permits are limited to an RWQCB NPDES Permit.

8.34.4 Additional Technical Studies

It is anticipated that the following additional technical studies will be completed during the Project Approval/Environmental Document and Design Phases of this project.

- Environmental Studies
  - Biological Assessment (BA)
  - Noise Technical Memorandum
  - Air Quality Technical Memorandum
  - Wetland Delineation
  - Natural Environment Study (NES)
  - Visual Resources – Technical Memorandum
  - Land Use and Community Impact – Technical Memorandum
- Geotechnical Analysis
- Hydrology/Hydraulic Analysis
- Storm Water Pollution Prevention Plan

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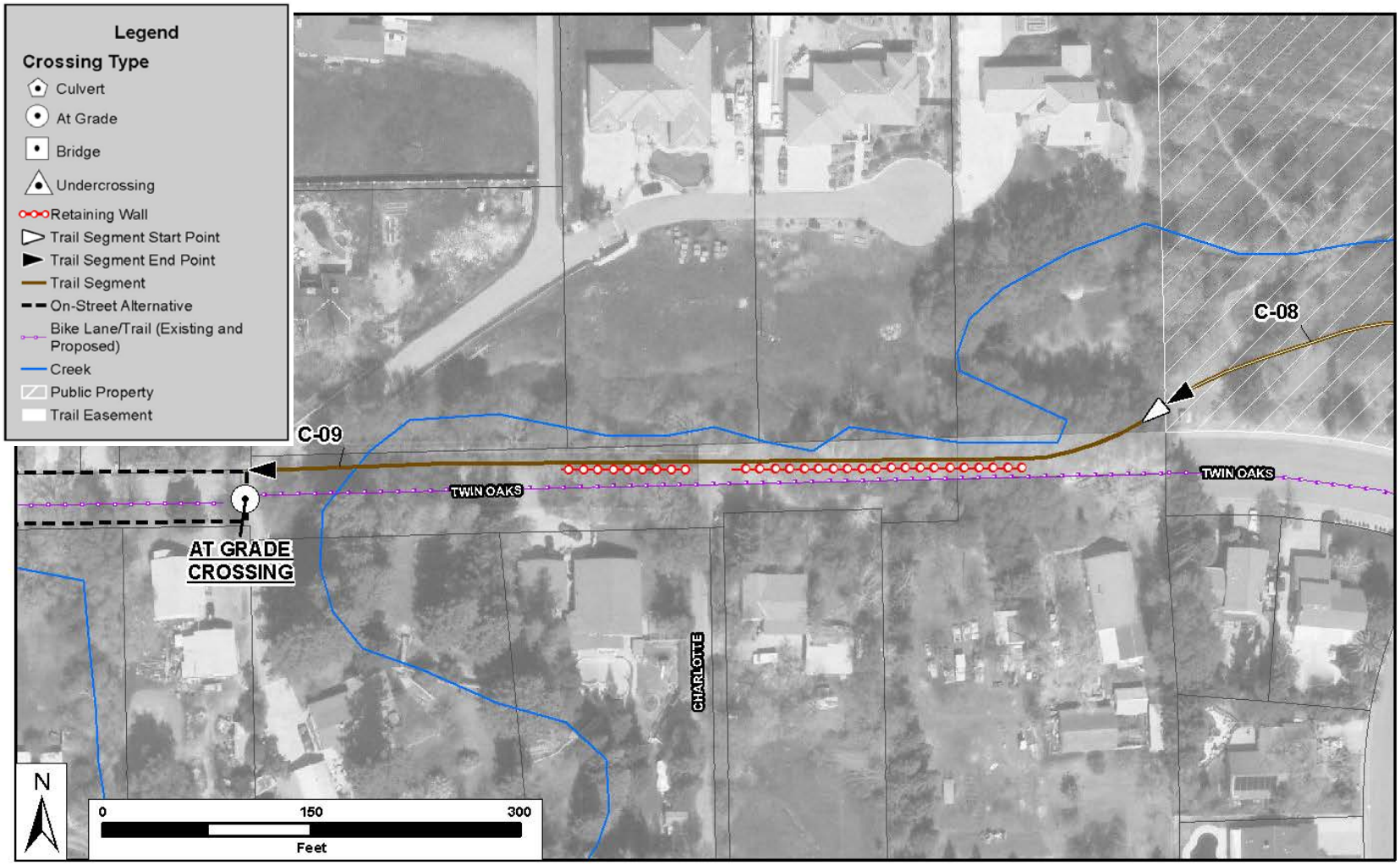
8.35 Segment C09



Subwatershed: Cripple Creek	Segment ID: C09	Start: Dept. Water Resources parcel W. boundary	End: Twin Oaks Avenue
LF Creek/Trail: 875'/670'	Number of Road Crossings: 1	Implementation Priority: 2	No. Potential Creek Crossings: 0

8.35.1 Preliminary Cost Estimate

Table 46 below shows a planning-level cost estimate for the recommended alignment as presented in this document. The costs do not include annual maintenance costs. The estimate is in year 2013 USD.

Table 46 – Preliminary Cost Estimate Segment C09

	Element	Costs x $1,000	Costs x $1,000
Construction	*Trail*	*314*	
	Structures	*0*	
	Mobilization (10%)	*33*	
	Contingency (20%)	*49*	
	Sub-Total Construction		**396**
Other Costs	Utility Relocations	5	
	Right of Way/Easements	69	
	Environmental Document (10%)	40	
	PS&E (10%)	40	
	Construction Management (12%)	48	
	Inspection/Testing (3%)	12	
	Administrative (3%)	12	
	Sub-Total Other		**226**
TOTAL COSTS			**622**

8.35.2 Design Elements

8.35.2.1 Trails

The recommended alignment for this segment starts at the western boundary of the Water Resources property and remains on the south side of the creek, following the existing access road and easement to tie into Twin Oaks Avenue which will have Class 2 Bike Lanes in the future. An Irrevocable Offer of Dedication (IOD) connects the gap in Twin Oaks Avenue along right bank of creek. This area is currently being used as private drive. A Class I bike path is proposed in the City's Bicycle Master Plan for this segment. The creek meanders close to road easement. To accommodate existing driveway access to the private residences along this alignment from Twin Oaks Avenue, it is proposed to create an access road to the south of the trail alignment. A potential exists for trail alignment along private open space on the north bank but would require easement/fee title purchase, as well as one pedestrian/bike bridge.

About 35 feet of the proposed trail lies within privately owned property, requiring right of way acquisition or easements for the trail. The remaining portion of the trail lies within an existing road easement or along the road in public property.

8.35.2.2 Creek Crossings

There are no creek crossings proposed along this segment.

8.35.2.3 Road Crossings

There are no formal roadway crossings within this segment. The trail will terminate where the alignment meets the driveway entrance off of Twin Oaks Avenue. An at-grade pedestrian crossing may be considered at the terminus point.

8.35.2.4 Access Areas and Amenities

Twin Oaks Avenue provides access to the both ends of this segment. Amenities are limited to basic trail signage.

8.35.2.5 Visual Screening

The trail shares the right-of-way with a driveway to the house at the end of the western run of Twin Oaks Avenue, and the trail will pass relatively close to the house. Visual screening will likely be needed along the length of this parcel due to proximity. Due to space constraints, a fence or wall is likely the appropriate screen, depending upon the preference of the land owner.

8.35.2.6 Access Control

A fence or wall used for visual screening will also function to keep trail users on the path. A gate may be desired by the homeowner to access the path.

8.35.2.7 Signage

Guidance/directional signs will be placed at the terminus point at Twin Oaks Avenue. Regulatory signage for trail users would be placed on the approach to the driveway entrance off of Twin Oaks Avenue requiring trail users to stop and restricting vehicle access. Regulatory and guidance signs will be placed at quarter mile intervals along the trail. Weight limitation warning signs and other regulatory will be placed on either side of all bridges crossing the creek.

8.35.2.8 Retaining Walls

To accommodate the proposed trail and reconstruct the existing driveway access, a retaining wall is anticipated along the south side of the new access driveway. Rock slope protection will be required to protect the integrity of the box culvert structure.

8.35.3 Environmental Compliance

Due to the proposed crossing, associated abutments, and channel stabilization, the following permits may be required for this segment of the trail:

- RWQCB - Section 401 Water Quality Certification and NPDES Permit
- CDFW - Section 1602 Streambed Alteration Agreement
- ACOE – Section 404 Nationwide Permit

If sensitive species are identified in the biological assessment, consultation with the USFWS under Section 7 of the Endangered Species Act will be necessary.

8.35.4 Additional Technical Studies

It is anticipated that the following additional technical studies will be completed during the Project Approval/Environmental Document and Design Phases of this project.

- Environmental Studies
  - Biological Assessment (BA)
  - Noise Technical Memorandum
  - Air Quality Technical Memorandum
  - Wetland Delineation
  - Natural Environment Study (NES)
  - Visual Resources – Technical Memorandum
  - Land Use and Community Impact – Technical Memorandum
- Geotechnical Analysis
- Hydrology/Hydraulic Analysis – Location Hydraulic Study
- Storm Water Pollution Prevention Plan

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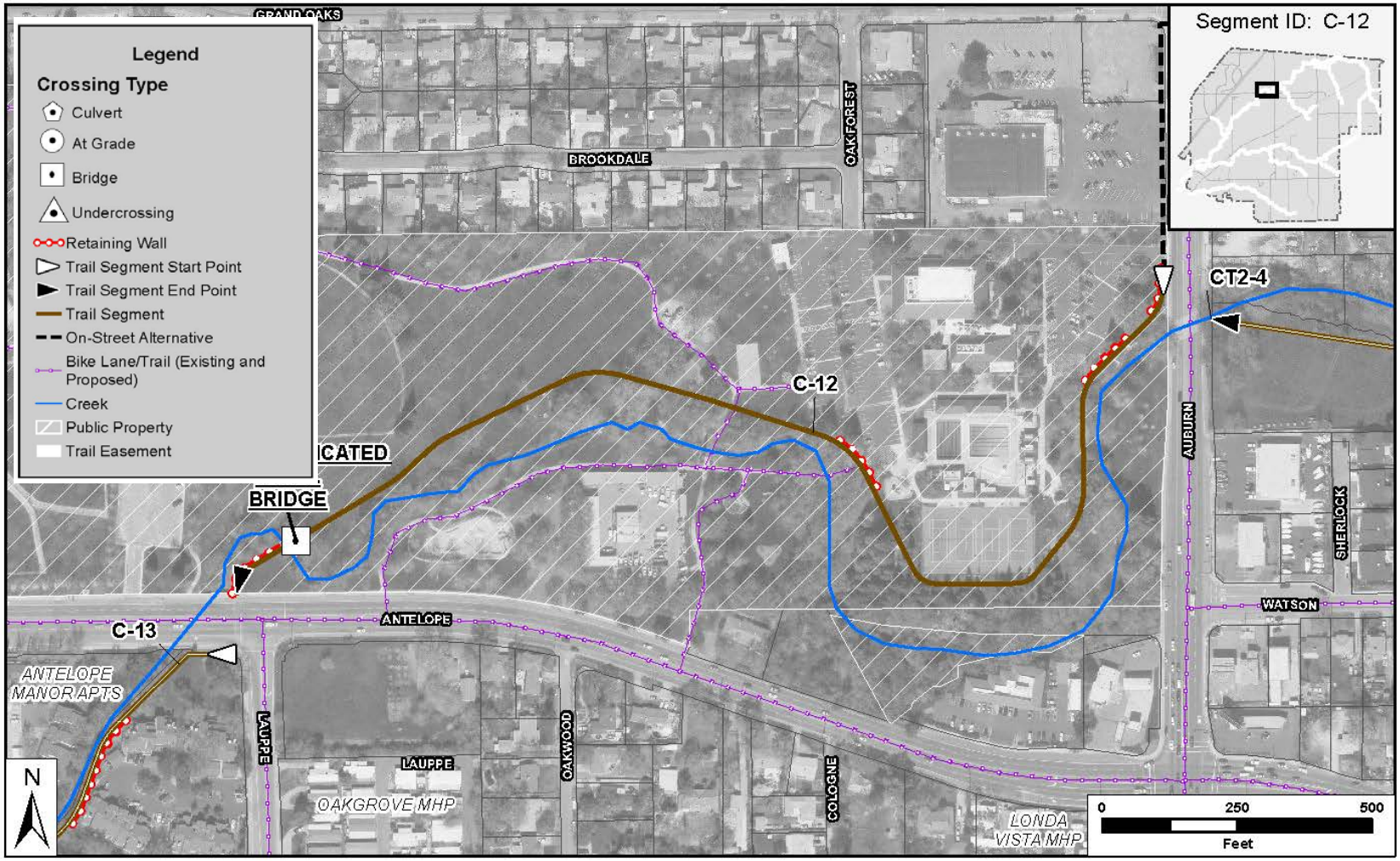
8.36 Segment C12



Subwatershed: Cripple Creek	Segment ID: C12	Start: Auburn Boulevard	End: Antelope Road
LF Creek/Trail: 2926'/2440'	Number of Road Crossings: 1	Implementation Priority: 3	No. Potential Creek Crossings: 1

8.36.1 Preliminary Cost Estimate

Table 47 below shows a planning-level cost estimate for the recommended alignment as presented in this document. The costs do not include annual maintenance costs. The estimate is in year 2013 USD.

Table 47 – Preliminary Cost Estimate Segment C12

	Element	Costs x $1,000	Costs x $1,000
Construction	*Trail*	*414*	
	Structures	*144*	
	Mobilization (10%)	*44*	
	Contingency (20%)	*65*	
	Sub-Total Construction		**667**
Other Costs	*Utility Relocations*	*11*	
	Right of Way/Easements	*-*	
	Environmental Document (10%)	*67*	
	PS&E (10%)	*67*	
	Construction Management (12%)	*81*	
	Inspection/Testing (3%)	*21*	
	Administrative (3%)	*21*	
	Sub-Total Other		**268**
TOTAL COSTS			**935**

8.36.2 Design Elements

8.36.2.1 Trails

The recommended alignment for this segment starts at the tie-in with the newly constructed separated sidewalk on the west side of Auburn Boulevard and runs westwards north of the creek. The trail then runs between the tennis courts and the creek and roughly follows the creek alignment to the existing traffic signal at Lauppe Lane and Antelope Road. Just north of Antelope Road the alignment crosses over the creek on a proposed bridge. Entire segment lies within Rusch Park, which is owned and operated by SRPD. While existing trails within Rusch could be utilized, they do not meet Class I width requirements, and the existing bridge over the creek is of inadequate width. Uses would need to be managed consistent with existing trails, or construction of a new Class I trail would need to be considered. Corridor is very wide through the park, except where it passes between the main parking lot and the creek. A retaining wall or reconfiguration of parking/fire access would be needed in that area. Preferred alignment is on right bank to minimize grading and tree impacts. A new bridge would be needed to cross the creek on the downstream end near Antelope Road, due to constriction between creek channel and Antelope upstream of that point.

The proposed trail lies entirely within publicly owned property and therefore no right of way or easement costs are anticipated.

8.36.2.2 Creek Crossings

The proposed alignment crosses the creek just north of Antelope Road. It is proposed to construct a prefabricated steel bridge with an estimated span length of 60 feet.

8.36.2.3 Road Crossings

The proposed trail will use the existing crosswalks at the signalized intersection of Lauppe Lane and Antelope Road.

8.36.2.4 Access Areas and Amenities

Rusch Park provides access to this trail segment. The park provides full recreational amenities including parking, active sports fields and courts, passive play areas, swimming pool, activities rooms, etc. Additional directional and rules signage would be added as part of the trail system.

8.36.2.5 Visual Screening

No visual screening will be needed in this segment.

8.36.2.6 Access Control

Access control fencing and/or bollards may be needed where the trail passes between the parking lot west of the park district offices and the creek. Additionally, in locations where the trail crosses existing pedestrian trails in the park, some additional striping, signage or pavement texturing may be desirable to reduce the likelihood of collisions.

8.36.2.7 Signage

Guidance/directional signs will be placed at the connection point at Auburn Boulevard and at Antelope Road. Regulatory signage for trail users would be placed on the approach to Auburn Boulevard and Antelope Road as well as at any crossings of the existing concrete pathways within Rusch Park requiring trail users to stop and restricting vehicle access. Regulatory and guidance signs will be placed at quarter mile intervals along the trail. Weight limitation warning signs and other regulatory will be placed on either side of all bridges crossing the creek. If existing trails will connect to a wider multi-user trail, appropriate signage should be considered to ensure the safety of all trail users.

8.36.2.8 Retaining Walls

Retaining walls are required in a constrained area of the trail adjacent to the fire truck turnaround area. Rock slope protection or abutment walls will be required to protect the integrity of the bridge abutments.

8.36.3 Environmental Compliance

Due to the proposed crossing, associated abutments, and channel stabilization, the following permits may be required for this segment of the trail:

- RWQCB - Section 401 Water Quality Certification and NPDES Permit
- CDFW - Section 1602 Streambed Alteration Agreement
- ACOE – Section 404 Nationwide Permit

If sensitive species are identified in the biological assessment, consultation with the USFWS under Section 7 of the Endangered Species Act will be necessary.

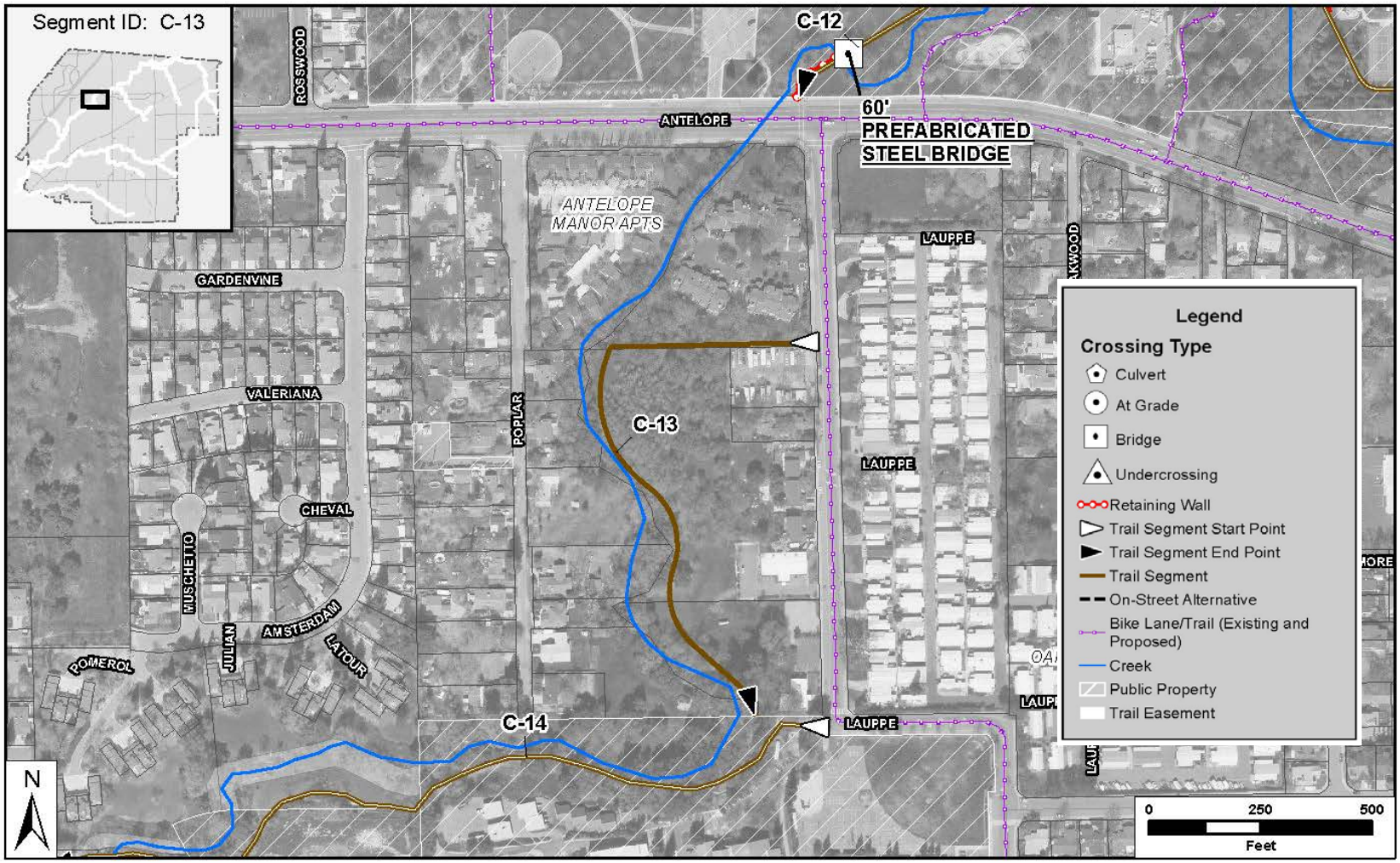
8.36.4 Additional Technical Studies

It is anticipated that the following additional technical studies will be completed during the Project Approval/Environmental Document and Design Phases of this project.

- Environmental Studies
    - Biological Assessment (BA)
    - Noise Technical Memorandum
    - Air Quality Technical Memorandum
    - Wetland Delineation

    - Natural Environment Study (NES)
    - Visual Resources – Technical Memorandum
    - Land Use and Community Impact – Technical Memorandum
- Geotechnical Analysis
- Hydrology/Hydraulic Analysis – Location Hydraulic Study
- Storm Water Pollution Prevention Plan

8.37 Segment C13



Subwatershed: Cripple Creek	Segment ID: C-13	Start: Antelope Road	End: Mesa Verde H.S. Class 1 Trail (east end)
LF Creek/Trail: 1657'/1617'	Number of Road Crossings: 0	Implementation Priority: 3	No. Potential Creek Crossings: 0

8.37.1 Preliminary Cost Estimate

Table 48 below shows a planning-level cost estimate for the recommended alignment as presented in this document. The costs do not include annual maintenance costs. The estimate is in year 2013 USD.

Table 48 – Preliminary Cost Estimate Segment C-13

	Element	Costs x $1,000	Costs x $1,000
Construction	*Trail - Civil*	*308*	
	Structures	*0*	
	Mobilization (10%)	*32*	
	Contingency (20%)	*48*	
	Sub-Total Construction		**388**
Other Costs	*Utility Relocations*	*5*	
	Right of Way/Easements	*147*	
	Environmental Document (10%)	*39*	
	PS&E (10%)	*39*	
	Construction Management (12%)	*47*	
	Inspection/Testing (3%)	*12*	
	Administrative (3%)	*12*	
	Sub-Total Other		**321**
TOTAL COSTS			**709**

8.37.2 Design Elements

8.37.2.1 Trails

The recommended alignment for this segment starts at Antelope Road and heads south along Lauppe Lane as a Class 2 bikeway and sidewalk, or other on-street configuration. It then veers west south of the apartment complex at 7733 Lauppe Lane and transitions to a Class 1 trail. The trail continues along the east side of the creek. Except for the on-street portion, this segment runs entirely through private property requiring right of way acquisition or easements for the trail. The riparian corridor is heavily wooded. An additional trail connection to Lauppe Lane may be considered at the south end of this segment.

8.37.2.2 Creek Crossings

There are no proposed creek crossings within this segment.

8.37.2.3 Road Crossings

There are no road crossings within this segment.

8.37.2.4 Access Areas and Amenities

Access to this segment is via Lauppe Lane and the future Mesa Verde High School Class I trail to the south. Rusch Park is only a short distance away from the north end on the north side of Antelope Road, and provides access to this segment through parking and numerous trails within the park. Amenities for this segment would be limited to directional and rules signage

8.37.2.5 Visual Screening

A healthy riparian corridor should screen the trail from adjacent properties; however access agreements with land owners may specify additional requirements.

8.37.2.6 Access Control

Access control is not currently anticipated, but fencing or vegetation buffers may be required as part of access agreements.

8.37.2.7 Signage

Guidance/directional signs will be placed at the connection point at Antelope Road and Lauppe Lane. Regulatory signage for trail users would be placed on the approach to Antelope Road and Lauppe Lane requiring trail users to stop and restricting vehicle access. Regulatory and guidance signs will be placed at quarter mile intervals along the trail.

8.37.2.8 Retaining Walls

At the southern end of this segment where the creek bank is fairly steep, rock slope protection is anticipated to protect the integrity of the trail.

8.37.3 Environmental Compliance

Due to absence of creek crossings, ACOE and CDFW permits are not anticipated. The following permits are anticipated to be required for this segment of the trail:

- RWQCB - NPDES Permit

8.37.4 Additional Technical Studies

It is anticipated that the following additional technical studies will be completed during the Project Approval/Environmental Document and Design Phases of this project.

