

Project Feasibility Study Ukiah NWP Rail Trail

Prepared for: City of Ukiah



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INTRODUCTION

Incorporated in 1876, Ukiah is located approximately 100 miles north of San Francisco in the northern coastal region of California on U.S. Highway 101. The area is centrally located between the Bay Area, Eureka and Sacramento. Ukiah is situated in the fertile Yokayo Valley with the northern Coastal Mountains as a backdrop. Surrounded by rich grape vineyards and pear orchards, Ukiah is just over an hour drive from the Mendocino Coast and the coastal redwoods.

The Northwest Pacific (NWP) rail corridor runs north-south through the eastern area of the City of Ukiah, approximately two city blocks west of Highway 101. This rail corridor varies in width but is typically 100 feet wide within incorporated Ukiah, providing an excellent opportunity for shared use and a non-motorized transportation corridor. There is great potential for a rail-with-trail facility on this segment.

The project area for the proposed NWP Rail Trail extends from Brush Street in the north to Talmage Street in the south. The trail will be located on the west side of the existing railway tracks. The project area is approximately one and one half miles long (1.61 miles). Located near downtown Ukiah and other important community locations, the NWP Rail Trail will serve as the primary north-south non-motorized transportation pathway for the City. This trail will provide many people with a wider range of transportation options and will become a destination in its own right.

The purpose of this study is to:

- Provide background on the project history and goals
- Identify constraints and proposed solutions including grade crossings, environmental conditions, property ownership, and railroad operation
- Provide design standards to facilitate the design process and ensure consistency with established state and national standards.
- Provide a cost-estimate for the project
- Identify future funding opportunities for detailed design and implementation

Most importantly, the feasibility study provides a forum for discussion on the planning and design issues that can be resolved prior to developing more detailed design and construction documents.

BACKGROUND

Project Setting and History

The proposed Ukiah Bikeway System identified in the *City of Ukiah Bicycle Master Plan* (1999) includes a primary north-south Class I Bikeway on the Northwestern Pacific Railroad right-of-way within the City limits, a primary north-south system of Class II bike lanes on Dora and Bush Streets, and a series of improved east-west bikeway connectors on Perkins, Gobbi, and Talmage Streets.

City staff, the public, and bikeway specialists selected the top bikeway projects for the Ukiah Bikeway System. Contributors made their decisions based on their local knowledge and cycling experience, the orientation of funding programs, and the planning criteria outlined in the Master Plan (coverage, connectivity, user groups, implementation, local input, funding sources).

The Northwestern Pacific Rail Trail (NWP Rail Trail) is ranked as a top priority short-term implementation project in the 1999 Bicycle Master Plan. This project is described in the Bicycle Master Plan as a “bike path...located on the west side of the tracks, set back about 25 feet from the centerline of the tracks within the 80 foot right-of-way. Access across the tracks onto the rail trail from the east will be at established crossings.” This railroad corridor is owned by the North Coast Railroad Authority, a publicly funded state agency with the long-term goal of restoring both freight and passenger rail service along the Northern California coast.

The NWP Rail Trail is ranked as a top priority project because it will:

- Provide one and a half miles of recreational trail
- Increase the safety of the Ukiah bicycle network by providing for separation of bicycle and pedestrian traffic from motor vehicles
- Increase the connectivity of the overall bikeway system by creating a central north-south spine
- Provide off-street commuter access between residential and employment centers.

Current planning funds for the NWP Rail Trail were allocated to the City of Ukiah Planning Department from the City general fund. Future detailed design, feasibility and environmental review work required for the project will be funded by other sources, including but not limited to transportation enhancement grants.

Project Goals

The NWP Rail Trail will serve many community functions. The trail will provide a direct link between north and south locations in the City, providing commuters with the option to ride or walk to their destinations rather than drive. The trail will link neighborhoods directly to transit stations and employment centers. The trail will also provide innumerable recreational and community-building benefits including outdoor space for walking, bicycling and jogging, as well as an environment for residents to socialize and learn about Ukiah's natural and cultural history. A summary of project goals is presented below.

- Goal 1: The NWP Rail Trail should be located, wherever possible, within the railroad right of way so as to organize and manage trail use in the corridor and to provide an alternative to using heavily traveled parallel roadways.
- Goal 2: Serve major and minor destinations, provide a direct north-south connection in the City, and follow routes already used by bicyclists, pedestrians, and others.
- Goal 3: Build upon and connect to existing and planned trails wherever possible.
- Goal 4: Maximize safety along the railroad corridor by organizing and managing pedestrian and bicycling activity, and maximizing separation between the trains and trail. This can be accomplished by appropriate design and operation of the facility.
- Goal 5: Minimize impacts to adjacent property owners through appropriate design and operation of the facility.
- Goal 6: Design the facility to meet state and federal standards, including the American with Disabilities Act.
- Goal 7: Provide separate tread ways for pedestrians and bicyclists, wherever feasible.
- Goal 8: Design grade crossings at roadways to maximize trail user safety and maximize convenience, while minimizing negative impacts to traffic capacity.
- Goal 9: Avoid new railroad grade crossings and utilize existing roadway crossings as much as possible.
- Goal 10: Develop a preliminary design theme that will integrate the NWP Rail Trail with the City of Ukiah and take full advantage of opportunities for linear open space parks with in the NWP corridor.

Need and Purpose

The need for the NWP Rail Trail is demonstrated by the intensive recreational use of existing bike lanes in Ukiah and surrounding communities and the number and variety of people who currently use the unimproved corridor. Each user group has specific needs that will directly affect the planning and

design of the trail. More detailed information on user needs can be developed using a variety of mechanisms, including community surveys. These methods are not always scientifically valid in terms of sample size, but can provide insight on the way that communities will use a trail facility. No such survey was completed for this study, given its limited scope.

In general, trail use can be grouped as follows:

Commuters

The NWP Rail Trail will provide an unencumbered north-south travel corridor that should be designed to be attractive to both the casual and serious commuter. The proposed NWP Rail Trail will provide safe and easy north-south access through town and is centrally situated between downtown and commercial shopping centers. Thus, there is great potential for the proposed trail to attract a significant number of local commuters. Commuters consist of employed adults, adult students, and school children. Adult commuters are typically seasoned bicyclists and walkers, who can move at above average speeds and maneuver across busy arterials. School children will be slower moving and less adept at crossing busy streets, meaning that new street and rail grade crossings must be designed with them in mind.

Recreation

The NWP Rail Trail will attract a significant number of users who simply desire a linear corridor for exercise and recreation. This includes families with young children, club bicyclists, long distance bicyclists, people walking their dogs, roller skaters/bladers, and joggers. All of these groups have unique characteristics, many of which can conflict with one another. For example, experienced bicyclists may be traveling at speeds in excess of 20 mph. Roller skaters/bladers often consume the entire trail width as part of their skating motion. Families and pets often move against the intended direction of travel, and otherwise obstruct through traffic. Joggers also have unique needs, and prefer the unpaved shoulder to paved surfaces.

All potential users of the NWP Rail Trail will require the development of new facilities. Features including benches, drinking fountains, signing, and waste receptacles are just a few of the items typically required for recreational and commuter trail users alike. If integrated into a site-appropriate design, these features will not only meet the typical demands of trail users but can also create an extension of Ukiah's downtown environment and greatly enhance the City's community transportation infrastructure.

EXISTING CONDITIONS

Railroad Corridor Use

Rail service is currently suspended on the NWP corridor pending additional planning, environmental review and the development of rail service management agreements. The rail corridor in the project area is owned and administered by the North Coast Railroad Authority (NCRA). The NCRA was formed in 1989 by the California Legislature under the North Coast Railroad Authority Act, Government Code Sections 93000, *et seq.* The Act was intended to ensure continuation of railroad service in Northwestern California and envisioned the railroad playing a significant role in the transportation infrastructure serving a vital part of the State. In 1992, the State purchased the railroad line from the Town of Willits north. In 1995, in a separate transaction, the State added the railroad line from Healdsburg north to the NCRA's holdings and provided for a joint powers authority, the Northwestern Pacific Railroad Authority (NWPRA) to own the right of way from Healdsburg south to Schellville in Sonoma County, where the railroad then feeds a 12-mile short line through Napa County which connects to the Union Pacific mainline at Fairfield-Suisun in Solano County.

Trespassing is a common occurrence within the NWP right-of-way, primarily by people walking, jogging or cycling along the tracks. The current right-of-way is almost completely open to the public, with no fencing, few "No Trespassing" signs, and little enforcement. Existing city streets that cross the right-of-way and other low volume streets that parallel the tracks provide access for walkers, joggers, and cyclists. In many sections of the 1.5 mile project area, well-worn use trails were observed in the grass along the tracks. While no data on recorded trespassing, vandalism or accidents was available, informal counts taken during field visits indicate that the right-of-way may be used by a significant number of people each day for commuting and recreation.

Adjacent property owners are also using the railroad right-of-way as an extension of their property, and have illegally encroached on the right-of-way. The City will need to formally document these illegal uses and develop a strategy for reclaiming areas necessary for trail development.

Easements

The scope of this project feasibility study does not include identification of existing utility easements in the project area. Identification of easements is, however, an important step in determining the preferred alignment for the proposed trail. The City will be required to prepare a survey of existing utility easements in the railroad corridor, including: electrical, natural gas, water, telecommunications, and sewer. In some cases a trail cannot be sited over an existing utility, but often if the utilities are sited at sufficient depth they need not influence the location of the proposed trail.

Roadway Crossings

The study segment of the NWP railroad corridor crosses seven roadways (not including Brush St. and Talmage St, the current identified north and south terminal points of the trail). These roadways present challenges related to the safety of a multi-use trail. Each roadway crossing is described briefly below. Traffic data for these streets was not available for this study but will be required to develop detailed crossing designs.

Brush Street

Brush Street is the northern terminus of the proposed NWP Rail Trail. This street extends from its eastern terminus next to Highway 101 to North State Street in the west, where the street connects with Low Gap Road, which continues west past Low Gap Regional Park. The trail will begin on the south side of Brush Street, approximately 750 feet east of North State Street. No crossing has been identified at this location.

Ford Street

Ford Street extends from Orchard Avenue in the east to North State Street in the west. The street runs east-west directly perpendicular to the railway corridor.

