Railroad Crossings – White Paper

To: Jim Olson, City of Ashland

Cc: Project Management Team

From: Adrian Witte, *Alta Planning + Design*; Tom Lister, *OTAK*

Date: December 30, 2010

Re: Task 7.1.T White Paper: "Railroad Crossings" - Draft

Direction to the Planning Commission and Transportation Commission

Five sets of white papers are being produced to present information on tools, opportunities, and potential strategies that could help Ashland become a nationwide leader as a green transportation community. Each white paper will present general information regarding a topic and then provide ideas on where and how that tool, strategy, and/or policy could be used within Ashland.

You will have the opportunity to review the content of each white paper and share your thoughts, concerns, questions, and ideas in a joint Planning Commission/Transportation Commission meeting. Based on discussions at the meeting, the material in the white paper will be: 1) Revised and incorporated into the alternatives analysis for the draft TSP; or 2) Eliminated from consideration and excluded from the alternatives analysis. The overall intent of the white paper series is to explore opportunities for Ashland and increase the opportunities to discuss the many possibilities for Ashland.

Railroad Crossing White Paper Introduction

There are a number of existing rail crossings in the City of Ashland as well as a number of locations where potential crossings are being considered. There are numerous considerations to be taken into account when evaluating a new crossing including "public necessity, convenience, safety, and economics" (2). The requirements to create a new rail crossing are particularly onerous and it is prudent that a substantial analysis of need, benefit, and cost be conducted prior to a decision on a new crossing. This white paper outlines some of the key considerations for new crossings, but does not replace the need for more detailed studies at each location.

Federal Highway Administration (FHWA) and Oregon Department of Transportation's (ODOT) Rail Division recommend that grade-separated crossings be considered for any new crossing or upgrade of existing crossings, but that where new at-grade crossings are found to be necessary that an existing crossing be closed. This "one-for-one" replacement allows for resource management generally within the status quo.

Existing Crossings

Currently, there are eleven at-grade crossings of the Central Oregon and Pacific (CORP) rail corridor that runs through the City of Ashland as shown on **Figure 1**. The type of control provided at each crossing is shown in **Table 1**. There is currently little to no activity on this rail line. When active, maximum train speeds are between 20 and 30 miles per hour (1). Recently there has been interest in the status of a number of these crossings and the potential for new crossings in several locations.

The *City of Ashland Railroad Crossing Evaluation* conducted by HDR Inc. in 2004 (1) developed a prioritized list of improvements to bring existing at-grade crossings into compliance with American Association of State Highway Transportation Officials (AASHTO) and American Railroad Engineering and Maintenance of Way Association (AREMA) standards for actively protected crossings.

The HDR report identified the highest priorities for improvement by ranking nine crossings (Normal Avenue and Crowson Road crossings were not included) based on traffic volumes, pedestrian generators, and the importance of the crossing route. City engineering staff updated the ranking to include crossing surface condition, integration with multi-path projects, safety of the existing crossing, pedestrian corridors within safe routes to school designation areas, and the proposed cost of crossing improvements. Both lists identified the Wightman Street crossing as a candidate for closure. The Glenn Street crossing was also identified (in the HDR study) as a candidate for closure.

