



## East West Corridor Project

Submitted to  
Yakima County Department of Public Services  
Yakima, Washington

# **Final Alignment Alternatives Study**

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### **Submitted to**

**Yakima County Department of Public Services  
Yakima, Washington**

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### **Submitted by**

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## **EXECUTIVE SUMMARY**

This report was prepared to document the process and findings of the east-west corridor alignment study initiated by the Yakima County Department of Public Services to find alternative solutions for improving traffic safety, circulation, and capacity between the City of Yakima and the Terrace Heights neighborhood as both areas undergo continued growth, development, and urban renewal.

The existing Yakima Avenue/Terrace Heights Drive route, the area's sole east-west travel corridor, has become ever more congested as the population has increased. The proposed corridor will offer drivers, bicyclists, and pedestrians an alternative river crossing and alleviate congestion and delays.

This report was prepared by BergerABAM with opinions and feedback gathered from local, state, and regional agencies; the public through two advisory groups: the Stakeholders' Advisory Committee and the Technical Advisory Committee; open houses; and a web site.

The study, which was accompanied by geotechnical, hazardous materials, and cultural resources assessments, narrowed the possible corridors for east-west travel to four alternatives: Ridge Top, Rest Haven Bench, Ridge Base, and Lowlands. These four alternatives are recommended to be carried through the National Environmental Policy Act (NEPA) review process.

## **1.0 INTRODUCTION**

### **1.1 Purpose and Need**

As the population of Terrace Heights keeps pace with projected growth rates, the existing Yakima Avenue/Terrace Heights Drive route will continue to suffer increasing congestion and delays. The east-west corridor, by offering drivers, bicyclists, and pedestrians an alternative river crossing for east-west travel, will alleviate this problem (see Figure 1).

Traffic studies performed by the Washington State Department of Transportation (WSDOT) South Central Region modeled the effects of the proposed east-west corridor, as well as a number of other travel alternatives for the Greater Yakima area. The results of the analysis indicate the proposed corridor will reduce trips on Yakima Avenue/Terrace Heights Drive and hold levels of service at a number of other locations within acceptable limits. The east-west corridor is a necessary component of any proposed improvement to the existing roadway network.

### **1.2 History**

The Terrace Heights neighborhood lies just to the east of the City of Yakima (City) (see Figure 2). The neighborhood—an unincorporated part of Yakima County—has grown considerably over the last four decades, with its population increasing fivefold in the 30 years between 1970 and 2000 to its current total of 8,031.

The Yakima River poses a natural barrier to travel between Yakima and Terrace Heights. Historically, east-west traffic has had only one option to travel between these two locations: the Yakima Avenue/Terrace Heights Drive corridor. In 1990, the Yakima County Department of Public Services (County) began seeking ways of improving the existing roadway network to better meet residents' needs and assist continued commercial development on both sides of the river.

The level of service on the Yakima Avenue/Terrace Heights Drive corridor has dropped steadily and has now reached a D rating. While this rating is acceptable within the City of Yakima, any level of service lower than a C rating triggers Yakima County's concurrency requirements, which limit new development permits along the affected corridor. In order to relax the concurrency restrictions, the County must either increase the capacity of the existing corridor or divert sufficient traffic volume away from the corridor and onto another route. Citing right-of-way constraints placed on the corridor by area businesses, the County ruled out further roadway widening and decided to plan a new corridor spanning the Yakima River: the east-west corridor.

In 2001, the County completed the Terrace Heights Corridor Study. This planning document identified, formulated, and screened alternative alignments for the future east-west corridor.

