

# Executive Summary

## ES.1 INTRODUCTION

A roadway extending from the south Truckee Meadows to the City of Sparks has long been considered by the respective roadway agencies in the Truckee Meadows. In 2004, three potential corridors for a Southeast Connector were accepted for consideration by the Regional Transportation Commission (RTC). These three corridors consisted of the so called "Valley Corridor", "Foothills Corridor", and "Sparks Industrial Corridor." At the Regional Transportation Commission Board Meeting of January 2007, Commissioners voted to proceed with the "Valley Corridor" for further investigation as the SouthEast Connector.

In August 2007, the Regional Transportation Commission retained Stantec Consulting Inc. to develop a Plan Line Study for the SouthEast Connector. The overall purpose of this Plan Line Study was to "put a line on a map". In effect the study was to investigate the constraints within the Valley Corridor and given these constraints, develop a conceptual horizontal and vertical alignment for the SouthEast Connector and ultimately develop opinions of probable cost associated with this conceptual alignment. The scope of work pertaining to the development of the Plan Line Study for the SouthEast Connector generally included the following:

- Provide a base map from existing Washoe County aerial mapping and existing Washoe County GIS parcel base and right-of-way information;
- Review all available data pertinent to the alignments of the roadway, including existing geotechnical reports, traffic data, hydrology/drainage reports, adjacent roadway construction drawings, etc.;
- Perform a geotechnical feasibility investigation to identify possible design/construction issues and difficulties;
- Perform preliminary analyses on cultural and archeological impacts associated with potential roadway alignments;
- Perform preliminary analyses on impacts to wetlands associated with potential roadway alignments;
- Analyze traffic operations for the alternative alignments;
- Develop feasible alignments to identify viable alternatives;
- Perform a drainage analysis to identify the drainage constraints and opportunities within the Valley Corridor, including conformance with the Truckee River Flood Control Project;

- Provide golf course master planning with regard to potential modifications to the Rosewood Lakes Golf Course to accommodate the SouthEast Connector;
- Provide conceptual level alignment drawings.

This executive summary provides results of these tasks. Detailed technical memorandums describing the results of these tasks are attached to this executive summary as appendices.

This plan line study could not have been completed without the generous assistance of Garth Oksol, Project Manager; Howard Riedl, Senior Engineer; Bob Russell, Engineering Director; Chris Louis, Senior Traffic Engineer; and Jack Lorbeer, Planning Manager of the Regional Transportation Commission. Stantec is grateful for their contributions to this effort.

## **ES.2 GEOTECHNICAL INVESTIGATION**

In support of this plan line study, Stantec performed a geotechnical feasibility study to determine the soil, bedrock, and groundwater conditions within the corridor area and provide information on potential construction difficulties. The geotechnical report entitled "Geotechnical Feasibility Study" attached to this report as Appendix A details the full results of this investigation.

The basis of this investigation was existing information only. No new borings or laboratory tests were performed as part of this study. In summary, the geotechnical investigation revealed that the predominant soils within the corridor are fine grained soils with low support characteristics. Groundwater varies from a depth of 1 to 15 feet depending on the location within the corridor. Due to the shallow groundwater table, deep foundations will likely be required for all structures. A summary of the design considerations is provided in Table 4 of the geotechnical report.

In addition to the geotechnical report, the Regional Transportation Commission expressed an interest in the seismic considerations for a roadway within this corridor. Sections 10 and 11 of the attached geotechnical report provide an overview of the seismic hazards as they pertain to this corridor. This information was expanded upon in Addendum 1 to the Geotechnical Feasibility Study entitled "Earthquake Fault Information" attached to this Geotechnical Feasibility Study. In summary, the faults within the corridor represent a low risk of movement during the service life of this roadway.

## **ES.3 CULTURAL & ARCHEOLOGICAL INVESTIGATION**

Stantec's subconsultant for this investigation was Kautz Environmental Consultants, Inc. The Cultural Resources Survey for the Southeast Connector was prepared based upon

Federal and Local requirements. A literature review was conducted of the Nevada Cultural Resource Information System (NVCRIS), the Nevada State Museum files, Washoe County Assessors and Recorders files and historic maps and aerial photos. Following the literature review, Kautz performed a field review of the project site.