Table 1: Existing Crossing Controls

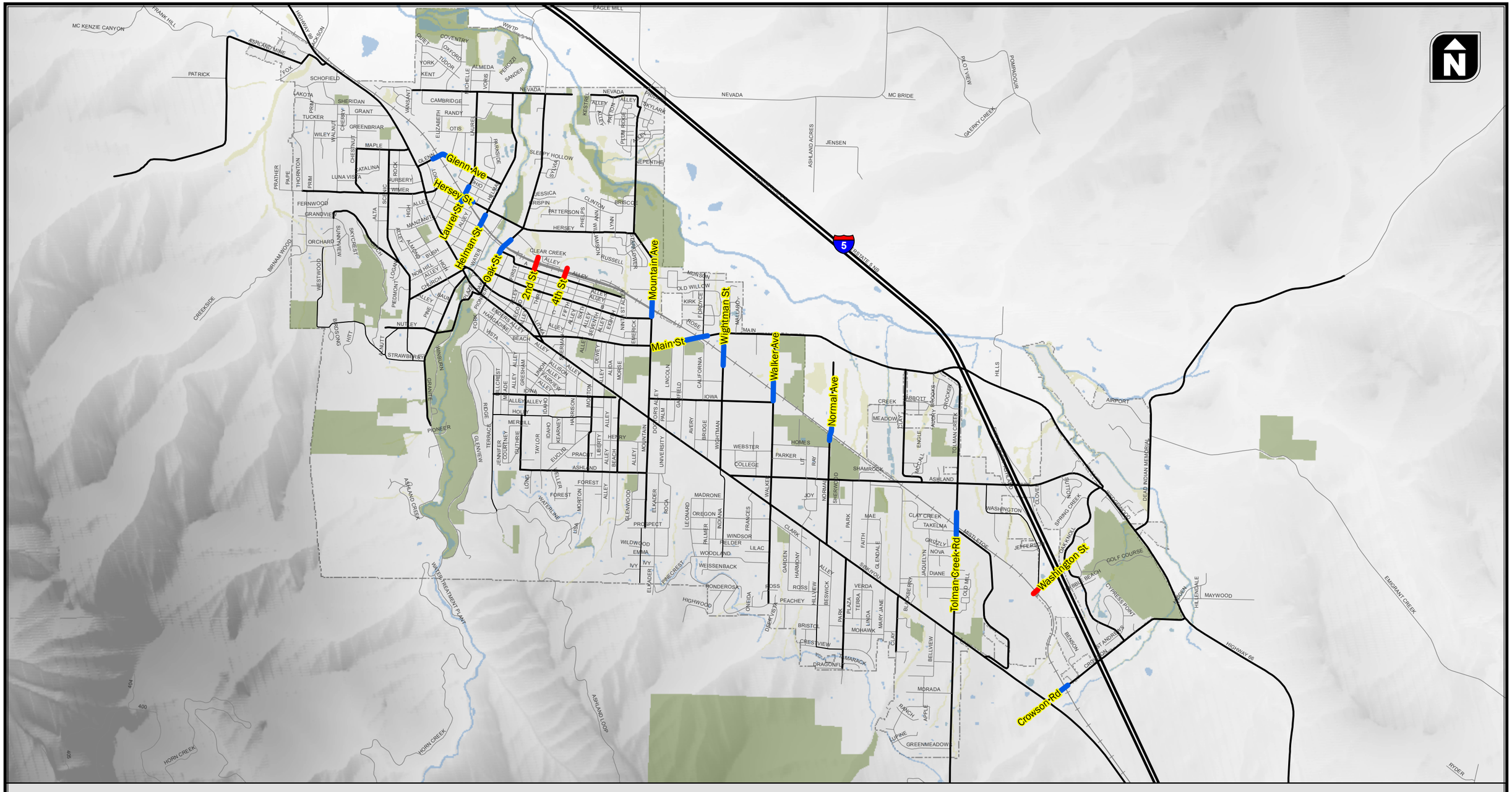
Crossing	Control Type
Glenn Street	Stop Sign
Laurel / Hersey	Stop Sign
Helman Street	Gate and Flashers
Oak Street	Flashers
Mountain Ave	Flashers
E Main Street	Gate and Flashers
Wightman Street	Stop Sign
Walker Street	Gate and Flashers
Normal Avenue	Uncontrolled
Tolman Creek Rd	Gate and Flashers
Crowson Road	Stop Sign

In 2007 staff brought forward a recommendation to Council to close the Glenn Street crossing to vehicular traffic (maintaining a pedestrian and bicycle crossing) and to upgrade the Laurel Street - Hersey Street crossing. Council resolved to maintain the Glenn Street crossing in its current form and to seek authority from ODOT to improve just the Laurel-Hersey Street crossing. To our knowledge, closure of the Wightman Street crossing has not been pursued at this time.