- Environmental Studies
  - Biological Assessment (BA)
  - Noise Technical Memorandum - related to construction activities
  - Air Quality Technical Memorandum - related to dust and emissions control during construction activities
  - Wetland Delineation
  - Natural Environment Study (NES)
  - Visual resources – Technical Memorandum
  - Land Use and Community Impact – Technical Memorandum
- Geotechnical Analysis
- Hydrology/Hydraulic Analysis
- Storm Water Pollution Prevention Plan
- Geomorphology Study

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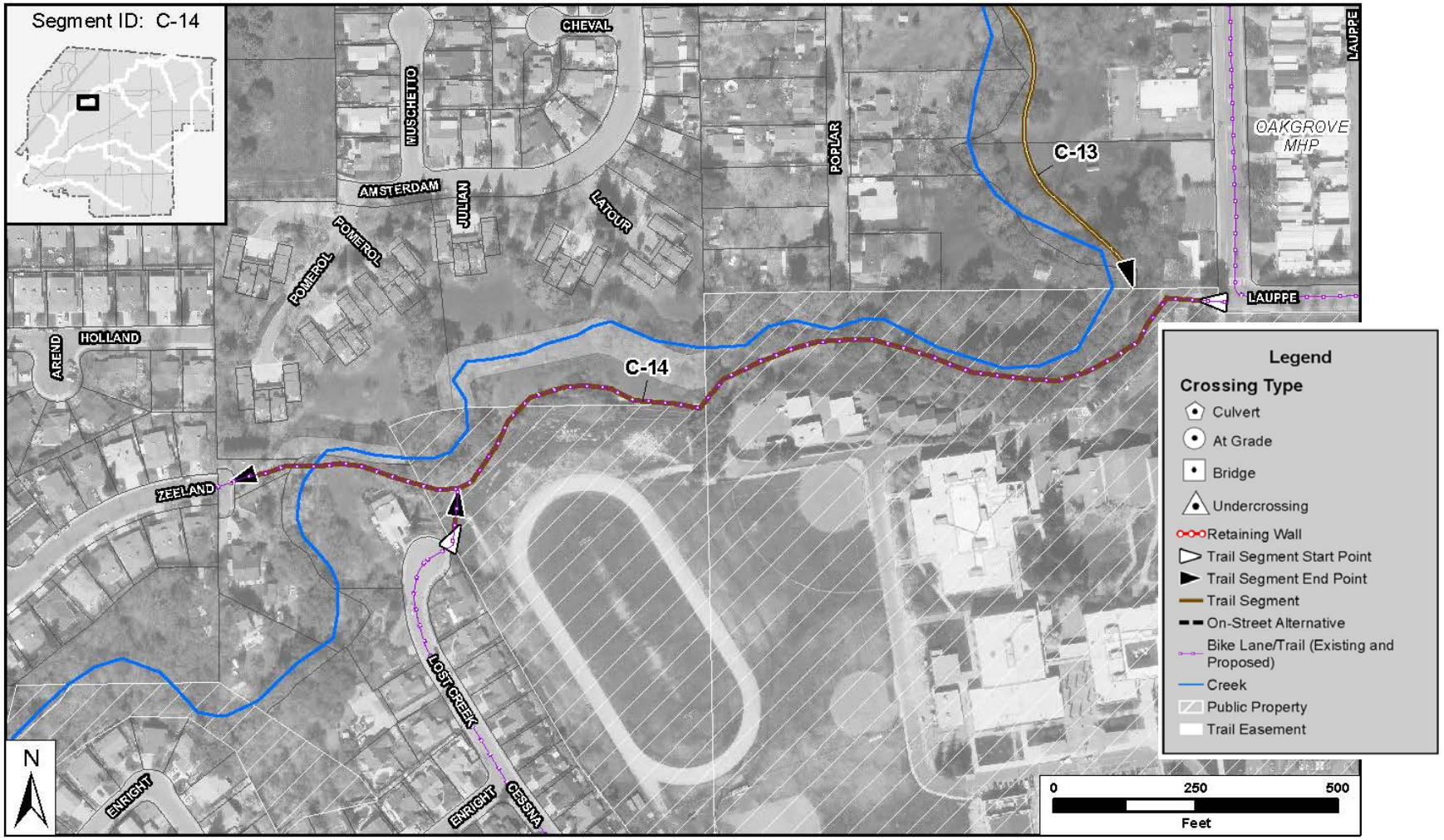
8.38 Segment C14



Subwatershed: Cripple Creek	Segment ID: C14	Start: Mesa Verde H.S. Class 1 Trail (east end)	End: Mesa Verde H.S. Class 1 Trail (west end)
LF Creek/Trail: 1742'/'1742'	Number of Road Crossings: 0	Potential for Future Study: Moderate	No. Potential Creek Crossings: 0

8.38.1 Preliminary Cost Estimate

This project is identified in the City of Citrus Heights Bikeway Master Plan. A portion of the project is currently under design for future consideration; therefore a cost estimate is not included in this report. The anticipated trail will be a paved, two-way multi-use trail.

8.38.2 Design Elements

8.38.2.1 Trails

The proposed Class I trail has already been approved and is in design development and environmental review for the western portion of this segment, connecting to Zeeland Drive. The eastern portion of the trail will require additional design considerations, including the best route for connecting upstream to segment C13. The eastern portion includes steep banks that may require retaining walls and impacts to riparian vegetation. Informal (earthen) trails are already in use throughout this segment.

8.38.2.2 Creek Crossings

There are no creek crossings proposed within this segment.

8.38.2.3 Road Crossings

There are no roadway crossings within this segment.

8.38.2.4 Access Areas and Amenities

Access to this segment is from Lauppe Lane, Mesa Verde High School, and Zeeland Drive. Parking on Lauppe Lane is limited.

8.38.2.5 Visual Screening

This segment is currently being planned by the City. Visual screening should be as specified in the approved plans.

8.38.2.6 Access Control

Access control should be as specified in the approved plan for this segment.

8.38.2.7 Signage

Signage will be provided as specified in the approved plans.

8.38.2.8 Retaining Walls

Retaining walls will be constructed as shown on the approved plans.

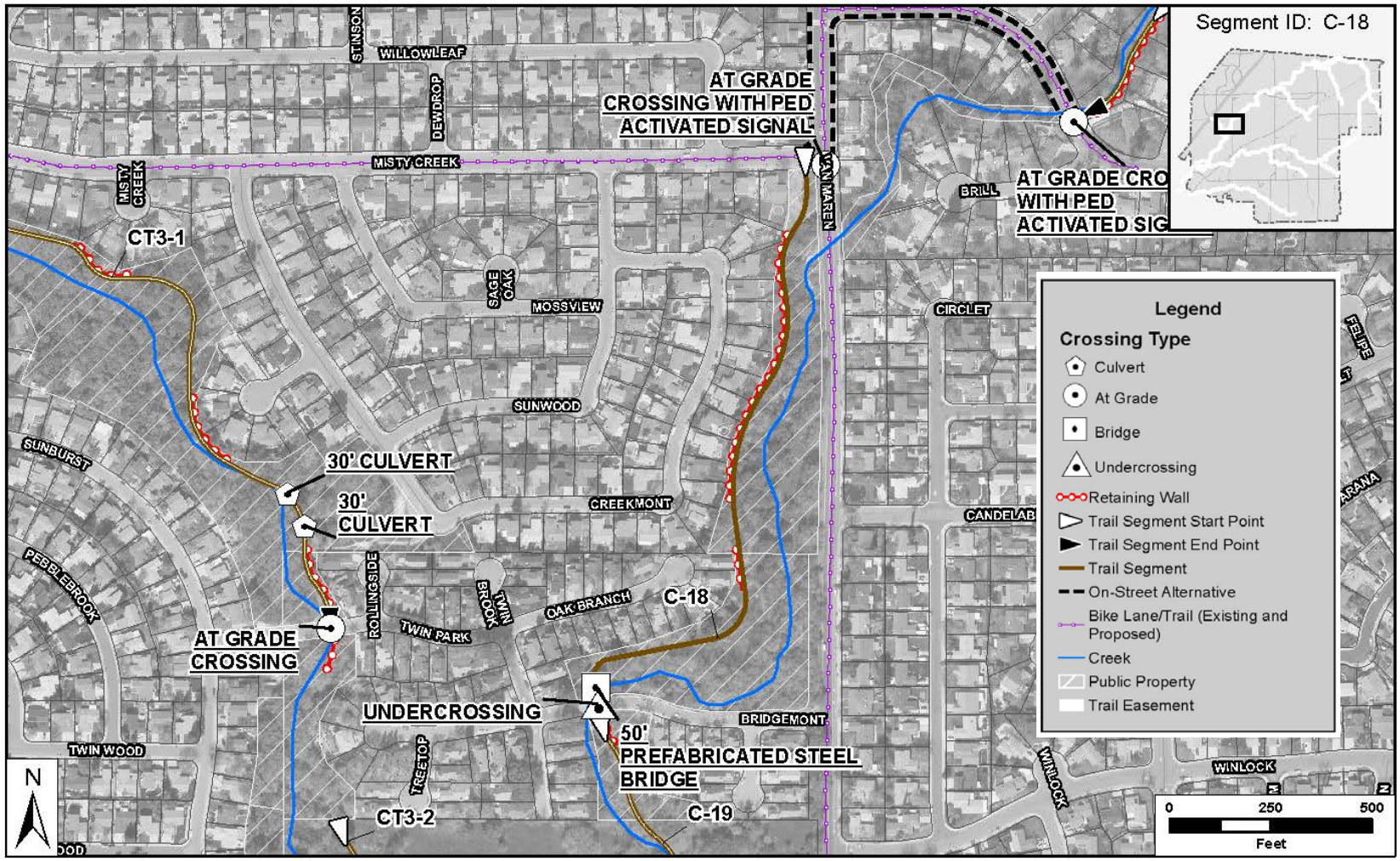
8.38.3 Environmental Compliance

Since no creek crossings are proposed, anticipated environmental permits are limited to an RWQCB NPDES Permit. Required permits will be obtained by the City prior to construction.

8.38.4 Additional Technical Studies

None

8.39 Segment C18



Subwatershed: Cripple Creek	Segment ID: C18	Start: Van Maren Lane	End: Bridgemont Way
LF Creek/Trail: 1723'/1717'	Number of Road Crossings: 1	Implementation Priority: 2	No. Potential Creek Crossings: 1

8.39.1 Preliminary Cost Estimate

Table 49 below shows a planning-level cost estimate for the recommended alignment as presented in this document. The costs do not include annual maintenance costs. The estimate is in year 2013 USD.

Table 49 – Preliminary Cost Estimate Segment C18

	Element	Costs x $1,000	Costs x $1,000
Construction	*Trail*	*554*	
	Structures	*192*	
	Mobilization (10%)	*58*	
	Contingency (20%)	*87*	
	Sub-Total Construction		**891**
Other Costs	*Utility Relocations*	*5*	
	Right of Way/Easements	*-*	
	Environmental Document (10%)	*90*	
	PS&E (10%)	*90*	
	Construction Management (12%)	*107*	
	Inspection/Testing (3%)	*27*	
	Administrative (3%)	*27*	
	Sub-Total Other		**346**
TOTAL COSTS			**1,237**

8.39.2 Design Elements

8.39.2.1 Trails

The recommended alignment would begin at the intersection of Misty Creek Drive and Van Maren Lane. The alignment would run along the west side of Cripple Creek within public property. Just north of Bridgemont Way a bridge would be constructed and the trail would then pass under Bridgemont Way on the east side of the creek. The existing terrain near Bridgemont Way could pose some grading challenges. Alignment would likely be on right (west) bank due to topographic constraints. Dense riparian vegetation poses some constraints and may require mitigation. Corridor width ranges from 100 to over 300 feet.

The proposed trail lies entirely within publicly owned property and therefore no right of way or easement costs are anticipated.

8.39.2.2 Creek Crossings

A prefabricated steel bridge is proposed just north of Bridgemont Way to facilitate a crossing of the creek. The estimated span length of the bridge is 50 feet.

8.39.2.3 Road Crossings

It is proposed to construct the trail on the east side of the creek under Bridgemont Way utilizing the existing bridge structure. The clearance to the bridge structure will be 9 feet which is less than the design standard and will require additional signage. Access ramps will be provided to tie into the sidewalks along Bridgemont Way.

8.39.2.4 Access Areas and Amenities

Access to this segment is from Van Maren on the upstream end and Bridgemont on the downstream end. The east side of Van Maren has limited parallel parking. Bridgemont does not. Amenities will be limited to basic trail signage.

8.39.2.5 Visual Screening

Screening may be required between the trail and homes along Creekmont Way and Oak Branch Court. Fencing or vegetation screening may both be appropriate, depending upon final trail alignment, topography and other site constraints. Residents should be consulted and details developed during design of this segment.

8.39.2.6 Access Control

Access control is currently provided by existing backyard fencing. Additional access control requirements should be evaluated during detailed design of this segment.

8.39.2.7 Signage

Guidance/directional signs will be placed at Misty Creek Drive and Bridgemont Way. Regulatory signage for trail users would be placed on the access ramps at the approach to Bridgemont Way requiring bicycle users to stop. Regulatory and guidance signs will be placed at quarter mile intervals along the trail. Weight limitation warning signs and other regulatory will be placed on either side of all bridges crossing the creek. Vertical clearance signs will be placed at the entrance to the undercrossing.

8.39.2.8 Retaining Walls

Retaining walls will be constructed to limit the footprint of the access roads up to Bridgemont Way.

8.39.3 Environmental Compliance

Due to the proposed crossing, associated abutments, and channel stabilization, the following permits may be required for this segment of the trail:

- RWQCB – Section 401 Water Quality Certification and NPDES Permit
- CDFW – Section 1602 Streambed Alteration Agreement
- ACOE – Section 404 Nationwide Permit

If sensitive species are identified in the biological assessment, consultation with the USFWS under Section 7 of the Endangered Species Act will be necessary.

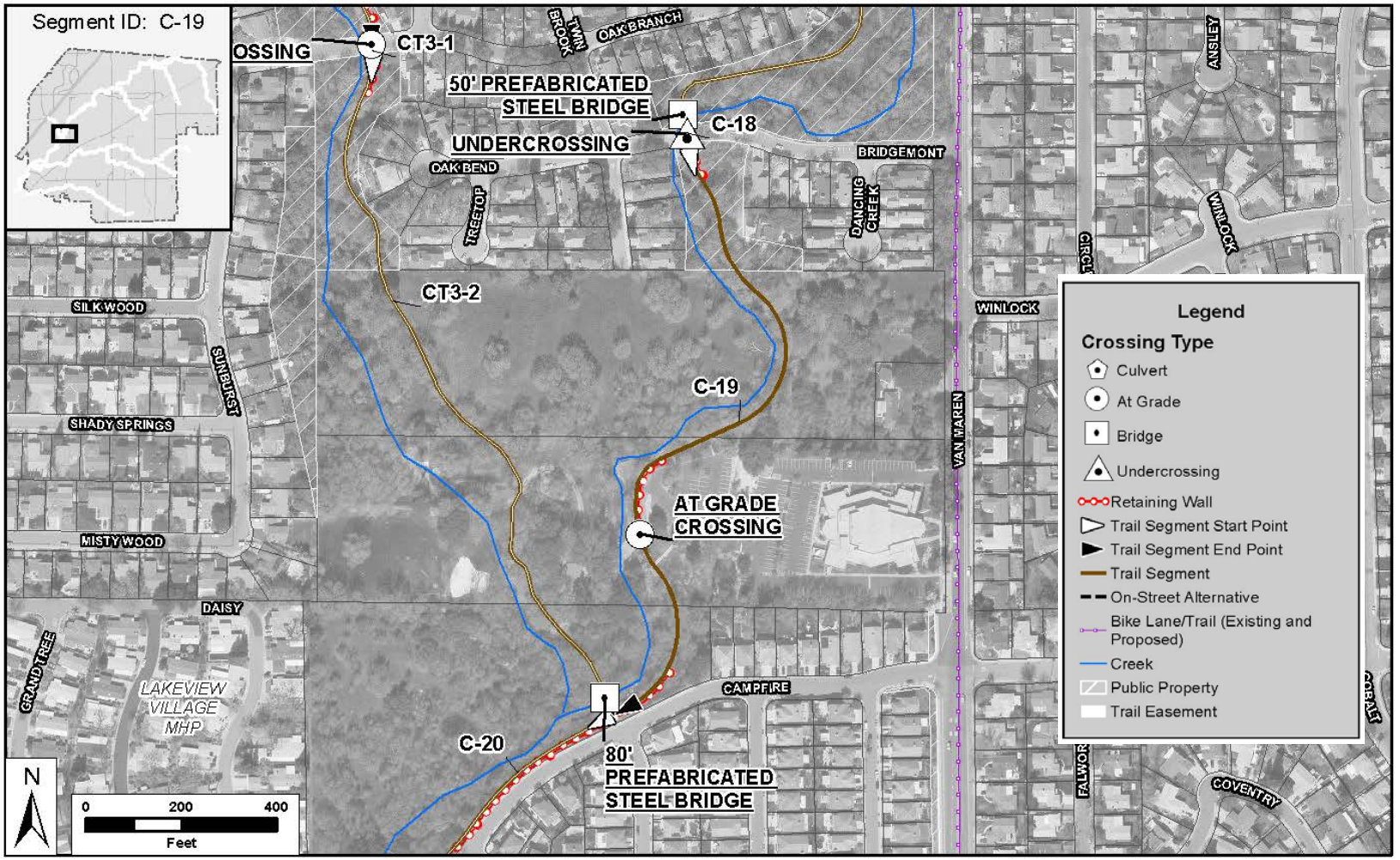
8.39.4 Additional Technical Studies

It is anticipated that the following additional technical studies will be completed during the Project Approval/Environmental Document and Design Phases of this project.

- Environmental Studies
    - Biological Assessment (BA)
    - Noise Technical Memorandum
    - Air Quality Technical Memorandum
    - Wetland Delineation
    - Natural Environment Study (NES)
    - Visual Resources – Technical Memorandum
    - Land Use and Community Impact – Technical Memorandum
- Geotechnical Analysis

- Hydrology/Hydraulic Analysis – Location Hydraulic Study
- Storm Water Pollution Prevention Plan
- Geomorphology Study

8.40 Segment C19



Subwatershed: Cripple Creek	Segment ID: C19	Start: Bridgemont Way	End: Confluence with CT3
LF Creek/Trail: 1635'/1494'	Number of Road Crossings: 1 (private)	Implementation Priority: 2	No. Potential Creek Crossings: 0-1

8.40.1 Preliminary Cost Estimate

Table 50 below shows a planning-level cost estimate for the recommended alignment as presented in this document. The costs do not include annual maintenance costs. The estimate is in year 2013 USD.

Table 50 – Preliminary Cost Estimate Segment C19

	Element	Costs x $1,000	Costs x $1,000
Construction	*Trail*	*352*	
	Structures	*0*	
	Mobilization (10%)	*37*	
	Contingency (20%)	*56*	
	Sub-Total Construction		**445**
Other Costs	Utility Relocations	5	
	Right of Way/Easements	125	
	Environmental Document (10%)	45	
	PS&E (10%)	45	
	Construction Management (12%)	54	
	Inspection/Testing (3%)	14	
	Administrative (3%)	14	
	Sub-Total Other		**302**
TOTAL COSTS			**747**

8.40.2 Design Elements

8.40.2.1 Trails

The recommended alignment would begin at Bridgemont Way and follows the east side of Cripple Creek through the church property to the confluence point. This reach includes a small segment of public land with the majority in private ownership held by two landowners, one of which is the Church of Jesus Christ of Latter-day Saints, who operate a facility spanning the creek. All private property owners would need to be consulted regarding potential easements or acquisitions. The corridor is largely undeveloped except for the church's parking lot on the left bank and a small amphitheater structure on the right. The church also maintains a bridge over the creek from the parking lot to the amphitheater area. Trails in this area would be located within the 100-year floodplain, outside the developable area of this site, and would be sited to minimize impacts to existing uses and structures. Fencing and vegetation could be incorporated as needed to control access and visual privacy. A bridge would be needed at the confluence to cross CT3 and a trail junction with the CT3 trail would occur just downstream of this point.

The proposed trail lies within private and publicly owned property, requiring right of way acquisition or easements for the trail through the privately owned property.

8.40.2.2 Creek Crossings

There are no bridges proposed along this segment, however if a connection is made to the trail along tributary CT3 a prefabricated steel bridge will be required. The estimated span length of the bridge is 80 feet.

8.40.2.3 Road Crossings

The proposed alignment crosses a private access road within the church property. This would be marked as an at-grade unsignalized crossing.

8.40.2.4 Access Areas and Amenities

Bridgemont and Campfire Way provide access to this segment. On-street parking is available along Campfire Way. Amenities are limited to trail signage.

8.40.2.5 Visual Screening

Provided that an access agreement can be reached with the Church and other property owners, additional screening may be desired between the trail and the improved portions of the private properties. All the private property owners should be engaged in the planning and design process for this segment.

8.40.2.6 Access Control

The Church may desire fencing to separate the trail from property improvements.

8.40.2.7 Signage

Guidance/directional signs will be placed at Bridgemont Way. Regulatory signage for trail users would be placed on the access ramps at the approach to Bridgemont Way requiring bicycle users to stop. Regulatory and guidance signs will be placed at quarter mile intervals along the trail. Weight limitation warning signs and other regulatory will be placed on either side of all bridges crossing the creek. Vertical clearance signs will be placed at the entrance to the undercrossing.

8.40.2.8 Retaining Walls

Retaining walls will be constructed to limit the footprint of the access roads up to Bridgemont Way. Minor retaining walls may be required to avoid impacts to the existing Church parking lot and structures.

8.40.3 Environmental Compliance

If the potential bridge noted under Creek Crossings is needed, the following permits may be required for this segment of the trail:

- RWQCB – Section 401 Water Quality Certification and NPDES Permit
- CDFW – Section 1602 Streambed Alteration Agreement
- ACOE – Section 404 Nationwide Permit

Otherwise, environmental agencies may only require an NPDES permit.

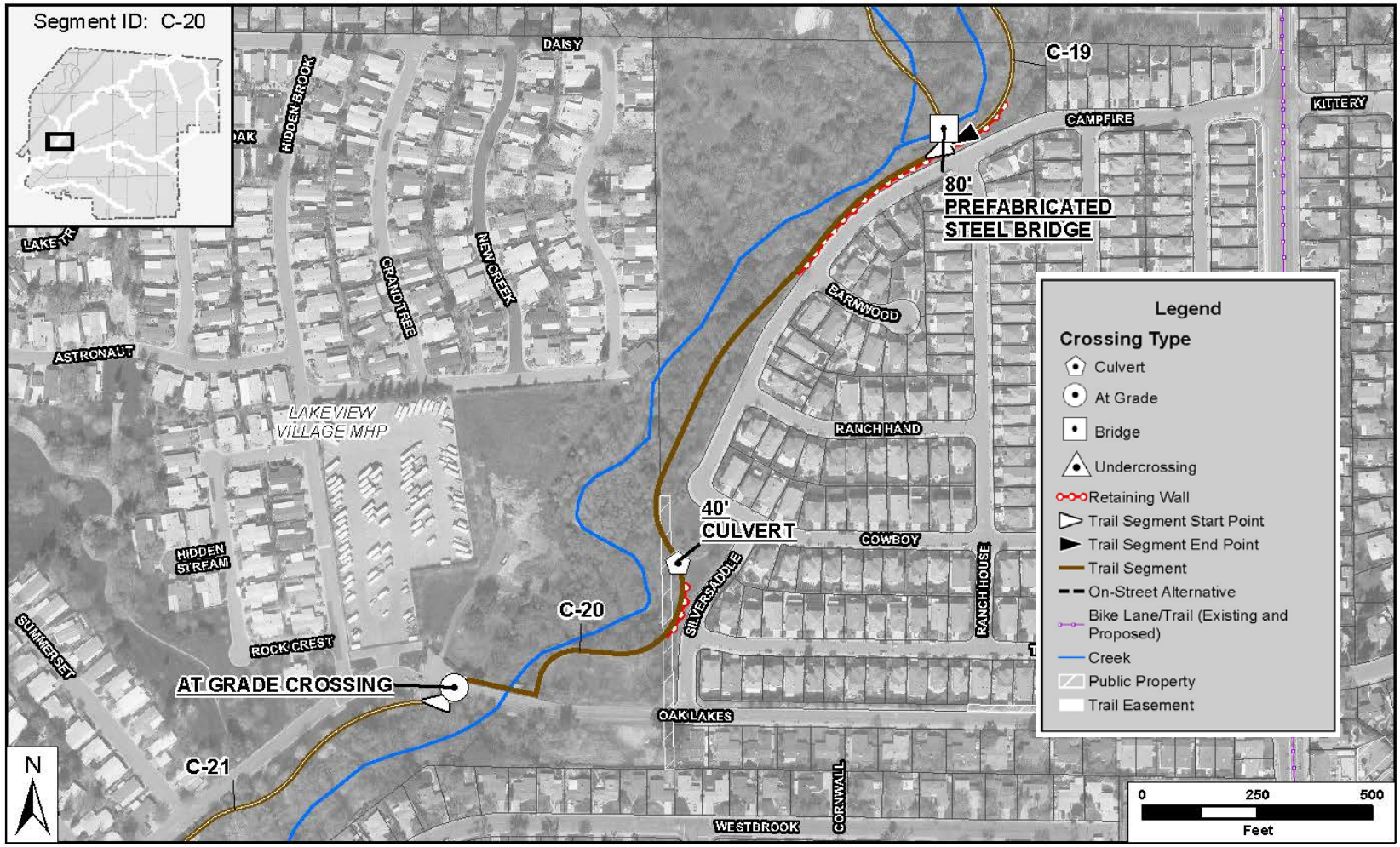
8.40.4 Additional Technical Studies

It is anticipated that the following additional technical studies will be completed during the Project Approval/Environmental Document and Design Phases of this project.