Federal regulations preclude a full release of the report as confidentiality is a significant issue with regards to archaeological sites. Federal Regulations, CFR Part 800 Protection of Historic Properties, 800.10 Part c stipulates: "...the head of a Federal agency or other public official receiving grant assistance pursuant to the act...shall withhold from public disclosure information about the location, character, or ownership of a historic property when disclosure may cause a significant invasion of privacy; risk harm to the historic property; or impede the use of a traditional religious site by practitioners." Therefore, the report is not included as part of this report and will be maintained under separate cover as per regulations. RTC Board members can be briefed on the report in closed quarters. Appendix B contains the cover letter for the Cultural Resources Survey Report.

#### **ES.4 WETLANDS INVESTIGATION**

Stantec's subconsultant for this investigation was Gibson & Skordal, LLC. Verified wetland delineations were obtained from the US Army Corps of Engineers followed by field verification of these wetland delineations. These were utilized to prepare updated wetland delineation maps within the project corridor. In all, 220.4 acres of potential water of the United States were mapped within the project corridor. Of the 220.4 acres, 87.5 acres were open water, 82.1 acres were open water/marsh complex, and 50.9 acres were marsh/seasonal wetland complex. Appendix C contains a letter report detailing these findings.

#### **ES.5 TRAFFIC ANALYSIS**

Stantec was provided projected traffic volumes by the Regional Transportation Commission for the 2018, 2030, and 2040 horizon years. Utilizing these projected traffic volumes, level of service (LOS) analyses were performed for the intersections of the SouthEast Connector with South Meadows Parkway, Mira Loma Drive, Pembroke Drive, and Greg Street. LOS analyses were not conducted at the intersections of Alexander Lake Parkway or Cleanwater Way as discussions with RTC staff indicate that there are currently no plans for these roadways to have signalized intersection access to the SouthEast Connector. A LOS analysis was not performed for the intersection of the SouthEast Connector and Mill Street as it is not known at this time the amount of traffic that will be used by an extension of Mill Street east to the SouthEast Connector.

Figures 6 through 9 of the “Traffic Analysis” Technical Memorandum summarize these lane configurations developed as part of this analysis. In summary, lane configurations meeting the required LOS criteria for each of the intersections were developed for the 2018 horizon year and for all of the intersections with the exception of South Meadows Parkway for the 2030 and 2040 horizon years. Projected traffic volumes for the intersection at South Meadows Parkway for the 2030 and 2040 horizon years are such that a standard intersection built to its “practical limit” will not meet current LOS criteria. A detailed discussion of the LOS analysis is described in the Technical Memorandum entitled “Traffic Analysis” attached to this report as Appendix D.

## **ES.6 DESIGN CRITERIA**

The SouthEast Connector is proposed to have a functional classification of a “high-access control arterial” with a design speed of 55 mph and posted speed limit of 45 mph. Based upon these assumptions, a thorough review of RTC, City of Reno, City of Sparks, American Association of State and Highway Transportation Officials (AASHTO), Transportation Research Board (TRB), and Federal Highway Administration (FHWA) design guidelines was performed for the purpose of establishing design criteria for the SouthEast Connector. Some of these design criteria are median types, driveway spacing, level of service threshold, intersection spacing, intersection skew, design vehicle, maximum superelevation, minimum curve radius, minimum stopping sight distance, minimum and maximum gradients to name a few. The technical memorandum entitled “Design Criteria”, Appendix E, provides a detailed listing of the design criteria established and agreed to by the RTC, City of Reno, and City of Sparks and brief discussions of each item.