Clara Street

Clara Street extends from Orchard Avenue in the east to North State Street in the west. The street runs east-west directly perpendicular to the railway corridor.

Mason Street

Mason Street runs roughly parallel to the railroad corridor, adjoining the railroad right-of-way west of the existing tracks, roughly at Clara Street, where it ends. This is a parallel roadway with low traffic volume, serving primarily neighborhood and industrial uses. The proposed trail would run within 20 feet of this roadway. Barriers or fencing may be required to establish separation between motor vehicle traffic and parking and the NWP Rail Trail.

Perkins Street

Perkins Street extends in an east-west direction from the on-off ramps at Highway 101. This street is the primary access from the freeway to Downtown Ukiah and carries some of the highest traffic volumes in the City of Ukiah. The Highway 101 on and off ramps serving Perkins Street are located approximately 1,500 feet east of the railroad right-of-way. Perkins Street consists of two travel lanes in each direction.

Clay Street

Clay Street extends in an east-west direction from the railroad right-of-way in the east past the northern edge of the Ukiah Civic Center to the western edge of Downtown at Highland Avenue. This is a low volume street, owing to the dead end at the railroad right-of-way. Clay Street ends at the historic Ukiah Railroad Depot and provides the greatest potential for a bicycle and pedestrian connection between the proposed rail-trail and the Ukiah Civic Center.

The Ukiah Railroad Depot is located on the east side of the existing tracks, on the opposite side from the proposed rail-trail. In order to establish this connection a new crossing will be needed. If a paper street exists at this location, there may be a legal crossing in existence.

Gobbi Street

Gobbi Street runs from the Russian River in the east to Dora Street in the west. This is a four lane street, with two lanes of travel in each direction. Gobbi is served by on and off ramps at Highway 101 approximately 1,500 feet east of the proposed railroad right-of-way.

Talmage Road

Talmage Road is the southern terminus of the proposed rail-with-trail. It extends from the East Side Road (east of the Russian River) to South State Street in central Ukiah. Talmage Street is served by on and off ramps at Highway 101 and is the primary access to the Ukiah Municipal Airport and other services located in the southern area of the City. The on and off ramps are located approximately 1,000 feet east of the railroad corridor.

Waterway Crossings

The NWP corridor crosses three waterways along the proposed trail alignment. Each crossing is described below.

Orr Creek

Orr Creek runs roughly west to east down from the Mendocino Range and crosses the NWP Rail Trail approximately 0.2 miles south of Brush Street. The creek flows beneath the railroad where it is located on an elevated wooden trestle that is approximately 75 feet long with concrete foundation footings.

Gibson Creek

Gibson Creek drains from the Mendocino Range to the Russian River, flowing from west to east through downtown Ukiah. The creek is largely covered by pavement in this area and flows beneath the railroad in a culvert that runs below East Perkins Street before surfacing into an open creek bed. No railroad trestle is required in this location.

Doolan Creek

Doolan Creek drains from the Mendocino Range to the Russian River, flowing from west to east. This is the smallest water crossing on the proposed NWP Rail Trail. The railroad crosses the creek on a narrow wood and metal trestle bridge that is roughly 40-foot long.

ACCESS

The NWP Rail Trail project area extends from the northern limits of incorporated Ukiah to near the Ukiah Municipal Airport located in the southern area of the City. This linear corridor forms a north-south spine for the City's non-motorized transportation network and will link to many other proposed bicycle facilities outlined in the City of Ukiah Bicycle Master Plan. Because the NWP Rail Trail will greatly improve connectivity in the bikeway and pedestrian circulation system there are numerous important destinations that warrant introduction in this study.

KEY DESTINATIONS NEAR CORRIDOR

URBAN DESTINATIONS

Central Ukiah

The NWP Rail Trail passes immediately east of Downtown Ukiah, creating potential access to numerous downtown destinations, including: the Ukiah Civic Center, the Mendocino County Courthouse, professional office locations, shopping, and restaurants. One of the key connections between the proposed trail and Downtown Ukiah, is the historic railroad depot.

The depot and surrounding property is approximately 13 acres and has great potential as a destination in and of itself. The combination of a linear park (the roughly 1.5 mile multi-use trail) with a developed passive recreation park including facilities such as a restaurant, café, community center, or historical museum could attract many residents and visitors. There are many potential development scenarios for this property, ranging from park to mixed-use urban development. Figure 1 graphically presents a sketch of one park development scenario.

Several major employment centers, including the Ukiah Valley Medical Center, and the Pear Tree Shopping Center are located east of the NWP Rail Trail. The trail can provide a connection between residential neighborhoods and these employment centers.

North Central Ukiah

The railroad corridor is also proximate to many destinations in the northern area of central Ukiah, including the Mendocino County Administration Center, the Ukiah Playhouse, and Ukiah High School which are located on Low Gap Road, less than one half mile from the proposed NWP Rail Trail terminus at Brush Street. Vinewood Park and the 12th District Fairgrounds are also located within 500 feet of the NWP corridor and Brush Street intersection. The fact that there are so many recreational, educational and employment destinations within one half mile of the northern terminus of the NWP Rail Trail demonstrates the importance of this proposed pathway and connecting non-motorized transportation infrastructure.

South Central Ukiah

The southern reach of the proposed NWP Rail Trail is surrounded primarily by residential and industrial land uses. The Ukiah Municipal Airport and the Airport Industrial Park are located just south of the southern terminus of the proposed trail.

REGIONAL PARKS

Low Gap County Park

Low Gap Park is an 80-acre park located near Ukiah High School on Low Gap Road. Low Gap features a range of facilities, including: hiking trails, a children's play area, volleyball and basketball courts, a disc-golf course Picnic and barbecue areas. As discussed below under local parks, the combination of the NWP Rail Trail and the Orr Creek Trail (identified in the Ukiah Bicycle Master Plan) could provide much of Ukiah with a bicycle and pedestrian link to this park.

LOCAL PARKS

The City of Ukiah supports and maintains five public parks including: Todd Grove Park, Oak Manor Park, Vinewood Park, and Anton Stadium. None of these parks is located immediately adjacent to the NWP railroad corridor, nor do they provide linear open space connecting separate neighborhoods. The NWP Rail Trail will fill a much needed gap in the City's park facilities..

Implementation of the NWP Rail Trail and other facilities identified in the City of Ukiah Bicycle Master Plan can effectively expand the City's local park network. For example, the Class I 0.4 mile Orr Creek Pathway is identified as a Mid-Term Project in the Ukiah Bicycle Master Plan, to be implemented within six to twenty years of Plan adoption in 1999. The Orr Creek Trail will make an important connection to the NWP Rail Trail, linking it to the Ukiah Unified School District athletic fields on Cypress Avenue and to the Todd Grove Park, both to the west. These two trail facilities could link much of Ukiah with a complex of public open space including Low Gap Regional Park, Ukiah Municipal Golf Course, Todd Grove Municipal Park, Giorno Park, and Anton Stadium.

SCHOOLS

A number of schools are located near the NWP railroad corridor.

- Ukiah High School, 1000 Low Gap Road
- South Valley High School, 429 South Dora Street
- Pomolita Middle School, 740 Spring Street
- Frank Zeek Elementary School, 1060 North Bush Street
- Yokayo Elementary School, 790 South Dora Street

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Figure 1: Illustrative Sketch
Ukiah Historic Depot: Rail Trail Greenway Implementation and Future Restoration of Passenger Rail

Insert Figure 1: Ukiah Depot Sketch

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Back

ALIGNMENT OPTIONS

INTRODUCTION

This section describes the preliminary alignment options for the NWP Rail Trail. This is a rough alignment based on preliminary analysis of the corridor through fieldwork and review of available mapping and aerial photographs.

The alignment identified in the Ukiah Bicycle Master Plan, and as referred to in this document, is along the west side of the existing railway. The trail will be setback approximately 25 feet from the tracks within the right-of-way. Access to the trail across the tracks from the east will be at established crossings. Any new crossing will require California Public Utilities Commission (CPUC) approval.

PROPOSED TRAIL ALIGNMENT

This section describes the preliminary alignment options for the Ukiah NWP Rail Trail. This is a rough alignment based on preliminary analysis of the corridor through fieldwork and review of available mapping and aerial photographs. Figure 2: Project Map, illustrates the location of the project area and the location of the four detail sheets. As shown in Figure 2, the corridor is divided into four reaches, each approximately 660 yards in length. Each of the detail sheets illustrates the boundary of the existing railroad right-of-way, the location of the center-line track and the proposed trail location. The figures highlight recommended roadway crossing treatments, potential access areas and other facilities associated with the trail.

REACH 1: BRUSH STREET TO NORTON STREET

Figure 3 illustrates the reach from Brush Street to Norton Street. This reach is predominately 100 feet in width, narrowing to approximately 80 feet in the southern portion of this reach. The character of this reach is defined by low-density light industrial uses. Brush Street, east of the railroad right-of-way is largely undeveloped.

The primary design considerations on this section include the Ford Street and Clara Street crossings and the Orr Creek crossing. Ford Street and Clara Street will require at-grade crosswalks, with appropriate signage. The low traffic volumes on these roadways do not warrant additional crossing features. At the southern end of the reach, Mason Street runs parallel to the railroad right-of-way, immediately adjacent to the proposed trail alignment. This area may require special treatment, such as a fixed barrier, in order to ensure that vehicular traffic does not enter the trail. Finally, the Orr Creek crossing will require the construction of a new bicycle/pedestrian bridge. Each of these constraints is addressed in greater detail below under Design and Implementation. The northern end of this reach will also require special attention, including but not limited to: entry features at Brush Street, appropriate signage for both trail and roadway, and a potential trailhead access point.

REACH 2: NORTON STREET TO SUN HOUSE PARK

Figure 4 illustrates the reach from Norton Street to Sun House Park. The railroad right-of-way widens considerably at the northern end of this reach, broadening to approximately 200 feet for a distance of approximately 600 feet. This approximately two and one half acre (2.5 acre) parcel could serve as a

broader segment in the NWP Rail Trail linear park. The right-of-way then narrows to approximately 80 feet south of Perkins Street. The character of this reach is defined by low-density light industrial uses in the north and by the large vacant parcels to the east of the corridor surrounding the historic Ukiah Depot. This area is a City of Ukiah urban development site with significant potential for a range of community park facilities and other urban redevelopment opportunities.

