SR 801/SR 202L System Traffic Interchange
Interchange Selection Report

NH-801-B(ARG)
801 MA 000 H6876 01L
Maricopa County, Arizona

Prepared for:
Arizona Department of Transportation
Project Management
205 South 17th Avenue
Phoenix, Arizona 85007

Prepared by:
HDR Engineering, Inc.
3200 East Camelback Road, Suite 350
Phoenix, Arizona 85018

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Executive Summary

This interchange selection report (ISR) describes the development and evaluation of the proposed system traffic interchange (TI) between the proposed State Route (SR) 801 and SR 202L (South Mountain Freeway) and concludes with a recommendation for a proposed system TI that best balances operational objectives, community impacts, and flexibility for future expansion activities. Another document, the *Alternatives Selection Report for the SR 801, SR 303L to SR 202L*, was completed prior to the development of this ISR. That report developed and evaluated numerous corridors for the proposed 14-mile-long SR 801 freeway and established where the freeway-to-freeway connection would be located between SR 801 and SR 202L. It did not, however, evaluate the shape, stack configuration, or local access implications of constructing a system TI at that location. This ISR addresses these and other factors.

The proposed system TI is located in Phoenix in western Maricopa County, Arizona. This ISR encompasses an area both within the system TI core and outside of the core both north and south along the SR 202L route and west along the SR 801 route to fully develop the lane configurations approaching and departing the TI ramps. This document, in conjunction with the previously mentioned SR 801 corridor Alternatives Selection Report (ASR), is the precursor to the location/design concept report (L/DCR) and environmental assessment (EA) for the proposed SR 801 freeway. The L/DCR and the EA will carry the findings of this document to the next level of analysis. The ISR's intent is to document the screening process for the concepts that do not warrant further analysis. The Arizona Department of Transportation (ADOT) is the SR 801 project sponsor. ADOT, with concurrence from the Federal Highway Administration (FHWA) and the Maricopa Association of Governments (MAG), will decide which concepts warrant further analysis.

The ADOT TRACS number for this study is 801 MA 000 H6876 01L, and the Federal-aid number is NH-801-B(ARG).

In November 2004, Maricopa County voters approved Proposition 400. The passage of Proposition 400 allowed for a 20-year extension of a ½-cent sales tax to continue to improve the existing regional transportation system and including the construction of new freeways in Maricopa County. This plan is administered by MAG and is called the *Regional Transportation Plan* (RTP). SR 801 is one of the new freeways identified in the RTP.

The Regional Public Transportation Authority (RPTA), MAG, and ADOT have worked together to develop the RTP. The recommended improvements are consistent with regional freeway, high occupancy vehicle (HOV), and transit system studies. Funding for the advance purchase of right-of-way is available for the proposed SR 801 freeway in FY 2011 and the newly introduced unfunded Phase V (2025+) of the RTP. However, the proposed design and construction of SR 801 as shown in this ISR is currently unfunded and, under the latest RTP, would not occur until after 2025 (i.e.: Phase V).

The purpose of the new SR 801 facility is to ease traffic congestion and provide a supplemental transportation link for Interstate 10 (I-10) in western Maricopa County by increasing the east-to-west freeway capacity in the region. The project would support the plans, policies, and growth objectives of jurisdictions in the region, including the Town of Buckeye, City of Goodyear, City of Avondale, City of Phoenix, and Maricopa County. In addition, the project would support the plans for other regional facilities, such as planned flood control infrastructure and river restoration projects in the Salt River.

This project is needed to accommodate the population growth, economic development, and employment patterns that have resulted in increased traffic congestion on the existing regional freeway system and arterial streets. Additionally, 2030 peak-hour travel demand is projected to exceed the capacity of a built-out I-10 facility, resulting in the need for a reliever route for I-10. Lastly, no high-capacity transportation facility exists, other than I-10, in this part of Maricopa County. As a result, when I-10 must be closed to clear an incident (as it occasionally has been in the past), traffic backups can occur for many miles and can last hours, resulting in lost time for the motoring public and adverse impacts on air quality.

The project area is located in ADOT's Phoenix District within Maricopa County in south-central Arizona. The system TI would be located south of Broadway Road between 67th and 59th avenues, partially over the Salt River. At the time of this document's preparation, ADOT had selected the W59 Alternative as the preferred alternative for the SR 202L route in this area. All system TI configurations evaluated in this report assume this SR 202L alignment would be selected as the final alignment. Should this assumption change, the findings of this report would need to be reevaluated.

Project stakeholders have requested that this TI be designed to accommodate a future fourth leg (eastern leg) with provisions for an SR 801 through movement within the TI. This document assumes that a fourth leg would most logically connect to the planned City of Phoenix Avenida Rio Salado/Broadway Road (ARS) project or similar type of facility. This document does not focus on where or how that connection would be made, but rather focuses on how a fourth leg and the through movement affect the shape of the TI. As this report will demonstrate, this accommodation was an important factor in selecting a recommended concept.

Provisions are also being included in the design of this TI for a future two-way HOV direct connector ramp. Based on the current 2030 MAG traffic model, a clear HOV direction is not apparent. The 2030 model projects less than 200 vehicles per hour (vph) regardless of which HOV ramp direction is selected, consequently, it is not obvious which HOV ramp should be accommodated. As a result, an interchange design was selected that did not require a commitment on direction.

Like all system TIs, limitations exist on how and where local access can be accommodated within the operational influence area of the TI. Along the SR 202L corridor, local access would be affected between Baseline Road on the south and Lower Buckeye Road on the north. Along SR 801, local access would be affected from the system TI on the east to 75th Avenue on the west.

Because of certain physical constraints at the site, such as the Salt River and an existing residential community just north of Broadway Road, the stack order of the interchange was, in part, already dictated prior to starting this evaluation. In general, the stack sequence of the recommended concept is as follows, from the bottom up: Salt River, SR 801/ARS, SR 202L, northbound-to-westbound/southbound-to-eastbound ramps, eastbound-to-northbound/westbound-to-southbound ramps.

Off-site drainage would be collected and conveyed by a channel located on the north side of the SR 801 freeway alignment and along the east side of the SR 202L alignment. Detention basins would be integrated into the drainage channel design. Drainage outfalls would all occur at the Salt River, and their design would be coordinated with the Flood Control District of Maricopa County to be consistent with the district's watercourse master plans and area drainage master plans.

Two other ongoing transportation studies will directly affect the SR 801 study. These studies include:

- SR 202L, South Mountain Transportation Corridor Study (ADOT)
  <www.azdot.gov/Highways/valley_freeways/Loop_202/South_Mountain/index.asp>
- Avenida Rio/Broadway Road Project (City of Phoenix)
  <avenidariosalado.com/about.php>

The SR 801 Study Team (primarily made up of ADOT, MAG, FHWA and HDR Engineering, Inc. staff members) has been in regular communication with representatives from these other projects to monitor progress and to incorporate decisions into the SR 801 project as necessary.

Additional reports have been or are being prepared as part of SR 801 study, many of which address the system TI location. Many are considered "predecisional" documents and are not available for release. The first two listed below are not predecisional and are available for review, with the first one appearing in the appendix of this document. These reports include:

- *Final SR 801 Roadway Design Criteria Report* (May 2010)
- *Groundwater Survey & Assessment Report* (May 2007)
- *Draft Noise Report* (December 2006)
- *Draft Air Quality Report* (December 2006)
- *Draft Preliminary Initial Site Assessment* (December 2006)
- *Draft Section 4(f) and Section 6(f) Report* (February 2007)
- *Draft Water Resources Report* (November 2006)
- *Draft Prime and Unique Farmland Report* (November 2006)
- *Draft Purpose and Need Report* (December 2006)
- *Draft Cumulative and Indirect Impacts Report* (February 2007)
- *Draft Jurisdictional Waters Report* (December 2006)
- *Draft Floodplain Report* (December 2006)
- *Draft Socioeconomic Report* (February 2007)
- *Draft Transit Modal Analysis* (November 2006)
- *A Class III Cultural Resource Survey of Proposed Alignments for the SR 801 Freeway, SR 303L to SR 202L, Maricopa County, Arizona* (December 2006)
- *Public Information Meetings Draft Comment Summary Report* (December 2005)
- *Draft Agency and Public Scoping Report* (August 2006)

This report contains the following appendixes:

- Appendix A – Roadway Design Criteria Report
- Appendix B – Analysis for the Removal of the Southern Avenue Traffic Interchange on SR 202L
- Appendix C – Tier 2 Concepts
- Appendix D – Tier 3 Concepts

This report recommends that a single TI configuration with associated local access modifications be carried forward into the L/DCR. Typically, a study of this type would narrow the selection down to two build concepts so that the L/DCR can evaluate two build alternatives before recommending a preferred configuration. However, the Study Team concluded that there was sufficient reason to drop all build concepts but one at this level because the preferred build solution was apparent.

New right-of-way would be required for this facility; however, it was not quantified at this level of development. All concepts evaluated had very similar footprint requirements; therefore, right-of-way was not deemed a critical differentiating factor except as it related to the existing residential community north of Broadway Road where right-of-way takes were kept to a minimum. The L/DCR will fully evaluate the right-of-way requirements for the selected concept. The RTP has right-of-way acquisition funded in fiscal years 2010 and 2026 through 2030.

Like right-of-way costs, construction cost was also not quantified because it would have been similar for the concepts evaluated. Because much of this TI would be built on bridges over the Salt River, bridge costs were estimated to give a sense of how much the TI concepts' costs would vary. This variable was included in the selection criteria, but ultimately was simply useful information during the screening process because other, more important factors ended up driving the selection of the recommended configuration. The L/DCR will fully evaluate the construction cost for the selected concept. The RTP currently does not have this project funded for construction.

The next step in the study process is to carry the selected system TI configuration, the two build alternative SR 801 corridor alignments, and the no-build alternative into the L/DCR to determine a single recommended alternative for the entire project. The Study Team anticipates that the L/DCR will be complete in late 2011.

Chapter 1. Introduction

1.1 Project Description

This interchange selection report (ISR) describes the development and evaluation of the proposed system traffic interchange (TI) between the proposed State Route (SR) 801 and SR 202L (South Mountain Freeway) and concludes with a recommendation for a proposed system TI configuration. The TI concepts were developed in accordance with the approved regional and local transportation plans to optimize the traffic operations of the TI, maintain local access at planned TIs along SR 202L, integrate construction phasing opportunities into the design, and minimize impacts the TI may have on the adjacent land uses.

The SR 202L (South Mountain Freeway) is a proposed new freeway in the *Regional Transportation Plan* (RTP) that loops around the south and west edges of South Mountain. It would connect to I-10 on the east end of the corridor at the existing I-10 / SR 202L Santan Freeway interchange and to I-10 again on the west end of the corridor at 59th Avenue.

The SR 801 is also a proposed new freeway in the RTP that is parallel to and south of I-10 on the west side of Phoenix. Its intent is to provide an alternative route to the existing I-10 corridor. Its proposed limits would extend from the SR 202L on the east to the SR 303L on the west, but ultimately would extend further west to SR 85 in Buckeye.

The proposed system TI is located in Phoenix in western Maricopa County, Arizona. Specifically, it is located in the Arizona Department of Transportation (ADOT) Phoenix District south of Broadway Road between 67th and 59th avenues, partially over the Salt River (see Figures 1-1 and 1-2). This ISR covers areas both within the system TI core and outside of the core both north and south along the SR 202L route and west along the SR 801 route to fully develop the lane configurations approaching and departing the TI ramps.

This document, in conjunction with the SR 801 corridor Alternatives Selection Report (ASR), is the precursor to the location/design concept report (L/DCR) and the environmental assessment (EA) for the proposed SR 801 freeway. An ISR's intent is to document the screening process for eliminating concepts that do not warrant further analysis. ADOT, with concurrence from the Maricopa Association of Governments (MAG) and the Federal Highway Administration (FHWA), decides which concepts warrant further analysis.

This study focuses on the design of a three-legged system TI between SR 801 and SR 202L, with this interchange being the eastern terminus of SR 801. However, this interchange is being designed to accommodate a future fourth leg (eastern leg) with provisions for an SR 801 through movement within the interchange. This document assumes that a fourth leg would most logically connect to the planned City of Phoenix Avenida Rio Salado/Broadway Road (ARS) project. This document does not focus on where or how that connection would be made, but rather focuses on how a fourth leg and the through movement would affect the shape of the TI. As this report will demonstrate, this accommodation was an important factor in selecting a recommended concept.

Provisions are also being included in the design of this TI for a future two-way high-occupancy vehicle (HOV) direct connector ramp. Based on the current 2030 MAG traffic model, a clear HOV direction is not apparent. The 2030 model projects less than 200 vehicles per hour (vph) regardless of which HOV ramp direction is selected, consequently, it is not obvious which HOV ramp should be accommodated. As a result, an interchange design was selected that did not require a commitment on direction.

To accommodate the System TI, local access must be reassessed along the SR 202L corridor between Baseline Road on the south and Lower Buckeye Road on the north. Along SR 801, local access is impacted from the System TI on the east to 75th Avenue on the west.

Due to certain physical constraints at the site, such as the Salt River and an existing residential community just north of Broadway Road, the stack order of the interchange was, in part, dictated prior to starting this evaluation. In general, the stack sequence of the recommended concept is as follows from the bottom up: Salt River, SR 801/Broadway Road, SR 202L, north-to-west (NW) ramp/south-to-east (SE) ramp, east-to-north (EN)/west-to-south (WS) ramp.

Off-site drainage would be collected and conveyed by a channel located on the north side of the SR 801 freeway alignment and along the east side of the SR 202L alignment. Detention basins would be integrated into the drainage channel design. Drainage outfalls will all occur at the Salt River and would be coordinated with the Flood Control District of Maricopa County to be consistent with the district's watercourse master plans and area drainage master plans.

While construction of this interchange was programmed in the original RTP, a recent reprioritization has now placed the SR 801 project and its connection with the SR 202L into an unfunded status. However, right-of-way preservation money is still allocated in the latest RTP. Consequently, the location and layout of the SR 801 is still necessary to spend these early right-of-way acquisition dollars wisely.

Coordination with public agencies has occurred over the course of this study and included ADOT, MAG, the FHWA, and the City of Phoenix.

A timeline of key events, meetings, and decisions that have occurred during the development of the SR 801/SR 202L System TI study is presented in Figure 6-1 and Table 6-1. Readers may find it useful to refer back to this timeline while reading this report to understand the sequence of events that occurred and how and when decisions were made.

Figure 1-1. Project location in state

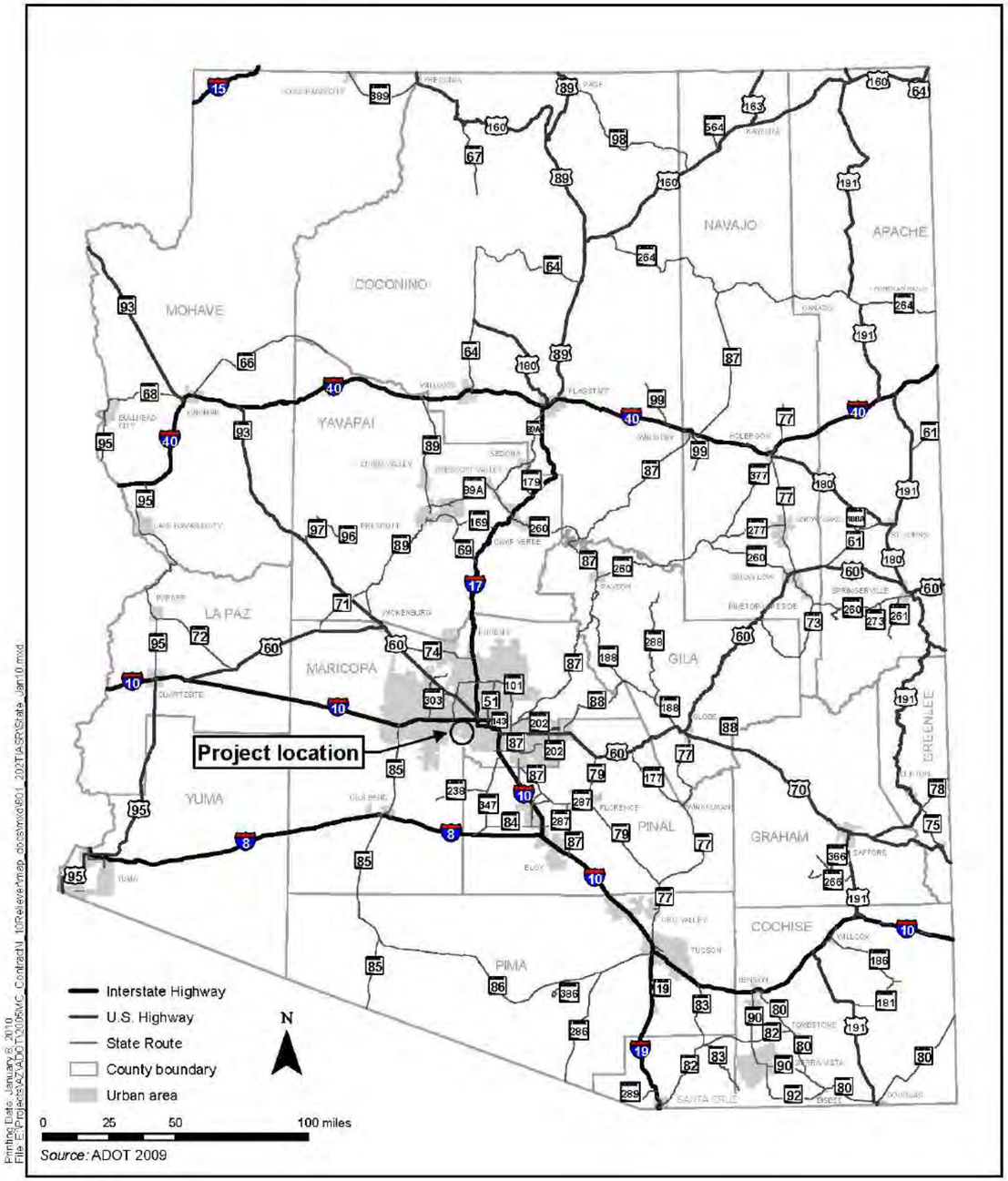
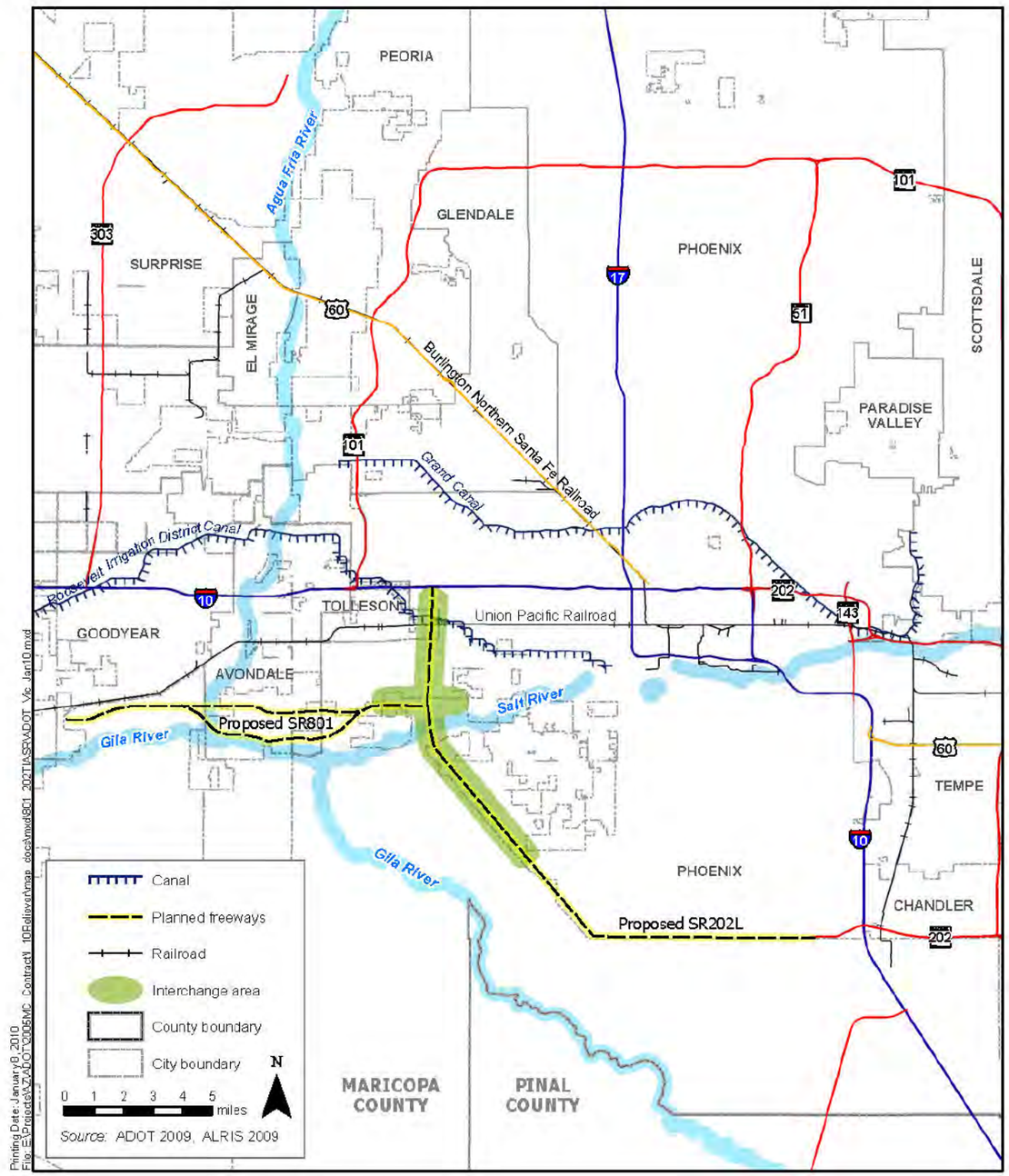


Figure 1-2. Project vicinity



1.2 Background

In November 2004, the voters of Maricopa County approved Proposition 400. The passage of Proposition 400 allowed for a 20-year extension of a ½-cent sales tax to continue to improve the existing regional transportation system and to construct new freeways in Maricopa County. This plan is administered by MAG and is called the *Regional Transportation Plan* (RTP). SR 801 is one of the new freeways designated in the RTP, along with the South Mountain Freeway portion of SR 202L.

The Regional Public Transportation Authority (RPTA), MAG, and ADOT have worked together to develop the RTP. The recommended improvements are consistent with regional freeway, HOV, and transit system studies. Funding for the advance purchase of right-of-way is available for the proposed SR 801 freeway in Phase I (2005–2010) and the newly introduced unfunded Phase V (2025+) of the RTP. However, the proposed design and construction of SR 801 as shown in this ISR is currently unfunded and, under the latest RTP, would not occur until after 2025 (i.e.: Phase V).

At the time of this document's preparation, ADOT had selected the W59 Alternative as the preferred alternative for the SR 202L route in this area (where SR 202L would connect to Interstate 10 [I-10] near 59th Avenue). All system TI configurations evaluated in this report assume this SR 202L alignment would be selected as the final alignment. In addition, based on coordination efforts with the ongoing SR 202L study, it has also been assumed that service TIs would be provided at Lower Buckeye Road, Broadway Road, Southern Avenue, and Baseline Road along SR 202L.

Another document, the *Alternatives Selection Report for the SR 801, SR 303L to SR 202L*, was completed prior to the development of this ISR. That report developed and evaluated numerous routes for the proposed 14-mile-long SR 801 freeway and, in conjunction with the selection of the W59 Alternative as the preferred alternative for SR 202L, established where the freeway-to-freeway connection would be located between SR 801 and SR 202L. It did not, however, evaluate the shape, stack configuration, or local access implications of constructing a system TI at that location. This ISR addresses these and other factors.

1.3 Purpose and Need

The purpose of the SR 801 facility is to ease traffic congestion and provide a alternate transportation link for the existing I-10 facility in western Maricopa County. The proposed SR 801 would increase the east-west freeway capacity in the region. Because the SR 801/SR 202L TI would act as the eastern terminus for SR 801 (until the Avenida Rio Salado/Broadway Road (ARS) connection if it is made), proper selection of an interchange configuration is crucial to the operations of both SR 801 and SR 202L. The project would support the plans, policies, and growth objectives of municipalities in the region.

This project is needed to serve the anticipated population growth, economic development, and employment patterns that have and will continue to produce increased traffic congestion on the existing regional freeway system and arterial streets. Additionally, 2030 peak-hour travel demand is projected to exceed the capacity of a built-out I-10 facility, resulting in the need for a reliever roadway for I-10. Lastly, no high-capacity transportation facility exists, other than I-10, in this part of Maricopa County. As a result, when I-10 must be closed to clear an incident (as it occasionally has in the past), traffic backups can occur for many miles and can last hours, resulting in lost time for the motoring public and adverse impacts on air quality.

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Chapter 2. Existing Conditions

2.1 Introduction

The SR 801/SR 202L TI study area is located in Phoenix and unincorporated Maricopa County and is bounded by 55th Avenue on the east, 83rd Avenue on the west, Van Buren Street on the north, and 51st Avenue on the south, as shown in Figure 1-2. The TI itself will be located between 59th Avenue and 67th Avenue, and between Broadway Road and Southern Avenue.

2.2 Roadway Characteristics

Currently, no freeways exist in the Interchange Area. It is anticipated that the SR 202L freeway would be built over the next decade and would be an existing facility before the SR 801 would be built. Only arterial and collector roadways exist today, many as two-lane, two-way roadways.

2.3 Land Use

The interchange is located in the urban fringes of the Phoenix metropolitan area where land use is gradually transitioning from agricultural to urban land uses, such as residential, commercial, and industrial. The existing land use surrounding the TI is predominantly agricultural and industrial, although some residential areas also exist. The Salt River floodway traverses the site from east to west between Broadway Road and Southern Avenue under the southern portion of the proposed TI. Specific land uses were identified through aerial imagery, field verification, and zoning data. Several noteworthy land uses are found around the TI:

- The section of the Salt River that crosses the Interchange Area has been significantly altered from its natural state, primarily because of the current and past presence of sand and gravel mines within and adjacent to the river. The U.S. Army Corps of Engineers is currently developing a river restoration project in this stretch of the Salt River called the Rio Salado Oeste. Additional information can be found at: <www.usace.army.mil/CECW/Documents/cwrb_docs/projects/sriver/sriver.pdf>
- A residential neighborhood, located north of Broadway Road, straddles the planned SR 202L route. When built, this neighborhood reserved a vacant swath of land through its middle anticipating the SR 202L route. However, it did not anticipate SR 801 or how it would connect to SR 202L in this area. Consequently, additional right-of-way would likely be required from this neighborhood.
- An existing large-lot rural residential neighborhood exists between 67th and 71st avenues south of Broadway Road. The western leg of the system TI (SR 801) would pass through this neighborhood and require the acquisition of several residences. Attempts have been made when designing the SR 801 alignment to limit the number of acquisitions to the fewest possible, but impacts are unavoidable.
- The City of Phoenix owns a parcel of land east of 67th Avenue approximately ¼ mile south of Broadway Road. Currently, the City has leased this land to a sand and gravel operator to excavate a 30-foot-deep hole on the site for a planned storage facility associated with the 91st Avenue Wastewater Treatment Plant. The western leg of the system TI would pass through the middle of this site, rendering it unusable for the City's intended purpose.

2.4 Utilities

Within the core of the system TI, few utilities exist because the TI largely occurs over vacant or agricultural land or the Salt River. Any utilities in these areas would be irrigation related and would likely be abandoned or removed as the land use changes from agricultural to transportation.

Major utilities in the area are generally located within the arterial street grid that crosses the Interchange Area. The most noteworthy utilities exist under Broadway Road and are large-diameter gravity sanitary sewer pipes that flow to the west to the City of Phoenix 91st Avenue Wastewater Treatment Plant. The presence of these sewer pipes virtually guarantees that no roadway elements would pass under Broadway Road because relocation of these pipes would be extremely challenging and costly.

Many utilities cross the SR 202L alignment. Those that conflict with the SR 202L construction would be addressed when SR 202L is built. The additional lanes needed on SR 202L to accommodate the TI with SR 801 would be added as a widening project, which would likely have little to no impact on the utilities that cross SR 202L. One exception could be the overhead power lines on Broadway Road. The SR 202L project would have to relocate these lines to accommodate the new SR 202L bridge over Broadway Road; however, this would commonly occur by simply raising the power lines. Because the system TI would add new and taller roadways over Broadway Road for the system TI ramp connections, a second relocation may be necessary. Consideration should be given to putting these overhead power lines underground during the SR 202L construction to avoid this second impact.

Several utilities cross the Interchange Area within the SR 801 corridor; however, none are directly impacted by the system TI. Utilities that cross the SR 801 facility are addressed in the SR 801 corridor ASR.

2.5 Drainage

At this time, very few stormwater conveyance facilities exist within the Interchange Area. Once SR 202L is completed, it is anticipated that it would include a drainage channel system along the eastern side of the freeway to collect off-site and on-site flows and convey them to the Salt River. However, today, the stormwater runoff generally flows from northeast to southwest north of the Salt River. South of the Salt River to the Phoenix South Mountain Park/Preserve, the stormwater runoff generally flows from southeast to northwest. The ultimate outfalls from both areas are the Gila and Salt rivers. Only one formal flood control feature exists in the Interchange Area—the Laveen Area Conveyance Channel (LACC) where it crosses the proposed SR 202L alignment south of Baseline Road. Other features influencing the existing drainage patterns in the area include:

- The Roosevelt Irrigation District (RID) canal that crosses the SR 202L freeway alignment from east to west between Buckeye and Lower Buckeye roads.
- Irrigation supply and return ditches (lined and earthen) located along the sides of major roads and fields.

Three studies provide information regarding stormwater runoff within the Study Area. They are:

- *Durango Area Drainage Master Plan*, October 2002, prepared by Dibble and Associates for the Flood Control District of Maricopa County (FCDMC). This area drainage master plan (ADMP) determined conceptual designs to reduce flooding in the area between the Agua Fria River and 47th Avenue. Several channels, basins, and a storm drain were proposed. A HEC-1 model was created for the existing conditions, as well as one for the proposed drainage improvements.
- *Laveen Area Drainage Master Plan*, September 1991, prepared by Cella Barr & Associates for the FCDMC. This ADMP determined conceptual designs to reduce flooding in the area between the South Mountains North Ridge and the Salt River. A HEC-1 model was created for the existing conditions and the proposed drainage improvements.

- *Design Hydrology for the Laveen Area Conveyance Channel*, November 2002, prepared by FCDMC. This study documented the hydrologic analysis of the LACC. This study uses the Laveen ADMP prepared by Cella Barr & Associates, September 1991, and the *South Phoenix/Laveen Drainage Improvement Project*, June 1997, prepared by HDR Engineering, Inc., as the basis for the existing and future condition hydrology.

Off-site drainage considerations are not anticipated to be major differentiators for the interchange selection process because the interchange is located over the outfalls of the proposed SR 202L drainage system (i.e. the Salt River) and because it is located at the headwater of the SR 801 corridor. On-site drainage water quality retention will be a challenge for this interchange because so much of the interchange is located over the Salt River, but this issue will be equally challenging for all the interchange concepts. As a result, drainage is not considered in the interchange selection process.

The L/DCR for the SR 801, SR 303L to SR 202L, project will fully evaluate the drainage implications of the system TI along both the SR 801 and SR 202L corridors.

2.6 Right-of-way

Because neither the SR 801 freeway nor the SR 202L freeway exist today, freeway right-of-way does not exist. However, ADOT does own select parcels of land in both the SR 202L and SR 801 corridors. Within the SR 801 corridor, ADOT purchased a parcel of land in the southeastern quadrant of Broadway Road and 67th Avenue and is currently using this parcel as a borrow stockpile site as material becomes available in the area by other agencies. Strategic hardship acquisitions continue in the SR 801 corridor as opportunities arise.

Because the SR 202L construction is more imminent, more ADOT-owned parcels exist within that corridor. The vacant swath of land north of Broadway Road separating the two residential developments is currently owned by ADOT, as is a parcel in the SR 202L path just south of Lower Buckeye Road. Most other ADOT-owned parcels in the SR 202L area fall outside of the system TI Study Area.

2.7 Structures

Currently, only one structure exists near the proposed system TI. It is the 51st Avenue bridge over the Salt River, which was built within the last 10 years. It is located approximately ½ mile upstream of where SR 202L is planned to cross the Salt River. This bridge's layout and substructure design will be reviewed during the L/DCR effort to refine the bridge cost assumptions for the portion of the system TI located over the Salt River.

Chapter 3. Traffic Analysis Overview

This section discusses the traffic data used for this study, along with assumptions and an overview of the operational analysis performed as part of the SR 801/SR 202L system TI study.

3.1 Source of Traffic Projections

The traffic projections were obtained from MAG's regional travel demand model (2008 Emme2). These projections were used to determine the traffic distribution discussed in Figure 3-1. (Note: The contents of this report reflect the analysis performed by HDR Engineering, Inc., which is responsible for the facts and accuracy of the data presented herein. The contents do not necessarily reflect the official views or policies of MAG and have not been approved or endorsed by MAG).

The latest projected traffic forecasts available from MAG are for 2030, which formed the basis for the traffic operational analysis. Because the construction of this interchange is not expected to occur before 2025, the 2030 traffic volumes test the operational performance of the design for only about 5 years after it would open, far short of the normal 20-year design life. An approved MAG traffic model for years beyond 2030 does not exist. To remedy this dilemma, the design team generated traffic volumes for years beyond 2030 by increasing the 2030 traffic volumes by a uniform growth rate, in 10 percent increments. For this report, this exercise is called the longevity analysis.

For the Tier 1 analysis (see Chapter 5 for a detailed description of the tiers), a longevity analysis was not included because it was found that the various interchange shapes were not that sensitive to the operations. For the Tier 2 analysis, the longevity analysis was performed for volumes up to 40 percent because that value produced adequate operational differentiation between the concepts to narrow the field of concepts. For Tier 3, the longevity analysis was expanded up to 80 percent because that value represented the differentiation needed to screen the final concepts.

The following sections discuss the baseline assumptions that are valid throughout the study process.

3.1.1 SR 801 and SR 202L Main Lines

The MAG regional travel model used for this study assumed an ultimate lane configuration of four general purpose lanes and one HOV lane in both directions (i.e. a 4+1 section, or a ten-lane freeway) on both SR 801 and SR 202L. As this interchange selection process was concluding, MAG redefined the SR 202L facility as an ultimate 3+1 section as part of the regional transportation reprioritization process. The Study Team recognized that this change would reduce the anticipated traffic volumes at the interchange, but it was decided to continue using the 4+1 model runs that had already been completed because they would be more conservative and because lower traffic volumes would not meaningfully change the interchange selection.