## **ES.7 DRAINAGE ANALYSIS**

The proposed SouthEast Connector traverses a delineated floodplain its entire length which creates a significant design consideration for the project. The floodplain is shown as a Special Flood Hazard Area Zone AE on the Federal Emergency Management Agency’s (FEMA) Flood Insurance Rate Map (FIRM) for Washoe County, Nevada and Incorporated Areas and is created in part by backwater of flood flows concentrating at the Vista Narrows, located at the eastern edge of the valley. The contributing watershed is approximately 1430 square miles, with flow emanating from the Truckee River, Steamboat Creek, the North Truckee Drain and all of their tributaries.

Due to the significance of this floodplain within the valley, the Regional Water Planning Commission’s *2004-2025 Washoe County Comprehensive Plan* identifies the area as the Zone 1 Critical Flood Pool. Development within the Critical Flood Pool is therefore subject

to more stringent development criteria such as meeting a one to one (1:1) volume mitigation ratio.

The Truckee River Flood Project (TRFP) and the United States Army Corps of Engineers (USACE) have been working together to develop flood control improvements to reduce the effect of flooding within the Truckee Meadows. As part of this project, an unsteady state hydraulic, Hydrologic Engineering Center River Analysis System (HEC-RAS) model of the Truckee River, Steamboat Creek, North Truckee Drain and Critical Flood Pool was developed to evaluate the TRFP alternatives.

Stantec utilized the TRFP/USACE HEC-RAS model to evaluate the impacts of and mitigation for development of the SouthEast Connector within the Zone 1 Critical Flood Pool. Within the HEC-RAS model, Stantec modified the model to include the proposed roadway, bridges, culverts and modifications to the Steamboat Creek channel to provide the required one to one (1:1) volume mitigation ratio.

The results of the modeling efforts demonstrate that the proposed improvements associated with the SouthEast Connector will have “no adverse impact” to the Truckee River Flood Project’s flood control improvements, water surface elevations or volumes in the Critical Flood Pool 1, and will be in compliance with or exceed all local ordinances. A detailed discussion of the drainage analysis can be found in the Technical Memorandum entitled “Drainage Analysis” attached to this report as Appendix F.

## **ES.8 GOLF COURSE MASTER PLANNING**

Stantec’s subconsultant for this task was Kyle Phillips Golf Course Design. Kyle Phillips provided a conceptual design for modifications to the existing Rosewood Lakes Golf Course which was provided to the City of Reno. In discussions involving City of Reno staff, RTC staff, and Stantec, it became clear that guidance was needed as to what the City of Reno policymakers envision for the future of a City of Reno municipal golf course. Lacking this significant direction, RTC staff concluded that further conceptual designs by Kyle Phillips would be premature. In any case, it is the intent to keep the City of Reno’s golf course “whole”, whether it be construction of a new 18-hole golf course or modifications to the existing Rosewood Lakes Golf Course with affected holes replaced in property adjacent to the existing course. Therefore, the tasks associated with master planning for the Rosewood Lakes Golf Course have been deferred to a more appropriate time and are not discussed within this report.

## **ES.9 MISCELLANEOUS ISSUES**

As is often the case, other issues not specifically tied to a scope of work envisioned at the onset of a project evolve and warrant discussion. In the case of the plan line study for the SouthEast Connector, several issues warrant such a discussion.

### **ES.9.1 BRIDGE STRUCTURES**

Stantec performed an analysis of projected bridge costs for several bridge alternatives over the Truckee River. The results of this analysis are described in the technical memorandum entitled "Truckee River Crossing Conceptual Design" attached to this report in Appendix G. Two bridge length alternatives were analyzed, 525 foot length and 1235 foot length. The bridge length would be dependent on the strategy utilized for maintaining "flood water equalization". In summary, the approximate cost for a steel girder bridge with a length of 1235 feet is \$33.2 million and for a steel/concrete bridge is \$28.5 million. The approximate cost for a steel girder bridge with a length of 525 feet is \$16.0 million and for a steel/concrete bridge is \$14.8 million. The cost for the shorter bridge length would be offset by the cost of additional box culverts required for flood water equalization.

