

Draft Alternatives Evaluation Results

This memorandum documents the findings of the alternatives evaluation process for the Salem River Crossing Project. The purpose of this step of the project is to help the Task Force and Oversight Team narrow the universe of alternatives to a few that will be analyzed in the draft environmental impact statement (DEIS). This memo is not intended to suggest recommendations or decisions. It is intended to summarize the results of the technical evaluation process. These evaluation results are just one piece of information that, along with local knowledge and stakeholder perspectives, will be used by the Task Force and Oversight Team in the narrowing process.

This memorandum is organized into four main sections:

- **Evaluation Process** – summarizes the evaluation framework, alternatives, the methodology used to evaluate alternatives, and the decision model used to score the alternatives.
- **General Findings by Goal** – summarizes the general findings of the alternatives evaluation process. Findings are summarized by evaluation criteria category and alternative.
- **Key Findings by Alternative** – documents the key findings of the alternative evaluation process. Findings are organized by alternative.
- **Summary** – summarizes the findings of the alternative evaluation and describes the next steps.

EVALUATION PROCESS

The Salem River Crossing Evaluation Framework (see Salem River Crossing Project Evaluation Framework Technical Memorandum, approved on Jan. 29, 2007) outlines the approach for narrowing all potential project alternatives to a set that will be evaluated in the DEIS. There are two steps in this process. The first step screened preliminary concepts to ensure that each concept both met project's adopted Purpose and Need Statement, and the mobility standard or alternate mobility standard agreed upon by the City of Salem and the Oregon Department of Transportation. The alternatives to be evaluated were identified by the project team, Task Force, and Oversight Team, with input from community members at open houses on June 26 and 27, 2007, and via the project web site. The set of alternatives to be evaluated was recommended by the Task Force on Aug. 15, 2007, and by the Oversight Team on Aug. 17, 2007.

The second step of the evaluation process, conducted in fall 2007, compared the performance of project alternatives against the evaluation criteria specified in the Evaluation Framework. The results of this process are described in this report. Evaluation criteria are used to differentiate and identify trade-offs among feasible alternatives. To be most

effective, an evaluation criterion must be measurable and well-defined. This ensures a common understanding of each criterion's meaning, and allows for a clear comparison among alternatives. In total, 43 evaluation criteria were developed and approved by the Task Force and Oversight Team. Some criteria important to stakeholders could not be measured during this evaluation phase due to lack of applicable data, but are included because they will be used later in the process for selection of a preferred alternative, during final design, or during the procurement of construction contractors. For a list of these criteria, see the Salem River Crossing Project Evaluation Framework Technical Memorandum (approved January 29, 2007).

The evaluation framework includes the following six goals. Five of these goals were evaluated through this process and include criteria and performance measures:

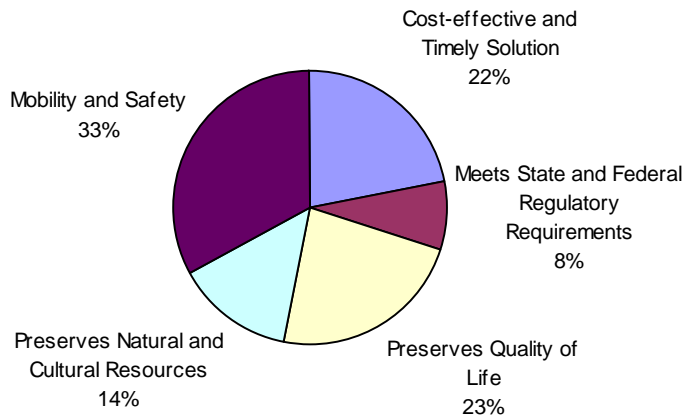
1. Improve mobility and safety for people and freight across the Willamette River in the Salem-Keizer Metropolitan Area
2. Preserve or improve natural and cultural resources
3. Preserve the quality of life in communities on both sides of the river
4. Meet federal and state regulatory requirements
5. Provide a cost effective and timely solution
6. Ensure that any structural solution is aesthetically pleasing¹

The Task Force determined weighting factors for the evaluation criteria to establish relative importance and value. Weighting was accomplished in a workshop using a nominal group process. First, each Task Force member developed his or her own weights for each of the six goals. Each member had 100 points to distribute across the six goals. Task Force member distributions were compiled to show the high, low, and median scores for each goal. The group discussed the scoring, with proponents of high and low scores explaining their reasoning to the others. Then the members individually reweighed the goals and their scores were averaged to determine the final weights.

This nominal group process was then repeated for the goals with the highest weights to determine the distribution of the weight assigned to the individual criteria within the goal. For example, the Preserve Quality of Life goal received a total weight of 23 points. Task Force members assigned 100 points across the 13 criteria comprising this goal in the same two-round process described above. The average weights were then normalized as a distribution of the 23 points. For the remaining goals, members each provided weights for the individual criteria and these were averaged and normalized without discussion. The weighting of the evaluation criteria goals is illustrated in Figure 1. A complete list of individual criterion weighting is provided in Attachment A. These weights and the performance of alternatives against the evaluation criteria were used to develop a "evaluation score," discussed later in this section.

¹ The sixth goal (aesthetics) was not evaluated at this time because bridge designs have not been developed. It will be considered as designs are developed.

FIGURE 1
Weight by Goal



Elements Common to Alternatives

For ease of reference, each of the potential crossing locations was assigned a color as a name. In some cases, two alternatives were developed for a particular crossing location: one was developed to meet the adopted mobility standard and one was developed to meet an alternate mobility standard.

In the alternatives referred to as a color plus “Red” (e.g. Orange + Red alternative), the “Red” component is generally consistent between alternatives. It refers to a direct connection between a new crossing and Highway 22 south of the existing bridges. The alternatives referred to as a color alone (e.g. Orange alternative) include improvements to the existing Marion Street and Center Street bridges and Highway 22 in addition to the new crossing. All alternatives also include some improvements to the street network.

Alternatives Evaluated

Seven crossing locations and 13 unique alternatives with variations including a Highway 22 connection (Red) or improvements to the existing bridges were evaluated. The alternatives are described below. It is important to note that all alternatives that do not include a direct connection to Highway 22 (Red) instead include extensive improvements to the existing Marion Street and Center Street bridges.

- Purple alternative** – Begins at the Salem Parkway on the east, extends south to Tryon Avenue, and connects to Wallace Road and Brush College Road on the west. Most of this bridge would need to be elevated, because it crosses over the floodplain and floodway. This concept does not have a direct connection to Highway 22, but does include significant improvement to the existing bridges.
- Orange and Orange + Red alternatives** – Begins at Salem Parkway on the east, extends south to Tryon Avenue, and connects to Wallace Road and Hope Avenue on the west. This bridge would need to be elevated for most of its length, because it crosses over the floodplain and floodway. Two variations were advanced for further study, one with a

direct connection to Highway 22 (Red) and one with improvements to the existing bridges.

- **Pink and Pink + Red alternatives** – Begins at Pine and Hickory streets on the east, extends slightly south to cross the river, then connects to Wallace Road and Hope Avenue on the west. Two variations were advanced for further study, one with a direct connection to Highway 22 (Red) and one with improvements to the existing bridges.
- **White, White + Red, and White + Red light alternatives** – Begins at Salem Parkway and Pine Street on the east, crosses the river and connects to Hope Avenue and Wallace Road on the west. Three variations were evaluated: one with a direct connection to Highway 22 (Red); one with a direct connection to Highway 22 (Red) but with a connection to the Liberty-Commercial couplet and no connection to Pine and Hickory streets; and a third that does not connect to Highway 22 (Red) but does include the Pine Street and Hickory Street couplet and improvements to the existing bridges.
- **Blue + Red alternative** – Begins at Academy and River streets on the east, extends over the river, then turns south to connect to Wallace and Orchard Heights Roads on the west. Includes direct connection to Highway 22 (Red).
- **Yellow and Yellow + Red alternatives** – Begins at Hood and Shipping streets on the east, crosses the river and connects to Wallace and Orchard Heights Roads on the west. Two variations were advanced for further study, one with a direct connection to Highway 22 (Red) and one with improvements to the existing bridges.
- **Green + Red alternative** – Begins at Market and Gaines streets on the east, crosses the river and connects to Glen Creek and Wallace Roads on the west. Includes a direct connection to Highway 22 (Red).
- **Forest alternative** – This alternative includes two new, independent bridges, one from Pine and Hickory streets to Wallace Road at Hope Avenue (Pink alignment) and one from Market Street to Glen Creek and Wallace roads (Green alignment). No direct connection to Highway 22 (Red) is included with this alternative, but it does include improvements to the existing bridges.