3.1.2 SR 801/SR 202L System Traffic Interchange

In the MAG regional travel demand model, the system TI at SR 801 and SR 202L is modeled as a three-legged TI with a direct HOV connector ramp for the northbound-to-westbound and eastbound-to-southbound directions (NW/ES direct HOV ramp). The eastbound-to-southbound system ramp (ES ramp) and northbound-to-westbound system ramp (NW ramp) are modeled as three-lane ramps due to their projected volumes. The southbound-to-westbound system ramp (SW ramp) and eastbound-to-northbound system ramp (EN ramp) are modeled as two-lane ramps. MAG's model also included slip ramps from the service TI ramps at Lower Buckeye Road and Southern Avenue to the system TI ramps.

For this analysis, the slip ramps connecting to the system TI ramps were removed and their traffic volumes were manually redistributed to alternative routes within the network to obtain the volumes on the system TI. The resulting number of lanes and projected traffic volumes for the three-legged TI are shown in Figure 3-1.

The operational analysis limits of this study have been set between Baseline and Lower Buckeye roads along the SR 202L and over to 67th Avenue along SR 801. Operational issues outside of these limits are not expected to differ between the system TI options evaluated and were not considered as part of this analysis.

3.1.3 Avenida Rio Salado/Broadway Road (ARS)

The City of Phoenix is currently studying a new high-capacity east-west roadway from 67th Avenue to 7th Street that roughly follows the Broadway Road alignment. This project is called the Avenida Rio Salado/Broadway Road (ARS) project. Information can be found at the project Web site: <avenidariosalado.com>.

It has been assumed that the Avenida Rio Salado/Broadway Road (ARS) project would eventually connect into the eastern side of the SR 801/SR 202L system TI, creating a fourth leg. The funding status and schedule for the Avenida Rio Salado/Broadway Road (ARS) project is unknown; however, this study assumes that this connection will eventually be made. As a result, the TI selection process evaluated how adding this fourth leg in the future would affect the interchange selection. A minimum of four through lanes (two in each direction) is assumed to pass through the core of the interchange to create a through movement for the SR 801 and Avenida Rio Salado/Broadway Road (ARS) traffic. One-lane system ramps are assumed for this fourth leg. In order to evaluate the various local access concepts along SR 202L and determine the geometry of the system TI, the traffic forecasts were obtained for both three-legged and four-legged traffic interchange configurations. However, the operational analysis in this report was performed only for the three-legged system TI condition due to relatively low traffic projections on the fourth leg.

3.2 Initial 2030 Traffic Projections

The initial 2030 peak-hour traffic projections shown in Figure 3-1 form the basis for the traffic operational analysis of the system TI presented in the subsequent sections of this document.

3.3 Future HOV Direct Connector Provisions

A direct HOV connector ramp between SR 801 and SR 202L is expected to be built at a later stage after the initial construction of TI. Therefore, provisions for this HOV ramp have been evaluated as part of this study.

3.3.1 Background

The MAG travel demand models used in this study have two-way direct HOV connections between SR 801 to the west and SR 202L to the south; however, the projected traffic forecasts on these HOV connectors are very low. The 2030 model projects less than 200 vph during peak periods in either of the two directions. It is also anticipated that the construction cost of this connector over the Salt River would be unusually expensive. Because of the low HOV volumes and high cost of construction, an evaluation was performed to determine the feasibility of including provisions for an HOV connector within the system TI.

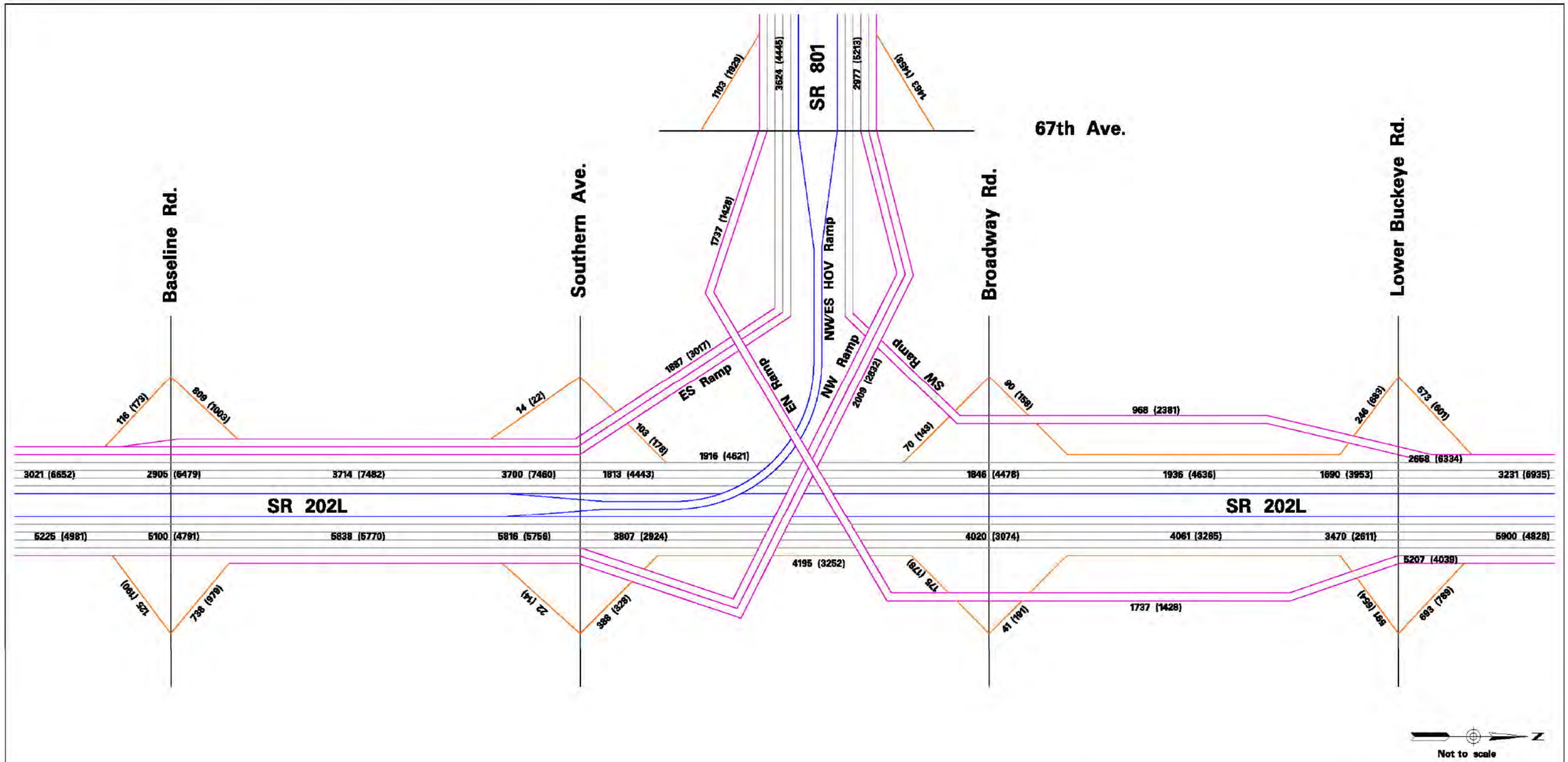
3.3.2 Concepts Considered

Four conditions were analyzed to determine the HOV connector options at the system TI. They are:

- three-legged system TI with HOV connector to the north along SR 202L
- three-legged system TI with HOV connector to the south along SR 202L

- four-legged system TI with HOV connector west to north along SR 202L
- four-legged system TI with HOV connector west to south along SR 202L

Figure 3-1. 2030 peak-hour traffic projections for three-legged system TI



Note: Volumes are manually adjusted based on February 2008 MAG Regional Travel Demand Model

3.3.3 Traffic Analysis

The four conditions were modeled within MAG's regional travel demand model, and projected traffic volumes were extracted for each case. Figure 3-3 shows the predicted HOV traffic volumes for each of the concepts discussed above. The following observations were made:

- An HOV connector to the north on SR 202L would attract more volume than to the south.
- The HOV connector to the north would relieve some of the general purpose ramp volumes to and from the north (i.e., EN and SW ramps) and, therefore, would result in better utilization of those ramps.
- The HOV volumes in either direction are predicted to be relatively low. Given the assumptions that go into a travel demand model and how those change over time, it does not seem prudent to make a decision based on these low figures. Consequently, it may be wise to produce a flexible design to allow an HOV ramp to go in either direction and not commit to either direction at this time.

3.3.4 Findings

The projected HOV volumes were presented to project stakeholders on September 3, 2009 (refer to Table 6-1). At that time, direction was given to evaluate how much extra cost would be incurred by the SR 202L project if HOV provisions were incorporated in both the north and south directions. These provisions largely took the form of widening of the SR 202L median to accommodate the HOV ramp take-off/touch-down length. The results of this analysis were presented to stakeholders on November 18, 2009. The findings were as follows:

- Widening the median of SR 202L to the south over the Salt River would add approximately $2 million to the cost of the SR 202L project, which equals the cost of the added right-of-way in the river bottom because this entire reach would all be on bridge structures. It was determined that widening the median of SR 202L south of the system TI would be prudent and cost effective. The implication of not constructing the wider median over the Salt River would essentially preclude an HOV connector to the south due to the high cost of replacing one of the SR 202L main line bridges—the minimum scope of work needed to create a wider median in the future.
- Widening the median of SR 202L to the north of the system TI north of Broadway Road would add approximately $5 million to the cost of the SR 202L project and would require the acquisition of 13 additional homes in the residential neighborhood north of Broadway Road. It was determined that this additional widening and the related home acquisitions were not justified with the initial SR 202L construction because it did not preclude an HOV connector to the north in the future. However, it does mean that a future HOV connector to the north would require additional right-of-way and reconstruction of the SR 202L southbound lanes.

It was also noted that the possibility exists that SR 801 could be extended east of SR 202L and be routed into the Phoenix inner loop area. While this idea remains a planning concept at this time, the possibility of this concept suggests that the primary HOV movements could then be on the SR 801 through movements and between the SR 801 eastern leg and the SR 202L southern leg. It also seems to imply that the HOV connector between the western and northern legs of the interchange would become less important given the congestion that I-10 will experience in the future. Given this possibility, this issue appears to strengthen the two decisions above.

As a result of these discussions, the following direction will be applied to the system TI layout:

- The interchange geometry and bridge layouts will be designed to accommodate a potential HOV connector ramp in three locations: between the southern and western legs, between the southern and eastern legs, and between the northern and western legs.
- Along SR 202L, the bridges over the Salt River will be spread apart during the initial construction to accommodate a possible south HOV connector.
- North of Broadway Road, no HOV provisions will be made in the initial SR 202L design.

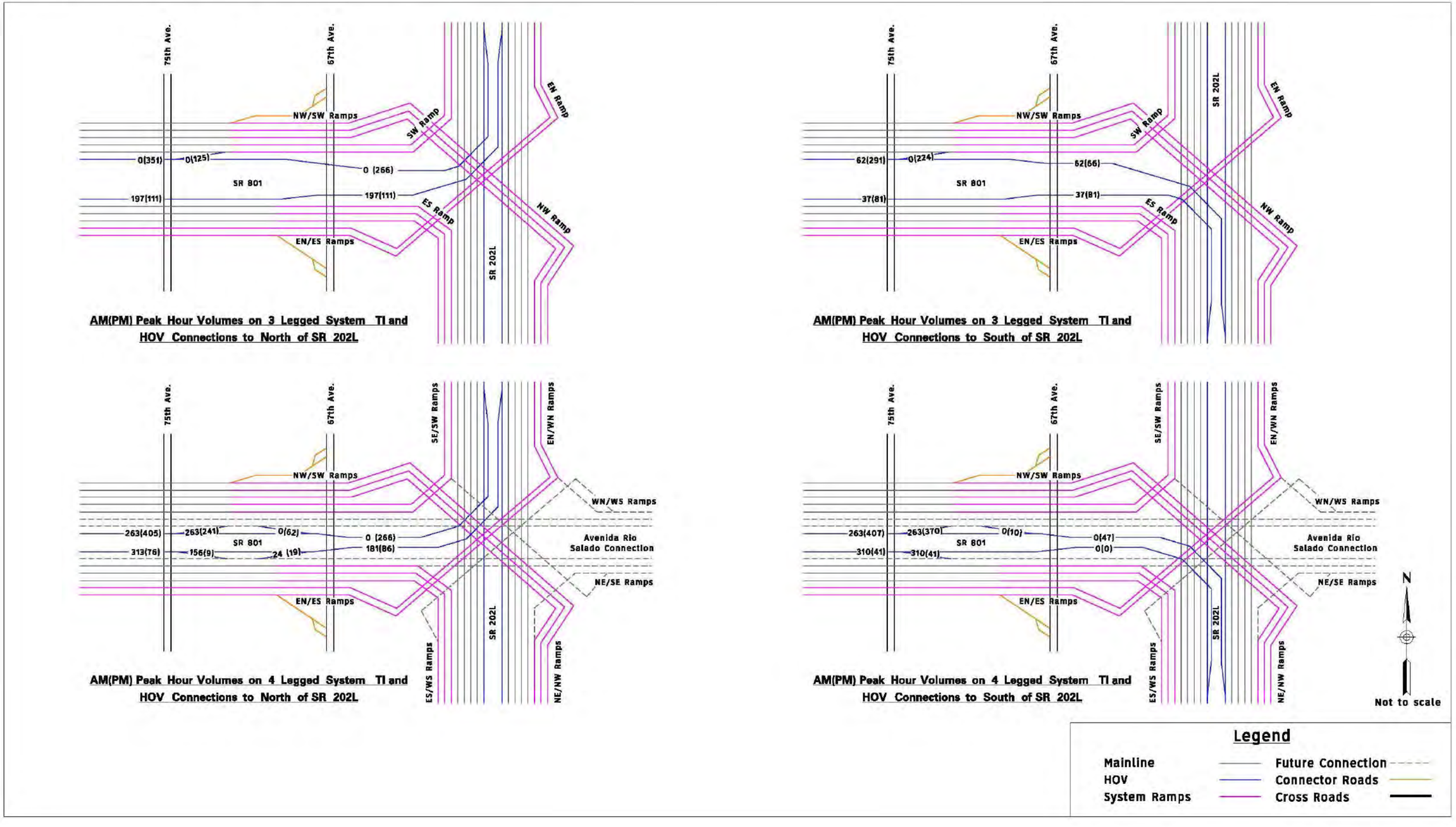
3.4 Traffic Analysis Methodology

The level of service (LOS) analysis methodology defined in the Transportation Research Board's *Highway Capacity Manual* (2000) was used to evaluate the traffic operations of the proposed system TI.

The LOS grading system qualitatively characterizes traffic conditions associated with varying traffic flows and different roadway facilities. LOS A indicates free-flow traffic conditions with little or no delay experienced by motorists. LOS F describes congested conditions where traffic exceeds design capacity, resulting in long queues and delays. See Figure 3-2. LOS A, B, and C are considered to be satisfactory service levels, while congestion becomes more noticeable at LOS D. LOS E is undesirable and is considered by most agencies to be the limit of acceptable delay. LOS F conditions are considered to be unacceptable to most drivers.

Figure 3-2. Level of Service

Figure 3-3. Predicted HOV traffic for three- and four-legged system TI configurations



The freeway operations (basic and weaving sections) and the exit and entry ramps were analyzed using the Highway Capacity Software (HCS+ version 5.21) software. Traffic signals at the TIs and frontage roads were analyzed using Synchro (version 7). Both software packages are based on the methodologies described in the *Highway Capacity Manual* (HCM). Table 3-1 presents the LOS criteria for freeway facilities and signalized intersections.

Table 3-1. Level of Service criteria

LOS	Freeway Basic Segments	Freeway Weaving Segments	Freeway Merge and Diverge Areas	Signalized Intersections
	Density Range (pc/mi/ln)	Density Range (pc/mi/ln)	Density Range (pc/mi/ln)	Control Delay (seconds per vehicle)
A	≤11	≤10	≤10	≤10
B	11–18	10–20	10–20	10–20
C	18–26	20–28	20–28	20–35
D	26–35	28–35	28–35	35–55
E	35–45	35–43	>35	55–80
F	>45	>43	Demand exceeds capacity	>80

HCS uses the morning and evening peak hour volumes and a number of roadway and driver characteristics to determine LOS. Some of the inputs that are constant along the corridor include:

- peak hour factor of 0.95
- truck factor of 12 percent
- driver population factor of 1.0
- free-flow speed based on the type of roadway:
  - freeway – 65 mph
  - system ramp – 55 mph
  - service TI on ramp – 55 mph
  - service TI off ramp – 60 mph

The HCM methodology for freeways suggests that the freeway be broken into sections based on operational characteristics. The three types of segments located in the study area are:

- Weaving sections – The weaving analysis is used for sections of freeway where a lane change must be made to either leave or join the freeway main line.
- Ramp junctions – The ramp junction analysis is used in locations where a ramp entrance or exit is not coupled with a weaving area. This generally occurs at the system TI ramp junctions.
- Basic freeway sections – The basic freeway analysis is used for sections of freeway that are outside of the weaving or ramp junction influence areas. This generally occurs between successive off ramps and on ramps. The basic freeway sections analysis was also used to analyze the body of the system TI ramps.

In the Tier 3 analysis, the VISSIM microsimulation software was used to analyze traffic operations between the dual exit/entry and single exit/entry ramp configurations options. VISSIM evaluates how each vehicle operates using a behavior-based, multipurpose traffic simulation program. The LOS is computed using the vehicle density from the model and the density thresholds for a basic freeway segment in the HCM.

3.5 Tiered Traffic Analysis Overview

A separate traffic analysis was conducted in three tiers to evaluate the various system TI concepts developed for that tier. The traffic analysis included an LOS analysis along the main line, connector roads, and TIs as well as a longevity analysis. Each tier evaluated varied degrees of roadway performance pertinent to the concept the tier was focused on. The results of the traffic analyses are included in the respective tiered analysis discussions in Chapter 5. The following sections describe the traffic analyses conducted in different tiers.

3.5.1 Tier 1 Traffic Analysis

The analysis in this tier focused on the system TI shape evaluation. Based on the initial 2030 traffic projections obtained from MAG, the traffic volumes were assigned to system ramps for the nine concepts developed in this tier. An LOS analysis was conducted to evaluate the performance of all the system TI ramps along with the main line for three-legged system TI configurations for all the eight concepts using HCS.

3.5.2 Tier 2 Traffic Analysis

The analysis in this tier focused on local access evaluation between Baseline and Lower Buckeye roads along SR 202L. Thirteen concepts were developed for the Tier 2 analysis. Of the thirteen concepts, three concepts were chosen for conducting a traffic analysis because the other ten were dropped from further consideration due to other factors.

Traffic forecasts were developed for the three Tier 2 concepts using MAG's regional travel demand model with a four-legged system TI configuration. An LOS analysis was conducted for the connector roads using HCS and the intersection LOS analysis was conducted at the traffic interchanges using the Synchro software. A longevity analysis was also conducted in 10 percent increments of 2030 traffic volumes up to 40 percent to evaluate the operational performance and reliability of the local access options.

3.5.3 Tier 3 Traffic Analysis

The analysis in this tier focused on evaluating the performance of the system TI in combination with the local access. Based on earlier tier evaluations, three hybrid concepts were developed and analyzed in this tier.

Traffic forecasts were developed for the concepts that were modeled using MAG's regional travel demand model with a three-legged system TI configuration. An LOS analysis for the connector roads and system TI ramps was conducted using HCS and an intersection LOS analysis was conducted at the traffic interchanges using the Synchro software.

A VISSIM analysis was also conducted in this tier to specifically evaluate the operational performance between single exit/entry and double exit/entry configurations on the northern leg of the system TI. A longevity analysis was conducted in 10 percent increments up to 80 percent to evaluate the operational performance and reliability of the concepts into the design year (approximately 2045).

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Chapter 4. Environmental Considerations

4.1 Environmental Overview

This section summarizes the environmental issues considered during the selection process for the SR 801/SR 202L system TI. The proposed SR 801 and SR 202L intersection point (and, thus, the TI site) is based on each facility's independent corridor selection process. Because of this, the potential environmental impacts of the system TI build concepts are similar. For the purposes of this document, only those environmental factors that could be affected in different magnitudes were considered during the interchange selection process.

The potential environmental impacts of the interchange concepts identified in this document that will be carried forward into the L/DCR are being evaluated as part of the EA for the SR 801, SR 303L to SR 202L, project, which includes the SR 801/SR 202L system TI.

The system TI site is located just south of Broadway Road between 67th and 59th avenues, and the proposed system TI would span the Salt River. Surrounding the western, southern, and eastern legs, and within the core of the system TI, the land use is primarily agricultural, vacant, or open space (for the river). The northern leg is notably different—a residential neighborhood exists north of Broadway Road on either side of the proposed SR 202L alignment.

The interchange selection process developed and evaluated different system TI configurations, all of which had similar physical characteristics with only slight differences. Specifically, each system TI configuration had slightly different requirements in terms of footprint and overall height. In addition, the location of the footprint varied slightly. Because of these variables, only those environmental factors that would be influenced by the footprint and interchange height were considered.

4.2 Environmental Factors Considered

The environmental factors considered, and how they were applied to the selection process, can be grouped into three categories, as shown in Table 4-1.

Table 4-1. SR 801/SR 202L system TI environmental considerations

Agricultural Land Use Impacts	Salt River Impacts	Residential Impacts
Prime and unique farmland	Floodplain	Noise levels
Biological resources	Water resources	Visual resources
	Jurisdictional waters	Title VI and environmental justice
	Clean Water Act	Socioeconomics
	Biological resources	
Environmental Issues as Applied to the Selection Process		
• Interchange footprint – the smaller the better	• Interchange footprint – the smaller the better	• Interchange footprint – the smaller the better, especially within residential neighborhood • Interchange height – the lower the better to minimize noise and visual impacts

As a result of the issues presented in Table 4-1, the interchange selection process measured the system TI footprint and height for all of the concepts developed. A special emphasis was placed on the footprint within the residential neighborhood north of Broadway Road. As Section 5.5.5 will show, this was a critical factor during the Tier 3 selection process.

4.3 Environmental Resources

Arizona Department of Transportation. 2007. *Draft Biological Resources Report, State Route (SR) 801: SR 303L to SR 202L*. Prepared by HDR Engineering, Inc. Phoenix.

Arizona Department of Transportation. 2007. *Draft Section 4(f) and Section 6(f) Report, State Route (SR) 801: SR 303L to SR 202L*. Prepared by HDR Engineering, Inc. Phoenix.

Arizona Department of Transportation. 2007. *Draft Socioeconomic Report, State Route (SR) 801: SR 303L to SR 202L*. Prepared by HDR Engineering, Inc. Phoenix.

Arizona Department of Transportation. 2006. *Draft Air Quality Report, State Route (SR) 801: SR 303L to SR 202L*. Prepared by HDR Engineering, Inc. Phoenix.

Arizona Department of Transportation. 2006. *Draft Floodplain Report, State Route (SR) 801: SR 303L to SR 202L*. Prepared by HDR Engineering, Inc. Phoenix.

Arizona Department of Transportation. 2006. *Draft Preliminary Initial Site Assessment, State Route (SR) 801: SR 303L to SR 202L*. Prepared by HDR Engineering, Inc. Phoenix.

Arizona Department of Transportation. 2006. *Draft Jurisdictional Waters Report, State Route (SR) 801: SR 303L to SR 202L*. Prepared by HDR Engineering, Inc. Phoenix.

Arizona Department of Transportation. 2006. *Draft Noise Report, State Route (SR) 801: SR 303L to SR 202L*. Prepared by HDR Engineering, Inc. Phoenix.

Arizona Department of Transportation. 2006. *Draft Prime and Unique Farmland Report, State Route (SR) 801: SR 303L to SR 202L*. Prepared by HDR Engineering, Inc. Phoenix.

Arizona Department of Transportation. 2006. *Draft Transit Modal Analysis, State Route (SR) 801: SR 303L to SR 202L*. Prepared by HDR Engineering, Inc. Phoenix.

Arizona Department of Transportation. 2006. *Draft Visual Assessment Report, State Route (SR) 801: SR 303L to SR 202L*. Prepared by HDR Engineering, Inc. Phoenix.

Arizona Department of Transportation. 2006. *Draft Water Resources Report, State Route (SR) 801: SR 303L to SR 202L*. Prepared by HDR Engineering, Inc. Phoenix.

Arizona Department of Transportation. 2005. *Noise Abatement Policy*. Prepared by Environmental and Enhancement Group. Phoenix.

Touchin, J., K. Belvin, S. Silverman, and M. Brodbeck. 2006. *A Class III Cultural Resources Survey of Proposed Alignments for the State Route (SR) 801 Freeway, SR 303L to SR 202L, Maricopa County, Arizona*. Prepared by HDR Engineering, Inc., for the Arizona Department of Transportation. Phoenix.

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Chapter 5. Concept Development and Evaluation

Through the SR 801, SR 303L to SR 202L study process, the need for a system TI connecting SR 801 with SR 202L has been identified at the intersection of these two proposed urban freeways. The two corridors' studies defined the alignments and, consequently, the location of the system TI. This document, and specifically this chapter, defines the methodology used to develop, evaluate, and select the final configuration for the system TI at that site.

5.1 Introduction

5.1.1 Overview

The goal of this chapter is to describe the selection of an interchange shape and stack order that minimizes impacts to the surrounding community and the environment, operates acceptably with future 2045 traffic volumes (about 20 years after it would open to traffic), meets American Association of State and Highway Transportation Officials (AASHTO) and ADOT geometric design standards, identifies how local access points are integrated into the system TI influence area, and accommodates future expansion concepts such as a future HOV direct connector ramp and an eastern leg of the interchange.

A tiered analysis approach was used to address these various design issues.

- Tier 1 focused on the shape and stack order options possible for the system TI. Nine concepts were identified. Tier 1 focused solely on the system TI movements and did not address any service TI movements. Once evaluated, six were dismissed and three were carried forward to the Tier 2 analysis.
- Tier 2 took the three remaining Tier 1 concepts and integrated several SR 202L local access solutions. Seven full local access solutions along SR 202L were identified. One additional reduced local access solution was identified. At the conclusion of the Tier 2 analysis, two of the full local access solutions survived, while the other six full and reduced access solutions were dismissed. However, the two surviving full local access solutions were actually the same concept designed to work with different system TI layouts. Consequently, only one local access solution remained after the Tier 2 process. When coupled with the three remaining concepts from Tier 1, a total of three concepts were carried into Tier 3.
- The Tier 1 analysis focused on "pure" interchange concepts as they related to ramp shapes and ramp merge/diverge strategies. However, over the course of the evaluation, it became apparent that the ideal solution was likely a hybrid concept where certain ramp shapes and merge/diverge strategies from one concept could be merged with other ramp shapes and merge/diverge strategies from another to create an interchange design that addressed certain physical constraints or operational issues at the site. The Tier 3 analysis attempted to take the best traits from each of the surviving Tier 2 concepts and recombine them in different ways to find an optimal layout. Consequently, three hybrid concepts were developed and evaluated against the remaining Tier 2 concepts. One concept emerged as the preferred configuration to carry forward into the L/DCR for the SR 801, SR 303L to SR 202L project.

5.1.2 Site Characteristics and Constraints

Several unique site features were recognized early on as critical to the concept development. The Salt River would pass through the southern side of the interchange site in an east-to-west orientation. Approximately half of the SR 801/SR 202L system TI would be located over the river. As a result, a large part of the interchange would be built on bridges over the river. Consideration for pier and abutment placement was a factor in laying out the design.

Based on the traffic projection models received from MAG, the NW and ES ramps are expected to carry very high traffic volumes. For the purposes of this study, it was assumed that these two ramps would require three lanes to accommodate predicted traffic. Because these two movements were identified as the two highest-volume ramps, there was an early desire by the stakeholders to keep the level of these ramps as low as possible to minimize capacity constraints resulting from steep grades and to keep the cost of these wide ramps as low as possible.

Another sensitive constraint, both physically and environmentally, is the residential neighborhood north of Broadway Road. The Study Team tried to minimize the impact to that neighborhood (both horizontally and vertically) while maintaining minimum geometric requirements. Some concepts fared better than others in this area.

The Tier 1 analysis included an evaluation of the stack order options available at this site. However, only two practical stack order variations were identified because certain elements were required to be on a certain level. To simplify this issue, level numbers were assigned to each of the elevations with approximately 25 feet of separation for required clearances. The Salt River floodway is designated as level 0 and is fixed. The local arterial streets (namely Broadway Road) and SR 801 share level 1. Level 1 is also fixed because Broadway Road exists today at level 1 and SR 801 parallels Broadway Road. The SR 202L and the northbound (NB) and southbound (SB) local access roads occupy level 2. Level 2 is also fixed because the SR 202L construction would occur first, and there would be no reason for the SR 202L main line to be any higher than it needs to be to cross over the river and Broadway Road. Generally speaking, this leaves the two pairs of left-turning flyover ramps to occupy levels 3 and 4—and they have the ability to be reversed. Consequently, the only variation in levels occurs by reversing which pair of left-turning ramps occupies level 3 and which occupies level 4.

5.1.3 Future Expansion Considerations

Modifications to the current proposed SR 202L alignment and geometry are recommended to accommodate the future SR 801 interchange. This includes but is not limited to providing a wider SR 202L median, providing room for a future HOV connector ramp, altering vertical alignments to accommodate future crossings, and constructing local access connections compatible with the future improvements.

The SR 801/SR 202L system TI would be built as a three-legged interchange connecting the northern, southern, and western legs. However, the project stakeholders have requested that this interchange be designed to accommodate adding a potential fourth leg to the east for an SR 801 through movement. As a result, each concept developed would accommodate the fourth leg.

Another future expansion consideration within the system TI is the potential addition of HOV connector ramps. As Section 3.3 of this document describes, it is not clear which HOV direct connector would be most beneficial in the future. For the purposes of the bulk of the concepts developed, the NW/ES HOV connector is shown in the layout. However, the final preferred concept is being designed to accommodate any one of three HOV connectors (NW/ES, NE/WS or EN/SW) to keep options open for the future.

5.2 Design Criteria

The *Roadway Design Criteria Report* generated for the SR 801, SR 303L to SR 202L, project documents the design criteria used when developing this ISR. It is included in Appendix A of this report. In general, a design speed of 55 mph was used for the system ramps with a maximum allowable superelevation rate of 6%. This requires a minimum radius of approximately 1,100 feet for the system ramps.

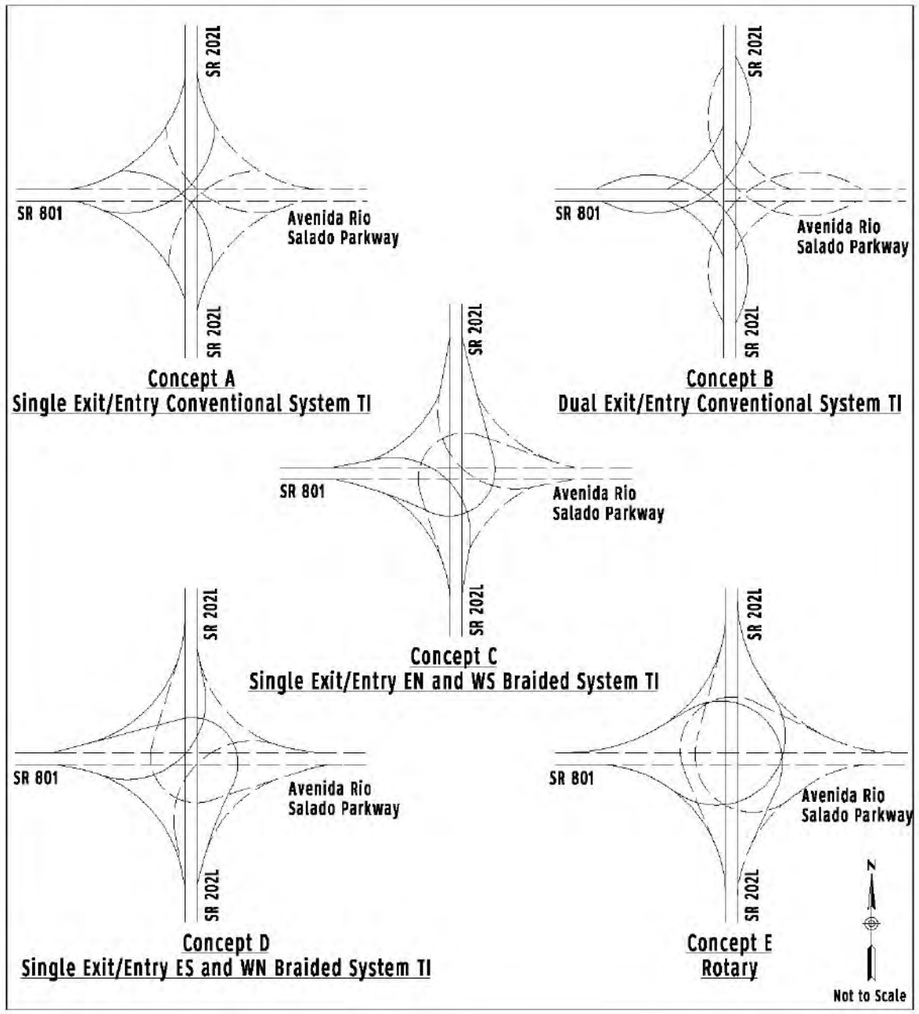
This ISR uses scalable lane line diagrams overlaid on ortho-rectified aerial photography for the concept development. Each line drawn represents the center of a lane. For purposes of relative comparison of concepts, this technique provides an accurate depiction of each concept without the need for detailed layouts.

5.3 Tier 1 Concepts – Interchange Shape and Stack Order

5.3.1 Introduction

The Tier 1 process focused on the shape and stack order options possible for the system TI movements. Figure 5-1 illustrates the basic system TI shapes used throughout the country, in their purest form.

Figure 5-1. Basic system TI shapes



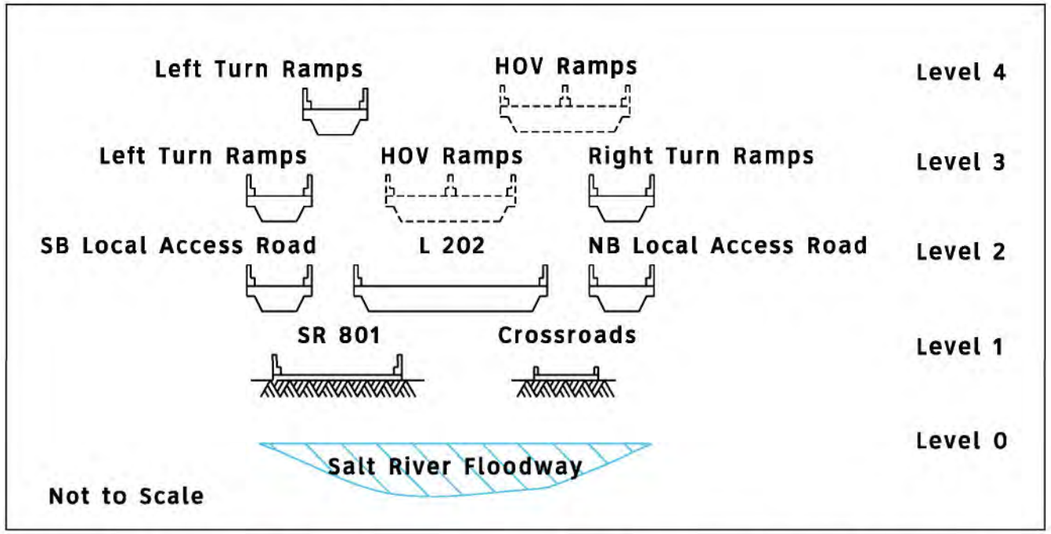
Each shape has advantages and disadvantages, depending on which feature is deemed most important. For instance, the single exit/entry concept is a more driver-intuitive configuration compared with the dual exit/entry concept, but the dual exit/entry concept requires a smaller right-of-way footprint in the four quadrants. Tier 1 evaluated these differences and trade-offs as they relate to the SR 801/SR 202L system TI and its site-specific issues and goals.