### **ES.9.2 ENVIRONMENTAL ISSUES – METHYL MERCURY**

During the course of the plan line study for the SouthEast Connector, the RTC instructed Stantec to perform some preliminary research as to the presence of methyl mercury in the corridor soils and make an assessment of possible impacts to the project. The technical memorandum entitled "Methyl Mercury" attached to this report as Appendix G contains the results of this research. In summary, methyl mercury is present within this area although concentration levels fall below regulatory thresholds. Most of the methyl mercury is bound to sediments. Therefore, monitoring should be performed throughout construction, and measures should be taken to minimize release of sediments through dust control and best management practices.

## **ES.10 CONCEPTUAL ALIGNMENT ALTERNATIVES/PREFERRED ALIGNMENT**

The software program "Quantm" was utilized to provide the initial step in the analysis of alignment alternatives within the SouthEast Connector corridor. Quantm is a program which when provided information on areas to avoid: i.e. mitigation costs, construction costs, general engineering design parameters, etc., can quickly analyze a multitude of alignments and provide output on construction costs, earthwork quantities, impacts to key areas, etc. Through the utilization of Quantm, three conceptual alignment alternatives

were developed. These alignment alternatives were then analyzed using higher level design tools such as AutoCAD to insert intersection geometries and to provide localized adjustments to horizontal and vertical alignments, side slopes, and earthwork calculations. An evaluation matrix as presented in Table 3 of the Technical Memorandum entitled "Alternate Alignment Analysis" attached as Appendix H to this report was developed to provide a means of comparison for these three alignment alternatives. Among the factors evaluated as part of this evaluation matrix were impacts to wetlands and significant archeological sites, residential buffering, impacts to the Truckee River Flood Project, and overall cost. The range of opinion of probable cost (including construction, mitigation, golf course, contingency, and right-of-way) for the three conceptual alignment alternatives was \$157 to \$207 million.

Note that an opinion of probable construction and right-of-way cost of \$144 to \$202 million was provided early in the plan line study. Its accuracy was consistent with the level of effort and design details investigated at that time. Additional information obtained during the remainder of the plan line study revised this opinion of probable construction and right-of-way cost to \$157 to \$207 million. Total costs, including construction, right-of-way, engineering design and construction administration varied from \$191 to \$252 million.

Through discussion with the RTC staff, Stantec developed a preferred alignment that endeavored to incorporate the positive attributes of the three conceptual alternatives with respect to impacts to wetlands, impacts to sites of prehistoric and historical interest, distance to nearest homes, and overall cost. The result was a hybrid alignment made up of selected segments of the alignment alternatives. Figure ES.1 graphically depicts the three conceptual alignments and the preferred alignment. The expected range of opinion of probable cost (including construction, mitigation, golf course, contingency, and right-of-way) for this preferred alignment is between \$167 and \$181 million. The total opinion of probable cost including design and construction administration is \$203 to \$221 million. These costs represent a single constructed roadway, beginning to end, with no allowance for additional costs associated with multiple construction phases.

The technical memorandum entitled "Alternate Alignment Analysis" attached to this report as Appendix H contains the detailed results of this study. Roadway drawings illustrating the conceptual alignments of the three alternatives as well of the recommended conceptual alignment are included within this technical memorandum. The technical memorandum entitled "Opinion of Probable Cost" attached to this report as Appendix I contains the detailed opinions of probable cost analyses.

## **ES.11 CONSTRUCTION PHASING**

The Regional Transportation Commission expressed an interest in how best to sub-phase this project, given that funding of the entire project at once may not be possible. A rigorous phasing analysis was not conducted as part of this plan line study, however, the following discussion is provided to serve as guidance with regard to phasing.

It should be mentioned that this discussion pertains to construction phasing of the complete connection of the SouthEast Connector between the South and East Truckee Meadows. It is not a discussion of the impacts of segments of the SouthEast Connector constructed as standalone projects with the potential that a complete connection may never be made. Lack of a complete connection does not meet the purpose and need of the SouthEast Connector and is outside the scope of this project. Arguably, the benefit to the transportation network would be diminished without a complete connection, and may cause a situation in which traffic must make its way from the SouthEast Connector to McCarran Boulevard on a transportation network that may not have the capacity to carry it.

