

Central Oregon Area Commission on Transportation (COACT)

REPORT on
CENTRAL OREGON RAIL PLANNING
November 2009

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ACRONYMNS

BLM – Bureau of Land Management
BNSF - Burlington Northern Santa Fe Railway
BTC – The Oregon Army National Guard’s Biak Training Center
COACT - Central Oregon Area Commission on Transportation
COIC – Central Oregon Intergovernmental Council
COPR – City of Prineville Railway
CORERT – Central Oregon Regional Economic Revitalization Team
DLCD – Department of Land Conservation and Development
DSL – Department of State Lands
EDCO – Economic Development for Central Oregon
ODFW – Oregon Department of Fish and Wildlife
ODOT - Oregon Department of Transportation, including the Rail Division, and Region 4 of the Highway Division
PMT - Project Management Team
ROW – Right-of-Way (i.e., transportation property)
SOW - Statement of Work
TAC - Technical Advisory Committee (for COACT)
TM - Technical Memo
TSP - Transportation System Plan
UP - Union Pacific Railway

CENTRAL OREGON RAIL PLANNING

November 2009

EXECUTIVE SUMMARY

This is a report of multi-agency (*Rail Team*) technical work and stakeholder involvement conducted between 2007 and 2009 to address various rail related safety, congestion, freight mobility, and economic development issues for Central Oregon. The report contains findings and recommendations summarized as follows:

Relocating BNSF Line to the East of Bend and Redmond:

The Rail Team recommended to COACT in 2008 that, based primarily on the cost data, neither of the relocation alternatives were feasible and should not be considered for further study. The COACT members concurred with this recommendation.

Existing At-Grade Railroad Crossings

Goals, objectives, and recommendations are provided for improving or eliminating all public at-grade crossings for the Burlington Northern Santa Fe (BNSF) and City of Prineville (COPR) railways, including decision-making tools and implementation strategies. The following are the recommended high priority locations (listed from north to south) for bridging existing at-grade crossings as of 2009:

- *BNSF Line / Belmont Lane & Bear Drive* (Jefferson County/Madras), ~\$4M
- *BNSF/COPR Lines (Prineville Jct)/O'Neil Highway* (Deschutes County/Redmond), ~\$18M
- *BNSF Line / Airport Way* (Deschutes County/Redmond), ~\$14M
- *BNSF Line / Cooley Road* (Deschutes County/Bend), ~\$24M
- *BNSF Line / Reed Market Road* (Deschutes County/Bend), ~\$18M
- *BNSF Line / Baker Road* (Deschutes County/Bend), ~\$36M
- *BNSF Line / US 97* (Deschutes County/La Pine), ~\$31M

Freight Mobility and Rail Service

Goals, objectives, and recommendations are provided for improving, enhancing, and sustaining freight mobility by use of rail services for all of Central Oregon. The key finding and recommendation is that Central Oregon needs to make strategic investments to avoid eventual loss of rail service by the Class 1 haulers, and the significant economic and livability impacts this would have on all of the communities here. Recommended implementation strategies include:

- Take advantage of and maximize opportunities with the area's shortline railroad, COPR, including industrial sites along the line, and freight terminal options such as at the Prineville Freight Depot and at the COPR interchange with BNSF at *Prineville Junction*.
- For on the Class 1 unit train operating model, for example by siting only unit train industries and ensure adequate on- and off-site support track along the BNSF mainline, and seek or create compatible (critical mass cargo) markets.
- Seek agreement by shippers in Central Oregon to use a single designated intermodal complex.

Passenger Rail Service

A discussion and recommendations are provided on future work to explore the feasibility of passenger or commuter rail in Central Oregon, including factors to consider, and coordination with an upcoming study of Central Oregon public transportation by the Central Oregon Intergovernmental Council (COIC).

Summary Recommendations

Over-arching decision-making and implementation strategies are recommended, including:

- Development of a multi-party agreement to provide a regional approach for partnerships on crossing improvements and priority needs, infrastructure development for rail-served industries, mainline expansion, and potentially passenger rail.
- Consideration and further evaluation of potential impacts, benefits, opportunities, and timing of a continuous second track on the BNSF line through Central Oregon.
- Use of this report by local jurisdictions for Comprehensive Plan and Transportation System Plan amendments.
- Other follow-up stakeholder involvement opportunities.

PURPOSE

The purpose of the Central Oregon Rail Planning effort was to develop a common *regional* strategy for Crook, Jefferson, and Deschutes counties to address various safety and congestion issues associated with roadway / railway *at-grade* crossings, and to enhance freight mobility.

The Central Oregon Area Commission on Transportation (COACT) initiated and sponsored the effort. COACT is made up of local and state agencies and transportation stakeholders within the three counties. COACT established a working group to lead this study, the COACT Rail Committed (aka, *Rail Team*), made up of representatives from the Oregon Department of Transportation (ODOT) Region 4 and Rail Division, Deschutes County, Jefferson County, the cities of Redmond, Bend, Madras and La Pine, the City of Prineville Railway, Economic Development for Central Oregon (EDCO), and the Oregon Department of Land Conservation and Development (DLCD).

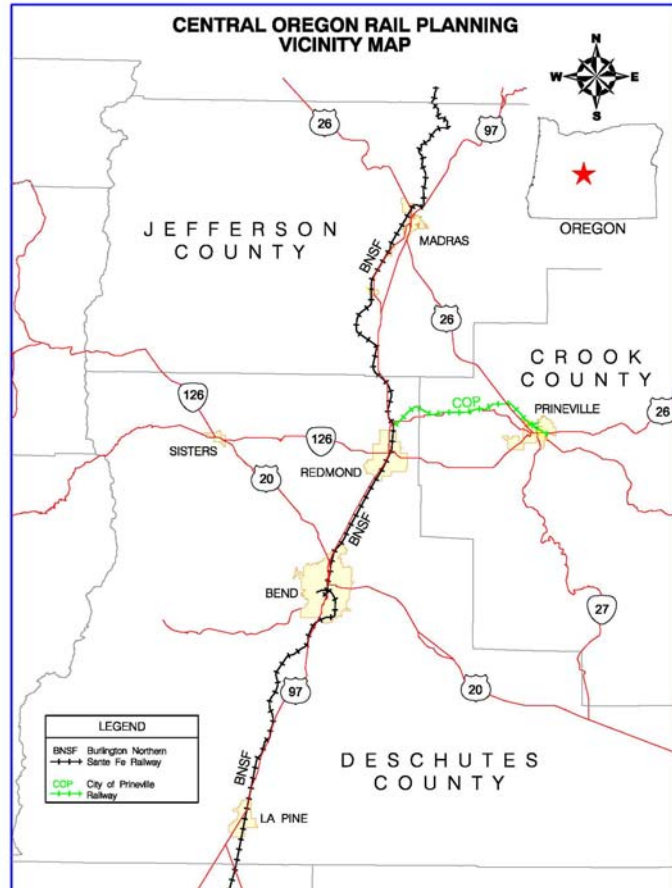
NEED

From the COACT perspective, two general rail-related subject areas needed to be addressed in this planning effort. As with many areas around the country, both subject areas reflect quality of life needs and the compatibility of railways with surrounding communities.

Rail Crossings

The first subject is about the location of the railway lines within communities, and the associated public *at-grade* roadway crossing safety and congestion issues. The Burlington Northern Santa Fe (BNSF) railway runs north-south through Madras, Redmond, and Bend. Given the rising volumes of rail traffic and the expanding lengths of trains, the railway with limited number of bridge crossings is, in effect, a barrier to east-west travel for motor vehicles, bicyclists and pedestrians. Finally, the combination of increasing rail and roadway traffic poses an increase in safety hazards for at-grade crossings (inherently unsafe even in low volume conditions).

The rapid population growth in Central Oregon communities has heightened the issue by funneling high traffic volumes at roadway / railway crossings. Most of the crossings do not have bridges to separate rail travel from community travel, and it is at many of these locations where significant safety and congestion issues have developed and will continue to grow. An at-grade crossing with high volumes of road or pathway traffic also creates operational inefficiencies and



safety issues for BNSF. The issue is exacerbated where communities need to expand their roadway and pathway systems across the railway, given bridge crossings are costly or infeasible and new or expanded at-grade crossings are not desirable. Other rapidly growing Central Oregon communities and rural sections face similar challenges with at-grade crossings, notably in the Culver area.

Freight Mobility

The second subject is about economics, preserving and enhancing rail freight mobility. The jurisdictions in Central Oregon have recognized a significant economic issue associated with freight rail service to the area. The operating model for both BNSF and the Union Pacific railway (UP, which has access rights to the BNSF line in Central Oregon) has been undergoing significant change, where they are seeking increased velocity on tracks, thereby improving capacity by transitioning to *hook and haul* operations. They are moving away from switching on the mainline toward moving *unit trains* consisting of 100 or more cars of a single commodity from one major hub to another. This means, for example, that BNSF and UP will no longer automatically provide existing or new service, nor allow a physical connection to be built onto their mainline.

Simultaneously, with the growth in Central Oregon an increasing number of companies located in Portland and the Willamette Valley are servicing customers in Central Oregon by daily truck freight deliveries. Central Oregon has seen a dramatic increase in truck freight traffic, and it is becoming a significant matter for economics and quality of life, from the rising price of fuel to road congestion and maintenance to safety. Therefore the trend of more trucked freight to Central Oregon, and the trend of less and less opportunities for freight rail service are both creating a significant issue for the area.

Rail Crossings and Freight Mobility

Both of these subject areas are very much related to each other, as illustrated by these example scenarios raised by the COACT membership:

- As long haul rail traffic grows, trains will affect traffic congestion at roadway crossings, impacting functions such emergency service response times and truck freight deliveries.
- The BNSF line in Central Oregon is currently not used for passenger rail, and there is interest among COACT members on the feasibility of passenger rail including the relationship to freight mobility and rail capacity.
- There are serious challenges in providing adequate access to regional facilities such as the Deschutes County Fairgrounds, the Redmond Airport, large employment areas, and other potential regional facilities.
- There is concern about the potential for hazardous material incidents in highly urbanized and/or environmentally sensitive areas.
- Both reduced access to rail freight and the conflicting rail / roadway traffic (priority dictated by the railway) makes Central Oregon less attractive for certain types of new and existing businesses.

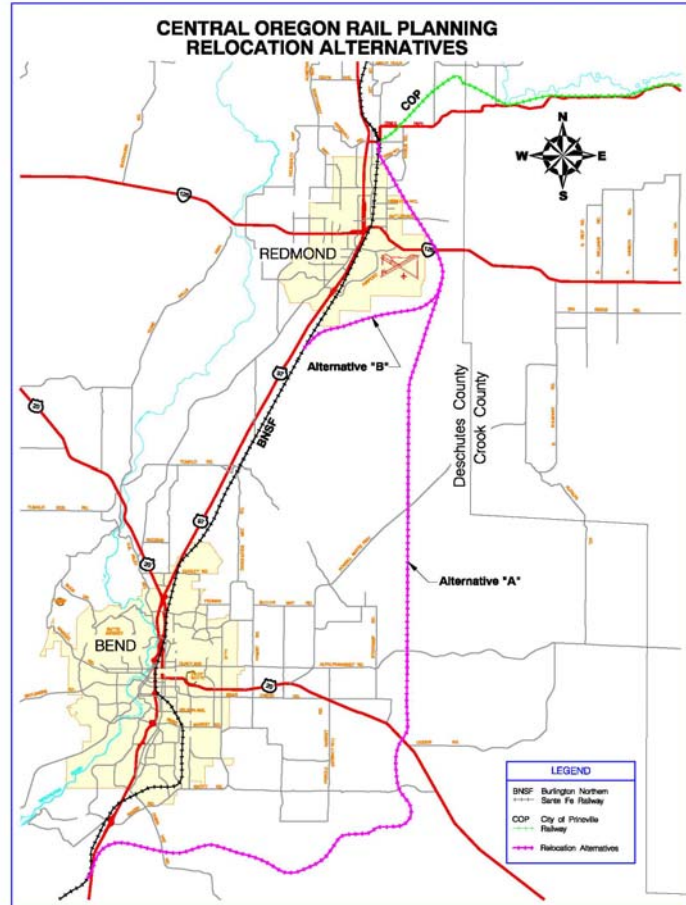
FINDINGS & RECOMMENDATIONS

1. Relocating BNSF Line to the East of Bend and Redmond

In addressing the needs and interests surrounding at-grade crossings, freight mobility, and even passenger rail in Central Oregon, there was a primary question to address which would ultimately affect all other findings and recommendations of this planning effort: *What is the feasibility of relocating the BNSF line to the east of Bend and Redmond?*

This was based on the potential assumed benefits of:

- Reduced traffic congestion and generally improved public safety in the urban areas (no more at-grade crossings with BNSF),
- Opportunities for improved rail service and operations (including benefits for BNSF and UP, or potential uses of abandoned BNSF line), and
- Eliminating the long-term costs that would come with the high priority needs of bridging or closing existing crossings;
- Lower/affordable land values and construction costs on a new alignment in a non-urban area.



The premise to address was how these benefits might be used to help justify and raise the *up-front* capital costs of relocation, as well as the environmental and other impacts of relocation.

Two relocation alternatives were developed and evaluated for feasibility: Alternative A - Relocate the BNSF railway east of both Bend and Redmond, and Alternative B - Relocate the BNSF railway to the east of Redmond only.

For feasibility comparison, an alternative was developed that made improvements along the existing BNSF line (where the line would otherwise be abandoned by BNSF). In other words, the assumption was that feasibility could not only be measured by the cost-effectiveness and

related issues of realignment, but also by other means of addressing primarily the at-grade roadway / railway crossing needs, and second, the freight mobility needs.

In order to establish an *apples-to-apples* comparison of the relocation versus the existing BNSF line in manageable terms, it was assumed for the long-term that any BNSF alignment would be free of at-grade railway / roadway crossings. It was further assumed for cost-effectiveness purposes that the relocation alternatives would be constructed free of at-grade crossings (e.g., with bridge crossings).

Findings of the relocation feasibility evaluation:

Appendix A - Rail Crossing Scoping Report, prepared by David Evans & Associates for the Rail Team, contains information on the track and crossing cost estimates for the [Alternative A](#) and [Alternative B](#) alignments. It also contains recommendations and costs estimates for eliminating existing BNSF at-grade crossings (this is further described in the next section *Existing At-Grade Crossings*). An [interactive map](#) is available on the Internet that shows the alternative alignments and provides crossing information.

Cost Feasibility

Cost feasibility became the primary evaluation factor, both in terms of the high up-front capital cost requirements for relocation as well as the comparison of at-grade improvement costs for the existing alignment.

Alternatives	Construction Cost (M)	Right of Way Cost (M)	Total Cost (M)
Relocate railroad east around Bend and Redmond	\$607	\$10	\$617
Grade-separate existing at-grade crossings, from south of Bend and to north of Redmond	\$313	\$73	\$386
Relocate railroad east around Redmond	\$169	\$7	\$176
Grade-separate existing at-grade crossing in Redmond	\$160	\$22	\$182

Note the cost estimates do not include:

- Utility impact/relocation costs for any of the above.
- Environmental mitigation costs (e.g., wetlands, historical resources) for any of the above.
- Cost to purchase existing BNSF right-of-way, for relocation alternatives (See *socio-economics* below)
- Additional costs to avoid County property impacts northeast of Redmond, for relocation alternatives

The importance of this cost comparison goes beyond the financial feasibility of such high *price tags* for each. The relocation alternatives require essentially all of the improvements to be made and paid for *up-front*, before a new alignment can be used and before any potential benefits can be realized. This justification *problem* for relocation is compounded by the fact that there are benefit and impact trade-offs, when compared with the alternative of making phased or incremental improvements to the existing line over the long-term (per below discussion points).

Other points of consideration for all alternatives included:

Crossing Safety

The potential for crashes at existing crossings. This generally favored the relocation alternatives, when assuming a single construction effort which would be grade-crossing free. Improvements to *existing* would take many years to resolve all crossing safety issues.

Public Safety

The potential for derailment/hazardous materials, and the impacts and benefits for emergency services (closings, blockages, etc). This favored the relocation alternatives by removing the potential for derailment outside of urban areas, and by grade-separating all crossings that would eliminate delays in responses by emergency services due to blockages at crossings.

Planned/Proposed New Crossings of roads or streets across the rail line

This is tied to the relationship of restrictions on new crossings and/or crossing widening (traffic congestion and safety, access to key land uses such as industrial/airports, etc.). An example is the future phases of the US 97 Reroute in Redmond. This favored the relocation alternatives.

Rural Roadways

Rural roadway route continuity and circulation effects. Because of the segregation a new realignment would create, this favored staying with the existing alignment alternative.

Socio-Economics

With the relocation alternatives, what might be the economic opportunities and/or impacts (for example, the cost of congestion), including existing customers (for example, industrial businesses along the rail line), freight mobility enhancements or impacts, potential redevelopment benefits and costs of existing rail line and right-of-way (for example, multi-modal benefits, potential revenue generators, etc.). Considerations included:

- Determining who would own the right of way of the existing BNSF railway if it were relocated to the east of Bend and/or Redmond.
- Socio-economic impacts (from an environmental perspective) of a new alignment would be significant, including the potential impacts to existing businesses which currently use the existing railroad alignment.
- Potential benefits of converting the existing railroad alignment to other multi-modal uses are to be described.

Generally speaking, the only conclusions during Rail Team discussion was that there would be countering trade-offs on the subject, between the relocation alternatives and staying with existing alignment.

Environment

Environmental impacts and feasibility (including emissions, neighborhoods, noise, wildlife, etc.), livability opportunities and/or impacts (for example, urban sprawl, noise, etc.). This favored staying with the existing alignment, giving for example:

- The relocated railway runs through two Oregon Department of Fish and Wildlife (ODFW) management units, Paulina (Unit 35) and Grizzly (Unit 38).

- The proposed alignment is located mostly on public lands managed by the Bureau of Land Management and the Forest Service. Both agencies have procedural requirements for acquiring public lands for this sort of project.

BNSF/UP

Railroad company benefits and costs, including safety, operating efficiencies, net value to share holders were considered. There appeared to be pros and cons which reflected trade-offs for relocation versus working within existing.

Land Use

These considerations general favored staying with the *existing* alignment:

- Implications for current and planned zoning were mentioned as something to consider.
- The proposed relocation alignment is located within or very close to the Redmond Airport runway protection zone. This would need to be verified and adjustment made, if necessary.
- The Oregon Army National Guard operates the Biak Training Center (BTC) located southeast of the Redmond Airport. The BTC consists of approximately 44,000 acres of federal lands managed by the Bureau of Land Management. The proposed alignment would go through the BTC.
- Although much of the land is under public ownership, there are private lands that would be impacted. Much of the land has had little development. At least one residential development in the Redmond area could be impacted.

Recommendation

The Rail Team recommended to COACT in 2008 that, based primarily on the cost data, neither of the relocation alternatives were feasible and should not be considered for further study. The COACT members concurred with this recommendation.

Therefore, the remainder of this report is based on findings, opportunities, priorities, and recommendations to work within the existing BNSF corridor.