As Figure 5-1 shows, letter designations have been assigned to each shape for organizing the Tier 1 concepts. For the C and D concepts, the same braided flyover system TI shape is used, but reverses which pair of left-turning flyovers are braided. It is also useful to note that Concept E is a logical extension of Concepts C and D, with all four flyovers braided.

The second interchange attribute studied under Tier 1 is the stack order options. Figure 5-2 shows the basic stack order available for the SR 801/SR 202L system TI. As noted in Section 5.1, levels 0 through 2 are fixed for this interchange. Only levels 3 and 4 are variable, with the ability to reverse which pair of left-turning flyover ramps is on levels 3 and 4.

Consequently, for each of the Concepts A through E, two stack order suboptions exist. A numerical reference is added to each concept name to differentiate the two. For instance, Concept A1 defines a layout where the NW and SE ramps are on level 3 while the WS and EN ramps are on level 4. Conversely, Concept A2 defines a layout where the WS and EN ramps are on level 3 while the NW and SE ramps are on level 4. The exception to this convention is Concept E, where it was quickly discovered that this concept was not geometrically feasible. As a result, this concept was not advanced to the same level of detail as the others, and suboptions E1 and E2 were not developed.

Figure 5-2. System TI stack order options



For the sake of simplicity, the Tier 1 analysis ignored the local access implications along both SR 801 and SR 202L within the operational influence area of the system TI—the assumption being that there was no local access to consider for many miles in either direction. While an oversimplification, this approach was taken to

focus solely on the shape and stack order of the system TI movements. The local access issues are the focus during the Tier 2 process.

In all, nine concepts were identified for Tier 1—A1, A2, B1, B2, C1, C2, D1, D2, and E.

5.3.2 Tier 1 Concepts

The following sections provide a brief description of the nine Tier 1 concepts developed. On the pages that follow, each interchange concept is illustrated, as noted in the figure references.

Concept A1

Concept A1 uses one of the most common system TI forms: the "California Stack." This interchange uses a single exit and single entry ramp configuration for each pair of movements, resulting in only two major exits and two major entries to the main line facilities. For instance, the EN and ES movements all exit the eastbound freeway at one location, then split downstream into two ramps. Likewise, the SE and NE ramps merge together before entering the eastbound freeway together. In accordance with this study's naming convention, the NW and SE ramps are on level 3 while the EN and WS ramps occupy level 4. The right-turning ramps occur on either level 3 or level 4, depending on which pair of left-turning ramps they connect to. Figure 5-3 depicts Concept A1.

Concept A2

Concept A2 also uses the "California Stack" form. However, unlike Concept A1, Concept A2 puts the NW and SE ramps on level 4 while the EN and WS ramps occupy level 3. Figure 5-4 depicts Concept A2.

Concept B1

Concept B1 is a variation of the "California Stack" form. Unlike Concepts A1 and A2, this interchange uses a dual exit and dual entry ramp configuration for each pair of movements, resulting in four major exits and four major entries to the main line facilities. For instance, the EN and ES movements each exit the eastbound freeway separately from one another. For this evaluation, it is assumed that the ES movement (i.e., the left-turning movement) exits first while the EN movement (i.e., the right-turning movement) exits second. It is possible to reverse the ramps to make them more driver intuitive, but then the inherent advantages of this form are lost, making it similar to Concepts A1 and A2. Consequently, that variation on the B concepts is ignored. Likewise, the SE and NE ramps enter the eastbound freeway separately, with the NE entering first and the SE entering second. The NW and SE ramps are on level 3 while the EN and WS ramps occupy level 4. In the B concepts, the right-turning ramps occur between level 1 and level 2 because they directly connect the two main lines and are not tied to the left-turning ramp profiles. Figure 5-5 depicts Concept B1.

Concept B2

Concept B2 uses the same shape as Concept B1, but again reverses the levels of the left-turning ramps. Concept B2 puts the NW and SE ramps on level 4 while the EN and WS ramps occupy level 3. The right-turning ramps are identical to Concept B1. Figure 5-6 depicts Concept B2.

Concept C1

Concept C1 uses the single exit and entry design from the A concepts, but braids the EN and WS ramps around the core of the interchange rather than having them cross through the core of the interchange opposing each other. For this concept, the NW and SE ramps are on level 3 while the EN and WS ramps (the braiding ramps) occupy level 4. Also like the A concepts, the right-turning ramps are on levels 3 or 4 depending on the left-turning ramps they connect. Figure 5-7 depicts Concept C1.

Concept C2

Concept C2 is identical to Concept C1 except that the NW and SE ramps are on level 4 while the EN and WS ramps (the braiding ramps) occupy level 3. The right-turning ramps are the same as Concept C1, except with their levels reversed as well. Figure 5-8 depicts Concept C2.

Concept D1

Concept D1 reverses which set of left-turning flyover ramps are braided compared with Concept C1. Concept D1 braids the SE and NW ramps around the core of the interchange. For this concept, the SE and NW ramps (the braiding ramps) are on levels 3 and 4 while the EN and WS ramps occupy level 4. The right-turning ramps are on levels 3 or 4 depending on the left-turning ramps they connect. Figure 5-9 depicts Concept D1.

Concept D2

Concept D2 is identical to Concept D1 except that the SE and NW ramps (the braiding ramps) are now on level 4 while the EN and WS ramps now occupy level 3. The right-turning ramps are also the same as Concept D1, except with their levels reversed as well. Figure 5-10 depicts Concept D2.

Concept E

Concept E combines the C and D concepts by braiding both sets of left-turning flyover ramps. This style of interchange, sometimes referred to as a rotary or turbine system TI, is ideal for keeping the total interchange height low by moving the ramps away from the core of the interchange. This comes at the expense of a much greater footprint. As noted earlier, this interchange form was found to not be geometrically feasible. Consequently, describing the ramp levels is not possible because it was not possible to make a solution fit. Even though it was not completed, Figure 5-11 depicts how far this Concept E was developed before it was dropped from consideration.

5.3.3 Tier 1 Traffic Analysis

Nine concepts were studied in the Tier 1 process to establish the interchange shape and stack order. One of these concepts (Concept E) was quickly dismissed as it was not geometrically feasible. Traffic analysis in this tier was limited to evaluating the operations along the SR 801 and SR 202L main lines and the system ramps of the SR 801/SR 202L system TI. Although the concepts differ in design, the traffic volumes on the system TI ramps would be the same regardless of the layout.

An LOS analysis was conducted for both the AM and PM peak hours for the eight remaining three-legged system TI concepts, using the initial 2030 traffic projections as shown in Figure 3-1. The main line segments and the body of the system ramps were analyzed using the HCM methodology for basic freeway segments. The system ramp merges and diverges were also analyzed using a basic freeway segment method because they are considered major splits. Figure 5-12 shows the LOS of the system ramps and the adjacent sections of main line. The figure shows only the worst-case AM or PM peak LOS.