Methodology Summary

A team of technical experts rated the performance of these 13 alternatives against each of the 39 evaluation criteria adopted by the Task Force that could be measured. Performance ratings were either qualitative or quantitative. Thirty-four of these evaluation criteria could be evaluated to differentiate among the alternatives.

- For the qualitative criteria, the technical experts rated the alternatives on a scoring scale described in the methodology report. The scales were 1 to 3, 1 to 4, or 1 to 5, depending on the variation in the performance of alternatives. In all cases, the highest score represents the best performance.
- For the quantitative criteria, such as property impacts, natural resource impacts and costs, actual performance data was used for the evaluation process. For these criteria, the lowest cost or lowest number or area of impact represent the best performance. The

Salem River Crossing Alternatives Methodology Report documents the methodology used to evaluate alternatives.

Evaluation Tool

The combination of 13 alternatives and 39 evaluation criteria results in more than 500 performance scores. In addition, the weighting of the five goals that are being scored and the 39 evaluation criteria produces a data set difficult to manage and interpret. For these reasons, a commercially available decision analysis tool, Criterium Decision Plus, was used to capture all of the information. The software also applies mathematical equations to ensure the appropriate calculation of results. Steps in the Criterium Decision Plus tool are as follows:

- **Step 1: Develop Decision Structure** – In the first step, the five goals (criteria categories) and 39 evaluation criteria being scored, and all 13 alternatives are entered into the model.
- **Step 2: Input the Performance of the Alternatives** – The second step entails inputting the performance score from the technical team’s analysis for each alternative against each evaluation criterion.
- **Step 3: Weight the Evaluation Criteria** – The third step entails inputting the weighting assigned by the Task Force for each of the goals and evaluation criteria.
- **Step 4: Run Model and Rank Alternatives** – The final step entails running the model. A decision score for each alternative was calculated by multiplying the weights times the performance ratings (the 1 to 5 scales indicating the extent to which the alternatives met the performance criteria) for each criterion and summing the scores for all the criteria. The higher the score, the higher the relative performance of the alternative against all evaluation criteria. Evaluation scores were arrayed from high to low to indicate the relative rank of the alternatives. Attachment A shows the evaluation scores and alternative rankings.

The evaluation model is intended only as a tool to assist the Task Force in developing a recommendation. The evaluation model captures technical analysis of criteria and goals, but is not a substitute for group discussion of trade-offs and local knowledge of impacts. Stakeholder interpretation of the data and perspectives will guide the development of alternatives. The evaluation scores are just one piece of information that should be used in developing recommendations and decisions.

FINDINGS BY GOAL

Alternative screening findings in this memorandum are divided into two sections: (1) General Findings and (2) Key Findings by Alternative. This section, General Findings, summarizes the general findings by goal and evaluation criteria. The next section, Key Findings by Alternative, provides a summary of the alternative evaluation results by alternative. Appendix A provides detail on the evaluation of each criteria. (NOTE: Appendix A is currently being developed.)

Goal 1: Improve Mobility and Safety for People and Freight

Total Weight	33 Points (33% of total score)
Evaluation Criteria	<ul style="list-style-type: none"> • Improve vehicle and freight mobility for local travel (5.5 points) • Improve vehicle and freight mobility for regional travel (5 points) • Improve vehicle and freight mobility for through travel (4.9 points) • Improve safety for people, vehicles and freight (4.3 points) • Improve transit reliability across the Willamette River (5 points) • Improve pedestrian facilities across the Willamette River (3.1 points) • Improve bicycle facilities across the Willamette River (2.3 points) • Improve emergency vehicle response across the Willamette River (3 points)

Findings by Goal

- The Forest, Green + Red, White and Pink alternatives score best for this goal. Forest and Green + Red both scored well on the local mobility, transit and through mobility criteria. Forest and White both scored well on regional mobility criteria.
- Forest scored more points than any other option on the emergency vehicle response criterion because it would provide bridge redundancy.
- The Purple, Orange + Red, White + red light and Orange alternatives all scored poorly for this goal.
- The alternatives without Red scored well (and in some cases better than their alternative with Red) in large part due to the improvements to the existing bridges that are part of the non-Red alternatives.

FIGURE 2
Evaluation Score for Goal 1: Safety and mobility by rank

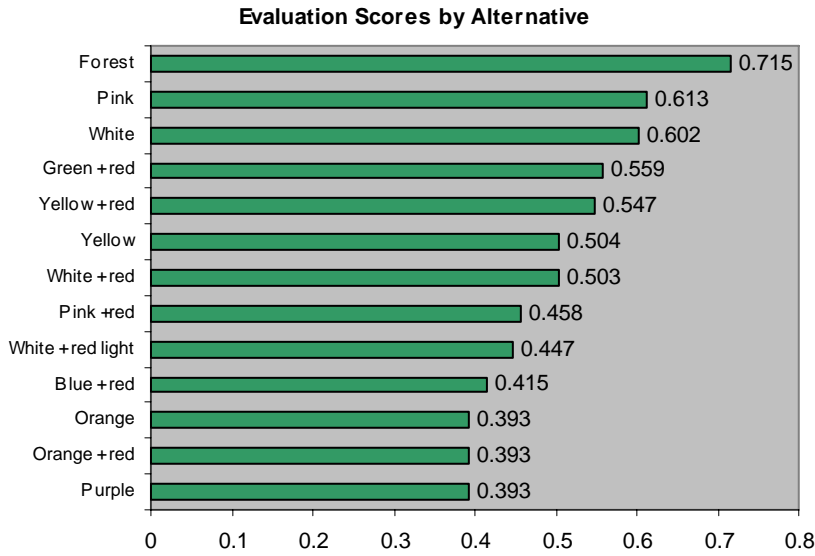
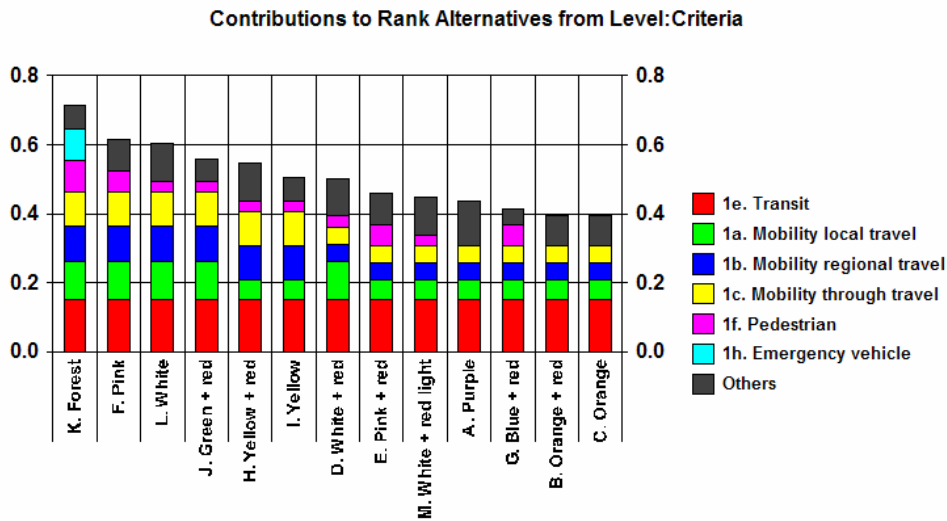


FIGURE 3
Contributions to Goal 1: Safety and mobility by rank



Findings by Criteria

Criteria	Overall Findings
Improve vehicle and freight mobility for local travel (5.5 points)	<ul style="list-style-type: none"> There was little overall differentiation between alternatives for this criterion, so alternatives were scored either a 2 or a 3 on a scale of 1 to 4. Green + Red, Forest, White, and Pink scored well for this criterion because they effectively relieved traffic on the existing bridges and resulted in a fewer system-wide vehicle hours of delay.
Improve vehicle and freight mobility for regional travel (5 points)	<ul style="list-style-type: none"> There was little overall differentiation between alternatives for this criterion, so alternatives were scored either a 2 or a 3 on a scale of 1 to 4.