Figure 1. Vicinity Map

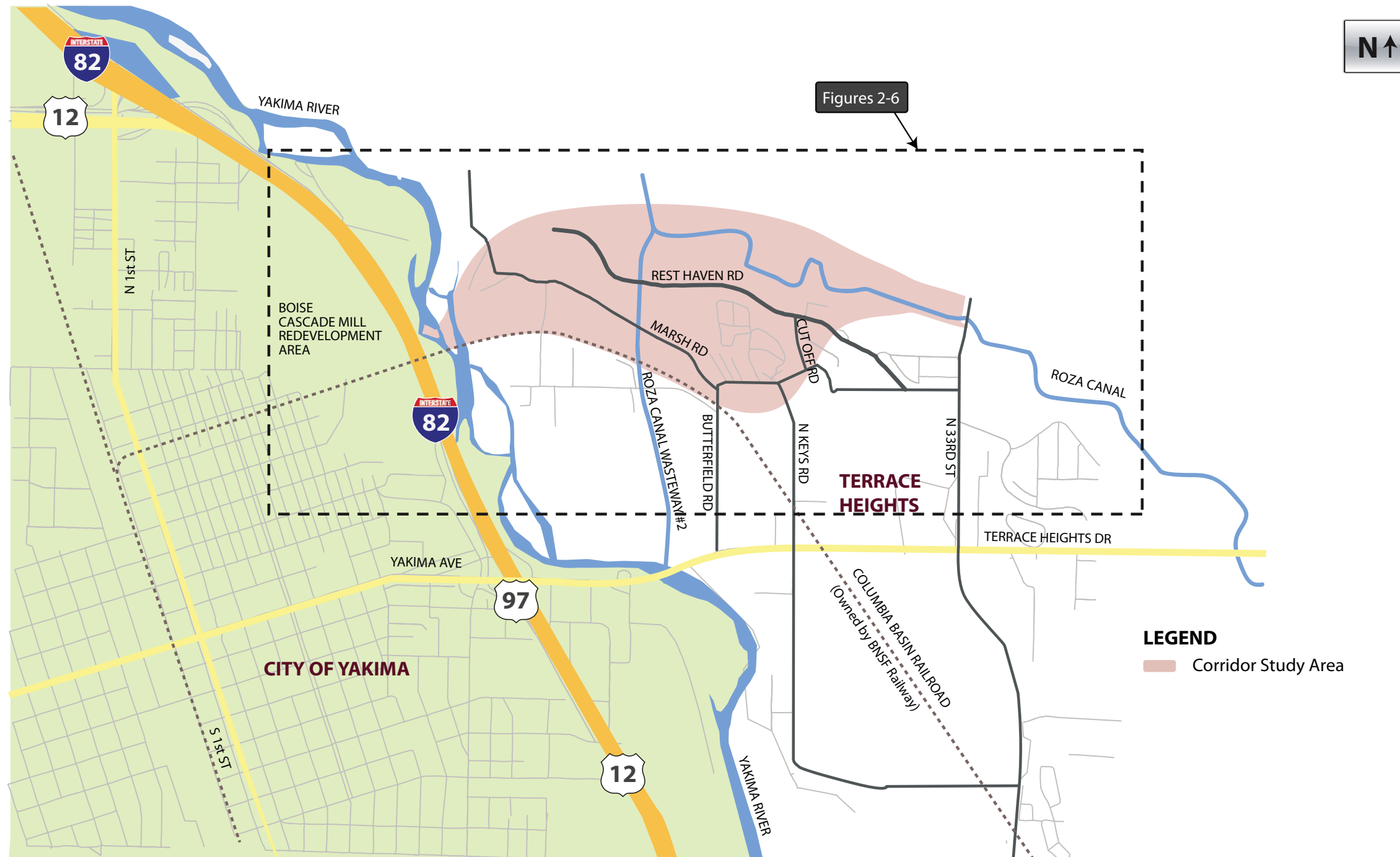
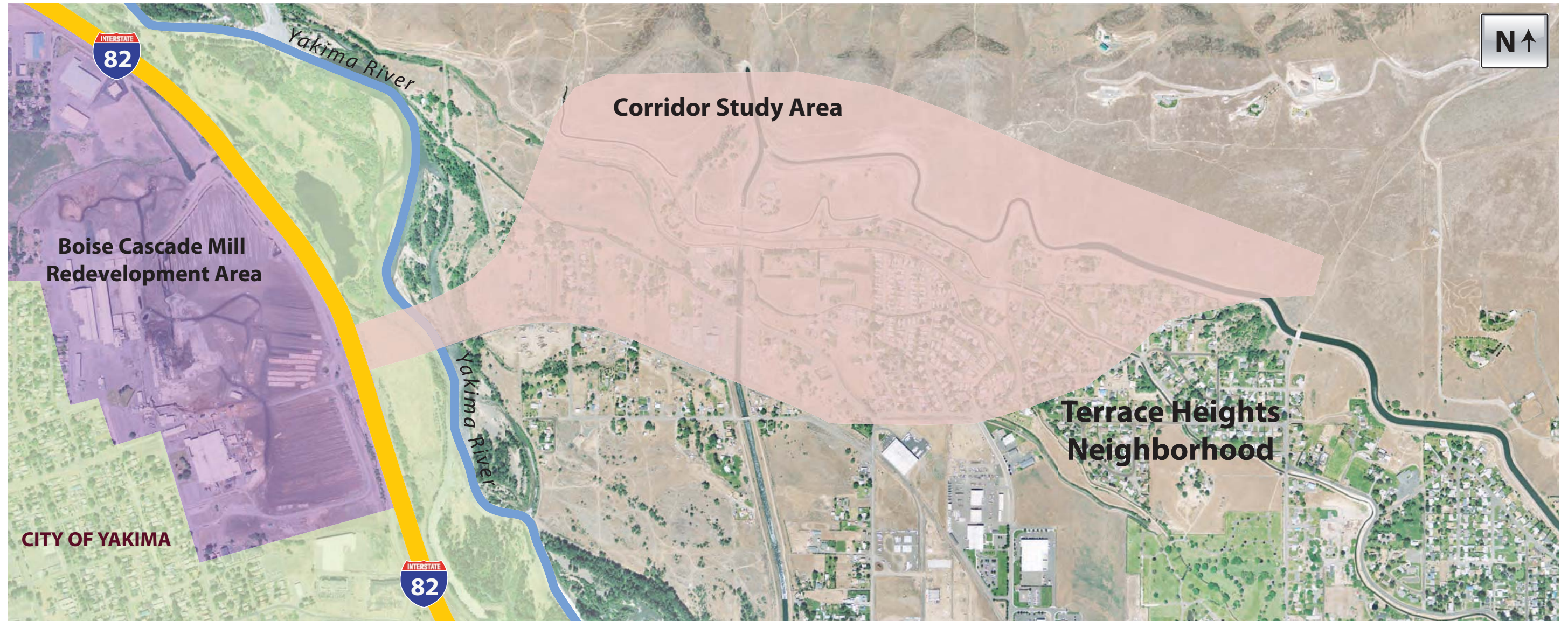