- Environmental Studies
    - Biological Assessment (BA)
    - Noise Technical Memorandum
    - Air Quality Technical Memorandum
    - Wetland Delineation
    - Natural Environment Study (NES)
    - Visual Resources – Technical Memorandum
    - Land Use and Community Impact – Technical Memorandum

- Geotechnical Analysis
- Hydrology/Hydraulic Analysis – Location Hydraulic Study
- Storm Water Pollution Prevention Plan
- Geomorphology Study

8.41 Segment C20



Subwatershed: Cripple Creek	Segment ID: C20	Start: Confluence with CT3	End: Oak Lakes Lane
LF Creek/Trail: 1820'/1954'	Number of Road Crossings: 1	Implementation Priority: 2	No. Potential Creek Crossings: 0

8.41.1 Preliminary Cost Estimate

Table 51 below shows a planning-level cost estimate for the recommended alignment as presented in this document. The costs do not include annual maintenance costs. The estimate is in year 2013 USD.

Table 51 – Preliminary Cost Estimate Segment C20

	Element	Costs x $1,000	Costs x $1,000
Construction	*Trail*	*428*	
	Structures	*0*	
	Mobilization (10%)	*45*	
	Contingency (20%)	*67*	
	Sub-Total Construction		**540**
Other Costs	*Utility Relocations*	*5*	
	Right of Way/Easements	*202*	
	Environmental Document (10%)	*54*	
	PS&E (10%)	*54*	
	Construction Management (12%)	*65*	
	Inspection/Testing (3%)	*17*	
	Administrative (3%)	*17*	
	Sub-Total Other		**414**
TOTAL COSTS			**954**

8.41.2 Design Elements

8.41.2.1 Trails

The recommended alignment would begin at the confluence with CT3 tributary and follow along the base of the fill slope adjacent to Campfire Way. The alignment would rise up to be at the same elevation as Campfire Way and follow this alignment south along the west side of Silver Saddle Way to Oak Lakes Lane. This reach occupies a single private parcel that is designated as a floodplain and maintained as open space. A narrow sliver of land owned by Sacramento County could provide access from near Cowboy Way to Oak Lakes Lane and avoid the need for a second easement on the adjacent property. Topography adequate for trail on left bank, except for one area adjacent to Campfire Way that may need a retaining wall. Corridor width varies from 250 to over 600 feet. Some areas of dense riparian vegetation may need mitigation.

The proposed trail lies entirely within privately owned property, requiring right of way acquisition or easements for the trail.

8.41.2.2 Creek Crossings

There are no bridges proposed along this segment. The trail users would use Oak Lakes Lane to cross the creek.

8.41.2.3 Road Crossings

The proposed alignment crosses Oak Lakes Lane as an at-grade unsignalized crossing. This appears feasible due to the relatively low traffic volumes and good sight distance at this location. It is not feasible to use the existing bridge structure to accommodate a trail undercrossing due to the restricted vertical clearance.

8.41.2.4 Access Areas and Amenities

Access is provided along Campfire and Silversaddle Ways and Oak Lakes Lane. Parallel parking is available along Campfire and Silversaddle Ways.

8.41.2.5 Visual Screening

Due to density of existing vegetation and width of the corridor, additional screening is not anticipated.

8.41.2.6 Access Control

Existing bollards along Campfire and Silversaddle Way are wood and will require period maintenance. No additional access control is anticipated.

8.41.2.7 Signage

Guidance/directional signs will be placed at Oak Lakes Lane and where the trail leaves Campfire Way. Regulatory signage for trail users would be placed at the approach to Oak Lakes Lane requiring bicycle users to stop. Regulatory and guidance signs will be placed at quarter mile intervals along the trail.

8.41.2.8 Retaining Walls

Retaining walls will be constructed along the embankment adjacent to Campfire Way, where there is insufficient space behind the existing sidewalk to accommodate the trail.

8.41.3 Environmental Compliance

If the retaining walls are outside the bed and bank of the creek, environmental permitting should be limited to an NPDES permit. If wetlands or the creek are impacted, the full suite of ACOE, CDFW and USFWS permits will be needed, in addition to a 401 Water Quality Certification and NPDES permit.

8.41.4 Additional Technical Studies

It is anticipated that the following additional technical studies will be completed during the Project Approval/Environmental Document and Design Phases of this project.

- Environmental Studies
  - Biological Assessment (BA)
  - Noise Technical Memorandum
  - Air Quality Technical Memorandum
  - Wetland Delineation
  - Natural Environment Study (NES)
  - Visual Resources – Technical Memorandum
  - Land Use and Community Impact – Technical Memorandum
- Geotechnical Analysis
- Hydrology/Hydraulic Analysis
- Storm Water Pollution Prevention Plan
- Geomorphology Study

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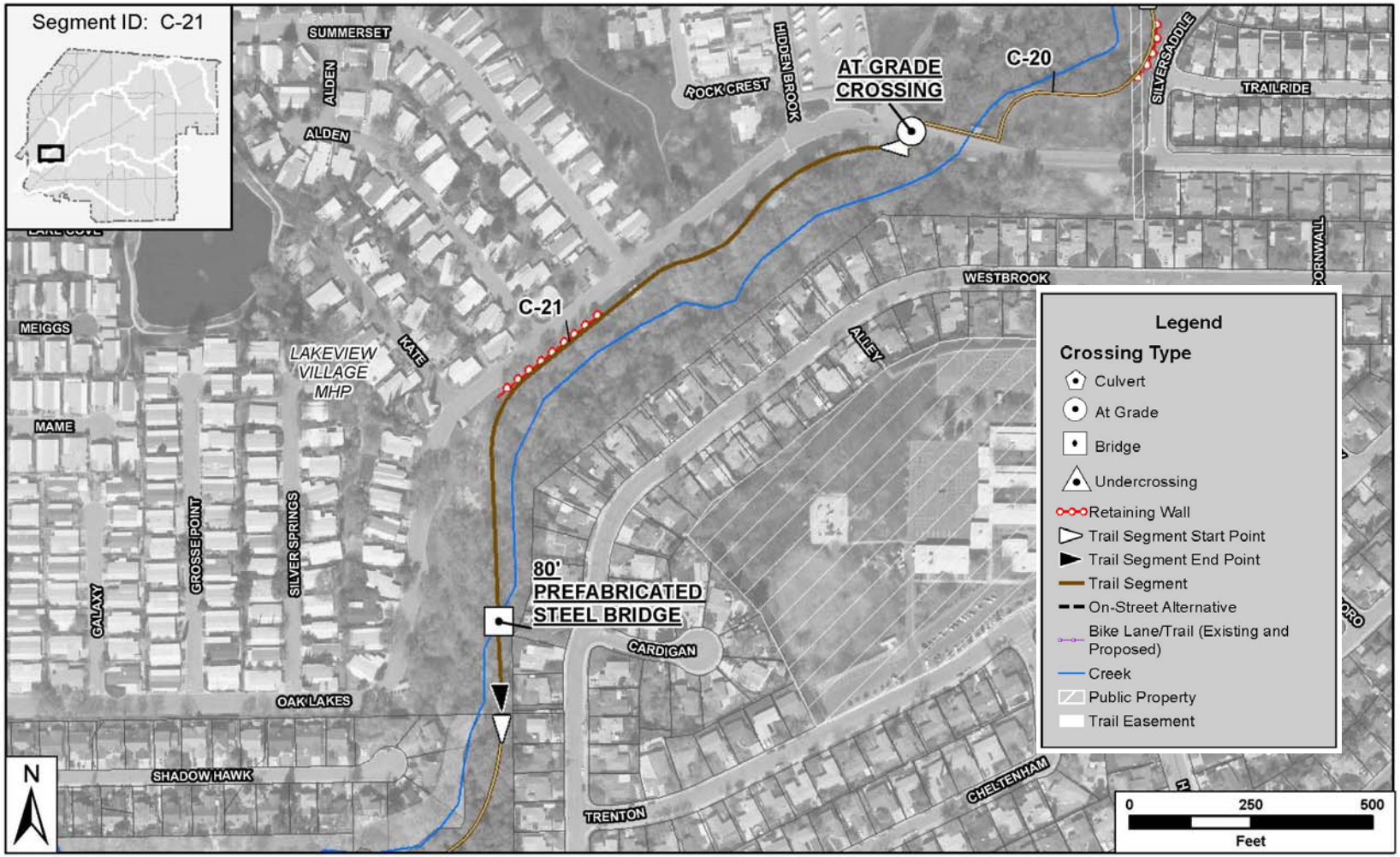
8.42 Segment C21



Subwatershed: Cripple Creek	Segment ID: C21	Start: Oak Lakes Lane	End: Public Access Easement N. boundary
LF Creek/Trail: 1682'/1706'	Number of Road Crossings: 0	Implementation Priority: 2	No. Potential Creek Crossings: 0

8.42.1 Preliminary Cost Estimate

Table 52 below shows a planning-level cost estimate for the recommended alignment as presented in this document. The costs do not include annual maintenance costs. The estimate is in year 2013 USD.

Table 52 – Preliminary Cost Estimate Segment C21

	Element	Costs x $1,000	Costs x $1,000
Construction	*Trail*	*345*	
	Structures	*192*	
	Mobilization (10%)	*36*	
	Contingency (20%)	*54*	
	Sub-Total Construction		**627**
Other Costs	*Utility Relocations*	*3*	
	Right of Way/Easements	*176*	
	Environmental Document (10%)	*63*	
	PS&E (10%)	*63*	
	Construction Management (12%)	*76*	
	Inspection/Testing (3%)	*19*	
	Administrative (3%)	*19*	
	Sub-Total Other		**415**
TOTAL COSTS			**1,042**

8.42.2 Design Elements

8.42.2.1 Trails

The recommended alignment starts at Oak Lakes Lane and enters into the Lakeview Village mobile home park and follows the right side of the creek to the southern property line. This reach runs through private open space and floodplain area maintained by the surrounding mobile home park. The corridor is approximately 230 feet wide and relatively flat. Riparian vegetation along the creek is dense, but the adjacent open space is well maintained and adequate for a trail. This would require acquisition of an easement or other method of access for trail development.

The proposed trail lies entirely within privately owned property, requiring right of way acquisition or easements for the trail.

8.42.2.2 Creek Crossings

There is one bridge proposed along this segment to allow the trail to cross to the left side of the creek near the southern property line of Lakeview Village. The proposed bridge will have an approximate span length of 60-80 feet and would be prefabricated steel bridge.

8.42.2.3 Road Crossings

There are no roadway crossings within this segment.

8.42.2.4 Access Areas and Amenities

This segment runs along Oak Lakes Lane, a private road. Assuming that a trail easement can be negotiated, public access would occur only at the upstream and downstream trail

connections. The Lakeview Village community would have access to the trail along Oak Lakes Lane.

8.42.2.5 Visual Screening

The Lakeview Village community should be engaged in the design process to determine the level of desired visual screening.

8.42.2.6 Access Control

Access control for this segment should be per access agreement and community desires.

8.42.2.7 Signage

Guidance/directional signs will be placed at Oak Lakes Lane. Regulatory signage for trail users would be placed at the approach to Oak Lakes Lane requiring bicycle users to stop. Regulatory and guidance signs will be placed at quarter mile intervals along the trail.

8.42.2.8 Retaining Walls

No retaining walls have been identified along this segment.

8.42.3 Environmental Compliance

Due to the lack of bridges, ACOE & CDFW permits are unlikely. Environmental permitting may be limited to an RWQCB NPDES permit.

8.42.4 Additional Technical Studies

It is anticipated that the following additional technical studies will be completed during the Project Approval/Environmental Document and Design Phases of this project.

- Environmental Studies
  - Biological Assessment (BA)
  - Noise Technical Memorandum
  - Air Quality Technical Memorandum
  - Wetland Delineation
  - Natural Environment Study (NES)
  - Visual Resources – Technical Memorandum
  - Land Use and Community Impact – Technical Memorandum
- Geotechnical Analysis
- Hydrology/Hydraulic Analysis – Location Hydraulic Study
- Storm Water Pollution Prevention Plan
- Geomorphology Study

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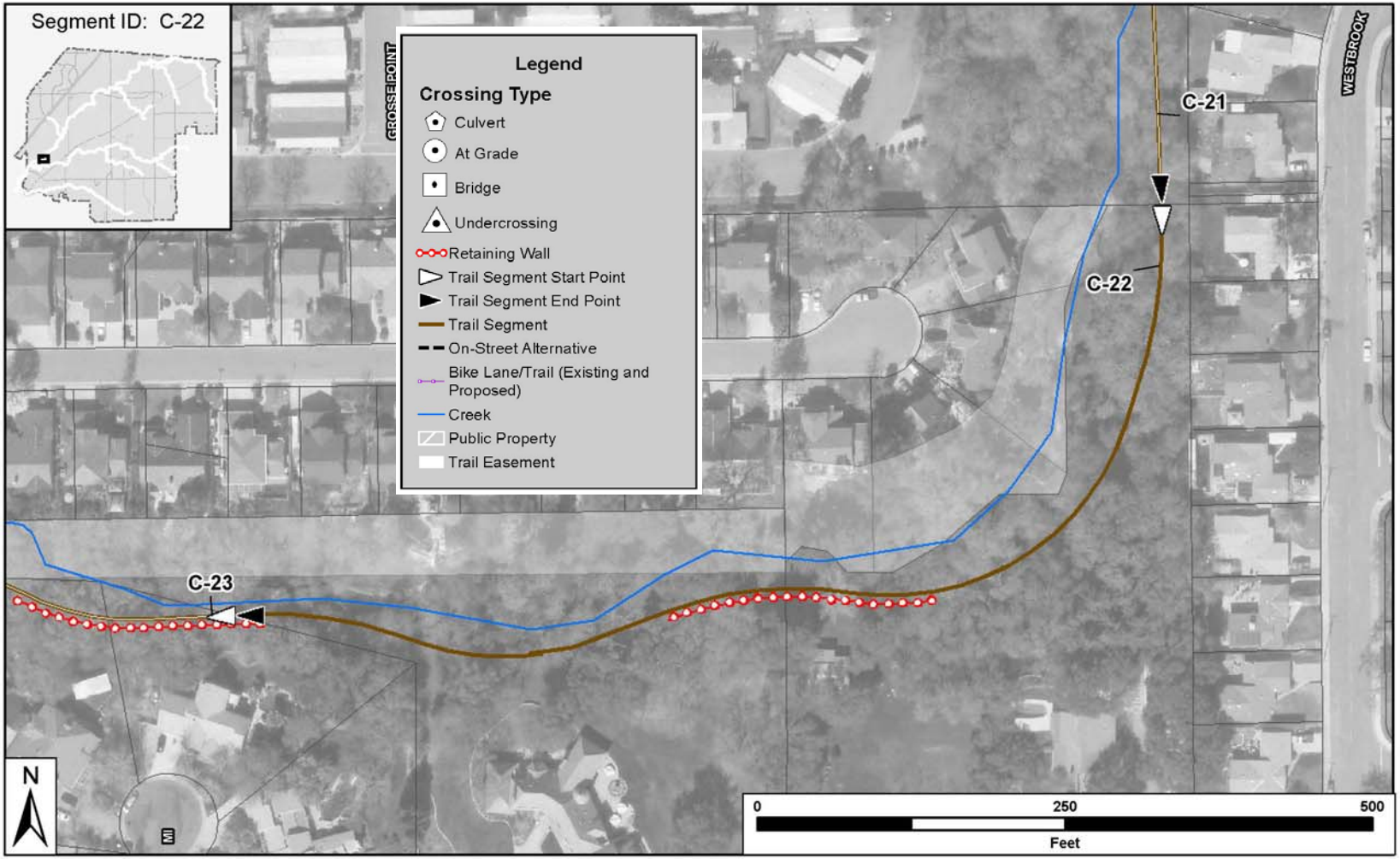
8.43 Segment C22



Subwatershed: Cripple Creek	Segment ID: C22	Start: Public Easement N. boundary	End: Mi Court
LF Creek/Trail: 1018'/960'	Number of Road Crossings: 0	Implementation Priority: 2	No. Potential Creek Crossings: 0

8.43.1 Preliminary Cost Estimate

Table 53 below shows a planning-level cost estimate for the recommended alignment as presented in this document. The costs do not include annual maintenance costs. The estimate is in year 2013 USD.

Table 53 – Preliminary Cost Estimate Segment C22

	Element	Costs x $1,000	Costs x $1,000
Construction	*Trail*	*260*	
	Structures	*0*	
	Mobilization (10%)	*27*	
	Contingency (20%)	*41*	
	Sub-Total Construction		**328**
Other Costs	*Utility Relocations*	*3*	
	Right of Way/Easements	*102*	
	Environmental Document (10%)	*33*	
	PS&E (10%)	*33*	
	Construction Management (12%)	*40*	
	Inspection/Testing (3%)	*10*	
	Administrative (3%)	*10*	
	Sub-Total Other		**231**
TOTAL COSTS			**559**

8.43.2 Design Elements

8.43.2.1 Trails

The recommended alignment follows the left bank of the creek which runs roughly parallel to Shadow Hawk Drive, ending at Mi Court. Although the area north of the creek behind the residences along Shadow Hawk Drive includes a public access easement, it is somewhat constrained, includes steep terrain in places, and there are several encroachments. Therefore, the alignment on the left bank is preferred. The corridor width is around 100-feet. Fencing and vegetation could be used to control access and screen views into private properties.

The proposed trail lies entirely within privately owned property requiring right of way acquisition or easements for the trail.

8.43.2.2 Creek Crossings

There are no bridges proposed along this segment.

8.43.2.3 Road Crossings

There are no roadway crossings within this segment.

8.43.2.4 Access Areas and Amenities

Access to this segment is via upstream and downstream trail connections only.

8.43.2.5 Visual Screening

Vegetation through this segment is relatively dense; however, due to the potential proximity of the trail to a number of backyards along Shadow Hawk Drive, additional screening may be required.

8.43.2.6 Access Control

Additional access control through planting and/or fencing upgrades may be required.

8.43.2.7 Signage

Regulatory and guidance signs will be placed at quarter mile intervals along the trail.

8.43.2.8 Retaining Walls

Retaining walls are anticipated where the trail passes through the constrained area between the creek and the property line of homes on Shadow Hawk Drive.

8.43.3 Environmental Compliance

Since no creek crossings are proposed, anticipated environmental permits are limited to an RWQCB NPDES Permit. Required permits will be obtained by the City prior to construction.

8.43.4 Additional Technical Studies

It is anticipated that the following additional technical studies will be completed during the Project Approval/Environmental Document and Design Phases of this project.

- Environmental Studies
  - Biological Assessment (BA)
  - Noise Technical Memorandum
  - Air Quality Technical Memorandum
  - Wetland Delineation
  - Natural Environment Study (NES)
  - Visual Resources – Technical Memorandum
  - Land Use and Community Impact – Technical Memorandum
- Geotechnical Analysis
- Hydrology/Hydraulic Analysis
- Storm Water Pollution Prevention Plan
- Geomorphology Study

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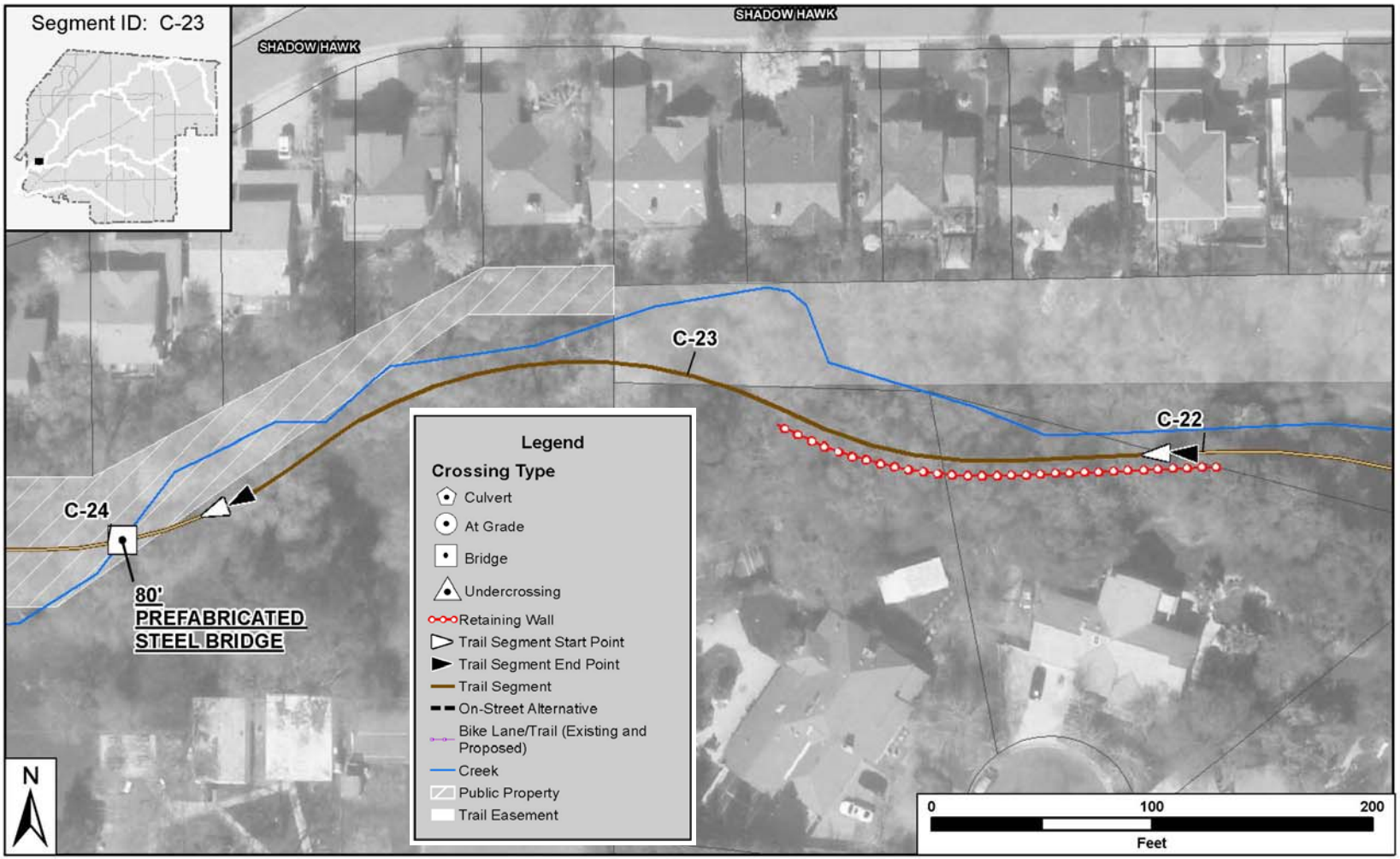
8.44 Segment C23



Subwatershed: Cripple Creek	Segment ID: C23	Start: Mi Court	End: 160 ft downstream of E. boundary of SRPD parcel
LF Creek/Trail: 380'/361'	Number of Road Crossings: 0	Implementation Priority: 2	No. Potential Creek Crossings: 0

8.44.1 Preliminary Cost Estimate

Table 54 below shows a planning-level cost estimate for the recommended alignment as presented in this document. The costs do not include annual maintenance costs. The estimate is in year 2013 USD.

Table 54 – Preliminary Cost Estimate Segment C23

	Element	Costs x $1,000	Costs x $1,000
Construction	*Trail*	*179*	
	Structures	*0*	
	Mobilization (10%)	*19*	
	Contingency (20%)	*28*	
	Sub-Total Construction		**226**
Other Costs	*Utility Relocations*	*3*	
	Right of Way/Easements	*42*	
	Environmental Document (10%)	*23*	
	PS&E (10%)	*23*	
	Construction Management (12%)	*28*	
	Inspection/Testing (3%)	*7*	
	Administrative (3%)	*7*	
	Sub-Total Other		**133**
TOTAL COSTS			**359**

8.44.2 Design Elements

8.44.2.1 Trails

The recommended alignment continues along the left (south) bank of the creek, roughly parallel to Shadow Hawk Drive. Canopy on left bank is open which will allow selective placement of the trail to limit impacts to trees.

Most of the proposed trail lies within private property, requiring right of way acquisition or easements for the trail through the privately owned parcels. A small segment of the trail falls within an existing trail easement.

8.44.2.2 Creek Crossings

No bridges are anticipated in this segment as the alignment is entirely on the left bank.

8.44.2.3 Road Crossings

There are no roadway crossings within this segment.

8.44.2.4 Access Areas and Amenities

Access to this segment is limited to upstream and downstream trail connections.