Ideally the project would be phased such that the earliest phases provide the most benefit to the transportation network as possible. The SouthEast Connector could be phased from north to south or from south to north depending upon development and need. Stantec recommends that during a preliminary design effort, the RTC traffic model be utilized to generate scenarios with differing SouthEast Connector construction phasing alternatives.

Table ES.1 provides opinions of probable cost for various phasing options. The costs reflected below are based upon a breakdown of items of work by segment only, and are not based upon a constructability review of the project or any specific phases. Such a review was not part of the scope of work for this project and a more in-depth analysis will be possible during a preliminary design effort.

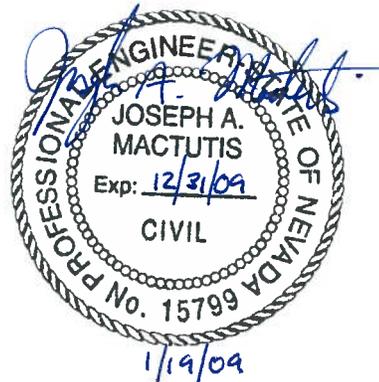
A constructability review may reveal a myriad of issues associated with phasing. For example, phased construction may impact the ability to utilize cut and fill material from different areas of the project efficiently. In addition, mitigation of wetlands, mitigation of sites of archeological and cultural interest, and realignment of Steamboat Creek may require separate phasing plans independent of the construction phasing. The first phase may trigger the need for all mitigation (wetlands, archeological/cultural, and flood) and modifications to Steamboat Creek to be performed prior to road reconstruction. If that is the case, other options for phasing exist as well, including contracting bridge work, mass grading, and roadway construction separately.

| <b>TABLE ES.1 – PHASING COST ANALYSIS (IN MILLIONS)</b> |                                   |                          |                                  |                         |
|---|-----------------------------------|--------------------------|----------------------------------|-------------------------|
| <b>Description</b>                                      | <b>Option A</b>                   |                          | <b>Option B</b>                  |                         |
|   | <b>South Meadows to Mira Loma</b> | <b>Mira Loma to Greg</b> | <b>South Meadows to Pembroke</b> | <b>Pembroke to Greg</b> |
| Construction, Mitigation, Golf Course, Contingency      | \$29-\$33                         | \$89-\$100               | \$51-\$57                        | \$67-\$76               |
| Right-of-Way  | \$17                              | \$32                     | \$30                             | \$18                    |
| <b>Subtotal</b>   | <b>\$46-\$50</b>                  | <b>\$120-\$132</b>       | <b>\$81-\$87</b>                 | <b>\$85-\$94</b>        |
| Engineering - Design                                    | \$5                               | \$12-\$13                | \$8-\$9                          | \$9                     |
| Engineering - Construction                              | \$6                               | \$14-\$16                | \$10                             | \$10-\$11               |
| <b>Total</b>  | <b>\$57-\$61</b>                  | <b>\$147-161</b>         | <b>\$99-106</b>                  | <b>\$104-\$114</b>      |

**NOTES:**

- 1) All costs represent FY2009 dollars. No inflation factor is provided.
- 2) Right-of-way costs were provided by the RTC.
- 3) In providing opinions of probable cost, it is recognized that neither the Client nor Stantec has control over the costs of labor, equipment or materials, or over the Contractor's methods of determining prices or bidding. The opinion of probable costs is based on Stantec's reasonable professional judgment and experience and does not constitute a warranty, express or implied, that the Contractor's bids or the negotiated price of the Work will not vary from the Client's budget or from any opinion of probable cost prepared by Stantec.

It is important to note that the costs by phase listed above may increase substantially based on further analysis. In phased construction, the total cost of the individual phases almost always exceeds the costs stated for the project as a whole. Stantec strongly recommends a more in-depth analysis with regard to phasing during a preliminary design effort.