New/Upgraded Crossings

Potential future at-grade crossings, shown on Figure 1, have been proposed for:

- **4th Street**: as part of the Ashland Railroad Property Master Plan.
- **2nd Street**: a petition was recently received for this crossing as an alternative to 4th Street.
- **Washington Street**: right-of-way is preserved in the Croman Mill District Plan for a future crossing with redevelopment of the site.



Railroad Crossings

- Existing At-grade Crossing
- Potential At-grade Crossing

- Rivers
- Parks
- Wetlands
- City Limits

Existing and Potential Railroad Crossings

CITY OF ASHLAND

Figure 1

G:\10-056 Ashland TSP\MXD\Bikeway Gaps.mxd

- **Normal Avenue**: currently an uncontrolled rail crossing, the existing dirt road section north of the tracks is identified for improvement in the CIP/STIP and the previous TSP identifies the need for new railroad crossing arms and signals for this location.

The FHWA's *Guidance on Traffic Control Devices at Highway – Rail Grade Crossings* (2007) recommends that grade-separation be first considered for any new rail crossing and that "generally new grade crossings should not be permitted unless no other viable alternatives exist and, even in those instances, consideration should be given to closing one or more existing crossings".

A pedestrian and bicycle crossing at Lower Clay Street has also been discussed in the past to provide residents connections to the Ashland Street shopping area and YMCA. Informal paths and crossings currently exist in the area. Given the proximity of the Ashland Street (OR 66) overpass and the limitations on creating new crossings, the best solution may be to connect the Central Ashland Bike Path running adjacent the rail tracks underneath the overpass to the north side of the Ashland Street overpass structure via a series of switchback ramps or a spiral ramp. This location has not been considered as a potential crossing in the analysis below.

At-Grade Crossing Needs

Traffic Control

Crossing treatment should be determined from a detailed engineering study that considers vehicle/pedestrian/bicyclist traffic volumes; train speed and frequency; the width and geometry of the crossing, nearby land uses, sight distance, etc. An engineering study will also identify the physical controls required by both the railroad entity and the public roadway authority for each crossing type. These controls are necessary to create awareness of the crossing to both trains and crossing vehicles and pedestrians. The level of treatment is dependent on the volume of train traffic and/or vehicular traffic at the crossing. The current edition of the MUTCD provides guidance on placement of control devices in conjunction with OAR Chapter 741, Division 110.

Passive Controls are used to provide awareness of an at-grade crossing to drivers and pedestrians, regardless of the presence of a train. These are static features placed in advance of a crossing and/or immediately in front of a crossing. Such controls may include:

- Crossbuck/STOP sign assembly.
- Crossbuck/YIELD sign assembly.
- Railroad STOP sign (fixed rectangular sign).
- 24" wide Stop Bar, set back per Section 3B.16, MUTCD.
- Luminaires arranged around the rail crossing.

Active Controls are also used to provide awareness of an at-grade crossing, specifically to alert drivers and pedestrians to approaching trains. These are installed closest to the crossing location and activate only in the presence of an approaching train. Active controls may include:

- Flashing-Light Signal with audible warning device per Section 8D.02, MUTCD.
- Cantilevered Flashing-Light Signal with audible warning device per Section 8D.03, MUTCD.
- Pedestrian Flashing-Light Signal with audible warning and alternately flashing-12" diameter red lights.
- Automatic Gate per Section 8D.04, MUTCD.
- Traffic Signal Preemption Control per Section 8D.07, MUTCD.

For each at-grade crossing, appropriate stopping sight distance (SSD) must be maintained at all times in both directions for pedestrians and vehicles. Maintenance falls to both the railroad company and the public authority, dependant on ownership of right-of-way. Vegetation is a significant factor and Oregon Administrative Rules require that the railroad company control vegetation and manage train cars for a distance of 250-feet in each direction of the crossing so that view of oncoming trains is adequate. Along the roadway, the public authority is responsible for maintaining vegetation, building placement, and signage within the appropriate SSD. Appropriate SSD is provided in **Table 2**.