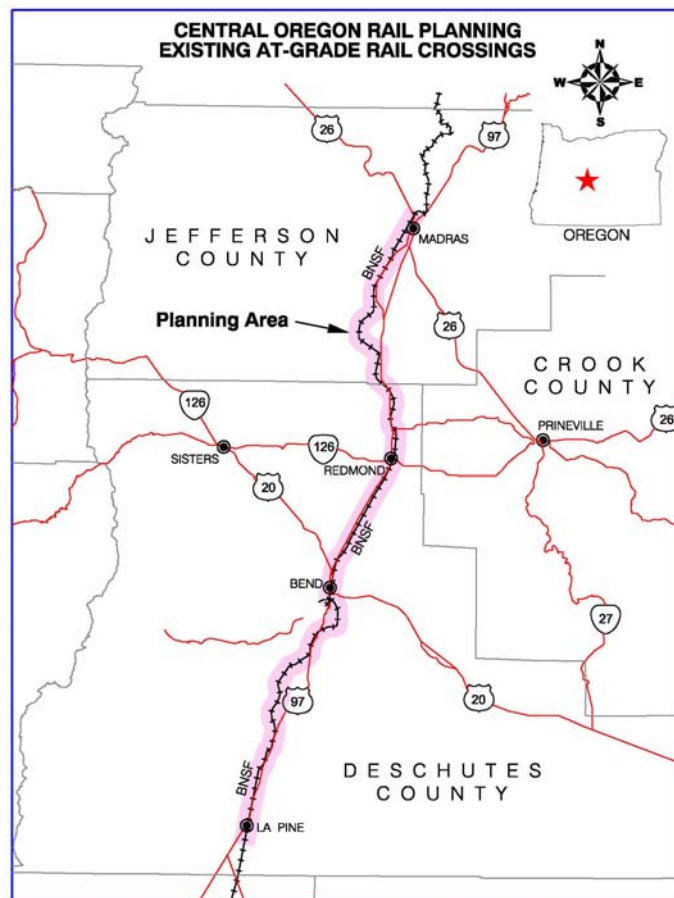
2. Existing At-Grade Rail Crossings

Goals & Objectives

As explained above in the *Need* section the increased traffic in the Central Oregon's rail and roadway systems results in growing safety concerns, travel delays, decreased mobility and adverse affects to the economy and overall quality of life. The ODOT Rail Division's Rail Safety programs and technologies have served to reduce incidents and crashes for at-grade crossings. Yet, given the rapid growth here, more must be done to improve crossing safety wherever possible, and to improve on the full range of other crossing-related economic and quality of life issues.

The long-term vision to resolve this issue would be to eliminate the at-grade crossings, either by bridge crossings or by closures. Particularly in the more developed areas, the high cost associated with this vision will make it challenging to implement, particularly in the shorter term (20 years) versus the longer term (50-70 years).

Therefore, the Goal is to uphold this ideal vision by continuously reducing the number of at-grade crossings, with emphasis on the highest priority bridge crossing needs and phases first. The complementary strategy is to seek opportunities for incremental improvements at existing crossings, and find mutual opportunities to improve or eliminate any at-grade crossing. This strategy would also apply when addressing other rail related issues (including freight mobility) or developing other nearby transportation system improvements for any mode.



Recommended standing Objectives to address needs associated with at-grade roadway / railway crossings for Central Oregon rail planning and implementation are as follows (see [Central Oregon Rail Crossings Table](#)):

1. *Bridge Crossings*. Complete five (5) of the proposed Highest Priority bridge crossings within 20 years.
2. *Closures*. Complete seven (7) of the proposed crossing closures within 20 years.

3. *Upgrades.* Complete eight (8) proposed interim upgrades (e.g., gates, lights) within 5 years.
4. *New Crossings.* Resolve all short-term and long-term decisions and/or complete plans for the five (5) new proposed crossing locations in Redmond and Bend, within 3 years. Quartz Avenue in Redmond would be the only new at-grade crossing for an interim period of time.
5. *Incidents.* Continuously decrease the potential for crossing-related incidents and crashes, through all potential methods including technologies, and for all modes of travel.
6. *Congestion.* Continuously improve on crossing-related traffic congestion issues, including land-use related impacts, through all potential methods including technologies and policies, and for all modes.
7. *Emergency Services.* Continuously improve on crossing-related emergency service response time issues, through all potential methods including technologies and policies.
8. *Freight Mobility.* Continuously seek opportunities to align at-grade rail crossing needs with freight mobility needs, for either or both rail- and truck- serviced industrial lands.

Framework for Evaluating & Prioritizing Rail Crossing Needs

This report establishes a framework through which railway / roadway crossings can be evaluated and tracked for status and range of improvement strategies and priorities. Findings currently (and should continuously) reflect key stakeholder involvement, such as public agencies, railways, cities and counties, emergency services, economic development advocates, etc. See the [Central Oregon Rail Crossings Table](#), a complete rail crossing inventory spreadsheet with rankings and status. The table includes one section each for:

- Existing public at-grade crossings on the BNSF mainline (41)
- New proposed crossings on the BNSF mainline (5, only 1 would be at-grade for an interim period of time)
- Existing public at-grade crossings on the COPR mainline (15)
- Existing grade separated crossings on the BNSF mainline (15)
- Existing at-grade crossings on BNSF spurs (5)

The focus of evaluation was for the 41 existing at-grade crossings on the BNSF mainline. Appendix A - Rail Crossings Scoping Report contains detailed scoping summaries of proposed *solutions* (bridge crossings or closures) and cost estimates for each. The appendix breaks out the existing at-grade crossings into four geographic areas: [southern Jefferson County](#), [northern Deschutes County](#), [central Deschutes County](#), and [southern Deschutes County](#). Also an interactive map with data and photos for these at-grade crossings on the BNSF mainline is available on the Internet at the following web address: http://www.odot.state.or.us/GIS_Maps/

A series of considerations (including safety, emergency services, traffic congestion, economic opportunities, local jurisdiction priorities, railway company needs, land use / environmental, road classification, cost, and phasing / financing) were identified to assist in developing an initial prioritized list of at-grade rail crossings shown on the [Central Oregon Rail Crossings Table](#). The rankings of high, medium, and low take (and should continuously take) into account other considerations and understanding of context, beyond the sum of assigned *scores* in each category. The individual and summary scores are meaningful in terms of assessing stakeholder

and subject matter perspectives, and in terms of supporting the decision-making discussion among the COACT membership.

The criteria and process, as described in the [Appendix B Rail Crossing Evaluation Process](#) document, should be used as the ongoing methodology for future crossing priority decisions. Also the starting point of these recommendations is that the highest-priority crossing locations should be considered for further development in the near term, with a recognition that priorities will change over time. The following are the recommended high priority locations (listed from north to south) for bridging existing at-grade crossings as of 2009:

- *BNSF Line / Belmont Lane & Bear Drive* (Jefferson County/Madras), ~\$4M
- *BNSF/COPR Lines (Prineville Jct)/O'Neil Highway* (Deschutes County/Redmond), ~\$18M
- *BNSF Line / Airport Way* (Deschutes County/Redmond), ~\$14M
- *BNSF Line / Cooley Road* (Deschutes County/Bend), ~\$24M
- *BNSF Line / Reed Market Road* (Deschutes County/Bend), ~\$18M
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- *BNSF Line / US 97* (Deschutes County/La Pine), ~\$31M

Implementation

The following are recommended decision-making and implementation strategies to achieve the at-grade crossing Goals and Objectives (unless stated otherwise, the lead responsibility for follow-up falls to staff for the jurisdiction who has authority for the road/street/highway crossing, the ODOT Area Manager and ODOT Rail Safety Manager will provide assistance and coordination as needed, and at minimum an update report will be provided on these items to COACT in the Fall of each year*):

1. Begin or continue project development on the high priority crossings shown on [Central Oregon Rail Crossings Table](#). At the same time seek funding and partnerships for construction, and identify *protective* right-of-way purchases.
2. Seek mutual opportunities and partnerships to eliminate or improve any at-grade crossing when addressing other nearby related issues (development or expansion of regional facilities such as fairgrounds, airports and large industrial sites, etc.), or developing other transportation system improvements (for any mode including rail, roadway, bicycle/pedestrian, public transportation, etc).
3. Focus decision-making and funding priorities (for at-grade crossing improvements) on multi-stakeholder benefits, beyond public safety and roadway traffic congestion, such as: rail freight mobility and industrial business recruitment (rail-served), short and long term issues with freight trucking (e.g., fuel costs, roadway impacts), rail operational needs, etc.
4. Update applicable City and County Transportation System Plans (TSP's) to reflect the above *Goals and Objectives*, the above (6) implementation strategies, and the current rail crossing priorities on the [Central Oregon Rail Crossings Table](#). *City or County Planning staff.

5. Provide input on the current statewide Rail Planning effort, to reflect the above *Goals and Objectives*, the above (6) implementation strategies, and the current rail crossing priorities on the [Central Oregon Rail Crossings Table](#). *Lead responsibility falls to ODOT staff.
6. Quartz Avenue in Redmond. In 1996, the City of Redmond closed an existing at-grade crossing at Odem Medo Avenue, with their understanding that in exchange there was support from BNSF and the ODOT Rail Division for installation of a new at-grade crossing at Quartz Avenue in the future to accommodate growth needs in the airport area. The City's TSP identifies Quartz Avenue as a collector roadway. This is the only currently known location within the BNSF mainline corridor in Central Oregon where a local jurisdiction is seeking a new, interim at-grade crossing. Although from the City's perspective it appeared they were amenable to the Quartz Avenue crossing in 1996, BNSF and the ODOT Rail Division have since stated opposition to this or any new at-grade crossings within the corridor. This issue needs to be addressed immediately, starting with resolution of these areas:
 - The road network needs expansion, including benefit to the state highway system.
 - Design, access, land use impacts, and cost feasibility create major issues for initially constructing a grade separation.
 - The COACT Rail Team supports a specific incremental strategy (proposed interim at-grade crossing), which includes evaluating and completing long-term design for grade-separation (including consideration of BNSF rail alignment *shift* to the east), finance plan for grade-separation, and closure/grade separation of at least one existing and comparable (e.g., similar traffic volumes) at-grade crossing within the corridor.

3. Freight Mobility and Rail Service

Goals & Objectives

As explained above in the *Need* section of this report, the change of operating model for BNSF and UP railways will continue to affect the economics of Central Oregon. The *unit train, hook & haul* model ultimately has the potential to completely isolate all of our communities from rail service. This is significant, given 2009 is a time when the area is facing devastating unemployment rates, and maintaining and enhancing freight service is a critical economic development and quality of life necessity.

The ideal vision for Central Oregon is to improve, enhance, and sustain freight mobility by use of rail services. However, given the changing model and trends of BNSF and UP, there is not a simple solution given our current situation of individual shippers (with individual commodities) located on the mainline.

Therefore, the primary recommended Goal for the jurisdictions of Central Oregon is twofold. One, maximize the existing rail network and two, develop large land parcels for rail served industries. By performing these two actions the region can collectively offset or even reverse the trend of loss in rail service.

Recommended standing Objectives to address the freight mobility needs for Central Oregon rail planning and implementation are as follows:

- Offset the trend of growing truck freight to and from Central Oregon, and reduce the associated cost impacts, both in terms of the cost to consumers and providers, and in terms of the costs for the road system (maintaining and improving roads, traveler delay costs, etc.).
- Maximize opportunities to improve freight mobility through the COPR line and operations, including direct operational services they may be able to provide to BNSF and UP.
- Prioritize industrial land development in places where *unit trains* can be created and enough market generated to meet the *hook and haul* model.
- Work continuously to eliminate at-grade crossings on the BNSF which compromise rail supported infrastructure.
- Work to achieve these above objectives so rail freight service options can be used a positive asset in attracting new and retaining existing industrial businesses.

Findings

[*Appendix C Study of Economic Opportunities / Rail Access Land Supply in Central Oregon*](#) was completed by Tangent Services, to address the needs and opportunities defined for the rail planning effort around freight mobility. Specifically, Tangent's research assisted the Rail Team and the COACT Membership in better understanding the region's railways (operations, infrastructure, facilities), how they are an asset, and how they fit in with the region's other transportation systems and land uses. The findings included details regarding 1) operations and motivations of the railroads which serve Central Oregon, 2) condition of existing infrastructure

and additional infrastructure needed to support industrial development, and 3) land site configuration and locations best suited for rail-dependent industries.

The following is a summary of findings summarized & paraphrased from Tangent's document:

1. In the long-term perspective Class I railroads, like BNSF and UP, will generally not support new industrial development along their mainline if they view it as impacting their mainline capacity. This is because as railroads become more congested (or anticipate congestion), they create operating models which increase velocity on tracks thereby improving capacity.
2. There has been some de-marketing by the railroads of customers along the Oregon Trunk mainline due to inefficiencies and low freight volumes. For example, the operators have reduced demand for serving industries shipping less than unit train volumes located on a mainline through higher pricing and conversely provided rate incentives for *unit trains*.
3. Central Oregon has already witnessed some of the effects of these strategies by BNSF which make rail less competitive with the truck mode, and recent rail freight volumes are not sufficient to ensure long-term competitive and efficient rail service in the region from the Class I railroads.
4. The market for unit train shippers who would consider development in Central Oregon is likely limited. Such shippers generally are closer to commodity growing areas, manufacturing nodes, or larger population centers.
5. Facilities with adequate infrastructure to hook multiple rail cars together to be picked up by the through trains, without impacting the mainline, are compatible with the current Class I railroads operating model.
6. There is not (in 2009) a current market need for an additional transload/reload hub facility within the area. However, it is rare, but highly desirable, to have access to both Western railroads because it provides market pressure for them to compete on pricing through COPR. It is even more advantageous to have a short-line operator do the switching and railcar aggregation on behalf of shippers and then interchange with the Class I carriers. This is a very marketable rail scenario since the short-line can provide a more customized service for the shipper.
7. The strength of the rail network in Central Oregon is that it is served by both Western Class I operators, as well as by COPR who specializes in what the big operators will no longer do – switching and aggregating cars from individual shippers.
8. The COPR provides switching services to local shippers and provides a location, the Freight Depot in Prineville, for regional shippers to access the rail network by transferring freight from trucks to railcars (*transload/reload* operation). This rail service with the Freight Depot are concepts which the Class I railroads will support.
9. BNSF is obliged by the Surface Transportation Board as a common carrier to provide service to shippers on their shortline partners (e.g., COPR). As with other shippers on the BNSF

mainline, however, the railroad could incrementally price the business high enough that rail service becomes uncompetitive with truck.

10. Central Oregon can also secure future efficient and competitive rail service by developing certain industrial sites for rail-served industries. These sites were identified and ranked in Tangent's study.
11. There are several sites which are well-suited for rail-served industrial development in the region, with the caveat that sustainable long-term rail service for shippers of less than *unit train* volumes will likely not be possible along the mainline. Many sites along the mainline, however, are large enough to develop for unit train shippers. These shippers could also accommodate shippers of smaller volumes who could then truck the product to the COPR Depot.
12. Freight volumes in and out of the region are currently depressed. Once the market rebounds, there should be enough freight to support rail/truck modal choice. For example, there are some opportunities to grow these volumes by supporting use of the COPR freight operation.
13. While the past and current existing rail market is relatively small, there is potential to capture additional volumes by exploring the dynamics of the trucking market. Based on 1997 commodities data, if 5 percent of the trucking volume were converted to the rail mode this would more than double current rail volumes, which would ensure competitive rail service for the long term.
14. The Department of State Lands (DSL) site in south of Redmond is approximately 1,000 acres of undeveloped land, which is a unique asset on the West Coast in terms of potential for large lot industrial. The site provides an opportunity to build all the rail infrastructure on site and still have ample acreage for a large industrial development.
15. With the exception of Lava Siding between Bend and La Pine, all rail support infrastructure (switching yards and sidings) is compromised by existing at-grade crossings. New infrastructure for the unit train model can be developed, but the costs must take into account the need for grade separated-crossings.

Implementation

The following are recommended decision-making and implementation strategies to achieve the freight crossing Goals and Objectives (primarily based on recommendations from the [Study of Economic Opportunities / Rail Access Land Supply in Central Oregon](#)):

1. Take advantage of and maximize opportunities with the area's shortline railroad, COPR. Secure long-term efficient and competitive rail service by siting non-unit train, rail-served industries along the COPR. Sites served by a shortline railroad with access to both the BNSF and UP are exceedingly rare and desirable from a competitive standpoint. The highest ranked sites from Tangent's Study include land at: Prineville Junction (Deschutes County), Crook County Heavy Industrial Zone, Northwest Industrial Park (Prineville).

2. Prioritize and encourage support of trucking freight to COPR Freight Depot for transfer to rail mode, for the shippers of less than one unit train volumes currently located on the mainline or new shippers locating in the vicinity of the mainline.
3. Site only unit train industries and ensure adequate on- and off-site support track along the BNSF mainline. The highest ranked for this recommendation is the Madras Industrial Zone.
4. Identify support infrastructure which will be needed to support rail-served sites and begin to incorporate this infrastructure in transportation system plans. Connectivity to the rail network is vital for economic development efforts in the region. This should be approached by examining scenarios which reflect much higher fuel prices in the future, as a significant change in cost per gallon will likely result in a much more significant change to the *break-even-distances* of truck versus rail.
5. Since the dramatic downturn of the economy, railroads are aggressively marketing all commodities. Therefore, this is the time to seek industries to locate in Central Oregon which are carload shippers. However, in order for the service to be sustainable in the long term, coinciding freight terminal options need to be implemented.
6. Investigate the wind energy industry and other alternative energy companies as they will likely evolve as major rail users in the coming years. Also investigate carload business such as construction materials, metal products, and wood or paper products, as they will be easiest to market for rail service.
7. Incorporate language in comprehensive plans which recognize and protect industrial sites lending themselves to rail-served industrial development (see listing and ranking in [Tangent's](#) study). Here is example language which might be used:

The City of () [or County] will seek to protect and preserve lands zoned for industrial use that are identified as having exceptional transportation and site characteristics which are compatible with rail operations adjacent to the BNSF and/or COPR for rail-dependent industrial uses.
8. Stay closely involved in the current ODOT statewide freight planning and rail planning efforts, as they could identify if there are new commodities which are moving (and will also show volume levels and corridors they are moving to and from) as useful information for targeting industries for rail served sites in Central Oregon.
9. La Pine has large and desirable sites from a development standpoint, and there is an existing siding. For rail-served development, look to market to a large rail user in order to be able to get service from the BNSF. It would be difficult to secure service for a rail user with occasional shipments of small numbers of railcars.
10. Having one pick-up and drop-off location in Central Oregon [for the BNSF line], rather than several, will ensure that the mainline velocity and capacity are not compromised over the long term.

11. Intermodal trains are generally high priority trains on the railroad network, and this is an important opportunity to explore for implementation. However, since there is no single business entity capable of providing a critical mass of container cargo in Central Oregon, regional businesses and transportation service providers will need to work together and combine their intermodal cargo needs into a single designated facility which offers:

- Good connectivity to the roadway and highway network
- Rail service
- Property with land for expansion
- Critical mass of cargoes

This would also include agreement by shippers in Central Oregon to use a single designated intermodal complex, including minimum guaranteed volumes before the railroad service providers will entertain discussions about dependable train service.