The primary design considerations on this section include the Perkins Street at-grade crossing and the lack of an established crossing from land uses to the east of the existing railroad right-of-way to the proposed trail. Perkins Street is the primary access from Highway 101 to Downtown Ukiah. A trail crossing at this location will require signalization and appropriate signage to ensure trail user safety.

Clay Street is shown on City of Ukiah Assessor's Parcel Maps (Assessor's Parcel Map #2-23) as a "paper street" crossing, and may exist as a legal crossing of the railroad right-of-way. Additional detailed property and title analysis is required to determine the status of this railway crossing. This would require thorough analysis and review of deeds, titles and easements held by the City of Ukiah and the railroad (Northcoast Railroad Authority) in order to determine the status and allowable uses of this crossing.

This railroad crossing is an important feature when considering future redevelopment of the Ukiah Depot since it will provide access between newly developed facilities on site to the existing downtown to the west. Each of these constraints is addressed in greater detail below under Design and Implementation.

REACH 3: SUN HOUSE PARK TO COOPER LANE

Figure 5 illustrates the reach from Sun House Park to Cooper Lane. The railroad right-of-way is predominately 80 feet in width along this reach. The character of this reach is defined by low-density light industrial uses.

The primary design consideration on this section is the Gobbi Street crossing. Gobbi Street is the secondary access (after Perkins Street) to Downtown Ukiah and a trail crossing at this location will require signalization and appropriate signage to ensure trail user safety. Each of these constraints is addressed in greater detail below under Design and Implementation.

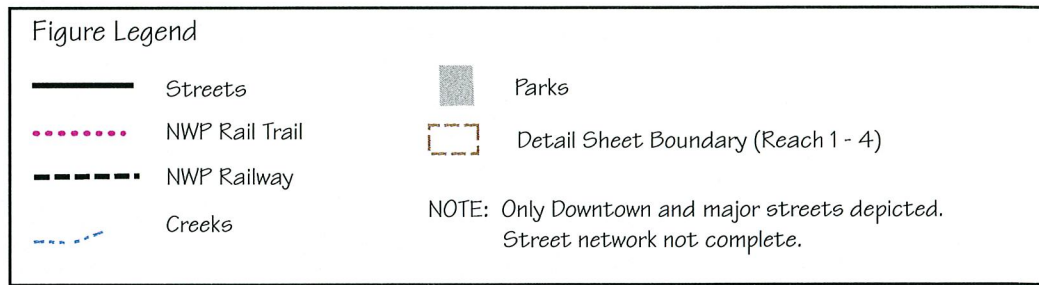
REACH 4: COOPER LANE TO TALMAGE STREET

Figure 6 illustrates the reach from Sun House Park to Cooper Lane. The railroad right-of-way is predominately 80 feet in width along this reach. The character of this reach is defined by low-density light industrial uses and medium-density residential land uses. Buildings are located much closer to the rail corridor along this reach than others, requiring that special consideration be given to neighbors' concerns about potential property impacts.

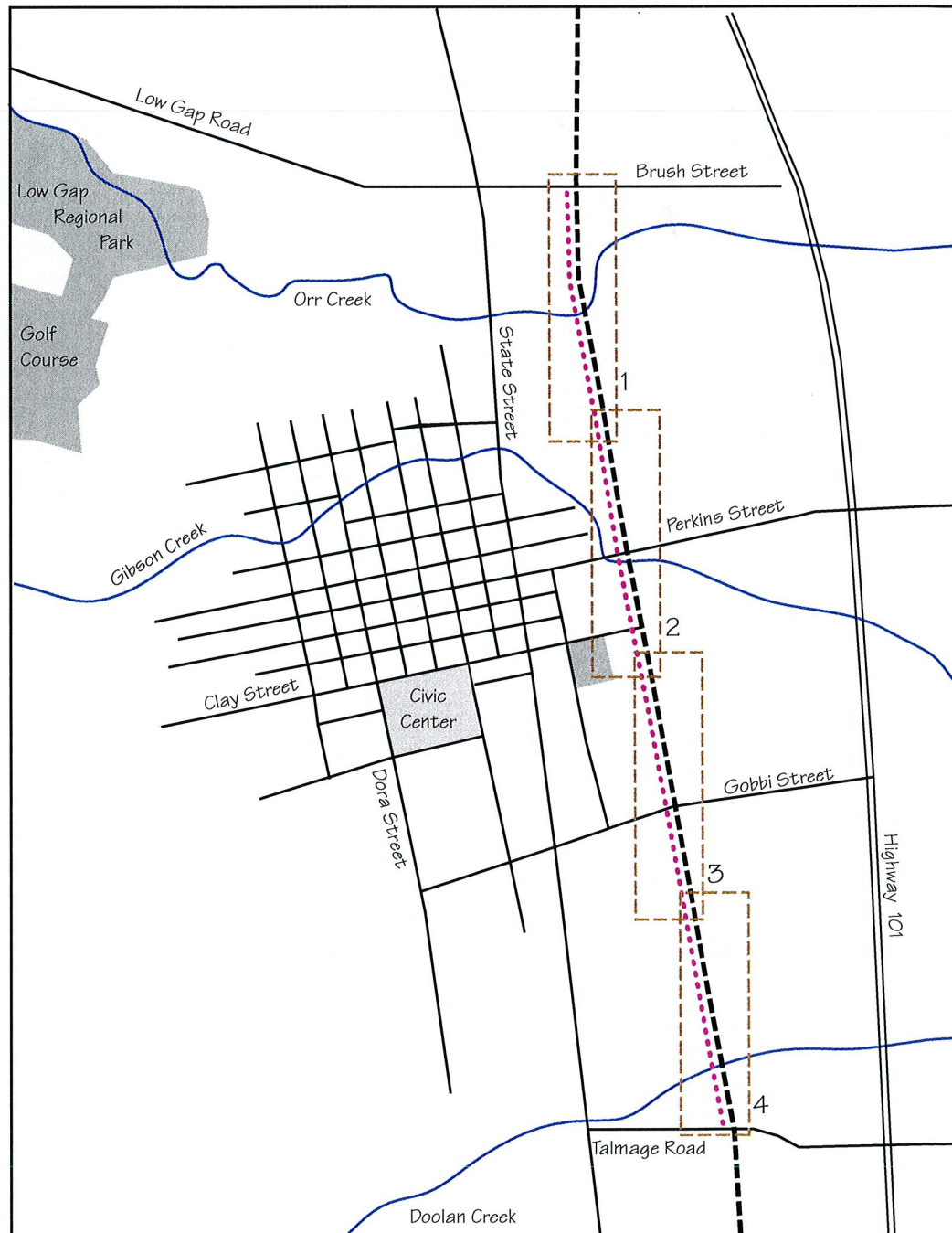
There are no street crossings along this reach and the primary constraint on this section is the Doolan Creek crossing. The creek crossing will require the construction of a new bicycle and pedestrian bridge, separate from the existing railroad trestle. The trail terminus at its southern end will also require special attention, including but not limited to entry features at Talmage Street, appropriate signage for both trail and roadway, and a potential trailhead access point. Each of these constraints is addressed in greater detail below under Design and Implementation.