Figure 2. Boundaries & Corridor Study Area



The 2001 study examined two alignments—the North Alternative and the South Alternative—but stopped short of a recommendation. This alternatives analysis report makes extensive use of the 2001 study.

In 2008, the County retained BergerABAM to complete the east-west corridor alignment study, which expands on the 2001 study by developing a broader slate of alternative alignments. Four corridors, as well as environmental and geotechnical information, were examined for their feasibility and probable cost. In addition, the project team sought outside opinions by convening advisory committees from various transportation planning agencies and soliciting public opinion at open houses and through a project web site.

### **1.3 Project Limits**

The east-west corridor is part of a larger transportation corridor that will eventually connect Fruitvale Boulevard in western Yakima to 57th Street in Terrace Heights.

In this report, the east-west corridor is designated as the central segment lying between Interstate 82 (I-82) and 33rd Street, a distance of approximately 2 miles. The County will obtain the funds and direct the design and construction of this segment (see Figure 3).

### **1.4 Route Termini**

The 2001 study identified both the western and eastern termini for the corridor in general terms.<sup>1</sup> Since then, the County has redefined proposed locations for both termini more specifically.

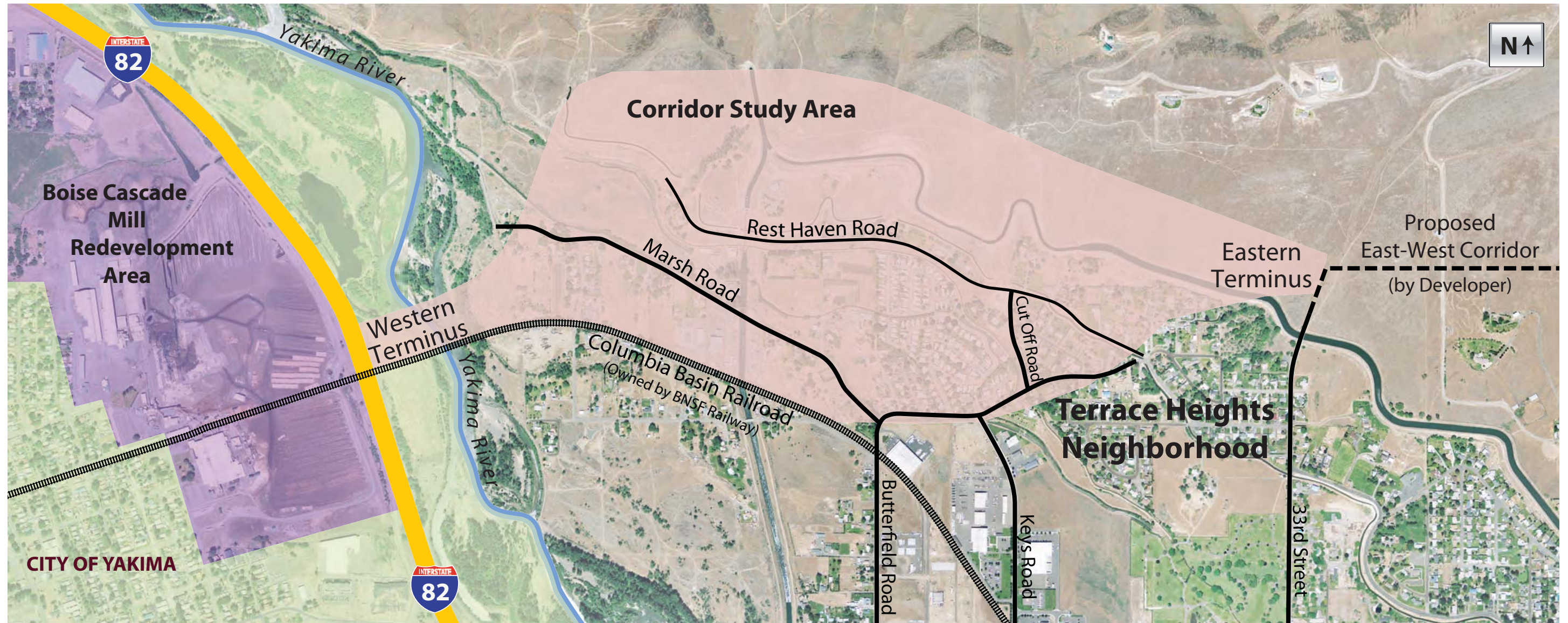
The corridor is stationed west to east, beginning at the western extent of WSDOT's I-82 right-of-way. Eventually, the western terminus of the corridor will be redrawn to tie into the City's existing roadway network (see Figure 3).