12. Investigate terminal development and grant funding opportunities (which would include multimodal) at Prineville Junction. The Tangent Study identifying that a terminal site must have the following characteristics:

- Proximity to highway freight corridors
- Efficient connectivity to the Class I rail network (on a connecting short line, at an industrial site with large enough base to have an industrial switcher interchange blocks of cars directly with the Class I at a strategic location)
- Adequate industrial land for future build-out
- On and/or offsite rail infrastructure sufficient to hold additional empty loaded cars.
- Critical mass of railcars.
- Sufficient storage capacity, preferably with some covered storage.

The ideal terminal model would be capable of generating volumes and could meet the requirements for unit train activity on the COPR. If the ideal were achieved, it would provide the greatest flexibility for shippers and in the long-term meet the needs of the Central Oregon shippers. Prineville Junction is a prime location, because it is at a nexus of roads/highways and rail providers, with access to expandable and developable property for facility growth.

There is also the potential that terminal development at Prineville Junction could provide an opportunity for the BNSF trunk line crew and switching operations to be moved here from the current location on the south side of Bend. This would provide numerous benefits for many different stakeholders.

Also regarding switching operations, BNSF has indicated their intention to de-market local freight switching along the mainline, and there is a very good chance that local switchers and crews will eventually disappear because BNSF can better afford to use the locomotive and crew on a through train rather than on local switching. On the other hand, COPR can perform a range of repairs and operations which all benefit the Class 1's, where local industries cannot perform these tasks.

The most recent opportunity COPR has suggested, with interest from both BNSF and UP, is the potential for access to the 1,600 acre Crook County landfill, which will likely soon have a *regional* landfill designation. This has great potential to immediately achieve the types of volumes to support the recommended terminal development.

Regardless of which recommended strategies COACT is able to or decides to implement, the COPR is Central Oregon's best hope for assuring we maintain access to the national rail network.

4. Passenger Rail Service

The Central Oregon Rail planning effort has been predominately focused on at-grade crossings from a safety and operational aspects and rail-freight mobility needs and economics. The study was not intended to address in any detail the feasibility of passenger or commuter rail in the area. Therefore, this section and its recommendations are largely drawn from previous work and other sources, primarily the [2001 Oregon Rail Plan](#), which was adopted by the Oregon Transportation Commission (OTC) November 8, 2001.¹

The recommended Goal for COACT is to establish passenger rail service through Central Oregon. However, it is important to recognize that freight carriers such as BNSF are concerned about the impact of adding passenger services over their routes, and they view each additional passenger train as a reduction in their ability to accommodate freight. Their willingness to accept additional or new passenger services is frequently proportional to the amount of capital investment that is committed to create additional rail capacity. In the case of Central Oregon, this would likely include adding a second rail line, as well as other significant and costly improvements. The 2001 Passenger Rail Study did include some comments on the feasibility of passenger rail in Central Oregon:

The BNSF north-south route from Chemult through Bend to the Columbia River constitutes an important freight movement resource through central Oregon. It has accommodated passenger trains when it was necessary to detour the Coast Starlight from its regular route. The line occasionally is used for special excursion operations. However, the light population density along the line and its slow, circuitous route through the Deschutes River Canyon render it infeasible for regular intercity service. Central Oregon communities are probably better served by more direct bus and air transportation between the Willamette Valley and Central Oregon. ODOT should continue to monitor and improve the current intercity bus routes to maintain the accessibility of the area and reinforce the connections to the Cascade Corridor trains and to the Coast Starlight at Chemult.

Recommendations

Further research is recommended to begin as soon as possible, to explore the feasibility of passenger or commuter rail in Central Oregon and to develop a phasing strategy and action plan that would likely include the initial creation of an express bus system. An upcoming study of Central Oregon Transit by the Central Oregon Intergovernmental Council (COIC) will likely include some additional analysis of this issue, but a separate study focused on this issue may be warranted. Additional analysis of Central Oregon commuter rail in particular would be helpful. Several factors should be considered when considering the feasibility of commuter rail:

- Direct rail link: An existing rail line with a reasonably direct rail line between the communities to be served and with sufficient capacity to accommodate relatively frequent rush hour passenger service.

¹ For more detailed information on Passenger Rail, see Chapter 3 of the [2001 Oregon Rail Plan](#).

- Supporting Regional Goals: Land use and transportation goals that seek to reduce motor vehicle trips, concentrate commercial and residential development in and near the urbanized areas in the corridor, and to promote higher-density development within the corridor and specifically, near rail station lines.
- Population Growth and Density: Continuing moderate to rapid population growth within the corridor, with a high concentration of residences and/or business/commercial activity close to station sites.
- Limited funding for Highway Projects: Difficulty in raising funds for new highway projects which would increase traffic capacity in the corridor.
- Commuting within the corridor: A high level of daily commuting within the corridor.
- Traffic Congestion: Growing traffic congestion on highways paralleling the rail line.
- Limited Parking: Limited and expensive parking at commuter destination points.
- Competitive transit times: Ability to provide rail commuter service competitive with auto commute times. This would include any supportive bus transit at destination/origin points.
- Availability of Funding: Ability to provide rail commuter service at a cost competitive with auto commuting.
- Willingness to use Transit: Daily commuters in the corridor with a relatively high propensity to use transit.

Key Passenger Rail Service Thresholds. Patronage, cost recovery and running time are factors that must be evaluated when considering extension of rail over a new route. **Patronage** is a measure of average occupancy. Typically a train should have a minimum average occupancy of about 75 passengers per train. **Cost Recovery** is a measure of how much fares are covering the operating costs. A new rail service should be expected to attain a 30-40% farebox ratio to be viable. **Running Time** is generally measured relative to a competitive auto route and travel time, for example a trip on Highway 97. If a new rail route is not competitive with travel time by auto, then it likely will not be successful.

There are also other factors that could significantly influence the decision to consider a new passenger rail line, including serving the transportation disadvantaged community. In the case of Central Oregon, passenger rail could potentially enhance the regional tourism economy.

5. *Summary Recommendations*

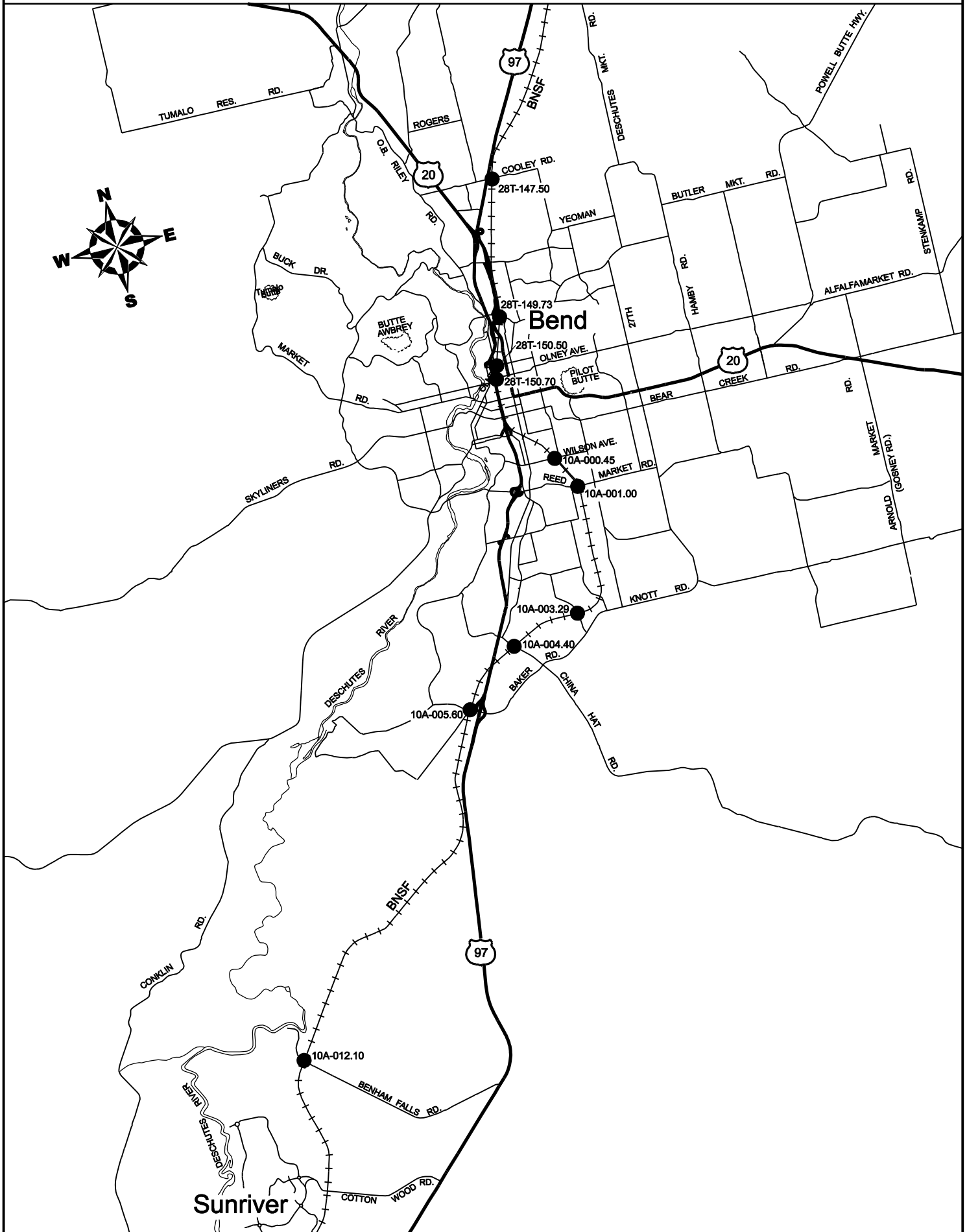
Recommendations for implementation have been provided in each of the above sections for:

1. *Relocating BNSF Line to the East of Bend and Redmond*
2. *Existing At-Grade Railroad Crossings*
3. *Freight Mobility and Rail Service*
4. *Passenger Rail Service*

To supplement those recommendations, the following are over-arching decision-making and implementation strategies to achieve the Goals and Objectives in all areas regarding rail in Central Oregon:

1. With the findings and recommendations of this report, begin outlining and developing a multi-party agreement for the entire corridor, to include:
 - New grade separation *credit* applied to (or packaged with) interim roadway system expansion needs across railway lines
 - Rail-served industrial options and infrastructure development (using the unit train / hook & haul model)
 - Mainline expansion opportunities
 - Cost-sharing for mutual priority crossing locations
 - Passenger rail feasibility analysis and a phasing strategy (likely including a first step of an express bus system)
2. There has been a question of the potential negative impacts, benefits, opportunities, and timing implications of a continuous second track on BNSF through Central Oregon related to the range of needs identified above. All decision-making on at-grade crossings, rail freight mobility, mainline freight capacity and efficiency, commuter rail, etc., should include consideration of and financing for double-tracking on the existing BNSF line.
3. The local jurisdictions should use this report to develop Comprehensive Plan amendments, particularly in the at-grade crossing and freight mobility areas. This might include specific amendments or new rail chapters in local Transportation System Plans, along with recommended funding strategies.
4. Acceptance of the findings and recommendations of this report should carry over to continued efforts to gain broad public and stakeholder support of implementation. This can include briefings, updated, and specific recommendations to city councils and county boards.

CENTRAL DESCHUTES COUNTY AT-GRADE RAIL CROSSINGS



Crossing 28T-147.50

Cooley Rd., Bend -- Undercrossing

RATIONALE: Cooley Rd. intersects US97 about 400 feet to the west of the RR. This intersection is about the same grade as the existing RR crossing, however Cooley Rd is at least 10 feet lower about 300 feet toward the east. The west approach of an overcrossing would require US97 to be raised significantly, or one could include both the RR and US97 under the overcrossing. An overcrossing would impact several city streets. The notes from the 3/11/08 meeting with City of Bend indicated that an undercrossing is needed under both the RR and US97. This type of undercrossing has not been considered previously, but may be feasible. It would require significant blasting of rock, since the rock appears to be close to the surface. This undercrossing would also impact the local streets. Raising the RR grade is an option but would require significant length of walls parallel to RR. Additional review of the options should be performed. During our site visit, it was mentioned that ODOT may be considering a new interchange at this location. ODOT is estimating the cost and impacts of a crossing at this location.

**US 97/Cooley Road Mid-Term Intersection Improvements
Planning Phase - Order of Magnitude**

Alternative H-1: Relocated Signalized US 97/Cooley Rd.

Construction Costs

Item	Quantity	Unit	Unit Cost	Cost
1 US 97 Seven lane section w median	3,500	LF	\$ 1,150.00	\$ 4,025,000.00
2 Utility relocations	1	LS	\$ 1,500,000.00	\$ 1,500,000.00
3 Cooley Road Six lane section w/o median	600	LF	\$ 550.00	\$ 330,000.00
4 Cooley Road Six lane section w/ median	950	LF	\$ 600.00	\$ 570,000.00
5 Cooley Road Three lane section w/ median	950	LF	\$ 460.00	\$ 437,000.00
6 US 97 Three lane ramp section	600	LF	\$ 500.00	\$ 300,000.00
7 US 97 Five lane ramp section	1,200	LF	\$ 900.00	\$ 1,080,000.00
8 New Traffic Signal	4	EA	\$ 250,000.00	\$ 1,000,000.00
9 Retaining Walls	-	SF	\$ 75.00	\$ -
10 Hwy 97 Bridge	14,720	SF	\$ 128.00	\$ 1,884,160.00
11 Railroad Bridge	8,000	SF	\$ 200.00	\$ 1,600,000.00
12 Underpass Excavation	1	LS	\$ 1,200,000.00	\$ 1,200,000.00
13 Utility relocations	1	LS	\$ 1,500,000.00	\$ 1,500,000.00
<i>Sub-Total</i>				\$ 15,426,160.00

*Cooley
RR Bridge Only*

*1,600,000
1,200,000*

Temporary Construction Costs

14 Relocate railroad crossing	1	EA	\$ 300,000.00	\$ 300,000.00
15 Cooley Road Three lane section	1,700	LF	\$ 200.00	\$ 340,000.00
16 Temporary Traffic Signal	1	EA	\$ 250,000.00	\$ 250,000.00
17 US 97 Five lane section w/o median	2,900	LF	\$ 600.00	\$ 1,740,000.00
18 Temporary Rail 'Shoe-Fly'	1,525	LF	\$ 150.00	\$ 228,750.00
<i>Sub-Total</i>				\$ 2,858,750.00

*300,000
340,000
250,000
1,740,000
1,158,750
2,858,750
1,848,750*

RR Portion of Shoe-Fly

Subtotal

Additional US 97 Widening South to US 20 (Partial Construction w/ Overlay)

19 US 97 One lane widening	400	LF	\$ 150.00	\$ 60,000.00
20 US 97 Two lane widening	1,600	LF	\$ 300.00	\$ 480,000.00
21 US 97 Three lane widening	1,050	LF	\$ 400.00	\$ 420,000.00
22 New Traffic Signal	1	EA	\$ 400,000.00	\$ 400,000.00
23 Robal Road One lane widening	300	LF	\$ 100.00	\$ 30,000.00
24 Robal Road Two lane widening	300	LF	\$ 150.00	\$ 45,000.00
25 4" Overlay	24,500	SY	\$ 15.00	\$ 367,500.00
<i>Sub-Total</i>				\$ 1,802,500.00

Additional Construction Costs

26 Construction Surveying	2.0%			\$ 401,748.20
27 Mobilization	8.0%			\$ 1,606,992.80
28 Erosion Control	2.0%			\$ 401,748.20
29 Contingency and Engineering	40.0%			\$ 8,034,964.00
<i>Sub-Total</i>				\$ 10,445,453.20
Construction Cost				\$ 30,532,863.20

*50%
2,424,375 EAC*

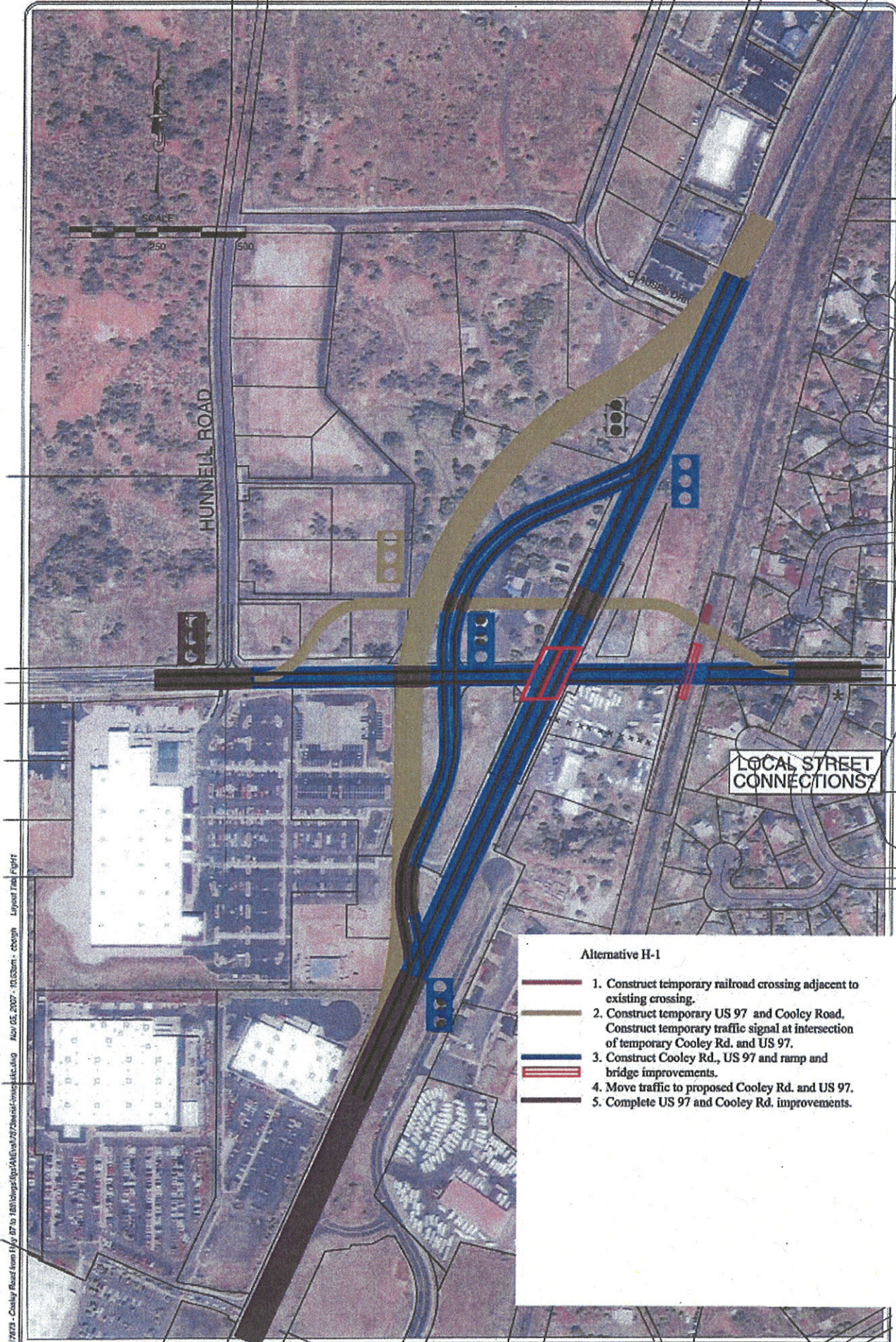
Right of Way Costs

30 New Right of Way Required	206,475	SF	\$ 20.00	\$ 4,129,500.00
31 Temporary construction easement	240,000	SF	\$ 1.50	\$ 360,000.00
32 New Right of Way Required (Robal Int.)	18,000	SF	\$ 20.00	\$ 360,000.00

Project Cost \$ 35,382,363.20






- A. Utility relocation cost estimate assumed for underpass construction. Actual utilities to be relocated unknown.
- B. Construction staging cost factored on maintaining mobility on US 97 during construction
- C. All quantities estimated from Alternative Figures from Kittelson & Associates, Inc.
- D. Assumed Right of Way required: 160' width for relocated US 97, 100' width for ramps
- E. US 97 bridge assumed dimensions and type: 92'W x 160'L, type BT84 precast.
- F. Railroad bridge assumed dimensions and type: 24'W x 160'L, steel thru girder.