8.44.2.5 Visual Screening

As with C22, screening should be evaluated in the detailed design phase for this segment, taking into consideration condition of existing fencing and desires of residents.

8.44.2.6 Access Control

Additional access control may be needed. Control may be planting, fencing, or both.

8.44.2.7 Signage

Regulatory and guidance signs will be placed at quarter mile intervals along the trail. Weight limitation warning signs and other regulatory will be placed on either side of all bridges crossing the creek.

8.44.2.8 Retaining Walls

Retaining walls are anticipated along this segment where the trail passes through the constrained area between the creek and the property line of homes on Shadow Hawk Drive.

8.44.3 Environmental Compliance

Due to the proposed crossings, associated abutments, and channel stabilization, the following permits may be required for this segment of the trail:

- RWQCB - Section 401 Water Quality Certification and NPDES Permit
- CDFW - Section 1602 Streambed Alteration Agreement
- ACOE – Section 404 Nationwide Permit

If sensitive species are identified in the biological assessment, consultation with the USFWS under Section 7 of the Endangered Species Act will be necessary.

8.44.4 Additional Technical Studies

It is anticipated that the following additional technical studies will be completed during the Project Approval/Environmental Document and Design Phases of this project.

- Environmental Studies
  - Biological Assessment (BA)
  - Noise Technical Memorandum
  - Air Quality Technical Memorandum
  - Wetland Delineation
  - Natural Environment Study (NES)
  - Visual Resources – Technical Memorandum
  - Land Use and Community Impact – Technical Memorandum
- Geotechnical Analysis
- Hydrology/Hydraulic Analysis
- Storm Water Pollution Prevention Plan
- Geomorphology Study

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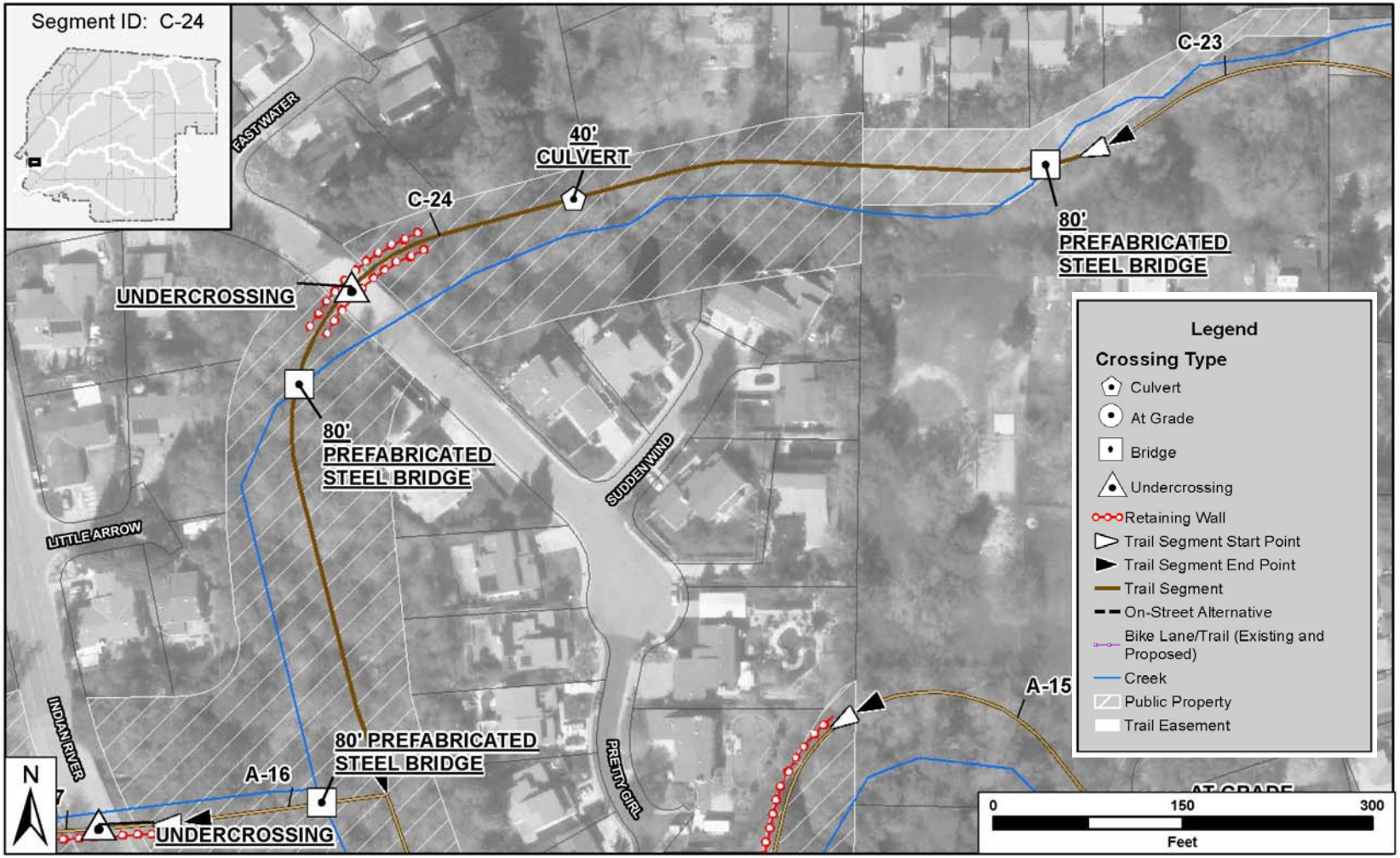
8.45 Segment C24



Subwatershed: Cripple Creek	Segment ID: C24	Start: 160 ft downstream of E. boundary of SRPD parcel	End: Confluence with Arcade Creek
LF Creek/Trail: 1116'/983'	Number of Road Crossings: 1	Implementation Priority: 2	No. Potential Creek Crossings: 2

8.45.1 Preliminary Cost Estimate

Table 55 below shows a planning-level cost estimate for the recommended alignment as presented in this document. The costs do not include annual maintenance costs. The estimate is in year 2013 USD.

Table 55 – Preliminary Cost Estimate Segment C24

	Element	Costs x $1,000	Costs x $1,000
Construction	*Trail*	*374*	
	Structures	*384*	
	Mobilization (10%)	*39*	
	Contingency (20%)	*59*	
	Sub-Total Construction		**856**
Other Costs	*Utility Relocations*	*11*	
	Right of Way/Easements	*-*	
	Environmental Document (10%)	*86*	
	PS&E (10%)	*86*	
	Construction Management (12%)	*103*	
	Inspection/Testing (3%)	*26*	
	Administrative (3%)	*26*	
	Sub-Total Other		**338**
TOTAL COSTS			**1,194**

8.45.2 Design Elements

8.45.2.1 Trails

The recommended alignment begins on the left (south) bank and crosses the creek via a bridge to the right bank of the creek to Broken Bow Drive where the trail would pass under the road using the existing bridge structure. The alignment would then cross back to the left side of the creek just west of Broken Bow Drive via a bridge and continue down to the confluence with Arcade Creek and tie into the Arcade Corridor trail which includes a bridge that crosses Arcade Creek to the west. Land is owned and managed by SRPD as a future park site for Matheny Way Park. Topography and vegetation favor right bank for trail. Corridor width is approximately 150 feet.

The proposed trail lies entirely within publicly owned property and therefore no right of way or easement costs are anticipated.

8.45.2.2 Creek Crossings

There are two bridges proposed along this segment. The approximate span length of these bridges is 80 feet.

8.45.2.3 Road Crossings

The trail will pass under Broken Bow Drive on the north side of the creek, via an undercrossing. Access ramps up to Broken Bow Drive will be constructed.

8.45.2.4 Access Areas and Amenities

Upstream access is via the trail. Indian River Drive provides access to the downstream end, including on-street parking.

8.45.2.5 Visual Screening

Some additional screening may be needed east of Broken Bow Drive, where the trail is still somewhat close to private backyards. West of Broken Bow Drive, topography and native vegetation should effectively screen backyards from the trail.

8.45.2.6 Access Control

As with other areas where the trail is near backyards, existing fences should be evaluated for effectiveness and need for improvement.

8.45.2.7 Signage

Guidance/directional signs will be placed at the confluence/connection point with the Arcade Creek corridor trail. Regulatory signage for trail users would be placed on the approach to Broken Bow Drive requiring trail users to stop and restricting vehicle access. Regulatory and guidance signs will be placed at quarter mile intervals along the trail. Weight limitation warning signs and other regulatory will be placed on either side of all bridges crossing the creek.

8.45.2.8 Retaining Walls

Retaining walls are anticipated along this segment where the trail passes through the constrained area between the property line of homes and the creek. Retaining and cut-off walls will be required under the Broken Bow Drive bridge structure to accommodate the trail and on the access ramps up to Broken Bow Drive.

8.45.3 Environmental Compliance

Due to the proposed crossing, associated abutments, and channel stabilization, the following permits may be required for this segment of the trail:

- RWQCB – Section 401 Water Quality Certification and NPDES Permit
- CDFW – Section 1602 Streambed Alteration Agreement
- ACOE – Section 404 Nationwide Permit

If sensitive species are identified in the biological assessment, consultation with the USFWS under Section 7 of the Endangered Species Act will be necessary.

8.45.4 Additional Technical Studies

It is anticipated that the following additional technical studies will be completed during the Project Approval/Environmental Document and Design Phases of this project.

- Environmental Studies
  - Biological Assessment (BA)
  - Noise Technical Memorandum
  - Air Quality Technical Memorandum
  - Wetland Delineation
  - Natural Environment Study (NES)
  - Visual Resources – Technical Memorandum
  - Land Use and Community Impact – Technical Memorandum
- Geotechnical Analysis
- Hydrology/Hydraulic Analysis – Location Hydraulic Study
- Storm Water Pollution Prevention Plan
- Geomorphology Study

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8.46 Segment CT1-2

Subwatershed: Cripple Creek	Segment ID: CT1-2	Start: Villa Oaks Drive	End: Old Auburn Road
LF Creek/Trail: 902'/666'	Number of Road Crossings: 1	Implementation Priority: 3	No. Potential Creek Crossings: 0

8.46.1 Preliminary Cost Estimate

Table 56 below shows a planning-level cost estimate for the recommended alignment as presented in this document. The costs do not include annual maintenance costs. The estimate is in year 2013 USD.

Table 56 – Preliminary Cost Estimate Segment CT1-2

	Element	Costs x $1,000	Costs x $1,000
Construction	*Trail*	*87*	
	Structures	*0*	
	Mobilization (10%)	*9*	
	Contingency (20%)	*14*	
	Sub-Total Construction		**110**
Other Costs	*Utility Relocations*	*11*	
	Right of Way/Easements	*-*	
	Environmental Document (10%)	*11*	
	PS&E (10%)	*11*	
	Construction Management (12%)	*14*	
	Inspection/Testing (3%)	*4*	
	Administrative (3%)	*4*	
	Sub-Total Other		**55**
TOTAL COSTS			**165**

8.46.2 Design Elements

8.46.2.1 Trails

The recommended alignment is between the creek tributary and Fair Oaks Boulevard from Villa Oaks Drive to Old Auburn Road where the trail users would cross using the crosswalk at the existing signalized intersection. Land is owned by the City. Left (west) bank is preferred due to private residential development on right. There is adequate width for trail parallel to Fair Oaks, and few topographic constraints. Construction would require regrade/realignment of road culvert/swale. Trail is redundant with existing on-street bike routes on Fair Oaks but would make for a more enjoyable experience, which could encourage greater usage.

The proposed trail lies entirely within publicly owned property and therefore no right of way or easement costs are anticipated.

8.46.2.2 Creek Crossings

There are no bridge crossings within this segment.

8.46.2.3 Road Crossings

The trail will cross Old Auburn Road using the crosswalk at the existing signalized intersection.

8.46.2.4 Access Areas and Amenities

Access is via Villa Oak Drive, Fair Oaks Boulevard and Old Auburn Road. Parking is very limited to nonexistent. This trail segment would provide a connection to downstream trails or on-street bike lanes, and as a neighborhood recreation feature. Basic trail signs should direct users and present rules.

8.46.2.5 Visual Screening

Visual screening is currently provided by backyard fencing and should be evaluated during detailed design.

8.46.2.6 Access Control

Additional access control along Fair Oaks Boulevard may be desired if the trail is between the road and the ditch. This control could take the form of a berm or landscape strip to create separation with the roadway.

8.46.2.7 Signage

Guidance/directional signs will be placed at Old Auburn Road. Regulatory signage for trail users would be placed on the approach to Old Auburn Road and Villa Oak Drive requiring trail users to stop and restricting vehicle access. Regulatory and guidance signs will be placed at quarter mile intervals along the trail.

8.46.2.8 Retaining Walls

Retaining walls are not anticipated along this segment.

8.46.3 Environmental Compliance

Since no creek crossings are proposed, anticipated environmental permits are limited to an RWQCB NPDES Permit. Required permits will be obtained by the City prior to construction.

8.46.4 Additional Technical Studies

It is anticipated that the following additional technical studies will be completed during the Project Approval/Environmental Document and Design Phases of this project.

- Environmental Studies
  - Biological Assessment (BA)
  - Noise Technical Memorandum
  - Air Quality Technical Memorandum
  - Wetland Delineation
  - Natural Environment Study (NES)
  - Visual Resources – Technical Memorandum
  - Land Use and Community Impact – Technical Memorandum
- Geotechnical Analysis
- Hydrology/Hydraulic Analysis
- Storm Water Pollution Prevention Plan
- Geomorphology Study

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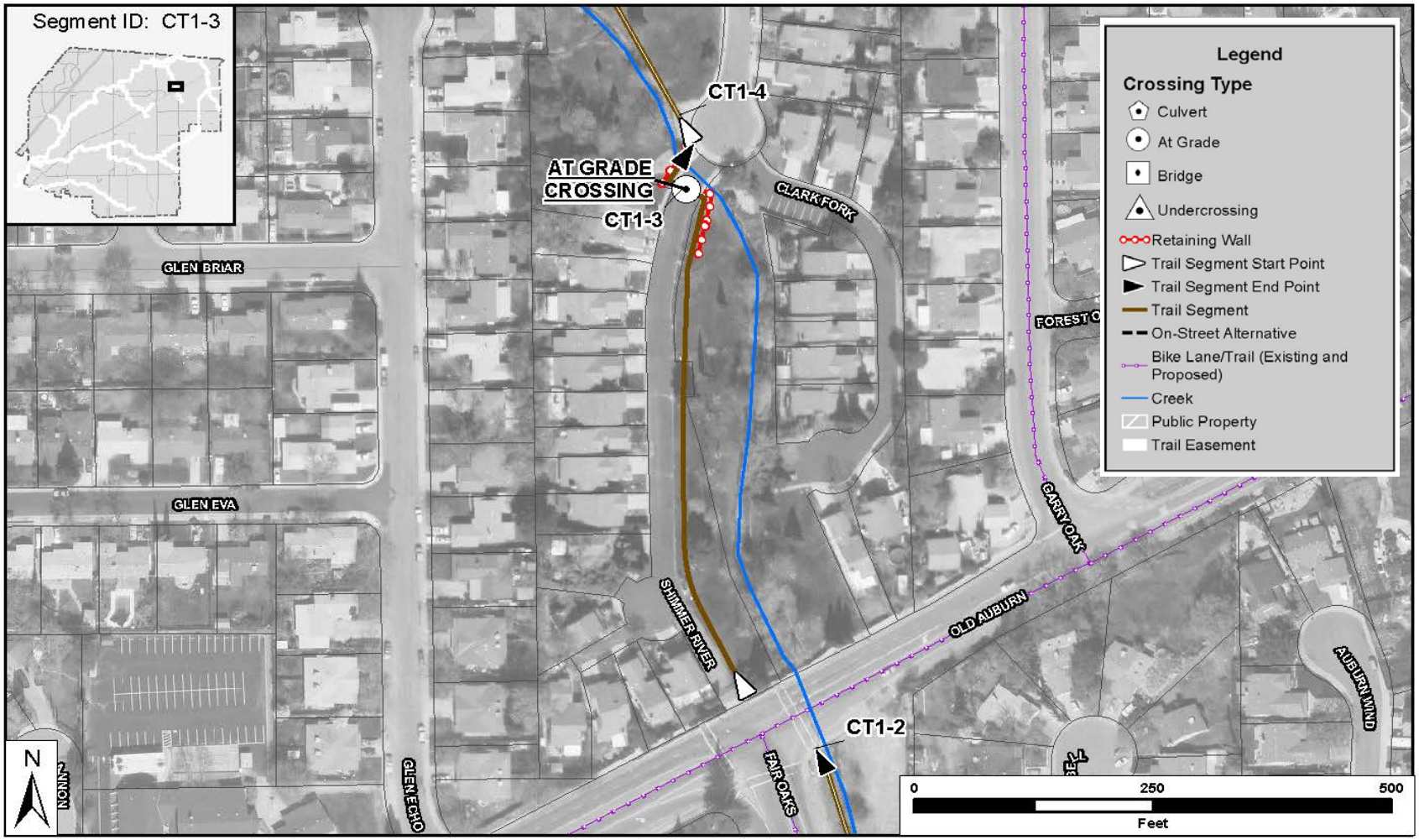
8.47 Segment CT1-3



Subwatershed: Cripple Creek	Segment ID: CT1-3	Start: Old Auburn Road	End: Shimmer River Lane
LF Creek/Trail: 618'/650'	Number of Road Crossings: 1	Implementation Priority: 3	No. Potential Creek Crossings: 1

8.47.1 Preliminary Cost Estimate

Table 57 below shows a planning-level cost estimate for the recommended alignment as presented in this document. The costs do not include annual maintenance costs. The estimate is in year 2013 USD.

Table 57 – Preliminary Cost Estimate Segment CT1-3

	Element	Costs x $1,000	Costs x $1,000
Construction	*Trail*	*154*	
	Structures	*0*	
	Mobilization (10%)	*16*	
	Contingency (20%)	*24*	
	Sub-Total Construction		**194**
Other Costs	*Utility Relocations*	*5*	
	Right of Way/Easements	*67*	
	Environmental Document (10%)	*20*	
	PS&E (10%)	*20*	
	Construction Management (12%)	*24*	
	Inspection/Testing (3%)	*6*	
	Administrative (3%)	*6*	
	Sub-Total Other		**148**
TOTAL COSTS			**342**

8.47.2 Design Elements

8.47.2.1 Trails

The recommended alignment is between the Shimmer River Lane and the creek, crossing the roadway prior to the cul-de-sac and crossing the creek using the shoulder of Shimmer River Lane. This reach of the creek flows through a privately owned common area. Adequate width (approximately 130') and open area for trail parallel to Shimmer River Lane. Minimal trees would be impacted. An existing Emergency Access road provides access to Old Auburn Road. An easement would be required for any future trail development parallel to Simmer River Lane.

The proposed trail lies entirely within privately owned property, requiring right of way acquisition or easements for the trail.

8.47.2.2 Creek Crossings

The proposed trail alignment crosses over the creek utilizing the west shoulder and concreted slope protection along Shimmer River Lane, just south of the Tanana River Court. This would require a retaining wall and new concreted slope protection.

8.47.2.3 Road Crossings

The trail will cross Shimmer River Lane, just south of the Tanana River Court as an unsignalized at-grade crossing.

8.47.2.4 Access Areas and Amenities

This segment is access through Old Auburn Road, Shimmer River Lane (private), and Tanana River Court. Amenities are limited to basic signage. A fire access gate currently exists.

8.47.2.5 Visual Screening

Screening should be determined through an access agreement negotiated with the development. Due to the location of the proposed trail between Shimmer River Lane and the creek channel, visual screening should be minimal.

8.47.2.6 Access Control

Access control should not be required based upon the location of the proposed trail between the creek and the lane.

8.47.2.7 Signage

Guidance/directional signs will be placed at Old Auburn Road. Regulatory signage for trail users would be placed on the approach to Old Auburn Road, Tanana River Court and Shimmer River Drive requiring trail users to stop and restricting vehicle access. Regulatory and guidance signs will be placed at quarter mile intervals along the trail.

8.47.2.8 Retaining Walls

Retaining walls are anticipated to support the trail where it crosses Shimmer River Lane above the existing pipe culverts.

8.47.3 Environmental Compliance

If the retaining wall and concrete slope protection remains outside the OHWM, anticipated environmental permits should be limited to an RWQCB NPDES Permit. If the retaining wall or concrete protection infringes on bed and bank, ACOE and CDFW permits will be required.

8.47.4 Additional Technical Studies

It is anticipated that the following additional technical studies will be completed during the Project Approval/Environmental Document and Design Phases of this project.

- Environmental Studies
  - Biological Assessment (BA)
  - Noise Technical Memorandum
  - Air Quality Technical Memorandum
  - Wetland Delineation
  - Natural Environment Study (NES)
  - Visual Resources – Technical Memorandum
  - Land Use and Community Impact – Technical Memorandum
- Geotechnical Analysis
- Hydrology/Hydraulic Analysis
- Storm Water Pollution Prevention Plan
- Geomorphology Study

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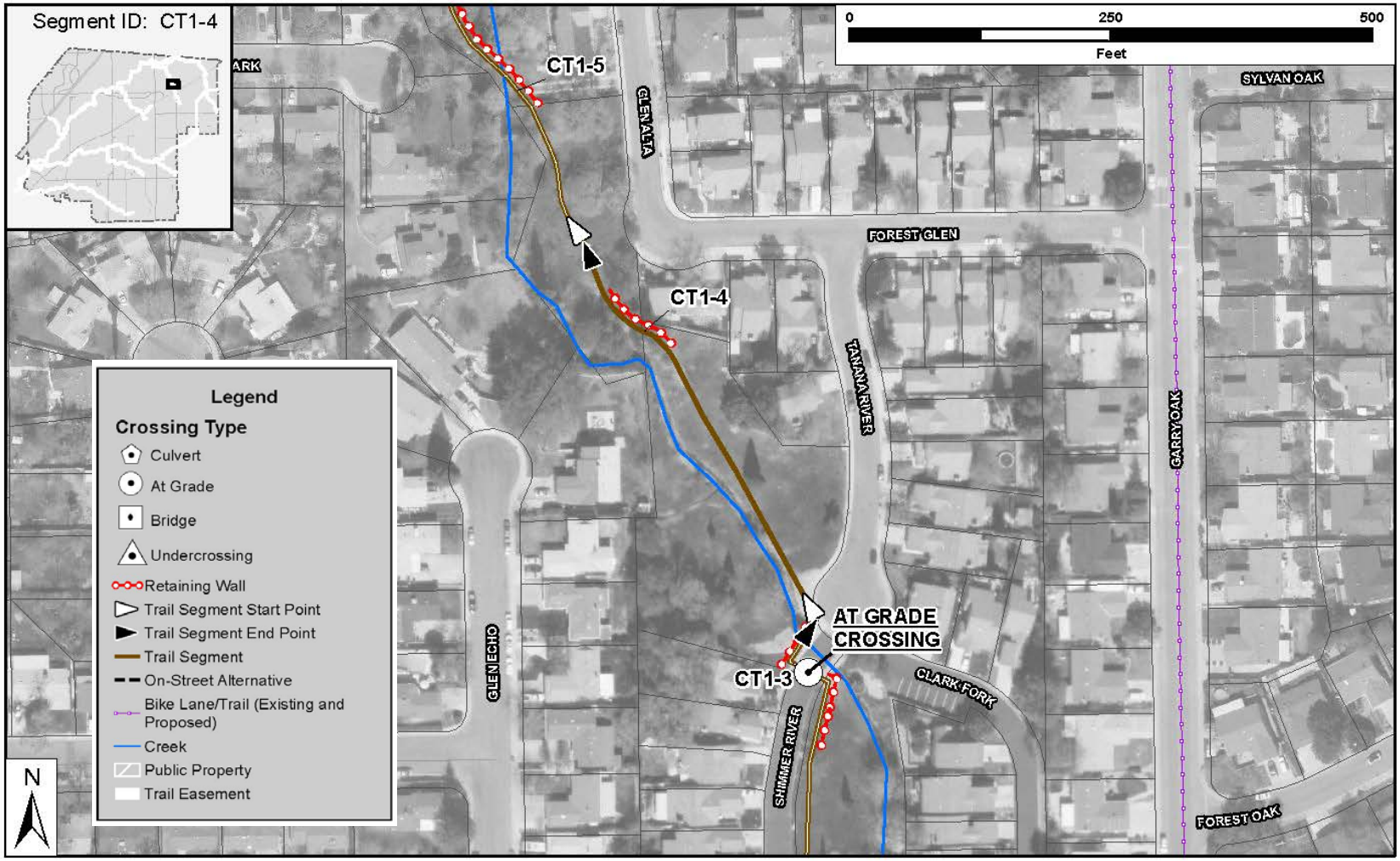
8.48 Segment CT1-4



Subwatershed: Cripple Creek	Segment ID: CT1-4	Start: Shimmer River Lane	End: Forest Glen Way
LF Creek/Trail: 453'/432'	Number of Road Crossings: 0	Implementation Priority: 3	No. Potential Creek Crossings: 0

8.48.1 Preliminary Cost Estimate

Table 58 below shows a planning-level cost estimate for the recommended alignment as presented in this document. The costs do not include annual maintenance costs. The estimate is in year 2013 USD.