Figure 5-3. Concept A1

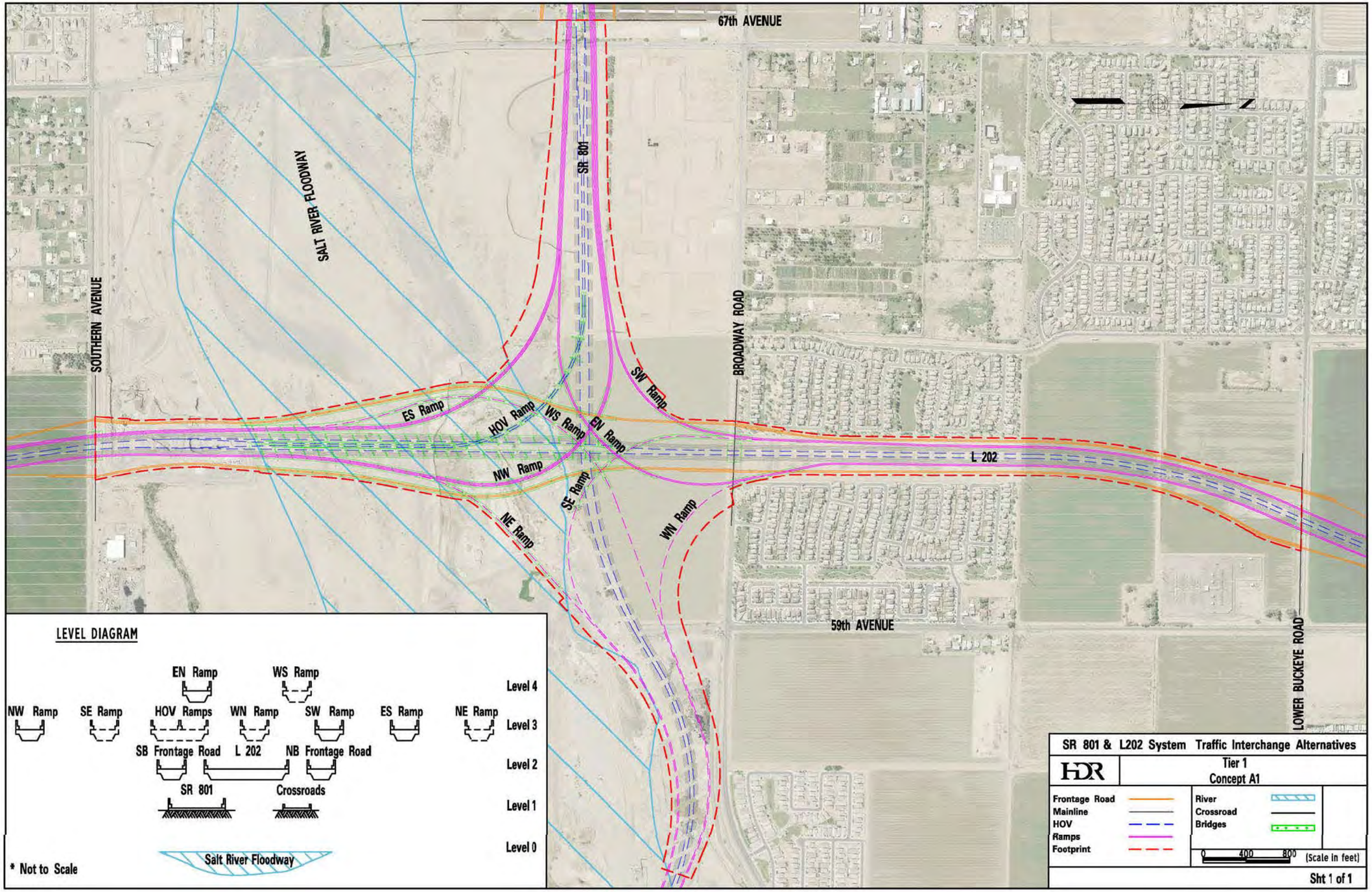


Figure 5-4. Concept A2

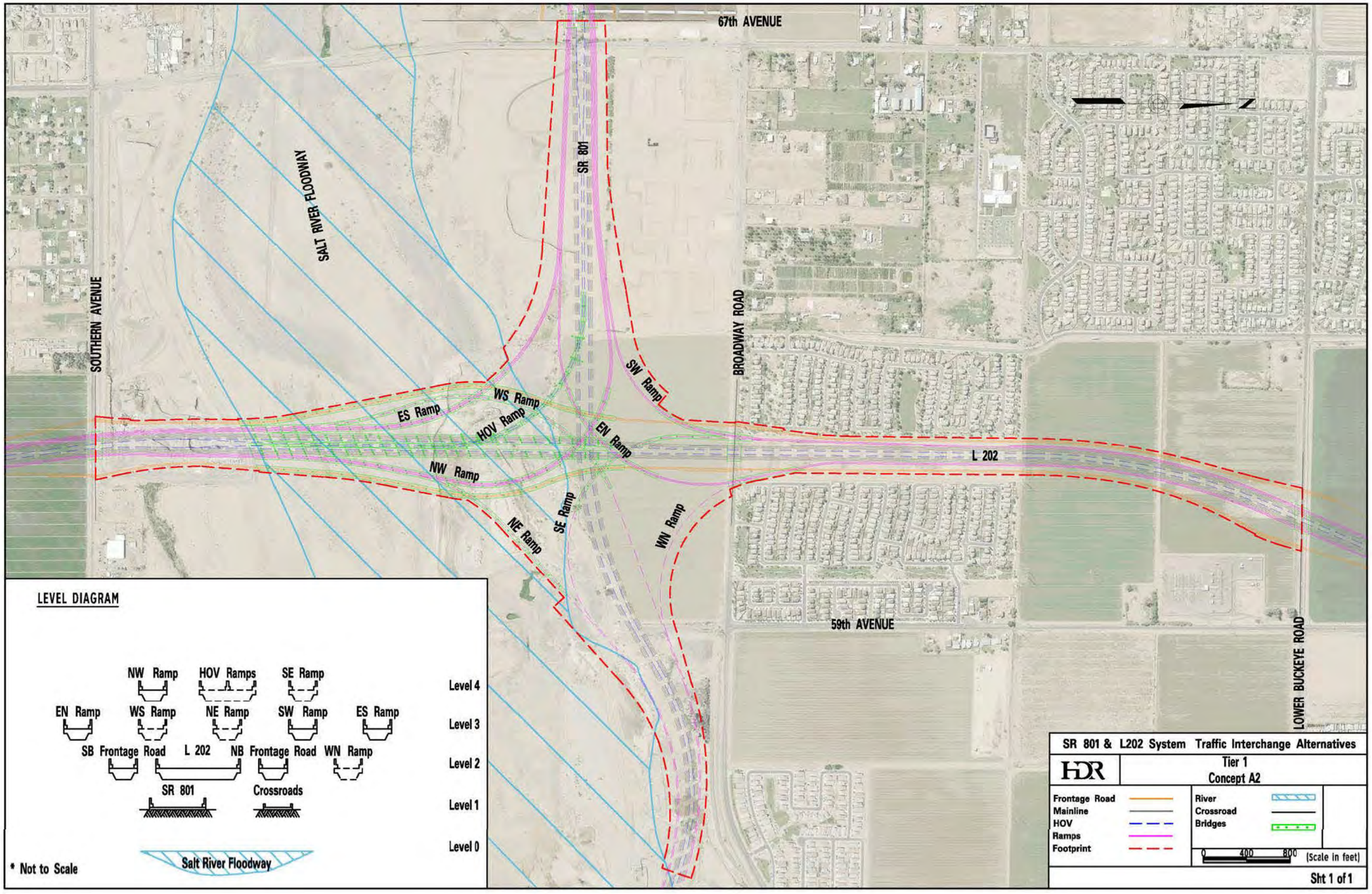


Figure 5-5. Concept B1

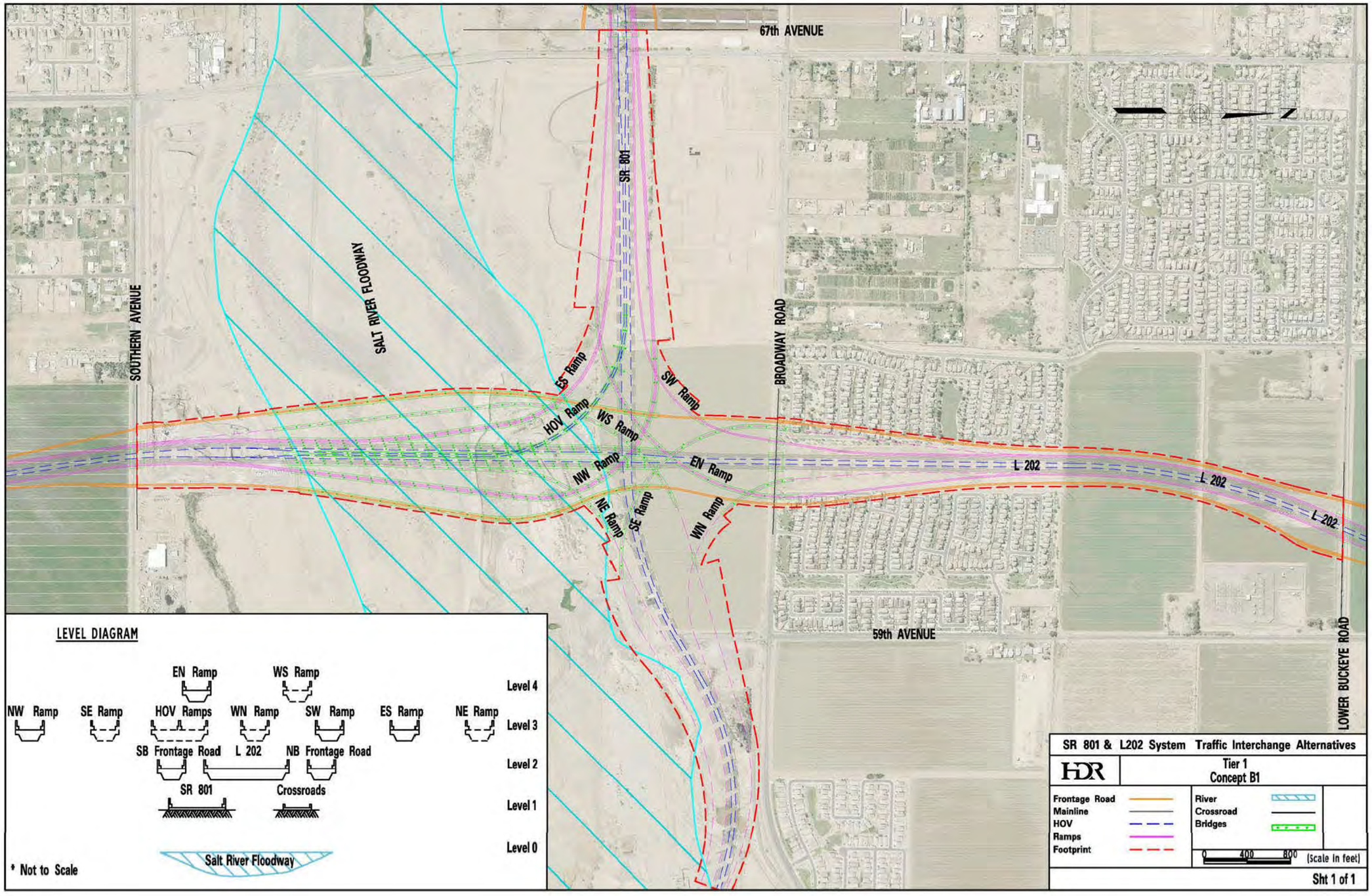


Figure 5-6. Concept B2

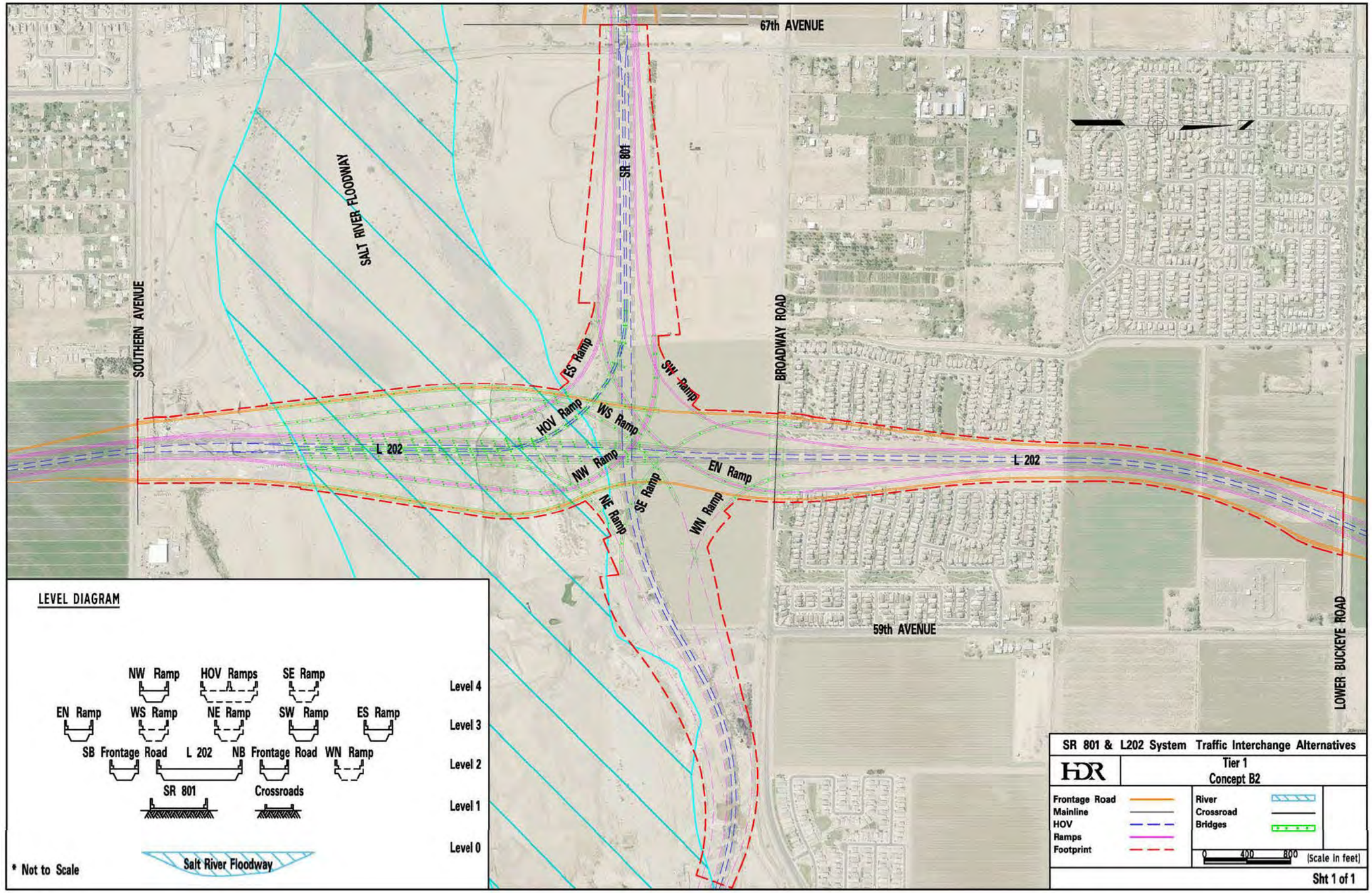


Figure 5-7. Concept C1

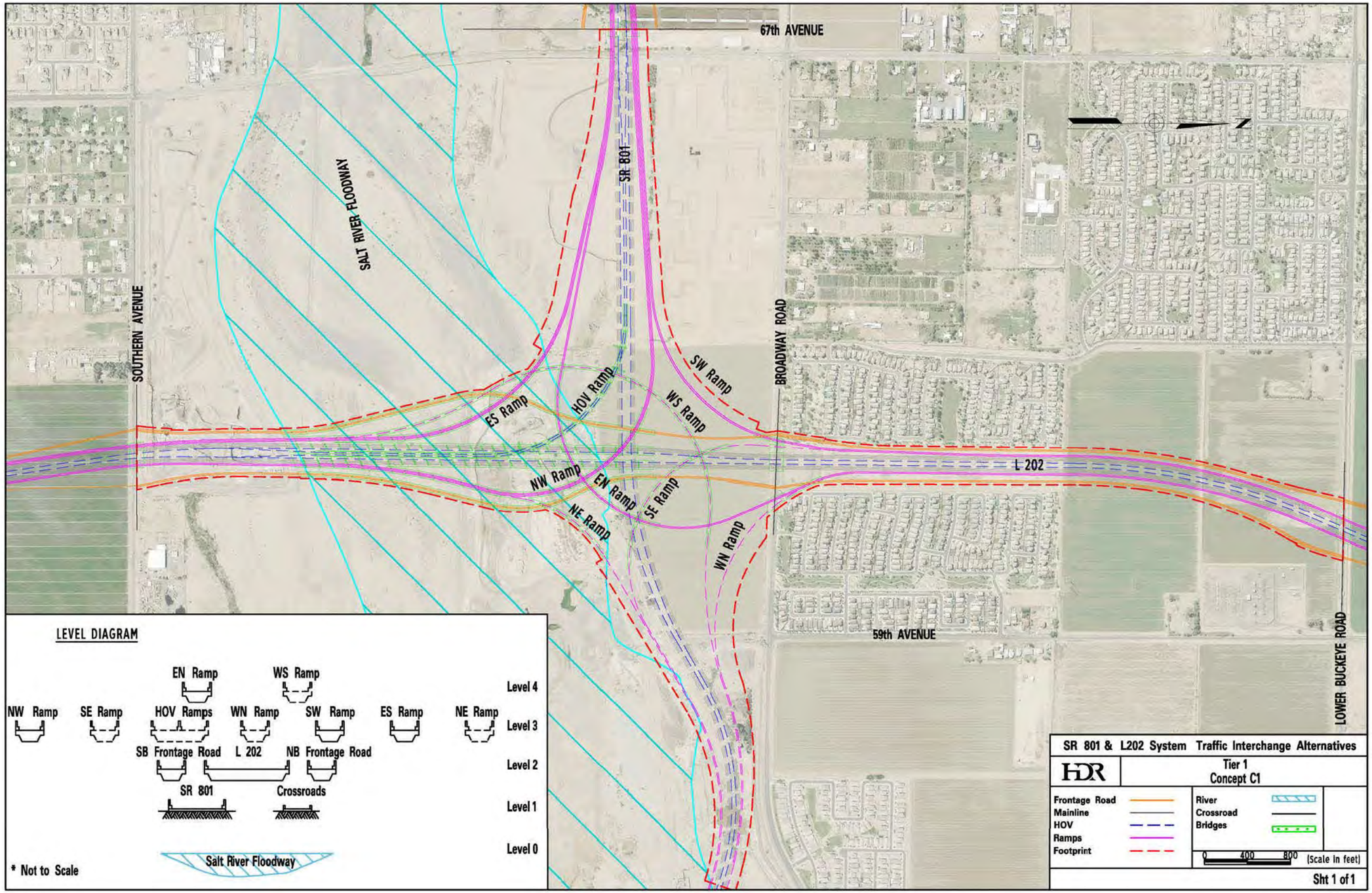


Figure 5-8. Concept C2

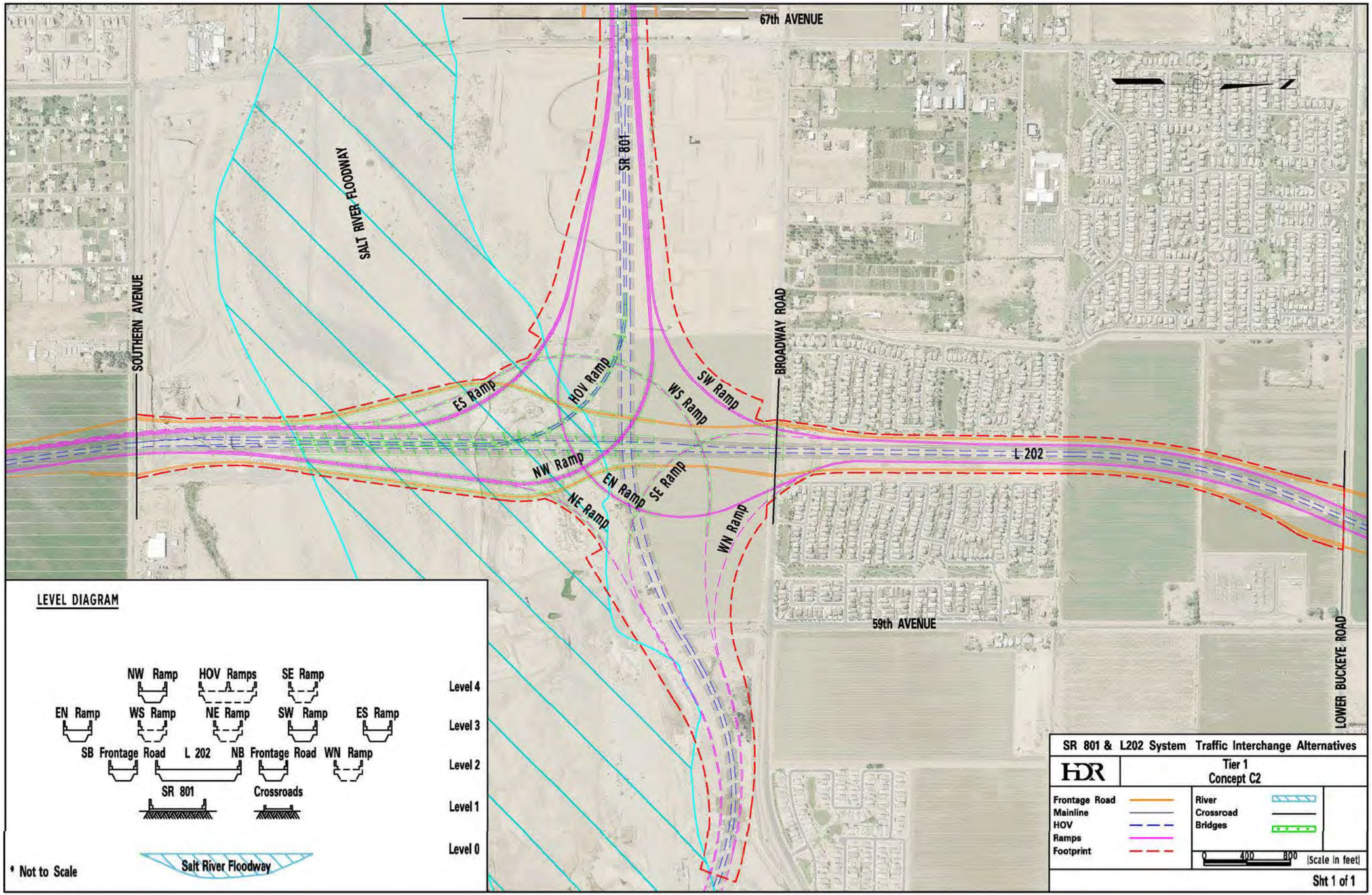


Figure 5-9. Concept D1

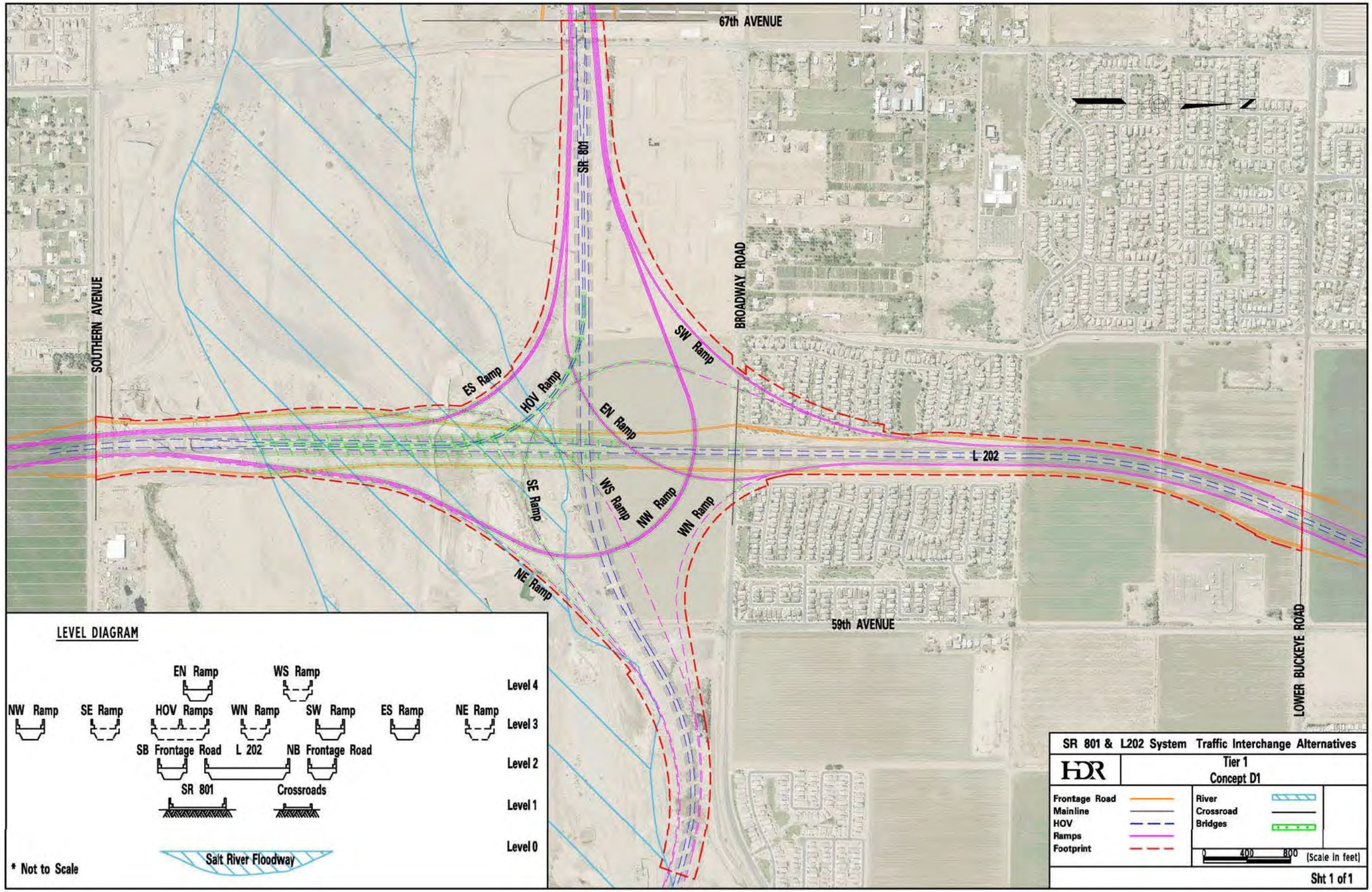


Figure 5-10. Concept D2

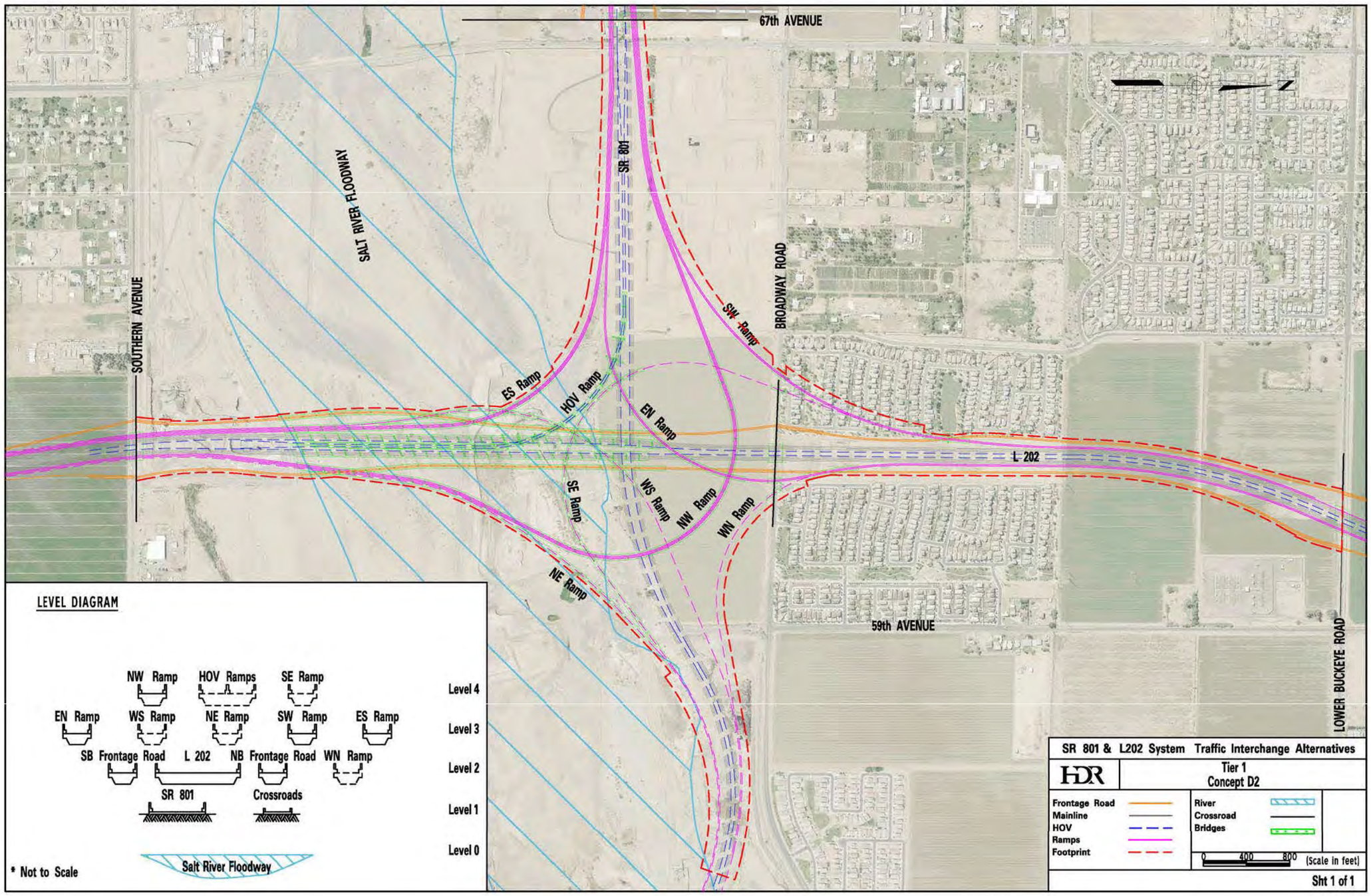


Figure 5-11. Concept E

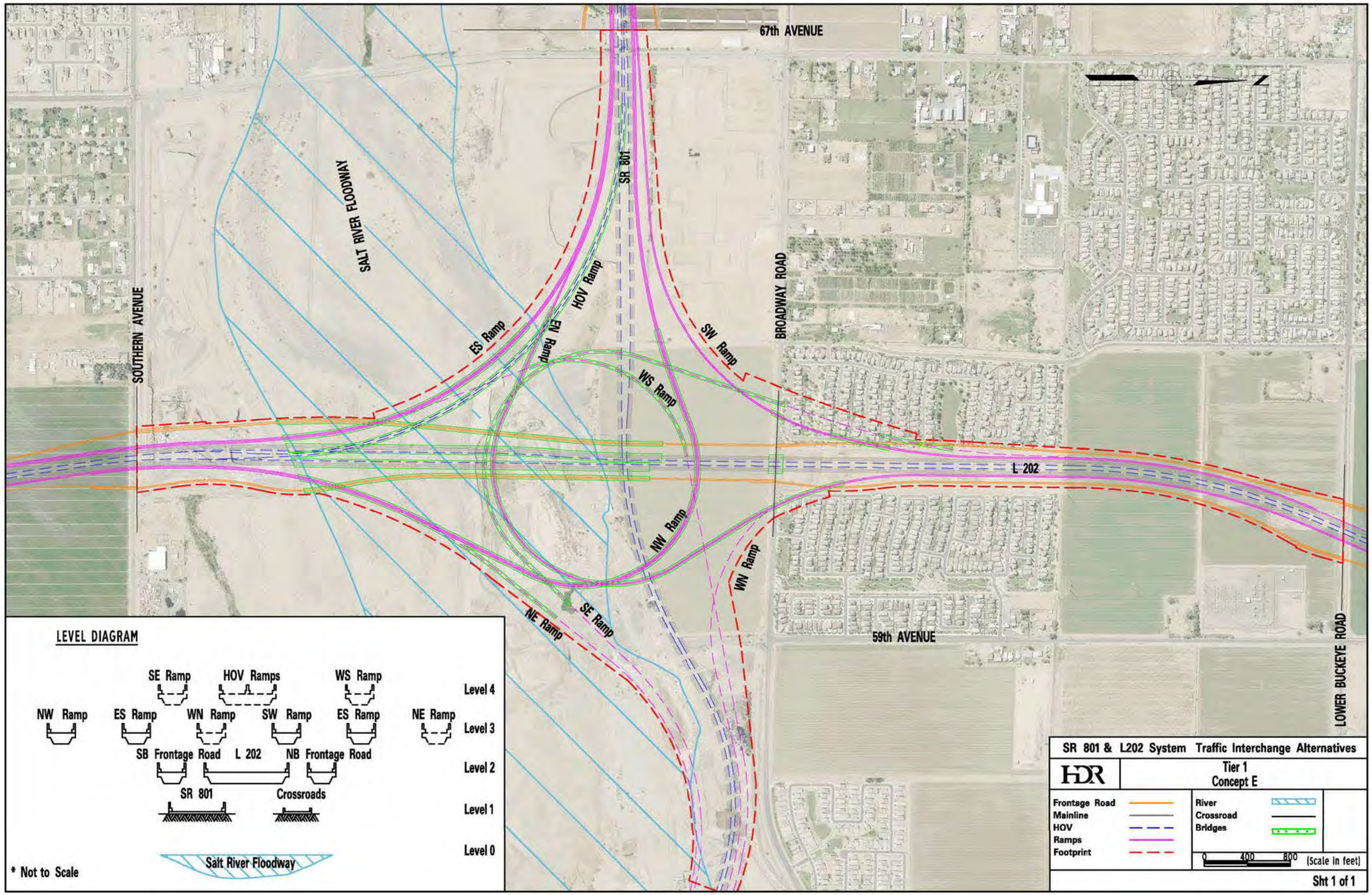
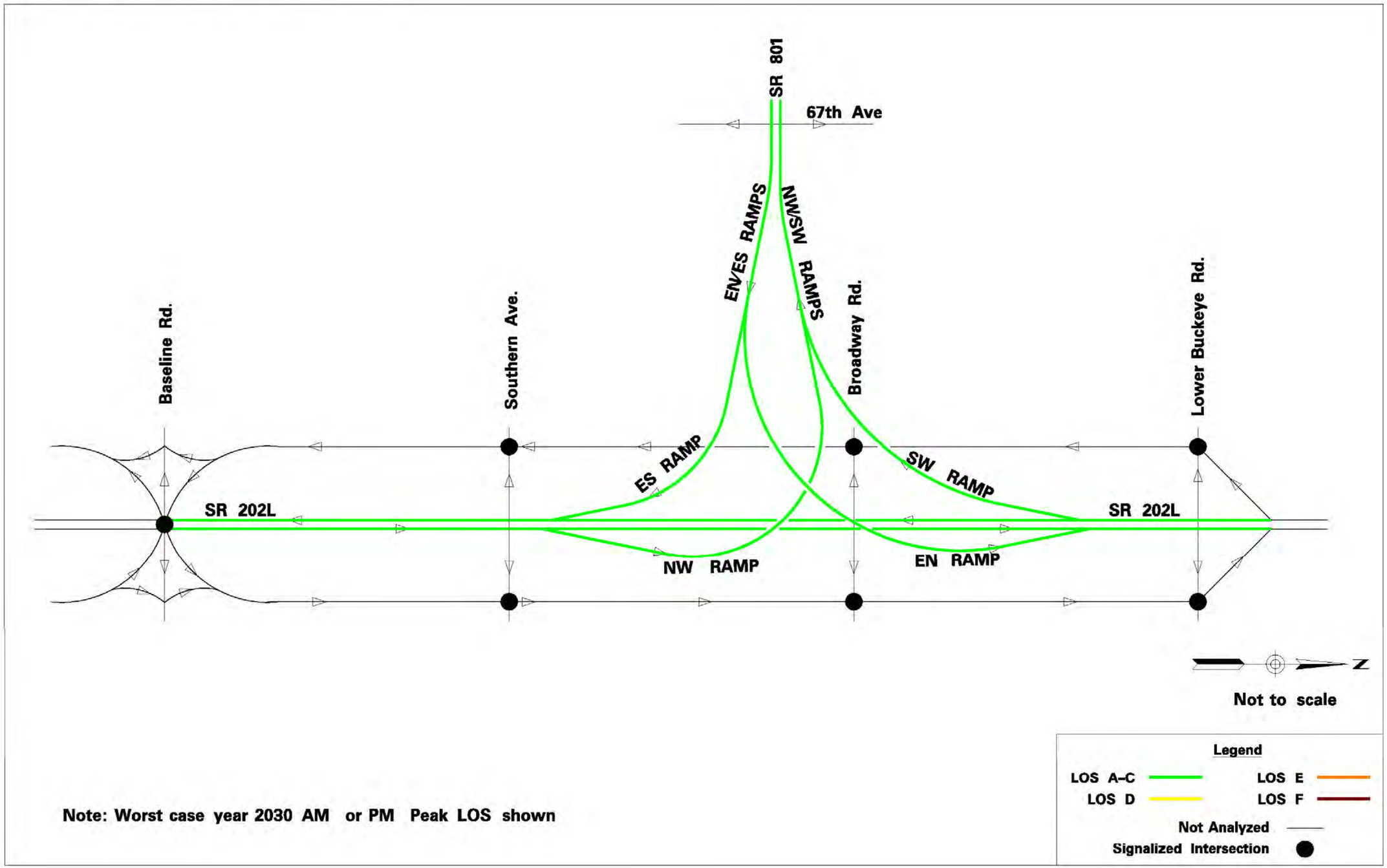


Figure 5-12. 2030 AM and PM LOS for Tier 1 concepts



As shown in Figure 5-12, all the system ramps and main line elements would operate at LOS C or better using 2030 traffic conditions. Therefore, the LOS analysis is same for all the concepts discussed in Tier 1 and is not a differentiator.

5.3.4 Tier 1 Evaluation Process

The Study Team selected seven criteria to evaluate the Tier 1 concepts. They are as follows:

- **Level of Service**: The SR 801/SR 202L system TI must operate at an acceptable LOS D or better with the design year 2030 traffic volume projections. Analysis was conducted using HCS.
- **Bridge Costs**: A preliminary cost estimate of bridgework was calculated for the system TI from Southern Avenue on the south to Broadway Road on the north and from 59th Avenue on the east to 67th Avenue on the west. With respect to the unit prices, a common set of assumptions was applied to each concept so that relative differences between concepts could be identified.
- **Three-Lane Ramps Levels**: The NW and ES ramps are higher volumes ramps and require three lanes to accommodate the projected 2030 traffic movements. The Study Team decided that it was less desirable to have the higher volume ramps on the highest level for both cost and capacity reasons. Consequently, concepts that kept these ramps low scored better relative to the options that had these ramps in the highest level.
- **Interchange Height**: For both aesthetic and noise reasons, the Study Team wanted to keep the overall interchange height as low as possible to minimize the relative environmental impacts and construction costs. While all the concepts rose to at least level 4, some required nearly five levels to make the geometry feasible.
- **HOV Ramp Levels**: All of the concepts developed in Tier 1 included the NW/ES HOV ramp. It was agreed to try to keep this HOV ramp as low as possible for both cost reasons as well as for ease of future constructability over live traffic.
- **Footprint**: The footprint of each concept was calculated from Southern Avenue to Broadway Road and used as a differentiator between concepts. Where bridges were planned, the footprint was kept tight to the bridge decks. Where no bridges were shown, a standard 3:1 slope was assumed extending from the ramp level down to level 1. Concepts with smaller footprints were more desirable.
- **Ease of Future Expansion**: The ease of future expansion was based on the incorporation of the future eastern leg of the interchange, as well as the future addition of the HOV direct connector. This was a subjective measure. The Study Team applied engineering judgment to "grade" the concepts because it is not known if or when the eastern leg or the HOV connector would be constructed and/or which would come first. In general, if future work elements had good access for construction, minimized impacts to live traffic, and avoided building bridges under existing bridges, that concept scored well. Also, it was felt that adding ramps on the outer right edge of another roadway was more desirable than trying to add it to the left edge.

Table 5-1 lists the rankings that were used for the first six criteria described above.

Table 5-1. Tier 1 ranking criteria

Ranking Criteria	Excellent ●	Good ◒	Moderate ○	Fair ◒	Poor ●
Level of Service	A–C	D	—	E	F
Bridge Cost (in millions)	$160–$165	$165–$175	$175–$185	>$185	—
Three-Lane Ramps Levels	at Level 3	—	—	at Level 4	—
Interchange Height	at Level 4	—	between Levels 4–5	—	—
HOV Ramp Levels	at Level 3	—	—	at Level 4	—
Footprint (in acres)	270–280	280–290	290–300	>300	—
Ease of Future Expansion	Easy	—	Moderate	—	Difficult

5.3.5 Tier 1 Evaluation Findings

The following lists the findings of the Tier 1 evaluation. At the conclusion of this listing, Table 5-2 summarizes these findings.

Concept A1 – Single Exit/Entry – EN/WS Ramps on Highest Level

- The LOS for this concept is good for the 2030 volumes.
- The single exit and entry ramps in this concept have reduced bridge costs when compared with the other Tier 1 concepts.
- The three-lane ramps and HOV ramps are on lower levels, which are more desirable with regard to capacity, constructability, and costs.
- The interchange height is at level 4, which is the lowest that can be obtained, earning an excellent score.
- This concept has a relatively small footprint compared with the other concepts in Tier 1. This is particularly beneficial with regard to the residential neighborhood north of Broadway Road.
- The ease of future expansion is moderate. The SE ramp diverges on the inside, which is not desirable for construction, but minimizes the impact to existing homes north of Broadway Road, which is desirable. The core of the TI is very crowded, causing all of the flyover ramps to cross in a congested area. This would be more complex for future construction of the SE and WS flyovers and would limit the room to set cranes when the future eastern leg ramps are added.

Concept A2 – Single Exit/Entry – NW/SE Ramps on Highest Level

- The LOS for this concept is good for the 2030 volumes.
- The single exit and entry ramps in this concept have reduced bridge costs when compared with the other Tier 1 concepts.
- The three-lane ramps and HOV ramps are on higher levels, which are undesirable with regard to capacity, constructability, and costs.
- The interchange height is at level 4, which is the lowest that can be obtained, earning an excellent score.
- Concept A2 has the smallest footprint in the Tier 1 analysis. This is particularly beneficial with regard to the residential neighborhood north of Broadway Road.
- The ease of future expansion is moderate. The SE ramp diverges on the inside, which is not desirable for construction, but minimizes the impact to existing homes north of Broadway Road, which is desirable. The core of the TI is very crowded, causing all of the flyover ramps to cross in congested area. This would be more complex for future construction of the SE and WS flyovers and would limit the room to set cranes when the future eastern leg ramps are added.

Concept B1 – Dual Exit/Entry – EN/WS Ramps on Highest Level

- The LOS for this concept is good for the 2030 volumes.
- Bridge costs are the highest compared with other concepts in Tier 1.
- The three-lane ramps and HOV ramps are on lower levels, which are desirable in terms of capacity, constructability, and costs.
- The interchange height is at level 5, which is the least desirable compared with other concepts.
- Footprint is the largest compared with the other Tier 1 concepts. Because of the required distances between consecutive entrances and exits, the houses north of Broadway Road would be affected the most with this concept.
- The ease of future expansion is fair. The core of the TI is very crowded, causing the system ramps to cross in a congested area. This would make it more complex for the future construction of the SE and WS flyover ramps and would limit the room to set cranes when the future eastern leg ramps are added. In addition, the future NE and WN ramps would be more complicated to construct because they cross under existing flyovers and are located near the core of the interchange.

Concept B2 – Dual Exit/Entry – NW/SE Ramps on Highest Level

- The LOS for this concept is good for the 2030 volumes.
- Bridge costs are high compared with the other concepts in Tier 1.
- The three-lane ramps and HOV ramps are on higher levels, which are undesirable with regard to capacity, constructability, and costs.
- The interchange height is at level 5, which is the least desirable compared with other concepts.
- Footprint is the large compared with the other Tier 1 concepts. Because of the required distances between consecutive entrances and exits, the houses north of Broadway Road would be affected the most with this concept.
- The ease of future expansion is fair. The core of the TI is very crowded, causing the system ramps to cross in a congested area. This would make it more complex for the future construction of the SE and WS flyover ramps and would limit the room to set cranes when the future eastern leg ramps are added. In addition, the future NE and WN ramps would be more complicated to construct because they cross under existing flyovers and are located near the core of the interchange.

Concept C1 – Braided EN/WS Flyovers – EN/WS Ramps on Highest Level

- The LOS for this concept is good for the 2030 volumes.
- Concept C1 has moderate bridge costs compared with the other Tier 1 concepts.
- The three-lane ramps and HOV ramps are on lower levels, which are desirable in terms of capacity, constructability, and costs.
- The interchange height is at level 4, which is the lowest that can be obtained, earning an excellent score.
- This concept has a smaller footprint compared with the other concepts in Tier 1. This is particularly beneficial with regard to the residential development north of Broadway Road.
- The ease of future expansion is good. The SE ramp diverges on inside, which is not desirable for construction, but minimizes the impact to existing homes north of Broadway Road, which is desirable. The core of the TI is more spacious, allowing the system ramps to pass through in a less congested area. This provides more space for construction and equipment when the future eastern leg ramps are added.

Concept C2 – Braided EN/WS Flyovers – NW/SE Ramps on Highest Level

- The LOS for this concept is good for the 2030 volumes.
- Concept C2 has moderate bridge costs compared with other Tier 1 concepts.
- The three-lane ramps and HOV ramps are on higher levels, which are undesirable with regard to capacity, constructability, and costs.
- The interchange height is at level 4, which is the lowest that can be obtained, earning an excellent score.
- Concept C2 has a moderate footprint compared with the other concepts in Tier 1. This is particularly beneficial with regard to the residential development north of Broadway Road.
- The ease of future expansion is good. The SE ramp diverges on the inside, which is not desirable for construction, but minimizes the impact to existing homes north of Broadway Road, which is desirable. The core of the TI is more spacious, allowing the system ramps to pass through in a less congested area. This would provide more space for construction and equipment when the future eastern leg ramps are added.

Concept D1 – Braided NW/SE Flyovers – EN/WS Ramps on Highest Level

- The LOS for this concept is good for the 2030 volumes.
- Concept D1 has moderate bridge costs compared with the other Tier 1 concepts.
- The NW three-lane ramp braids between level 3 and 4, giving this concept a fair rating with regard to capacity, constructability, and costs of a heavy movement.
- The interchange height is at least level 4; however, this option was found to not be geometrically feasible because Ramp EN's length is inadequate to transition levels. Consequently, the interchange height is not an accurate indicator for this concept.

- Overall, Concept D1 has a moderate footprint compared with the other concepts in Tier 1; however, impacts to the residential neighborhood north of Broadway Road are significant.
- The ease of future expansion is good. The SE ramp diverges on the inside, which is not desirable for construction, but minimizes the impact to existing homes north of Broadway Road, which is desirable. The core of the TI is more spacious, allowing the system ramps to pass through in a less congested area. This would provide more space for construction and equipment when the future eastern leg ramps are added.

Concept D2 – Braided NW/SE Flyovers – NW/SE Ramps on Highest Level

- The LOS for this concept is good for the 2030 volumes.
- Concept D2 has moderate bridge costs compared with other Tier 1 concepts.
- The NW three-lane ramp is at level 4, scoring this concept a fair rating with regard to capacity, constructability, and costs of a heavy movement.
- The interchange height is at level 4.5, which scores this concept a moderate interchange height rating.
- Overall, Concept D2 has a moderate footprint compared with the other concepts in Tier 1; however, impacts to the residential neighborhood north of Broadway Road are significant.
- The ease of future expansion is good. The SE ramp diverges on the inside, which is not desirable for construction, but minimizes the impact to existing homes north of Broadway Road, which is desirable. The core of the TI is more spacious, allowing the system ramps to pass through in a less congested area. This would provide more space for construction and equipment when the future eastern leg ramps are added.

Concept E – Rotary

- Very large footprint in sensitive areas (river, neighborhoods, etc.).
- High bridge costs when compared with the other Tier 1 concepts because of the river.
- Provisions for a future HOV ramp would be cumbersome and awkward.
- Overall height of the interchange would be comparable to the other concepts when local access roadways are integrated along SR 202L, negating the primary benefit of this interchange form.

Tier 1 Evaluation Findings

Upon completion of the Tier 1 concepts development process, the concepts were presented to ADOT and the FHWA for guidance on how to proceed. The following conclusions were reached:

1. There was agreement that the concepts that required the NW and/or ES ramps to be located at or near the top level of the interchange should be dropped from further consideration. Because these two movements are the heaviest volume movements, there was a strong desire to keep these ramp levels as low as possible to maximize ramp capacity and to keep the three-lane ramp costs as low as possible. Consequently, Concepts A2, B2, C2, D1, and D2 were dropped.
2. Concept E was dropped from further consideration because of its large impact on the river and the neighborhood north of Broadway Road. Furthermore, its challenges in accommodating a future HOV connector were deemed excessively problematic.
3. There was general agreement that the open configuration of the interchange core inherent to Concept C1 offered greater flexibility for future expansion.
4. The dual exit/entry ramp configuration seemed to offer some slight operational advantages, especially in the two legs associated with the three-lane ramps (i.e., the western and southern legs).
5. The single exit/entry ramp configuration seemed to offer some advantages on the northern leg as it minimized impacts to the residential neighborhood north of Broadway Road.
6. Because Concepts A1, B1, and C1 all included certain promising features, it was agreed to carry these three concepts into the Tier 2 analysis.

Table 5-2 summarizes these findings.

Table 5-2. Tier 1 evaluation summary

System TI Concept	Level of Service	Bridge Cost	Three-Lane Ramps Levels	Interchange Height	HOV Ramp Levels	Footprint	Ease of Future Expansion	Conclusion
Concept A1: Single Exit/Entry (EN/WS highest level)	◓	◓	●	●	●	●	○	Surviving concept to be carried to Tier 2
Concept A2: Single Exit/Entry (NW/SE highest level)	◓	◓	◒	●	◒	●	○	Dropped
Concept B1: Dual Exit/Entry (EN/WS highest level)	◓	◒	●	○	●	◒	◒	Surviving concept to be carried to Tier 2
Concept B2: Dual Exit/Entry (NW/SE highest level)	◓	◒	◒	○	◒	◒	◒	Dropped
Concept C1: Braided Flyover EN/WS (EN/WS highest level)	◓	◓	●	●	●	◓	◓	Surviving concept to be carried to Tier 2
Concept C2: Braided Flyover EN/WS (NW/SE highest level)	◓	○	◒	●	◒	○	◓	Dropped
Concept D1: Braided Flyover ES/WN (EN/WS highest level)	◓	○	◒	○	●	○	◓	Dropped
Concept D2: Braided Flyover ES/WN (NW/SE highest level)	◓	○	◒	○	◒	○	◓	Dropped
Concept E: Rotary	◓	◒	●	○	◒	◒	○	Dropped

Key: ● *Excellent* ◓ *Good* ○ *Moderate* ◒ *Fair* ● *Poor* ▢ *Surviving concept to be carried to Tier 2.*

5.4 Tier 2 Concepts – Local Access Integration

5.4.1 Introduction

In order to identify the subtle differences between the stack order and interchange shape options for this system TI, Tier 1 focused exclusively on the system movements and ignored the local access needs surrounding the interchange site. Using the three surviving Tier 1 concepts as the base system TI, Tier 2 focused on identifying, integrating, and evaluating local access solutions along both SR 801 and SR 202L within the operational influence area of the system TI.

Along SR 801, local access was evaluated between 75th Avenue on the west and SR 202L on the east.

Along SR 202L, local access was evaluated between Baseline Road on the south and Lower Buckeye Road on the north. The SR 202L local access discussion is divided into three sections, as follows:

- SR 202L Full Local Access for Concepts A1 and C1
- SR 202L Full Local Access for Concept B1
- SR 202L Reduced Local Access

5.4.2 SR 801 Local Access

Because SR 801 is currently planned to end at the SR 202L, its local access needs are relatively simple compared with SR 202L. Even though SR 801 is being designed with a through movement option in the future, SR 801 local access east of SR 202L was not evaluated. West of SR 202L, local access was evaluated at primarily 67th and 75th avenues, or about 2 miles west of the system ramp connections.

67th Avenue

With SR 801 ending at SR 202L, the 67th Avenue crossing is the closest major arterial street crossing to the system TI ramps. The system ramps would merge/diverge from the SR 801 alignment immediately east of the 67th Avenue crossing. With no SR 801 main line east of 67th Avenue, no east side 67th Avenue ramps are warranted. However, the west side ramps are included because they would become the first service ramp connections to SR 801 at the beginning/end of the freeway.

As a half diamond, the ramps would point away from the system movements and would not directly conflict with the system ramps either physically or operationally. While half diamond service TIs are generally discouraged because they do not allow drivers to return to the main line after they exit, this location seems appropriate because no main line would exist east of 67th Avenue. In other words, it is an end-of-freeway service TI. It is also common practice in the Phoenix area to use half diamond TIs as the first service TI next to a system TI.

While not specifically addressed in this document, it is recognized that SR 801 could be extended east past SR 202L, either as a freeway, parkway, or arterial roadway in the future. Consequently, the alignments and profiles for the SR 202L system ramps are being designed to accommodate a braided ramp option for the east side 67th Avenue ramps to be added should those connections be desired in the future. As it pertains to the graphics in this document, this feature only shows up in the final preferred configuration.

75th Avenue

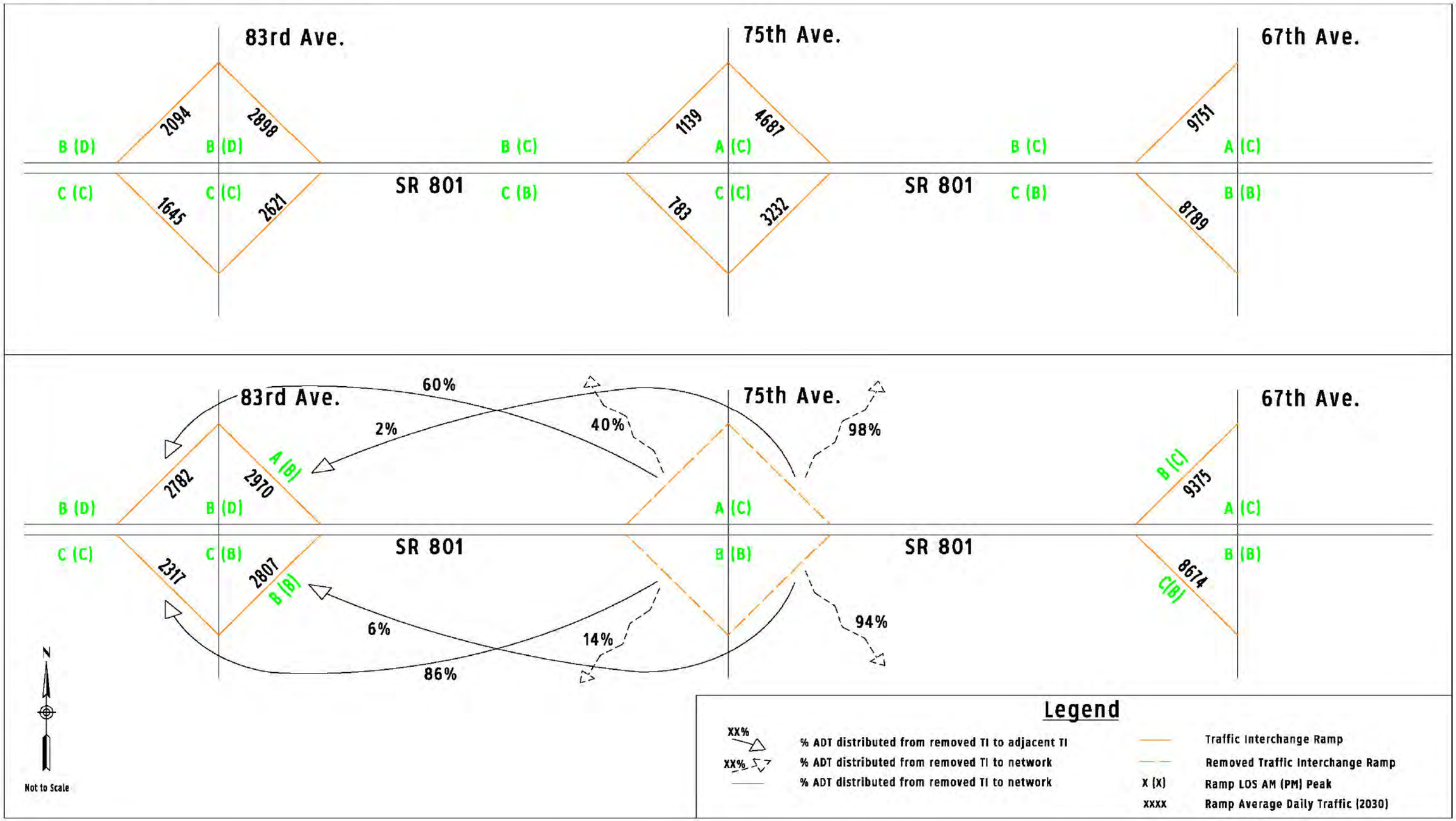
As part of the SR 801, SR 303L to SR 202L corridor study, service TIs were systematically evaluated for possible elimination based on a range of factors including, among others, traffic demand. This evaluation will be fully documented in the L/DCR for the corridor. As it pertains to the SR 801/SR 202L system TI, the 75th Avenue TI location was identified as a possible candidate for elimination because it attracted relatively light traffic and because no Salt River bridge crossing has been envisioned at that location. Figure 5-13 illustrates the traffic analysis that was performed should the 75th Avenue interchange be eliminated from the SR 801 scope of work. The figure shows how the 75th Avenue ramp traffic is redistributed to the adjacent service TIs (at 67th Avenue and 83rd Avenue). This information was shared with the City of Phoenix, and city officials concurred with the recommendation to eliminate the 75th Avenue TI on December 17, 2008.

The elimination of the 75th Avenue TI also proves beneficial to the SR 801/SR 202L system TI. Because it would have been the first service TI with ramps to and from the east, it is the first interchange that would have created weave sections on the SR 801 main line between a service ramp and a system ramp. These sorts of weaves are routinely problematic. Consequently, the elimination of these ramps removed two potentially troublesome weave sections. The result is a relatively simple SR 801 main line section approaching and departing the SR 801/SR 202L system TI with few operational friction points.

Conclusion

All SR 801/SR 202L system TI options evaluated from this point forward assume that the 67th Avenue TI is a half diamond to and from the west and that the 75th Avenue TI does not exist. The first full interchange on SR 801 from the system TI is 83rd Avenue, which is 2 miles away from the system ramps.

Figure 5-13. SR 801/75th Avenue service TI removal



5.4.3 SR 202L Full Local Access for Concepts A1 and C1

With respect to the number of system exits and entries that connect to SR 202L, Concepts A1 and C1 were observed to be identical. As a result, these two TI concepts were evaluated together, and the Study Team assumed that SR 202L would have full interchanges at Baseline Road, Southern Avenue, Broadway Road, and Lower Buckeye Road. When the SR 801 connection is made, it was also assumed that all four of these access points would be maintained—labeled a "full local access" concept.

Figure 5-14 illustrates the assumed SR 202L freeway configuration prior to the SR 801 connection. It also includes some baseline traffic volume information for each of the service ramps between Baseline and Lower Buckeye roads.

The SR 202L project is currently designing the Baseline Road service TI as a single-point urban interchange, or SPUI. This is important because it is counterproductive to introduce a ramp through movement into the SPUI design. All operational advantages of a SPUI are lost when this occurs. Consequently, any local access solution that requires a ramp through movement at Baseline Road did not fare well in the evaluation.

Five local access solutions were developed to maintain full access on SR 202L and to accommodate the Concept A1 and C1 SR 801 system ramp additions. To differentiate these concepts from the system TI concepts that use the alphanumeric-number nomenclature, the local access concepts instead use the number-alphanumeric term. The resulting full local access solutions were titled as follows: Base, 1A, 1B, 1C-Phase 1, 1C-Phase 2

For simplicity, a lane diagram schematic is included for each of the concepts in the descriptions, however, Appendix B includes scalable lane-line plans overlaid on ortho-rectified aerial photography to show how each concept fits with the site.

A1/C1 – Base Concept

This concept represents the simplest form of local access alteration to maintain the four access points while opening up space on SR 202L to add new system movements. This concept essentially replaces the interchanges with an extended split diamond configuration with connector roads between Baseline and Lower Buckeye roads. Half diamond ramps would exist on the southern side of Baseline Road and on the northern side of Lower Buckeye Road.

While simple, this concept has obvious problems. All of the SR 202L traffic destined to or departing from four interchanges must exit or enter the main line through one of four ramps. Even if the resulting four ramps could handle the cumulative volume, the challenges associated with signing four destinations for one exit ramp would violate *Manual on Uniform Traffic Control Devices* (MUTCD) guidelines. In addition, it does require the addition of a ramp through movement at the Baseline Road SPUI.

Figure 5-15 illustrates the A1/C1 – Base Concept for full local access.

A1/C1 – 1A Concept

In an attempt to relieve the traffic burden experienced by the four ramps in the Base Concept, the 1A Concept strategically introduces ramps between the connector road and the SR 202L main line. These connector ramps were added at all four quadrants of the Southern Avenue interchange as well as the south side of Lower Buckeye Road. They are placed in locations that would not create main line weave sections between the connector ramps and the system ramps. However, the 1A Concept does introduce a new main line weave section between two of the new connector ramps within the system TI.

Figure 5-16 illustrates the A1/C1 – 1A Concept for full local access.