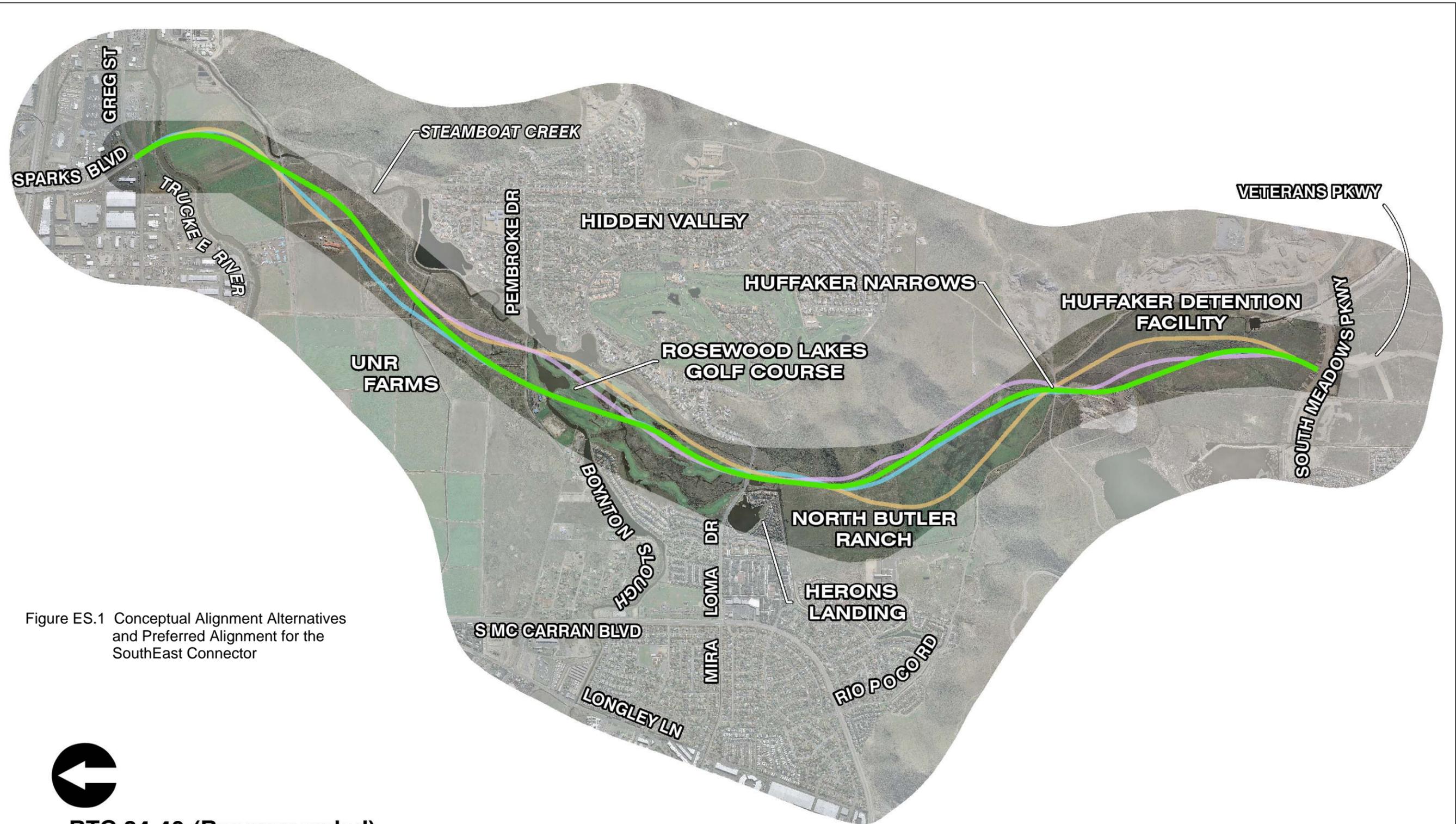


Figure ES.1 Conceptual Alignment Alternatives and Preferred Alignment for the SouthEast Connector



- RTC 34-40 (Recommended)
- RTC 7-25-37
- RTC 9-34
- RTC 10-40