Table 2: Appropriate Stopping Sight Distance (7)

Vehicular Speed on Roadway	Safe Stopping Distance
15 mph	80 ft
20 mph	115 ft
25 mph	155 ft
30 mph	200 ft
35 mph	250 ft
40 mph	305 ft
45 mph	360 ft
50 mph	425 ft
55 mph	495 ft
60 mph	570 ft
65 mph	645 ft

Pedestrian and Cyclist Considerations

There are specific passive and active control devices that can be used to supplement highway-related control devices and enhance non-motorist safety. Passive devices include fencing; swing gates; pedestrian barriers; pavement markings and texturing; refuge areas; and fixed message signs (2). Active devices include flashers; audible active control devices; automated pedestrian gates; pedestrian signals; variable message signs; and blank-out signs (2).

There are a number of cross-section details that can contribute to cyclist safety at rail track crossings. A detail of a typical rail cross-section is shown on Figure 2. Track considerations include:

- **Angle of the crossing**: track crossings should ideally be provided at a 90-degree angle to the track. For crossings between 60- and 74-degrees, the crossing should be signed (see Figure 3) and/or the bike facility diverted to meet the track at a more appropriate angle. Crossing angles less than 59-degrees require an engineering study.
- **Width of the flangeway gap**: commercial products are available to fill these gaps. For low speed train operations, both flangeways can be filled. For high speed train operations the gauge flangeway, which carries the railcar's wheel flange, must be kept clear to a certain depth (see Figure 4).

- **Width of sidewalks**: all sidewalks at grade crossings shall be constructed to meet minimum standards, but shall not be less than five feet in width. The width of the sidewalk surface shall not be less than the width of the sidewalk approaches to the crossing.
- **Pavement unevenness**: surface level variations can damage bicycle wheels and cause crashes. Using concrete, rubberized, or blended crossing panels offers greater durability and traction than traditional asphalt or timber panels. Surface levels must also meet the Americans with Disabilities Act (ADA) that requires the path surface "to be level and flush with the rail top at the outer edge and between the rails, except for a maximum 2 ½ inch gap on the inner edge of each rail to permit safe passage of the train's wheel flanges" (3).

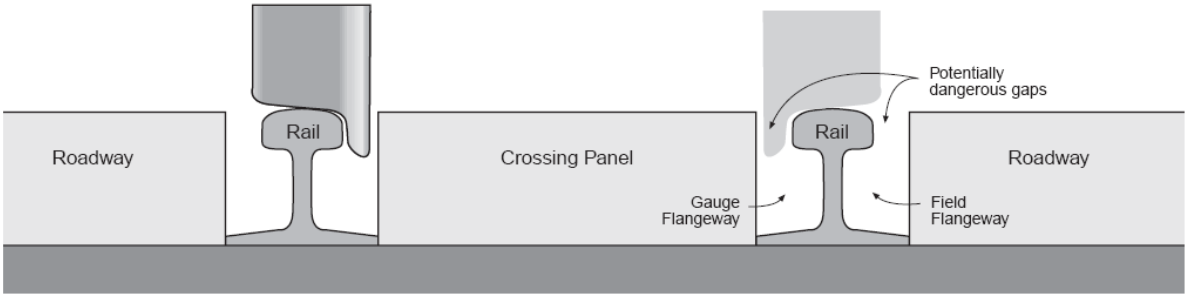


Figure 2: Typical Rail Crossing Cross-Section (3).