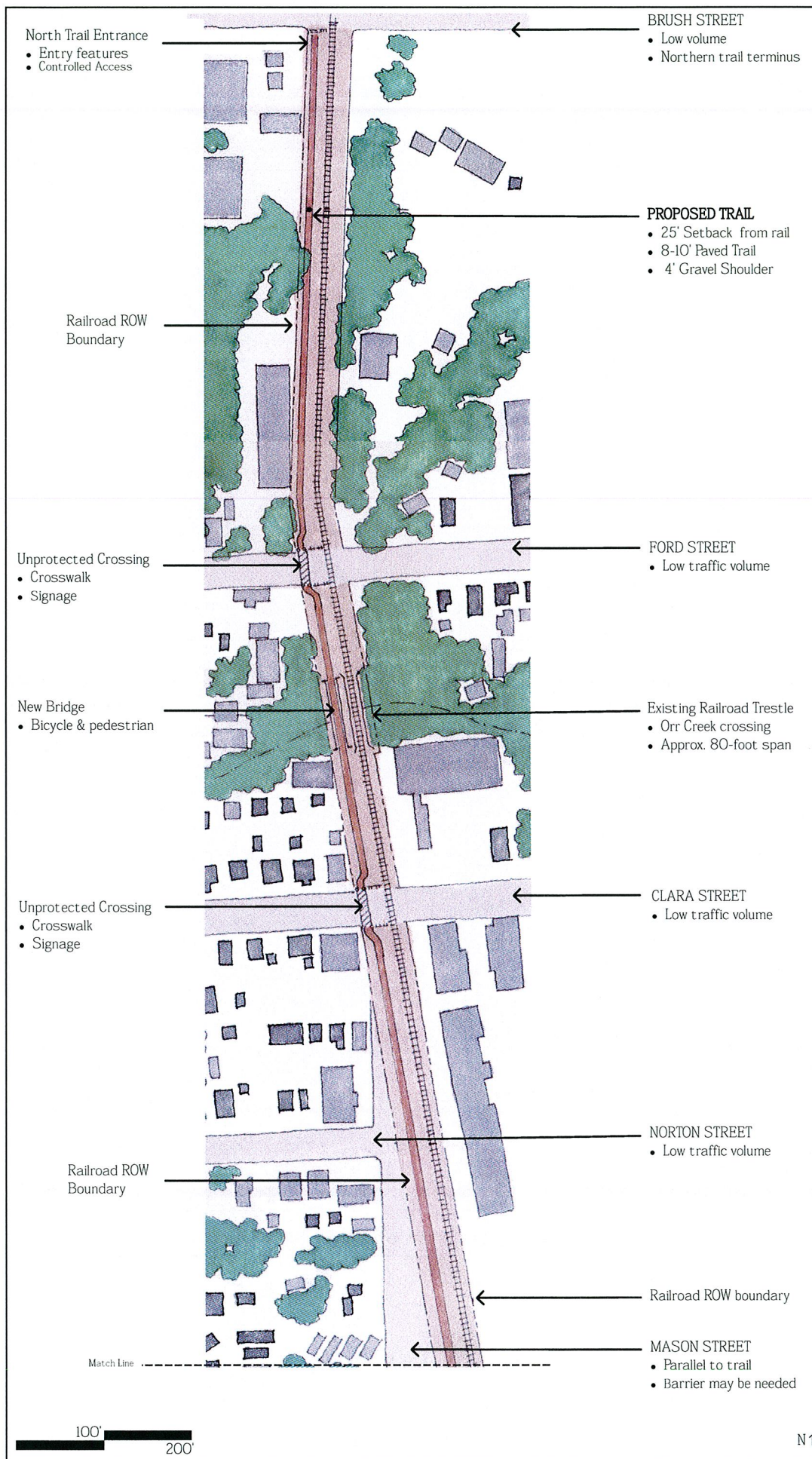
UKIAH NWP RAIL TRAIL

FIGURE 2: LOCATION MAP

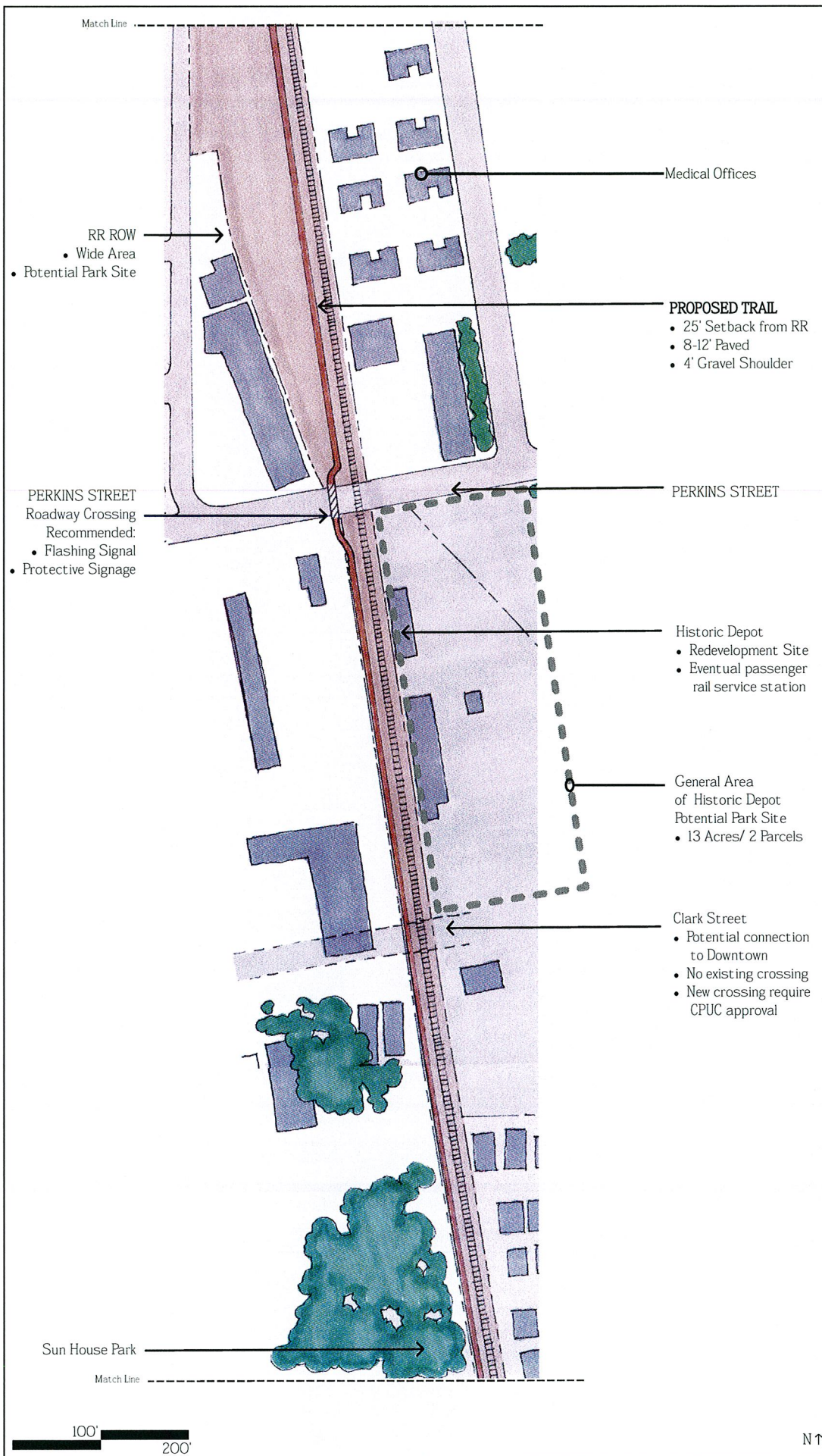


Illustrative Figure: Not to Scale, Street Grid Not Complete

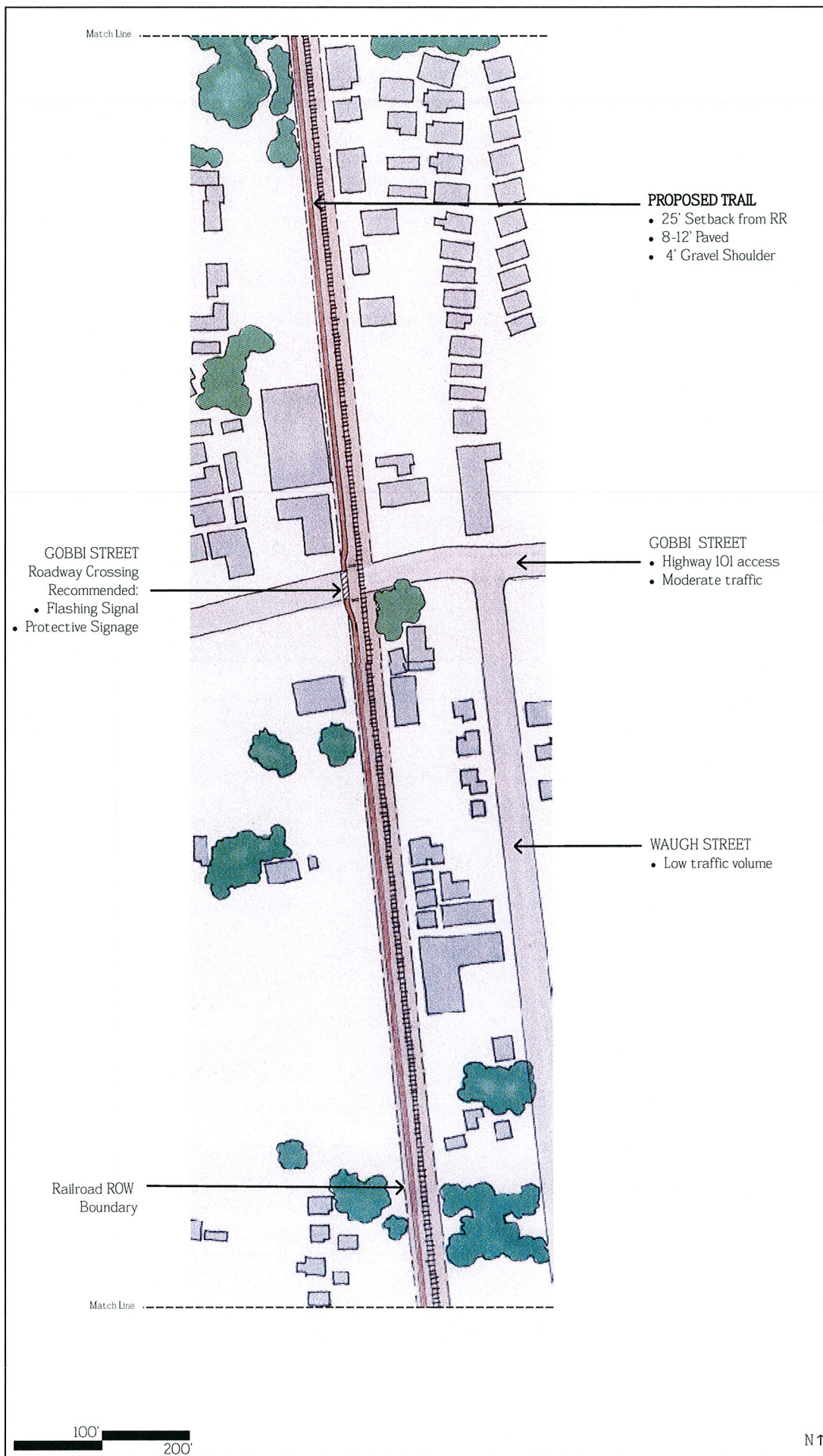




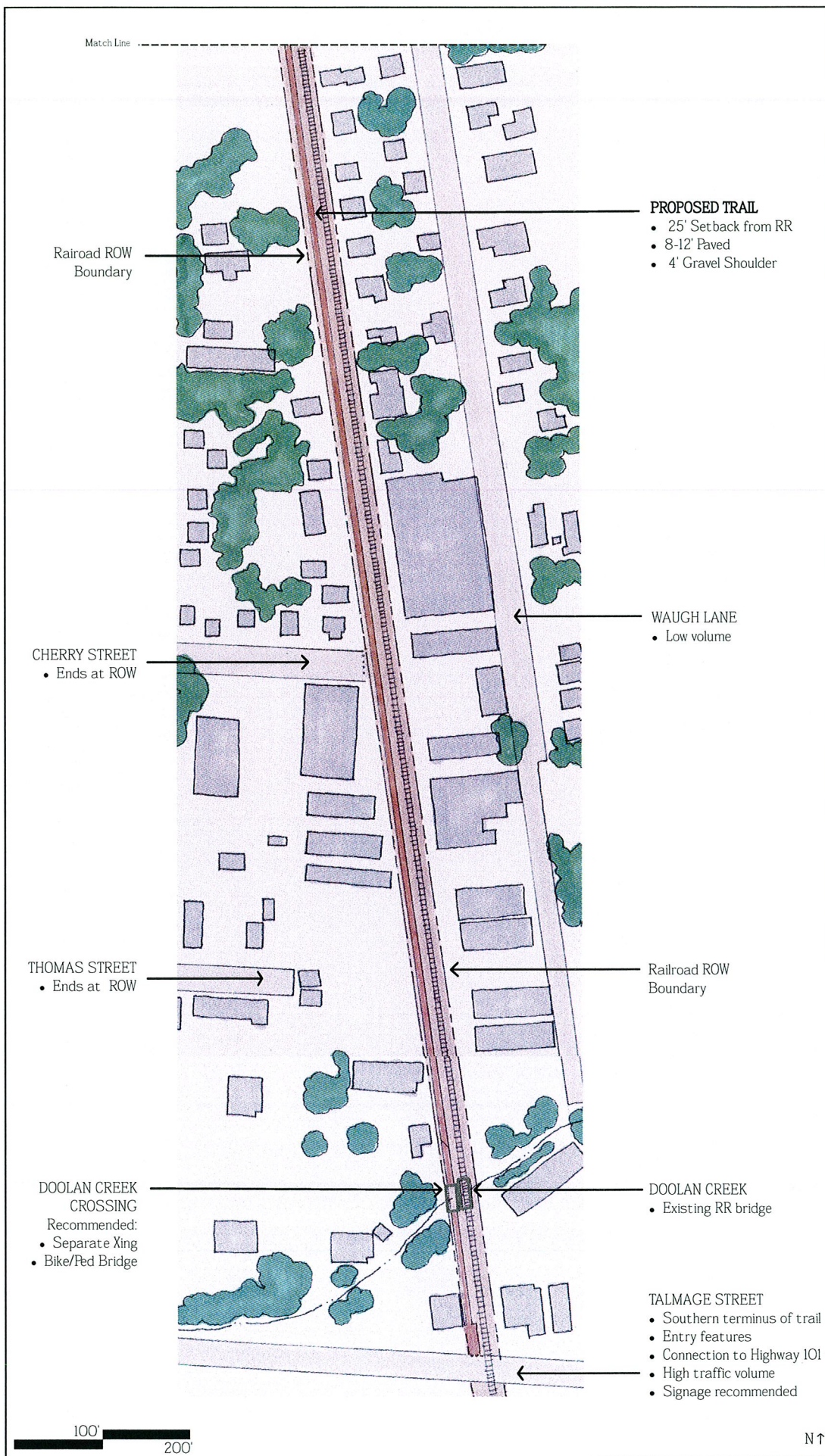
Utah NWP Rail Trail Feasibility Study
Schematic Trail Plan - Reach 1: Brush Street to Norton Street



Utah NWP Rail Trail Feasibility Study
 Schematic Trail Plan - Reach 2: Norton Street to Sun House Park



Utah NWP Rail Trail Feasibility Study
Schematic Trail Plan - Reach 3: Sun House Park to Cooper Lane



Utah NWP Rail Trail Feasibility Study
Schematic Trail Plan - Reach 4: Cooper Lane to Talmage Street

DESIGN AND IMPLEMENTATION

RECOMMENDED PLANNING AND DESIGN STANDARDS

This section provides specific design and implementation guidelines and standards to ensure that the NWP Rail Trail is constructed to a consistent set of the highest and best standards currently available in the United States. Planning, design, and implementation standards are derived from the following sources:

- Caltrans: Highway Design Manual (Chapter 1000: Bikeway Planning and Design)
- AASHTO: A Policy on Geometric Design of Highways and Streets
- Manual of Uniform Traffic Control Devices (MUTCD)
- USDOT, FHWA: Selecting Roadway Design Treatments to Accommodate Bicycles
- USDOT/FHWA: Conflicts on Multiple-Use Trails
- ITE: Design and Safety of Pedestrian Facilities
- RTC: Rails-with-Trails, Sharing Corridors for Transportation and Recreation

It is useful to note that while there are a considerable number of trails-on-active-railroads around the United States, there are few design guidelines that have been developed specifically for this type of facility to date. The sources listed above provide details on many aspects of a rail trail, but (a) may contain recommendations that conflict with each other, (b) are not, in most cases, officially recognized ‘requirements,’ and (c) do not cover all of conditions on most rail trails. Except for the Caltrans guidelines, all design guidelines must be considered as simply design resources for the NWP Rail Trail, to be supplemented with professional judgment.

In addition to the published resources listed above, we have drawn from the experiences of active rail trails around California and the United States to establish accepted practices. The U.S. Department of Transportation (Federal Highway Administration and Federal Railroad Administration) have published Rails-with-Trails: Lessons Learned to provide a summary of current practices common in rail-with-trail development. This document is available from the Federal Highway Administration.

The following sections establish the basic design parameters as developed by Caltrans. Mandatory standards are shown in bold face.

Recommended Width

The recommended minimum width for paved multi-use trails in California is 8-feet, with 2-feet of lateral clearance and 8-feet of vertical clearance. If the trail is projected to have higher volumes of bicyclists and others, or if maintenance vehicles will be using the rail trail on a regular basis, a minimum width of 10-feet is recommended with the same lateral and vertical clearances. Typically, 3-foot wide unpaved shoulders with a compacted surface (often decomposed granite) are located on each side of the paved surface to accommodate joggers and others who prefer a softer surface. A 2% cross slope for drainage should be provided on all trails. (See Figure 7)

Signing and Striping

A yellow centerline stripe may be desirable (but is not required) on sections of the rail trail that have