Table 58 – Preliminary Cost Estimate Segment CT1-4

	Element	Costs x $1,000	Costs x $1,000
Construction	*Trail*	*97*	
	Structures	*0*	
	Mobilization (10%)	*10*	
	Contingency (20%)	*15*	
	Sub-Total Construction		**122**
Other Costs	*Utility Relocations*	*5*	
	Right of Way/Easements	*45*	
	Environmental Document (10%)	*13*	
	PS&E (10%)	*13*	
	Construction Management (12%)	*15*	
	Inspection/Testing (3%)	*4*	
	Administrative (3%)	*4*	
	Sub-Total Other		**99**
TOTAL COSTS			**221**

8.48.2 Design Elements

8.48.2.1 Trails

The recommended alignment is along the east side of the creek, from Shimmer River Lane to Forest Glen Way. This short reach runs through privately owned and maintained common area adjacent to Shimmer River Lane. Topographic and vegetation constraints are minor. Corridor width is adequate. An easement would be required for any future trail development.

The proposed trail lies entirely within privately owned property, requiring right of way acquisition or easements for the trail.

8.48.2.2 Creek Crossings

There are no creek crossings proposed within this segment.

8.48.2.3 Road Crossings

There are no roadway crossings within this trail segment.

8.48.2.4 Access Areas and Amenities

Tanana River Court and Forest Glen Way provide access to this segment. On-street parking is limited. Trail amenities would be basic signage.

8.48.2.5 Visual Screening

If trail access can be secured for this segment, additional screening would likely be needed for the home at the intersection of Forest Glen Way and Glen Alta Way, since the trail would pass close to the backyard. Additional vegetation or fencing upgrades may be desired.

8.48.2.6 Access Control

The adequacy of the existing fence at the abovementioned home should be evaluated and the residents engaged in the planning and design process.

8.48.2.7 Signage

Guidance/directional signs will be placed at Tanana River Court and any connection to Forest Glen Way. Regulatory signage for trail users would be placed on the approach to Tanana River Court and Forest Glen Way requiring trail users to stop and restricting vehicle access. Regulatory and guidance signs will be placed at quarter mile intervals along the trail.

8.48.2.8 Retaining Walls

Retaining walls may be required where the trail passes through a constrained area between the residential properties on Forest Glen Way and the creek.

8.48.3 Environmental Compliance

Since no creek crossings are proposed, anticipated environmental permits are limited to an RWQCB NPDES Permit.

8.48.4 Additional Technical Studies

It is anticipated that the following additional technical studies will be completed during the Project Approval/Environmental Document and Design Phases of this project.

- Environmental Studies
    - Biological Assessment (BA)
    - Noise Technical Memorandum
    - Air Quality Technical Memorandum
    - Wetland Delineation
    - Natural Environment Study (NES)
    - Visual Resources – Technical Memorandum
    - Land Use and Community Impact – Technical Memorandum
- Geotechnical Analysis
- Hydrology/Hydraulic Analysis
- Storm Water Pollution Prevention Plan
- Geomorphology Study

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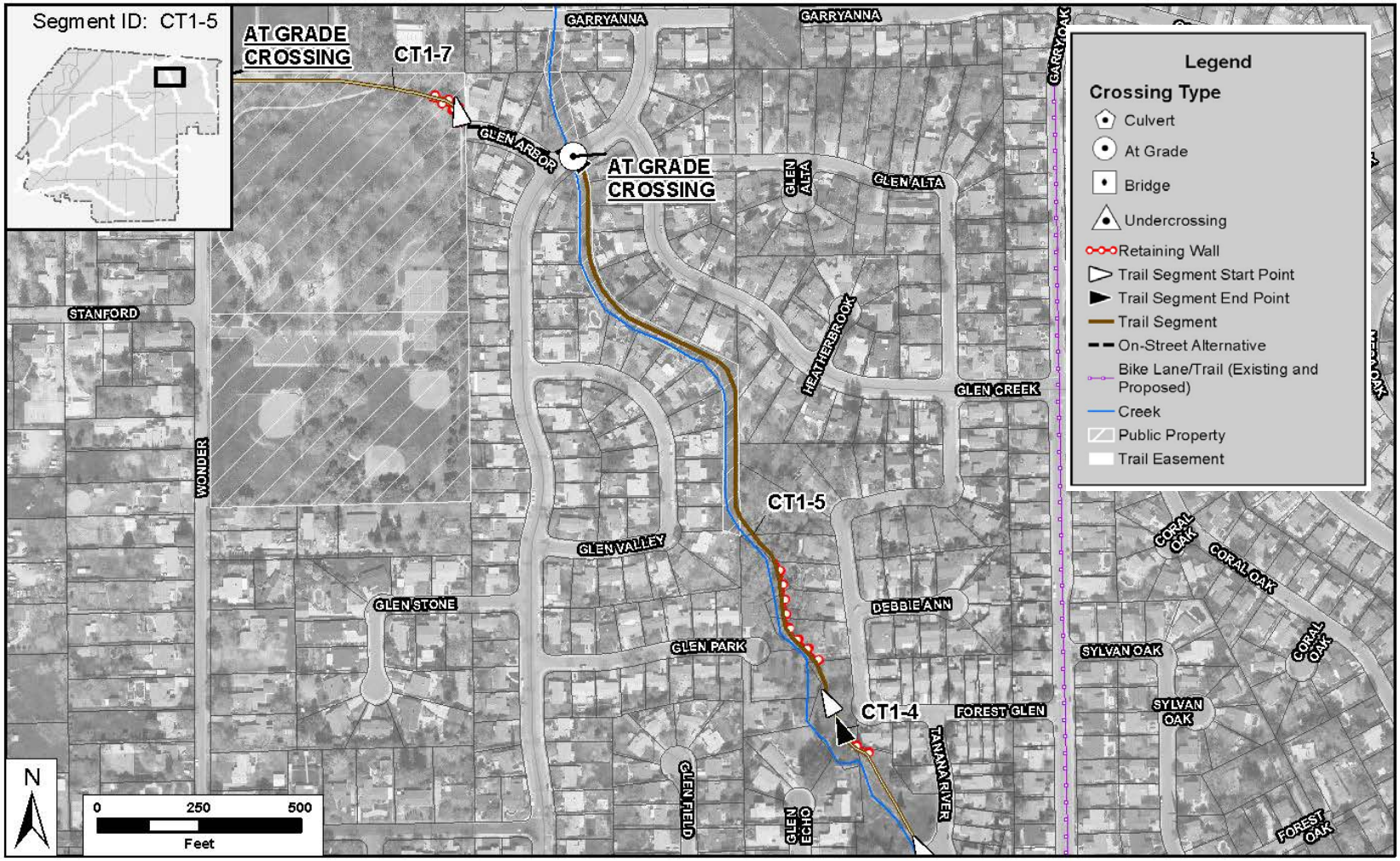
8.49 Segment CT1-5



Subwatershed: Cripple Creek	Segment ID: CT1-5	Start: Forest Glen Way	End: Glen Tree Drive
LF Creek/Trail: 1707'/1673'	Number of Road Crossings: 1	Implementation Priority: 3	No. Potential Creek Crossings: 0

8.49.1 Preliminary Cost Estimate

Table 59 below shows a planning-level cost estimate for the recommended alignment as presented in this document. The costs do not include annual maintenance costs. The estimate is in year 2013 USD.

Table 59 – Preliminary Cost Estimate Segment CT1-5

	Element	Costs x $1,000	Costs x $1,000
Construction	*Trail*	*251*	
	Structures	*0*	
	Mobilization (10%)	*26*	
	Contingency (20%)	*40*	
	Sub-Total Construction		**317**
Other Costs	*Utility Relocations*	*5*	
	Right of Way/Easements	*58*	
	Environmental Document (10%)	*32*	
	PS&E (10%)	*32*	
	Construction Management (12%)	*39*	
	Inspection/Testing (3%)	*10*	
	Administrative (3%)	*10*	
	Sub-Total Other		**186**
TOTAL COSTS			**503**

8.49.2 Design Elements

8.49.2.1 Trails

The recommended alignment is along the east side of the creek, from Forest Glen Way to a proposed unsignalized at-grade crossing at Glen Tree Drive. The trail users would then be directed toward Madera Park using Glen Arbor Way. The first third of reach is in a privately owned common area. Remainder is public property owned and managed by City, consisting of a maintenance road on the right bank, above a concrete channel. Available width for trail on private land varies depending upon side of bank and vegetation. Width on public land is sufficient for trail, which could also function as the access road.

The proposed trail lies within private and publicly owned property, requiring right of way acquisition or easements for the trail through the privately owned property.

8.49.2.2 Creek Crossings

There are no creek crossings proposed within this segment.

8.49.2.3 Road Crossings

The trail would cross Glen Tree Drive as an at-grade unsignalized intersection. This appears feasible due to the relatively low traffic volumes at this location. It is not feasible to use the existing bridge structure since the trail is discontinuous to the north.

8.49.2.4 Access Areas and Amenities

Glen Tree Drive and Forest Glen Way provide access to this segment. On-street parking is limited.

8.49.2.5 Visual Screening

The narrowness of the corridor, proximity to backyards and lack of vegetation in the northern two-thirds of the segment make visual screening likely. Due to space constraints, fencing is likely the best method. Existing fences should be evaluated as part of detailed design of this segment.

8.49.2.6 Access Control

As with screening, existing fencing should be evaluated for access control. Residents should be involved in the design and planning process to ensure access controls meet their needs.

8.49.2.7 Signage

Guidance/directional signs will be placed at Glen Tree Drive. Regulatory signage for trail users would be placed on the approach to Glen Tree Drive requiring trail users to stop and restricting vehicle access. Regulatory and guidance signs will be placed at quarter mile intervals along the trail.

8.49.2.8 Retaining Walls

Retaining walls may be required where the trail passes through a constrained area between the residential properties on Glen Alta Way and the creek.

8.49.3 Environmental Compliance

Since no creek crossings are proposed, anticipated environmental permits are limited to an RWQCB NPDES Permit.

8.49.4 Additional Technical Studies

It is anticipated that the following additional technical studies will be completed during the Project Approval/Environmental Document and Design Phases of this project.

- Environmental Studies
  - Biological Assessment (BA)
  - Noise Technical Memorandum
  - Air Quality Technical Memorandum
  - Wetland Delineation
  - Natural Environment Study (NES)
  - Visual Resources – Technical Memorandum
  - Land Use and Community Impact – Technical Memorandum
- Geotechnical Analysis
- Hydrology/Hydraulic Analysis
- Storm Water Pollution Prevention Plan
- Geomorphology Study

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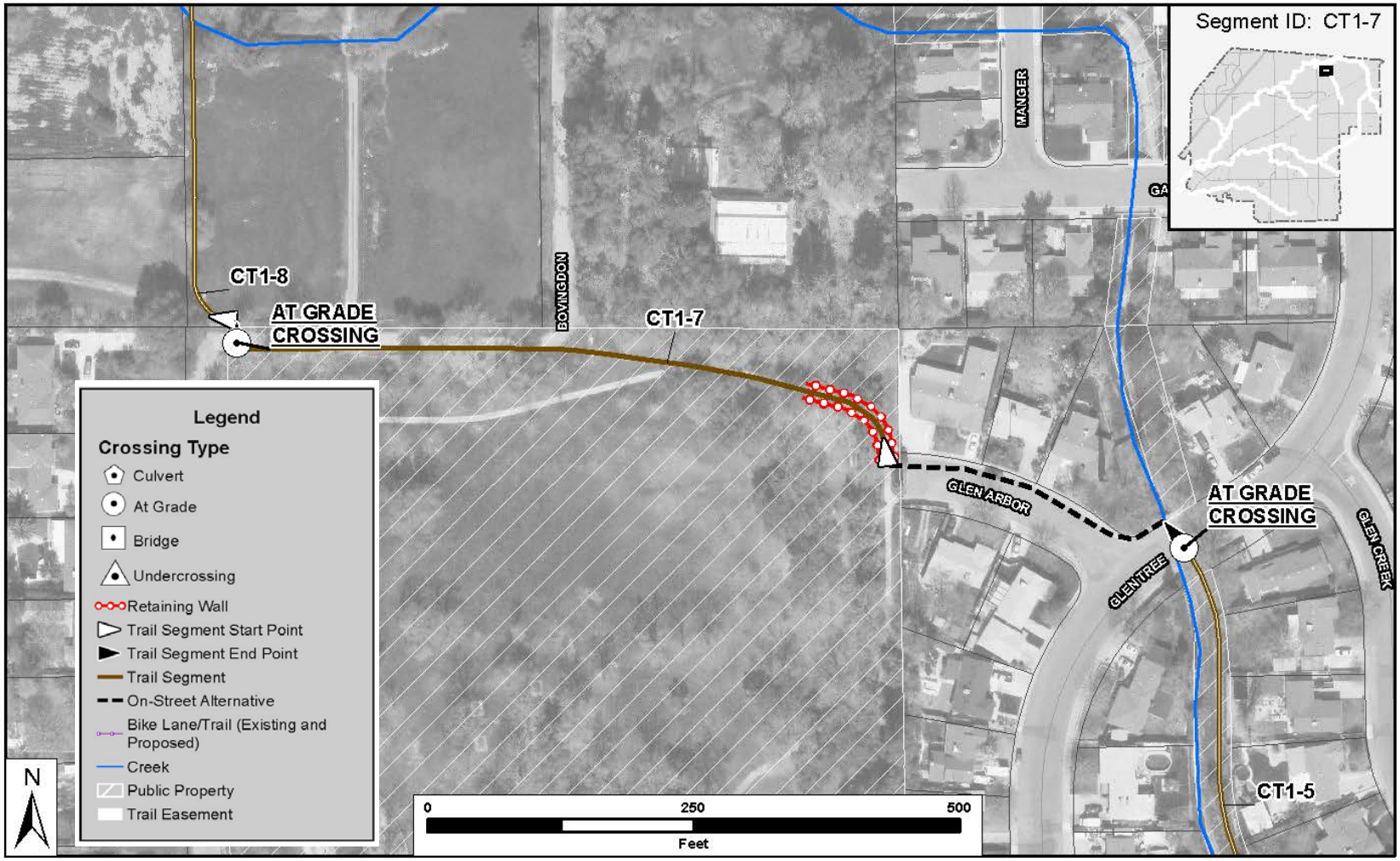
8.50 Segment CT1-7



Subwatershed: Cripple Creek	Segment ID: CT1-7	Start: Glen Arbor Way	End: Wonder Street
LF Creek/Trail: 710'/682'	Number of Road Crossings: 1	Implementation Priority: 3	No. Potential Creek Crossings: 0

8.50.1 Preliminary Cost Estimate

Table 60 below shows a planning-level cost estimate for the recommended alignment as presented in this document. The costs do not include annual maintenance costs. The estimate is in year 2013 USD.

Table 60 – Preliminary Cost Estimate Segment CT1-7

	Element	Costs x $1,000	Costs x $1,000
Construction	*Trail*	*151*	
	Structures	*0*	
	Mobilization (10%)	*16*	
	Contingency (20%)	*24*	
	Sub-Total Construction		**191**
Other Costs	*Utility Relocations*	*5*	
	Right of Way/Easements	*-*	
	Environmental Document (10%)	*20*	
	PS&E (10%)	*20*	
	Construction Management (12%)	*23*	
	Inspection/Testing (3%)	*6*	
	Administrative (3%)	*6*	
	Sub-Total Other		**80**
TOTAL COSTS			**271**

8.50.2 Design Elements

8.50.2.1 Trails

The recommended alignment is to enter Madera Park from Glen Arbor Way and follow an existing paved path that will need to be widened around the north side of the park to Wonder Street within publicly owned property. This alignment is south of the creek.

The proposed trail lies entirely within publicly owned property and therefore no right of way or easement costs are anticipated.

8.50.2.2 Creek Crossings

There are no creek crossings proposed within this segment.

8.50.2.3 Road Crossings

Prior to Wonder Street the alignment would turn north and cross Bovingdon Lane as an unsignalized at-grade crossing and follow the property line north. This appears feasible due to the very low traffic volumes using this road.

8.50.2.4 Access Areas and Amenities

Access to this segment is through Madera Park. The park includes parking, restrooms, sports fields and courts, play equipment and other park amenities.

8.50.2.5 Visual Screening

Since this segment is within a public park, visual screening is not anticipated.

8.50.2.6 Access Control

Access controls are not required. The existing entry on Glen Arbor Way may need upgrading to comply with ADA standards.

8.50.2.7 Signage

Guidance/directional signs will be placed at Glen Arbor Way. Regulatory signage for trail users would be placed on the approach to Glen Arbor Way and Bovingdon Lane requiring trail users to stop and restricting vehicle access. Regulatory and guidance signs will be placed at quarter mile intervals along the trail. A general informational and regional trails map is proposed to be installed in Madera Park.

8.50.2.8 Retaining Walls

Retaining walls are anticipated on the access paths from Glen Arbor Way to Madera Park.

8.50.3 Environmental Compliance

Since no creek crossings are proposed, anticipated environmental permits are limited to an RWQCB NPDES Permit.

8.50.4 Additional Technical Studies

It is anticipated that the following additional technical studies will be completed during the Project Approval/Environmental Document and Design Phases of this project.

- Environmental Studies
    - Biological Assessment (BA)
    - Noise Technical Memorandum
    - Air Quality Technical Memorandum
    - Wetland Delineation
    - Natural Environment Study (NES)
    - Visual Resources – Technical Memorandum
    - Land Use and Community Impact – Technical Memorandum
- Geotechnical Analysis
- Hydrology/Hydraulic Analysis
- Storm Water Pollution Prevention Plan
- Geomorphology Study

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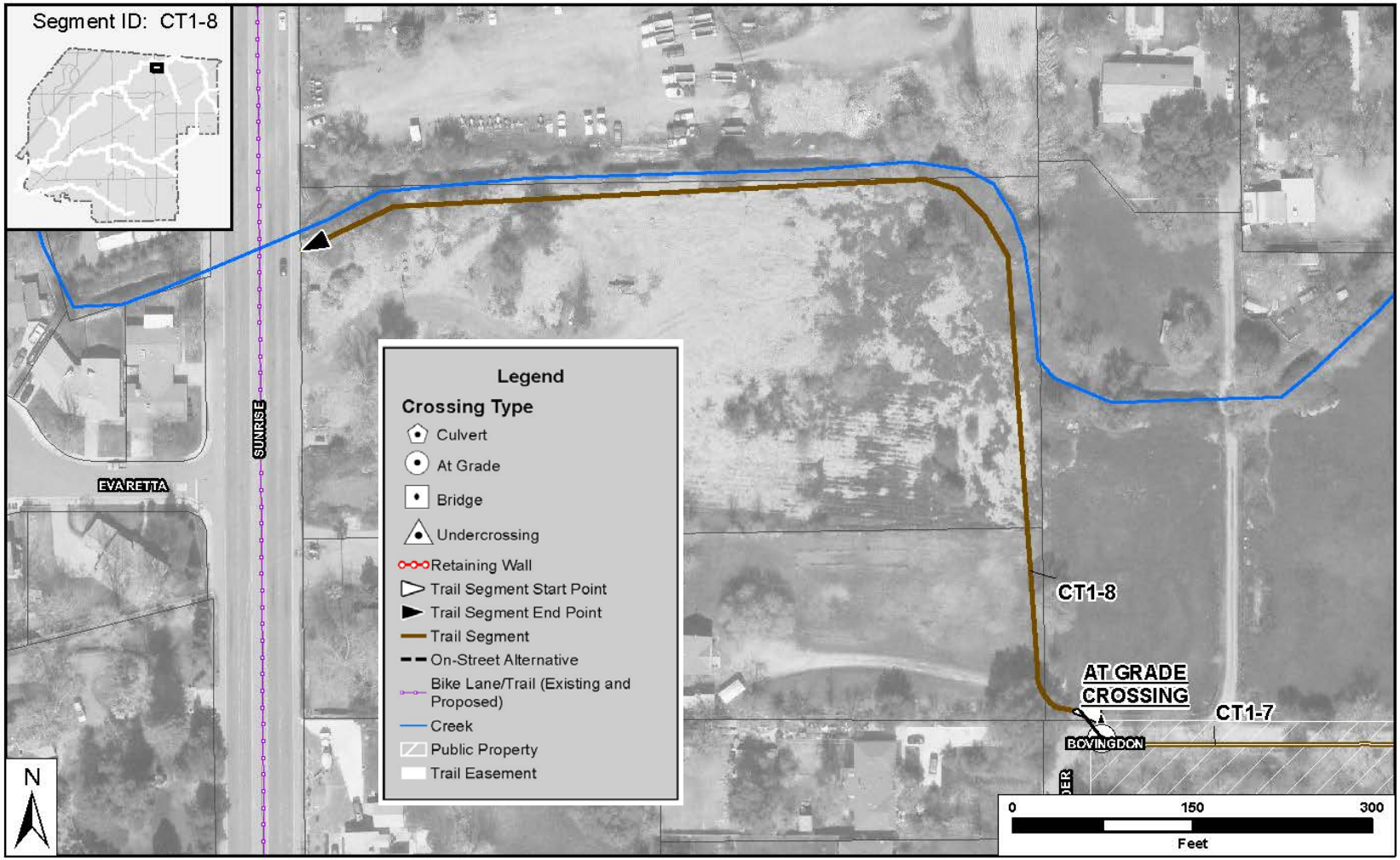
8.51 Segment CT1-8



Subwatershed: Cripple Creek	Segment ID: CT1-8	Start: Wonder Street	End: Sunrise Boulevard
LF Creek/Trail: 836'/1122'	Number of Road Crossings: 1	Implementation Priority: 3	No. Potential Creek Crossings: 0

8.51.1 Preliminary Cost Estimate

Table 61 below shows a planning-level cost estimate for the recommended alignment as presented in this document. The costs do not include annual maintenance costs. The estimate is in year 2013 USD.

Table 61 – Preliminary Cost Estimate Segment CT1-8

	Element	Costs x $1,000	Costs x $1,000
Construction	*Trail*	*182*	
	Structures	*0*	
	Mobilization (10%)	*19*	
	Contingency (20%)	*29*	
	Sub-Total Construction		**230**
Other Costs	*Utility Relocations*	*5*	
	Right of Way/Easements	*116*	
	Environmental Document (10%)	*23*	
	PS&E (10%)	*23*	
	Construction Management (12%)	*28*	
	Inspection/Testing (3%)	*7*	
	Administrative (3%)	*7*	
	Sub-Total Other		**209**
TOTAL COSTS			**439**

8.51.2 Design Elements

8.51.2.1 Trails

The recommended alignment is to follow along the east side of Wonder Street, crosses Wonder Street as an unsignalized at-grade crossing, and then run westward to Sunrise Boulevard. Sunrise Boulevard is a future Complete Streets project. The exact location of the west link will be determined by planned future development of these parcels. The creek in this reach flows through a single large private parcel with no development on the left bank. A senior care facility is currently proposed for the site. The development includes a creekside setback without development consistent with the City's Zoning Code. Topographic constraints are minimal.

The proposed trail lies entirely within privately owned property, requiring right of way acquisition or easements for the trail.

8.51.2.2 Creek Crossings

There are no creek crossings proposed within this segment. The alignment would be on the south side of the creek.

8.51.2.3 Road Crossings

An unsignalized at-grade crossing of Wonder Street is proposed. This appears feasible due to the very low traffic volumes using this road. No crossing of Sunrise Boulevard is proposed because the trail is discontinuous to the west. Sunrise Boulevard is a future Complete Streets project being developed by the City of Citrus Heights.

8.51.2.4 Access Areas and Amenities

Madera Park and Sunrise Boulevard provide access to this segment. Madera Park provides parking and includes amenities listed in CT1-7

8.51.2.5 Visual Screening

Visual screening should be included in the planning and design of the senior care facility.

8.51.2.6 Access Control

Access control should be included in the planning and design of the senior care facility.

8.51.2.7 Signage

Guidance/directional signs will be placed at Sunrise Boulevard and Wonder Street. Regulatory signage for trail users would be placed on the approach to Sunrise Boulevard and Wonder Street requiring trail users to stop and restricting vehicle access. Regulatory and guidance signs will be placed at quarter mile intervals along the trail.

8.51.2.8 Retaining Walls

No retaining walls have been identified along this segment.

8.51.3 Environmental Compliance

Since no creek crossings are proposed, anticipated environmental permits are limited to an RWQCB NPDES Permit.

8.51.4 Additional Technical Studies

It is anticipated that the following additional technical studies will be completed during the Project Approval/Environmental Document and Design Phases of this project.