*Total 7,273,125
RR Crossing
Cooley*



M:\projects\2007 - Cooley Road from Hwy 37 to 180\docs\plans\A\US97\2007-us97-imp-1.dwg 10/05/2007 10:53am cbsgh Layout 1.mxd

Alternative H-1

-  1. Construct temporary railroad crossing adjacent to existing crossing.
-  2. Construct temporary US 97 and Cooley Road. Construct temporary traffic signal at intersection of temporary Cooley Rd. and US 97.
-  3. Construct Cooley Rd., US 97 and ramp and bridge improvements.
-  4. Move traffic to proposed Cooley Rd. and US 97.
-  5. Complete US 97 and Cooley Rd. improvements.

ALTERNATIVE H-1: RELOCATED SIGNALIZED US 97/COOLEY RD BEND, OREGON **H-1**

Crossing 28T-149.73

Butler Market Rd., Bend -- Undercrossing

RATIONALE: Butler Market Rd currently crosses under US97 Parkway about 350 feet to the west of the RR. At US97 Parkway the grade on Butler Market Rd. is about 15 feet below the RR grade. A solution of half RR overcrossing and half RR undercrossing was considered. However, it appears that raising the RR grade 10 feet would reduce the vertical clearance of the 3rd St./US 20 bridge over the RR below minimum clearance. A full undercrossing (lowering Butler Market Rd. and leaving RR at grade) is a better solution. Lowering Butler Market Rd. does not affect US97 Parkway, but does require lowering the frontage road and on ramp between the RR and US 97 Parkway, and requires lowering 4th St. An overcrossing was also considered. The overcrossing would need to span both the RR and US 97 Parkway because the west approach could not fit under the existing US97 Parkway bridge over Butler. The frontage road, the on ramp to US97, and 4th St. would all need to be raised to meet the new overcrossing profile. An undercrossing appears to be the better option.

DAVID EVANS AND ASSOCIATES, INC.

SUMMARY COST ESTIMATE

PROJECT: ODOT0000608 Central Oregon Rail Plan		Terry Shike/503-361-8635			
CROSSING NO:		Butler Market Rd - Uxing RR by lowering road			
RAIL SEGMENT IDENTIFICATION:		RAIL SEGMENT LENGTH:			
NO.	ITEM	UNIT	QUANTITY	UNIT COST	TOTAL
	Bridge 80' x 45'	ft2	3600	\$635	\$2,286,000
	Excavation	yd3	42000	\$20	\$840,000
	Paving	ft2	102000	\$10	\$1,020,000
	Sidewalks	ft2	15100	\$10	\$151,000
	Cul de sacs	each	0	\$25,000	\$0
SUBTOTAL					\$4,297,000

ADDITIONAL COSTS	
Utility Allowance	\$100,000
Design/Surveying (10%)	\$429,700
Constr.Engr./Contingency (50%)	\$2,148,500
Special Costs (Unique to crossing or segment)	
SUBTOTAL	\$2,678,200
TOTAL CONSTRUCTION COST	
RIGHT-OF-WAY COSTS (Supplied by ODOT)	
TOTAL CROSSING/SEGMENT COST	
	\$6,975,200

Assumptions/Notes:

- Four lanes with 6 ft bike/shoulder and 6 ft sidewalks.
- Rock is close to surface, so retaining walls not needed. Assume drill and blast rock excavation.
- Lower Frontage Rd adjacent to Parkway, 6.4 ft, both sides of Butler, 56 ft width.
- Lower 4th St. 9 ft east side of Butler, 50 ft width.
- Lower accesses to businesses, SW - changes from downward grade to upward grade.

Crossing 28T-150.50

Revere Ave., Bend -- Undercrossing

RATIONALE: Revere Ave. intersects the Parkway about 500 ft. to the west and Division St. about 150 ft. to the west of the RR. The On/Off Ramps to Parkway are directly opposite of Division St. Revere Ave. intersects Lytle St about 200 ft. to east of the RR, 2nd St. about 400 ft. to east of the RR and 3rd St. about 700 ft. to the east of the RR. The approaches to a full overcrossing would each be about 1,100 ft.. long and vary in height from zero to 30 feet high at the RR. The impact of these approaches would reduce the vertical clearance under the Parkway, and would require all of these streets to be raised or become cul de sacs, shutting of access to businesses. An overcrossing at this location does not appear to be feasible. A full undercrossing of RR (by raising the RR) was also considered, but would require very long approaches along the RR, which requires retaining walls full length to contain the fill within RR ROW.

It would either block off crossings at other streets or require additional undercrossings. A full undercrossing of the RR (by lowering Revere) appears to be the better solution, but costly. The on/off ramps must be lowered to meet the new profile, however lowering them will exceed maximum grades. Therefore, new ramps must be provided. Division St. can be lowered. Also, lowering Revere could reduce the stability of the abutments for the Parkway bridge over Revere. Strengthening of the rock may be required, but does appear feasible. Access to Revere from Lytle St. and 2nd. St would be cut off by using cul de sacs, but 3rd St would experience minor impact.

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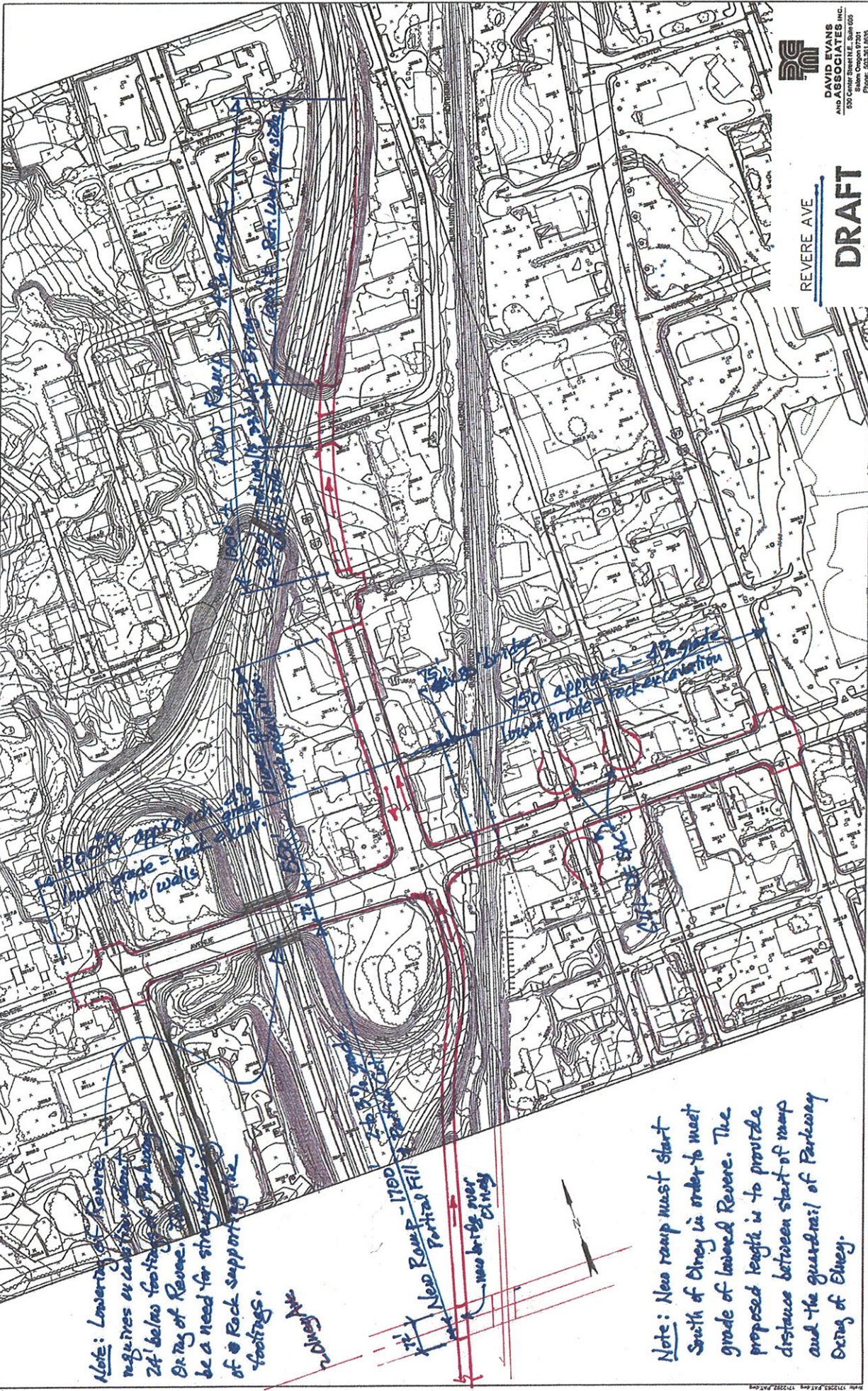
SUMMARY COST ESTIMATE

PROJECT: ODOT0000608 Central Oregon Rail Plan		Terry Shike/503-361-8635			
CROSSING NO:		Revere Avenue - Uxing RR by lowering road			
RAIL SEGMENT IDENTIFICATION:		RAIL SEGMENT LENGTH:			
NO.	ITEM	UNIT	QUANTITY	UNIT COST	TOTAL
	RR Bridge 80' x 75'	ft2	6000	\$635	\$3,810,000
	Hwy Bridge 33' x 80'	ft2	2805	\$165	\$462,825
	Hwy Bridge 33' x 140'	ft2	3080	\$165	\$508,200
	MSE Retaining Walls	ft2	6000	\$100	\$600,000
	Excavation	yd3	125000	\$20	\$2,500,000
	Paving	ft2	244000	\$10	\$2,440,000
	Sidewalks	ft2	23000	\$10	\$230,000
	Cul de sacs	each	3	\$25,000	\$75,000
	Rock bolting under Parkway Br.	LS	1	\$200,000	\$200,000
SUBTOTAL					\$10,826,025

ADDITIONAL COSTS	
Utility Allowance	\$100,000
Design/Surveying (10%)	\$1,082,603
Constr. Engr./Contingency (50%)	\$5,413,013
Special Costs (Unique to crossing or segment)	
SUBTOTAL	\$6,595,615
TOTAL CONSTRUCTION COST	
RIGHT-OF-WAY COSTS (Supplied by ODOT)	
TOTAL CROSSING/SEGMENT COST	
	\$17,421,640

Assumptions/Notes:

Four lanes with 6 ft bike/shoulder and 6 ft sidewalks on Revere and Division. 30' width on Ramps.
 Two existing tracks, so proposed bridge will be 3 track bridge - no access road.
 Rock is close to surface, so retaining walls not needed. Assume drill and blast rock excavation.
 Cul de sac Lytle Street both sides of Revere and 2nd Street east side of Revere.
 Lowering grade on Revere will require 24 ft exc below extg footings of Parkway Oxing Revere, which may require strengthening of the rock supporting the footings. A cost for rock bolting has been included.
 Existing On/Off ramps to Revere must be closed due to lowering of Revere. Concept has been included to show possible re-establishment of the ramps, and is included in the cost.



Note: Lowering of Revere requires excavation along 24' below footings of Parkway Dr.ing of Revere. There may be a need for strengthening of Rock supporting the footings.

1700

New Ramp - 1700 Partial Fill
new bridge over Elsie

Note: New ramp must start South of Elsie in order to meet grade of lowered Revere. The proposed length is to provide distance between start of ramp and the guardrail of Parkway Dr.ing of Elsie.

1500 approach
low grade - no walls
no walls

1500 approach
low grade - no walls
no walls

150 approach - 4% grade
low grade - rock excavation

150 approach - 4% grade
low grade - rock excavation

Crossing 28T-150.70

Olney Ave., Bend -- Undercrossing

RATIONALE: Olney Ave. intersects the Parkway about 200 ft. to the west of the RR and the Parkway goes over Olney. The approaches to a full overcrossing would each be at least 1100 ft. long and vary in height from zero to 30 feet high at the RR. The west approach would not fit under the Parkway, therefore an overcrossing of Olney over RR is not feasible. A half overcrossing/half undercrossing was considered, but was not feasible due to impacts to the RR. A full undercrossing of the RR (raising RR) was also considered, but would require very long approaches along the RR, which requires retaining walls full length to contain the fill within the RR ROW. It would either block off crossings at other streets or require additional undercrossings. A full undercrossing of the RR (lowering Olney) appears to be the better overall solution. Lowering Olney will impact the Parkway Bridge but it appears that strengthening of the supporting rock is feasible. 1st St. would have access cut off with cul de sacs.

DAVID EVANS AND ASSOCIATES, INC.

SUMMARY COST ESTIMATE

PROJECT: ODOT0000608 Central Oregon Rail Plan		Terry Shike/503-361-8635			
CROSSING NO:		Olney Avenue - Uxing RR by lowering road			
RAIL SEGMENT IDENTIFICATION:		RAIL SEGMENT LENGTH:			
NO.	ITEM	UNIT	QUANTITY	UNIT COST	TOTAL
	Bridge 75' x 80'	ft2	6000	\$635	\$3,810,000
	Excavation	yd3	55000	\$20	\$1,100,000
	Paving	ft2	97000	\$10	\$970,000
	Sidewalks	ft2	13500	\$10	\$135,000
	Cul de sacs	each	2	\$25,000	\$50,000
	Rock bolting under Parkway Br.	LS	1	\$200,000	\$200,000
SUBTOTAL					\$6,265,000

ADDITIONAL COSTS	
Utility Allowance	\$100,000
Design/Surveying (10%)	\$626,500
Constr.Engr./Contingency (50%)	\$3,132,500
Special Costs (Unique to crossing or segment)	
SUBTOTAL	\$3,859,000
TOTAL CONSTRUCTION COST	
RIGHT-OF-WAY COSTS (Supplied by ODOT)	
TOTAL CROSSING/SEGMENT COST	
	\$10,124,000

Assumptions/Notes:

Four lanes with 6 ft bike/shoulder and 6 ft sidewalks.

Two existing tracks, so proposed bridge will be 3 track bridge - no access road.

Rock is close to surface, so retaining walls not needed. Assume drill and blast rock excavation.

Cul de sac 1st Street both sides of Olney.

Lowering grade on Olney will require 24 ft exc below extg footings of Parkway Oxing Olney. This may require strengthening of the rock supporting the footings. A cost for rock bolting has been included.

Note: Lowering of Olney requires excavation of about 24' below footing of Parkway Over Olney. There may be a need for strengthening of the rock supporting the footings.



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OLNEY AVE

DRAFT

650' approach - lower grade = rock excavation, no walls

75' x 80' Bridge

650' approach - lower grade = rock excavation, no walls

Propose new heavy ho assembly site under crossing at River City

Cul de Sac

Crossing 10A-000.45

Wilson Ave., Bend -- Overcrossing

RATIONALE: Wilson Ave. intersects Centennial St. about 200 ft. to west and 9th St. about 400 feet to east of the RR. The grades are relatively flat along Wilson so an over crossing appears to be the best solution.

Centennial and 9th St. would need to be raised to meet the profile of a new overcrossing or cul de sacs constructed. The City indicated 9th St. is to remain open and cul de sac Centennial, 6th St and Douglas St. Raising the profile of Wilson would severely impact access to several residences and businesses.

DAVID EVANS AND ASSOCIATES, INC.

SUMMARY COST ESTIMATE

PROJECT: ODOT0000608 Central Oregon Rail Plan		Terry Shike/503-361-8635			
CROSSING NO:		Wilson Avenue			
RAIL SEGMENT IDENTIFICATION:		RAIL SEGMENT LENGTH:			
NO.	ITEM	UNIT	QUANTITY	UNIT COST	TOTAL
	Bridge 113' x 75'	ft2	8475	\$165	\$1,398,375
	MSE Retaining Walls	ft2	97643	\$100	\$9,764,300
	Embankment	yd3	61386	\$15	\$920,790
	Paving	ft2	199200	\$10	\$1,992,000
	Sidewalks	ft2	38100	\$10	\$381,000
	Cul de sacs	each	4	\$25,000	\$100,000
SUBTOTAL					\$14,556,465

ADDITIONAL COSTS	
Utility Allowance	\$100,000
Design/Surveying (10%)	\$1,455,647
Constr.Engr./Contingency (50%)	\$7,278,233
Special Costs (Unique to crossing or segment)	
SUBTOTAL	\$8,833,879
TOTAL CONSTRUCTION COST	
RIGHT-OF-WAY COSTS (Supplied by ODOT)	
TOTAL CROSSING/SEGMENT COST	
\$23,390,344	

Assumptions/Notes:

- Four lanes, with 6 ft bike/shoulder and 6 ft sidewalks.
- Retaining walls each side to reduce ROW costs.
- Raise 9th St. 22.8 ft both side of Wilson - 54 ft width west and 40 ft width east.
- Need retaining walls each side of 9th St., use maximum grade of 6%.
- Cul de sac Centennial and 6th St., both sides of Wilson.
- Raise Douglas Sat. 3.5 ft each side of Wilson, 40 ft width.
- Raise Business Way 1.1 ft east side of Wilson, 40 ft width.
- Access to multiple businesses/residences will be cut off due to raising grades of Wilson & 9th.
- Existing profile along Wilson varies 3700 to 3708 ft - ignore this effect on cost estimate.

Crossing 10A-001.00

Reed Market Rd., Bend -- Overcrossing

RATIONALE: Reed Market Rd intersects 9th St. about 300 ft. to the east and American Lane about 250 ft. to the west of the RR. There are commercial buildings on each side of Reed Market Rd. A standard overcrossing is feasible, except that the intersecting streets will have to be raised to accommodate the overcrossing. The City is estimating the cost of this crossing.

Crossing 10A-003.29

Country Club Rd., Bend -- Undercrossing

RATIONALE: Country Club Road curves to the left, toward the west and drops in elevation approximately 20 ft.. There is an access road about 1000 ft. to the north that will be affected by the approach if an overcrossing is selected. Country Club Road is tangent to the east and drops a few feet. It intersects Mountain High Rd about 180 feet to east and an access driveway to a utility about 400 ft. to the north of the RR. An overcrossing was considered but determined to be impractical due to length of the north approach required by the 20 foot drop in elevation. An undercrossing (lowering Country Club Rd) is feasible. Due to presence of rock near the surface, rock excavation without retaining walls is feasible. Mountain High Rd will need to be lowered to meet the profile of the lowered Country Club Rd. The access road to the utility can be regraded with no walls.