Criteria	Overall Findings
points)	<ul style="list-style-type: none"> Pink, Yellow, Yellow + Red, Green + Red, Forest and White scored well for this criterion because they effectively relieved traffic on the existing bridges and resulted in fewer system-wide vehicle hours of delay.
Improve vehicle and freight mobility for through travel (4.9 points)	<ul style="list-style-type: none"> There was little overall differentiation between alternatives for this criterion, so alternatives were scored either a 2 or a 3 on a scale of 1 to 4. Pink, Yellow, Yellow + Red, Green + Red, Forest and White scored well for this criterion because they effectively relieved traffic on the existing bridges and resulted in fewer system-wide vehicle hours of delay.
Improve safety for people, vehicles and freight (4.3 points)	<ul style="list-style-type: none"> Purple scored well for this criterion because of limited access, only one new signalized intersection, and limited bicycle/pedestrian interactions with vehicles and freight Forest and Blue + Red scored poorly for this criterion. The Forest alternative performed poorly in the access control and bicycle/pedestrian interaction subcriteria, and performed average in the other two subcriteria. The Blue + Red alternative performed poorly in the new signalized intersection and bicycle/pedestrian interaction subcriteria.
Improve transit reliability across the Willamette River (5 points)	<ul style="list-style-type: none"> There was little differentiation between alternatives for this criterion so all alternatives received a score of three.
Improve pedestrian facilities across the Willamette River (3.1 points)	<ul style="list-style-type: none"> Forest scored well for this criterion. Purple, Orange + Red and Orange scored poorly because of the longer crossing distances and lack of pedestrian facilities near the bridge heads.
Improve bicycle facilities across the Willamette River (2.3 points)	<ul style="list-style-type: none"> Forest scored well for this criterion. Purple, Orange + Red and Orange scored poorly for this criterion because of the longer crossing distances and lack of bicycle facilities near the bridge heads.
Improve emergency vehicle response across the Willamette River (3 points)	<ul style="list-style-type: none"> Forest scored well for this criterion because it provides two new bridges. The remaining alternatives that provide one new bridge received the same score.

Goal 2: Preserve or Improve Natural and Cultural Resources

Total Weight	14 Points (14% of total score)
Evaluation Criteria	<ul style="list-style-type: none"> Avoid direct and indirect impacts to wetlands where practicable. Minimize and mitigate any unavoidable adverse impacts and provide opportunities for wetland enhancement (1.7 points) Avoid direct and indirect impacts to Threatened and Endangered (T&E) and other fish species where practicable. Minimize and mitigate any unavoidable adverse impacts and provide opportunities for improvement of critical habitat (1.5 points) Avoid direct and indirect impacts to terrestrial T&E species where practicable. Minimize and mitigate any unavoidable adverse impacts, and provide opportunities for improvement of habitat (1 point) Preserve or enhance ecological connectivity (1.4 points) Preserve or improve the existing floodplain and fluvial functions (1.4 points)

- Preserve air quality (2.7 points)
- Avoid direct and indirect impacts to historic resources where practicable, and mitigate any unavoidable impacts (.9 point)
- Avoid direct and indirect impacts to cultural resources where practicable, and mitigate any unavoidable impacts (1 point)
- Avoid or minimize impacts to or improve tree cover where practicable, and mitigate any unavoidable adverse impacts (1.1 points)
- Avoid or minimize impacts to or improve native plant communities where practicable, and mitigate any unavoidable adverse impacts (1 point)

Findings by Goal

- The Green + Red, White + Red light, White + Red, and Yellow + Red alternatives all scored well for this goal. These alternatives all scored well for minimizing floodplain impacts. The Green + Red and Yellow + Red alternatives scored well for minimizing wetland impacts.
- The Pink + Red, Blue + Red, Orange + Red, Orange and Forest alternatives scored poorly for this goal. These alternatives scored poorly on a variety of natural resource criteria.

FIGURE 4
Evaluation Score for Goal 2: Preserve or Improve Natural and Cultural Resources

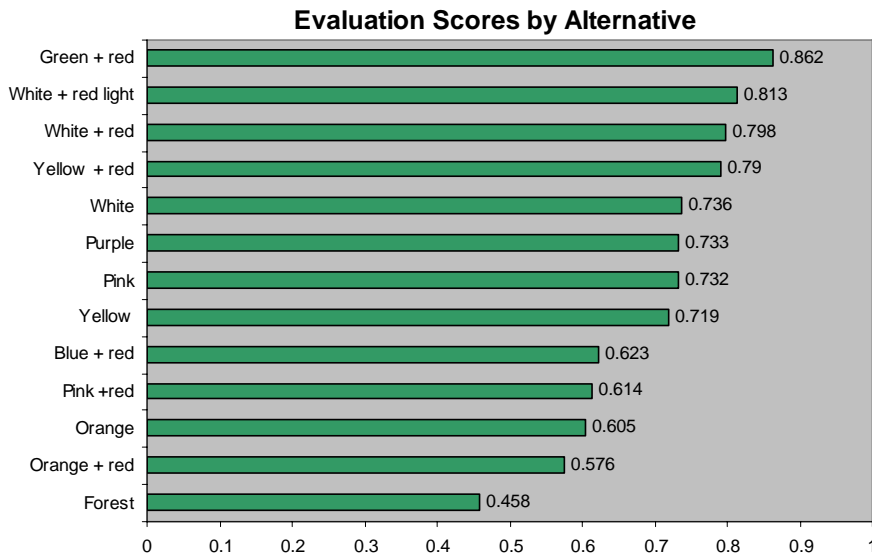
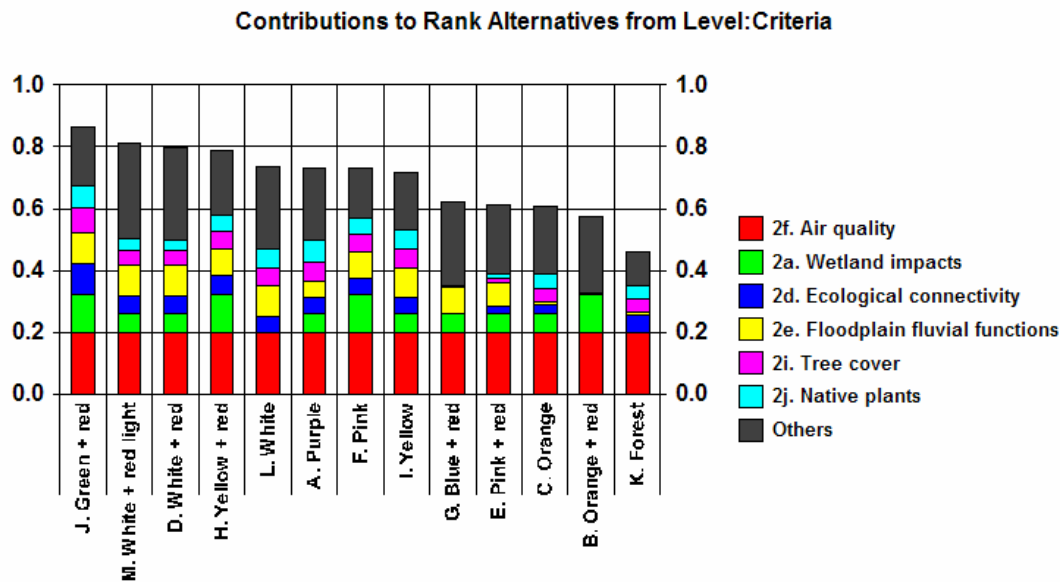


FIGURE 5
Contributions to Goal 2: Preserve or Improve Natural and Cultural Resources



Findings by Criteria

Biological Impacts

Greatest potential impacts: Alternatives with the greatest potential impacts to biological resources include the Forest, Orange, and Orange + Red alternatives. The Forest alternative had the lowest overall score for preserving biological resources. Each of the two included bridges extends across the 500-year floodplain. It also crosses the greatest area of high quality wetlands. The Orange + Red alternative extends across the greatest area of 500-year floodplain with a single bridge, as well as a relatively large area of contiguous wildlife habitat. It impacts the largest area of predominantly native plant community and includes the second greatest tree canopy cover. The Orange alternative extends across a large area of 500-year floodplain. It impacts a greater area of native plant community and has a relatively high extent of tree canopy cover.

Least potential impacts: Alternatives with the least potential impacts to biological resources include the White + Red, White, and White + Red Light alternatives. All of these alternatives extend across the shortest area of 500-year floodplain; have the shortest crossing of the Willamette River, and cross the least area of contiguous wildlife habitat. These alternatives also scored the lowest for potential to impact T&E terrestrial species.

Moderate potential impacts: Of the remaining alternatives, the Blue + Red and Pink alternatives would impact some of the highest acreages of native plant communities, contiguous wildlife habitat, and tree canopy cover. The Green + Red, Yellow, Pink + Red, and Yellow alternatives have the highest probability of impacting T&E terrestrial species. The Pink + Red alternative would also impact a large area of high quality wetlands. Impacts to all other biological resources for these alternatives are moderate to low.