- Environmental Studies
  - Biological Assessment (BA)
  - Noise Technical Memorandum
  - Air Quality Technical Memorandum
  - Wetland Delineation
  - Natural Environment Study (NES)
  - Visual Resources – Technical Memorandum
  - Land Use and Community Impact – Technical Memorandum
- Geotechnical Analysis
- Hydrology/Hydraulic Analysis
- Storm Water Pollution Prevention Plan
- Geomorphology Study

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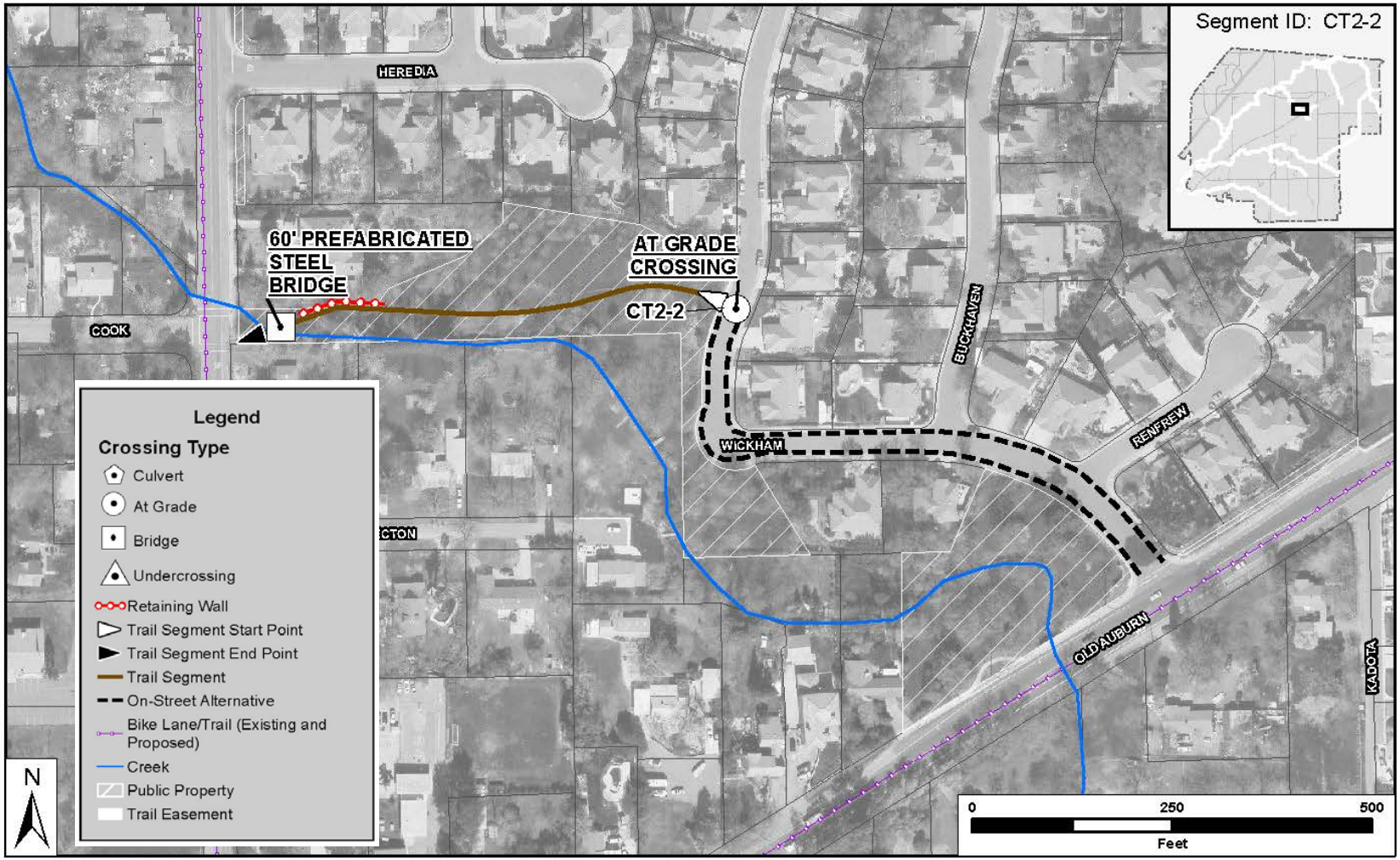
8.52 Segment CT2-2



Subwatershed: Cripple Creek	Segment ID: CT2-2	Start: Old Auburn Road	End: Mariposa Avenue
LF Creek/Trail: 1395'/625'	Number of Road Crossings: 0	Implementation Priority: 3	No. Potential Creek Crossings: 1

8.52.1 Preliminary Cost Estimate

Table 62 below shows a planning-level cost estimate for the recommended alignment as presented in this document. The costs do not include annual maintenance costs. The estimate is in year 2013 USD.

Table 62 – Preliminary Cost Estimate Segment CT2-2

	Element	Costs x $1,000	Costs x $1,000
Construction	*Trail*	*170*	
	Structures	*144*	
	Mobilization (10%)	*18*	
	Contingency (20%)	*27*	
	Sub-Total Construction		**359**
Other Costs	*Utility Relocations*	*5*	
	Right of Way/Easements	*-*	
	Environmental Document (10%)	*36*	
	PS&E (10%)	*36*	
	Construction Management (12%)	*44*	
	Inspection/Testing (3%)	*11*	
	Administrative (3%)	*11*	
	Sub-Total Other		**143**
TOTAL COSTS			**502**

8.52.2 Design Elements

8.52.2.1 Trails

The recommended alignment would follow on street Class 3 facilities on Wickham Drive before entering publicly owned property north of the creek, running westward to Mariposa Avenue. Just before Mariposa Avenue a bridge would allow the trail to cross the creek and tie into Mariposa Avenue opposite Cook Avenue. Approximately half of this reach is in public ownership by the County Department of Water Resources. Private homes are near the creek at the beginning and end of the reach. An informal trail connects Mariposa Avenue to Wickham Drive. May need bridge at downstream end to connect with Mariposa while avoiding private property impacts.

The proposed trail lies entirely within publicly owned property and therefore no right of way or easement costs are anticipated.

8.52.2.2 Creek Crossings (Bridges, Culverts, etc.)

A prefabricated steel bridge structure is proposed just east of Mariposa Avenue. The proposed span length of the bridge is 60 feet.

8.52.2.3 Road Crossings

Although there are no formal roadway crossing planned because the trail is discontinuous to the west, it is proposed to use the existing crosswalk at the stop-controlled at-grade intersection at Cook Avenue.

8.52.2.4 Access Areas and Amenities

Access to this segment is via Old Auburn Road, Wickham Drive and Mariposa Avenue. On-street parking is available on Wickham Drive. Amenities are limited to signage.

8.52.2.5 Visual Screening

Visual screening may be needed between the trail and the residence on Mariposa Avenue, or the two residences on the south side of Wickham closest to Antelope.

8.52.2.6 Access Control

Due to the location of the trail with respect to the side yard of the house on Mariposa, fencing is recommended to separate trail users from the yard. If access can be secured south of the homes on Wickham Drive, fencing may also be appropriate where the trail passes behind the homes.

8.52.2.7 Signage

Guidance/directional signs will be placed at Mariposa Avenue and Wickham Drive. Regulatory signage for trail users would be placed on the approach to Mariposa Avenue and Wickham Drive requiring trail users to stop and restricting vehicle access. Regulatory and guidance signs will be placed at quarter mile intervals along the trail. Weight limitation warning signs and other regulatory will be placed on either side of all bridges crossing the creek.

8.52.2.8 Retaining Walls

No retaining walls have been identified along this segment however where the trail approaches Mariposa Avenue there may be a need for retaining walls in the constrained area.

8.52.3 Environmental Compliance

Due to the proposed crossing, associated abutments, and channel stabilization east of Mariposa, the following permits may be required for this segment of the trail:

- RWQCB – Section 401 Water Quality Certification and NPDES Permit
- CDFW – Section 1602 Streambed Alteration Agreement
- ACOE – Section 404 Nationwide Permit

If sensitive species are identified in the biological assessment, consultation with the USFWS under Section 7 of the Endangered Species Act will be necessary.

8.52.4 Additional Technical Studies

It is anticipated that the following additional technical studies will be completed during the Project Approval/Environmental Document and Design Phases of this project.

- Environmental Studies
  - Biological Assessment (BA)
  - Noise Technical Memorandum
  - Air Quality Technical Memorandum
  - Wetland Delineation
  - Natural Environment Study (NES)
  - Visual Resources – Technical Memorandum
  - Land Use and Community Impact – Technical Memorandum
- Geotechnical Analysis
- Hydrology/Hydraulic Analysis – Location Hydraulic Study
- Storm Water Pollution Prevention Plan
- Geomorphology Study

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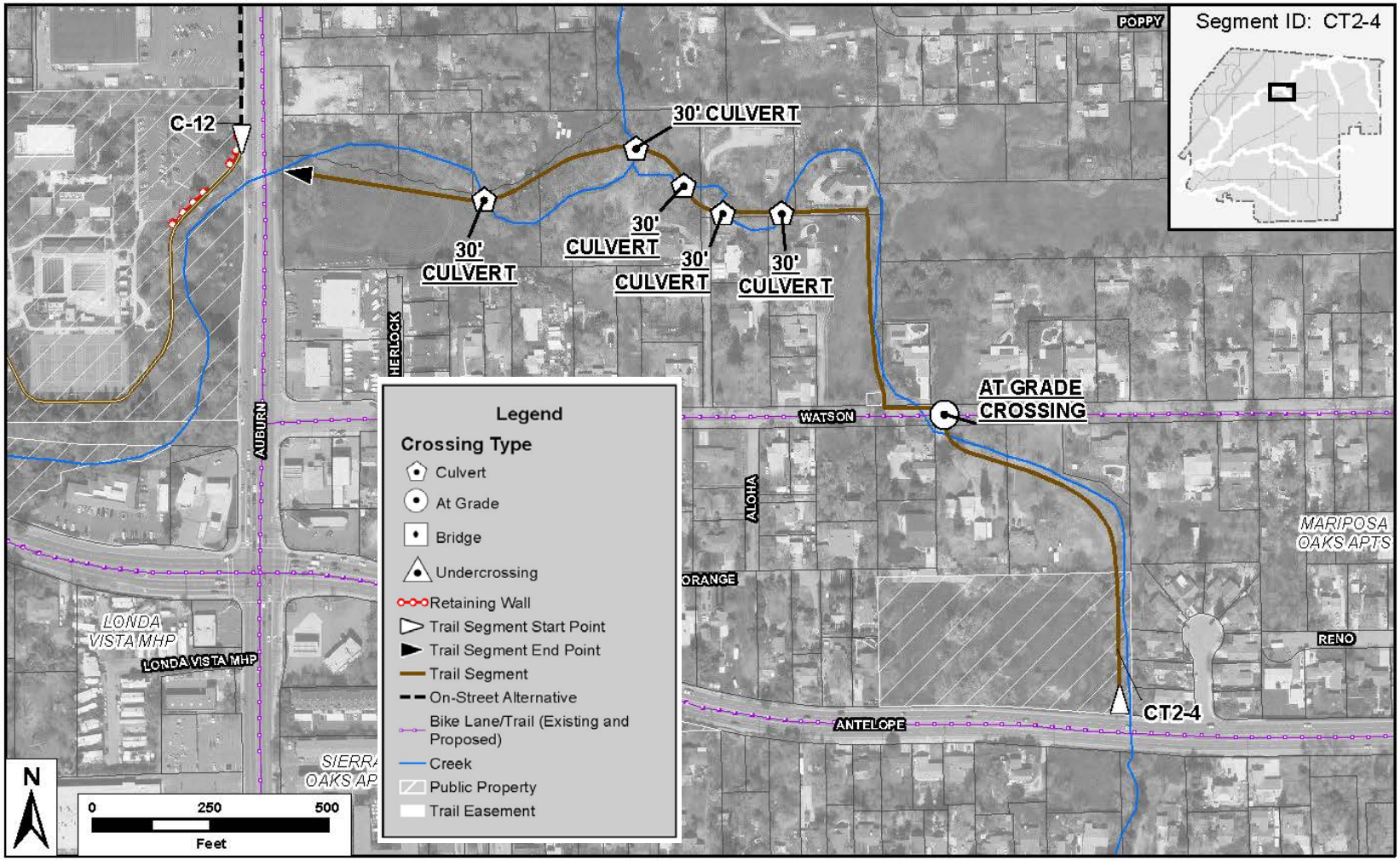
8.53 Segment CT2-4



Subwatershed: Cripple Creek	Segment ID: CT2-4	Start: Antelope Road	End: Confluence with main stem
LF Creek/Trail: 2245'/2748'	Number of Road Crossings: 1	Implementation Priority: 3	No. Potential Creek Crossings: Multiple

8.53.1 Preliminary Cost Estimate

Table 63 below shows a planning-level cost estimate for the recommended alignment as presented in this document. The costs do not include annual maintenance costs. The estimate is in year 2013 USD.

Table 63 – Preliminary Cost Estimate Segment CT2-4

	Element	Costs x $1,000	Costs x $1,000
Construction	*Trail*	*646*	
	Structures	*0*	
	Mobilization (10%)	*49*	
	Contingency (20%)	*73*	
	Sub-Total Construction		**586**
Other Costs	*Utility Relocations*	*5*	
	Right of Way/Easements	*284*	
	Environmental Document (10%)	*59*	
	PS&E (10%)	*59*	
	Construction Management (12%)	*71*	
	Inspection/Testing (3%)	*18*	
	Administrative (3%)	*18*	
	Sub-Total Other		**514**
TOTAL COSTS			**1,100**

8.53.2 Design Elements

8.53.2.1 Trails

The recommended alignment would follow the existing creek mainly on the west side of the creek crossing Watson Way and running north to the confluence. This segment would have limited value if the main trail along Cripple Creek is not feasible. Land is privately owned, but lots are generally large and undeveloped adjacent to the creek. Reach would require easements and multiple crossings. No significant topographic constraints.

The proposed trail lies within private and publicly owned property, requiring right of way acquisition or easements for the trail through the privately owned property.

8.53.2.2 Creek Crossings (Bridges, Culverts, etc.)

To accommodate the needs of the property owners it is likely that the trail will cross the small creek in several locations. This may be achieved with culvert structures.

8.53.2.3 Road Crossings

An unsignalized at-grade crossing of Watson Way is proposed. This appears feasible due to the very low traffic volumes using this road. No crossing is shown at Auburn Boulevard due to road clearance limitations. However, since this segment provides a connection to Rusch Park, a crossing at Auburn Boulevard should be evaluated in more detail in the future.

8.53.2.4 Access Areas and Amenities

This reach is accessible from Antelope Road, Watson Way, Auburn Boulevard and Holly Drive (via a spur trail)

8.53.2.5 Visual Screening

This trail runs through a number of private residential parcels, and access agreements will be needed for trail approval. Agreements should address the need for and type of screening. Given the relatively large parcel sizes, vegetated buffers are feasible.

8.53.2.6 Access Control

Access control in the form of fencing and/or vegetation may be desired by residents. Agreements should be made as part of the easement/fee title purchase.

8.53.2.7 Signage

Guidance/directional signs will be placed at Antelope Road and Watson Way. Regulatory signage for trail users would be placed on the approach to Antelope Road and Watson Way requiring trail users to stop and restricting vehicle access. Regulatory and guidance signs will be placed at quarter mile intervals along the trail.

8.53.2.8 Retaining Walls

No retaining walls have been identified along this segment however small retaining walls may be required in the constrained area.

8.53.3 Environmental Compliance

Due to the proposed crossings, associated abutments, and channel stabilization east of Mariposa, the following permits may be required for this segment of the trail:

- RWQCB – Section 401 Water Quality Certification and NPDES Permit
- CDFW – Section 1602 Streambed Alteration Agreement
- ACOE – Section 404 Nationwide Permit

If sensitive species are identified in the biological assessment, consultation with the USFWS under Section 7 of the Endangered Species Act will be necessary.

8.53.4 Additional Technical Studies

It is anticipated that the following additional technical studies will be completed during the Project Approval/Environmental Document and Design Phases of this project.

- Environmental Studies
  - Biological Assessment (BA)
  - Noise Technical Memorandum
  - Air Quality Technical Memorandum
  - Wetland Delineation
  - Natural Environment Study (NES)
  - Visual Resources – Technical Memorandum
  - Land Use and Community Impact – Technical Memorandum
- Geotechnical Analysis
- Hydrology/Hydraulic Analysis – Location Hydraulic Study
- Storm Water Pollution Prevention Plan
- Geomorphology Study

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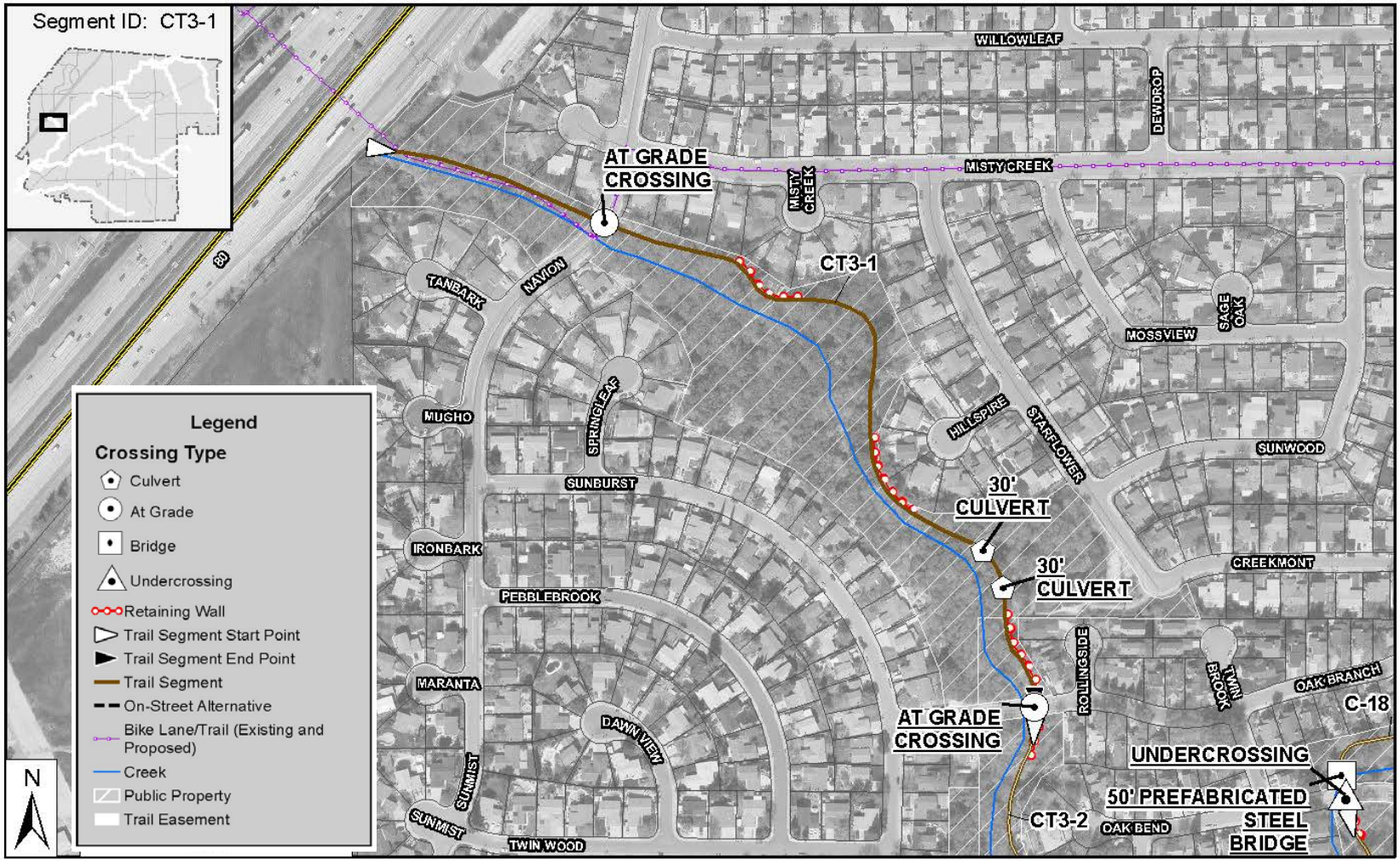
8.54 Segment CT3-1



Subwatershed: Cripple Creek	Segment ID: CT3-1	Start: I-80	End: Twin Park Drive
LF Creek/Trail: 2019'/2146'	Number of Road Crossings: 2	Implementation Priority: 2	No. Potential Creek Crossings: 2

8.54.1 Preliminary Cost Estimate

Table 64 below shows a planning-level cost estimate for the recommended alignment as presented in this document. The costs do not include annual maintenance costs. The estimate is in year 2013 USD.

Table 64 – Preliminary Cost Estimate Segment CT3-1

	Element	Costs x $1,000	Costs x $1,000
Construction	*Trail*	*617*	
	Structures	*0*	
	Mobilization (10%)	*65*	
	Contingency (20%)	*97*	
	Sub-Total Construction		**779**
Other Costs	*Utility Relocations*	*5*	
	Right of Way/Easements	*-*	
	Environmental Document (10%)	*78*	
	PS&E (10%)	*78*	
	Construction Management (12%)	*94*	
	Inspection/Testing (3%)	*24*	
	Administrative (3%)	*24*	
	Sub-Total Other		**303**
TOTAL COSTS			**1,082**

8.54.2 Design Elements

8.54.2.1 Trails

The recommended alignment would follow the north side of this creek tributary from a possible future overcrossing of I-80, southwards to Twin Park Drive. Unsignalized at-grade crossings are proposed at Navion Drive and Twin Park Drive. This reach of the creek is in public ownership: primarily Twin Creeks Park, owned by SRPD, with the remaining small segment owned by the City. A paved connection exists from just outside the corridor at Rollingside Court to Starflower Drive. Informal trails run throughout. Riparian vegetation is dense in some areas will likely require mitigation. Corridor width generally good, but near to homes in three locations. An overcrossing of I-80 is planned at this location in the City's 2008 Bikeway Master Plan (Citrus Heights 2008) to connect to the northwest portion of the City.

The proposed trail lies entirely within publicly owned property and therefore no right of way or easement costs are anticipated.

8.54.2.2 Creek Crossings (Bridges, Culverts, etc.)

Two creek crossings are proposed along this segment. It is anticipated that box culverts or pipe culverts will be used to achieve these crossings just north of Twin Park Drive where the tributary meanders significantly.

8.54.2.3 Road Crossings

Unsignalized at-grade crossings of Navion Drive and Twin Park Drive is proposed. This appears feasible due to the relatively low traffic volumes using these roads. It is not feasible to use the existing bridge structure to accommodate a trail undercrossing due to the restricted vertical clearance.

8.54.2.4 Access Areas and Amenities

Navion Drive and Twin Park Drive provide access to this segment. On-street parking is very limited.

8.54.2.5 Visual Screening

The proposed trail passes through a heavily wooded area. The existing vegetation generally provides adequate visual screening, however, additional screening may be warranted in several locations.

8.54.2.6 Access Control

Access control is generally provided by backyard fencing. In at least one instance, fencing condition was in need of upgrading.

8.54.2.7 Signage

Guidance/directional signs will be placed at Navion Drive and Twin Park Drive. Regulatory signage for trail users would be placed on the approach to Navion Drive and Twin Park Drive requiring trail users to stop and restricting vehicle access. Regulatory and guidance signs will be placed at quarter mile intervals along the trail.

8.54.2.8 Retaining Walls

No retaining walls have been identified along this segment however small retaining walls may be required in the constrained area.

8.54.3 Environmental Compliance

Due to the proposed crossings and associated improvements, the following permits may be required for this segment of the trail:

- RWQCB – Section 401 Water Quality Certification and NPDES Permit
- CDFW – Section 1602 Streambed Alteration Agreement
- ACOE – Section 404 Nationwide Permit

If sensitive species are identified in the biological assessment, consultation with the USFWS under Section 7 of the Endangered Species Act will be necessary.

8.54.4 Additional Technical Studies

It is anticipated that the following additional technical studies will be completed during the Project Approval/Environmental Document and Design Phases of this project.

- Environmental Studies
  - Biological Assessment (BA)
  - Noise Technical Memorandum
  - Air Quality Technical Memorandum
  - Wetland Delineation
  - Natural Environment Study (NES)
  - Visual Resources – Technical Memorandum
  - Land Use and Community Impact – Technical Memorandum
- Geotechnical Analysis
- Hydrology/Hydraulic Analysis
- Storm Water Pollution Prevention Plan
- Geomorphology Study

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8.55 Segment CT3-2

Subwatershed: Cripple Creek	Segment ID: CT3-2	Start: Twin Park Drive	End: Confluence with main stem
LF Creek/Trail: 1624'/1584'	Number of Road Crossings: 0	Implementation Priority: 2	No. Potential Creek Crossings: 0

8.55.1 Preliminary Cost Estimate

Table 65 below shows a planning-level cost estimate for the recommended alignment as presented in this document. The costs do not include annual maintenance costs. The estimate is in year 2013 USD.