A1/C1 – 1B Concept

Like the 1A Concept, the 1B Concept addresses the concerns noted in the Base Concept, but using a different connector ramp configuration that avoids adding any SR 202L main line weave sections. Ramps are included all four quadrants of the Southern Avenue interchange again, but the south side Lower Buckeye Road ramps have been removed. To compensate for these two ramps being eliminated, this concept includes the addition of a pair of connector road grade separations over Southern Avenue. These were necessary to ensure that the Southern Avenue signal systems did not operate at an unacceptable LOS.

Figure 5-17 illustrates the A1/C1 – 1B Concept for full local access.

A1/C1 – 1C Phase 1 and A1/C1 – 1C Phase 2 Concepts

The 1C Phase 1 and 1C Phase 2 concepts are very similar in that they break the connector road system shown in the Base Concept into two separate sections on each side of SR 202L. In the Phase 1 version, a main line weave section is reintroduced into the mile of SR 202L between Southern Avenue and Broadway Road. Should this weave section fail, the connector road ramps making up these weave sections could be braided to eliminate the weave. This is the scenario shown in Phase 2. These concepts were named using the Phase 1 and 2 convention to demonstrate that this concept could be introduced in phases if the cost of the Phase 2 solution was too expensive initially.

Figure 5-18 illustrates the A1/C1 – 1C Phase 1 Concept for full local access.

Figure 5-19 illustrates the A1/C1 – 1C Phase 2 Concept for full local access.

Figure 5-14. Assumed SR 202L local access prior to connection with SR 801

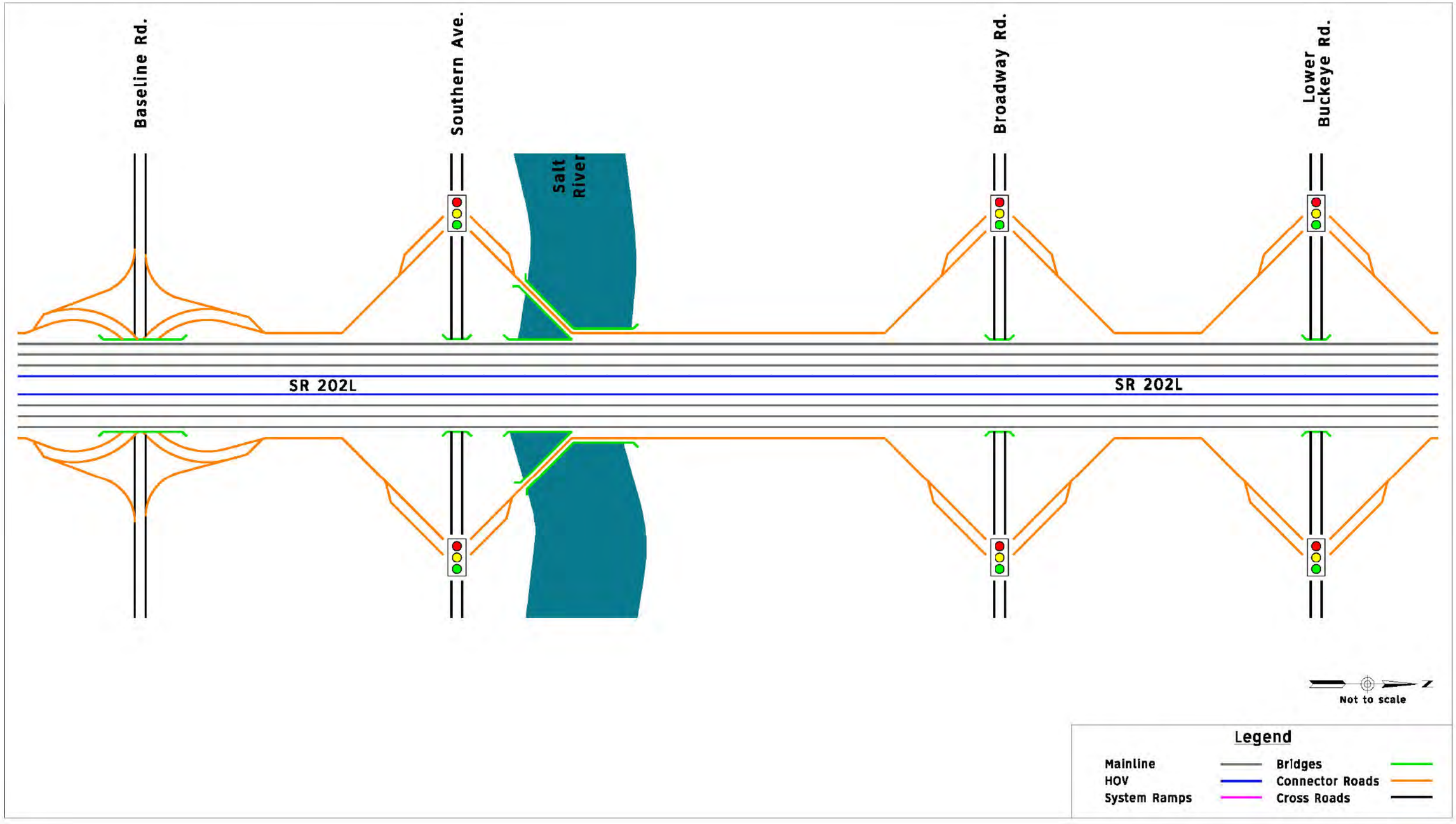


Figure 5-15. A1/C1 – Base Concept for full local access

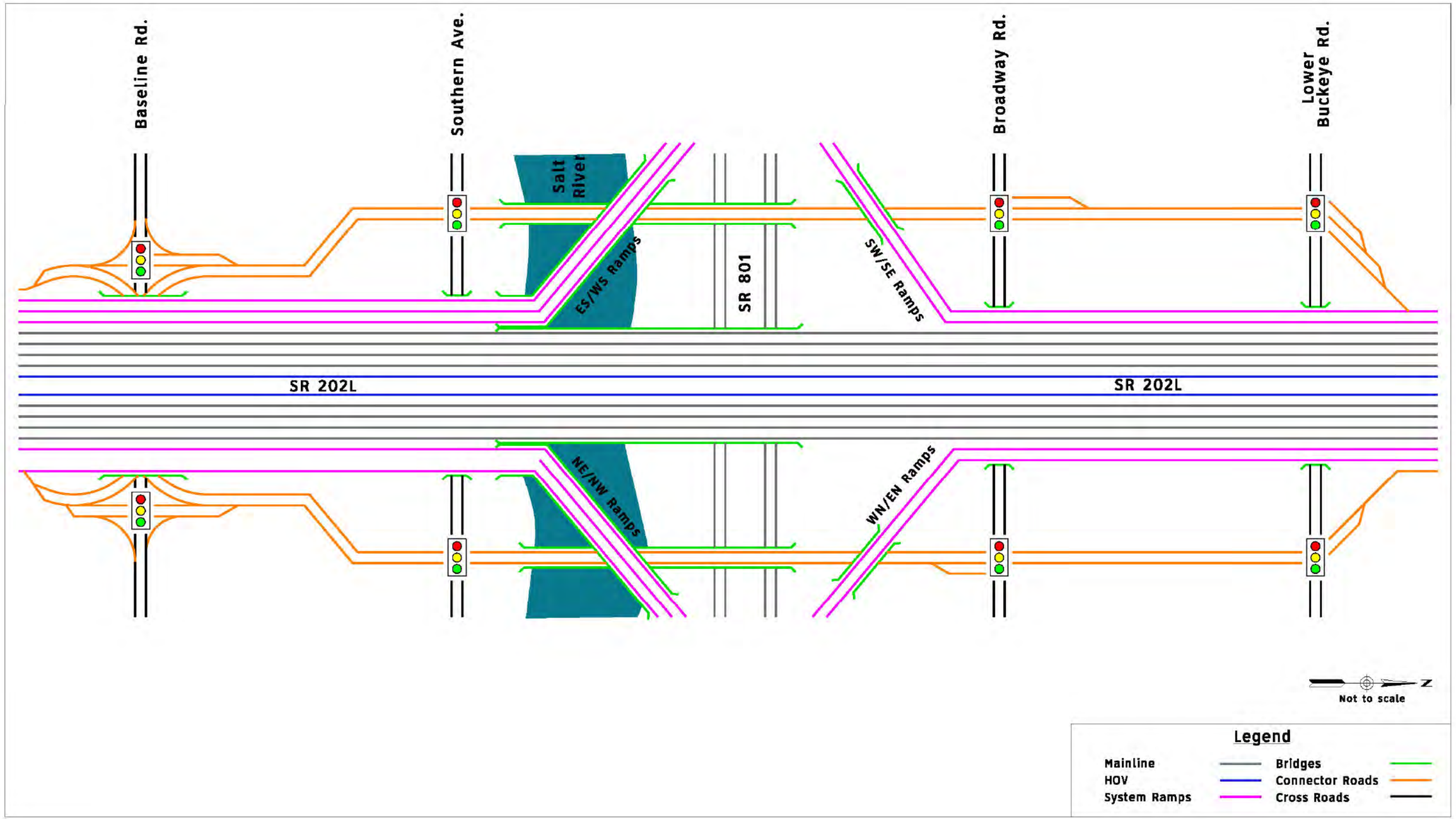


Figure 5-16. A1/C1 – 1A Concept for full local access

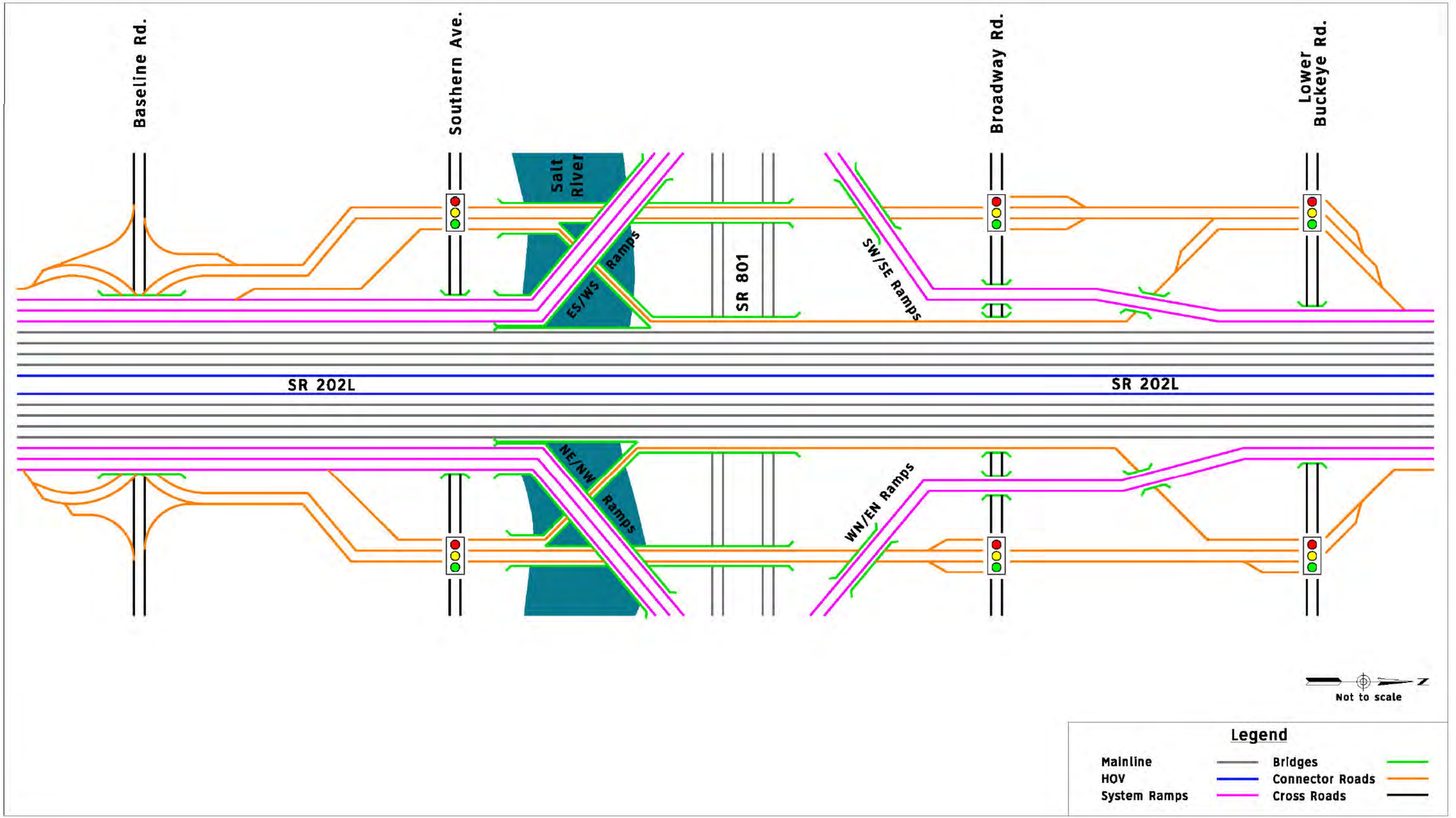


Figure 5-17. A1/C1 – 1B Concept for full local access

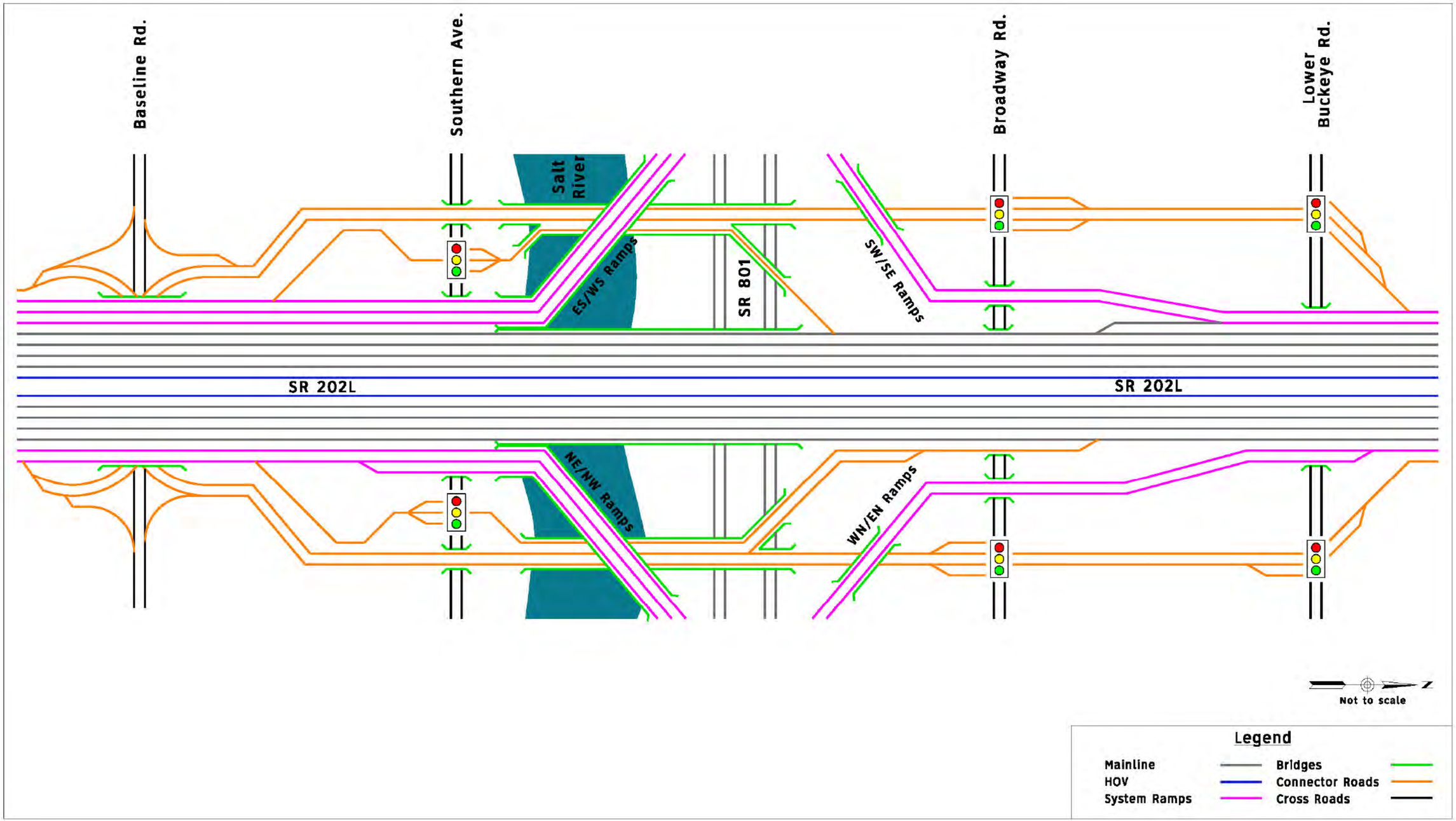


Figure 5-18. A1/C1 – 1C Phase 1 Concept for full local access

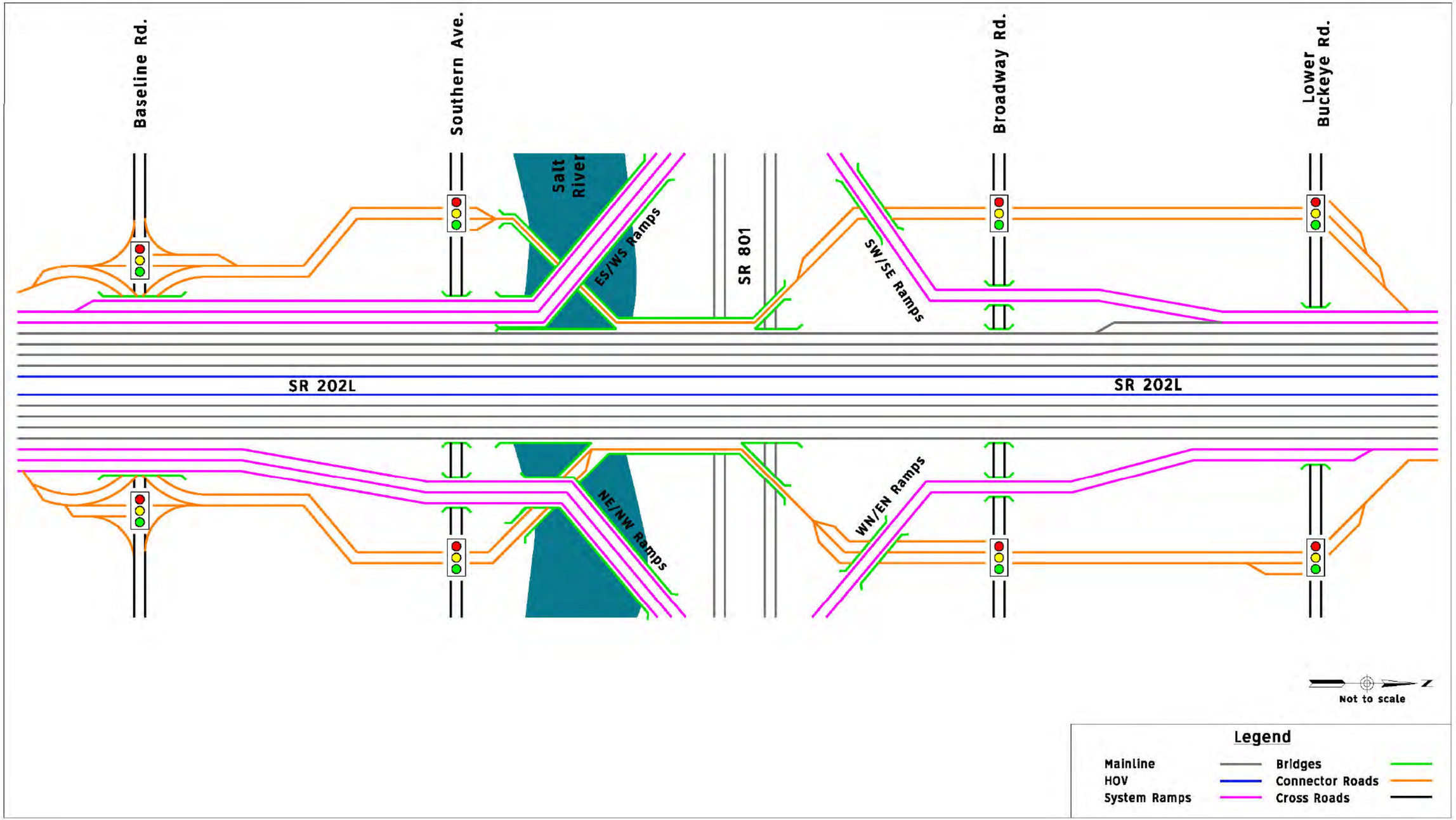
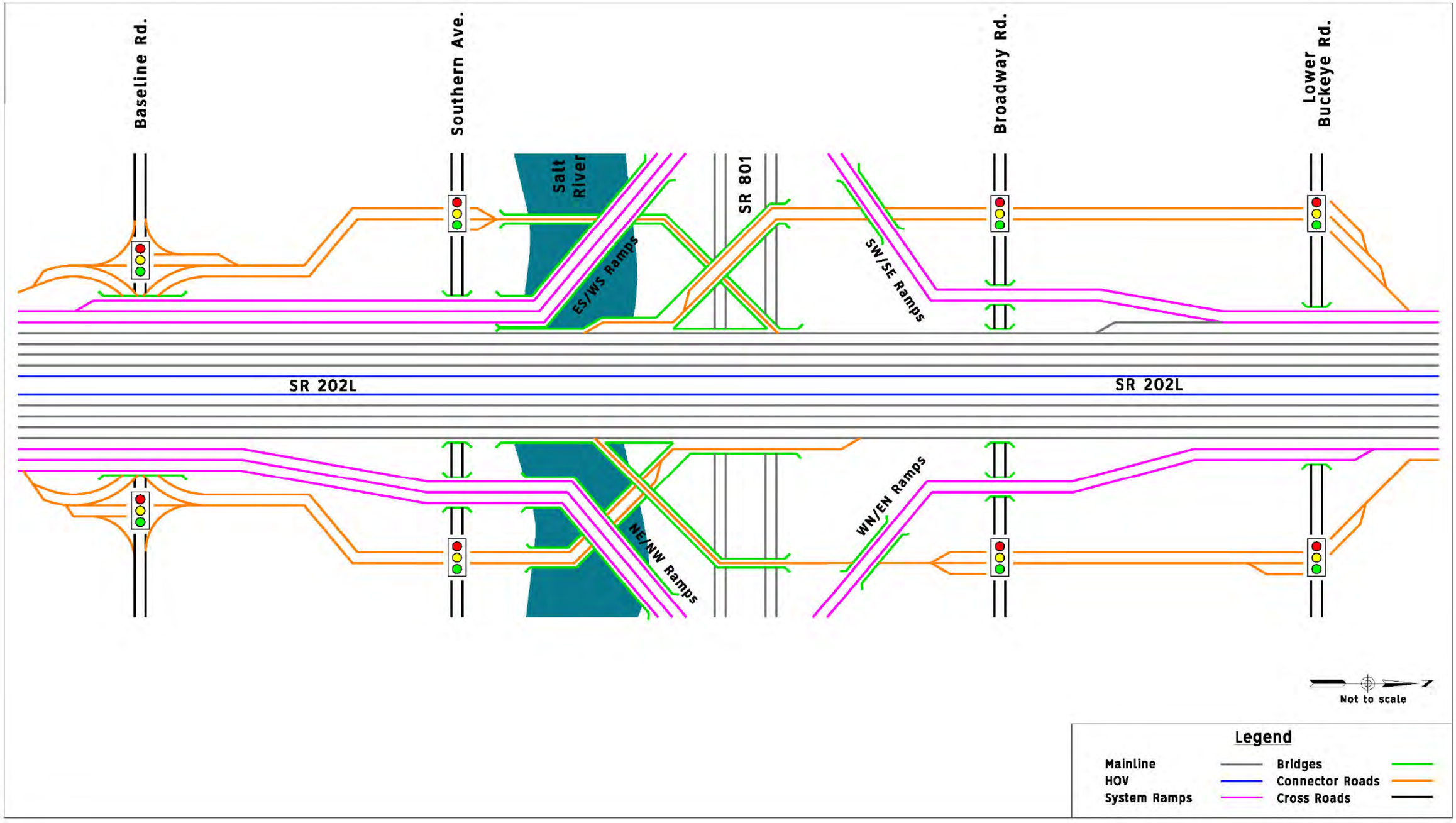


Figure 5-19. A1/C1 – 1C Phase 2 Concept full local access concept



5.4.4 SR 202L Full Local Access for Concept B1

As the dual exit/entry configuration, Concept B1 doubled the number of exits and entry points on SR 202L, limiting the number of local access points that could be made, thus reducing the number of local access options available. These concepts also assume that SR 202L would have full interchanges at Baseline Road, Southern Avenue, Broadway Road, and Lower Buckeye Road, and that all four of these access points would be maintained when the SR 801 connection is made.

Like the A1/C1 concepts, Figure 5-14 illustrates the assumed SR 202L freeway configuration prior to the SR 801 connection.

The SR 202L project is currently designing the Baseline Road TI as a SPUI. This is important because it is counterproductive to introduce a ramp through movement into the SPUI design. All operational advantages of a SPUI are lost when this occurs. Consequently, any local access solution that requires a ramp through movement at Baseline Road did not fare well in the evaluation.

Three local access solutions were developed to maintain full access on the SR 202L and accommodate the B1 Concept SR 801 system ramp additions. The resulting B1 Concept full local access solutions are titled as follows: Base, 2A, and 2B.

For simplicity, a lane diagram schematic is included for each of the concepts in the descriptions. Appendix B includes scalable lane-line plans overlaid on ortho-rectified aerial photography to show how each concept fits with the site.

B1 – Base Concept

From a local access perspective, this concept is identical to the A1/C1 – Base Concept. This concept essentially replaces the interchanges with an extended split diamond configuration with connector roads between Baseline and Lower Buckeye roads. Half diamond ramps exist on the southern side of Baseline Road and on the northern side of Lower Buckeye Road. However, because there is double the number of system ramps now entering and exiting the SR 202L main line, there is less room for connector ramps to be added.

This concept suffers from the same problems as the A1/C1 – Base Concept. All of the SR 202L traffic destined to or departing from four interchanges must exit or enter the main line through one of four ramps. Even if the resulting four ramps could handle the cumulative volume, providing signs with four destinations for one exit ramp would violate MUTCD guidelines. In addition, it does require the addition of a ramp through movement at the Baseline Road SPUI.

Figure 5-20 illustrates the B1 – Base Concept for full local access.

B1 – 2A Concept

The B1 – 2A Concept attempts to solve the deficiencies of the B1– Base Concept similar to how the 1A and 1B concepts attempt to solve the deficiencies of the A1/C1 – Base Concept. In fact, if you compare the B1 – 2A Concept to the A1/C1 – 1B Concept, you will notice that the two are identical as they pertain to local access.

Figure 5-21 illustrates the B1 – 2A Concept for full local access.

B1 – 2B Concept

From a local access perspective, the B1 – 2B Concept is identical to the A1/C1 – 1C Phase 2 Concept.

Figure 5-22 illustrates the B1 – 2B Concept for full local access.

Figure 5-20. B1 – Base Concept for full local access

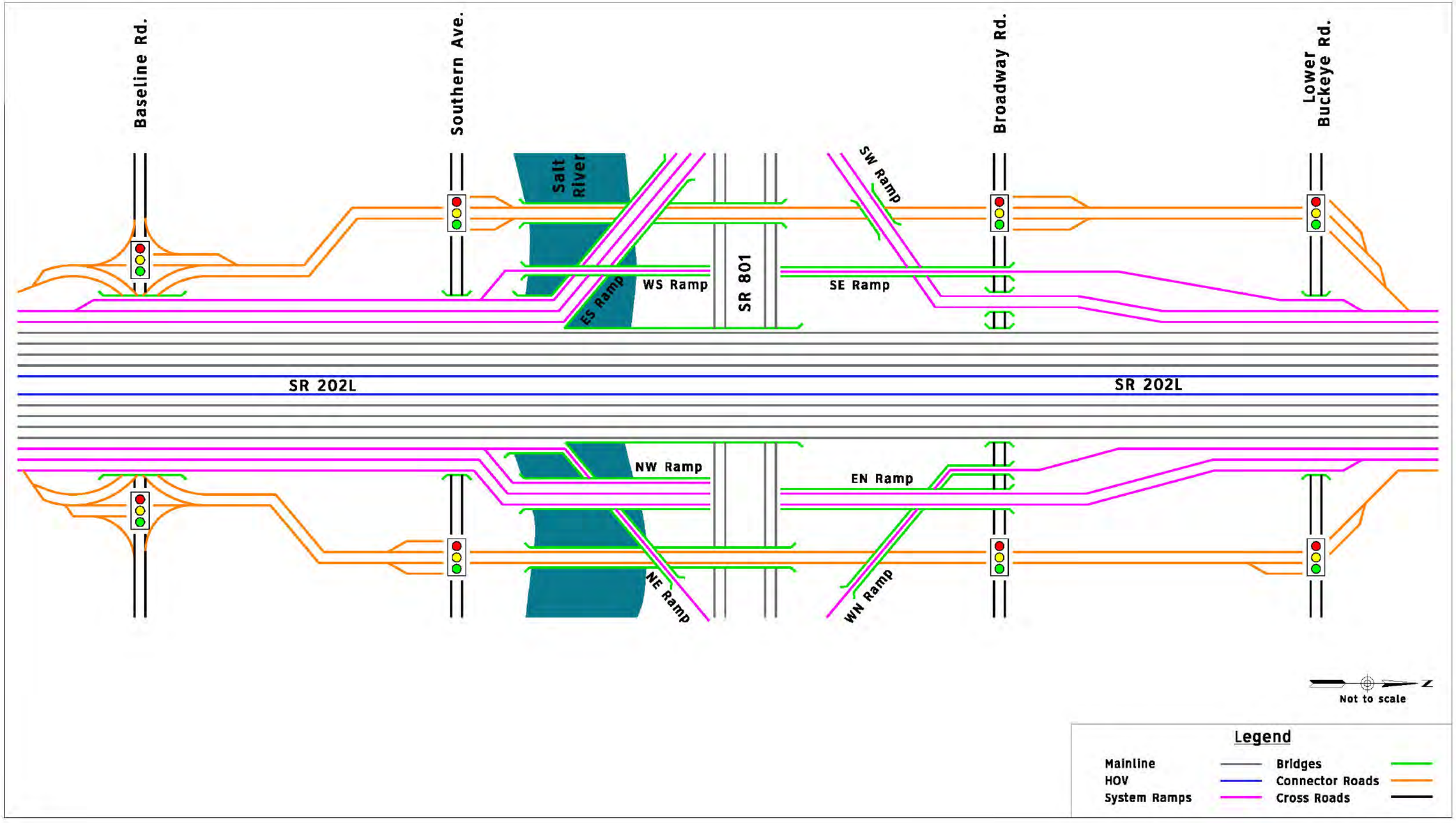


Figure 5-21. B1 – 2A Concept for full local access

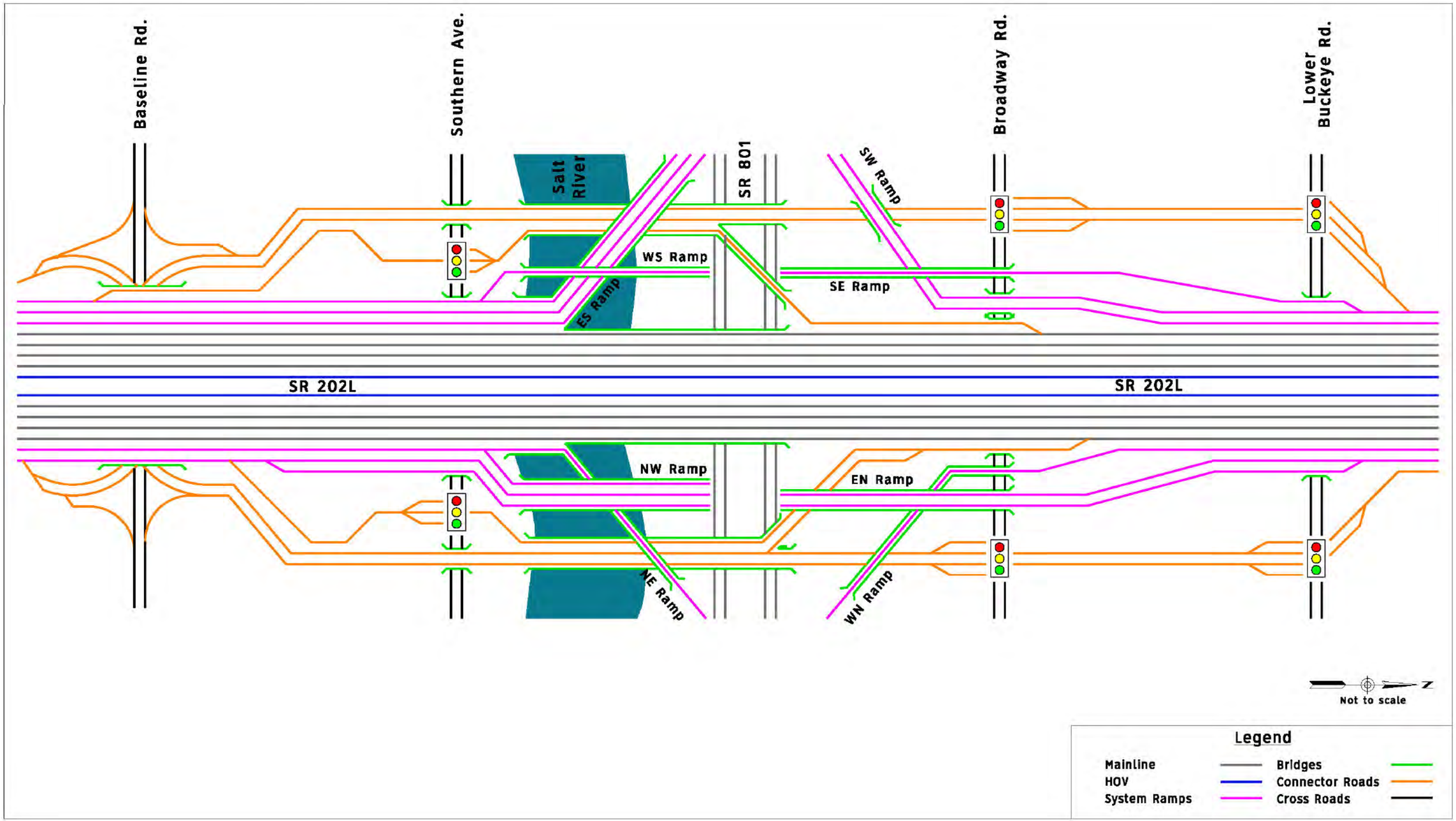
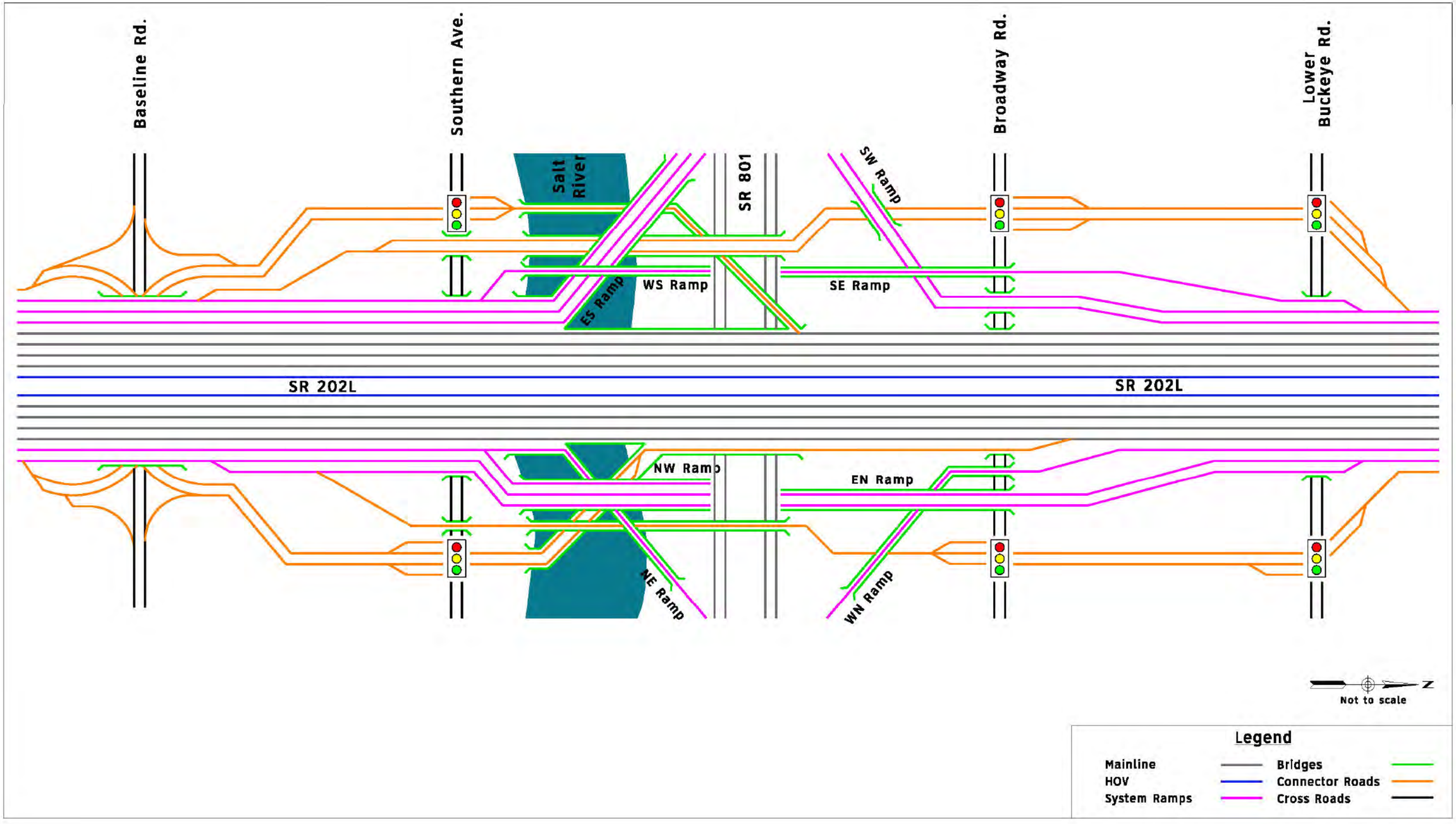


Figure 5-22. B1 – 2B Concept for full local access



5.4.5 SR 202L Reduced Local Access

This section discusses how the Study Team challenged the access points at every mile along SR 202L. As the "full local access" solutions were developed, it was observed that "reduced local access" solutions should also be considered along SR 202L; these solutions could potentially save money and simplify the access requirements along SR 202L and surrounding the future SR 801 connection.