heavy usage, curves with restricted sight lines, at approaches to intersections, and/or where nighttime riding is expected.

Intersections and Crossings

The rail trail alignment should take into consideration the frequency and condition of grade crossings of roadways. Grade separations, such as bridges or under crossings, are recommended if traffic volumes are heavy. If grade separation is not feasible, traffic signals may suffice. Stop or Yield signs for bicyclists will suffice where traffic volumes are not heavy.

Trail crossings should occur at established pedestrian crossings wherever possible, or at locations completely out of the influence of intersections. Mid-block crossings should address right of way for the motorist and trail user through use of Yield, Stop, or traffic signals that can be activated by trail users. Trail approaches at intersections should always have Stop or Yield signs to minimize conflicts with autos. Bike Crossings may be placed in advance of trail crossings to alert motorists. Ramps should be placed on sidewalk curbs for bicyclists.

Separation of Pathways

Bikeways or trails parallel to roadways should be located no closer than 5-feet from the edge of the roadway, unless a physical barrier is provided. Generally, bikeways are not recommended directly parallel to roadways as most bicyclists will find it less usable than the street itself, assuming there is adequate width.

Design Speed

The minimum design speed for bike paths is 20 miles per hour, except on sections where there are long downgrades (steeper than 4%, and longer than 500-feet). Speed bumps or other surface irregularities should never be used to slow bicycles.

Structural Section

Bike path construction should be conducted in a similar manner as roadway construction, with sub-base thickness to be determined by soils condition and expansive soil types requiring special structural sections. Minimum asphalt thickness should be three inches (3") of Type A or Type B as described by Caltrans Standard Specifications, with one-half inch (0.5") maximum aggregate and medium grading. The preferred pathway material for the Ukiah Rail Trail--due to the desire to minimize maintenance costs--is a four inch (4") reinforced concrete material with sub-base or six inches (6") of reinforced concrete on compacted native material (if suitable). (See Figure 7)

Drainage

The 2% cross slope will resolve most drainage issues on a bike path, except along cut sections where uphill water must be collected in a ditch and directed to a catch basin, where the water can be directed under the NWP Rail Trail in a drainage pipe of suitable dimensions.

Barrier Posts

Posts at trail intersections and entrances may be necessary to keep vehicles from entering. Posts should be designed to be visible to bicyclists and others, especially at night, with reflective materials and appropriate striping. Posts should be designed to be moveable by emergency vehicles.

Bikeway Crossing of Railroads

Bikeways crossings of railroad railway tracks should be at least as wide as the approach bikeway, and should be at right (90 degree) angles to the railway tracks. Pavement should be maintained with timber plank or other enhanced surfaces installed when possible to avoid ridge buildup adjacent to the railway tracks.

The California Public Utilities Commission (CPUC) regulates railroad crossings. All new bike path railroad crossings must be approved by the CPUC. Necessary railroad protection will be determined based on a joint field review involving the applicant, the railroad company, and the CPUC.

In the case of the NWP Rail Trail, this would apply only to the proposed connection to the Downtown area. No other crossings are anticipated.