The eastern terminus falls on a tangent splitting the existing right-of-way parcel already acquired by the County for the proposed corridor. This parcel lies north of the Roza Canal and includes a strip of right-of-way necessary to extend 33rd Street north from the existing bridge over the Roza Canal to tie in with the corridor. The parcel terminates near Hardy Road, but in this report, the proposed corridor extends to the influence area of the eastern approach leg of the proposed 33rd Street intersection (see Figure 3).

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<sup>1</sup>Terrace Heights Corridor Study, Section 4.1, p. 4-1.

Figure 3. Route Termini & Existing Roadway Network



## **1.5 Connection to Existing Roadway Network**

Other than the termini designated above, the proposed corridor will tie in to the existing roadway network at additional locations. The number of locations varies with the alternative, but in most cases, two tie-in points were provided. These tie-ins will divide the corridor into three roughly equal segments approximately 3,000 to 3,500 feet long. The first tie-in will occur at Marsh Road west of the U.S. Bureau of Reclamation property. The second tie-in will occur in the vicinity of Cut Off Road. This location varies considerably among the alignment alternatives (see Figure 3).

At each of these locations, the County proposes improvements to the existing road network to facilitate better connections with the proposed corridor. Some alignment alternatives suggest substantial improvements, some even to the extent of realigning major segments of existing roadways.

## **2.0 EXISTING CONDITIONS**

### **2.1 Topography**

The project area is located in eastern Yakima County at the interface of two landforms.

The project area is framed on the west side by the Yakima River and its floodplain, which separates the City of Yakima from the Terrace Heights neighborhood. Within Terrace Heights, lowlands comprise the southern portion of the project area while the northern portion rises abruptly through a series of stepped benches to form the Yakima Ridge (see Figure 4).

Each bench is characterized by a flat layer of cobbles, gravels, pebbles, and silts pointing to their common origin as part of the Yakima River floodplain. This type of landform is called a terrace, which gives Terrace Heights its name. Moving northward up the ridge slope, the first and most prominent terrace in the project area is the Rest Haven Bench. The portion of the bench that coincides with potential corridor alternatives strikes east-west through the project area and ranges from 25 to 125 feet in width. This portion of the bench is entirely occupied by Rest Haven Road and its adjacent residential properties. Continuing north up the ridge slope, the second terrace is occupied entirely by the Selah-Moxee Canal, while the third terrace holds the Roza Canal.

### **2.2 Yakima River and Floodplain**

The western tangent for all alignment alternatives follows a 100-foot parallel offset to the north of the existing railroad bridge across the Yakima River and floodplain. At this location, the Yakima River flows through two effective channels, separated by an island that houses a timber pier that supports the existing railroad bridge. Corridor-level geotechnical studies did not identify any conditions preventing the similar use of this island to support the corridor bridge over the Yakima River. The proposed bridge will consist of two spans, each approximately 250 feet long, with the rest of the bridge continuing over the Yakima River floodplain approximately 550 feet to the east (see Figure 4).