Because the SR 202L study process was underway at the same time as this study, the issue of local access locations along SR 202L became more of an issue for that corridor study than this interchange selection process, but the two are not mutually exclusive. To address this, a separate project memorandum was developed that explored the advantages and disadvantages of reduced local access along SR 202L, both from an SR 202L corridor perspective and from a future SR 801 connection perspective. This memorandum is included in Appendix B.

In summary, the memorandum concluded that eliminating access at Lower Buckeye, Broadway, and Baseline roads would not be possible because of the high travel demand. However, the Southern Avenue TI had a much lower travel demand and entailed some expensive Salt River bridge crossings to maintain access. The memorandum explored some variations on a reduced access solution that eliminated all or part of the Southern Avenue TI. This memorandum was presented to ADOT, FHWA, MAG, and the City of Phoenix. Ultimately, it was determined that the City of Phoenix would not agree to eliminate the Southern Avenue TI.

5.4.6 Tier 2 Traffic Analysis

The Tier 2 traffic analysis focused on the local access concepts developed between Baseline and Lower Buckeye roads along SR 202L. Various concepts were developed based on the single and dual exit/entry ramp configurations associated with the surviving Tier 1 system TI shapes. The operational performance and geometric feasibility of each concept were evaluated. Traffic forecasts were developed for the concepts that were based on MAG's regional travel demand model with a four-legged system TI configuration. Figures 5-23 and 5-24 show the traffic volumes for the various concepts studied in this tier. An LOS analysis was conducted for the connector roads using HCS, while the intersection LOS analysis was performed at the traffic interchanges using Synchro. A longevity analysis was also conducted in 10 percent increments up to 40 percent to evaluate operational performance and reliability of the concepts.

Table 5-3 shows the LOS results for the local access concepts: Base, 1A, 1B, 1C – Phase 1, and 1C – Phase 2 developed for system TI Concepts A1 and C1 (single exit/entry concepts). The table also shows concepts Base, 2A, and 2B developed for the system TI Concept B1 (dual exit/entry concept).

LOS results are shown for a longevity analysis of up to 40 percent of the volumes projected for the base year of 2030. Note that the location within the concept with the worst LOS is noted in the table, along with a description of where it is located.

Notable observations from the analysis include:

- The traffic operations fail at the intersection of Broadway Road and the SR 202L west ramp for the base concept for both single and dual exit/entry system TI concepts with even the 2030 traffic volumes.
- The weave area along southbound SR 202L between Lower Buckeye Road and Southern Avenue is the cause of failure in concepts 1A and 1C – Phase 1 under the single exit/entry system TI concept with only a 20 percent growth rate applied to 2030 volumes.

Table 5-3. LOS longevity analysis to +40 percent

System TI Concept	Local Access Concept	Level of Service (LOS)					Location of Worst Congestion
		2030 Volume	2030 Volume + 10% increase	2030 Volume + 20% increase	2030 Volume + 30% increase	2030 Volume + 40% increase	
Concept A1/C1: Single Exit/Entry (EN/WS highest level)	Base	**F**	**F**	**F**	**F**	**F**	Intersection at Broadway Road and SR 202L west ramp
	1A	D	D	**E**	**E**	**F**	Weave area on SR 202L between southbound Lower Buckeye Road and Southern Avenue
	1B	C	C	C	C	D	Diverge area at Southern Avenue off ramp
	1C – Phase 1	D	D	**E**	**E**	**F**	Weave area on SR 202L between southbound Broadway Road and Southern Avenue
	1C – Phase 2	C	C	C	C	D	Diverge area at southbound Southern Avenue off ramp
Concept B1: Dual Exit/Entry (EN/WS highest level)	Base	**F**	**F**	**F**	**F**	**F**	Intersection at Broadway Road and SR 202L west ramp
	2A	C	C	C	C	D	Diverge area at southbound Southern Avenue off ramp
	2B	C	C	C	C	D	Diverge area at southbound Southern Avenue off ramp

- The local access options 1C – Phase 2 and 2B exhibit the same LOS compared with 1B and 2A; however, 1C – Phase 2 and 2B are eliminated because they require the addition of through movements at the Baseline Road SPUI.

The remaining local access concepts are 1B from single exit/entry Concepts (A1/C1) and 2A from dual exit/entry Concept (B1). When compared, these two local access concepts are identical, which leaves one final local access solution along SR 202L and can be seen in Figures 5-17 and 5-21, depending on which TI concept is utilized.

Figure 5-23. SR 202L local access: Concept A1/C1 2030 peak hour traffic volumes

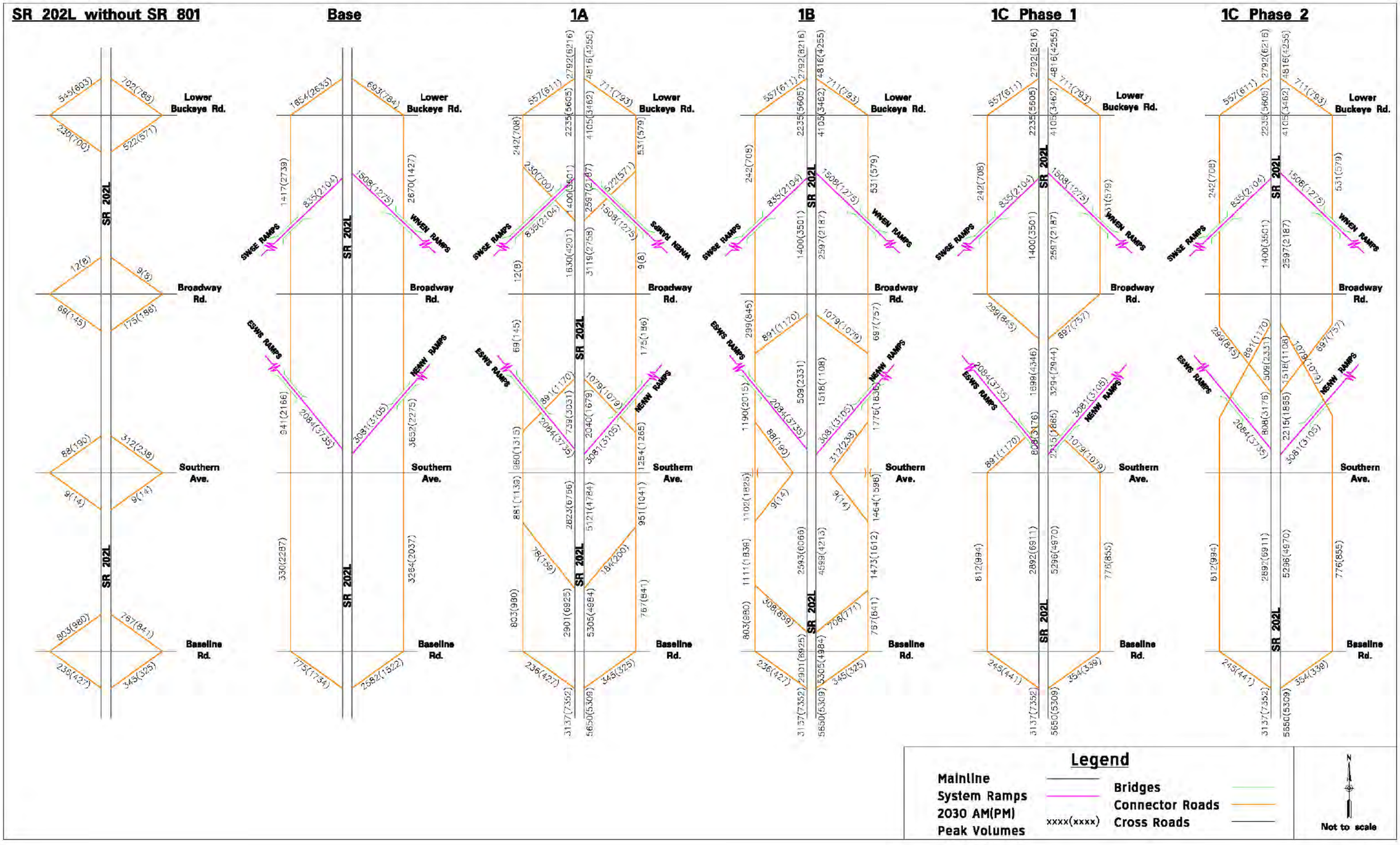
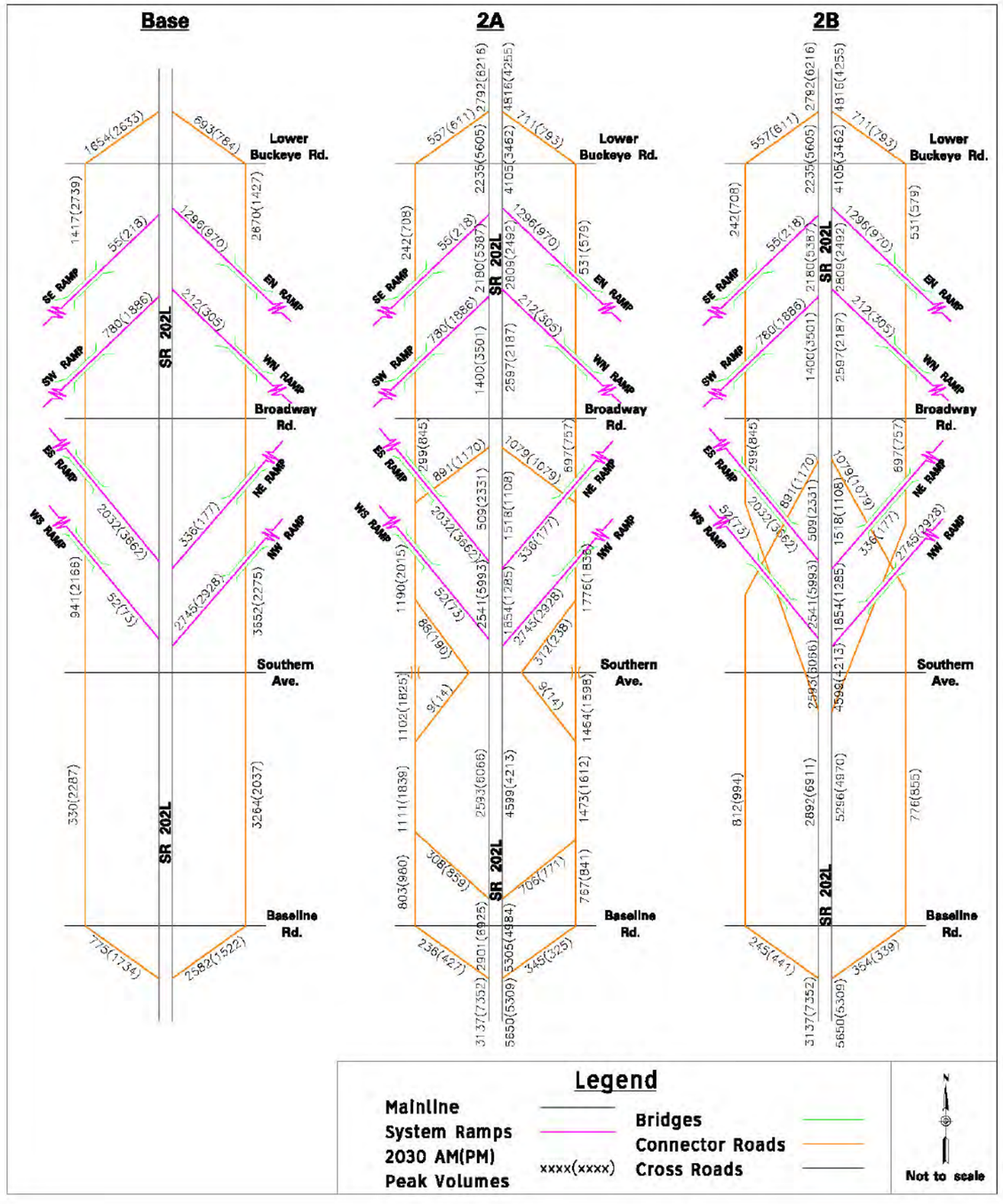


Figure 5-24. SR 202L local access: Concept B1 2030 peak hour traffic volumes



5.4.7 Tier 2 Guide Sign Concepts

In order to evaluate each of the local access concepts, a guide sign concept was also developed in conjunction with each layout to determine whether the sign messages and spacing met MUTCD guidance. In addition, the signing concepts were evaluated to determine how "driver friendly" a particular concept was in regard to the simplicity of each sign message. While it was determined that many of the concepts were conducive to the appropriate installation of guide signs, some were found to be severely deficient. The guide sign concepts are included in the detailed concept layouts shown in Appendix C.

5.4.8 Tier 2 Evaluation Process

For the Tier 2 process, 12 criteria were used in the evaluation. Of the 7 Tier 1 criteria, 6 were carried forward with no change; however, the LOS criterion was redefined for Tier 2 as described below. Five new criteria were added that are unique to Tier 2. The redefined LOS criterion and the five additional Tier 2 criteria are:

- **Level of Service – Longevity Analysis**: Because this system TI would likely not open to traffic until at least 2025, a traffic longevity analysis was conducted in which the Study Team evaluated the concepts against the design year 2030 volumes as well as volumes that represented a uniform growth rate of +10, +20, +30, and +40 percent to determine when LOS failure would likely occur. In many cases, the 2030 volumes produced no differentiation between the concepts. However, as the volumes grew, it became more apparent which concepts could handle increased traffic volumes. This analysis was conducted using HCS and Synchro.
- **System Ramp Lengths**: With the introduction of the local access ramps, some system TI layouts required longer system ramps to braid with other ramps or to keep ramp spacing adequate. Shorter, more direct, system ramps are more desirable and efficient.
- **Weave Sections**: Some concepts introduce undesirable main line weave sections.
- **Phasing Improvements**: The traffic longevity analysis demonstrated that some concepts would be able to accommodate volume increases better than others. For the single entrance and exit TI concepts, a phasing concept was devised to allow for phased construction to match capital expenditure with traffic need, so as to defer construction cost to a time when the demand warrants it. This "built-in" implementation strategy was viewed as a positive characteristic.
- **Sign Concepts**: Guide sign concepts were created for all the local access concepts. Each concept was scored based on whether the concept required single, double, triple, or quadruple destination messages on the sign panels—the more the destinations needed, the worse the score.
- **Baseline Road SPUI Conflicts**: A SPUI is envisioned at Baseline Road. Concepts that required the addition of ramp through movements through the Baseline Road SPUI were determined to be highly undesirable and were dropped from further consideration because it would eliminate any operational advantages of the SPUI configuration at this site.

Table 5-4 lists the 12 Tier 2 ranking criteria, and how the scores were determined.

Table 5-4. Tier 2 ranking criteria

Ranking Criteria	Excellent ●	Good ◒	Moderate ○	Fair ◒	Poor ●
Level of Service	D or Better at 40%	D or Better at 30%	D or Better at 20%	D or Better at 10%	D or Worse at 2030
Bridge Cost (in millions)	$150–$165	$165–$180	$180–$195	>$195	—
Three-lane Ramps Levels	at Level 3	—	—	at Level 4	—
Interchange Height	at Level 4	—	Between Levels 4–5	—	—
HOV Ramp Levels	at Level 3	—	—	at Level 4	—
Footprint (in acres)	330–340	340–355	355–370	>370	—
Ease of Future Expansion	Easy	—	Moderate	—	Difficult
System Ramp Lengths	Short	—	—	—	Long
Weave	No mainline weave	—	—	—	Mainline weave
Phasing Improvements	Can phase	—	—	No phasing	—
Sign Concepts	Single destination message	Double destination message	—	Triple destination message	Quadruple destination message
Baseline Road SPUI Conflicts	No conflict	—	—	—	Conflict

5.4.9 Tier 2 Evaluation Groupings

To assist in screening the Tier 2 options, the options were categorized into four groups based on a set of common critical characteristics within each group. The groups were defined as follows:

Group 1 Concepts: A1 – Base
B1 – Base
C1 – Base

Group 2 Concepts: A1 – 1A
C1 – 1A

Group 3 Concepts: A1 – 1C Phase 1
A1 – 1C Phase 2
B1 – 2B
C1 – 1C Phase 1
C1 – 1C Phase 2

Group 4 Concepts: A1 – 1B
B1 – 2A
C1 – 1B

Group 1 Concepts

- All three Group 1 concepts use the Base Concept local access solution.
- Operationally, all three concepts begin to fail with just 10% growth of the 2030 traffic volumes, implying that this solution would likely fail shortly after the facility opened to traffic.
- A quadruple destination sign message is needed in each direction to exit traffic off of the freeway to all four of the crossroads between Baseline and Lower Buckeye road. This condition is highly undesirable and would violate MUTCD guidance.
- The Base Concept local access solution requires the addition of a large volume through movement to the SPUI configuration at Baseline Road. This negates the operational advantages of the SPUI interchange form.

Group 2 Concepts

- Both of the Group 2 concepts use the 1A local access solution.
- Both of these concepts introduce a pair of main line weave sections to SR 202L.
- Because of the SR 202L weave sections, both concepts begin to operationally break down with just 20% growth of the 2030 traffic volumes. Very little service life can be expected out of this concept.
- The addition of the ramps immediately south of Broadway Road requires the south side system ramps to become very long and stretch out over the Salt River. This creates a very expensive solution with little benefit.

Group 3 Concepts

- All five of the Group 3 concepts have one major issue in common—they all require through ramp movements at the Baseline Road SPUI.

Group 4 Concepts

- The three Group 4 concepts have one thing in common: they all use the same local access solution**.** As was noted earlier in this document, the 1B and 2A local access solutions were both essentially the same concept, except designed for different system TI configurations.
- These three concepts offer excellent LOS for volumes in excess of 40% of the 2030 volumes.
- No main line weave section is introduced.
- No ramp through movements are required at the Baseline Road SPUI.
- Northbound SR 202L guide signs would require a triple destination message. Although this complies with MUTCD guidance, it is not as desirable as a sign panel with fewer destinations.

5.4.10 Tier 2 Evaluation Findings

At the completion of the Tier 2 concepts development process, the concepts were presented as shown in Table 5-5 to ADOT and FHWA (refer to Table 6-1). The following conclusions were reached:

1. The three Group 1 concepts should be dropped from further consideration because of the Baseline SPUI ramp through movement, the quadruple destination guide signs, and because the operational life of the facility is limited.
2. Both of the Group 2 concepts should be dropped from further consideration because they penalize the system ramp movements and because of the limited operational characteristics resulting from the main line weave sections.
3. All five Group 3 concepts should be dropped from further consideration because they require through ramp movements at the Baseline Road SPUI.
4. The three Group 4 concepts should be carried to Tier 3 for further evaluation. No fatal flaws are apparent at this time with these solutions, and they all provide the greatest capacity with the longest operational longevity.

In conclusion, the Tier 2 analysis resulted in a single local access solution to be carried forward to Tier 3 – concept 1B (or 2A). Tier 3 will refine the three concepts and create hybrid interchange layouts that attempt to maximize the benefits of each of the three surviving Tier 2 concepts.

Table 5-5. Tier 2 evaluation summary

System TI Concept	Local Access Concept	Level of Service	Bridge Cost	Three-lane Ramps Levels	Inter-change Height	HOV Ramp Levels	Footprint	Ease of Future Expansion	System Ramps Lengths	Weave	Phasing Improve-ments	Sign Concepts	Baseline Road SPUI Conflicts	Conclusion
Concept A1: Single Exit/Entry (EN/WS highest level)	Base	Fair	Good	Excellent	Excellent	Excellent	Excellent	Moderate	Excellent	Excellent	Excellent	Poor	Poor	Recommended elimination because local access solution fails operationally, signing requirements violate MUTCD guidelines, and because they require through movements at the Baseline Road SPUI.
Concept B1: Dual Exit/Entry (EN/WS highest level)	Base	Fair	Moderate	Excellent	Moderate	Excellent	Good	Moderate	Excellent	Excellent	Excellent	Poor	Poor	
Concept C1: Braided Flyover EN/WS (EN/WS highest level)	Base	Fair	Good	Excellent	Excellent	Excellent	Excellent	Good	Excellent	Excellent	Excellent	Poor	Poor	
Concept A1: Single Exit/Entry (EN/WS highest level)	1A	Moderate	Moderate	Excellent	Excellent	Excellent	Fair	Fair	Fair	Poor	Moderate	Good	Excellent	Recommended elimination because system ramps are long and undesirable, because SR 202L weave sections exist, and because these weave sections operationally fail with only 20% traffic growth beyond 2030.
Concept C1: Braided Flyover EN/WS (EN/WS highest level)	1A	Moderate	Moderate	Excellent	Moderate	Excellent	Fair	Moderate	Fair	Poor	Moderate	Good	Excellent	
Concept A1: Single Exit/Entry (EN/WS highest level)	1C – Phase 1	Moderate	Excellent	Excellent	Excellent	Excellent	Good	Moderate	Moderate	Poor	Excellent	Good	Poor	Recommended elimination because local access solution requires through movements at the Baseline Road SPUI.
Concept A1: Single Exit/Entry (EN/WS highest level)	1C – Phase 2	Excellent	Moderate	Excellent	Excellent	Excellent	Good	Fair	Moderate	Excellent	Moderate	Good	Poor	
Concept B1: Dual Exit/Entry (EN/WS highest level)	2B	Excellent	Fair	Excellent	Moderate	Excellent	Moderate	Fair	Excellent	Excellent	Moderate	Good	Poor	
Concept C1: Braided Flyover EN/WS (EN/WS highest level)	1C – Phase 1	Excellent	Good	Excellent	Moderate	Excellent	Moderate	Good	Moderate	Poor	Excellent	Good	Poor	
Concept C1: Braided Flyover EN/WS (EN/WS highest level)	1C – Phase 2	Excellent	Fair	Excellent	Moderate	Excellent	Fair	Moderate	Moderate	Excellent	Moderate	Good	Poor	
Concept A1: Single Exit/Entry (EN/WS highest level)	1B	Excellent	Good	Excellent	Excellent	Excellent	Good	Fair	Excellent	Excellent	Moderate	Fair	Excellent	Surviving concepts to be carried to Tier 3.
Concept B1: Dual Exit/Entry (EN/WS highest level)	2A	Excellent	Moderate	Excellent	Moderate	Excellent	Fair	Fair	Excellent	Excellent	Moderate	Fair	Excellent	
Concept C1: Braided Flyover EN/WS (EN/WS highest level)	1B	Excellent	Moderate	Excellent	Moderate	Excellent	Fair	Moderate	Excellent	Excellent	Moderate	Fair	Excellent	

Key: *Excellent* *Good* *Moderate* *Fair* *Poor* *Surviving concept to be carried to Tier 3.*

5.5 Tier 3 Concepts – Hybrid Concepts

5.5.1 Introduction

To recap, the Tier 1 analysis focused on the system TI shape and stack order. Tier 2 focused on the integration of the local access into both of the corridors adjacent to and within the surviving Tier 1 concepts.

Regarding the interchange shape, the Tier 1 concepts were "pure" versions with respect to dual exit and dual entry designs. In other words, each concept always applied a dual exit/entry or a single exit/entry ramp configuration on each of the four legs. After processing the Tier 2 analysis, where local access points were added to the corridors, it became apparent that some legs would benefit from the single exit/entry ramp configurations while others would benefit from dual exit/entry ramp designs, and for different reasons. Tier 3 took the knowledge learned from the Tier 1 and Tier 2 analyses and created "hybrid" concepts that took the best features from each of the concepts and integrated them in different ways to create new concepts. Consequently, in addition to the three surviving Tier 2 concepts carried forward to Tier 3, three new hybrid concepts were developed.

5.5.2 Tier 3 Concepts

From the Tier 2 analysis, three concepts are being carried forward to Tier 3:

- Concept A1-1B
- Concept B1-2A
- Concept C1-1B

These three concepts can be seen in Figures 5-17 and 5-21 and in Appendix C.

As mentioned in Section 5.5.1, hybrid concepts were also developed for this tier that combined the best designs for each of the four legs as well as the core of the system TI. This resulted in the development of three new Tier 3 hybrid concepts. Since Tier 2 established the local access solution along SR 202L as Concept 1B/2A (both of which are identical), all of the hybrid concepts incorporate this local access solution. For convention, the "2A" title is used on all the hybrid designations. A detailed description of each hybrid follows.

Concept F-2A

Concept F-2A is a hybrid blend of Concept A1 for the northern leg and center of the interchange combined with the features of Concept B1 for the western, southern, and eastern legs of the interchange. This results in a design that uses the dual exit/entry ramp configuration in the two legs with the three-lane ramp splits and merges, resulting in better advance signing and lane assignment, improved operations for the two heavy traffic movements, and a reduced footprint over the Salt River. For the northern leg, this concept uses the single exit/entry ramp configuration where the Study Team wanted to minimize impacts to the residential neighborhood north of Broadway Road. The interchange core uses the more common "stack" ramp configuration used in the A Concepts shown in Figure 5-1. While this shape makes the interchange layout more familiar, it does so at the expense of making future expansion more difficult and costly. Figure 5-25 shows the interchange core layout for Concept F-2A. A full layout is included in Appendix D.

Concept G1a-2A

Concept G1a-2A is a hybrid blend of Concept C1 for the northern leg and center of the interchange combined with the features of Concept B1 for the western, southern, and eastern legs of the interchange. This results in a design that uses the dual exit/entry ramp configuration in the two legs with the three-lane ramp splits and merges, resulting in better advance signing and lane assignment, improved operations for the two heavy traffic movements, and a reduced footprint over the Salt River. For the northern leg, this concept uses the single exit/entry ramp configuration where the Study Team wanted to minimize impacts to the residential neighborhood north of Broadway Road. Because of its open and less dense design and its flexibility for future expansion, the Study Team favored the braided flyover interchange core design in the Tier 2 analysis. Consequently, Concept G1a-2A applies the interchange core design from the Concept C1 braided ramp flyover layout. Figure 5-26 shows the interchange core layout for Concept G1a-2A. A full layout is included in Appendix D.

Concept G1b-2A

Concept G1b-2A is identical to Concept G1a-2A except that the northern leg uses the dual exit/entry ramp configuration on the northern leg instead of the single exit/entry design. Figure 5-27 shows the interchange core layout for Concept G1b-2A. A full layout is included in Appendix D.