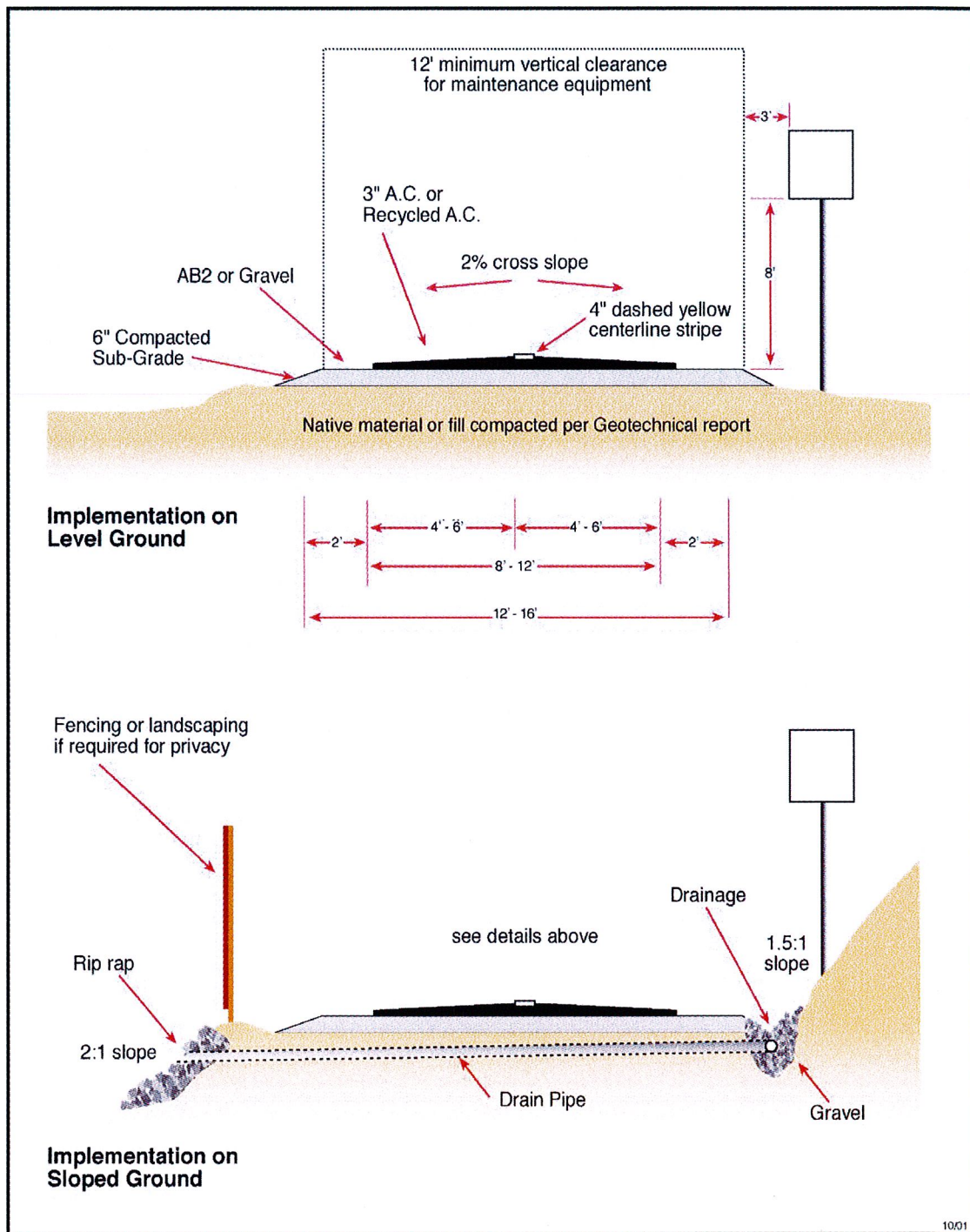


Figure 7: Typical Cross Section

Signing, Markings, and Traffic Control Devices

Uniform signs, markings, and traffic control devices shall be used per section 2376 of the Streets and Highways Code. An optional four inch (4") yellow centerline stripe may be used to separate users on a Class I bike path. **Bike lane signs (R81) shall be placed at the beginning of all bike lanes, on the far side of every arterial street intersection, at all major changes in direction, and at maximum half-mile intervals.** Bike lane pavement markings shall be placed on the far side of each intersection.

Bike path, bike lane, and bike route signing and markings should follow the guidelines as developed by Caltrans and the Manual on Uniform Traffic Control Devices. This includes advisory, warning, directional, and informational signs for bicyclists, pedestrians, and motorists. The final striping, marking, and signing plan for the NWP Rail Trail should be reviewed and approved by a licensed traffic engineer or civil engineer.

APPLICATION OF STANDARDS

The California Department of Transportation (Caltrans) has developed specific design guidelines in the Highway Design Manual for Class I bike paths. The NWP Rail Trail will be designed to Class I standards wherever possible. These standards are intended to be a guide to engineers in their exercise of sound judgment in the design of projects. Design standards should meet or exceed the Caltrans standards to the maximum extent feasible. Lower standards may be used “when such use best satisfies the concerns of a given situation.” Mandatory design standards “are those considered most essential to achievement of overall design objectives. Many pertain to requirements of law or regulations such as those embodied in the FHWA’s controlling criteria.” Mandatory standards are identified in Chapter 1000 of the Highway Design Manual with the word ‘shall’.

Advisory standards are important but allow for greater flexibility and are identified by the word ‘should.’ Permissive standards are identified by the words ‘should’ or ‘may’, and can be applied at the discretion of the project engineer. Controlling Criteria, as defined by the FHWA, consists of 13 specific criteria to be used in the selection of design standards. They are: (1) design speed, (2) lane width, (3) shoulder width, (4) bridge width, (5) horizontal alignment, (6) vertical alignment, (7) grade, (8) stopping sight distance, (9) cross slope, (10) super elevation, (11) horizontal clearance, (12) vertical clearance, and (13) bridge structural capacity.

Designs that deviate from the mandatory Caltrans design standards **shall** be approved by the Chief, Office of Project Planning and Design, or to delegated Project Development Coordinators.

These standards represent the basic guidelines set forth by Caltrans. There are many conditions that are not explicitly covered in the Caltrans or AASHTO guidelines. These are presented below.

Trail Setbacks From Railroad Tracks

The California Public Utilities Commission has specific minimum setbacks for any structures or improvements (including any sidewalk or trail that parallels active railroad tracks). These standards are typically applied to the minimum distance that crossing guard equipment is located from tracks.

Minimum distances from the centerline of an active railroad to the outside edge of a trail or bikeway is 8'6" on tangent and 9'6" on curved track (General Order No. 26-D). Wherever possible, it is recommended that the trail be set back at least 25 feet from the centerline of the tracks, or at least 15 feet when there is a vertical separation of more than 10 feet (See Fig. 8)

Grade Crossings

When considering a proposed separated bike path and required crossings of roadways, it is important to remember two items: (1) trail users will be enjoying an auto-free experience and may enter into an intersection unexpectedly, and (2) motorists will not expect to see bicyclists shooting out from an unmarked intersection into the roadway. In most cases, bikeway crossings at-grade can be properly designed to a reasonable degree of safety and to meet existing traffic and safety standards.

Evaluation of bikeway crossings involves analysis of traffic patterns of vehicles as well as trail users. This includes traffic speeds (85th percentile), street width, traffic volumes (average daily traffic, and peak hour), line of sight, and trail user profile (age distribution, destinations). A Traffic Safety study will need to be completed as part of the actual civil engineering design of the proposed crossings to determine the most appropriate design features. This study identifies the most appropriate crossing options given available information, which must be verified and/or refined through the actual engineering and construction document stage.

The proposed systems approach in this report is based on established standards, published technical reports, and the experiences on existing facilities. Virtually all crossings fit into one of three basic categories, described below.

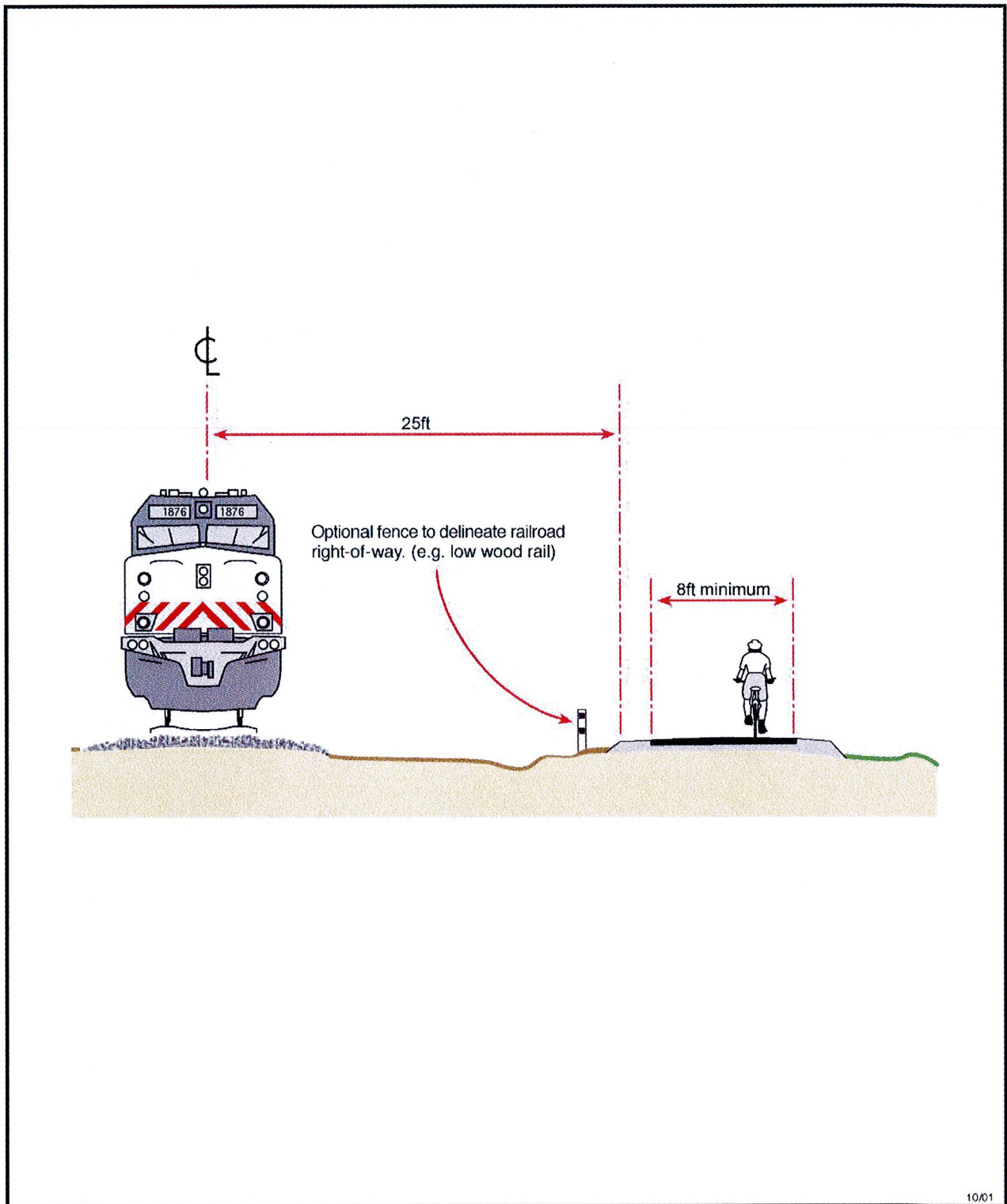


Figure 8: Rail with Trail Setback: Recommended Setback

Table 1:
Basic Crossing Prototypes Appropriate to NWP Rail Trail

Crossing Type	Description
1. Unprotected	Unprotected crossings include mid-block crossings of residential, collector, and sometimes major arterial streets.
2. Routed to Existing Intersection	Bikeways which emerge near existing intersections may be routed to these locations.
3. Signalized/Controlled	Bikeway crossings which require signals or other control measures due to traffic volumes, speeds, and trail usage.

Type 1 or uncontrolled crossings (unsignalized, but with other traffic control devices) are recommended for streets with 85th percentile travel speeds below 45 mph and ADTs below 10,000 vehicles.

Type 2 crossings within 250 feet of an existing signalized intersection with pedestrian crosswalks are typically diverted to the signalized intersection for safety purposes. In order for this option to be effective barriers and signing would be needed to direct trail users to the signalized crossings. In many cases the intersections are directly adjacent to the crossings and are not a significant problem for trail users.