Figure 4. Topography & Drainage



### **2.3 Irrigation Canals**

The project corridor contains six canals managed by three irrigation authorities. Throughout the preliminary engineering stage of the project, the County coordinated with representatives of each agency to determine its operational priorities, maintenance practices, and improvement schedules and considered these factors in developing the current slate of alignment alternatives (see Figure 4).

### **2.4 Geotechnics**

A corridor-level geotechnical report was completed and dated 12 July 2010. It summarizes the findings of visual reconnaissance from public rights-of-way and a review of available geologic maps and literature. While the scope of the geotechnical study did not include soil borings or subsurface investigations, borings performed for the Hillcrest Drive Bridge crossing the Roza Canal adjacent to the proposed corridor were reviewed.

The Yakima Ridge is the dominating landform in the corridor study area. The lowland areas south of the ridge are composed of Quaternary alluvium dominated by dense to very dense sand and gravel.

Likely geologic hazards in the corridor study area are slope instability and landslides on the ridge, river scour in the floodplain, and soil liquefaction in the alluvium. The area has a low likelihood of ground surface fault rupture. Natural springs are likely on and near the Rest Haven Bench.

### **2.5 Hazardous Materials**

A corridor-level environmental site assessment dated June 2010 summarizes the findings of a visual reconnaissance from public rights-of-way, as well as a review of available literature, maps, and databases held by the County, the U.S. Department of Agriculture (USDA), the U.S. Environmental Protection Agency (EPA), the Washington State Department of Ecology (Ecology), and the Yakama Nation.

The assessment focuses on identifying potential sources of contamination in the corridor study area, both past and present. Aboveground and underground storage tanks are present in the study area, along with old equipment, inoperable vehicles, and the like, and these may be potential sources of contamination. In addition, soil tests should be performed on Bureau of Reclamation property and next to telephone poles.<sup>2</sup>

### **2.6 Cultural Resources**

A corridor-level cultural resources memorandum was completed and dated 17 May 2011. The assessment looks at the corridor in the context of relevant state and

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<sup>2</sup> Shannon & Wilson, Inc., Environmental Site Assessment, Terrace Heights Corridor Study, June 2010.

federal statutes to determine what permits, reports, or agency concurrences will likely be needed over the course of the project's design and construction.<sup>3</sup>

The memorandum found that the project will likely require an environmental assessment (EA) or an environmental impact statement (EIS) under the National Environmental Policy Act (NEPA). This document must include a section on environmental justice (EJ), which addresses how the project will avoid, minimize, or mitigate disproportionately high and adverse human health, environmental, and socioeconomic effects on minority and/or low-income populations.

A cultural resources assessment will be required under Section 106 of the National Historic Preservation Act. The four alternatives described in this report vary in terms of their likelihood of impacting potential cultural resources. As the alternatives move up the Yakima Ridge and development becomes less dense, this likelihood increases.

## **2.7 Other Regulatory Oversight**

The Federal Highway Administration will require a noise discipline report for the project under the Federal Aid Highway Act.

A number of actions will be required for the project to comply with the Clean Water Act. A Section 401 permit must be submitted to Ecology. A Section 404 permit must be submitted to the U.S. Army Corps of Engineers. Both of these requirements can be satisfied through the submittal of a Joint Aquatic Resources Permit Application (JARPA). The JARPA will also be used to obtain hydraulic project approval from the Washington State Department of Fish and Wildlife, as well as a floodplain development permit from the City of Yakima.

The City of Yakima will require at least two other documents: a checklist for Washington State Environmental Policy Act (SEPA) compliance and a shoreline development permit.

A biological assessment will be required under Section 7 of the Endangered Species Act. This document will assess the project's possible impacts on listed species and will be submitted to the U.S. Fish and Wildlife Service and the National Oceanic and Atmospheric Administration's National Marine Fisheries Service.

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<sup>3</sup> Widener & Associates, Yakima East West Corridor, Environmental/Permitting Issues Memorandum, May 2011.

### **3.0 DESIGN CONSTRAINTS**

The sections below summarize design constraints associated with the development of the alternatives (see Figure 5).

#### **3.1 Interstate 82 Bridges**

Within the corridor's vicinity, Interstate 82 (I-82) is a four-lane, access-controlled highway with two bridges that provide an elevated crossing of the railroad tracks that are owned by BNSF Railway and operated by the Columbia Basin Railroad. Each bridge has three spans, none of which has the clear width necessary to construct the entire proposed roadway cross-section. Consequently, the corridor will have an interim design condition where it splits at the centerline with the eastbound (EB) lanes passing under the center span and the westbound (WB) lanes passing under the northern span with a cut wall.<sup>4</sup>

WSDOT South Central Region intends to widen I-82 to six lanes within the next 20 years. At that time, the bridges over the railroad tracks will be rebuilt and lengthened to accommodate a single span over the corridor, and the corridor will be reconfigured to the ultimate design condition with a single normal crowned cross-section.