Figure 5-25. Hybrid system TI: F-2A Concept

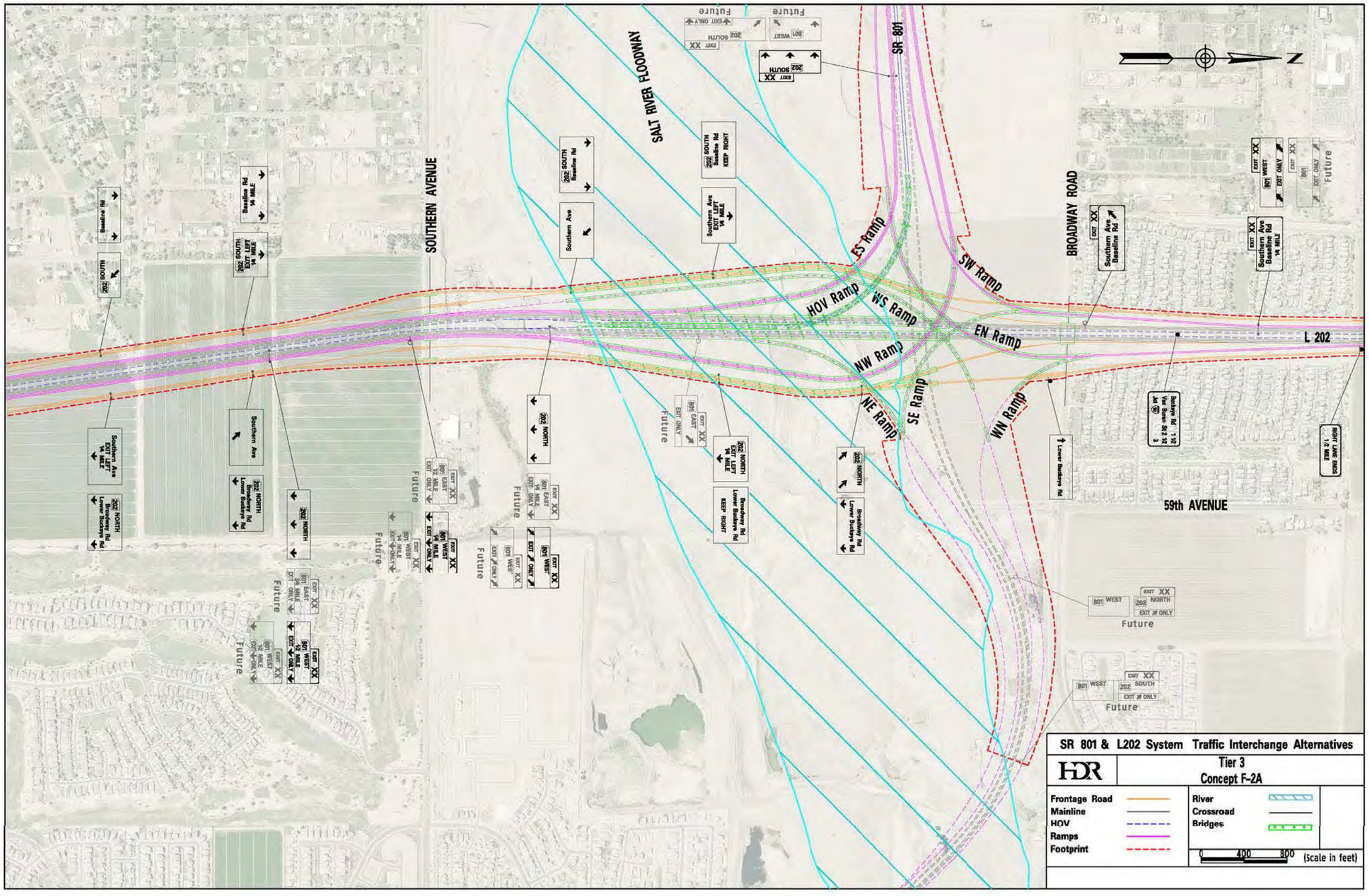


Figure 5-26. Hybrid system TI: G1a-2A Concept

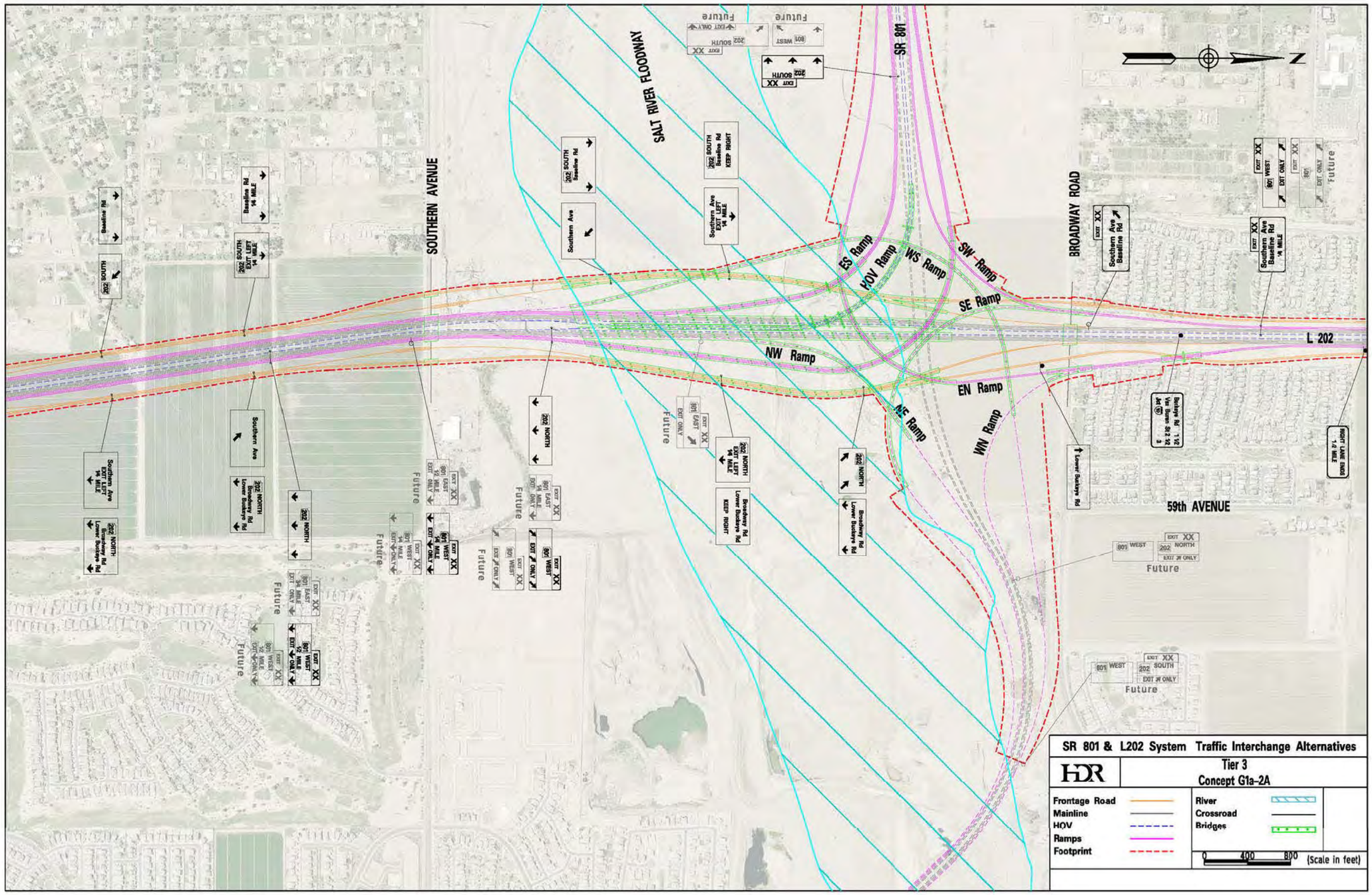
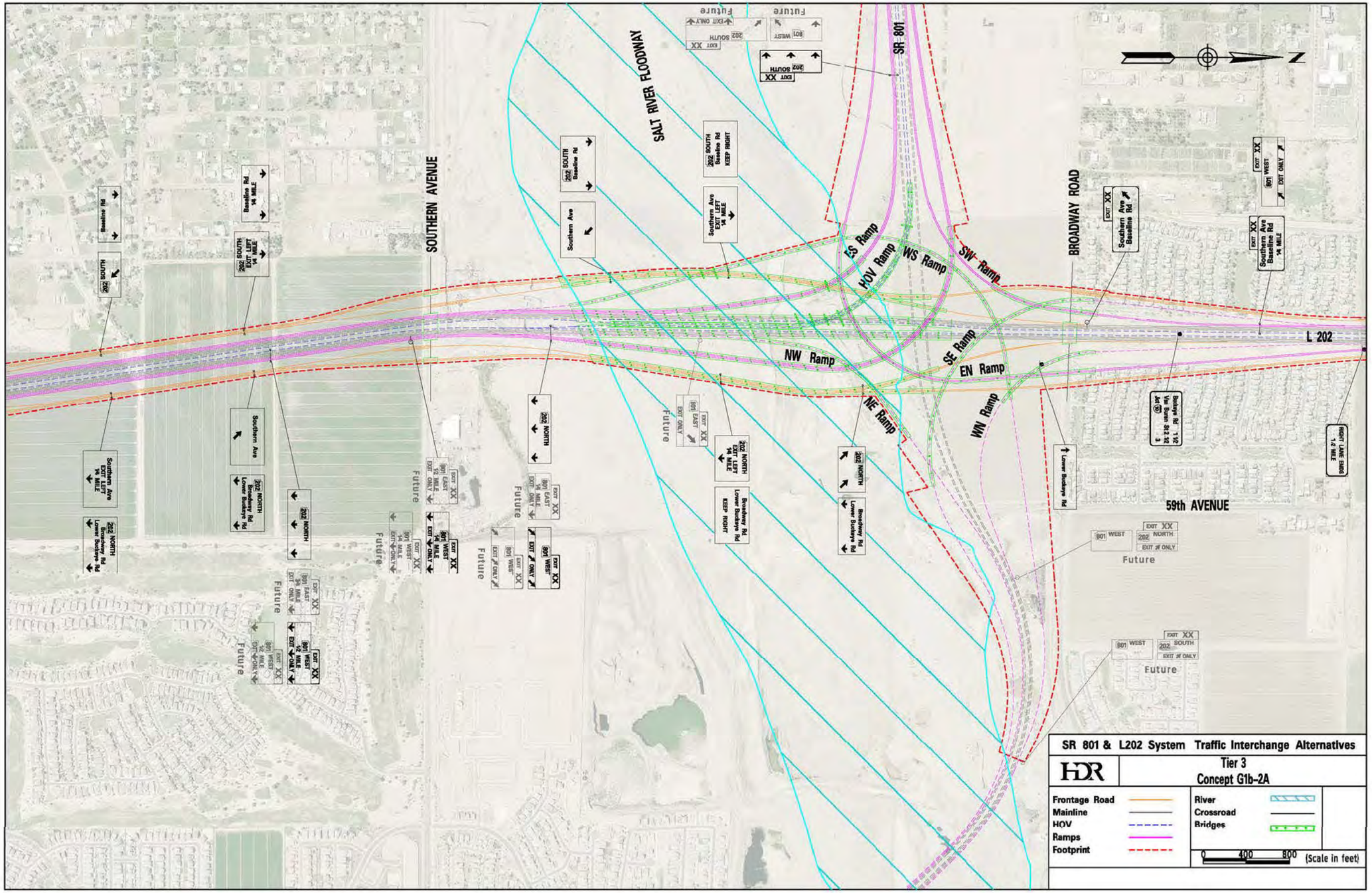


Figure 5-27. Hybrid system TI: G1b-2A Concept



5.5.3 Tier 3 Traffic Analysis

Overview

The traffic analysis for Tier 3 focused on the operational performance of the SR 801/SR 202L system TI integrated with the final local access solution 1B/2A. There are six TI concepts within this tier with different system ramp shape and exit/entry ramp configurations. Since the Tier 3 traffic operational analysis is only performed for the three-legged system TI configuration, only one traffic network results from a traffic analysis perspective because half of the system ramps do not exist. The exception to this occurs on the western leg where all four system ramps are included with the three-legged configuration. However, because the SR 801 through movements do not exist, these ramps function as a beginning/end of freeway condition and while the dual and single exit/entry ramp designs would reverse how the ramps merge/split, this subtle configuration change is negligible from an operational perspective.

The traffic projections used for the Tier 3 analysis are derived from MAG's regional travel demand model with a three-legged system TI configuration shown in Figure 3-1, but were manually redistributed to match the Tier 3 system TI configuration with the final local access solution included. Figure 5-28 shows the results of this redistribution.

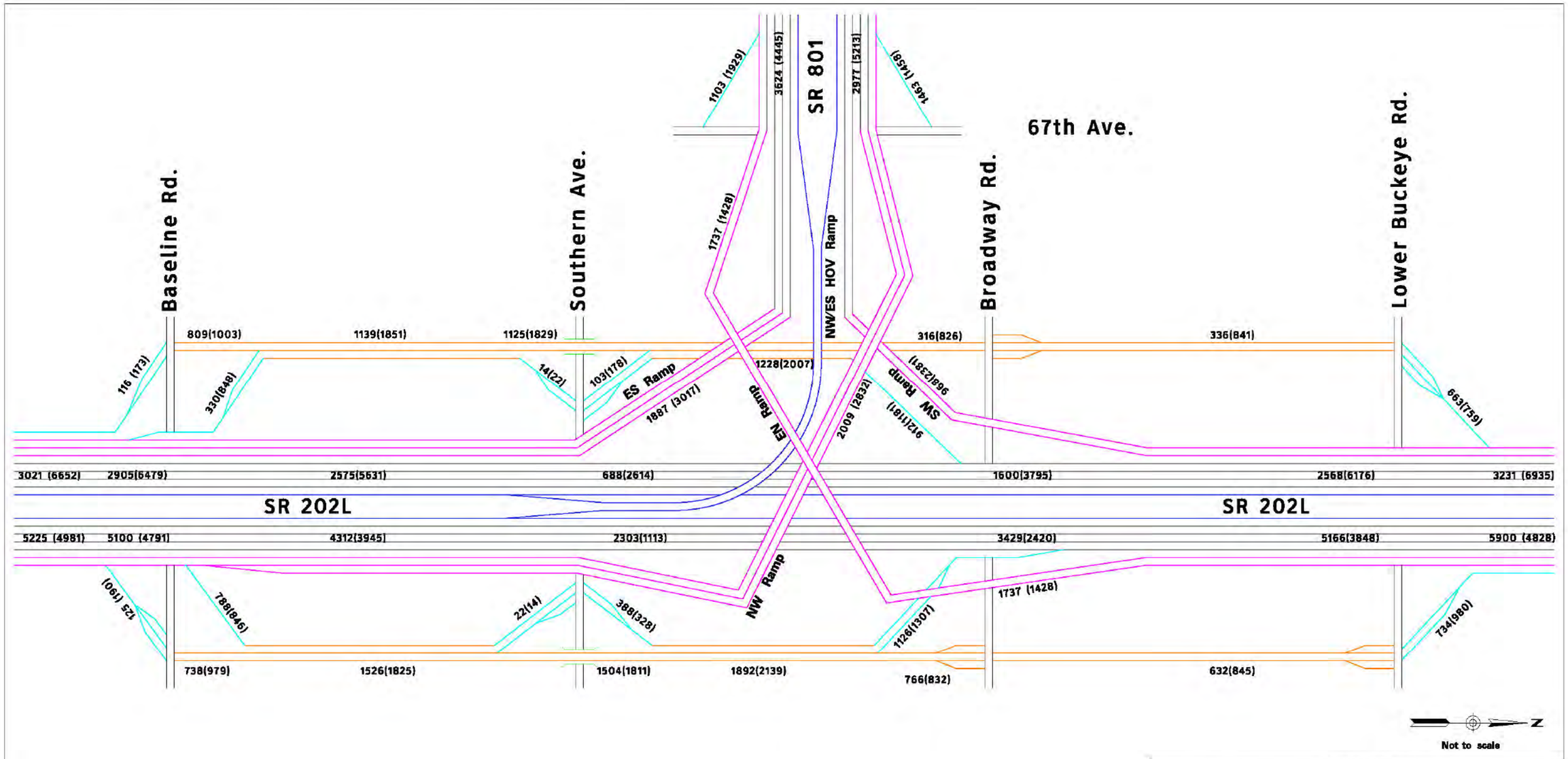
LOS Analysis

An LOS analysis for the connector roads and the system ramps was conducted using HCS, and the intersection LOS analysis was performed at the TIs using Synchro. In addition to performing an LOS analysis for the 2030 volumes noted in Figure 5-28, an LOS longevity analysis was also conducted in 10 percent increments above the 2030 traffic volumes up to 80 percent to evaluate the operational performance of the system TI into future years (approximately 2045) to simulate how the interchange would operate about 20 years after it opened to traffic. Figure 5-29 (extends over three pages) shows the LOS longevity analysis for the system TI and the estimated year of failure of different segments based on variable traffic growth rates.

The following observations can be made based on the LOS longevity analysis shown in Figure 5-29:

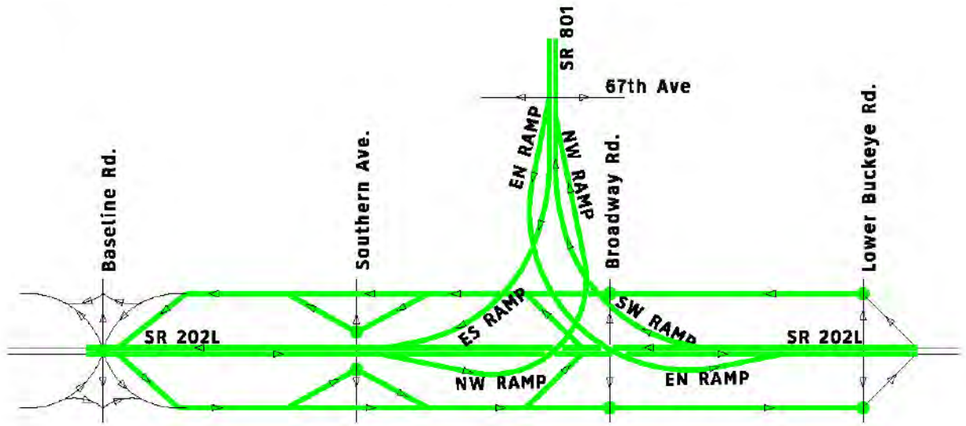
- All of the segments operate at LOS C or better with the 2030 volumes.
- The SW ramp is the first system ramp expected to experience congestion. It operates at LOS D with just a 10 percent increase of the base 2030 traffic volumes, but it operates at LOS D until the 2030 volumes are increased to 50 percent when LOS E is achieved. At an 80 percent increase, LOS F is expected.
- The local access connector road system along SR 202L operates at LOS D or better up to a 60 percent increase of 2030 base traffic volumes. After that, only the section between Southern Avenue and Broadway Road is expected to deteriorate to LOS E.
- With the exception of the SW ramp, the other system ramps operate within an acceptable LOS D or better up to a 70 percent increase of the 2030 base traffic volumes.
- The southbound SR 202L Southern Avenue off ramp diverge area operates at congested conditions with LOS E at a 70 percent increase of base 2030 traffic volumes.
- The Baseline Road SPUI signal operates at LOS E with an 80 percent increase of base 2030 traffic volumes.
- Considering a moderate traffic growth rate of 3 percent per year, all the segments of system TI except the SW ramp would operate at LOS D or better approximately 20 years after it opens to traffic (about 2045) while a 4 percent traffic growth rate per year would result in breakdown of three segments about 15 to 18 years after it opens to traffic.

Figure 5-28. 2030 traffic projections for three-legged system TI with local access solution

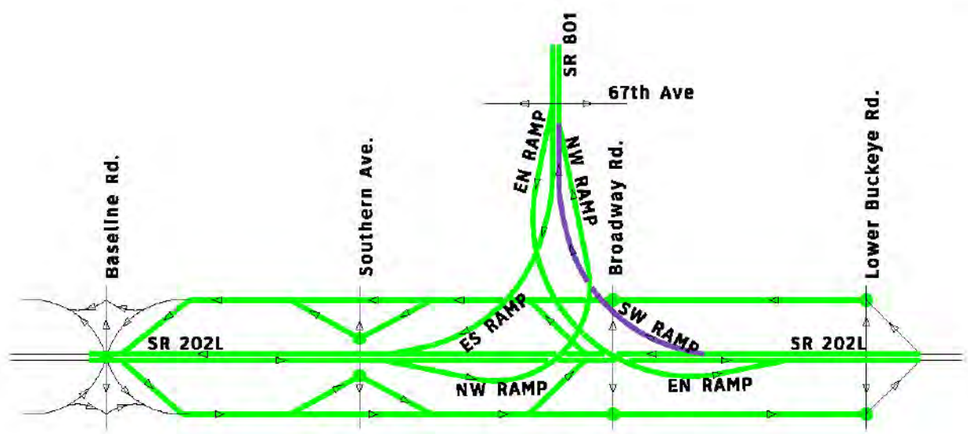


Notes: *Volumes are manually adjusted based on February 2008 MAG Travel Demand Model.
*Baseline Road Service Traffic Interchange is a SPUI but shown here as diamond ramps.

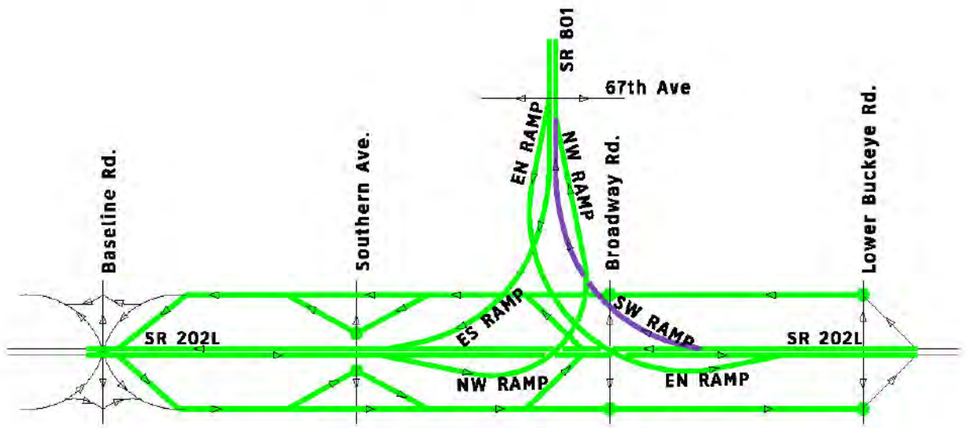
Figure 5-29. Tier 3 LOS longevity analysis of three-legged SR 801/SR 202L system TI



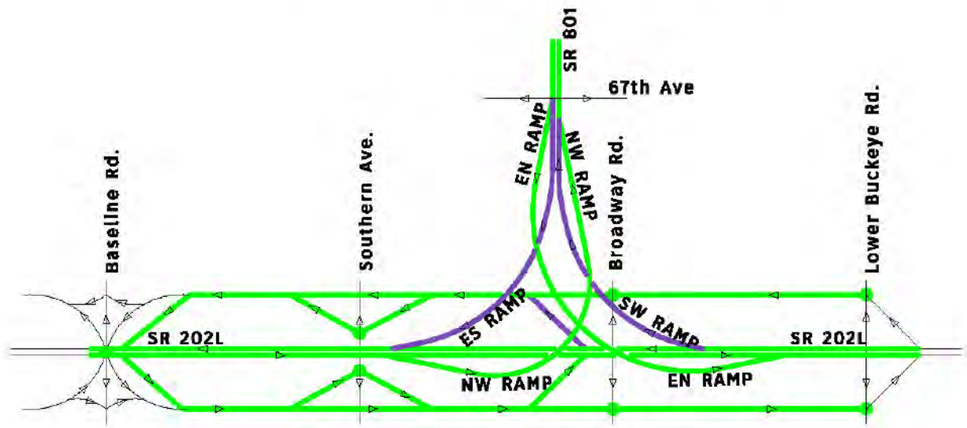
2030 Volumes



10% increase of 2030 Volumes



20% increase of 2030 Volumes



30% increase of 2030 Volumes

* Worst case AM or PM Peak LOS shown

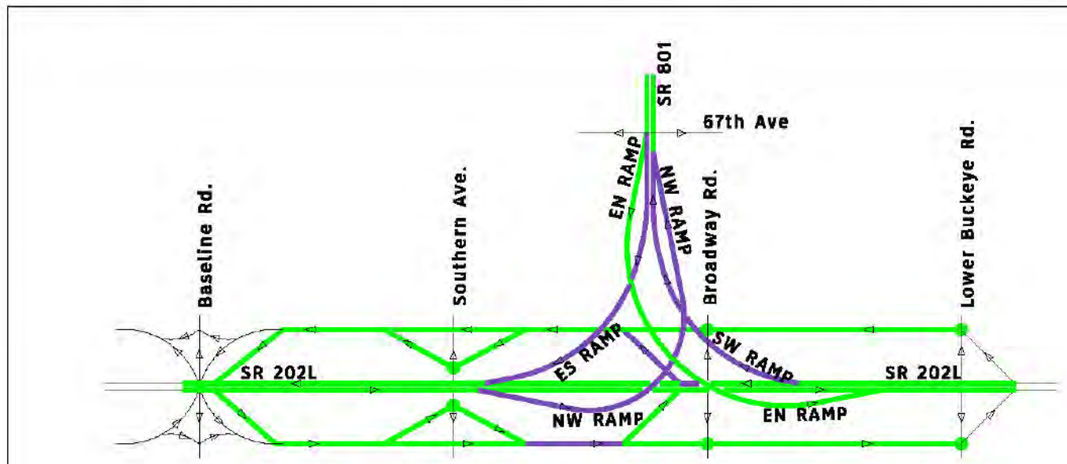
LOS Longevity Analysis of 3-Legged
SR 801 & SR 202L System TI

Legend

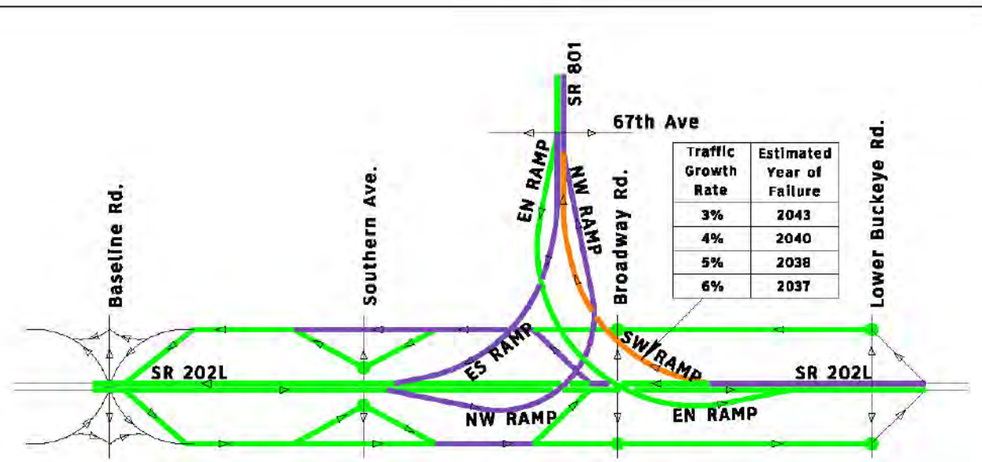
LOS A-C
LOS D
LOS E
LOS F
Not Analyzed

Not to scale

Figure 5-29. Tier 3 LOS longevity analysis of three-legged SR 801/SR 202L system TI (continued)

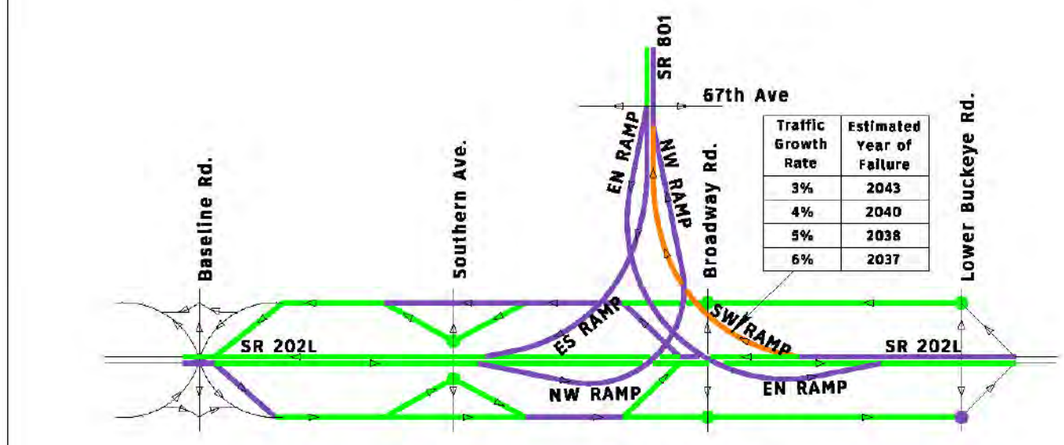


40% increase of 2030 Volumes



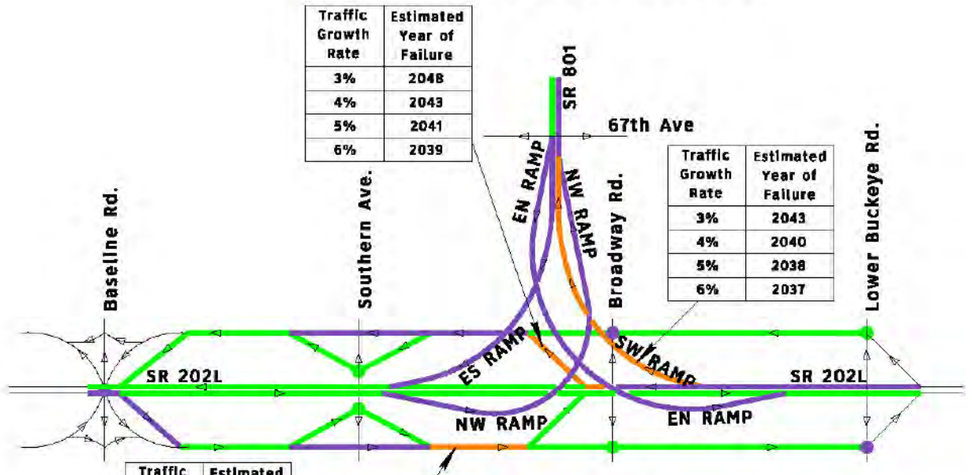
Traffic Growth Rate	Estimated Year of Failure
3%	2043
4%	2040
5%	2038
6%	2037

50% increase of 2030 Volumes



Traffic Growth Rate	Estimated Year of Failure
3%	2043
4%	2040
5%	2038
6%	2037

60% increase of 2030 Volumes



Traffic Growth Rate	Estimated Year of Failure
3%	2048
4%	2043
5%	2041
6%	2039

Traffic Growth Rate	Estimated Year of Failure
3%	2043
4%	2040
5%	2038
6%	2037

Traffic Growth Rate	Estimated Year of Failure
3%	2048
4%	2043
5%	2041
6%	2039

70% increase of 2030 Volumes

* Worst case AM or PM Peak LOS shown

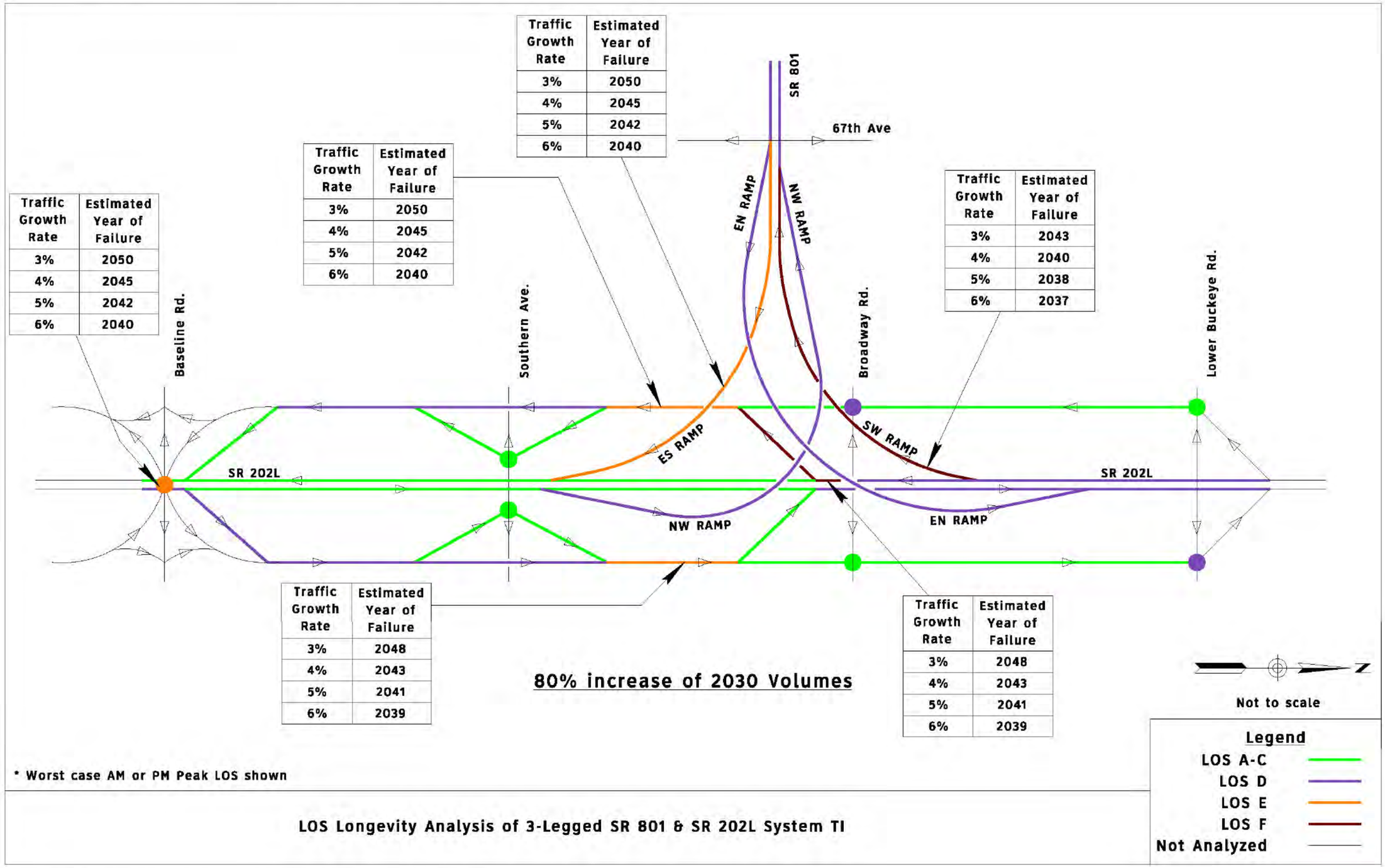
LOS Longevity Analysis of 3-Legged
SR 801 & SR 202L System TI

Legend

LOS A-C
LOS D
LOS E
LOS F
Not Analyzed

Not to scale

Figure 5-29. Tier 3 LOS longevity analysis of three-legged SR 801/SR 202L system TI (continued)



LOS Analysis of the Dual versus Single Exit-Entry Ramp Configuration on North Leg

During the concept development process, it was observed that the dual exit/entry ramp configuration requires the acquisition of 30 to 40 additional homes within the residential neighborhood north of Broadway Road on the northern leg compared with the single exit/entry ramp configuration. Given the sensitivity to this neighborhood, the question was naturally raised about whether the acquisition of these additional homes resulted in an interchange design that operated better and/or longer.

In order to differentiate the operational characteristics of these two concepts, a VISSIM microsimulation was prepared because the HCS analysis was not precise enough to evaluate the subtle operational differences between these two geometric configurations. It should be noted that this analysis required a four-legged interchange configuration be used in order to realize the dual ramp configuration on the northern leg. Additional MAG models were requested with this configuration. The AM and PM volumes used in the analysis are shown in Figure 5-30. Select link volumes influenced by the two northern leg configurations were also obtained from the MAG model to build the VISSIM network.

VISSIM Model Development Methodology:

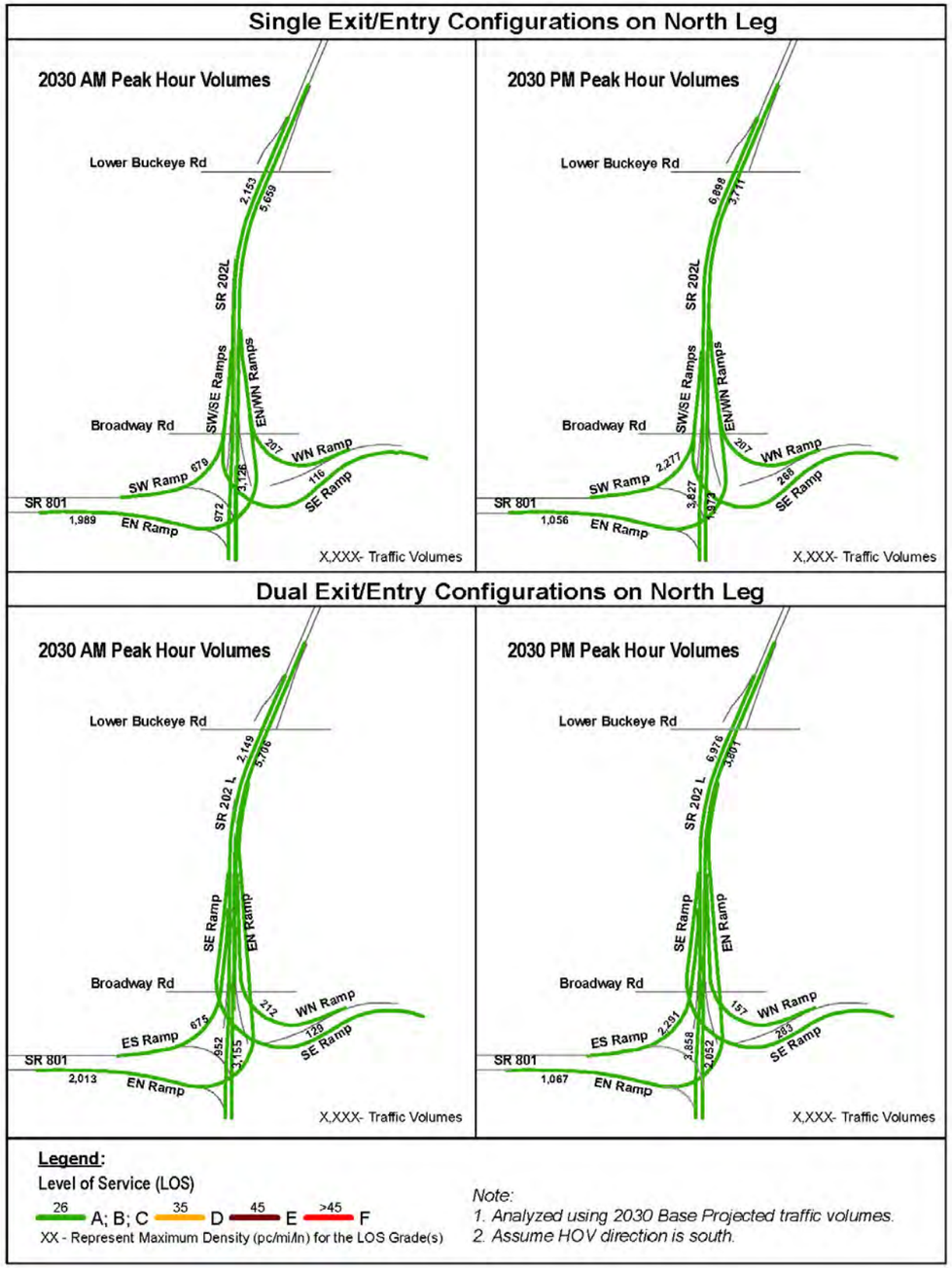
VISSIM (Version 5.10-09) was used to evaluate the traffic operations of the SW, SE, EN, and WN ramps of the future SR 801/SR 202L system TI.