DAVID EVANS AND ASSOCIATES, INC.

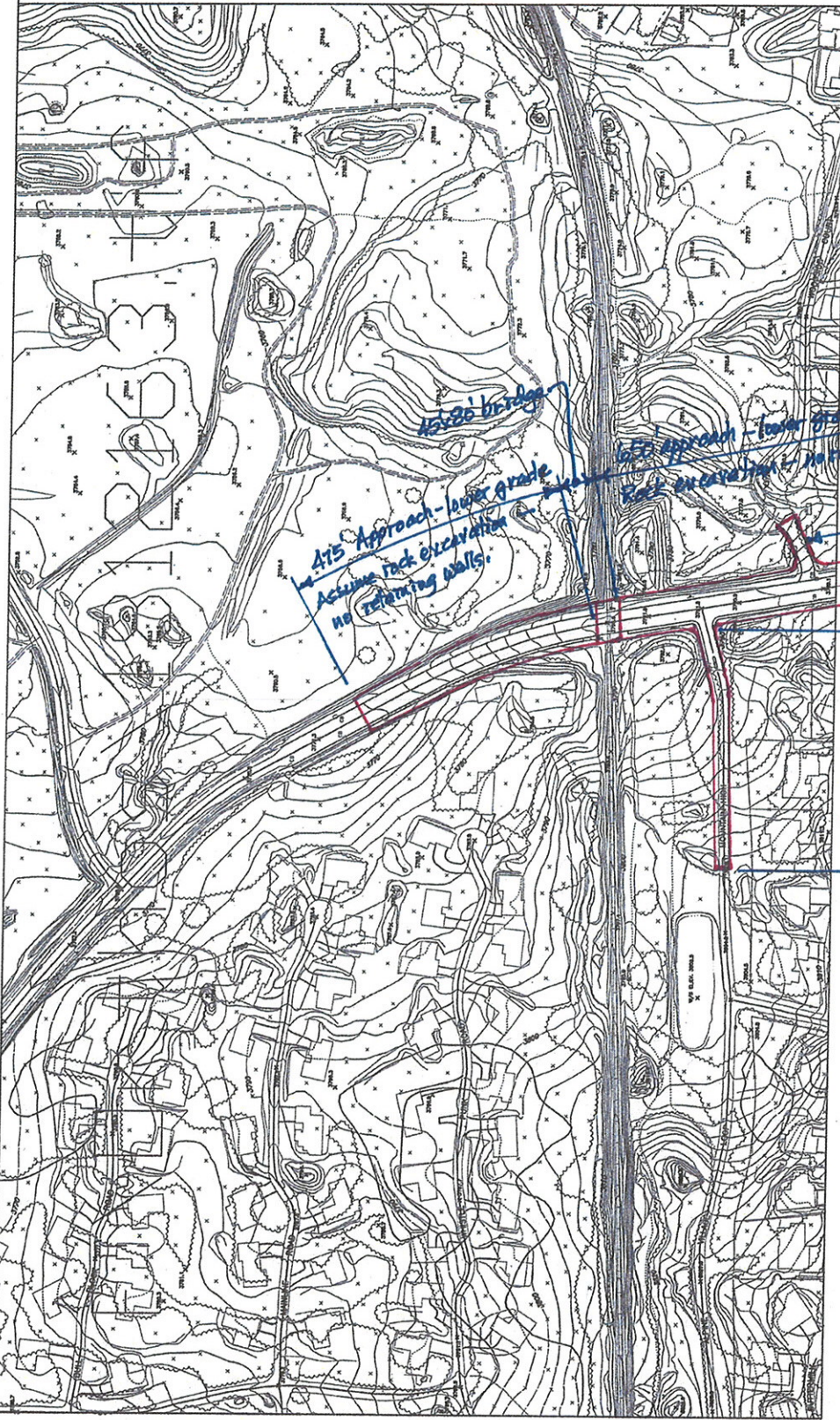
SUMMARY COST ESTIMATE

PROJECT: ODOT0000608 Central Oregon Rail Plan	Terry Shike/503-361-8635				
CROSSING NO:	Country Club Road - Uxing RR by lowering road				
RAIL SEGMENT IDENTIFICATION:	RAIL SEGMENT LENGTH:				
NO.	ITEM	UNIT	QUANTITY	UNIT COST	TOTAL
	Bridge 80' x 45'	ft2	3600	\$635	\$2,286,000
	Excavation	yd3	45000	\$20	\$900,000
	Paving	ft2	85000	\$10	\$850,000
	Sidewalks	ft2	16300	\$10	\$163,000
	Cul de sacs	each	0	\$25,000	\$0
SUBTOTAL					\$4,199,000

ADDITIONAL COSTS	
Utility Allowance	\$100,000
Design/Surveying (10%)	\$419,900
Constr. Engr./Contingency (50%)	\$2,099,500
Special Costs (Unique to crossing or segment)	
SUBTOTAL	\$2,619,400
TOTAL CONSTRUCTION COST	
RIGHT-OF-WAY COSTS (Supplied by ODOT)	
TOTAL CROSSING/SEGMENT COST	
	\$6,818,400

Assumptions/Notes:

- Four lanes with 6 ft bike/shoulder and 6 ft sidewalks.
- Rock is close to surface, so retaining walls not needed - assume drill and blast rock excavation.
- Lower Mountain High Rd. 18.3 ft west side of Country Club, 30 ft width.
- Mountain High, use max grade 8% to eliminate impact to reservoir.
- Access to utility on SE side already lower than Country Club, can excavate/flatten grade.
- Aerial topo only extends 440 ft from RR, so guessing about impacts beyond topo.



15x20 bridge

415' Approach - lower grade
Assume rock excavation
No retaining walls.

105' approach - lower grade
Rock excavation - No Ret. walls

400' - lower grade
rock excavation -
No retaining walls

access to utility -
on existing close grade,
So excavation will flatten
grade. - no walls

COUNTRY CLUB ROAD

DRAFT

Crossing 10A-004.40

China Hat Rd., Bend -- Overcrossing

RATIONALE: China Hat Rd. intersects with a driveway about 600 feet northwest of the RR and another driveway or local road about 800 ft. southwest of RR. A surface drainage detention pond is in the SE quadrant of the intersection with the RR. This appears to be a standard overcrossing, except that the intersecting streets will have to be raised to accommodate the overcrossing.

DAVID EVANS AND ASSOCIATES, INC.

SUMMARY COST ESTIMATE

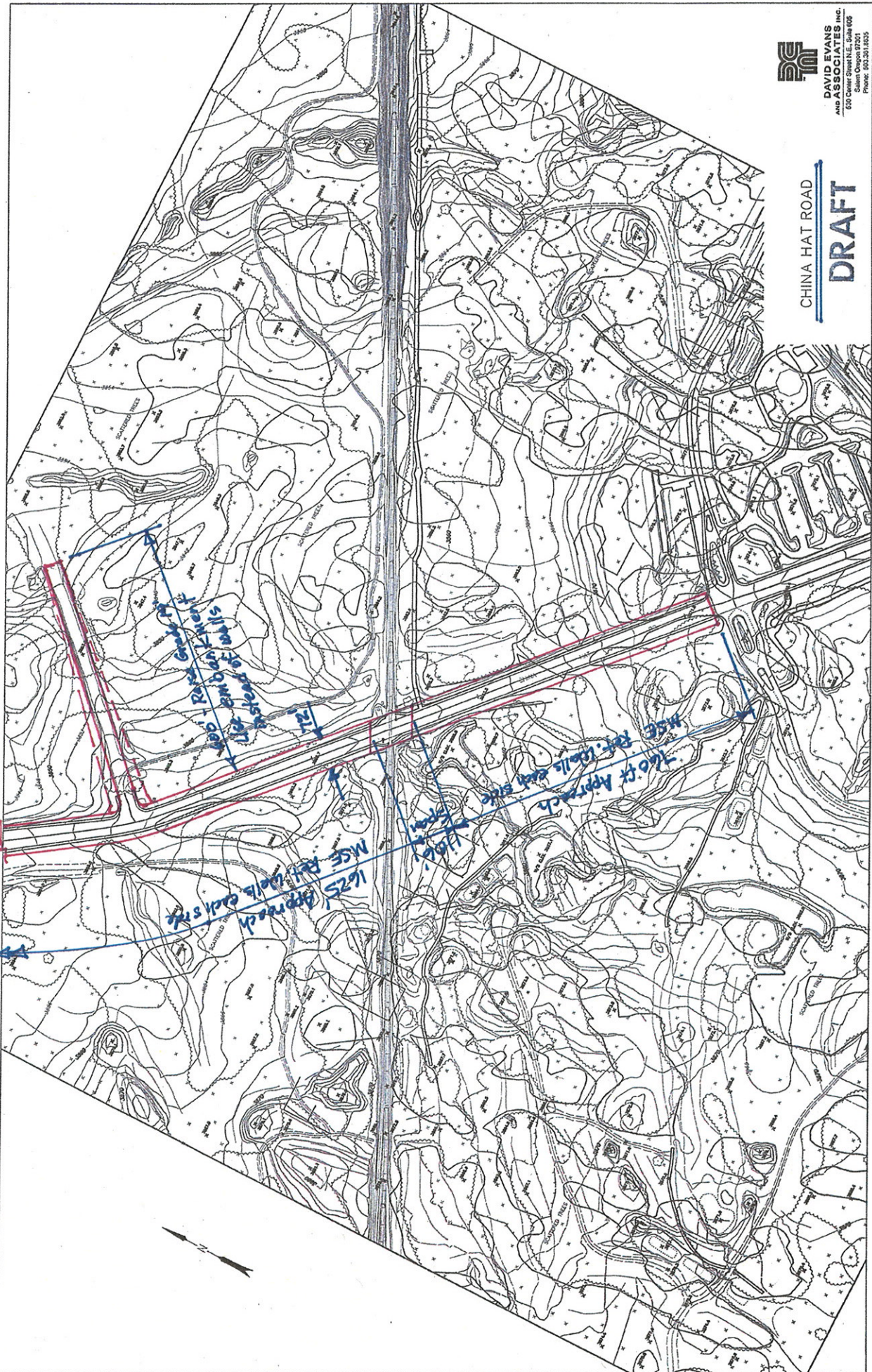
PROJECT: ODOT0000608 Central Oregon Rail Plan		Terry Shike/503-361-8635			
CROSSING NO:		China Hat Road (USFS Road 18)			
RAIL SEGMENT IDENTIFICATION:		RAIL SEGMENT LENGTH:			
NO.	ITEM	UNIT	QUANTITY	UNIT COST	TOTAL
	Bridge 106' x 75'	ft2	7950	\$165	\$1,311,750
	MSE Retaining Walls	ft2	78077	\$100	\$7,807,700
	Embankment	yd3	67247	\$15	\$1,008,705
	Paving	ft2	165900	\$10	\$1,659,000
	Sidewalks	ft2	29550	\$10	\$295,500
	Cul de sacs	each	0	\$25,000	\$0
SUBTOTAL					\$12,082,655

ADDITIONAL COSTS	
Utility Allowance	\$100,000
Design/Surveying (10%)	\$1,208,266
Constr.Engr./Contingency (50%)	\$6,041,328
Special Costs (Unique to crossing or segment)	
SUBTOTAL	\$7,349,593
TOTAL CONSTRUCTION COST	
RIGHT-OF-WAY COSTS (Supplied by ODOT)	
TOTAL CROSSING/SEGMENT COST	
	\$19,432,248

Assumptions/Notes:

- Four lanes with 6 ft bike/shoulder and 6 ft sidewalks.
- Retaining walls each side to reduce ROW costs.
- Raise access road located about 600 ft NW 18.8 ft, - 40 ft width.
- See note next page for impact of grade change along China Hat Road.

The existing profile along China Hat Rd varies from 3864 ft at the crossing to 3854 about 870 ft NW of the crossing. The drop in grade will extend this approach about 500 feet and increase the approach quantities. However, the grade south of the crossing rises in elevation and reduces the approach length to about 860 ft, stopping short of the access roads. The quantities almost balance out compared to a crossing with a flat grade, but the ROW impacts are quite different. Ignore the grade change in construction cost but consider it in ROW cost..



CHINA HAT ROAD

DRAFT

Crossing 10A-005.60

Baker Rd., Bend -- Overcrossing

RATIONALE: Baker Rd intersects US97 approximately 600 feet to the east of the RR and is carried over US97 on a structure. The profile of this bridge will not match the needed profile over RR, therefore the bridge must be replaced. Assume the new overcrossing would be adjacent and to the north of the existing one. There are on/off ramps to US 97 that will need to be raised to match the profile of the overcrossing. There are approach streets to Baker Rd on the west side, which also must be raised to meet the new profile, rerouted or access stopped with a cul de sac.

DAVID EVANS AND ASSOCIATES, INC.

SUMMARY COST ESTIMATE

PROJECT: ODOT0000608 Central Oregon Rail Plan		Terry Shike/503-361-8635			
CROSSING NO:		Baker Rd, Oxing of BNSF, US97			
RAIL SEGMENT IDENTIFICATION:		RAIL SEGMENT LENGTH:			
NO.	ITEM	UNIT	QUANTITY	UNIT COST	TOTAL
	RR Bridge 100' x 86'	ft2	8600	\$165	\$1,419,000
	US 97 Bridge, 200' x 86'	ft2	17200	\$165	\$2,838,000
	MSE Retaining Walls	ft2	115,000	\$100	\$11,500,000
	Embankment	yd3	100000	\$15	\$1,500,000
	Paving	ft2	287,000	\$10	\$2,870,000
	Sidewalks	ft2	26000	\$10	\$260,000
	Cul de sacs	each	3	\$25,000	\$75,000
SUBTOTAL					\$20,462,000

ADDITIONAL COSTS	
Utility Allowance	\$100,000
Design/Surveying (10%)	\$2,046,200
Constr.Engr./Contingency (50%)	\$10,231,000
Special Costs (Unique to crossing or segment)	
SUBTOTAL	\$12,377,200
TOTAL CONSTRUCTION COST	
RIGHT-OF-WAY COSTS (Supplied by ODOT)	
TOTAL CROSSING/SEGMENT COST	
	\$32,839,200

Assumptions/Notes:

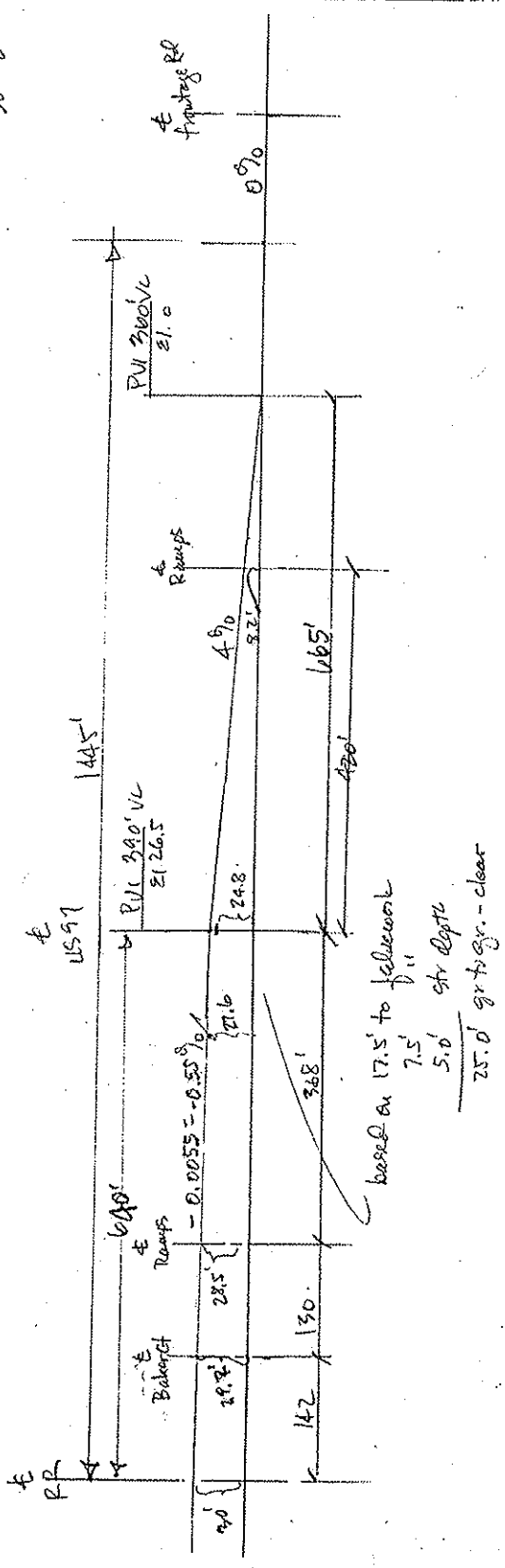
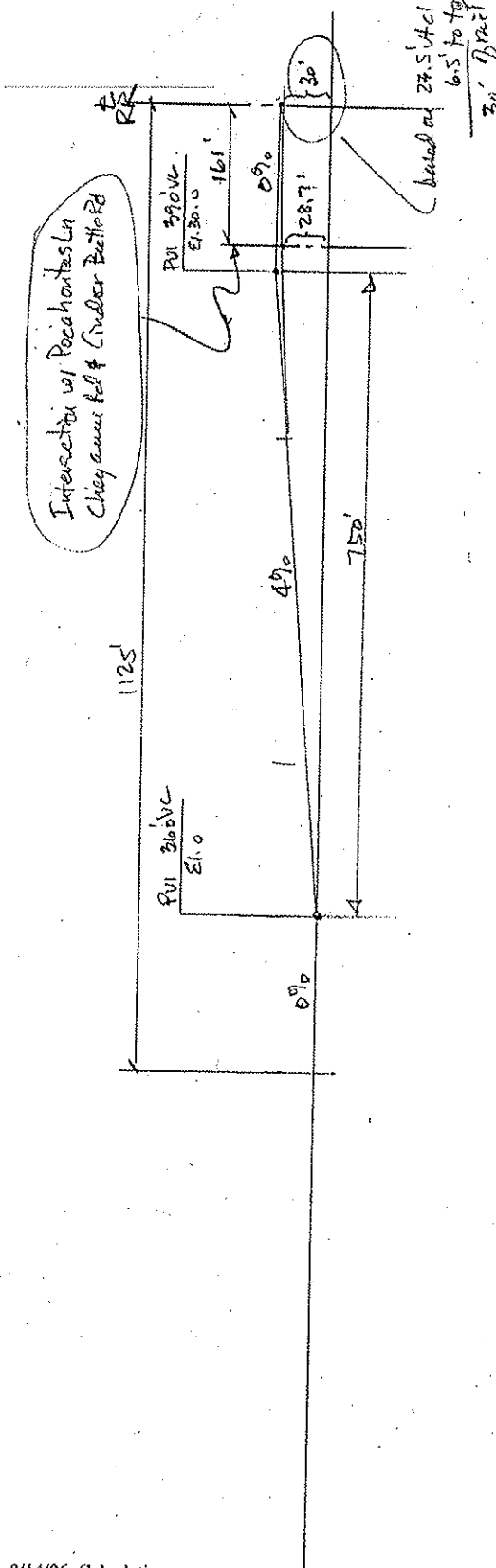
- Four lanes, median with 6 ft bike/shoulder and 6 ft sidewalks.
- Retaining walls each side to reduce ROW costs. May be less cost to use embankment.
- Span across RR and US 97 - remove existing US97 bridge to match new gradeline.
- Raise existing on/off ramps - west ramps raise 24 feet - east ramps 4 ft - MSE walls each side.
- Cul de sac intersecting local streets - maybe reconnect these streets toward the west.
- Estimate based on rough lengths between features from attached sketch.
- Profile is an estimate - assuming 0% grade along the existing ground.