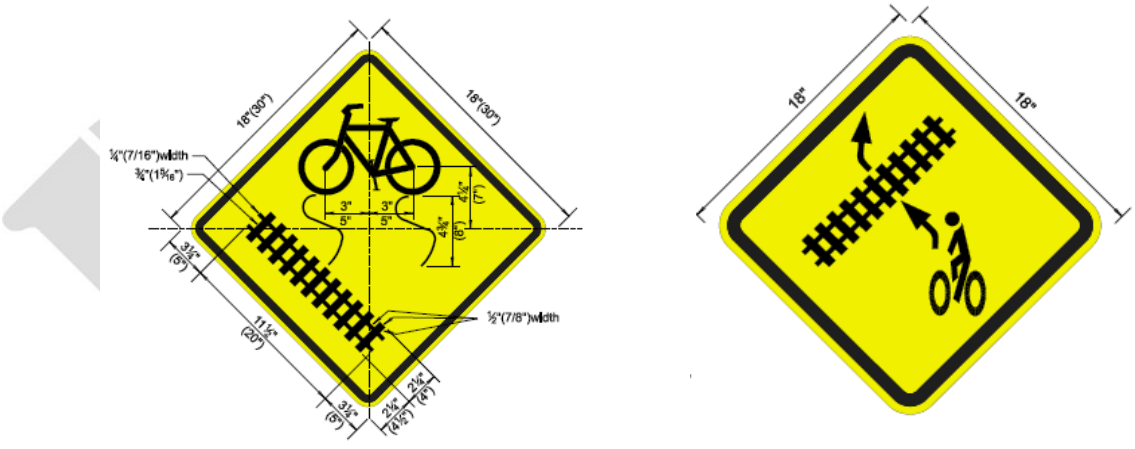


Figure 3: Rail Crossing Signage and Marking Examples.

Left: ODOT OBW8-20 Sign (4), Center: ODOT OBW8-19L Sign (4).

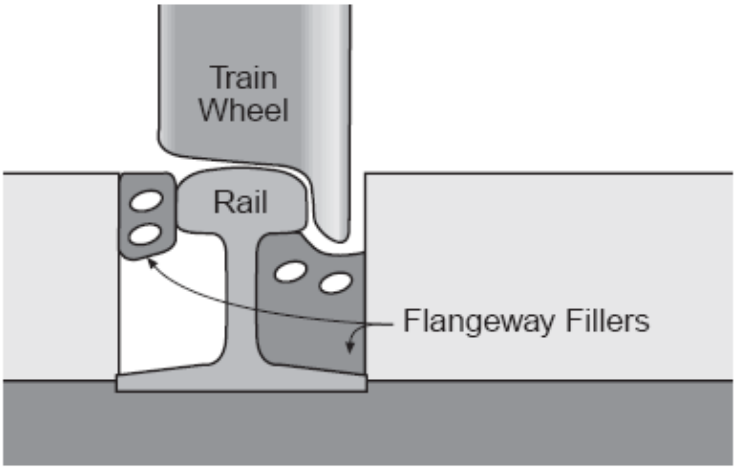


Figure 4: Flange Filler Treatment (3).

Grade Separated Crossing Needs

The vertical separation required at a roadway overcrossing is 20 feet, 9 inches from the bottom of the structure to the top of rail. Generally, an overcrossing requires a depth of structure of 4 feet or more, placing the top of roadway surface at approximately 25 feet above the top of rail. Depending on the number of tracks at the crossing, the horizontal length of an overcrossing can extend approximately 500 feet in each direction (for a 5% roadway grade); the width of the structure should match the width of the approach roadway. It is advantageous to identify overcrossings where the tracks are in a depressed area, thereby using the natural grade change on either side of the track to absorb the amount of crossing structure required. Protective features such as fencing, signage, or tall handrails are often required along the overcrossing directly over the tracks.

Figure 5: Footprint for Potential 4th Street Overcrossing.

Although an at-grade crossing has been identified as the preferred crossing form at 4th Street (as included in the updated Comprehensive Plan Transportation Plan Map in 2002 and the Railroad Property Master Plan), the footprint of a potential grade separated crossing at 4th Street has been illustrated in **Figure 5** and the grade change requirements in **Figure 6**.