#### **3.2 U.S. Bureau of Reclamation Property**

The alignment alternatives reflect the importance to the efficient construction and use of the corridor of property owned by the Bureau of Reclamation. The alternatives either skirt the northern and southern edges of the property, strategically bridge over it, or avoid it entirely. During the project design, the County coordinated discussions with decision makers at the Bureau and formulated a number of solutions that balanced the priorities of both agencies (see Appendix C).

#### **3.3 Marsh Road**

Marsh Road bisects the Bureau's property in a northwest-southeast diagonal. An extension of the corridor's initial tangent meets Marsh Road diagonally at a roughly 45-degree angle. This angle is too oblique for an intersection; therefore, the corridor must be banked north to intersect Marsh Road at a minimum 60 degrees. Another option would partially realign Marsh Road in the vicinity of the proposed corridor to improve the skew.

#### **3.4 Roza Canal Wasteway No. 2**

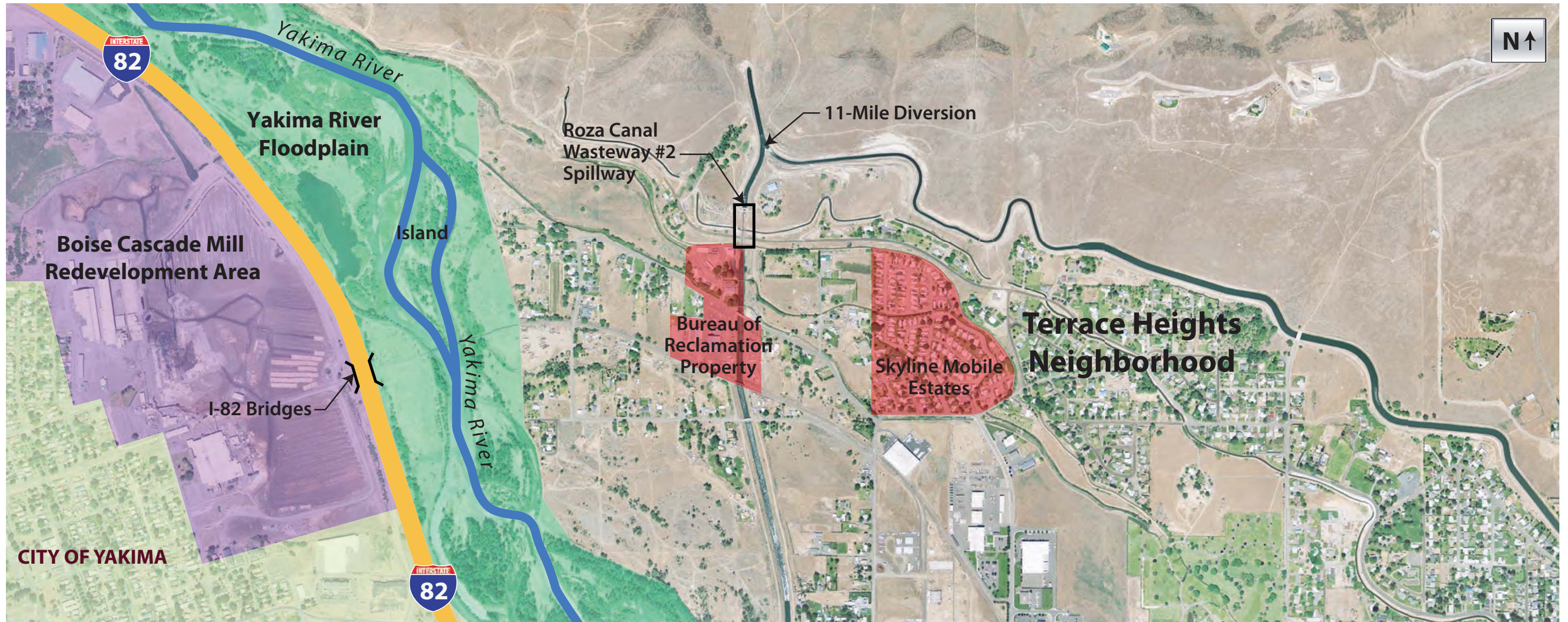
The Roza Canal Wasteway No. 2 splits off from the Roza Canal proper at the "11-Mile" diversion north of the Bureau of Reclamation property near the top of the Yakima Ridge. Water from the wasteway flows down the ridge and into the Bureau power plant via a spillway channel. Any proposed crossing of the corridor over this channel must allow the channel to remain intact for its entire length down the side of the ridge.