DAVID EVANS
AND ASSOCIATES INC.

JOB DESCRIPTION Baker Rd.
CALCULATION FOR _____

JN. _____
BY TJSH DATE 5/15/08
SHEET _____ OF _____ SHEETS
CHECKED BY _____ DATE _____

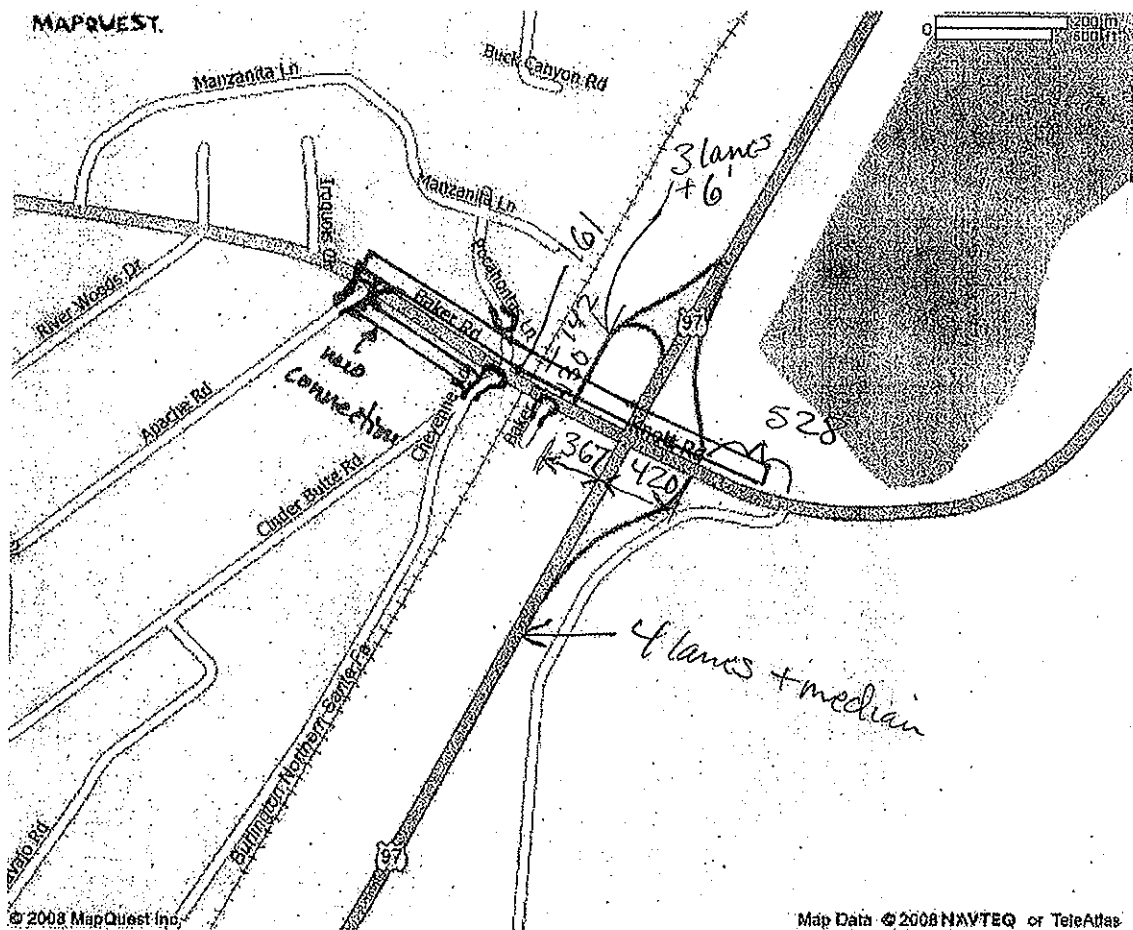


$$1.95 \times 0.0055 = 1.07$$

$$\left(\frac{.04 + .0055(195)}{2(300)} \right) = 1.68$$

$$\frac{26.5}{1.68} = 15.8$$

$$\frac{15.8}{24.82} = .64$$



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Crossing 10A-012.10

Benham Falls Road/USFS Road 9702 – Undercrossing

RATIONALE: Benham Falls Road is a paved Forest Service road that provides access from Highway 97 to a parking lot near the Deschutes River with access to Benham Falls. The road generally slopes downhill to the river. There are other dirt Forest Service roads that connect to this paved road near the tracks. These dirt Forest Service roads will need to be relocated. Since the road west of the tracks slope away from the tracks at a grade of approximately 4% and the road slopes toward the tracks on the east side at a grade of approximately 2%, an undercrossing is proposed. It would take a very long distance to get the road back to the existing road grades on the west side of the tracks with an overcrossing.

DAVID EVANS AND ASSOCIATES, INC.

SUMMARY COST ESTIMATE

PROJECT: ODOT0000630 Central Oregon Rail Plan	Engineer Name/Phone: Jim Dobrowski / 541.389.7614
CROSSING NO: 29, ODOT 066839Y	LOCATION: Benham Falls Road / USFS Rd 9702 Deschutes County
RAIL SEGMENT IDENTIFICATION: 10A-012.10	RAIL SEGMENT LENGTH:

NO.	ITEM	UNIT	QUANTITY	UNIT COST	TOTAL
1	Mobilization	LS	1	\$360,000	\$360,000
2	Selective Demolition	LS	1	\$150,000	\$150,000
3	Gravel access	LS	1	\$30,000	\$30,000
4	RR Bridge 100' x 45'	SF	4500	\$165	\$742,500
5	Excavation	CY	80000	\$20	\$1,600,000
6	Paving	SF	45600	\$10	\$456,000
SUBTOTAL					\$3,338,500

ADDITIONAL COSTS

Utility Allowance	\$50,000
Engineering/Surveying (10%)	\$333,850
Construction Engr./Contingency (50%)	\$1,669,250
Special Costs (Unique to crossing or segment)	
SUBTOTAL	\$2,053,100

TOTAL CONSTRUCTION COST

RIGHT-OF-WAY COSTS (Supplied by ODOT)	\$10,000
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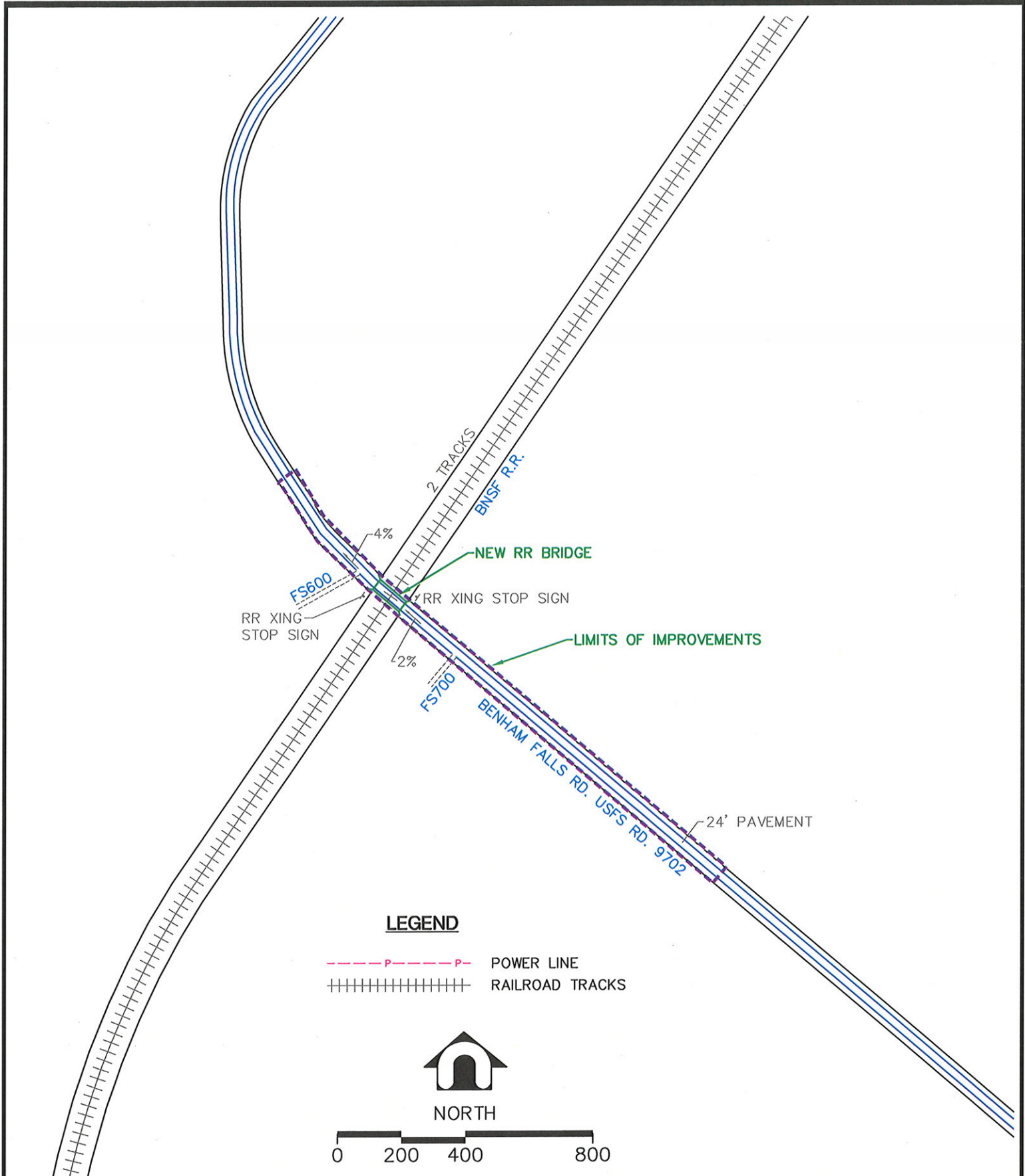
TOTAL CROSSING/SEGMENT COST **\$5,401,600**

Assumptions/Notes:

Bridge to provide for 2 tracks

RR bridge span 100', 45' wide

24 ft. wide existing pavement, 24 ft. wide pavement for road improvements



P:\O\ODOT\00000630\0400CAD\EC\SHEETS\029-ODOT-0630-Benham Falls Rd.dwg Apr 22,2009 - 9:14am jjd

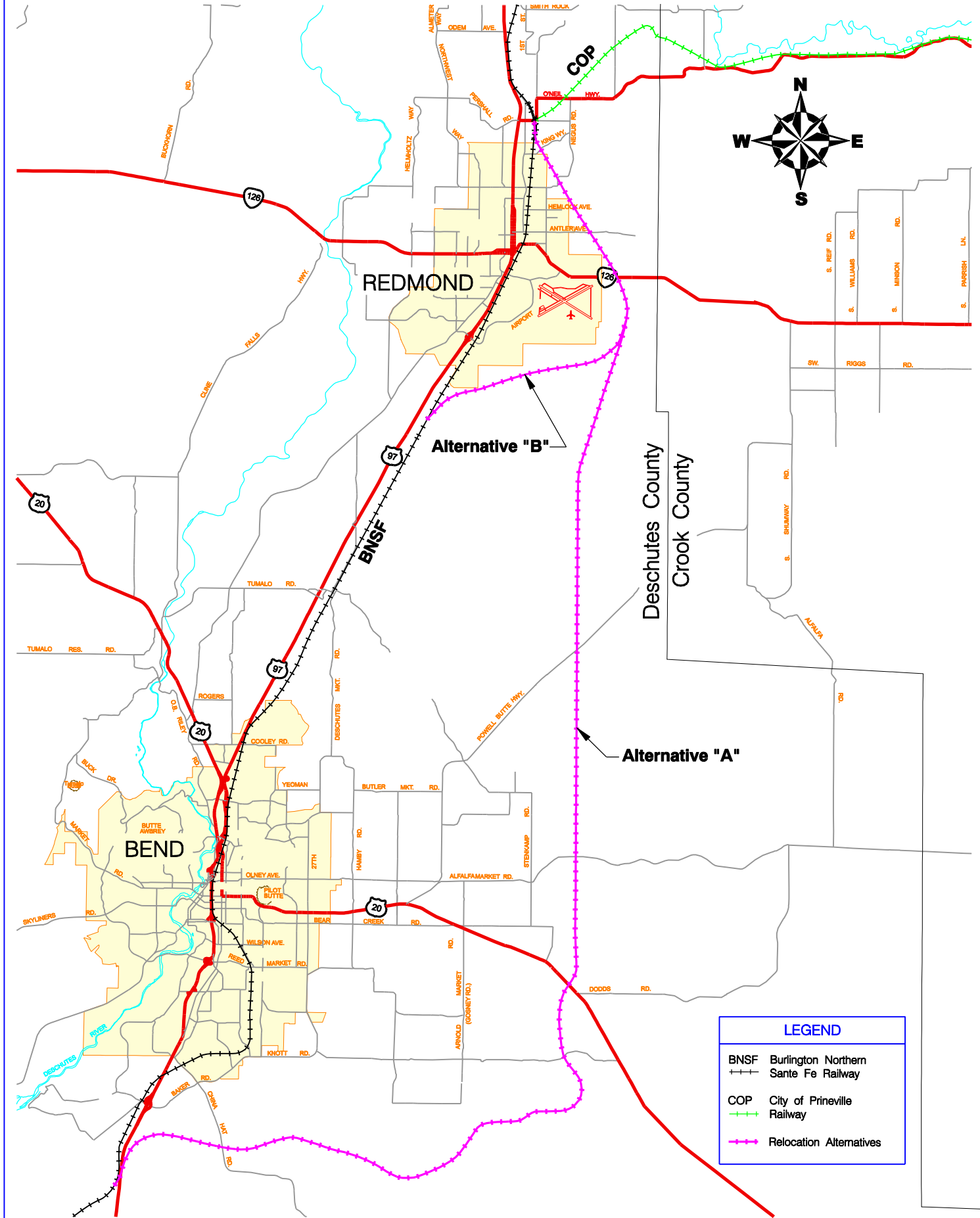
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date	11.14.08	drawn	WXS
file			



**DAVID EVANS
AND ASSOCIATES INC.**
320 SW Upper Terrace Drive, Suite 200
Bend, Oregon 97702 (541) 389-7814

CROSSING NO. 29
CROSSING ID 10A-012.80
USDOT NO. 066839Y
N 43°55'26" W -121°24'48"
LAVA
DESCHUTES COUNTY, OREGON

CENTRAL OREGON RAIL PLANNING RELOCATION ALTERNATIVES



LEGEND	
BNSF	Burlington Northern
---+	Sante Fe Railway
COP	City of Prineville Railway
---	Relocation Alternatives

Oregon Department of Transportation --Central Oregon Rail Project
 Alternate 'A' -- Redmond / Bend Track and Crossing Cost