Table 65 – Preliminary Cost Estimate Segment CT3-2

	Element	Costs x $1,000	Costs x $1,000
Construction	*Trail*	*283*	
	Structures	*192*	
	Mobilization (10%)	*30*	
	Contingency (20%)	*45*	
	Sub-Total Construction		**550**
Other Costs	*Utility Relocations*	*5*	
	Right of Way/Easements	*114*	
	Environmental Document (10%)	*55*	
	PS&E (10%)	*55*	
	Construction Management (12%)	*66*	
	Inspection/Testing (3%)	*17*	
	Administrative (3%)	*17*	
	Sub-Total Other		**329**
TOTAL COSTS			**879**

8.55.2 Design Elements

8.55.2.1 Trails

The recommended alignment would follow the east side of this creek tributary from Twin Park Drive, southward to the confluence. To connect to the main trail along Cripple Creek a creek crossing will be required. Two-thirds of this reach is in private ownership, but it flows through only three parcels that are largely undeveloped. One of these is the Church of Jesus Christ of Latter Day Saints discussed earlier in reach C19. The Church maintains some improvements on this portion of their property, including a bridge over the tributary. The other two privately owned parcels are north and south of the Church property. The north parcel has a residence on its eastern end. The south parcel is undeveloped open space. The parcel adjacent to Twin Parks Drive on the downstream side, encompassing approximately 460 feet of this reach, is owned by the City.

The proposed trail lies within private and publicly owned property, requiring right of way acquisition or easements for the trail through the privately owned property.

8.55.2.2 Creek Crossings (Bridges, Culverts, etc.)

A creek crossing is proposed to connect this trail to the main Cripple Creek trail. The proposed prefabricated steel bridge will have a span length of 60-80 feet.

8.55.2.3 Road Crossings

There are no roadway crossings proposed within this segment.

8.55.2.4 Access Areas and Amenities

Access to the upstream end is provided through Park Drive. This segment connects to the Cripple Creek main stem trail on the downstream end. Amenities will be limited to signage.

8.55.2.5 Visual Screening

Visual screening may be desired on the east side of the upstream portion of the segment where the trail passes behind several houses along Treetop Court, Oak Bend Way and Twin Park Drive. Additionally, this segment passes through land belonging to the LDS Church. If access can be negotiated with all owners, additional screening and access control may be desired.

8.55.2.6 Access Control

Access control should be evaluated during design of this segment, based upon resident desires and requirements negotiated with the Church.

8.55.2.7 Signage

Guidance/directional signs will be placed at Twin Park Drive and at the connection point to the main Cripple Creek trail. Regulatory signage for trail users would be placed on the approach to Twin Park Drive requiring trail users to stop and restricting vehicle access. Regulatory and guidance signs will be placed at quarter mile intervals along the trail.

8.55.2.8 Retaining Walls

It is anticipated that retaining walls will be required for construction of the trail embankment up to Twin Park Drive.

8.55.3 Environmental Compliance

Due to the proposed crossing, associated abutments, and channel stabilization, the following permits may be required for this segment of the trail:

- RWQCB – Section 401 Water Quality Certification and NPDES Permit
- CDFW – Section 1602 Streambed Alteration Agreement
- ACOE – Section 404 Nationwide Permit

If sensitive species are identified in the biological assessment, consultation with the USFWS under Section 7 of the Endangered Species Act will be necessary.

8.55.4 Additional Technical Studies

It is anticipated that the following additional technical studies will be completed during the Project Approval/Environmental Document and Design Phases of this project.

- Environmental Studies
  - Biological Assessment (BA)
  - Noise Technical Memorandum
  - Air Quality Technical Memorandum
  - Wetland Delineation
  - Natural Environment Study (NES)
  - Visual Resources – Technical Memorandum
  - Land Use and Community Impact – Technical Memorandum
- Geotechnical Analysis
- Hydrology/Hydraulic Analysis – Location Hydraulic Study
- Storm Water Pollution Prevention Plan
- Geomorphology Study

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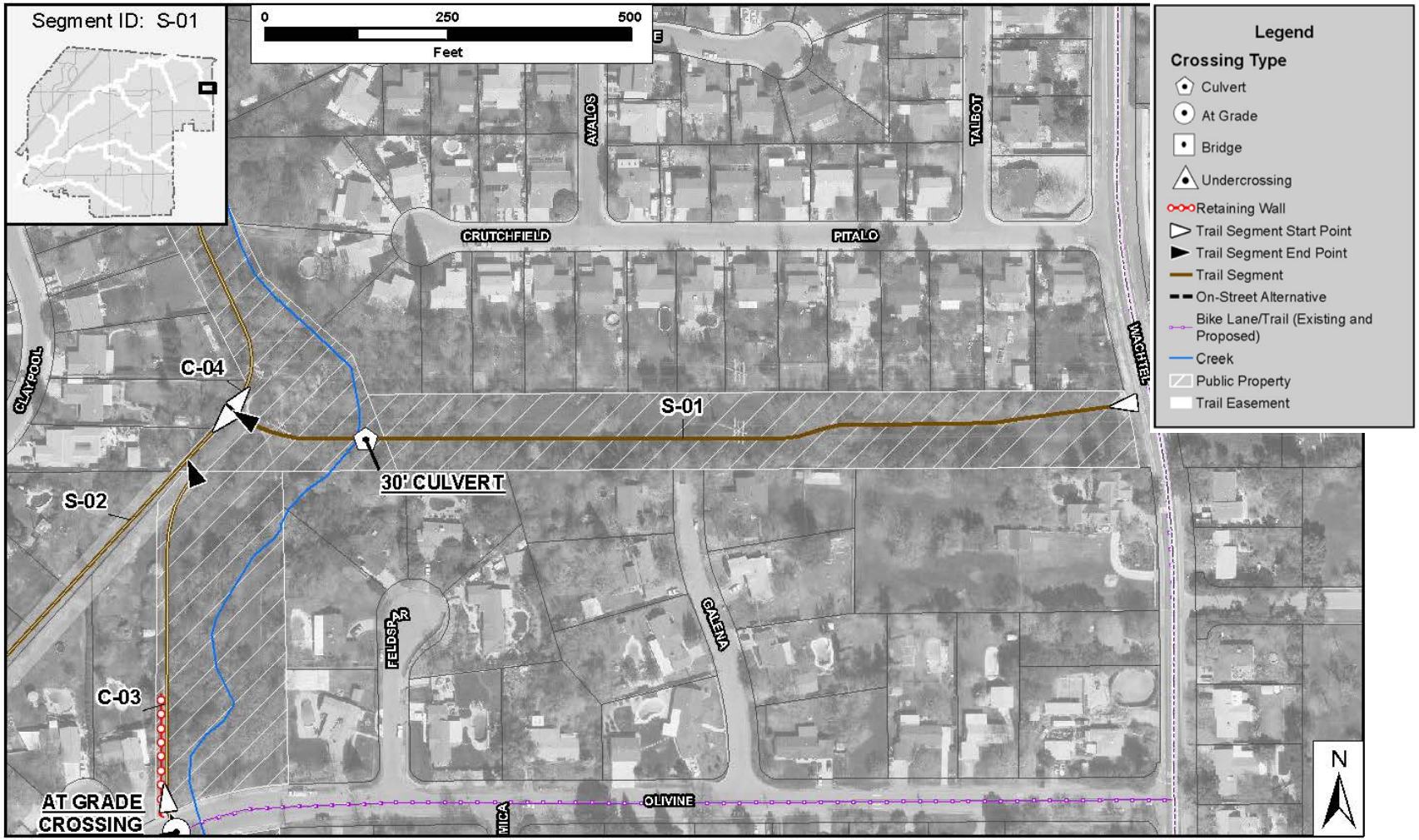
8.56 Segment S1



Subwatershed: Cripple Creek	Segment ID: S1	Start: Wachtel Way	End: City Parcel, West Boundary
LF Creek/Trail: 1353'/1254'	Number of Road Crossings: 0	Implementation Priority: 1	No. Potential Creek Crossings: 0

8.56.1 Preliminary Cost Estimate

Table 66 below shows a planning-level cost estimate for the recommended alignment as presented in this document. The costs do not include annual maintenance costs. The estimate is in year 2013 USD.

Table 66 – Preliminary Cost Estimate Segment S1

	Element	Costs x $1,000	Costs x $1,000
Construction	*Trail*	*205*	
	Structures	*0*	
	Mobilization (10%)	*22*	
	Contingency (20%)	*32*	
	Sub-Total Construction		**259**
Other Costs	*Utility Relocations*	*5*	
	Right of Way/Easements	*-*	
	Environmental Document (10%)	*26*	
	PS&E (10%)	*26*	
	Construction Management (12%)	*32*	
	Inspection/Testing (3%)	*8*	
	Administrative (3%)	*8*	
	Sub-Total Other		**105**
TOTAL COSTS			**364**

8.56.2 Design Elements

8.56.2.1 Trails

The recommended alignment would follow existing unpaved footpath through this SMUD corridor from Wachtel Way to the main Cripple Creek trail near Claypool Way. Parcels are owned by City and SRPD. Existing informal trails run throughout. Adequate width exists for Class I trails without impacting existing trees. Trails are generally consistent with SMUD's corridor guidelines, however specific trail alignments would require SMUD approval.

The proposed trail lies entirely within publicly owned property and therefore no right of way or easement costs are anticipated.

8.56.2.2 Creek Crossings (Bridges, Culverts, etc.)

There will be one crossing of Cripple Creek, requiring construction of a proposed prefabricated concrete box culvert with an estimated length of 20-30 feet.

8.56.2.3 Road Crossings

There are no roadway crossings proposed within this segment. In the future when the trail is extended eastwards by the County, the crossing of Wachtel Way may warrant an at-grade pedestrian activated traffic signal.

8.56.2.4 Access Areas and Amenities

Access to this segment of the trail corridor is via Wachtel Way, Galena Way, the trail corridor along Cripple Creek, and the SMUD corridor to the south. No parking is available and amenities are limited to trail signage. Since this segment is the eastern terminus of the trail system, consideration should be given to providing parallel parking along Wachtel Way.

8.56.2.5 Visual Screening

The SMUD corridor is already screened on both sides by vegetation and backyard fences. Additional visual screening of this segment is not anticipated.

8.56.2.6 Access Control

Additional access control is not anticipated.

8.56.2.7 Signage

Guidance/directional signs will be placed at Wachtel Way and at the connection point to the main Cripple Creek trail. Regulatory signage for trail users would be placed on the approach to Wachtel Way requiring trail users to stop and restricting vehicle access. Regulatory and guidance signs will be placed at quarter mile intervals along the trail.

8.56.2.8 Retaining Walls

Rock slope protection is required to protect the integrity of the reinforced concrete box culvert

8.56.3 Environmental Compliance

Due to the proposed culvert the following permits may be required for this segment of the trail:

- RWQCB – Section 401 Water Quality Certification and NPDES Permit
- CDFW – Section 1602 Streambed Alteration Agreement
- ACOE – Section 404 Nationwide Permit

If sensitive species are identified in the biological assessment, consultation with the USFWS under Section 7 of the Endangered Species Act will be necessary.

8.56.4 Additional Technical Studies

It is anticipated that the following additional technical studies will be completed during the Project Approval/Environmental Document and Design Phases of this project.

- Environmental Studies
  - Biological Assessment (BA)
  - Noise Technical Memorandum
  - Air Quality Technical Memorandum
  - Wetland Delineation
  - Natural Environment Study (NES)
  - Visual Resources – Technical Memorandum
  - Land Use and Community Impact – Technical Memorandum
- Geotechnical Analysis
- Hydrology/Hydraulic Analysis – Location Hydraulic Study
- Storm Water Pollution Prevention Plan

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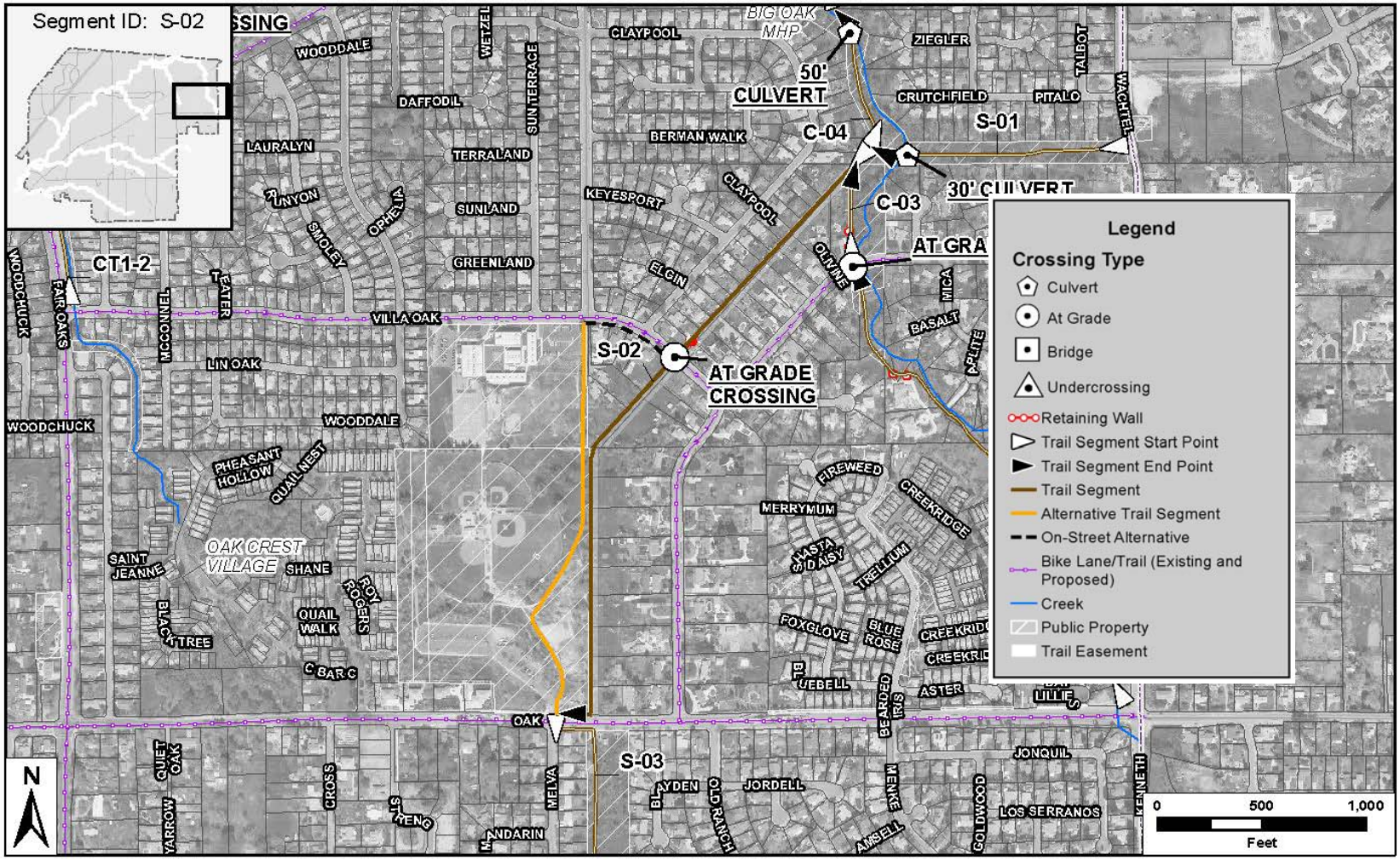
8.57 Segment S2



Subwatershed: Cripple Creek	Segment ID: S2	Start: City Parcel, West Boundary	End: Oak Avenue
LF Creek/Trail: 3152'/3250'	Number of Road Crossings: 1	Implementation Priority: 1	No. Potential Creek Crossings: 0

8.57.1 Preliminary Cost Estimate

Table 67 below shows a planning-level cost estimate for the recommended alignment as presented in this document. The costs do not include annual maintenance costs. The estimate is in year 2013 USD.

Table 67 – Preliminary Cost Estimate Segment S2

	Element	Costs x $1,000	Costs x $1,000
Construction	*Trail*	*349*	
	Structures	*0*	
	Mobilization (10%)	*37*	
	Contingency (20%)	*55*	
	Sub-Total Construction		**441**
Other Costs	*Utility Relocations*	*5*	
	Right of Way/Easements	*-*	
	Environmental Document (10%)	*45*	
	PS&E (10%)	*45*	
	Construction Management (12%)	*53*	
	Inspection/Testing (3%)	*14*	
	Administrative (3%)	*14*	
	Sub-Total Other		**176**
TOTAL COSTS			**617**

8.57.2 Design Elements

8.57.2.1 Trails

The recommended alignment would roughly follow the existing unpaved maintenance road along this SMUD corridor, crossing Villa Oak Drive and continuing on to Oak Avenue. Between Villa Oak Drive and Oak Avenue the trail would be located in private property within the SMUD corridor easement and a trail easement. At Oak Avenue it is proposed to re-direct the trail users to the crosswalks at the existing signalized intersection at Melva Street. A public trail easement runs the entirety of this segment; however, several private yards block access with fences and other improvements. Most of this occurs northeast of Villa Oak Drive. Width and topography are adequate for a Class I trail. This segment could utilize trails within C-Bar-C Park, or a trail could be located on the east side of the park following the trail easement.

The proposed trail is located within an existing trail easement on private property. A utility easement with access rights for SMUD also exists along this same alignment.

8.57.2.2 Creek Crossings (Bridges, Culverts, etc.)

There are no creek crossings within this segment.

8.57.2.3 Road Crossings

An unsignalized at-grade crossing is proposed at Villa Oak Drive. This appears feasible due to the relatively low traffic volumes and good sight distance at this location. There is also a crossing at the existing signalized intersection at Melva Street.

8.57.2.4 Access Areas and Amenities

This segment is accessed through the Cripple Creek main stem trail, the SMUD corridor trail from Wachtel Way, Villa Oak Drive, C-Bar-C Park and Oak Avenue. C-Bar-C is a full service park with parking, restrooms, sports fields, a dog park, trails, drinking fountains, and other amenities. Additional features incorporated into the trail in this area might include benches, trash receptacles, pet waste station, and interpretive signage.

8.57.2.5 Visual Screening

This corridor passes along numerous backyard fences, some of which encroach into the corridor. Vegetation and fencing may be needed in some areas for screening.

8.57.2.6 Access Control

Due to encroachment into the trail easement, some fences will need reconfiguration and others may need upgrading to meet the needs of the City and the homeowners for access control.

8.57.2.7 Signage

Guidance/directional signs will be placed at Villa Oak Drive and Oak Avenue and at the connection point to the main Cripple Creek trail. Regulatory signage for trail users would be placed on the approach to Villa Oak Drive and Oak Avenue requiring trail users to stop and restricting vehicle access. Regulatory and guidance signs will be placed at quarter mile intervals along the trail.

8.57.2.8 Retaining Walls

It is anticipated that a short segment of retaining walls will be required on the approach to Villa Oak Avenue from the north side.

8.57.3 Environmental Compliance

Since no creek crossings are proposed, anticipated environmental permits are limited to an RWQCB NPDES Permit.

8.57.4 Additional Technical Studies

It is anticipated that the following additional technical studies will be completed during the Project Approval/Environmental Document and Design Phases of this project.

- Environmental Studies
  - Biological Assessment (BA)
  - Noise Technical Memorandum
  - Air Quality Technical Memorandum
  - Wetland Delineation
  - Natural Environment Study (NES)
  - Visual Resources – Technical Memorandum
  - Land Use and Community Impact – Technical Memorandum
- Geotechnical Analysis
- Drainage Technical Memorandum
- Storm Water Pollution Prevention Plan

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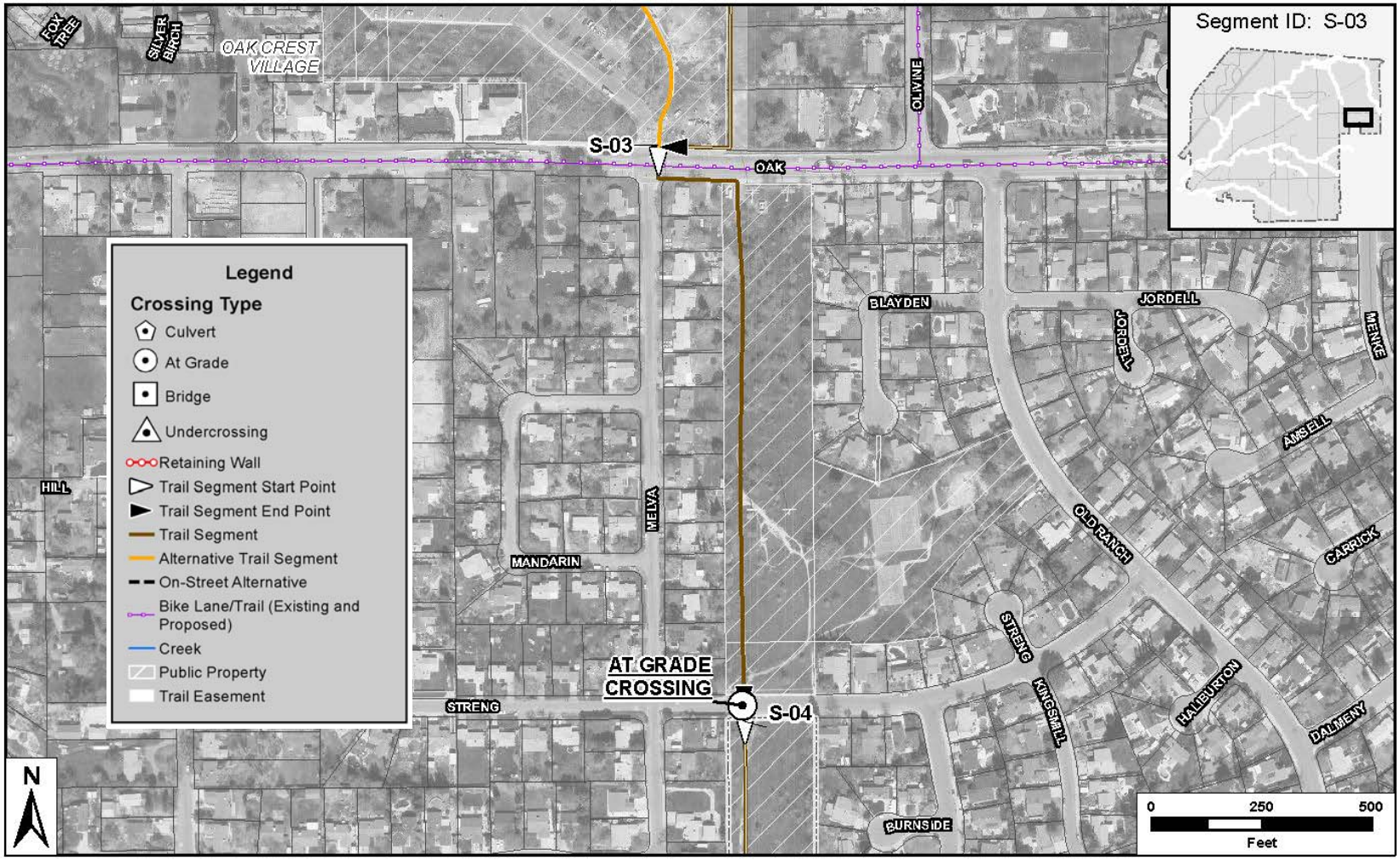
8.58 Segment S3



Subwatershed: Cripple Creek	Segment ID: S3	Start: Oak Avenue	End: Streng Avenue
LF Creek/Trail: 1260'/1391'	Number of Road Crossings: 1	Implementation Priority: 1	No. Potential Creek Crossings: 0

8.58.1 Preliminary Cost Estimate

Table 68 below shows a planning-level cost estimate for the recommended alignment as presented in this document. The costs do not include annual maintenance costs. The estimate is in year 2013 USD.

Table 68 – Preliminary Cost Estimate Segment S3

	Element	Costs x $1,000	Costs x $1,000
Construction	*Trail*	*154*	
	Structures	*0*	
	Mobilization (10%)	*16*	
	Contingency (20%)	*24*	
	Sub-Total Construction		**194**
Other Costs	*Utility Relocations*	*5*	
	Right of Way/Easements	*-*	
	Environmental Document (10%)	*20*	
	PS&E (10%)	*20*	
	Construction Management (12%)	*24*	
	Inspection/Testing (3%)	*6*	
	Administrative (3%)	*6*	
	Sub-Total Other		**81**
TOTAL COSTS			**275**

8.58.2 Design Elements

8.58.2.1 Trails

The recommended alignment would roughly follow the existing path along this SMUD corridor, crossing Streng Avenue as an at-grade crossing. The trail will include a connection to Northwoods Park. Land within this segment is publicly owned and managed by SRPD as part of Northwoods Park. Existing informal trails run throughout. Trees and sparse minor landscaping encroachments have occurred on some parcels. As in all trails within the SMUD corridor, specific trail alignments would require the approval of SMUD.

The proposed trail lies entirely within publicly owned property and therefore no right of way or easement costs are anticipated.

8.58.2.2 Creek Crossings (Bridges, Culverts, etc.)

There are no creek crossings within this segment.

8.58.2.3 Road Crossings

An unsignalized at-grade crossing is proposed at Streng Avenue. This appears feasible due to the relatively low traffic volumes and good sight distance at this location.