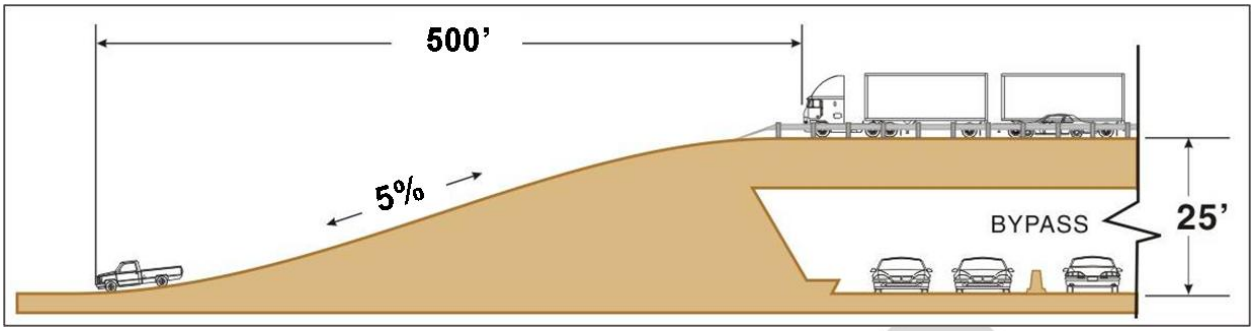


Figure 6: Grade Change Requirements for Rail Overcrossing.

Pedestrian and vehicular overcrossings are treated similarly. For ADA accessibility, the grade of the sidewalk (typically matching the grade of the roadway) must be 5% or less. In cases where this is not achievable, there are options for elevators or static pathways on each side of the crossing. Both options may require amenities to promote safety, such as handrails, lighting and/or CCTV. These should be a last resort – elevators are costly to construct, costly to maintain, and induce security concerns amongst many of the people that use them.

Figure 7: Example of a Pedestrian Overcrossing with Switchback Ramps in Portland, OR.

The footprint for a static pathway, consisting of a spiral concrete ramp structure or switchback style ramp structure (an example of which is shown in **Figure 7**), is often larger than that of an elevator. When installing a structure, the grade of the pedestrian pathway must be a constant 5% or up to 8.33% with landings every 30 feet. For a lower cost option, switchback style ramps can be graded into the landscape surrounding the overcrossing, reflecting a meandering sidewalk. Exceptions to ADA guidance can be made where the grade of the roadway and sidewalk match the grade of the land.

Underpass crossings are rarely considered for rail crossings unless there is a favorable elevation difference. Significant cost is involved in constructing a new railroad bridge as well as temporary structures to keep the train running during construction.

Permitting

All crossings of railroads that are open to the public and equipped with safety devices are regulated by the state Department of Transportation. This jurisdiction extends along the appropriate stopping sight distance within the public right-of-way on either side of the track(s). Oregon Administrative Rules Section 741, Divisions 20 - 710 apply to rail services in Oregon. A crossing application is required to construct, relocate, or alter a sidewalk, multi-use path or vehicular roadway crossing one or more tracks for either grade or grade separated crossings. Applications must be made by the railroad company or the public roadway authority.

The permitting for a crossing begins with a safety application. The application covers new construction or alteration of existing at grade and grade separated crossings. Upon submittal of the application, the ODOT Rail section reviews the application and draws up a crossing order. An order grants legal authority to construct or alter a public crossing. This document provides the details of the crossing, including:

- Purpose and need of the crossing location.
- Background of the crossing location, functional operations, geometry, proposed improvements.
- Establishment of a quiet zone, if applicable.
- Size, type, and location of safety devices: signage, striping, gates.
- Cost or reimbursement protocol of crossing improvements.