11/4/2009



RAILROAD CROSSING DATA										RAILROAD TRACK SEGMENT DATA							COMMENTS			
Crossing No.	Name of Crossing	Over RR or Under RR	Extg Rdwy Width, ft	New Rdwy Width, ft	Skew Degrees	Span Length	Bridge/Crossing Cost	Approach Cost	Utility + 60% E&C Bridge/Crossing	Track Segment ID	Cut(cy)	Fill(cy)	Track(tf)	Total Track Cost	No. 24 Mainline Turnout	60% E&C Trackwork	Total Cost (in millions)			
BNSF Mainline Tie (North)															\$1.0	\$0.5	\$1.5			
	North Tie																			
118/119	Kings Way/Pilot Butte Canal	Under	NA	15	na	na	\$1.5	\$0.0	\$0.8	North Tie to 118/119	6,778	3,014	2,740	\$0.7		\$0.3	\$1.0			Canal crossing - Buried 8 to 11 ft. diameter irrigation pipe with 15 ft. x 18 ft. box cluvert for maintenance road.
										118/119 to 111	408,913	387,546	17,819	\$17.1		\$8.6	\$25.7			
117	COID Lateral						\$0.80		\$0.4								\$1.2			Canal crossing - Buried 8 to 11 ft. diameter irrigation pipe with 15 ft. x 18 ft. box cluvert for maintenance road.
114	COID Lateral						\$0.80		\$0.4								\$1.2			Canal crossing - Buried 8 to 11 ft. diameter irrigation pipe with 15 ft. x 18 ft. box cluvert for maintenance road.
113	COID Lateral						\$0.80		\$0.4								\$1.2			Canal crossing - Buried 8 to 11 ft. diameter irrigation pipe with 15 ft. x 18 ft. box cluvert for maintenance road.
111	Maple Ave./ Negus Ave.	Over	24'	86'	45	145'	\$2.1	\$10.3	\$7.5								\$19.9			roadway realigned. Standard Overcrossing is feasible.
101	Antler Ave.	Over	NA	86'	30	115'	\$1.6	\$10.3	\$7.2								\$19.1			There is no existing road, but city plans to extend Antler to the east. Standard Overcrossing is feasible.
99	Hwy 126	Over	32' Or 36'	86'	30	115'	\$1.6	\$10.3	\$7.2								\$19.1			Road is tangent. Standard overcrossing is feasible.
										111 to 91	0	68,552	2,432	\$1.5		\$0.7	\$2.2			
91	N. Unit Main Canal	Under	NA	15	na	na	\$1.5	\$0.0	\$0.8								\$2.3			Canal crossing - Buried 8 to 11 ft. diameter irrigation pipe with 15 ft. x 18 ft. box cluvert for maintenance road.
88,89, 127	SW McCaffery	Over	18' gravel	24'	0	100'	\$0.4	\$2.2	\$1.7								\$4.3			Realign roads so that one structure carries all. Standard overcrossing is feasible.
76	Hornor Rd	Over	28'	86'	20	107'	\$1.5	\$10.2	\$7.1								\$18.8			Road is tangent. Standard overcrossing is feasible.
71 & 72	Morrill Rd	Over	28'	86'	0	100'	\$1.4	\$10.2	\$7.0								\$18.6			Realign roads so that one structure carries all. Standard overcrossing is feasible.
70	Powell Butte Hwy	Over	28'	86'	45	145'	\$2.1	\$10.3	\$7.5								\$19.9			Road is tangent. Standard overcrossing is feasible.
56	Alfalfa Market Rd.	Over	28'	86'	0	100'	\$1.4	\$10.2	\$7.0								\$18.6			Road is tangent. Standard overcrossing is feasible.
142	Bear Creek Rd.	Over	18' gravel	24'	0	100'	\$0.4	\$2.2	\$1.7								\$4.3			Road is tangent. Standard overcrossing is feasible.
										91 to 140	125,510	1,349,711	80,963	\$36.9		\$18.5	\$55.4			
140	Central Oregon Irrigation District Canal	Under	NA	15	na	na	\$1.5	\$0.0	\$0.8								\$2.3			Canal crossing - Buried 8 to 11 ft. diameter irrigation pipe with 15 ft. x 18 ft. box cluvert for maintenance road.
139	US Hwy 20	Over	40'	86'	17	105'	\$1.5	\$10.2	\$7.1								\$18.8			Road is tangent. Standard overcrossing is feasible.
135	Rickard Rd.	Over	20' gravel	24'	0	100'	\$0.4	\$2.2	\$1.7								\$4.3			Realign Road to 90 degree crossing. Standard crossing is feasible.
21	Calgary Drive	Under	24'	45'	0	100'	\$2.9	\$0.0	\$1.8								\$4.7			Assume 100 ft span length with vertical abutments.
										140 to 20	2,108,278	1,179,292	36,370	\$66.2		\$33.1	\$99.3			
20	Ravine	Under	NA	45'	0	200'	\$5.7	\$0.0	\$3.5								\$9.2			Assume 200 ft bridge length, using most economical span lengths.
17	Horse Butte Rd	Over	18' Gravel	24'	0	100'	\$0.4	\$2.2	\$1.7								\$4.3			Realign Road to 90 degree crossing. Standard crossing is feasible.
5	China Hat Rd	Over	24'	86'	25	110'	\$1.6	\$10.2	\$7.2								\$19.0			Road is tangent. Standard overcrossing is feasible.
2	Scale House Rd.	Over	20'	86'	35	125'	\$1.8	\$10.2	\$7.3								\$19.3			Road is tangent. Standard overcrossing is feasible.
										20 to 1	2,314,393	1,848,067	41,456	\$81.3		\$40.6	\$121.9			
1	Hwy 97	Under	NA	45'	75	150'-150'	\$9.40	\$0.0	\$5.8								\$15.2			The entrance to the High Desert Museum is located at the low point of the highway profile. It is assumed that this entrance will be moved to the south so that the undercrossing can be located at the low point to avoid raising the RR grade any more than necessary.
										1 to South Tie	8,575	27,267	1,919	\$0.9		\$0.5	\$1.4			
BNSF Mainline Tie (South)															\$1.0	\$0.5	\$1.5			
South Tie																				
Subtotal											4,972,446	4,863,448	183,699	\$204.5	\$2.0	\$103.3	\$557.5			
LUMP SUM ITEMS																				
Right of Way Fence																		\$7.3		
10000 LF siding connected to mainline with 2 No 15 Turnouts																		\$9.8		
Clear and Grub																		\$32.0		
Grand Total																		\$606.7		
Note: Cost estimates for the crossing structures were predicated on the assumption that cast-in-place abutments and pre-cast (typical bulb-tee section) girders would be used.																				
Cost Assumptions:											Design Assumptions									
Cut - \$20 cu. yd.											Cut and Fill numbers represent a double track subgrade and a 13' access road.									
Fill - \$15 cu. yd.											Track numbers represent a single track installation.									
Clear and Grub - \$13.00 s.y											All vertical data compiled from GIS information provided by Deschutes County.									
Structures - \$635 sq. ft.											Overhead power line clearances meet UPRR and Bonneville Power Company standards in their present location									
Track (including subballast, ballast, ties, rail & OTM) - \$175 TF											Utility relocations are not part of track estimate									
Right of Way Fence - \$20 LF											All cuts are assumed to be rock cuts.									
10000 LFsiding connected to mainline with 2 No 15 Turnouts (switches) - \$3,250,000											BNSF requires a 10,000 LF siding be installed at 10 mile intervals									
No 24 Mainline Turnout (switch) - \$1,000,000																				

DAVID EVANS AND ASSOCIATES, INC.

SUMMARY COST ESTIMATE

PROJEC ODOT0000608 Central Oregon Rail Plan	Engineer Name/Phone: Chris White, Jon Burgi 1-541-389-7614
CROSSING NO: 118 & 119 - Pilot Butte Canal and Maint. Road	LOCATION: Bend
RAIL SEGMENT IDENTIFICATION:	RAIL SEGMENT LENGTH:

NO.	ITEM	UNIT	QUANTITY	UNIT COST	TOTAL
1	Mobilization	LS	1	\$100,842	\$100,842
2	Clearing and Grubbing	LS	1	\$10,000	\$10,000
3	Selective Demolition	LS	1	\$50,000	\$50,000
4	CLSM Pipe Encasement Complete	CY	185	\$110	\$20,350
5	90-inch Steel Pipe System Complete	LF	300	\$900	\$270,000
6	Inlet Structure Complete	LS	1	\$90,000	\$90,000
7	Outlet Structure Complete	LS	1	\$80,000	\$80,000
8	Excavation	LS	1	\$40,000	\$40,000
9	Embankment	LS	1	\$30,000	\$30,000
10	Landscape Restoration and Seeding	LS	1	\$15,000	\$15,000
11	Road Reconstruction / Box Culvert Crossing	LS	1	\$235,000	\$235,000

SUBTOTAL \$941,192

ADDITIONAL COSTS

Utility Allowance	\$40,000
Design/Construction Engineering/Surveying (25%)	\$235,298
Special Costs (Unique to crossing or segment)	\$0
Contingency (25%)	\$235,298
SUBTOTAL	\$510,596

TOTAL CONSTRUCTION COST \$1,451,788

RIGHT-OF-WAY COSTS (Supplied by ODOT)

TOTAL CROSSING/SEGMENT COST \$1,451,788

Assumptions/Notes: King Way cul-de-sac at each side of new RR. RR at grade.

DAVID EVANS AND ASSOCIATES, INC.

SUMMARY COST ESTIMATE

PROJECT: ODOT0000608 Central Oregon Rail Plan	Engineer Name/Phone: Chris White, Jon Burgi 1-541-389-7614
CROSSING NO: 117 - Canal Lateral	LOCATION: Redmond
RAIL SEGMENT IDENTIFICATION:	RAIL SEGMENT LENGTH:

NO.	ITEM	UNIT	QUANTITY	UNIT COST	TOTAL
1	Mobilization	LS	1	\$53,124	\$53,124
2	Clearing and Grubbing	LS	1	\$8,000	\$8,000
3	Selective Demolition	LS	1	\$30,000	\$30,000
4	CLSM Pipe Encasement Complete	CY	60	\$95	\$5,700
5	36-inch HDPE Pipe System Complete	LF	200	\$160	\$32,000
6	Inlet Structure Complete	LS	1	\$55,000	\$55,000
7	Outlet Structure Complete	LS	1	\$45,000	\$45,000
8	Excavation	LS	1	\$10,000	\$10,000
9	Embankment	LS	1	\$12,000	\$12,000
10	Landscape Restoration and Seeding	LS	1	\$10,000	\$10,000
11	Road Reconstruction / Box Culvert Crossing	LS	1	\$235,000	\$235,000

SUBTOTAL \$495,824

ADDITIONAL COSTS

Utility Allowance	\$25,000
Design/Construction Engineering/Surveying (25%)	\$123,956
Special Costs (Unique to crossing or segment)	\$0
Contingency (25%)	\$123,956
SUBTOTAL	\$272,912

TOTAL CONSTRUCTION COST \$768,736

RIGHT-OF-WAY COSTS (Supplied by ODOT)

TOTAL CROSSING/SEGMENT COST \$768,736

Assumptions/Notes:

DAVID EVANS AND ASSOCIATES, INC.

SUMMARY COST ESTIMATE

PROJECT: ODOT0000608 Central Oregon Rail Plan	Engineer Name/Phone: Chris White, Jon Burgi 1-541-389-7614
CROSSING NO: 114 - Canal Lateral	LOCATION: Redmond
RAIL SEGMENT IDENTIFICATION:	RAIL SEGMENT LENGTH:

NO.	ITEM	UNIT	QUANTITY	UNIT COST	TOTAL
1	Mobilization	LS	1	\$53,124	\$53,124
2	Clearing and Grubbing	LS	1	\$8,000	\$8,000
3	Selective Demolition	LS	1	\$30,000	\$30,000
4	CLSM Pipe Encasement Complete	CY	60	\$95	\$5,700
5	36-inch HDPE Pipe System Complete	LF	200	\$160	\$32,000
6	Inlet Structure Complete	LS	1	\$55,000	\$55,000
7	Outlet Structure Complete	LS	1	\$45,000	\$45,000
8	Excavation	LS	1	\$10,000	\$10,000
9	Embankment	LS	1	\$12,000	\$12,000
10	Landscape Restoration and Seeding	LS	1	\$10,000	\$10,000
11	Road Reconstruction / Box Culvert Crossing	LS	1	\$235,000	\$235,000

SUBTOTAL \$495,824

ADDITIONAL COSTS

Utility Allowance	\$25,000
Design/Construction Engineering/Surveying (25%)	\$123,956
Special Costs (Unique to crossing or segment)	\$0
Contingency (25%)	\$123,956
SUBTOTAL	\$272,912

TOTAL CONSTRUCTION COST \$768,736

RIGHT-OF-WAY COSTS (Supplied by ODOT)

TOTAL CROSSING/SEGMENT COST \$768,736

Assumptions/Notes:

DAVID EVANS AND ASSOCIATES, INC.

SUMMARY COST ESTIMATE

PROJECT: ODOT0000608 Central Oregon Rail Plan	Engineer Name/Phone: Chris White, Jon Burgi 1-541-389-7614
CROSSING NO: 113 - Canal Lateral	LOCATION: Redmond
RAIL SEGMENT IDENTIFICATION:	RAIL SEGMENT LENGTH:

NO.	ITEM	UNIT	QUANTITY	UNIT COST	TOTAL
1	Mobilization	LS	1	\$53,124	\$53,124
2	Clearing and Grubbing	LS	1	\$8,000	\$8,000
3	Selective Demolition	LS	1	\$30,000	\$30,000
4	CLSM Pipe Encasement Complete	CY	60	\$95	\$5,700
5	36-inch HDPE Pipe System Complete	LF	200	\$160	\$32,000
6	Inlet Structure Complete	LS	1	\$55,000	\$55,000
7	Outlet Structure Complete	LS	1	\$45,000	\$45,000
8	Excavation	LS	1	\$10,000	\$10,000
9	Embankment	LS	1	\$12,000	\$12,000
10	Landscape Restoration and Seeding	LS	1	\$10,000	\$10,000
11	Road Reconstruction / Box Culvert Crossing	LS	1	\$235,000	\$235,000

SUBTOTAL \$495,824

ADDITIONAL COSTS

Utility Allowance	\$25,000
Design/Construction Engineering/Surveying (25%)	\$123,956
Special Costs (Unique to crossing or segment)	\$0
Contingency (25%)	\$123,956
SUBTOTAL	\$272,912

TOTAL CONSTRUCTION COST \$768,736

RIGHT-OF-WAY COSTS (Supplied by ODOT)

TOTAL CROSSING/SEGMENT COST \$768,736

Assumptions/Notes:

DAVID EVANS AND ASSOCIATES, INC.

SUMMARY COST ESTIMATE

PROJECT: ODOT0000608 Central Oregon Rail Plan	Terry Shike/503-361-8635				
CROSSING NO: 111	Maple/Negus Ave.				
RAIL SEGMENT IDENTIFICATION: Reroute	RAIL SEGMENT LENGTH:				
NO.	ITEM	UNIT	QUANTITY	UNIT COST	TOTAL
	Bridge 86' x 145'	ft2	12470	\$165	\$2,057,550
	MSE Retaining Walls	ft2	74000	\$100	\$7,400,000
	Embankment	yd3	64000	\$15	\$960,000
	Paving	ft2	171000	\$10	\$1,710,000
	Sidewalks	ft2	27000	\$10	\$270,000
SUBTOTAL					\$12,397,550

ADDITIONAL COSTS	
Utility Allowance	\$100,000
Design/Surveying (10%)	\$1,239,755
Constr. Engr./Contingency (50%)	\$6,198,775
Special Costs (Unique to crossing or segment)	
SUBTOTAL	\$7,538,530
TOTAL CONSTRUCTION COST	
RIGHT-OF-WAY COSTS (Supplied by ODOT)	
TOTAL CROSSING/SEGMENT COST	
	\$19,936,080

Assumptions/Notes:

Four lanes, median, with 6 ft bike/shoulder and 6 ft sidewalks.

Retaining walls each side to reduce ROW costs.

Bridge on 45 degree skew

DAVID EVANS AND ASSOCIATES, INC.

SUMMARY COST ESTIMATE

PROJECT: ODOT0000608 Central Oregon Rail Plan		Terry Shike/503-361-8635			
CROSSING NO: 101		Antler Avenue			
RAIL SEGMENT IDENTIFICATION: Reroute		RAIL SEGMENT LENGTH:			
NO.	ITEM	UNIT	QUANTITY	UNIT COST	TOTAL
	Bridge 86' x 115'	ft2	9890	\$165	\$1,631,850
	MSE Retaining Walls	ft2	73000	\$100	\$7,300,000
	Embankment	yd3	64000	\$15	\$960,000
	Paving	ft2	171000	\$10	\$1,710,000
	Sidewalks	ft2	27000	\$10	\$270,000
SUBTOTAL					\$11,871,850

ADDITIONAL COSTS	
Utility Allowance	\$100,000
Design/Surveying (10%)	\$1,187,185
Constr.Engr./Contingency (50%)	\$5,935,925
Special Costs (Unique to crossing or segment)	
SUBTOTAL	\$7,223,110
TOTAL CONSTRUCTION COST	
RIGHT-OF-WAY COSTS (Supplied by ODOT)	
TOTAL CROSSING/SEGMENT COST	
	\$19,094,960

Assumptions/Notes:

- Four lanes, median, with 6 ft bike/shoulder and 6 ft sidewalks.
- Retaining walls each side to reduce ROW costs.
- Bridge on 30 degree skew

DAVID EVANS AND ASSOCIATES, INC.

SUMMARY COST ESTIMATE

PROJECT: ODOT0000608 Central Oregon Rail Plan		Terry Shike/503-361-8635			
CROSSING NO: 99		Highway 126			
RAIL SEGMENT IDENTIFICATION: Reroute		RAIL SEGMENT LENGTH:			
NO.	ITEM	UNIT	QUANTITY	UNIT COST	TOTAL
	Bridge 86' x 115'	ft2	9890	\$165	\$1,631,850
	MSE Retaining Walls	ft2	73000	\$100	\$7,300,000
	Embankment	yd3	64000	\$15	\$960,000
	Paving	ft2	171000	\$10	\$1,710,000
	Sidewalks	ft2	27000	\$10	\$270,000
SUBTOTAL					\$11,871,850

ADDITIONAL COSTS	
Utility Allowance	\$100,000
Design/Surveying (10%)	\$1,187,185
Constr.Engr./Contingency (50%)	\$5,935,925
Special Costs (Unique to crossing or segment)	
SUBTOTAL	\$7,223,110
TOTAL CONSTRUCTION COST	
RIGHT-OF-WAY COSTS (Supplied by ODOT)	
TOTAL CROSSING/SEGMENT COST	
	\$19,094,960

Assumptions/Notes:

- Four lanes, median, with 6 ft bike/shoulder and 6 ft sidewalks.
- Retaining walls each side to reduce ROW costs.
- Bridge on 30 degree skew

DAVID EVANS AND ASSOCIATES, INC.

SUMMARY COST ESTIMATE

PROJECT: ODOT0000608 Central Oregon Rail Plan		Engineer Name/Phone: Chris White, Jon Burgi 1-541-389-7614			
CROSSING NO: 91-N. Unit Main Canal and Maint. Road		LOCATION: Bend			
RAIL SEGMENT IDENTIFICATION:		RAIL SEGMENT LENGTH:			
NO.	ITEM	UNIT	QUANTITY	UNIT COST	TOTAL
1	Mobilization	LS	1	\$102,498	\$102,498
2	Clearing and Grubbing	LS	1	\$10,000	\$10,000
3	Selective Demolition	LS	1	\$50,000	\$50,000
4	CLSM Pipe Encasement Complete	LS	1	\$20,500	\$20,500
5	108-inch Steel Pipe System Complete	CY	215	\$110	\$23,650
6	Inlet Structure Complete	LF	300	\$1,100	\$330,000
7	Outlet Structure Complete	LS	1	\$90,000	\$90,000
8	Excavation	LS	1	\$45,000	\$45,000
9	Embankment	LS	1	\$35,000	\$35,000
10	Landscape Restoration and Seeding	LS	1	\$15,000	\$15,000
11	Road Reconstruction / Box Culvert Crossing	LS	1	\$235,000	\$235,000
SUBTOTAL					\$956,648

ADDITIONAL COSTS	
Utility Allowance	\$40,000
Design/Construction Engineering/Surveying (25%)	\$239,162
Special Costs (Unique to crossing or segment)	\$0
Contingency (25%)	\$239,162
SUBTOTAL	\$518,324
TOTAL CONSTRUCTION COST	
\$1,474,972	
RIGHT-OF-WAY COSTS (Supplied by ODOT)	
TOTAL CROSSING/SEGMENT COST	
\$1,474,972	

Assumptions/Notes:

DAVID EVANS AND ASSOCIATES, INC.

SUMMARY COST ESTIMATE

PROJECT: ODOT0000608 Central Oregon Rail Plan	Terry Shike/503-361-8635
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CROSSING NO: 88,89,127	SW McCaffery Road
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RAIL SEGMENT IDENTIFICATION: Reroute	RAIL SEGMENT LENGTH:
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NO.	ITEM	UNIT	QUANTITY	UNIT COST	TOTAL
	Bridge 24' x 100'	ft2	2400	\$165	\$396,000
	MSE Retaining Walls	ft2	0	\$100	\$0
	Embankment	yd3	111200	\$15	\$1,668,000
	Paving	ft2	54000	\$10	\$540,000
	Sidewalks	ft2	0	\$10	\$0

SUBTOTAL	\$2,604,000
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ADDITIONAL COSTS	
Utility Allowance	\$100,000
Design/Surveying (10%)	\$260,400
Constr. Engr./Contingency (50%)	\$1,302,000
Special Costs (Unique to crossing or segment)	
SUBTOTAL	\$1,662,400

TOTAL CONSTRUCTION COST

RIGHT-OF-WAY COSTS (Supplied by ODOT)
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TOTAL CROSSING/SEGMENT COST	\$4,266,400
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Assumptions/Notes:
 Two lanes, no shoulders, no bike lanes, no sidewalks
 Embankment with 2:1 slopes, no retaining walls.
 Bridge on 0 degree skew

DAVID EVANS AND ASSOCIATES, INC.