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<sup>4</sup> Terrace Heights Corridor Study, Figure 5-4.



Figure 5. Design Constraints



### **3.5 Skyline Mobile Estates Trailer Park**

Environmental justice guidelines prohibit disproportionate impacts to any of several protected classes, which in the case of the Skyline Mobile Estates Trailer Park, could mean the ages, socioeconomic status, or ethnic backgrounds of some park residents.

The park also raises concerns about hazardous materials because many of the single-wide mobile homes at the park appear to have been built prior to 1977. In that case, they likely contain asbestos and/or lead-based paint, and corridor development would entail removing the mobile homes in question and destroying them in a contained environment. The disposal and resulting soil remediation would pose additional costs.<sup>5</sup>

### **3.6 Rest Haven Road and Cut Off Road Intersection**

The existing three-legged intersection between Rest Haven Road and Cut Off Road lies at a location strategic for all the alignment alternatives. This was by design, because Cut Off Road was designated as one of the two nonterminal locations where the corridor would tie in with the existing roadway network. Each alternative attempts to make this connection, but the resulting configurations have specific limitations unique to each group.

### **3.7 Roza Canal and Roza Canal Maintenance Access Drive**

The Roza Canal flows southeast in a perched channel near the top of the Yakima Ridge. Because this canal sees more use than any other canal in the corridor, the Roza Irrigation District (RID) has requested that any proposed crossing of the canal by the corridor be accomplished by a bridge rather than a large culvert. The County, which had assumed this since early planning, confirmed it in a meeting with the district.

Alone, the bridge does not pose a significant obstacle to project development. However, RID also maintains a gravel maintenance access drive along the southern canal bank. RID maintenance personnel use this drive several times a day to oversee the canal's operation. RID has requested that any crossing by the corridor of the access drive be kept at-grade. As a result, the vertical grade of any alternative crossing the canal must use the access drive as a hinge point. Moving south from the access drive down the ridge, the steepness of the descent requires a similarly steep grade for the corridor. All of the alternatives that cross the canal employ the maximum vertical grade allowable by the County for an urban arterial highway through rolling terrain (see Section 4 – Design Criteria).

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<sup>5</sup> Shannon & Wilson, Inc., Environmental Site Assessment, Terrace Heights Corridor Study, June 2010.

## **4.0 DESIGN CRITERIA**

### **4.1 Functional Classification, Density, Capacity, and Modes**

The east-west corridor is considered a major arterial and will consist of four lanes, each 12 feet wide. Left-turn pockets will be provided at each of the proposed intersections. The corridor runs through an urban area and will have a corresponding cross-section featuring curb and gutter with no shoulder.<sup>6</sup>

The corridor will be designed for use by pedestrians and bicyclists. The 2001 study stipulated that 4-foot bike lanes between the traveled way and the gutter flag and 5-foot sidewalks offset 7 feet from the traveled way be included on the roadway cross-section.<sup>7</sup> The 2001 study also indicated that a single 14-foot paved multi-use trail could be substituted for both sidewalks and both bike lanes. A separate trail with an independent profile can provide a series of plateaus to allow pedestrians and bicyclists opportunities to rest before becoming fatigued, while a barrier between the road and the trail provides enhanced safety from errant vehicles and drivers with reduced sight distance.

### **4.2 Design Speed and Vehicle**

The proposed design speed (V) for the corridor is 40 mph and the posted speed is 35 mph.<sup>8</sup> However, the 2001 study notes that "...potential usage of a higher design speed for some segments along the final alternatives was found to be practical and feasible and could be considered during preliminary and final design."<sup>9</sup>

The proposed design vehicle is a WB-50.<sup>10</sup>

### **4.3 Grades**

The maximum longitudinal profile grade is set at 8 percent.<sup>11</sup> This value corresponds to the maximum grade allowable for 40 mph design speed on an urban arterial through rolling terrain.<sup>12</sup>

The minimum longitudinal profile grade is set at 0.5 percent.<sup>13</sup> This value corresponds to the recommended minimum grade required to drain a cast-in-place curb and gutter.

### **4.4 Cross-Slope**

The minimum value for transverse cross-slope ( $e_{nc}$ ) is 2 percent.<sup>14</sup>

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<sup>6</sup> Terrace Heights Corridor Study, Table 4-1.