Crossing Blockage

During times of train congestion, railroad companies may slow or stop a train over a crossing. The time a crossing may be blocked is no longer a regulated element by the state rail section. Therefore, railroad companies are allowed to block a crossing for an unregulated length of time. Trains may not, however, cause a sight distance problem by parking or storing train cars within 250' of a crossing. While a railroad company may have the option to block a crossing for long periods of time, the chances are unlikely, as a number of motorists, residents, or community leaders would speak out against this type of activity.

Evaluation

An assessment of the need, convenience, safety, and cost of each of the potential future rail crossings as well as those identified for possible closure (i.e., the Wightman Street and Glenn Street crossings) is included in **Table 3**. This assessment does not remove the need for more detailed feasibility studies and cost estimates prior to a decision on these crossings.

At a system level, the one-for-one replacement policy requires an existing crossing to be closed in order to open a new crossing. An open crossing includes pedestrian / cyclist only crossings, which means that a crossing must be completely closed before a new one can be opened.

The Wightman crossing seems the most obvious candidate for closure given it is a minor crossing that is last on the City's list for improvements and is not far from Walker Street, which provides a nearby parallel route. This would allow the City to create a crossing at either 2nd Street, 4th Street, or Washington Street. Consideration would need to be given to the suitability and convenience of alternative crossings. Anecdotally, the Central Ashland Bike Path is a desirable off-street alternative for school children and removing a low stress connection to this facility on Wightman Street (north of the rail tracks) needs to be carefully considered.

The need for this crossing is somewhat dependent on future development in the Railroad Properties and the Croman Mill site, although there is public support for an additional connection from Hersey Street into downtown that expedites the need for a crossing at either 2nd Street or 4th Street. A crossing at 4th Street is preferred so as to achieve the best spacing between the existing crossings at Oak Street and Mountain Avenue. Prior to the development of the Railroad Properties, this would require extension of 4th Street north of the tracks to connect to Hersey Street.

In the future, if the City decides that an additional rail crossing at Washington Street is required for the Croman Mill site, another at-grade crossing will need to be closed or a grade-separated solution would need to be pursued at that time. Glenn Street is the next most likely candidate, which would require it to be completely closed. Downgrading to a pedestrian / bicycle only crossing would not be considered a one-for-one replacement, although a pedestrian / bicycle overpass may be allowable.

References

1. *City of Ashland Railroad Crossing Evaluation* (2004). HDR Inc.

2. *Guidance on Traffic Control Devices at Highway – Rail Grade Crossings* (2007). Federal Highway Administration.

3. *Wisconsin Bicycle Facility Design Handbook* (2004). Wisconsin Department of Transportation.

4. *Sign Policy and Guidelines – Chapter 8: Bicycle Signs* (2007). Oregon Department of Transportation.

5. Oregon Administrative Rules, Chapter 741: Rail Division.

6. Oregon Revised Statutes, Chapters 823 and 824.

7. A Policy on Geometric Design of Highways and Streets, AASHTO, 2001, Fourth Edition.

Table 3: Preliminary Evaluation of Possible Future Rail Crossings in Ashland, Oregon.