8.58.2.4 Access Areas and Amenities

Oak Avenue, Streng Avenue and Northwoods Park provide access to this segment. Limited on-street parking is available at Northwoods Park and on Streng. Amenities available at Northwoods Park include play equipment, tennis and basketball courts, trails and passive recreation areas.

8.58.2.5 Visual Screening

Due to the width of the corridor and existing fencing along this segment, additional screening is not anticipated; however, residents should be engaged in design and planning of this segment to solicit input and adjust designs accordingly.

8.58.2.6 Access Control

As with visual screening, additional access control is not anticipated, but public input should be sought during the design and planning process.

8.58.2.7 Signage

Guidance/directional signs will be placed at Streng Avenue and Oak Avenue. Regulatory signage for trail users would be placed on the approach to Streng Avenue and Oak Avenue requiring trail users to stop and restricting vehicle access. Regulatory and guidance signs will be placed at quarter mile intervals along the trail. A general informational and regional trails map is proposed to be installed in Northwoods Park

8.58.2.8 Retaining Walls

No retaining walls have been identified for this segment of the trail.

8.58.3 Environmental Compliance

Since no creek crossings are proposed, anticipated environmental permits are limited to an RWQCB NPDES Permit.

8.58.4 Additional Technical Studies

It is anticipated that the following additional technical studies will be completed during the Project Approval/Environmental Document and Design Phases of this project.

- Environmental Studies
  - Biological Assessment (BA)
  - Noise Technical Memorandum
  - Air Quality Technical Memorandum
  - Wetland Delineation
  - Natural Environment Study (NES)
  - Visual Resources – Technical Memorandum
  - Land Use and Community Impact – Technical Memorandum
- Geotechnical Analysis
- Drainage Technical Memorandum
- Storm Water Pollution Prevention Plan
- Geomorphology Study

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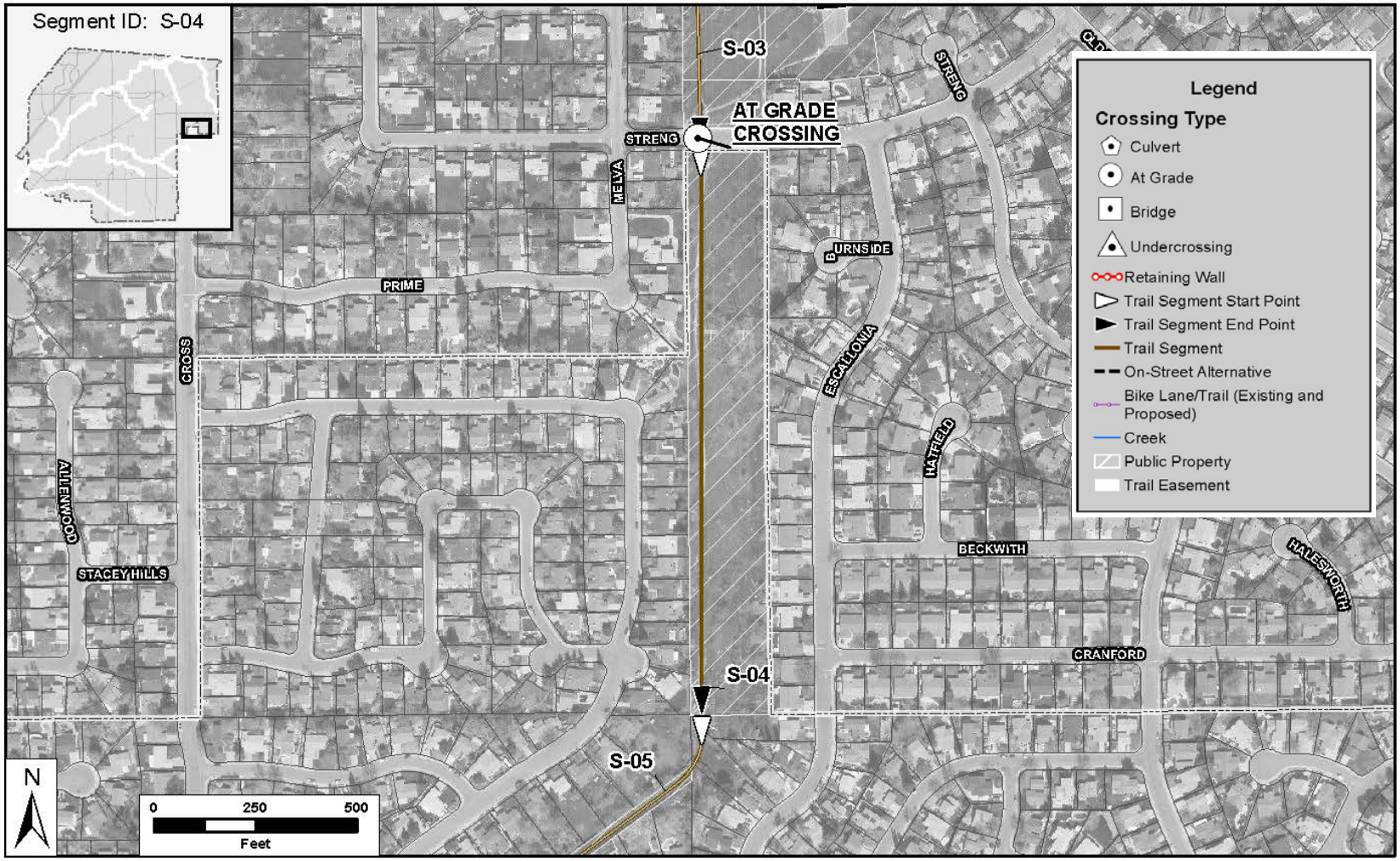
8.59 Segment S4



Subwatershed: Cripple Creek	Segment ID: S4	Start: Streng Avenue	End: ORPD Parcel, S boundary
LF Creek/Trail: 1260'/1400'	Number of Road Crossings: 0	Implementation Priority: 1	No. Potential Creek Crossings: 0

8.59.1 Preliminary Cost Estimate

Table 69 below shows a planning-level cost estimate for the recommended alignment as presented in this document. The costs do not include annual maintenance costs. The estimate is in year 2013 USD.

Table 69 – Preliminary Cost Estimate Segment S4

	Element	Costs x $1,000	Costs x $1,000
Construction	*Trail*	*118*	
	Structures	*0*	
	Mobilization (10%)	*12*	
	Contingency (20%)	*19*	
	Sub-Total Construction		**149**
Other Costs	*Utility Relocations*	*5*	
	Right of Way/Easements	*-*	
	Environmental Document (10%)	*15*	
	PS&E (10%)	*15*	
	Construction Management (12%)	*18*	
	Inspection/Testing (3%)	*5*	
	Administrative (3%)	*5*	
	Sub-Total Other		**63**
TOTAL COSTS			**212**

8.59.2 Design Elements

8.59.2.1 Trails

The recommended alignment would roughly follow the existing path along this SMUD corridor, from Streng Avenue to the ORPD property boundary near the angle point of the SMUD alignment. Most of the property is in public ownership by ORPD, but negotiations with three property owners for small segments are underway. Existing trails continue through this area. Corridor is wide (approximately 180 feet) and trees are sparse.

The proposed trail lies entirely within publicly owned property and therefore no right of way or easement costs are anticipated.

8.59.2.2 Creek Crossings (Bridges, Culverts, etc.)

There are no creek crossings within this segment.

8.59.2.3 Road Crossings

There are no roadway crossings within this segment.

8.59.2.4 Access Areas and Amenities

Streng Avenue provides access to this segment at the northern end. Limited on-street parking is available at Streng Avenue.

8.59.2.5 Visual Screening

The corridor width and backyard fencing should make additional screening unnecessary. Informal trails in this segment would reinforce this assessment.

8.59.2.6 Access Control

Additional access controls should not be needed in this segment. At the southern end, S04 terminates in a fence blocking the corridor.

8.59.2.7 Signage

Guidance/directional signs will be placed at Streng Avenue. Regulatory signage for trail users would be placed on the approach to Streng Avenue requiring trail users to stop and restricting vehicle access. Regulatory and guidance signs will be placed at quarter mile intervals along the trail.

8.59.2.8 Retaining Walls

No retaining walls have been identified for this segment of the trail.

8.59.3 Environmental Compliance

Due to the upland nature of the corridor, anticipated environmental permits are limited to an RWQCB NPDES Permit; however, if wetlands are identified during the biological assessment that cannot be avoided, additional permits will be required.

8.59.4 Additional Technical Studies

It is anticipated that the following additional technical studies will be completed during the Project Approval/Environmental Document and Design Phases of this project.

- Environmental Studies
    - Biological Assessment (BA)
    - Noise Technical Memorandum
    - Air Quality Technical Memorandum
    - Wetland Delineation
    - Natural Environment Study (NES)
    - Visual Resources – Technical Memorandum
    - Land Use and Community Impact – Technical Memorandum
- Geotechnical Analysis
- Drainage Technical Memorandum
- Storm Water Pollution Prevention Plan
- Geomorphology Study

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8.60 Segment S5

Subwatershed: Cripple Creek	Segment ID: S5	Start: ORPD Parcel, S boundary	End: Woodmore Oaks Drive
LF Creek/Trail: 896'/905'	Number of Road Crossings: 0-1	Implementation Priority: 1	No. Potential Creek Crossings: 0

8.60.1 Preliminary Cost Estimate

Table 70 below shows a planning-level cost estimate for the recommended alignment as presented in this document. The costs do not include annual maintenance costs. The estimate is in year 2013 USD.

Table 70 – Preliminary Cost Estimate Segment S5

	Element	Costs x $1,000	Costs x $1,000
Construction	*Trail*	*135*	
	Structures	*0*	
	Mobilization (10%)	*14*	
	Contingency (20%)	*21*	
	Sub-Total Construction		**170**
Other Costs	Utility Relocations	5	
	Right of Way/Easements	-	
	Environmental Document (10%)	17	
	PS&E (10%)	17	
	Construction Management (12%)	21	
	Inspection/Testing (3%)	6	
	Administrative (3%)	6	
	Sub-Total Other		**72**
TOTAL COSTS			**242**

8.60.2 Design Elements

8.60.2.1 Trails

The recommended alignment would roughly follow the existing path along this SMUD corridor to Woodmore Oaks Drive. This segment is almost entirely on public land owned by Sacramento County, except for three private parcels at the north end. ORPD is in the process of negotiating easements through these parcels. The corridor is relatively narrow, approximately 25 feet between backyard fences, but more than sufficient for a 12-foot trail and 2- to 4-foot shoulders. Topographic constraints are minor and little sensitive vegetation exists.

The proposed trail lies entirely within publicly owned property and therefore no right of way or easement costs are anticipated

8.60.2.2 Creek Crossings (Bridges, Culverts, etc.)

There are no creek crossings within this segment.

8.60.2.3 Road Crossings

There are no roadway crossings within this segment, however if the trail extends further south along the SMUD corridor, an unsignalized at-grade crossing at this location of Woodmore Oaks Drive is recommended.

8.60.2.4 Access Areas and Amenities

This segment is accessed via S04 on the northern end and Woodmore Oaks Drive on the southern end. The northern end of this segment is currently blocked by several fences. ORPD is currently negotiating with the landowners to secure access, and whatever agreements are reached regarding fencing and screening should be implemented.

8.60.2.5 Visual Screening

The corridor is relatively narrow through this segment, but backyard fencing provides relatively good screening. Residents should be engaged during planning and design of this segment to determine additional screening needs.

8.60.2.6 Access Control

As with screening, access is currently controlled by existing fencing. Adjacent land owners should be consulted during planning and design to determine if additional control is needed.

8.60.2.7 Signage

Guidance/directional signs will be placed at Woodmore Oaks Drive. Regulatory signage for trail users would be placed on the approach to Woodmore Oaks Drive requiring trail users to stop and restricting vehicle access. Regulatory and guidance signs will be placed at quarter mile intervals along the trail.

8.60.2.8 Retaining Walls

No retaining walls have been identified for this segment of the trail.

8.60.3 Environmental Compliance

Due to the upland nature of the corridor, anticipated environmental permits are limited to an RWQCB NPDES Permit; however, if wetlands are identified during the biological assessment that cannot be avoided, additional permits will be required.

8.60.4 Additional Technical Studies

It is anticipated that the following additional technical studies will be completed during the Project Approval/Environmental Document and Design Phases of this project.

- Environmental Studies
  - Biological Assessment (BA)
  - Noise Technical Memorandum
  - Air Quality Technical Memorandum
  - Wetland Delineation
  - Natural Environment Study (NES)
  - Visual Resources – Technical Memorandum
  - Land Use and Community Impact – Technical Memorandum
- Geotechnical Analysis
- Drainage Technical Memorandum
- Storm Water Pollution Prevention Plan
- Geomorphology Study

9 Implementation Priorities

Development of the Citrus Heights creek corridor trail network is a long-term vision that will take many years to fully implement. Since funding for design, construction, and maintenance of the Citrus Heights creek corridor trails will have to be identified and secured over time, it is important to determine which segments should be implemented first.

9.1 Criteria for Assigning Priorities

The prioritization presented in this chapter takes into consideration multiple criteria. One important criterion is the value of the trail segment in providing connections to destinations of public interest. These could include parks, schools, retail centers, employment opportunities, and public buildings. This consideration of connectivity also looks at how a specific segment relates to upstream and downstream segment as well as on-street routes to maximize connectivity.

Connections to public places also provide pre-existing access points for trail users. This will make it easier for more people to use the trails with less disruption of private neighborhoods.

Another consideration is the ease and cost of constructing the trail. This is heavily influenced by property ownership and physical characteristics of the corridor such as topography and width. For segments where the creek corridor includes numerous privately owned parcels, negotiations and agreements with many individuals may be needed to secure the requisite easements or fee-title. The construction of segments that are primarily in public ownership, already have a trail easement, or have only a few private owners will likely be easier to accomplish.

Figure 32 – Trail Elevated above Creek Channel

Physical characteristics of the corridor that influence the ease of construction includes how many times the trail would need to cross the creek to maintain the desired grade, how many feet of retaining wall might be needed, and how the trail would interface with the road intersections. In general, the flatter and wider the corridor is, and the fewer times the trail crosses the creek, the less expensive it will be to construct. The type of road crossing is also important since roads can be a major

barrier to trail connectivity. Certain types of crossings are much more expensive than other to construct, depending on the width of the road and the difference in elevation between the trail and road surface.

A final, very important consideration for trail construction priorities is understanding how well a proposed trail fits within the surrounding neighborhood. At this time, there are no multi-use trails in the Citrus Heights creek corridors. Unless residents have lived in or visited other communities with these types of facilities, it is understandable that some may have concerns about how well they will fit in Citrus Heights neighborhoods.

Giving priority to development of trails in locations where there is already some level of public activity on public land or within existing trail easements may provide Citrus Heights residents with opportunities to become familiar with creek corridor trails in settings that minimize disruption of private residences. Over time, as more trail segments are developed, residents will gain more understanding about how these spaces are managed, maintained, and used. This will help residents make more informed decisions about the pros and cons of trails through their neighborhoods as future trail segments are considered for implementation. This experience will also help the City with designing trails to minimize intrusion and maximize their benefit to neighborhoods.

9.2 Assigned Priorities

The following criteria have been used in assigning priorities for implementation of each potential creek corridor trail segment:

- Priority I (High – 4.2 miles) – Trail segments that form critical linkages between existing trails and/or parks and other public places, contain primarily public land or existing easements, and/or are relatively easy to construct (Table 71).
- Priority II (Medium – 7.4 miles) – Segments that form moderately important linkages through primarily public land or easements, and/or are moderately easy to construct (Table 72).
- Priority III (Low – 5.1 miles) – Remaining segments with less connectivity value and more implementation challenges such as corridor constraints or private property.

Table 71 – Priority 1 Trail Segments

Creek	Description	Segments
SMUD Corridor	East city limit to Woodmore Oaks Drive	S1, S2, S3, S4, S5
Arcade Creek Mainstem	SMUD corridor to Tempo Park	A01
Arcade Creek Mainstem	Tempo Park to Arcade Creek Park Preserve	A03
Arcade Creek Mainstem	Arcade Creek Park Preserve to Stock Ranch Nature Preserve	A05, A06, A07
Arcade Creek Mainstem	Stock Ranch Nature Preserve to Crosswoods Park	A08, A09, A10
Cripple Creek Mainstem	Mesa Verde High School	C14

Table 72 – Priority 2 Trail Segments

Creek	Description	Segments
Arcade Creek Mainstem	Crosswoods Park to City Limits	A11, A12, A13, A14, A15, A16, A17
Arcade Creek Tributary 1	Fair Oaks Boulevard to Confluence	AT1-1, AT1-2
Arcade Creek Tributary 2	Sylvan Road to Confluence	AT2-4
Cripple Creek Mainstem	Old Auburn Road to Twin Oaks Avenue	C06, C07, C08, C09
Cripple Creek Mainstem	Van Maren Lane to confluence with Arcade Creek	C18, C19 C20, C21, C22, C23, C24
Cripple Creek Tributary 3	I-80 to Confluence with Mainstem	CT3-1, CT3-2
Brooktree Creek Mainstem	El Sol Way to Hickorywood Way	B05, B06
Brooktree Creek Mainstem	Shadowcreek Park to Shadow Lane	B12

Assignment of priority is intended as a guideline only. Actual implementation sequence should respond to funding opportunities, transportation needs, public safety concerns, or other circumstances at the discretion of the City of Citrus Heights. In addition, prior to any segment being built, the up and downstream segments will be reviewed to make sure meaningful connections are possible. Since costs per linear foot of trail are typically less for longer segments, the City will try to implement the longest segments possible with available funding. Ownership of proposed trail alignments is shown in Table 73.

Table 73 - Trail Alignment Ownership

Priority	Public	Easement	Private	Total
Miles of Trail				
1	2.8	1.0	0.4	4.2
2	4.1	0.4	3.0	7.4
3	2.4	0.1	2.6	5.1
Percent of Trails				
1	67%	24%	9%	
2	55%	5%	40%	
3	47%	2%	50%	

This report addresses only the 6o trail segments that were identified as having High or Moderate value for future study by the Background Analysis Report, and found to be feasible by subsequent analysis. Of these 60 segments, construction estimates have already been completed for two segments as separate projects that were already underway prior to the start of this study. These are Arcade Creek segment A04 through the Arcade Creek Park Preserve and Cripple Creek segment C14 north of Mesa Verde High School.

All remaining segments not listed above as Priority I or Priority II may be regarded as Priority III segments. Table 74 shows the estimated construction costs and mileage for all segments within each priority classification. Implementation priorities are illustrated in Figure 33. The timeline for implementing any of the trail segments identified in this report is dependent on the City's ability to secure the necessary project funding. Once

funding is available, it is reasonable to assume that it may take 3 to 4 years to complete a trail segment of typical complexity. This period of time includes design, public outreach, environmental review, permitting, bidding and construction.

Table 74 – Trail Segment Implementation Priorities and Costs

Segment	Construction Costs (x $1,000)	Other Costs (x $1,000)	Total Costs (x $1,000)	Length of Trail (feet)	Average Segment Cost/Mile (x $1,000)	Priority Ranking
A-01	504	206	710	1,476	2,540	1
A-03	757	408	1,165	1,532	4,015	1
A-05	2,045	944	2,989	2,450	6,442	1
A-06	1,404	799	2,203	2,434	4,779	1
A-07	593	366	959	1,615	3,135	1
A-08	488	198	686	1,618	2,239	1
A-09	1,147	449	1,596	1,895	4,447	1
A-10	263	113	376	760	2,612	1
S1	259	105	364	1,254	1,533	1
S2	441	176	617	3,250	1,002	1
S3	194	81	275	1,391	1,044	1
S4	149	63	212	1,400	800	1
S5	170	72	242	905	1,412	1
Priority 1 Subtotal:	*8,414*	*3,980*	*12,394*	*21,980*	*2,977*	

Segment	Construction Costs (x $1,000)	Other Costs (x $1,000)	Total Costs (x $1,000)	Length of Trail (feet)	Average Segment Cost/Mile (x $1,000)	Priority Ranking
A-11	783	457	1,240	1,410	4,643	2
A-12	1,949	884	2,833	1,269	11,787	2
A-13	947	564	1,511	1,905	4,188	2
A-14	528	264	792	1,735	2,410	2
A-15	111	79	190	272	3,688	2
A-16	558	218	776	1,017	4,029	2
A-17	839	332	1,171	1,005	6,152	2
AT1-2	734	329	1,063	3,305	1,698	2
AT2-4	686	453	1,139	2,355	2,554	2
B-05	430	169	599	1,794	1,763	2
B-06	681	267	948	1,221	4,099	2
B-12	1,029	457	1,486	2,799	2,803	2
C-06	1,113	437	1,550	1,068	7,663	2
C-07	1,084	420	1,504	2,486	3,194	2
C-08	471	188	659	1,804	1,929	2
C-09	396	226	622	670	4,902	2
C-18	891	346	1,237	1,717	3,804	2
C-19	445	302	747	1,494	2,640	2
C-20	540	414	954	1,954	2,578	2
C-21	627	419	1,046	1,706	3,237	2
C-22	328	231	559	960	3,075	2
C-23	226	133	359	361	5,251	2
C-24	856	338	1,194	983	6,413	2
CT3-1	779	303	1,082	2,146	2,662	2
CT3-2	550	329	879	1,584	2,930	2
Priority 2 Subtotal:	*17,581*	*8,559*	*26,140*	*39,020*	*3,537*	

Segment	Construction Costs (x $1,000)	Other Costs (x $1,000)	Total Costs (x $1,000)	Length of Trail (feet)	Average Segment Cost/Mile (x $1,000)	Priority Ranking
A-02	774	303	1,077	2,010	2,829	3
A-18	1,495	776	2,271	2,980	4,024	3
B-02	449	204	653	1,545	2,232	3
B-07	494	193	687	781	4,645	3
B-08	374	191	565	420	7,103	3
B-11	665	356	1,021	1,207	4,466	3
C-02	791	582	1,373	2,756	2,630	3
C-03	164	69	233	495	2,485	3
C-04	225	90	315	717	2,320	3
C-05	852	517	1,369	1,735	4,166	3
C-12	667	268	935	2,440	2,023	3
C-13	388	301	689	1,617	2,250	3
CT1-2	110	55	165	666	1,308	3
CT1-3	194	148	342	650	2,778	3
CT1-4	122	99	221	432	2,701	3
CT1-5	317	186	503	1,673	1,587	3
CT1-7	191	80	271	682	2,098	3
CT1-8	230	209	439	1,122	2,066	3
CT2-2	359	143	502	625	4,241	3
CT2-4	586	514	1,100	2,748	2,114	3
Priority 3 Subtotal:	*9,447*	*5,284*	*14,731*	*27,301*	*2,849*	
Total All Segments:	**35,442**	**17,823**	**53,265**	**88,301**	**3,185**	

FIGURE 33

CREEK CORRIDOR TRAIL PROJECT

LEGEND

- Segment Begin Point

Trail Implementation Priority

- Priority 1
- Priority 2
- Priority 3
- Not a Priority

Other Routes

- Alternate Route
- Bike Lane/Trail (Existing and Proposed)
- Neighboring Community Bike Routes

Jurisdictions

- City of Citrus Heights
- Other Communities
- County Boundary
- SRPD/ORPD Parks

Creek Corridor Trail Implementation Priorities

FOOTHILL ASSOCIATES
ENVIRONMENTAL CONSULTING • PLANNING • LANDSCAPE ARCHITECTURE

PSOMAS

N

0 0.5 1
Miles

ANTELOPE
Placer County
Sacramento County
CITY OF ROSEVILLE
ORANGEVALE
FAIR OAKS
CARMICHAEL
ANTELOPE NORTH RD
ROSEVILLE RD
ANTELOPE RD
AUBURN BLVD
OLD AUBURN RD
OAK AVE
KENNETH AVE
MARIPOSA AVE
SYLVAN RD
SUNRISE BLVD
FAIR OAKS BLVD
VAN MAREN LN
DEWEY DR
SAN JUAN AVE
GREENBACK LN
MADISON AVE
80

Cripple Creek
Cripple Creek Trib 1
Cripple Creek Trib 2
Cripple Creek Trib 3
Arcade Creek
Arcade Creek Trib 1
Arcade Creek Trib 2
Brooktree Creek

C10 C09 C08 C07 C06 C05 C04 C03 C02 C01 C11 C12 C13 C14 C15 C16 C17 C18 C19 C20 C21 C22 C23 C24 CT1-9 CT1-8 CT1-7 CT1-6 CT1-5 CT1-4 CT1-3 CT1-2 CT1-1 CT2-4 CT2-3 CT2-2 CT2-1a CT2-1b CT3-1 CT3-2 S1 S2 S3 S4 S5 S6 A01 A02 A03 A04 A05 A06 A07 A08 A09 A10 A11 A12 A13 A14 A15 A16 A17 A18 AT2-4 AT2-3 AT2-2 AT2-1 AT1-2 AT1-1 B01 B02 B03 B04 B05 B06 B07 B08 B09 B10 B11 B12 B13

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CITRUS HEIGHTS CREEK CORRIDOR

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10 References

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