<sup>7</sup> Ibid.

<sup>8</sup> Ibid.

<sup>9</sup> Terrace Heights Corridor Study, Section 1.2, p. 1-1

<sup>10</sup> Ibid., Table 4-1.

<sup>11</sup> Terrace Heights Corridor Study, Table 4-1.

<sup>12</sup> AASHTO 2004, Exhibit 7-10.

<sup>13</sup> Terrace Heights Corridor Study, Table 4-1.

#### **4.5 Superelevation**

The maximum value for superelevation ( $e_{\max}$ ) through horizontal curves is set at 4 percent due to Yakima County's propensity for snow and ice during the winter months.<sup>15</sup>

#### **4.6 Horizontal Curves**

A minimum radius of 575 feet was selected for all horizontal curves.<sup>16</sup> This is slightly above the American Association of State Highway and Transportation Officials (AASHTO) minimum value of 533 feet for a  $V=40$  mph and  $e_{\max}=4$  percent.<sup>17</sup> This leads to the reasonable assumption that the design superelevation for minimum-radius curves is the maximum superelevation ( $e_d=e_{\max}$ ).

Because of numerous tight geographical constraints throughout the project corridor, the minimum radius was used for nearly all horizontal curves in all alignment alternatives. Notable exceptions include a curve in the Rest Haven Bench Alternative, where the radius was increased to parallel the bench itself more closely and, thus, prevent encroachment into the canal right-of-way on either side, and a curve in the Lowlands Alternative, where a larger radius was used to more closely parallel the railroad tracks.

#### **5.0 TRAFFIC STUDIES**

The Yakima Valley Conference of Governments (YVCoG) sponsored the creation of a region-wide traffic demand analysis model. The YVCoG model has subsequently been used to study the impacts of various transportation improvements proposed by various agencies throughout the County. In anticipation of a number of changes proposed to the City's street network, the County performed a traffic analysis on the Yakima Avenue/Terrace Heights Drive corridor and its relationship with I-82. The YVCoG traffic model showed the proposed east-west corridor would absorb over 500 trips per peak hour from Yakima Avenue/Terrace Heights Drive. Additionally, a number of intersections in downtown Yakima showed level of service improvements because the corridor diverted some Terrace Heights trips from the City's street network.

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<sup>15</sup> Ibid.

<sup>16</sup> Ibid.

<sup>17</sup> AASHTO 2004, Exhibit 3-25.

## **6.0 ANALYSIS OF CORRIDOR ALTERNATIVES**

The following section describes past alternatives and the process of generating the current selection of alternatives.

### **6.1 Past Corridor Alternatives**

The 2001 study suggested two primary alignment alternatives: the North Alternative and the South Alternative. With the eastern terminus firmly established and the property acquired by the County, the North Alternative became the more viable of the two. First, the South Alternative split the Terrace Heights community in half, isolating some area residents. The North Alternative lay closer to the community's fringe at the base of the Yakima Ridge and would, thus, allow Terrace Heights to remain an integral community.

Second, the 2001 study listed the "increased congestion, delay, inconvenience, and hazard" on Terrace Heights Drive as the primary factor driving the need for the corridor.<sup>18</sup> The study suggested that "the new route will divert traffic from Terrace Heights Drive."<sup>19</sup> However, the South Alternative lay less than 3,000 feet north of the Terrace Heights Drive corridor. The County believed placing the two arterial corridors so close together would limit the tributary area for each and negate the corridor's ability to collect and distribute traffic more effectively.

### **6.2 Generation and Consolidation of Alternatives**

The intent at the beginning of this alignment study was to use the North Alternative from the 2001 study. However, as the design team began to consider the constraints of that alignment, other alignments that might meet the purpose and need were conceived. Because the North Alternative from the 2001 study occupied the entire Rest Haven Bench, it was clear any other alignments would have to either go further up the hill or stay more in the lowlands.

From this premise, an alternative was developed as the northernmost potential alignment, and an alternative through the northern edge of the mobile home park was developed as the southernmost potential alignment. From these three basic alternatives—the North Alternative and the two enveloping alignments—a corridor study area was defined. A number of in-between alignments were also generated and formulated into a grid called the "braided swath" (see Figure 6). Through further study and agency coordination, the braided swath was consolidated into three alignment alternatives: Ridge Top, Rest Haven Bench, and Ridge Base (see Figure 7).

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<sup>18</sup> Terrace Heights Corridor Study, Section 1.1.

<sup>19</sup> Ibid., Section 3.3.