	Glenn Street	2nd Street	4th Street	Wightman Street	Normal Avenue	Washington Street
Discussion	Possible full closure or closure to automobile traffic.	Would provide connection between downtown and existing/future uses in the Railways District.	Would provide connection between downtown and existing/future uses in the Railways District.	Possible full closure.	Formalization of an existing crossing.	Would provide additional connection to Croman Mill District.
Public Necessity	Impact of traffic diversion to other streets – 980 vpd currently. Provides limited through function serving only a limited residential catchment.	Desire lines between existing land uses north of the tracks that anecdotally already observe significant pedestrian crossing activity.	High desire lines between Railroad Property and existing land uses north of the tracks.	Rated a "minor crossing" and ranked last on prioritized list of improvements prepared by City.	Connects few land uses, but would provide more reasonable crossing spacing.	This crossing may be necessary for pedestrian/cycling permeability – seems less necessary for vehicular traffic.
Next Nearest Crossings	Hersey - Laurel provides parallel route (approx. 1,150 feet east) with greater through connection.	Oak Street crossing: 900 feet west. Mountain Avenue crossing: 3,000 feet east.	Oak Street crossing: 1,650 feet west. Mountain Avenue crossing: 2,250 feet east.	Main Street crossing: 775 feet west. Walker Avenue crossing: 1,500 feet east.	Walker Ave crossing: 1,725 feet west. Tolman Creek Road crossing: 3,750 feet east.	Tolman Creek Road crossing: approx. 2,500 feet west.
Connectivity	Northernmost rail crossing. Connects only a limited residential catchment to Main Street. Nearby Laurel Street provides connection for through traffic.	2nd Street connects more centrally to downtown than 4th Street.	4th Street provides a more central connection to the Railroads Property and better spacing of rail crossings than 2nd Street.	Connects few large generators. Direct connection to the Central Ashland Path for residents north of the track. Main St and Walker Ave are nearby alternatives.	Would provide for more regular crossing spacing. Few existing land uses would benefit from connection. Future development potential would be improved.	Pedestrian and bicycle connectivity important. Vehicular connection may alleviate boulevards traffic by connecting to commercial uses east of rail line.

Table 3 (cont.): Preliminary Evaluation of Possible Future Rail Crossings in Ashland, Oregon.

	Glenn Street	2nd Street	4th Street	Wightman Street	Normal Avenue	Washington Street
Safety	Upgrade would include active protection for pedestrians/bikes.	High volumes of pedestrians and cyclists likely. Grade separation would provide highest level of safety. Active control minimum.	High volumes of pedestrians and cyclists likely. Grade separation would provide highest level of safety. Active control minimum.	Low volume crossing – lowest on the City's list for improvements to active crossing standards.	Low volume crossing – likely warrants only passive control. This may be counter to ODOT rail policy.	Medium volume of peds/cyclists, low-medium traffic potential. Active control at a minimum.
Cost						
At-Grade	$800,000 [1]		$990,000 [2]	$800,000 [1]	$370,000 [3]	$680,000 [4]
Grade Separated	n/a	$7.6 million [5]	$7.6 million [5]	n/a	n/a	$4.6 million [5]
Preliminary Assessment*	This crossing could be maintained until a future crossing is required (e.g. Washington Street). Investigate with ODOT's Rail Division the possibility of maintaining this as a pedestrian/bicycle crossing without the need for one-for-one replacement or as a pedestrian overpass or underpass.	Pursue a new crossing at 4th Street rather than 2nd Street. 4th Street provides better crossing spacing and a central location for the Railways Property.	Pursue a new crossing at 4th Street. Appears to be demand for a pedestrian/bicycle crossing prior to redevelopment. Requires connection north of the tracks to Hersey Street. Consider long term traffic closure even with redevelopment. Assessment of at-grade or grade-separated is required.	Close this crossing to pursue a new crossing. This is a minor crossing with nearby alternatives along Main Street and Walker Avenue.	Upgrade existing dirt road crossing to active at-grade standards as funds and opportunities allow.	Consider need and timing for this crossing upon redevelopment of Croman Mill District. Further study is required to determine if a vehicular crossing is warranted at this location and its impacts on local traffic patterns. This crossing would require closure of a second crossing.

Notes on Table 3:

[1] Based on a conceptual cost estimate of $692,000 included in the 2004 HDR *Railroad Crossing Evaluation* inflated to 2010 dollars.

[2] Includes an at-grade signal and 600 feet of street extension work (40' wide) as well as a 30% contingency.

[3] Includes an at-grade signal and a 30% contingency.

[4] Includes an at-grade signal and 300 feet of street construction (40' wide) as well as a 30% contingency.

[5] Includes up to 500 feet of street improvements on each side of crossing, retaining walls either side to support and enclose the rising of the street to bridge level, cost of bridge structure, general allowance for property impacts and right-of-way acquisition.

***** More detailed studies of all crossing locations are required to determine need and feasibility.