Other Natural and Cultural Resource Impacts

Criteria	Overall Findings
Preserve air quality (2.7 points)	<ul style="list-style-type: none"> Because there was little differentiation between alternatives, all alternatives received the same score for this criterion.
Avoid direct and indirect impacts to historic resources where practicable, and mitigate any unavoidable impacts (.9 point)	<ul style="list-style-type: none"> Orange + Red alternative would impact the fewest historic resources. Forest would impact the most historic resources.
Avoid direct and indirect impacts to cultural resources where practicable, and mitigate any unavoidable impacts (1 point)	<ul style="list-style-type: none"> There are no known cultural resources affected by any alternative, so all alternatives received the same score.

Goal 3: Preserve Quality of Life on Both Sides of the River

Total Weight	23 Points (23% of total score)
Evaluation Criteria	<ul style="list-style-type: none"> Minimize impacts to businesses (1.2 points) Minimize impacts to residences (1.6 points) Minimize impacts to non-displaced businesses (1.1 points) Minimize other impacts to non-displaced residences (1.2 points) Minimize traffic intrusion onto residential streets (3.2 points) Minimize noise in residential areas (1.8 points) Maintain neighborhood cohesion (3.4 points) Reduce through-freight traffic in downtown (2.9 points) Support adopted land use and transportation plans (1.5 points) Minimize construction duration and traffic impacts during construction (1.2 points) Enhance public access to the river (1.4 points) Minimize impacts to recreational facilities (1.3 points) Minimize impacts to schools (1.7 points)

Findings by Goal

- The White + Red Light, Pink, White + Red, and Orange + Red alternatives score best for this goal. White + Red and White + Red Light scored well for the through freight traffic, school impacts and residential displacement criteria. Orange + Red scored well for the traffic intrusion and neighborhood cohesion criteria.
- Yellow, Yellow + Red, White, Forest and Blue + Red scored poorly for this goal. Forest scored poorly for the neighborhood cohesion and school impacts criteria. Yellow and Yellow + Red scored poorly for the residential impacts and traffic intrusion criteria. Blue + Red scored poorly for the residential impacts, business impacts and school impacts criteria.

FIGURE 6
Evaluation Score for Goal 3: Preserve Quality of Life on Both Sides of the River

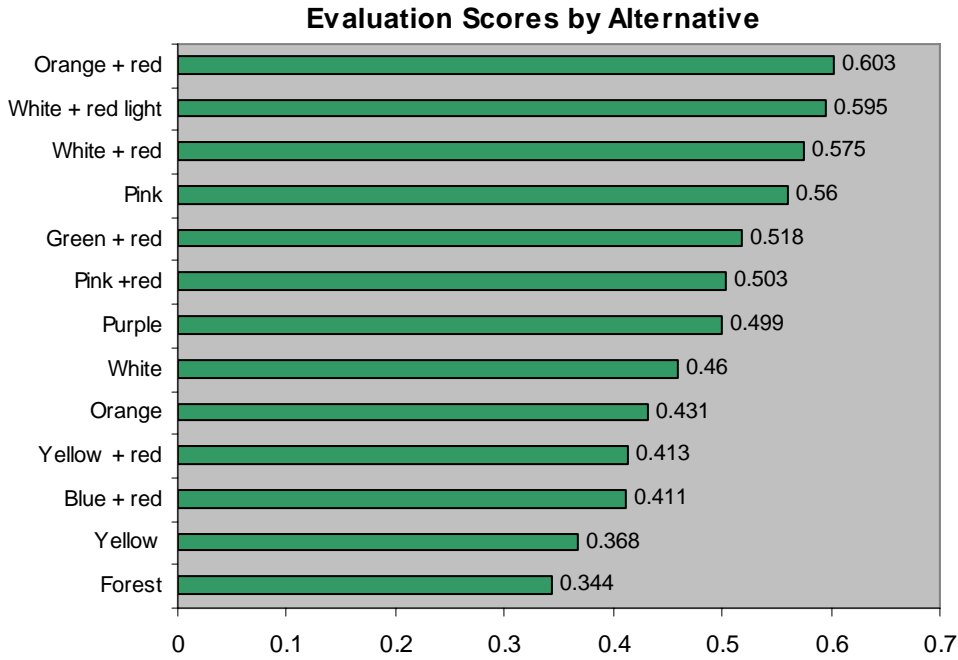
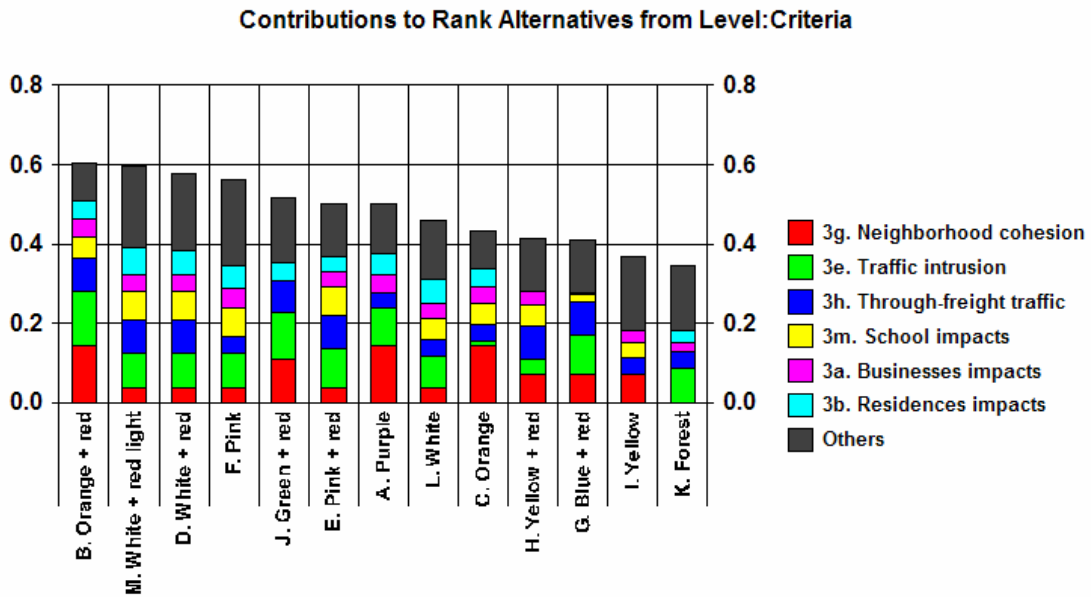


FIGURE 7
Contributions to Goal 3: Preserve Quality of Life on Both Sides of the River



Findings by Criteria

Criteria	Overall Findings
Minimize impacts to businesses (1.2 points)	<ul style="list-style-type: none"> Blue + Red and Green + Red alternatives impact the most businesses (65 and 66 businesses, respectively). Purple, Orange, Orange + Red, Pink, White + Red and White + red light impacted the fewest businesses (between 31 and 39).
Minimize impacts to residences (1.6 points)	<ul style="list-style-type: none"> Blue + Red, Yellow and Yellow + Red alternatives impact the most residences (between 71 and 73). The three White, Purple and Pink alternatives impact the fewest residences (between 28 and 39).
Minimize impacts to non-displaced businesses (1.1 points)	<ul style="list-style-type: none"> Pink, Yellow and Green + Red alternatives impact the fewest square feet of non-displaced business property. Pink + Red and Purple alternatives impact the greatest square footage of non-displaced business property.
Minimize other impacts to non-displaced residences (1.2 points)	<ul style="list-style-type: none"> Green + Red, Forest and the three White alternatives impact the fewest square feet of non-displaced residential property. Orange + Red and Blue + Red impact the greatest square footage of non-displaced residential property.
Minimize traffic intrusion onto residential streets (3.2 points)	<ul style="list-style-type: none"> Orange + Red alternative would result in the fewest miles of traffic intrusion onto local and collector residential streets. The Orange and Yellow alternatives would result in the most miles of traffic intrusion onto local and collector residential streets.
Minimize noise in residential areas (1.8 points)	<ul style="list-style-type: none"> Yellow and Pink alternatives would result in the fewest noise impacts. Orange + Red and the three White alternatives would result in the most noise impacts.
Maintain neighborhood cohesion (3.4 points)	<ul style="list-style-type: none"> Purple, Orange + Red, and Orange alternatives, maintained neighborhood cohesion best because east side improvements were located outside residential-zoned areas and not on minor arterials or local streets. Forest alternative had the highest neighborhood cohesion impact because it would construct two bridges.
Reduce through-freight traffic in downtown (2.9 points)	<ul style="list-style-type: none"> Since different traffic types were not modeled at this stage, total traffic through downtown was used as a proxy for freight traffic. Since there was little differentiation between alternatives based on this criterion, all alternatives were scored either a two or a three based on a scale of 1 to 4. The options with Red scored better on this criterion than options without Red.
Support adopted land use and transportation plans (1.5 points)	<ul style="list-style-type: none"> White, White + Red and White + Red Light scored best because they were more consistent with the Polk County Comprehensive Plan. The remaining options received the same score.