SUMMARY COST ESTIMATE

PROJECT: ODOT0000608 Central Oregon Rail Plan		Terry Shike/503-361-8635			
CROSSING NO: 76		Horner Road			
RAIL SEGMENT IDENTIFICATION: Reroute		RAIL SEGMENT LENGTH:			
NO.	ITEM	UNIT	QUANTITY	UNIT COST	TOTAL
	Bridge 86' x 107'	ft2	9202	\$165	\$1,518,330
	MSE Retaining Walls	ft2	72600	\$100	\$7,260,000
	Embankment	yd3	64000	\$15	\$960,000
	Paving	ft2	171000	\$10	\$1,710,000
	Sidewalks	ft2	27000	\$10	\$270,000
SUBTOTAL					\$11,718,330

ADDITIONAL COSTS	
Utility Allowance	\$100,000
Design/Surveying (10%)	\$1,171,833
Constr.Engr./Contingency (50%)	\$5,859,165
Special Costs (Unique to crossing or segment)	
SUBTOTAL	\$7,130,998
TOTAL CONSTRUCTION COST	
RIGHT-OF-WAY COSTS (Supplied by ODOT)	
TOTAL CROSSING/SEGMENT COST	
	\$18,849,328

Assumptions/Notes:

Four lanes, median, with 6 ft bike/shoulder and 6 ft sidewalks.

Retaining walls each side to reduce ROW costs.

Bridge on 20 degree skew

DAVID EVANS AND ASSOCIATES, INC.

SUMMARY COST ESTIMATE

PROJECT: ODOT0000608 Central Oregon Rail Plan		Terry Shike/503-361-8635			
CROSSING NO: 71/72		Morrill Road			
RAIL SEGMENT IDENTIFICATION: Reroute		RAIL SEGMENT LENGTH:			
NO.	ITEM	UNIT	QUANTITY	UNIT COST	TOTAL
	Bridge 86' x 100'	ft2	8600	\$165	\$1,419,000
	MSE Retaining Walls	ft2	72300	\$100	\$7,230,000
	Embankment	yd3	64000	\$15	\$960,000
	Paving	ft2	171000	\$10	\$1,710,000
	Sidewalks	ft2	27000	\$10	\$270,000
SUBTOTAL					\$11,589,000

ADDITIONAL COSTS	
Utility Allowance	\$100,000
Design/Surveying (10%)	\$1,158,900
Constr.Engr./Contingency (50%)	\$5,794,500
Special Costs (Unique to crossing or segment)	
SUBTOTAL	\$7,053,400
TOTAL CONSTRUCTION COST	
RIGHT-OF-WAY COSTS (Supplied by ODOT)	
TOTAL CROSSING/SEGMENT COST	
	\$18,642,400

Assumptions/Notes:

- Four lanes, median, with 6 ft bike/shoulder and 6 ft sidewalks.
- Retaining walls each side to reduce ROW costs.
- Bridge on 0 degree skew

DAVID EVANS AND ASSOCIATES, INC.

SUMMARY COST ESTIMATE

PROJECT: ODOT0000608 Central Oregon Rail Plan	Terry Shike/503-361-8635
CROSSING NO: 70	Powell Butte Highway
RAIL SEGMENT IDENTIFICATION: Reroute	RAIL SEGMENT LENGTH:

NO.	ITEM	UNIT	QUANTITY	UNIT COST	TOTAL
	Bridge 86' x 145'	ft2	12470	\$165	\$2,057,550
	MSE Retaining Walls	ft2	74000	\$100	\$7,400,000
	Embankment	yd3	64000	\$15	\$960,000
	Paving	ft2	171000	\$10	\$1,710,000
	Sidewalks	ft2	27000	\$10	\$270,000

SUBTOTAL	\$12,397,550
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ADDITIONAL COSTS	
Utility Allowance	\$100,000
Design/Surveying (10%)	\$1,239,755
Constr.Engr./Contingency (50%)	\$6,198,775
Special Costs (Unique to crossing or segment)	
SUBTOTAL	\$7,538,530

TOTAL CONSTRUCTION COST

RIGHT-OF-WAY COSTS (Supplied by ODOT)	
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TOTAL CROSSING/SEGMENT COST	\$19,936,080
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Assumptions/Notes:
 Four lanes, median, with 6 ft bike/shoulder and 6 ft sidewalks.
 Retaining walls each side to reduce ROW costs.
 Bridge on 45 degree skew

DAVID EVANS AND ASSOCIATES, INC.

SUMMARY COST ESTIMATE

PROJECT: ODOT0000608 Central Oregon Rail Plan		Terry Shike/503-361-8635			
CROSSING NO: 56		Alfalfa Market Road			
RAIL SEGMENT IDENTIFICATION: Reroute		RAIL SEGMENT LENGTH:			
NO.	ITEM	UNIT	QUANTITY	UNIT COST	TOTAL
	Bridge 86' x 100'	ft2	8600	\$165	\$1,419,000
	MSE Retaining Walls	ft2	72300	\$100	\$7,230,000
	Embankment	yd3	64000	\$15	\$960,000
	Paving	ft2	171000	\$10	\$1,710,000
	Sidewalks	ft2	27000	\$10	\$270,000
SUBTOTAL					\$11,589,000

ADDITIONAL COSTS	
Utility Allowance	\$100,000
Design/Surveying (10%)	\$1,158,900
Constr.Engr./Contingency (50%)	\$5,794,500
Special Costs (Unique to crossing or segment)	
SUBTOTAL	\$7,053,400
TOTAL CONSTRUCTION COST	
RIGHT-OF-WAY COSTS (Supplied by ODOT)	
TOTAL CROSSING/SEGMENT COST	
	\$18,642,400

Assumptions/Notes:

- Four lanes, median, with 6 ft bike/shoulder and 6 ft sidewalks.
- Retaining walls each side to reduce ROW costs.
- Bridge on 0 degree skew

DAVID EVANS AND ASSOCIATES, INC.

SUMMARY COST ESTIMATE

PROJECT: ODOT0000608 Central Oregon Rail Plan		Terry Shike/503-361-8635			
CROSSING NO: 142		Bear Creek Road			
RAIL SEGMENT IDENTIFICATION: Reroute		RAIL SEGMENT LENGTH:			
NO.	ITEM	UNIT	QUANTITY	UNIT COST	TOTAL
	Bridge 24' x 100'	ft2	2400	\$165	\$396,000
	MSE Retaining Walls	ft2	0	\$100	\$0
	Embankment	yd3	111200	\$15	\$1,668,000
	Paving	ft2	54000	\$10	\$540,000
	Sidewalks	ft2	0	\$10	\$0
SUBTOTAL					\$2,604,000

ADDITIONAL COSTS	
Utility Allowance	\$100,000
Design/Surveying (10%)	\$260,400
Constr.Engr./Contingency (50%)	\$1,302,000
Special Costs (Unique to crossing or segment)	
SUBTOTAL	\$1,662,400
TOTAL CONSTRUCTION COST	
RIGHT-OF-WAY COSTS (Supplied by ODOT)	
TOTAL CROSSING/SEGMENT COST	
	\$4,266,400

Assumptions/Notes:

- Two lanes, no shoulders, no bike lanes, no sidewalks
- Embankment with 2:1 slopes, no retaining walls.
- Bridge on 0 degree skew

DAVID EVANS AND ASSOCIATES, INC.

SUMMARY COST ESTIMATE

PROJECT: ODOT0000608 Central Oregon Rail Plan	Engineer Name/Phone: Chris White, Jon Burgi 1-541-389-7614
CROSSING NO: 140 - Central Oregon Canal and Maint. Rd.	LOCATION: Redmond
RAIL SEGMENT IDENTIFICATION:	RAIL SEGMENT LENGTH:

NO.	ITEM	UNIT	QUANTITY	UNIT COST	TOTAL
1	Mobilization	LS	1	\$105,774	\$105,774
2	Clearing and Grubbing	LS	1	\$10,000	\$10,000
3	Selective Demolition	LS	1	\$50,000	\$50,000
4	CLSM Pipe Encasement Complete	CY	195	\$110	\$21,450
5	96-inch Steel Pipe System Complete	LF	300	\$1,000	\$300,000
6	Inlet Structure Complete	LS	1	\$95,000	\$95,000
7	Outlet Structure Complete	LS	1	\$85,000	\$85,000
8	Excavation	LS	1	\$40,000	\$40,000
9	Embankment	LS	1	\$30,000	\$30,000
10	Landscape Restoration and Seeding	LS	1	\$15,000	\$15,000
11	Road Reconstruction / Box Culvert Crossing	LS	1	\$235,000	\$235,000

SUBTOTAL \$987,224

ADDITIONAL COSTS

Utility Allowance	\$40,000
Design/Construction Engineering/Surveying (25%)	\$246,806
Special Costs (Unique to crossing or segment)	\$0
Contingency (25%)	\$184,306
SUBTOTAL	\$471,112

TOTAL CONSTRUCTION COST \$1,458,336

RIGHT-OF-WAY COSTS (Supplied by ODOT)

TOTAL CROSSING/SEGMENT COST \$1,458,336

DAVID EVANS AND ASSOCIATES, INC.

SUMMARY COST ESTIMATE

PROJECT: ODOT0000608 Central Oregon Rail Plan	Terry Shike/503-361-8635
CROSSING NO: 139	US Highway 20
RAIL SEGMENT IDENTIFICATION: Reroute	RAIL SEGMENT LENGTH:

NO.	ITEM	UNIT	QUANTITY	UNIT COST	TOTAL
	Bridge 86' x 105'	ft2	9030	\$165	\$1,489,950
	MSE Retaining Walls	ft2	72500	\$100	\$7,250,000
	Embankment	yd3	64000	\$15	\$960,000
	Paving	ft2	171000	\$10	\$1,710,000
	Sidewalks	ft2	27000	\$10	\$270,000

SUBTOTAL	\$11,679,950
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ADDITIONAL COSTS	
Utility Allowance	\$100,000
Design/Surveying (10%)	\$1,167,995
Constr.Engr./Contingency (50%)	\$5,839,975
Special Costs (Unique to crossing or segment)	
SUBTOTAL	\$7,107,970

TOTAL CONSTRUCTION COST

RIGHT-OF-WAY COSTS (Supplied by ODOT)	
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TOTAL CROSSING/SEGMENT COST	\$18,787,920
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Assumptions/Notes:
 Four lanes, median, with 6 ft bike/shoulder and 6 ft sidewalks.
 Retaining walls each side to reduce ROW costs.
 Bridge on 17 degree skew

DAVID EVANS AND ASSOCIATES, INC.

SUMMARY COST ESTIMATE

PROJECT: ODOT0000608 Central Oregon Rail Plan	Terry Shike/503-361-8635
CROSSING NO: 135	Rickard Road
RAIL SEGMENT IDENTIFICATION: Reroute	RAIL SEGMENT LENGTH:

NO.	ITEM	UNIT	QUANTITY	UNIT COST	TOTAL
	Bridge 24' x 100'	ft2	2400	\$165	\$396,000
	MSE Retaining Walls	ft2	0	\$100	\$0
	Embankment	yd3	111200	\$15	\$1,668,000
	Paving	ft2	54000	\$10	\$540,000
	Sidewalks	ft2	0	\$10	\$0

SUBTOTAL	\$2,604,000
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ADDITIONAL COSTS	
Utility Allowance	\$100,000
Design/Surveying (10%)	\$260,400
Constr.Engr./Contingency (50%)	\$1,302,000
Special Costs (Unique to crossing or segment)	
SUBTOTAL	\$1,662,400

TOTAL CONSTRUCTION COST

RIGHT-OF-WAY COSTS (Supplied by ODOT)	
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TOTAL CROSSING/SEGMENT COST	\$4,266,400
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Assumptions/Notes:
 Two lanes, no shoulders, no bike lanes, no sidewalks
 Embankment with 2:1 slopes, no retaining walls.
 Bridge on 0 degree skew

DAVID EVANS AND ASSOCIATES, INC.

SUMMARY COST ESTIMATE

PROJECT: ODOT0000608 Central Oregon Rail Plan		Terry Shike/503-361-8635			
CROSSING NO: 21		Calgary Drive			
RAIL SEGMENT IDENTIFICATION: Reroute		RAIL SEGMENT LENGTH:			
NO.	ITEM	UNIT	QUANTITY	UNIT COST	TOTAL
	RR Bridge, 45' x 100'	ft2	4500	\$635	\$2,857,500
SUBTOTAL					\$2,857,500

ADDITIONAL COSTS	
Utility Allowance	\$100,000
Design/Surveying (10%)	\$285,750
Constr.Engr./Contingency (50%)	\$1,428,750
Special Costs (Unique to crossing or segment)	
SUBTOTAL	\$1,814,500
TOTAL CONSTRUCTION COST	
RIGHT-OF-WAY COSTS (Supplied by ODOT)	
TOTAL CROSSING/SEGMENT COST	
	\$4,672,000

Assumptions/Notes:

Double track bridge - steel through girders with transverse floor beams and ballasted track.
All approach costs are in the track bed cost estimate.

DAVID EVANS AND ASSOCIATES, INC.

SUMMARY COST ESTIMATE

PROJECT: ODOT0000608 Central Oregon Rail Plan		Terry Shike/503-361-8635			
CROSSING NO: 20		Ravine			
RAIL SEGMENT IDENTIFICATION: Reroute		RAIL SEGMENT LENGTH:			
NO.	ITEM	UNIT	QUANTITY	UNIT COST	TOTAL
	RR Bridge, 45' x 200'	ft2	9000	\$635	\$5,715,000
SUBTOTAL					\$5,715,000

ADDITIONAL COSTS

Utility Allowance	\$100,000
Design/Surveying (10%)	\$571,500
Constr.Engr./Contingency (50%)	\$2,857,500
Special Costs (Unique to crossing or segment)	
SUBTOTAL	\$3,529,000

TOTAL CONSTRUCTION COST

RIGHT-OF-WAY COSTS (Supplied by ODOT)

TOTAL CROSSING/SEGMENT COST **\$9,244,000**

Assumptions/Notes:

Double track bridge - spans lengths and structure type to be determined, ballasted track.
All approach costs are in the track bed cost estimate.

DAVID EVANS AND ASSOCIATES, INC.

SUMMARY COST ESTIMATE

PROJECT: ODOT0000608 Central Oregon Rail Plan		Terry Shike/503-361-8635			
CROSSING NO: 17		Horse Butte Road			
RAIL SEGMENT IDENTIFICATION: Reroute		RAIL SEGMENT LENGTH:			
NO.	ITEM	UNIT	QUANTITY	UNIT COST	TOTAL
	Bridge 24' x 100'	ft2	2400	\$165	\$396,000
	MSE Retaining Walls	ft2	0	\$100	\$0
	Embankment	yd3	111200	\$15	\$1,668,000
	Paving	ft2	54000	\$10	\$540,000
	Sidewalks	ft2	0	\$10	\$0
SUBTOTAL					\$2,604,000

ADDITIONAL COSTS	
Utility Allowance	\$100,000
Design/Surveying (10%)	\$260,400
Constr.Engr./Contingency (50%)	\$1,302,000
Special Costs (Unique to crossing or segment)	
SUBTOTAL	\$1,662,400
TOTAL CONSTRUCTION COST	
RIGHT-OF-WAY COSTS (Supplied by ODOT)	
TOTAL CROSSING/SEGMENT COST	
	\$4,266,400

Assumptions/Notes:

- Two lanes, no shoulders, no bike lanes, no sidewalks
- Embankment with 2:1 slopes, no retaining walls.
- Bridge on 0 degree skew

DAVID EVANS AND ASSOCIATES, INC.

SUMMARY COST ESTIMATE

PROJECT: ODOT0000608 Central Oregon Rail Plan		Terry Shike/503-361-8635			
CROSSING NO: 5		China Hat Road			
RAIL SEGMENT IDENTIFICATION: Reroute		RAIL SEGMENT LENGTH:			
NO.	ITEM	UNIT	QUANTITY	UNIT COST	TOTAL
	Bridge 86' x 110'	ft2	9460	\$165	\$1,560,900
	MSE Retaining Walls	ft2	72800	\$100	\$7,280,000
	Embankment	yd3	64000	\$15	\$960,000
	Paving	ft2	171000	\$10	\$1,710,000
	Sidewalks	ft2	27000	\$10	\$270,000
SUBTOTAL					\$11,780,900

ADDITIONAL COSTS	
Utility Allowance	\$100,000
Design/Surveying (10%)	\$1,178,090
Constr.Engr./Contingency (50%)	\$5,890,450
Special Costs (Unique to crossing or segment)	
SUBTOTAL	\$7,168,540
TOTAL CONSTRUCTION COST	
RIGHT-OF-WAY COSTS (Supplied by ODOT)	
TOTAL CROSSING/SEGMENT COST	
	\$18,949,440

Assumptions/Notes:

- Four lanes, median, with 6 ft bike/shoulder and 6 ft sidewalks.
- Retaining walls each side to reduce ROW costs.
- Bridge on 25 degree skew

DAVID EVANS AND ASSOCIATES, INC.

SUMMARY COST ESTIMATE

PROJECT: ODOT0000608 Central Oregon Rail Plan		Terry Shike/503-361-8635			
CROSSING NO: 2		Scale House Road			
RAIL SEGMENT IDENTIFICATION: Reroute		RAIL SEGMENT LENGTH:			
NO.	ITEM	UNIT	QUANTITY	UNIT COST	TOTAL
	Bridge 86' x 125'	ft2	10750	\$165	\$1,773,750
	MSE Retaining Walls	ft2	73200	\$100	\$7,320,000
	Embankment	yd3	64000	\$15	\$960,000
	Paving	ft2	171000	\$10	\$1,710,000
	Sidewalks	ft2	27000	\$10	\$270,000
SUBTOTAL					\$12,033,750

ADDITIONAL COSTS	
Utility Allowance	\$100,000
Design/Surveying (10%)	\$1,203,375
Constr. Engr./Contingency (50%)	\$6,016,875
Special Costs (Unique to crossing or segment)	
SUBTOTAL	\$7,320,250
TOTAL CONSTRUCTION COST	
RIGHT-OF-WAY COSTS (Supplied by ODOT)	
TOTAL CROSSING/SEGMENT COST	
\$19,354,000	

Assumptions/Notes:

- Four lanes, median, with 6 ft bike/shoulder and 6 ft sidewalks.
- Retaining walls each side to reduce ROW costs.
- Bridge on 35 degree skew

DAVID EVANS AND ASSOCIATES, INC.

SUMMARY COST ESTIMATE

PROJECT: ODOT0000608 Central Oregon Rail Plan		Terry Shike/503-361-8635			
CROSSING NO: 1		US Highway 97			
RAIL SEGMENT IDENTIFICATION: Reroute		RAIL SEGMENT LENGTH:			
NO.	ITEM	UNIT	QUANTITY	UNIT COST	TOTAL
	RR Bridge, 45' x 300'	ft2	13500	\$700	\$9,450,000
SUBTOTAL					\$9,450,000

ADDITIONAL COSTS	
Utility Allowance	\$100,000
Design/Surveying (10%)	\$945,000
Constr.Engr./Contingency (50%)	\$4,725,000
Special Costs (Unique to crossing or segment)	
SUBTOTAL	\$5,770,000
TOTAL CONSTRUCTION COST	
RIGHT-OF-WAY COSTS (Supplied by ODOT)	
TOTAL CROSSING/SEGMENT COST	
	\$15,220,000

Assumptions/Notes:

Double track bridge - steel through girders with transverse floor beams and ballasted track.

Two span, 150'-150', on 75 degree skew.

All approach costs are in the track bed cost estimate.