New signalized crossings (Type 3) are identified for crossings more than 250 feet from an existing signalized intersection and where 85th percentile travel speeds are 45 mph and above and/or ADTs 10,000 vehicles. Each crossing, regardless of traffic speeds or volumes, requires additional review by a registered engineer to identify sight line and other factors

Standard Crossing Features

Signage

Crossing features for all roadways include warning signs both for vehicles and trail users. The type, location, and other criteria are identified in the *Manual for Uniform Traffic Control Devices* (MUTCD) and the Caltrans *Highway Design Manual*. Consideration must be given for adequate warning distance based on vehicle speeds and line of sight, with visibility of any signing absolutely critical. ‘Catching the attention’ of motorists jaded to roadway signs may require additional alerting devices such as a flashing light, roadway striping, or changes in pavement texture. Signing for trail users must include a standard ‘STOP’ sign and pavement marking, sometimes combined with other features such as bollards or a kink in the Ukiah Rail Trail to slow bicyclists. Care must be taken not to place too many signs at crossings lest they begin to lose their impact.

Directional signing may be useful for trail users and motorists alike. For motorists, a sign reading ‘NWP Rail Trail Xing’ along with a trail emblem or logo helps both warn and promote use of the trail itself. For trail users, directional signs and street names at crossings help direct people to their destinations.

Striping

A number of striping patterns have emerged over the years to delineate trail crossings. A median stripe on the trail approach will help to organize and warn trail users. The actual crosswalk striping is a matter of local and state preference, and may be accompanied by pavement treatments to help warn and slow motorists. The effectiveness of crosswalk striping is highly related to local customs and regulations. In communities where motorists do not typically defer to pedestrians in crosswalks, additional measures may be required. While there is a trend to remove unprotected crossings, it is the author's opinion that they serve a valuable function and, at the very least, provides the trail user with legal recourse.

Unprotected Crossings

An unprotected crossing consists of a crosswalk, signing, and often no other devices to slow or stop traffic (see Figure 9). The approach to designing crossings at mid-block locations depends on an evaluation of vehicular traffic, line of sight, trail traffic, use patterns, road type and width, and other safety issues such as nearby schools. The table below identifies the general thresholds below which unprotected crossings may be acceptable.

Table 2: Unprotected Crossings

Install Crosswalks	All locations ¹
Maximum Traffic Volumes:	10,000-15,000 (ADT), 1,000-1,500 peak hour
Maximum 85th Percentile Speeds:	35-45 mph
Maximum Trail User Volumes:	50-75 per hour, 300-400 per day
Maximum Street Width	60 feet (no median)
Minimum Line of Sight	25mph zone: 100 feet 35 mph zone: 200 feet 45 mph zone: 300 feet

On residential and collector streets below 10,000 ADT, crosswalks and warning signs ('Bike Xing') should be provided for motorists, and STOP signs and slowing techniques (bollards/geometry) used on the trail approach. Care should be taken to keep vegetation and other obstacles out of the view line for motorists and trail users.

Collector streets up to 15,000 ADT require a higher level of treatment for crossings than residential streets. In addition to the features described for residential streets, signing locations may need to be moved further upstream and made more visible for motorists. A flashing yellow beacon costing between \$15,000 and \$30,000, may be used, preferably one that is activated by the trail user rather than continuous. The East Bay Regional Park District is successfully using a flashing beacon that is activated by motion detectors on the trail, triggering the beacon as trail users approach the intersection. This

¹ Some traffic design guidelines suggest that crosswalks are not required with ADT volumes below 7,000.

equipment, though slightly more expensive, helps to keep motorists alert. (See Figure 10)

Higher volume arterials over 15,000 ADT may be unprotected in some circumstances, for example if they are located near a signalized intersection and there are substantial 'gaps' in the traffic, and/or there is a median island. This would not be appropriate if there were a significant number of school children using the trail.

Signalized Crossings

When a trail must cross a roadway that exceeds the maximum thresholds identified for unprotected crossings, generally 10,000 ADTs, some type of signalized control must be installed to protect the trail users (See Figure 10). Signals require the input of local traffic engineers, who review potential impacts on traffic progression, capacity, and safety. On corridors with timed signals, a new trail crossing may need to be coordinated with adjacent signals to maximize efficiency. Trail signals are normally activated by push buttons, but also may be triggered by motion detectors as well. The maximum delay for activation of the signal should be two minutes, with minimum crossing times determined by the width of the street and trail volumes. The signals may rest on flashing yellow or green for motorists when not activated, and should be supplemented by standard advance warning signs. Typical costs for a signalized crossing range from \$75,000 to \$150,000. Table 3 presents a summary of crossings and crossing types for the NWP Rail Trail.

Table 3:
NWP Rail Trail Crossings and Recommended Crossing Types

Crossing	Crossing Type
Brush Street	Unprotected Type I
Ford Street	Unprotected Type I
Clara Street	Unprotected Type I
Mason Street	No Crossing – parallel roadway
Perkins Street	Signalized Controlled (Yellow Flashing)
Clay Street*	Unprotected
Gobbi Street	Signalized Controlled (Yellow Flashing)
Talmage Road	Unprotected Type I

- Roadway would be established as connector between Downtown Ukiah and Ukiah Depot redevelopment area.

Railroad Crossings

The only potential railroad crossing associated with the NWP Rail Trail is the desired connection between the historic depot site and existing Downtown Ukiah. This crossing would occur in the vicinity of Clay Street. The historic depot is located on the east side of the NWP right-of-way and the proposed rail trail (to be located west of the existing tracks). In order to provide bicycle and pedestrian access between Downtown and the proposed redevelopment area, a new at-grade crossing will be required at Clay Street unless an existing paper street exists at this intersection.

The establishment of a new crossing at this location would require the installation of bicycle/pedestrian crossing warning equipment. In the event that the site is developed in a manner that requires additional vehicular service access the crossing could be installed with standard vehicle crossing warning equipment. As described above under the description of Reach 2, additional detailed property and title research are required to determine the feasibility of establishing a trail crossing at this location.