Criteria	Overall Findings
Minimize construction duration and traffic impacts during construction (1.2 points)	<ul style="list-style-type: none"> Alternatives without “Red” would result in improvements to the existing bridges which would be a major construction impact. These options received the worst score. The impacts to traffic were the lowest when an alternative included the Red option AND it matched in “at grade” on the east side connection (Pink + Red and Blue + Red).
Enhance public access to the river (1.4 points)	<ul style="list-style-type: none"> Because the Forest alternative would construct two bridges, it would provide the most opportunity for new river access. This assumes that the right-of-way under and around the bridge could be used for public river access.
Minimize impacts to recreational facilities (1.3 points)	<ul style="list-style-type: none"> Blue + Red would impact the most recreational facilities. Purple would impact the fewest recreational facilities.
Minimize impacts to schools (1.7 points)	<ul style="list-style-type: none"> Pink, Pink + Red, and White, and White + Red alternatives would impact seven or fewer schools with increased traffic and no schools with right-of-way acquisition. The Green + Red, Purple, and Blue + Red alternatives performed poorly. The Green + Red alternative is near Grant Elementary School. The Purple alternative is near Brush College School. The Blue + Red alternative is near Highland Elementary School.

Goal 4: Meet Federal and State Regulatory Requirements

Total Weight	8 Points (8% of total score)
Evaluation Criteria	<ul style="list-style-type: none"> Meet Section 4(f) and 6(f) requirements (4.4 points) Meet Statewide Planning goal requirements (3.8 points)

Findings by Goal

- The Green + Red and Orange + Red alternatives scored well for this goal. The Green + Red alternative scores well for the criterion “meets statewide planning goals.” The Orange + Red alternative scores well for well for the criterion “meets 4(f) and 6(f) requirements.”
- The Purple, Blue + Red and Forest alternatives do not score well for this goal. Purple scores poorly on the “meets statewide planning goals” criterion because of its extensive footprint outside the urban growth boundary.

FIGURE 8
Evaluation Score for Goal 4: Meet Federal and State Regulatory Requirements

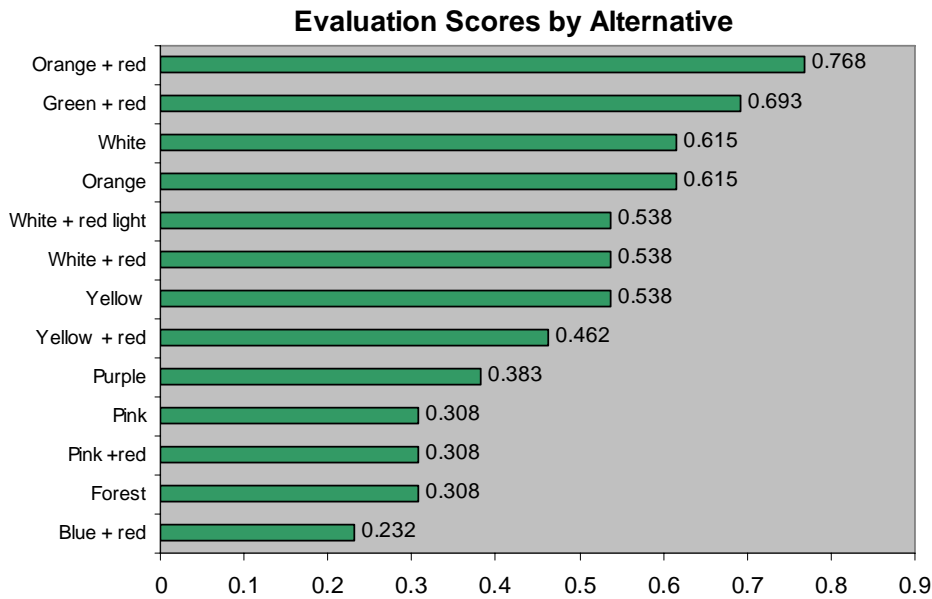
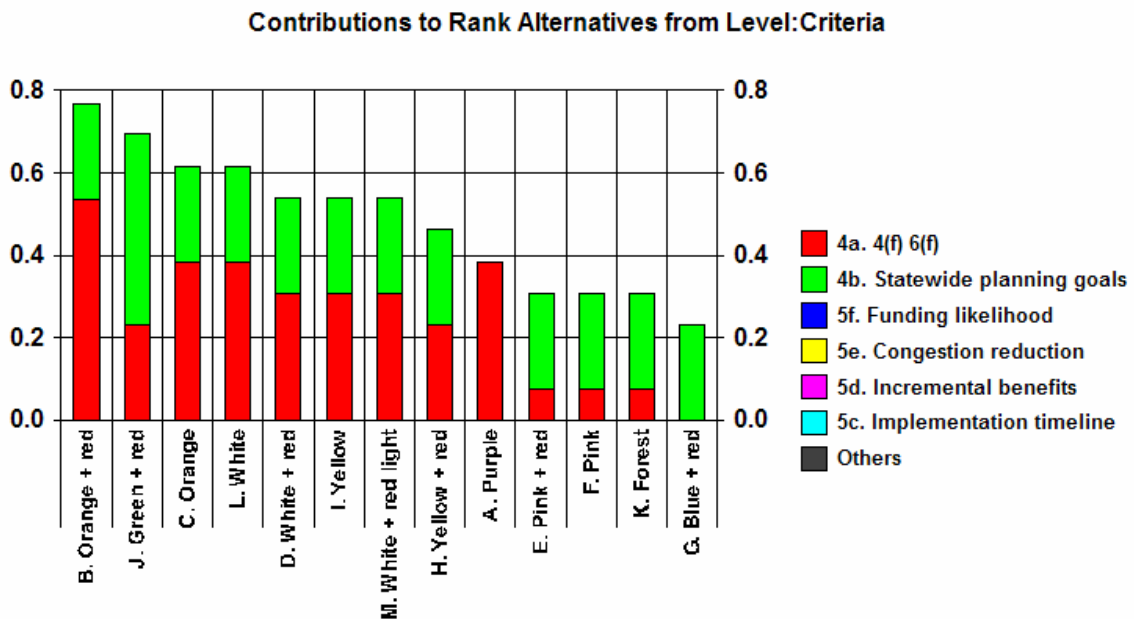


FIGURE 9
Contributions to Goal 4: Meet Federal and State Regulatory Requirements



Findings by Criteria

Criteria	Overall Findings
Meet Section 4(f) and 6(f) requirements (4.4 points)	<ul style="list-style-type: none"> Orange + Red alternative would best meet these requirements. It would impact fewer resources than the other alternatives. Pink, Orange and White alternative would also meet these requirements well. Blue + Red alternative would impact the most 4(f) and 6(f) resources including both parks and historic resources. All alternatives impact Wallace Marine Park, though the severity of impacts varies. The Green + Red alternative would have the most severe impact to Wallace Marine Park.
Meet Statewide Planning goal requirements (3.8 points)	<ul style="list-style-type: none"> Purple alternative has the highest risk of not meeting statewide planning requirements because it impacts a large area outside the urban growth boundary (UGB) and bisects land zoned for exclusive farm use. The Green + Red alternative scored best for this alternative because it has the smallest area of impacts outside the UGB associated with the river crossing itself. The other alternatives all had crossing locations and system improvements outside the UGB.

Goal 5: Provide a Cost-effective and Timely Solution

Total Weight	22 Points (22% of total score)
Evaluation Criteria	<ul style="list-style-type: none"> Minimize construction cost (5.1 points) Minimize operations and maintenance cost (2.4 points) Minimize implementation timeline (2.2 points) Maximize incremental benefits (2.5 points) Maximize congestion reduction benefits over the planning period (3.3 points) Maximize likelihood of funding (6 points)

Findings by Goal

- All alternatives received the same score for two criteria: (1) Maximize incremental benefits, and (2) maximize likelihood of funding because there is not sufficient detail to differentiate between the alternative based on this criteria.
- The Green + Red alternative received best score for this goal. It had the lowest construction cost.
- The Purple, Forest, Orange and Orange + Red alternatives scored poorly for this goal. These are the four most expensive alternatives.

FIGURE 10
Evaluation Score for Goal 5: Provide a Cost-effective and Timely Solution

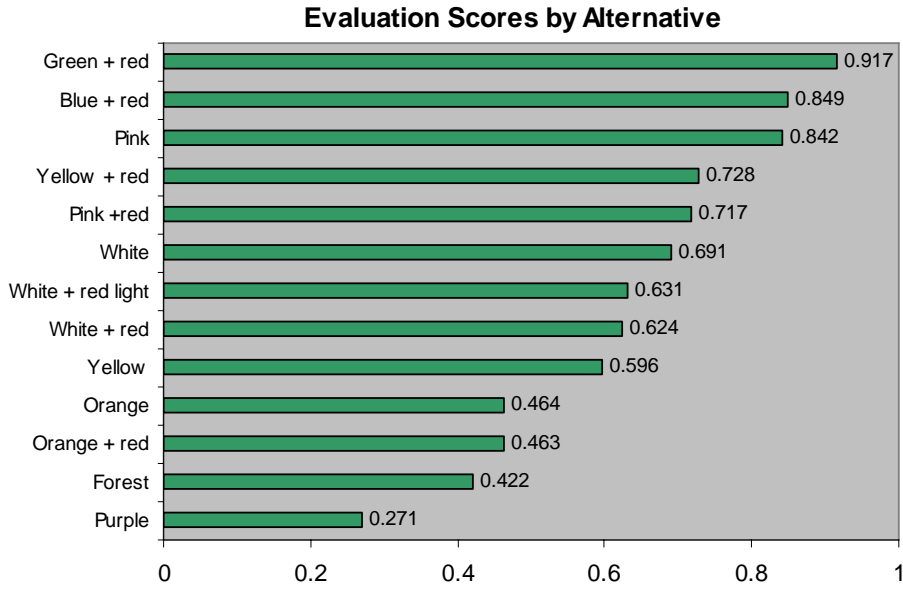
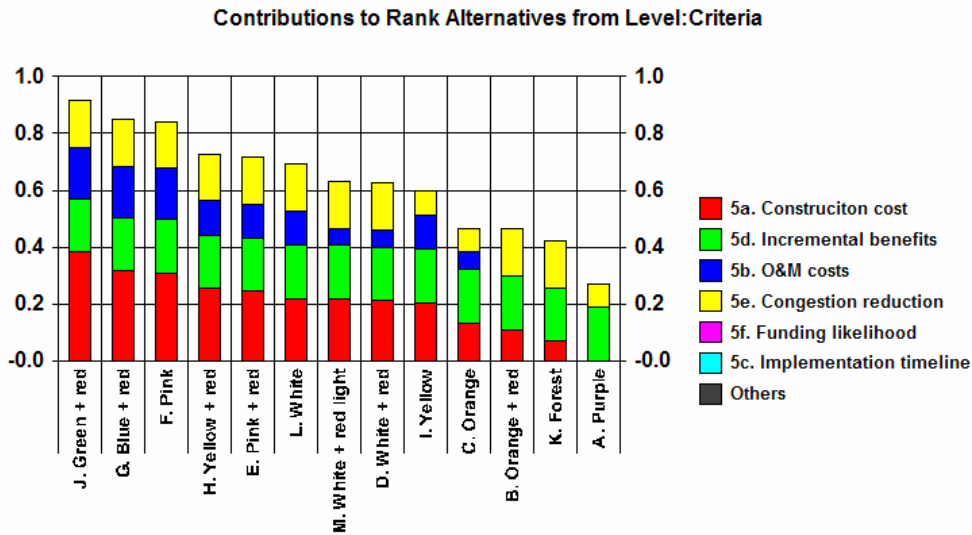


FIGURE 11
Contributions to Goal 5: Provide a Cost-effective and Timely Solution



Findings by Criteria

Construction Costs

The alternatives ranged from a low of \$509.6 million (Green + Red) to a high of \$874.3 million (Purple). The shortest bridge was the least expensive and the longest bridge was the most expensive. A review of the details of the cost estimates identified the structure

size (length and width) as the primary differentiator. The system improvements and the right-of-way acquisition costs did not vary significantly among alternatives with the exception of some variations on Marine Drive when a connection was made in the floodplain. The table below shows the cost estimates:

Alternative	Cost in millions (\$2012)
Purple	874.3
Forest	809.5
Orange + red	770
Orange	747.4
Yellow	679.5
White + red	673.7
White + red light	667.6
White	667.4
Pink + red	642.8
Yellow + red	632.1
Pink	580.8
Blue + red	574.3
Green + red	509.6

Criteria	Overall Findings
Minimize operations and maintenance cost (2.4 points)	<ul style="list-style-type: none"> Green + Red, Blue + Red, and Pink alternatives had the least amount of structure, therefore the lowest operations and maintenance cost. Purple, Forest, and Orange + Red had the most structure, therefore the highest cost.
Maximize congestion reduction benefits over the planning period (3.3 points)	<ul style="list-style-type: none"> Because there was little differentiation between alternatives based on this criterion, all alternatives received a score of 2 or 3 on a scale of 1 to 4. Purple, Orange and Yellow alternatives would result in the smallest reduction in vehicle hours of delay.

KEY FINDINGS BY ALTERNATIVE

This section provides a summary of results by alternative. It includes a summary table that shows the ranking of alternatives for each goal, a total evaluation score chart, a contribution to total score by goal chart, and a cost-benefit chart. A narrative description of the results by alternative is also given.

ALTERNATIVE RANKING BY GOAL

Rank	Goal 1: Safety and Mobility	Goal 2: Natural and Cultural Resources	Goal 3: Quality of Life	Goal 4: Regulatory Requirements	Goal 5: Cost-effective and timely	Total Evaluation Score
1	Forest	Green + red	Orange + red	Orange + red	Green + red	Green + red
2	Pink	White + red light	White + red light	Green + red	Blue + red	Pink
3	White	White + red	White + red	White	Pink	White
4	Green + red	Yellow + red	Pink	Orange	Yellow + red	White + red
5	Yellow + red	White	Green + red	White + red light	Pink +red	Yellow + red
6	Yellow	Purple	Pink +red	White + red	White	White + red light
7	White + red	Pink	Purple	Yellow	White + red light	Pink +red
8	Pink +red	Yellow	White	Yellow + red	White + red	Yellow
9	White + red light	Blue + red	Orange	Purple	Yellow	Blue + red
10	Blue + red	Pink +red	Yellow + red	Pink	Orange	Orange + red
11	Orange	Orange	Blue + red	Pink +red	Orange + red	Forest
12	Orange + red	Orange + red	Yellow	Forest	Forest	Orange
13	Purple	Forest	Forest	Blue + red	Purple	Purple