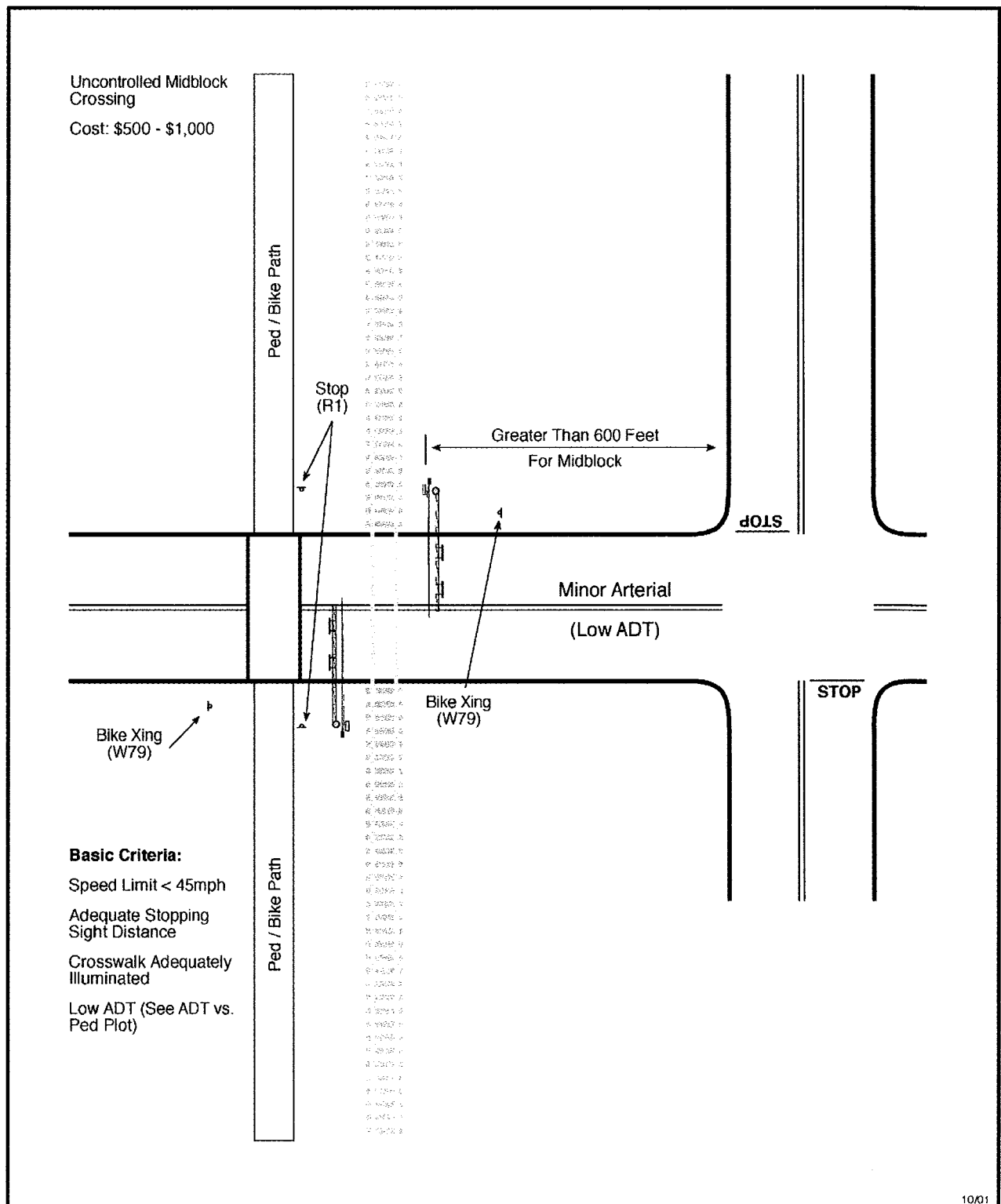


Figure 9: Type 1 Trail Crossing: Unprotected

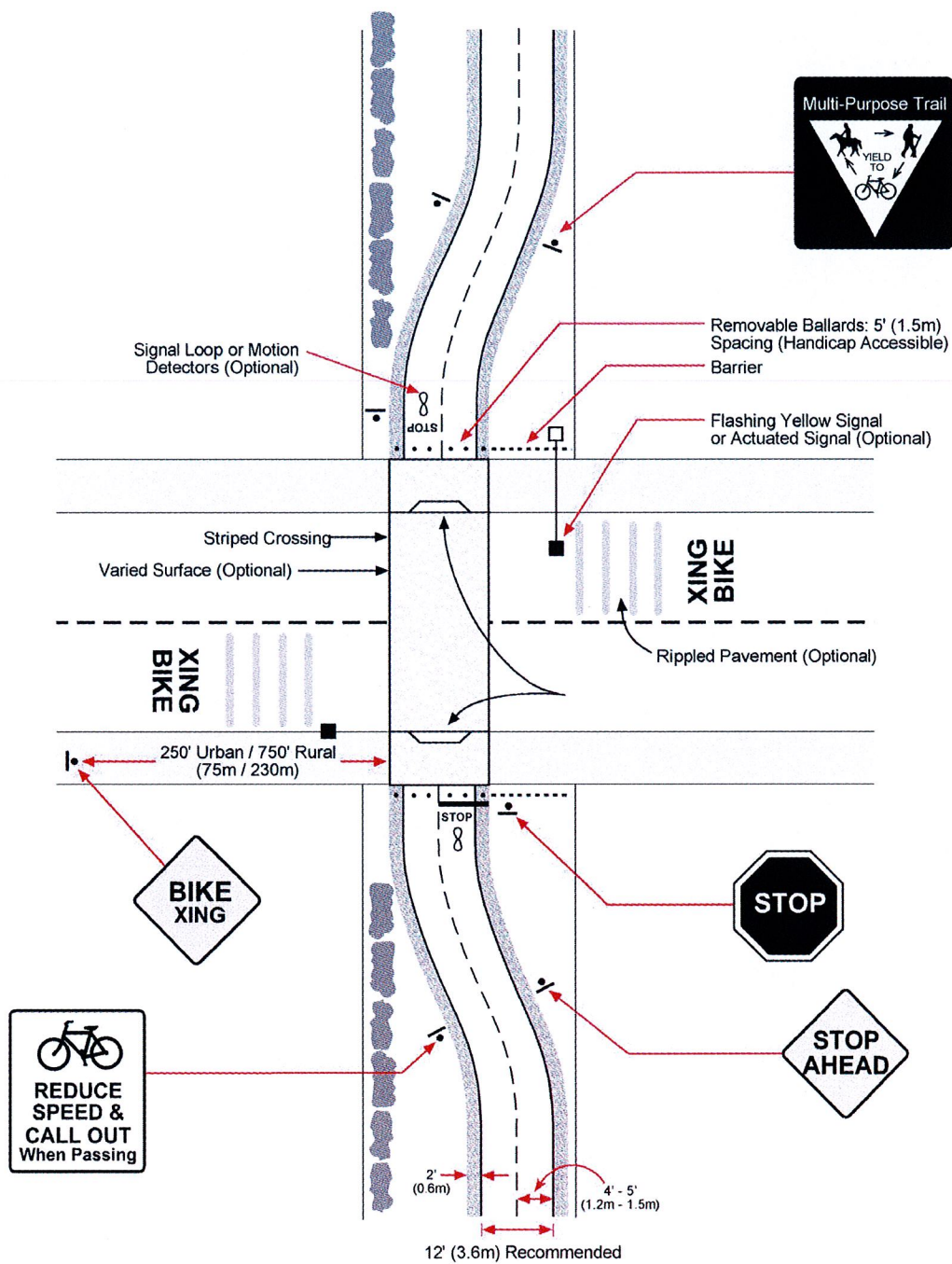


Figure 10: Type III Trail Crossing: Flashing Yellow Signal

OTHER TRAIL AND DESIGN ISSUES

Utilities and Lighting

Surface and sub-surface utilities are located within the railroad right of way, impacting the location and construction of the NWP Rail Trail. Utilities include active and abandoned railroad communications cable, signal and communication boxes, fiber optic cable, water and sewer lines, and telephone lines. The Ukiah Rail Trail will be designed to avoid having to move most active surface utilities, although utility poles no longer in use may be removed. The trail may be located directly over existing sub-surface utilities assuming (a) adequate depth exists between the trail surface and utility to prevent damage, and (b) agreements can be reached with the utility owner regarding access for repairs and impact to the trail.

The City of Ukiah may choose to install trail lighting, especially where there is considerable evening pedestrian and bicycle commuter traffic. There will be some lighting benefit from existing lighting along adjacent roadways, land uses, and at crossings.

Signing and Marking

The NWP Rail Trail should be designed to include all of the required and recommended signing and marking standards developed by Caltrans in Chapter 1000 of the Highway Design Manual. In addition, all signs and markings should conform to the standards developed in the Manual of Uniform Traffic Control Devices (MUTCD). Finally, the NWP Rail Trail should be identified by a consistent, unique logo or design that will help guide people to and on the trail.

In general, all signs should be located 3 to 4 feet from the edge of the paved surface, have a minimum vertical clearance of 8.5 feet when located above the trail surface and be a minimum of 4 feet above the trail surface when located on the side of the trail. All signs should be oriented so as not to confuse motorists. The designs (though not the size) of signs and markings should be the same as used for motor vehicles.

Entrance Features

Major entrances to the Ukiah Rail Trail may contain a variety of support facilities and other items, depending on available resources and local support. Typical entrance features include:

1. **Trail heads.** The trail may draw substantial numbers of users during peak times. Trail users could be directed to specific trail heads where parking and other amenities are provided, helping to relieve some of the pressure on residential and commercial areas. Trail heads may also contain drinking fountains, telephones, restrooms, bike lockers, and other features. Trail heads should be accessible by transit and rail service.
2. **Bollards.** A single 48" wood or metal bollard (post) should be placed on the centerline of the trail at all entrances to prevent motor vehicles from entering the trail. The bollard should be

designed with high reflective surfaces and be brightly painted. The bollard should be locked to a ground plate and be easily removed by emergency vehicles.

3. **Entrance Features.** The trail alignment should have a sharp (20' or less radius) curve at all major roadway intersections wherever physically possible, to help slow bicycles. Entrance circles may be constructed with a 20' inside radius to help slow bicycles. Public art and/or entrance signs may be placed in the circle. Entrance signs should include regulations, hours of operation (if any), and trail speed limit. Entrance signs may also include sponsorships by local agencies, organizations, and/or corporations. Signs may be placed at the entrances or at appropriate locations along the trail that provide brief descriptions of historic events or natural features (see Figure 23).

Landscaping

Landscape plant materials should be located along the NWP Rail Trail to provide a sequence of visual landmarks. Selection of an appropriate plant palette can enhance gateway and entry features and provide the trail with a strong identity. The NWP Rail Trail is surrounded by predominately light industrial land uses and much of the land is unimproved, meaning that landscape plants will serve an important role in the overall development of the trail.

Choices of plants will respect the sharing of the right-of-way with the rail and will introduce seasonal color and shade. Groundcovers and shrubs will be water efficient and capable of withstanding the periodic wind stream created by passing trains. Trees should be a mix of deciduous and evergreen species, and should be located at the edges of the rail corridor, also providing a wind screen in places.

Irrigation should be predominately drip and plant materials will be capable of self-sustainability within two to three years. Solar controllers and other stand alone equipment will be used throughout the NWP Rail Trail, eliminating costly trenching for electric. Irrigation will be minimal after establishment of plant material.

Amenities

There are numerous locations where shaded benches, information kiosks, mile markers, interpretive signage or exercise stations can be integrated into the overall design of the proposed NWP Rail Trail. These are the features that provide trails with the strongest identity and make them important aspects of the community. A wide range of well designed and tested pre-fabricated trail fixtures are used on trail facilities across the country and could be used successfully in Ukiah. In addition, many communities elect to design and develop site specific amenities that more directly reflect the unique character of the region, town or locale of the trail.

COST ESTIMATE

Table 4 presents estimates for construction of the trail, based on the preliminary alignment options presented above. These costs do not include the cost of right-of-way acquisition. The estimate also does not include annual maintenance and operations costs.

Table 4:
NWP Rail Trail Cost Estimate Table

NWP Rail Trail Boundaries = Brush Street (North) to Talmage Road (South)

Distance = 1.5 miles (7920 linear feet) approximately

Description	Quantity	Unit	Unit Cost	Item Cost
Mobilization		LS	8%	\$118,359
Clearing & Demolition	198,000	SF	\$0.35	\$69,300
Rough Grading	118,800	SF	\$0.15	\$17,820
Finish Grading	95,040	SF	\$0.15	\$14,256
Soil Preparation	95,040	SF	\$0.25	\$23,760
12' Wide Asphalt Path	95,040	SF	\$2.25	\$213,840
Fencing (4' high chain link)	1,000	LF	\$17.00	\$17,000
4' wide gravel shoulder	31,680	SF	\$1.50	\$47,520
Mitigation plantings (24" box trees for creek crossings)	100	EA	\$300.00	\$30,000
Mulch	95,040	SF	\$0.30	\$28,512
Temporary irrigation	95,040	SF	\$0.75	\$71,280
Railroad crossing (at Clay Street)	1	EA	\$200,000.00	\$200,000
Site Furnishings (benches)	4	EA	\$2,800.00	\$11,200
Type I Unprotected Crossing (Ford St. & Clara St.)	2	EA	\$5,000.00	\$10,000
Type III Signalized Roadway Crossing (Perkins St.)	1	EA	\$100,000.00	\$100,000
Type III Signalized Roadway Crossing (Gobbi St.)	1	EA	\$100,000.00	\$100,000
Drinking fountains (with point of connection)	2	EA	\$7,500.00	\$15,000
Signing & Striping	1.50	Mile	\$40,000.00	\$60,000
Trailhead with Restroom (at Historic Depot)	1	EA	\$250,000.00	\$250,000
Bicycle/Pedestrian Bridge Creek Crossing (Orr Creek - 175')		EA	\$150,000.00	\$150,000
Bicycle/Pedestrian Bridge Creek Crossing (Doolan Creek- 40')		EA	\$50,000.00	\$50,000
SubTotal Estimated Cost				\$1,479,488
Engineering Costs			10%	\$147,949
Contingency			10%	\$147,949
Grand Total				\$1,775,386