FIGURE 12
Total Evaluation Scores

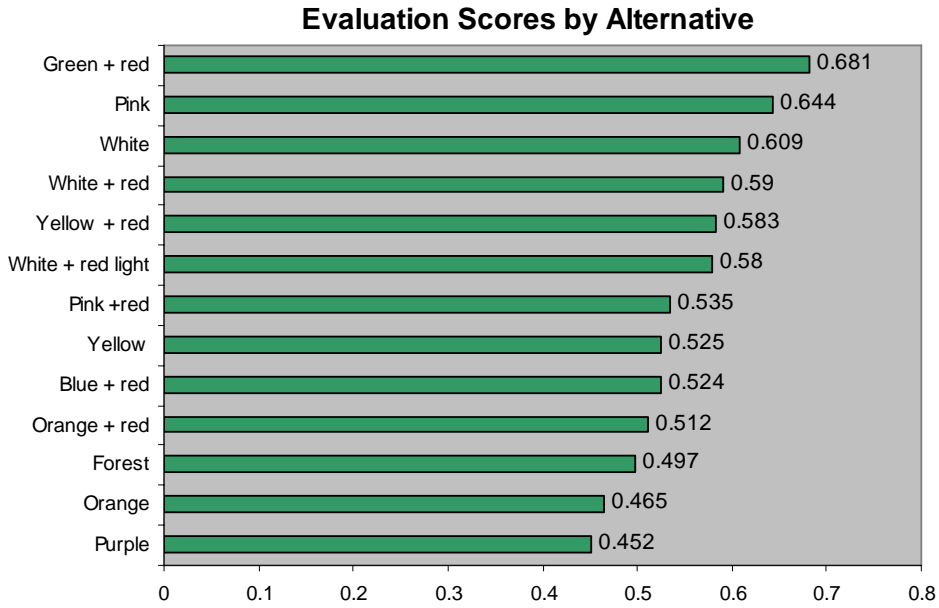


FIGURE 13
Contributions to Total Score by Goal

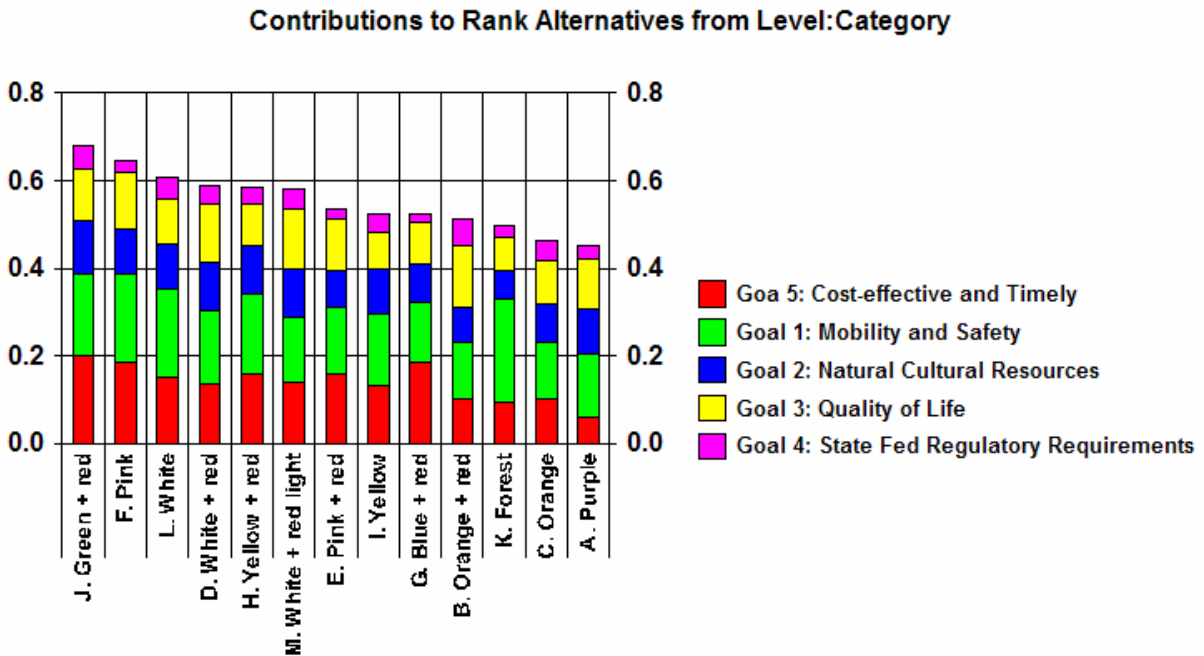
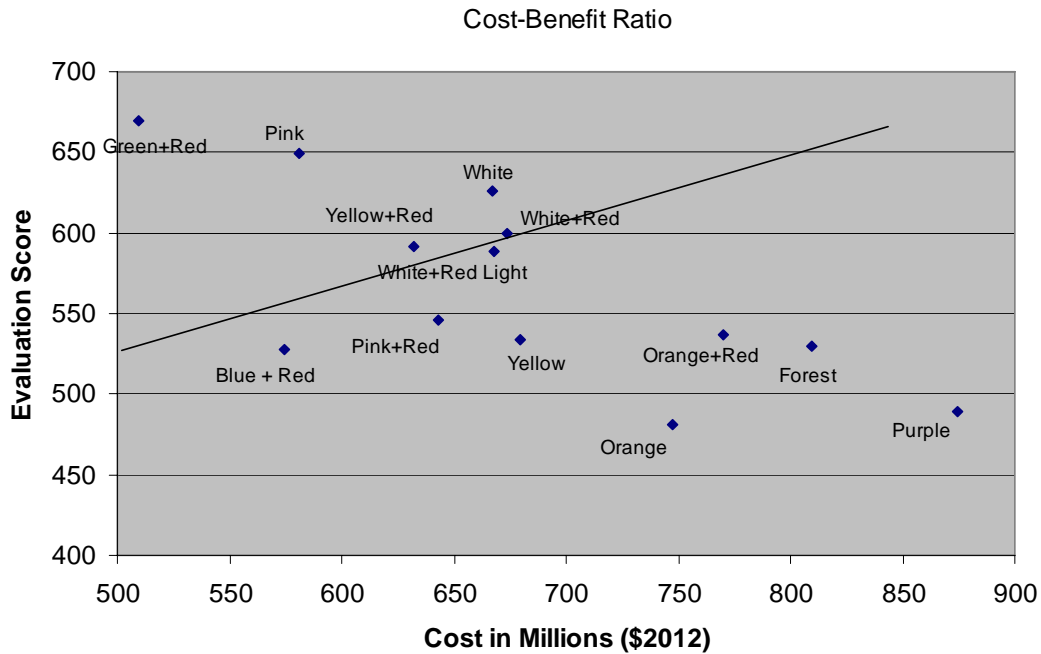


FIGURE 14
Cost-Benefit Ratio for Alternatives



Purple Alternative

The Purple alternative has the worst total score of any alternative. It scores worst on the improve mobility and safety, and cost-effective and timely solution goals. It is the most expensive alternative with a cost of than \$874.3 million (\$2012). Since it is located farther from the existing bridges than the other alternatives, it attracts less traffic and, therefore, does less to relieve congestion on the existing bridges and in the overall system. The Purple alternative has more significant impacts to land outside the UGB making it less likely to meet state land use regulations than other alternatives.

Orange and Orange + Red Alternatives

The Orange and Orange + Red alternatives have poor total scores (second and fourth worst, respectively). These alternatives are expensive and have low overall benefit scores. They scored poorly for the cost-effective and timely solution, improve safety and mobility, and natural and cultural resources goals. The Orange + Red alternative had the best score for the quality of life goal, while Orange scored poorly. Both options scored relatively well for the meets state and federal regulatory requirements goal.

Pink and Pink + Red Alternatives

The Pink alternative has the third highest total score while the Pink + Red alternative has a medium total evaluation score. Both alternatives score well for the cost-effective and timely solution goal. Pink has a relatively low construction cost. The Pink alternative scores well

for the quality of life, and mobility and safety goals. Both received a low score for the meeting state and federal requirements goal.

White, White + Red, and White + Red Light Alternatives

The White and White + Red alternatives received the third and fourth highest total score, respectively. The White + Red Light alternative received a medium score (sixth highest). All three alternatives had medium scores on the cost-effective and timely goals.

The White + Red and White + Red Light alternatives both received medium scores on the cost-effective and timely solution goal and had similar costs. These alternatives also scored well on the natural and cultural resources and quality of life goals. These alternatives had medium-low scores on the safety and mobility goal.

The White alternative scored well for the meets state and federal requirements and safety and mobility goals. It had medium scores on the natural and cultural resources and quality of life goals.

Blue + Red alternative

The Blue + Red alternative received a low total score. It had a relatively low cost and a low benefit score. It scored well on the cost-effective and timely goal. It scored poorly on the quality of life, natural and cultural resources, and safety and mobility goals. It received the lowest score for the state and federal requirements goal.

Yellow and Yellow + Red alternatives

The Yellow + Red and Yellow alternatives received medium evaluation scores. The Yellow + Red alternative received a medium-high score for the cost-effective and timely solution, preserve natural and cultural resources, and mobility and safety goals. It received a medium score for the meet state and federal requirements goal and a low score for the quality of life goal.

The Yellow alternative had a relatively low evaluation score. Yellow alternative received medium to low scores for the cost-effective and timely, quality of life, and natural and cultural resources goals. Yellow had a medium score for the state and federal requirements and safety and mobility goals.

Green + Red Alternative

The Green + Red alternative received the highest total evaluation score and had the best cost-benefit ratio. This alternative received the best score for the cost-effective and timely solution and natural and cultural resources goals. This can largely be attributed to the fact that this alternative has the shortest bridge crossing with the smallest total footprint – making it the lowest cost alternative (\$509.6 million) with fewer impacts to natural and cultural resources. It also received a relatively high score for the likelihood of meeting state and federal requirements (it impacts relatively little area outside the Urban Growth Boundary) despite its impacts on parks (both 4(f) and 6(f) resources). It received a medium/high score for the safety and mobility and quality of life goals.

Forest Alternative

The Forest alternative received a low total score. It had a medium benefit score and a high cost. Forest received the lowest score for quality of life and natural and cultural resources goals and a low score for the federal and state requirements and cost-effective and timely goals. Forest received the highest score for the improve safety and mobility goal, which is not surprising since the Forest alternative would provide two new bridges.

SUMMARY

These evaluation results are just one piece of information that, along with local knowledge and stakeholder perspectives, will be used by the Task Force and Oversight Team in the narrowing process. The information here is not intended to suggest recommendations or decisions but rather is intended to summarize the results of the technical evaluation process.

The overall results for the evaluation scores were driven largely by criteria related to construction cost and mobility. Construction cost was weighted with 5.1 points. The seven mobility-related scores accounted for 29 points in the total evaluation. These criteria ranged in purpose, but all benefited alternatives that provided for good mobility. They are:

- Improve vehicle and freight mobility for local travel (5.5 points)
- Improve vehicle and freight mobility for regional travel (5 points)
- Improve vehicle and freight mobility for through travel (4.9 points)
- Improve transit reliability across the Willamette River (5 points)
- Preserve air quality (2.7 points)
- Reduce through-freight traffic in downtown (2.9 points)
- Maximize congestion reduction benefits over the planning period (3.3 points)

There was little differentiation between alternatives based on these goals. This is not surprising since all alternatives were designed to meet either ODOT's adopted mobility standards or alternate mobility standards. As a result, all alternative received the same score for transit reliability and air quality, and either a score of 2 or 3 on a scale of 1 to 4 on the remaining mobility and congestion-related alternatives.

Alternatives ranged in cost from \$509.6 million to \$874.3 million (\$2012). When these costs are compared to the benefit scores (the total evaluation scores without cost), the following score well on the cost-benefit scale meaning that the evaluation score is good in comparison to the cost:

- Green + Red
- White
- White + Red
- Yellow + Red
- Pink

In some cases, alternatives with the "Red" improvements perform better than their counterparts without "Red" improvements. Pink and White score better without the "Red" component. Yellow and Orange score better with the Red component.

In terms of overall score, the Green + Red alternative received a much higher evaluation score than the other options. It received the highest score for two goals: cost-effective and timely solution, and preserve natural and cultural resources. It received the second highest score for the state and federal requirements goal. On the 34 individual criteria that showed differentiation, the Green + Red alternative received the highest possible score on 14. It received the lowest possible score on five criteria including school impacts, tree canopy impacts, terrestrial species impacts, business displacements, and access to river.

Among the alternatives receiving the lowest total scores, Purple received the lowest score on the following goals: cost-effective and timely, and safety and mobility. The two Orange options also scored poorly on these goals as well as on the natural and cultural resources goal. Forest received the lowest score for natural and cultural resources and quality of life and low scores for the state and federal requirements and cost-effective and timely goals.



Evaluation Scores

Goals	Weight (totals 100 points)	Criteria	Purple	Orange + red	Orange	White + red	Pink + red	Pink	Blue + red	Yellow + red	Yellow	Green + red	Forest	White	White + red light	min	max	best
Goal 1: Mobility and Safety	5.5	1a. Mobility local travel	2	2	2	3	2	3	2	2	2	3	3	3	2	2	3	4
	5	1b. Mobility regional and through travel	2	2	2	2	2	3	2	3	3	3	3	3	2	2	3	4
	4.9	1c. Mobility through travel	2	2	2	2	2	3	2	3	3	3	3	3	2	2	3	4
	4.3	1d. Safety	5	4	4	4	3	3	2	4	3	3	2	4	4	2	5	5
	5	1e. Transit	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
	3.1	1f. Pedestrian	2	2	2	3	4	4	4	3	3	3	5	3	3	2	5	5
	2.3	1g. Bicycle	2	2	2	3	4	4	4	3	3	3	5	3	3	2	5	5
	3	1h. Emergency vehicle	3	3	3	3	3	3	3	3	3	3	5	3	3	3	5	5
Goal 2: Natural Cultural Resources	1.7	2a. Wetland impacts	2	3	2	2	2	3	2	3	2	3	1	1	2	1	3	3
			4	4	4	5	4	4	5	4	4	3	1	5	5	1	5	5
	1.5	2b. Fish impacts (cubic yards)	(210)	(240)	(240)	(180)	(240)	(240)	(180)	(210)	(210)	(270)	(374)	(180)	(180)			
	1	2c. Terrestrial species impacts	2	2	2	3	2	1	2	1	1	1	2	3	3	1	3	3
			3	1	2	3	2	3	1	3	3	5	3	3	3	1	5	5
	1.4	2d. Ecological connectivity (acres)	(17.8)	(26.2)	(21.7)	(17)	(22.3)	(17.7)	(26.4)	(16)	(17.8)	(9.5)	(17)	(17.9)	(17)			
			3	1	1	5	4	4	4	4	5	5	1	5	5	1	5	5
	1.4	2e. Floodplain fluvial functions (cubic yards)	(411)	(673)	(621)	(159)	(288)	(236)	(231)	(236)	(185)	(185)	(621)	(159)	(159)			
	2.7	2f. Air quality	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
	0.9	2g. Historic resources	4	7.5	4	5	5	2	6	5.5	3	6.5	0.5	2	6.5	0.5	7.5	7.5
	1	2h. Archaeological resources	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10
			4	1	3	3	2	4	1	4	4	5	3	4	3	1	5	5
	1.1	2i. Tree cover (acres)	(16.1)	(28.9)	(20.6)	(20.2)	(26.5)	(18)	(29.4)	(18)	(16.8)	(13)	(20.9)	(17.4)	(20)			
			5	1	4	3	2	4	1	4	4	5	3	4	3	1	5	5
	1	2j. Native plants (acres)	(6)	(20.8)	(11)	(13)	(18.3)	(9.6)	(19.7)	(10.1)	(8.1)	(5.3)	(11.7)	(8.6)	(13)			
Goal 3: Quality of Life	1.2	3a. Businesses impacts (# structures)	4	5	4	4	4	5	1	4	4	1	3	4	4	1	5	5
			(36)	(34)	(36)	(38)	(39)	(31)	(65)	(44)	(44)	(66)	(49)	(40)	(38)			
	1.6	3b. Residences impacts (# structures)	4	4	4	5	3	4	1	1	1	4	2	5	5	1	5	5
			(39)	(45)	(44)	(31)	(48)	(36)	(71)	(74)	(73)	(44)	(54)	(32)	(28)			
	1.1	3c. Non-displaced businesses impacts (sq. ft)	1	3	2	3	1	5	3	2	5	4	2	2	3	1	5	5
			(362500)	(310329)	(348042)	(305616)	(373063)	(261476)	(315642)	(345084)	(258189)	(287291)	(332479)	(343052)	(302625)			
	1.2	3d. Non-displaced residences impacts (sq. ft.)	2	1	2	4	2	4	1	3	4	5	4	4	4	1	5	5
			(188599)	(228349)	(195121)	(158911)	(213063)	(145175)	(227044)	(171207)	(150965)	(122237)	(158666)	(161016)	(155910)			
	3.2	3e. Traffic intrusion	4	5	1	4	4	4	4	2	1	4	4	3	4	1	5	5
			(40.2)	(29)	(61.5)	(40.9)	(38.3)	(41.4)	(38.6)	(54.1)	(63.8)	(34)	(41.6)	(43.3)	(40.9)			
	1.8	3f. Noise (# residences)	3	2	2	1	2	4	2	4	5	3	3	1	2	1	5	5
			(755)	(1006)	(896)	(1044)	(937)	(648)	(891)	(708)	(531)	(818)	(775)	(1104)	(952)			
	3.4	3g. Neighborhood cohesion	5	5	5	2	2	2	3	3	3	4	1	2	2	1	5	5
	2.9	3h. Through-freight traffic	2	3	2	3	3	2	3	3	2	3	2	2	3	2	3	4
	1.5	3i. Adopted plans	4	4	4	5	4	4	4	4	4	4	4	5	5	4	5	5
	1.2	3j. Construction duration impacts	1	3	1	3	4	1	4	3	1	3	1	1	3	1	4	4
	1.4	3k. Access to river	1	1	1	1	3	3	3	1	1	1	5	1	1	1	5	5
	1.3	3l. Recreational facilities	4.5	2.5	3.5	2.5	2.5	3.5	1	1.5	2.5	1.5	1.5	3.5	2.5	1	4.5	4.5
	1.7	3m. School impacts	1	4	4	5	5	5	2	4	3	1	1	4	5	1	5	5
Goal 4: State Fed Regulatory Requirements	4.4	4a. 4(f) 6(f)	3	3.5	3	2.75	2	2	1.75	2.5	2.75	2.5	2	3	2.75	1.75	3.5	3.5
	3.8	4b. Statewide planning goals	1	2	2	2	2	2	2	2	2	3	2	2	2	1	3	3
Goal 5: Cost-effective and Timely	5.1	5a. Project cost (\$2012)	1	2	2	3	4	4	4	4	3	5	2	3	3	1	5	5
			(874.3)	(770)	(747.4)	(673.7)	(642.8)	(580.8)	(574.3)	(632.1)	(679.5)	(509.6)	(809.5)	(667.4)	(667.6)			
	2.4	5b. Operations and maintenance cost	1	1	2	2	3	4	4	3	3	4	1	3	2	1	4	4
	2.2	5c. Implementation timeline	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
	2.5	5d. Incremental benefits	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
	3.3	5e. Congestion reduction	2	3	2	3	3	3	3	3	2	3	3	3	3	2	3	4
	6	5f. Funding likelihood	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3