VISSIM is a microscopic, behavior-based multipurpose traffic simulation program used in the optimization of complex transportation systems. VISSIM is based on car following and lane change logic that can analyze vehicular traffic operations based on various driver behavior patterns and lane configurations, including HOV lanes and ramp metering.

The VISSIM model inputs consisted of five basic components:

1. **Roadway Network (links and nodes)**: The roadway network, including the elevations, horizontal curvature, and lane configurations, were inputted using the Microstation CADD graphics created for the respective scenarios (single entry/exit and dual entry/exit). The roadway network coding is limited to only that network that vehicles could use to access the SW, SE, EN, and WN ramps.
2. **Traffic Volumes and Time Periods**: Select link projected traffic volumes provided by MAG for 2030 were used in the simulation model runs. The analysis was conducted for a 1-hour peak period for both AM and PM time periods. Longevity model runs were conducted using a 20, 40, 60 and 80 percent increase over the 2030 base projected traffic volumes.
3. **Heavy Vehicles Percentage**: It was assumed that all the vehicle mix included 12 percent heavy vehicles for each network link.
4. **Vehicle Routes**: The origin and destination data for each of the network links were chosen such that all the possible routes to access the SW, SE, EN, and WN ramps are coded in the VISSIM model. This information was extracted from the select link data provided by MAG.
5. **Calibration**: Because the system TI does not exist today, the VISSIM model was calibrated using the driving behavior and vehicle parameters that were used in another study conducted to analyze traffic operations along I-10 between I-17 and SR 51/SR 202L, the closest existing freeway facility.

Figure 5-30. VISSIM analysis of single and dual exit/entry configurations for northern leg of SR 801/SR 202L system TI (2030 volumes)



VISSIM Model Results

The VISSIM model analyzed the LOS along SR 202L from Lower Buckeye Road to just south of the SR 801/SR 202L system TI and for the SW, SE, EN, and WN system ramps. To estimate the variations in operational conditions, the VISSIM models were run five times and the key statistics were averaged to smooth the statistical anomalies.

For freeways, VISSIM reports densities (and speeds) on a per-link basis, and does not typically distinguish between main line, ramp junction, and weave section (as HCM does) in calculating measures of effectiveness. VISSIM segmentation is typically based on the characteristics of the link (such as speed and the number of lanes) or locations where interruptions or changes occur (ramp junction, lane drop, etc.). For the purposes of this study, density was extracted for each segment in the VISSIM model, and the HCM freeway main line density-LOS correlation shown in Table 5-6 was used to generate an LOS map for all of the model segments.

Table 5-6. Freeway main line LOS criteria

LOS	Freeways: Density Range (pc/mi/ln)
A	≤11
B	11-18
C	18-26
D	26-35
E	35-45
F	>45

Figure 5-30 shows the resulting 2030 AM and PM peak hour LOS of the VISSIM study area for both the single and dual exit/entry ramp configurations. As the figure shows, the system TI operates satisfactorily at LOS C or better in 2030.

LOS Longevity Analysis

Because no differentiation existed between the two configurations using the 2030 volumes, an LOS longevity analysis was also performed until an LOS difference was identified between the dual and single exit/entry ramp designs. Growth increments of 20, 40, 60, and 80 percent over the 2030 volumes were tested. The LOS results of this longevity analysis are shown in Figures 5-31 and 5-32 for the AM and PM peak period, respectively.

The following observations can be made from the VISSIM analysis:

- Both the single and dual exit/entry ramp configurations on the northern leg will perform at LOS C or better using the 2030 base projected traffic volumes.
- Both single and dual exit/entry configurations operate at LOS D or better using 2030 volumes plus 40 percent.
- With the 60 percent increase during the PM peak hour, both the single and dual exit/entry configurations begin showing elements at LOS E. In the case of the single exit/entry configuration, LOS E occurs on the combined SW/SE system ramp; however, for the dual exit/entry configuration, LOS E occurs on the southbound SR 202L main line at the SE ramp split.

Tier 3 Traffic Analysis Findings

The LOS analysis performed for the Tier 3 system TI concepts appears to offer satisfactory operational performance for a lifespan of 15 to 25 years after it opens to traffic depending on when the interchange is built and what traffic growth rate actually occurs, regardless of which Tier 3 interchange concept is chosen.

For the northern leg of the system TI, the single exit/entry ramp configuration was selected as the preferred configuration because the VISSIM LOS longevity analysis showed a slight preference for the single configuration because the failing element occurred on a system ramp as opposed to the SR 202L main line (refer to Table 6-1). In addition, the single exit/entry configuration right-of-way needs were less in the sensitive residential area north of Broadway Road. As a result, this decision eliminated Concepts B1-2A and G1b-2A from further consideration.

5.5.4 Tier 3 Evaluation Process

For Tier 3, 13 criteria were used in the evaluation of the six concepts. Of the 12 Tier 2 criteria, the "Phasing Improvements" criterion was dropped, the "Level of Service – Longevity Analysis" was redefined as described below, and the remaining 11 criteria were carried forward with no change. Two new criteria were added that are unique to Tier 3. The redefined LOS criterion and the two additional Tier 3 criteria are defined as follows:

- **Level of Service - Longevity Analysis**: This criterion has been redefined slightly for Tier 3. Instead of growing the 2030 traffic numbers up to 40 percent, this analysis now grows the traffic volumes in 10 percent increments until two elements in the system failed. A 4 percent growth rate was assumed. These findings are shown in the traffic longevity analysis exhibits included in Figure 5-29. Analysis was conducted using HCS and Synchro.
- **Additional Right-of-way on Northern Leg**: The existing residential neighborhood on the northern side of Broadway Road would be affected differently by the options being considered. Because the rest of the land use within and around the proposed system TI is vacant, agricultural, or waterway, the neighborhood has been identified as sensitive, and emphasis should be placed on minimizing impacts in that area. At this time, the SR 202L project is expected to purchase additional right-of-way in this neighborhood. This analysis evaluated how many additional homes would have to be acquired above and beyond the SR 202L project. Generally, the findings demonstrated that the single exit/entry configuration on the northern leg required far fewer homes than the options with the dual exit/entry configuration. Therefore, options that used the single exit/entry configuration on the northern leg scored better under this criterion.
- **System TI Signs**: Ease of providing signs has now been divided into two categories for Tier 3: local signs and system signs. Since all options use the same local access layout on SR 202L, they all score the same—fair, because the northbound SR 202L exit to the connector road system requires a triple destination exit. The system ramp guide sign concepts developed for each option indicate a preference for the dual exit/entry ramp configurations approaching the major splits because they get drivers in the appropriate lanes farther in advance using simpler messages.

Figure 5-31. VISSIM longevity analysis of single and dual exit/entry configurations for northern leg of SR 801/SR 202L system TI (AM peak hour)

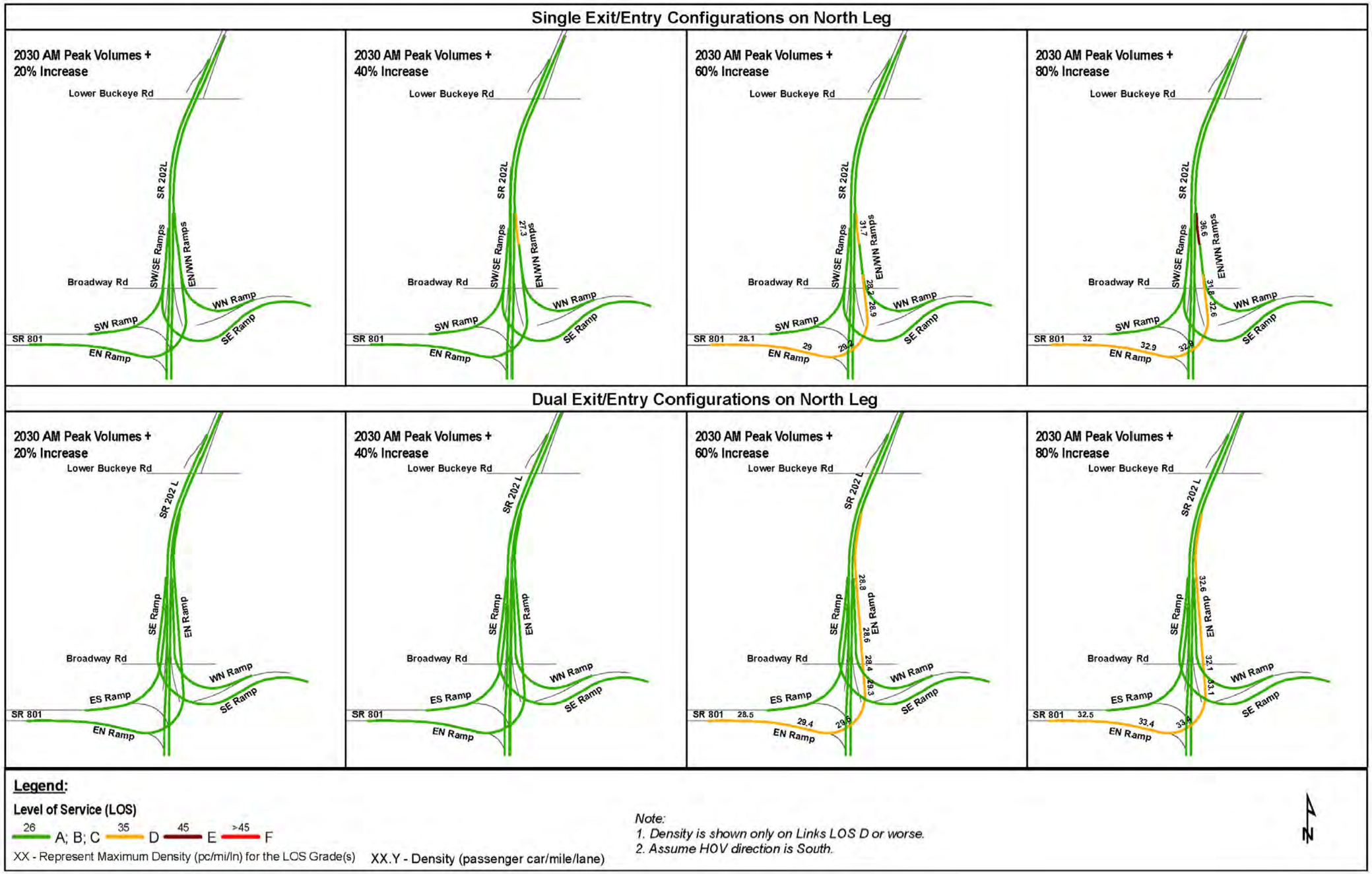


Figure 5-32. VISSIM longevity analysis of single and dual exit/entry configurations for northern leg of SR 801/SR 202L system TI (PM peak hour)

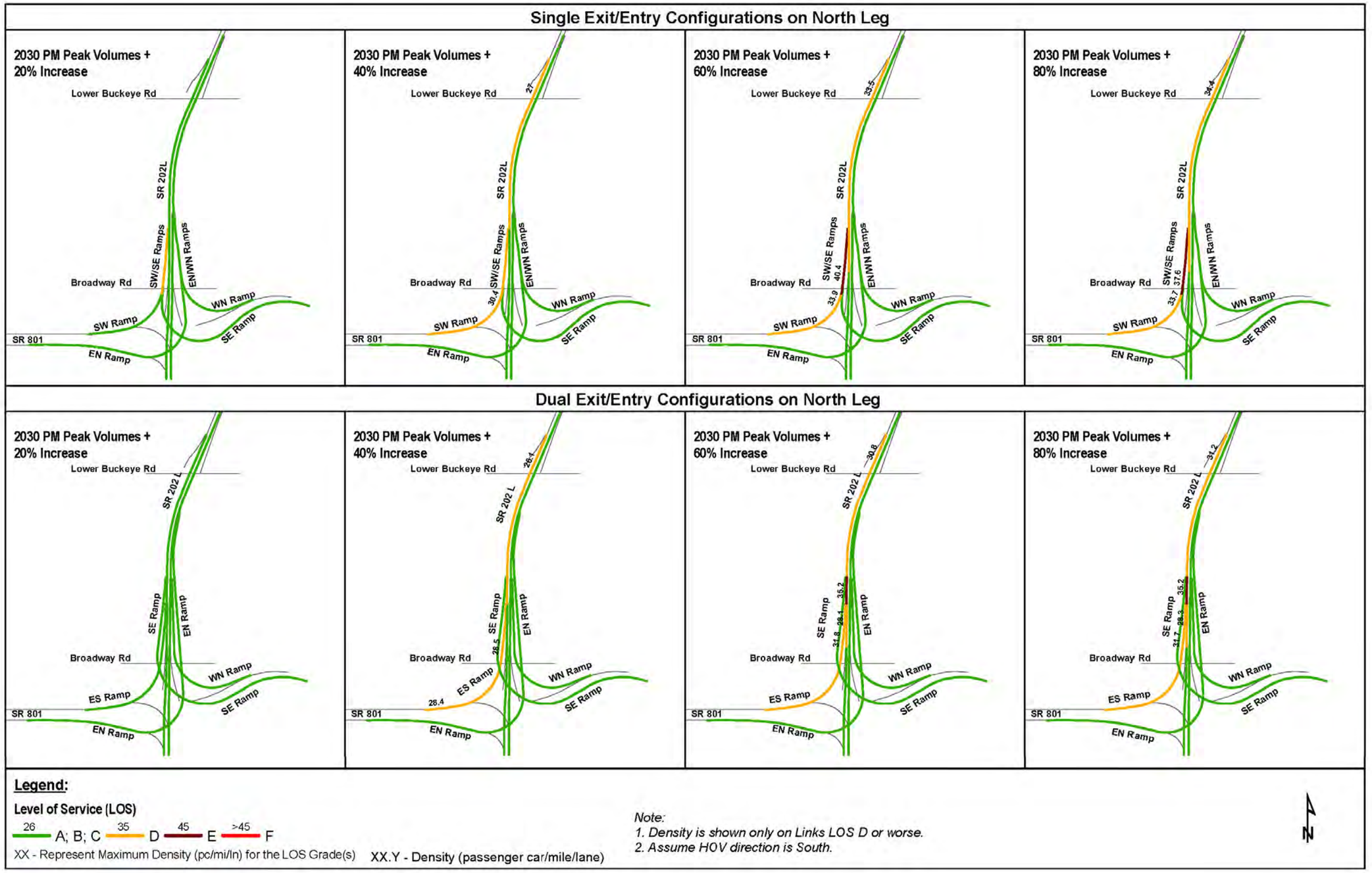


Table 5-7 lists the 13 Tier 3 ranking criteria, and how the scores were determined.

Table 5-7. Tier 3 ranking criteria

Ranking Criteria	Excellent ●	Good ◒	Moderate ○	Fair ◒	Poor ●
LOS Longevity Analysis	D or Better at 50%	D or Better at 40%	D or Better at 30%	D or Better at 20%	D or Worse at 2030
Bridge Cost (in millions)	$150–$165	$165–$180	$180–$195	>$195	—
Three-lane Ramps Levels	at Level 3	—	—	at Level 4	—
Interchange Height	at Level 4	—	Between Levels 4–5	—	—
HOV Ramp Levels	at Level 3	—	—	at Level 4	—
Overall Footprint (in acres)	330–340	340–355	355–370	>370	—
Additional R/W on Northern Leg	0–5 homes	6–10 homes	11–20 homes	21–30 homes	>31 homes
Ease of Future Expansion	Easy	—	Moderate	—	Difficult
System Ramp Lengths	Short	—	—	—	Long
Weave	No mainline weave	—	—	—	Mainline weave
Local Signs	Single destination message	Double destination message	—	Triple destination message	Quadruple destination message
System Signs	Dual entry/exit for three-lane ramps	—	—	Single entry/exit for three-lane ramps	—
Baseline Road SPUI Conflicts	No conflict	—	—	—	Conflict

5.5.5 Tier 3 Evaluation Findings

Table 5-8 summarizes the Tier 3 evaluation findings after applying the criteria defined in Table 5-7. After presentations to the Study Team, the following conclusions were reached:

1. All three hybrid options scored well under the newly defined Tier 3 LOS longevity analysis and system interchange sign categories. This essentially reflects the findings that the dual exit and entry ramp configuration better accommodates signs approaching the major splits because they get drivers in the appropriate lanes farther in advance with simpler sign messages and because they perform slightly better over time, especially for the heavy ES and NW movements.
2. There was general consensus that the braided flyover concept best served the potential for future expansion because of the spatial configuration within the core of the interchange.
3. Attempts should be made to minimize impacts to the residential neighborhood north of Broadway Road for both cost and environmental reasons.
4. There was general consensus that the single exit and entry ramp concept is the appropriate solution on the northern leg of the interchange because it would affect about 30 fewer homes in the neighborhood north of Broadway Road without giving up significant operational performance advantages.

Discussions occurred among the Study Team to carry both G1a-2A and G1b-2A forward into the EA and L/DCR document (refer to Table 6-1) with the only difference between the two concepts being the single versus dual exit/entry ramp design on the northern leg. The Study Team ultimately decided that the single exit/entry ramp configuration was a superior solution because it minimized the impacts to the neighborhood north of Broadway Road without compromising operational characteristics. Consequently, there was no need to carry Concept G1b-2A forward and as a result, **Concept G1a-2A is the recommended interchange concept**.

It should be noted that Concept G1a-2A does not excel in every category shown in Table 5-7. Most notably, bridge costs are higher, the three-lane ramp levels are slightly higher, the overall interchange height is slightly taller, and the overall footprint increases. While these are not desirable traits, they are all compromises necessary to minimize impacts to the residential community north of Broadway Road because the interchange shape is forced southward toward and into the Salt River. In exchange for these trade-offs, it is the only option that meets the operational objectives, minimizes impacts on the community, and provides the maximum flexibility for future expansion activities.

Table 5-8. Tier 3 evaluation summary

System TI Concept	Local Access Concept	LOS Longevity Analysis	Bridge Cost	Three-lane Ramps Levels	Inter-change Height	HOV Ramp Levels	Overall Footprint	R/W on Northern Leg	Ease of Future Expansion	System Ramps Lengths	Weave	Local Signing	System Signing	Baseline Road SPUI Conflicts	Conclusion
Concept A1: Single Exit/Entry all legs (EN/WS highest level)	1B	●	◓	●	●	●	◓	◓	◒	●	●	◒	◒	●	Recommended elimination because hybrid options were developed to optimize the most critical elements of these concepts.
Concept B1: Dual Exit/Entry all legs (EN/WS highest level)	2A	●	○	●	○	●	◒	●	◒	○	●	◒	●	●	
Concept C1: Braided Flyover EN/WS Single Exit/Entry all legs (EN/WS highest level)	1B	●	○	●	○	●	◒	◓	○	●	●	◒	◒	●	
Hybrid Concept F: Single and Dual Exit/Entry (EN/WS highest level)	2A	●	◒	◓	○	●	○	●	◒	●	●	◒	●	●	Recommended elimination because stakeholders prefer the braided flyover core configuration for this interchange.
Hybrid Concept G1a: Braided Flyover and Single Exit/Entry on North Leg, Dual on Others (EN/WS highest level)	2A	●	○	◓	○	●	◒	●	○	●	●	◒	●	●	Hybrid of Concepts C1 and B1 with single entry/exit at northern leg and dual entry/exit for southern, eastern, and western legs.
Hybrid Concept G1b: Braided Flyover and Dual Exit/Entry on all Legs (EN/WS highest level)	2A	●	○	◓	○	●	◒	●	○	○	●	◒	●	●	Recommended elimination because the additional 30-40 homes required in the northern leg would provide no additional operational benefit as compared with Hybrid Concept G1a.

Key: ● *Excellent* ◓ *Good* ○ *Moderate* ◒ *Fair* ● *Poor* □ *Surviving Concept*

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Chapter 6. Interchange Selection Process Timeline

Figure 6-1 illustrates the interchange selection process timeline of events with major milestones listed relative to the tiered analysis. Table 6-1 lists these same events in more detail, including the participants and the key decisions or direction given at those points in time.

Figure 6-1. SR 801/SR 202L system TI study timeline

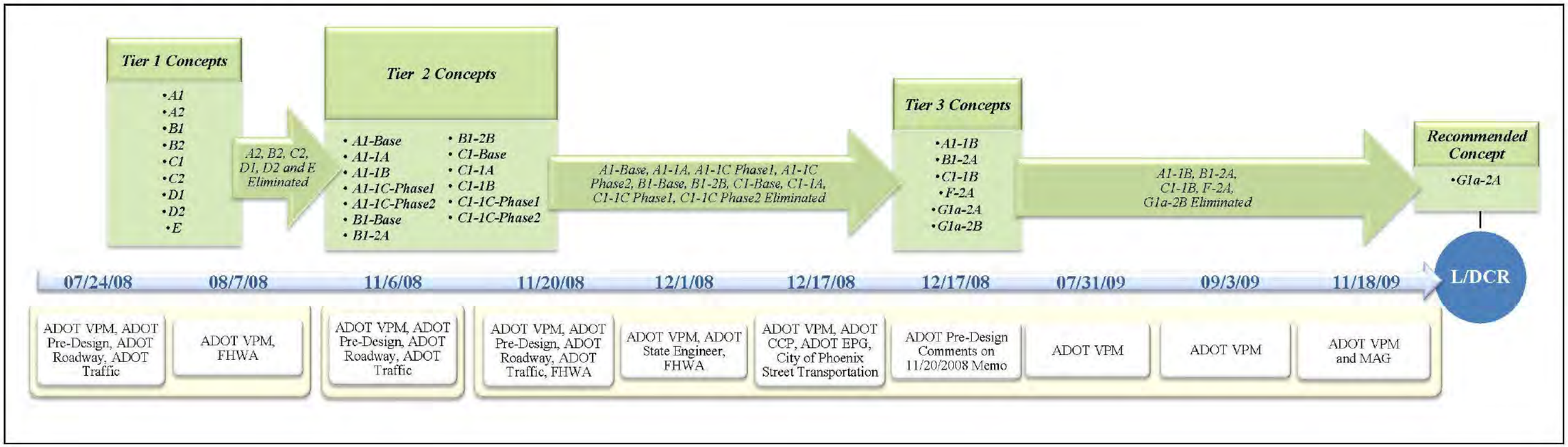


Table 6-1. SR 801/SR 202L system TI study timeline summary

Date	Participation	Significant Decision/Direction
Tier 1 Concepts: A1, A2, B1, B2, C1, C2, D1, D2, and E		
7/24/2008	ADOT VPM, ADOT Pre-Design, ADOT Roadway, ADOT Traffic	• It was decided to eliminate concepts that had geometric constraints and those with the NW/ES (three-lane ramps) and HOV ramp on the highest levels. This includes concepts A2, B2, C2, D1, D2, and E. • Analysis of SR 801 interim and ultimate lane configuration needs to be conducted to accommodate potential through movements. • Analysis of local access scenarios along SR 202L need to be developed and evaluated to further narrow the list of potential TI configurations.
8/7/2008	ADOT VPM, FHWA	• It was decided to eliminate concepts that had geometric constraints and those with the NW/ES (three-lane ramps) and HOV ramp on the highest levels. This includes concepts A2, B2, C2, D1, D2, and E. • Signs along SR 202L and SR 801 should be taken into consideration when developing concepts during the next iteration of analysis.
Tier 2 Concepts: A1-Base, A1-1A, A1-1B, A1-1C-Phase 1, A1-1C-Phase 2, B1-Base, B1-2A, B1-2B, C1-Base, C1-1A, C1-1B, C1-1C-Phase 1, and C1-1C-Phase 2		
11/6/2008	ADOT VPM, ADOT Pre-Design, ADOT Roadway, ADOT Traffic	• It was decided to eliminate concepts due to quadruple destination sign messages, failing operations, long system ramps, main line weaves, and/or through movement conflicts at the Baseline Road SPUI. • Strong preference was shown for dual entrance and exit concepts with emphasis on the southern and western legs due to the presence of the triple lane ramps. • General consensus concluded that the braided flyover concept best served the potential for future expansion, and the spatial configuration of the core was preferred. • The technical group felt that the argument to get to a preferred configuration was not strong enough and recommended additional analysis with consideration of preference for dual entrance and exit on the northern leg. • Pre-Design suggested extending the longevity analysis farther into the future to identify failing elements and to evaluate whether the concepts would still operate 20 years ± after opening in 2025. • The Pre-Design group commented that at least two options should be carried forward from the ASR to the L/DCR.
Tier 3 Concepts: A1-1B, B1-2A, C1-1B, F-2A, G1a-2A, and G1b-2B		
11/20/2008 (memorandum)	ADOT VPM, ADOT Pre-Design, ADOT Roadway, ADOT Traffic, FHWA	• The Tier 3 evaluation matrix was updated to incorporate the comments of previous meetings • HDR recommended that ADOT carry only Concept G1a forward into the L/DCR because it is the only option that meets the operational objectives, minimizes impacts on the community, and provides the most flexibility for the future expansion activities.
12/1/2008	ADOT VPM, ADOT State Engineer, FHWA	• General consensus concluded that the braided flyover concept best served the potential for future expansion, and the spatial configuration of the core was preferred. Also, strong preference was shown for dual entrance and exit concepts with emphasis on the southern and western legs due to the presence of the triple lane ramps. • FHWA and the ADOT management group agreed with the recommendations of HDR and felt that Concept G1a represents the optimum solution for the site, assuming HDR's claim that taking 30–40 extra homes resulted in no additional significant operational benefit. • FHWA commented that Concepts G1a and G1b should be carried forward to the EA. ADOT management felt that it would be more advantageous and cost-effective to carry just Concept G1a forward, but asked HDR to prove its claim first. • FHWA made the comment that HCS analysis is somewhat limited and suggested conducting microsimulation modeling to determine whether, operationally, there is a difference between single and dual entrance and exit for the northern leg of the TI. This would help prove the claim. • Further discussion is needed on how the local access along SR 202L is to be presented to the public for both the SR 202L and SR 801 projects.
12/17/2008	ADOT VPM, ADOT CCP, ADOT EPG, City of Phoenix Street Transportation	• The system TI concept development and evaluation process was presented to date. The City of Phoenix acknowledged the Study Team's recommendations (system TI configuration G1a and local access solution 2A along SR 202L and the elimination of the 99th Avenue and 75th Avenue TIs along SR 801) as presented and did not have a problem with the project moving forward based on those recommendations.

Table 6-1. SR 801/SR 202L system TI study timeline summary

Date	Participation	Significant Decision/Direction
12/17/2008	ADOT Pre-Design Comments on 11/20/2008 memorandum	• No traffic study has been completed. Operational analysis of concepts (HCS and Corsim/Vissim) is needed to properly evaluate the system TI and service TIs within the Study Area. • Cost versus justification of connector road/frontage road (CR/FR) system. The current design appears to maximize and enhance local access. A less expensive concept would be to reduce local access options. ADOT policy is to provide FRs only if necessary, per RDG 104.3. There is no existing access to maintain to the state highway so there should be no obligation to provide maximum local access. No comparative analysis with versus without CR/FR system was provided as previously requested. What are the incremental impacts of providing the CR/FR (more R/W, impacts to homes, environmental impacts)? The MAG RTP is fiscally challenged. What are the costs of this CR/FR system? A cost estimate for the FR system should be provided for evaluation of the incremental cost of a system TI with versus without CRs/FRs. • No proper screening of the range of concepts (full/equal application of evaluation criteria to all concepts) to reduce the number for detailed study. Are environmental impacts all equal? • No public involvement in compliance with the ADOT Project Development Process is part of the concepts development and recommendations. It's unclear as to how coordination with all other stakeholders has been carried out. • The alternatives selection process/report should identify alternatives for detailed study in a DCR, not a single recommended alterative. If there is only one apparent alternative warranting detailed study, then an ASR is not needed. But, this is usually only the case for smaller-scale projects such as an isolated service TI. • This project will not be constructed until 2025 (if funding is available). 2030 traffic analysis only evaluates the facility 5 years into service. The presented traffic analysis indicates that all alternatives will be at acceptable LOS for 2030, which means traffic operation is not weighted in the evaluation matrix. It is recommended that 2030 traffic volume be increased by 10, 20, 30, 40, and 50 percent to distinguish the merit of alternatives and see which alternatives would serve at an acceptable LOS after the facility is 10 and 20 years in service.
7/31/2009	ADOT VPM	• ADOT VPM agreed to continue with the 4+1 lane configuration on SR 202L for the interchange ASR document, but to update to the 3+1 configuration on SR 202L for the L/DCR effort and corridor traffic report. • ADOT VPM and the Study Team agreed to evaluate the elimination of the connector roads along SR 202L over the Gila River to reduce the project cost. • ADOT VPM requested a delta right-of-way costs along SR 801 between the 3+1 and 4+1 lane configurations so that a decision can be reached on the SR 801 lane configuration. • ADOT VPM agreed with the Study Team on restarting the microsimulation of the two remaining SR 801 and SR 202L system TI concepts so as to determine the operational differences between the single and dual exit/entry configurations on the northern leg (the traffic volumes used for this microsimulation represent the worst case scenario with 4+1 lane configuration of SR 801 and SR 202L). • ADOT VPM thought that continuing the HOV connections to the south of SR 202L due to the elimination HOV connections at the I-10 and SR 202L system TI was appropriate; however, HDR will take a quick look at the traffic runs to see if anything contradictory is apparent in the numbers. • Consensus has been reached between ADOT VPM and the Study Team that new model runs will be requested from MAG with the changed lane configuration on SR 801 and SR 202L when all the parameter questions (i.e., 3+1 or 4+1 on SR 801, local access on SR 202L, HOV connection direction) have been answered. This new data will be the base for updating the system ramp lane configuration and also for traffic analysis of the system TI and corridor. • The Study team recommended the following list of things that needs to be incorporated in the design of SR 202L: o The SR 202L bridges over the Baseline Road SPUI should be designed and built to accommodate the additional SR 202L lanes resulting from the SR 801 and SR 202L system TI ramp runouts. o The median flaring of SR 202L should be constructed so as to add future HOV connections between SR 202L and SR 801. o The SR 202L Gila River bridge needs to be extended by two spans on the northern side of the river to accommodate a future SR 801/Rio Salado Parkway through connection. Related to this, the SR 202L profile should be kept elevated over the northern bank of the Gila River to accommodate this future roadway crossing. o The Union Pacific Railroad Bridge should be wide enough to accommodate the additional lanes resulting due to SR 801 and SR 202L system TI ramp runouts.
9/3/2009	ADOT VPM	• ADOT VPM and Study Team agreed on requesting new MAG models with the new local access option C along SR 202L so that a detailed traffic analysis of local access options C and D could be performed based on the new models. • HDR agreed to develop a white paper on the pros and cons of eliminating the Southern Avenue TI on SR 202L (attached as Appendix B). • With regard to the future HOV connector options, ADOT VPM requested HDR to analyze what additional cost (construction and right-of-way) would be incurred on the SR 202L project to accommodate an HOV connector to the north. Direction will be given once this analysis has been completed. • ADOT VPM and the Study Team agreed with the continuation of single exit/entry configuration on northern leg based on operational performance (microsimulation results) and right-of-way costs, among other reasons.

Table 6-1. SR 801/SR 202L system TI study timeline summary

Date	Participation	Significant Decision/Direction
11/18/2009	ADOT VPM and MAG	• The contents of the Southern Avenue TI project memorandum were discussed (See Appendix B). • It was concluded from the meeting that the HOV connector concept 4A (See Appendix B) is the final SR 801/SR 202L system TI configuration. Key points about 4A are: o The final system TI configuration will be a braided flyover with dual exits/entries on the eastern, western, and southern legs and a single exit/entry on the northern leg. o The EN/WS ramps will be the braided flyover ramps and will have heavy traffic movement ramps NW and ES as low as possible. The team agreed that it was still important for these two high-volume ramps to be as low as possible, regardless of the HOV connector level implication. o The braided EN/WS ramps will result in a future HOV connector to the south on SR 202L at level 3 and HOV connector to the north on SR 202L at level 4 if the HOV connector originates from the western leg. This would be reversed if the HOV connector originated from the eastern leg. o NW/EN/ES/SW system ramps will have two lanes, while the future NE/SE/WS/WN system ramps will have one lane. o Median will be flared/opened up south of Broadway Road during the initial construction of SR 202L to provide room for a future HOV connector to the south over the river. o No provisions will be made in the SR 202L initial construction for an HOV connector to the north. Consequently, if a north side HOV connector is needed in the future, new right-of-way and some southbound SR 202L reconstruction will be required. o The full local access solution (1B/2A) will be implemented between Baseline and Lower Buckeye roads along SR 202L because ADOT, MAG, and the City of Phoenix have all agreed to include the Southern Avenue service TI with the initial SR 202L construction. o The initial SR 202L will leave room for future SR 801 TI auxiliary lanes. Walls and the drainage channel will be constructed wherever necessary to minimize the right-of-way. • The median opening north of Broadway Road within SR 202L for the future HOV connector to the north (as shown in 3B and 4B) will not be included because: o No HOV connector at the I-10 and SR 202L system TI is planned. o SR 801 may be extended east of SR 202L to the Durango Curve on I-17. If that occurs, then it may be more logical to provide the HOV connector to the south on SR 202L from the eastern leg. o Not providing the median opening along SR 202L to the north does not preclude a north HOV connector, although it would add future cost and would require additional right-of-way. • This meeting concluded the design of the SR 801/SR 202L system TI. At this point, HDR will focus on designing the interchange to the 15% level and developing the system TI ISR document.
Recommended Concept: G1a-2A		

Chapter 7. Recommended Concept

The system interchange selection process used for the SR 801/SR202L TI utilized three tiers of evaluation, with input from the Study Team at each level of development. Tier 1 focused on the interchange shape and stack order. Tier 2 focused on the local access points within the influence area of the system TI. Tier 3 integrated the Tier 1 and Tier 2 findings and developed new hybrid concepts with the goal of developing configurations that combined the best of all the interchange attributes evaluated.

Based on the evaluation of the 9 Tier 1 concepts, 13 Tier 2 concepts, and 6 Tier 3 concepts, Concept G1a-2A is the concept recommended to be carried forward as the build alternative in the L/DCR and EA documents for the SR 801, SR 303L to SR 202L, freeway project.

This design is recommended because it provides the best design consistent with the site constraints, maximizes the future expansion opportunities with the least impact to existing traffic, handles the anticipated traffic demand for approximately 20 years after it opens to traffic, has support from all the project stakeholders, and minimizes the environmental impacts in the Study Area.

The L/DCR and EA documents will fully evaluate this interchange as well as the SR 801 corridor against the no-build alternative; draft versions of these documents will present the results of this assessment to the public for review and comment. A public hearing will also be held, although the date of the hearing is to be determined.

Figure 7-1 shows the layout of the recommended concept in its three-legged form with the fourth leg showing as future elements of work. Figure 7-2 shows the same layout, but with the three possible future HOV connectors included.

Figure 7-1. Three-legged concept, with no HOV

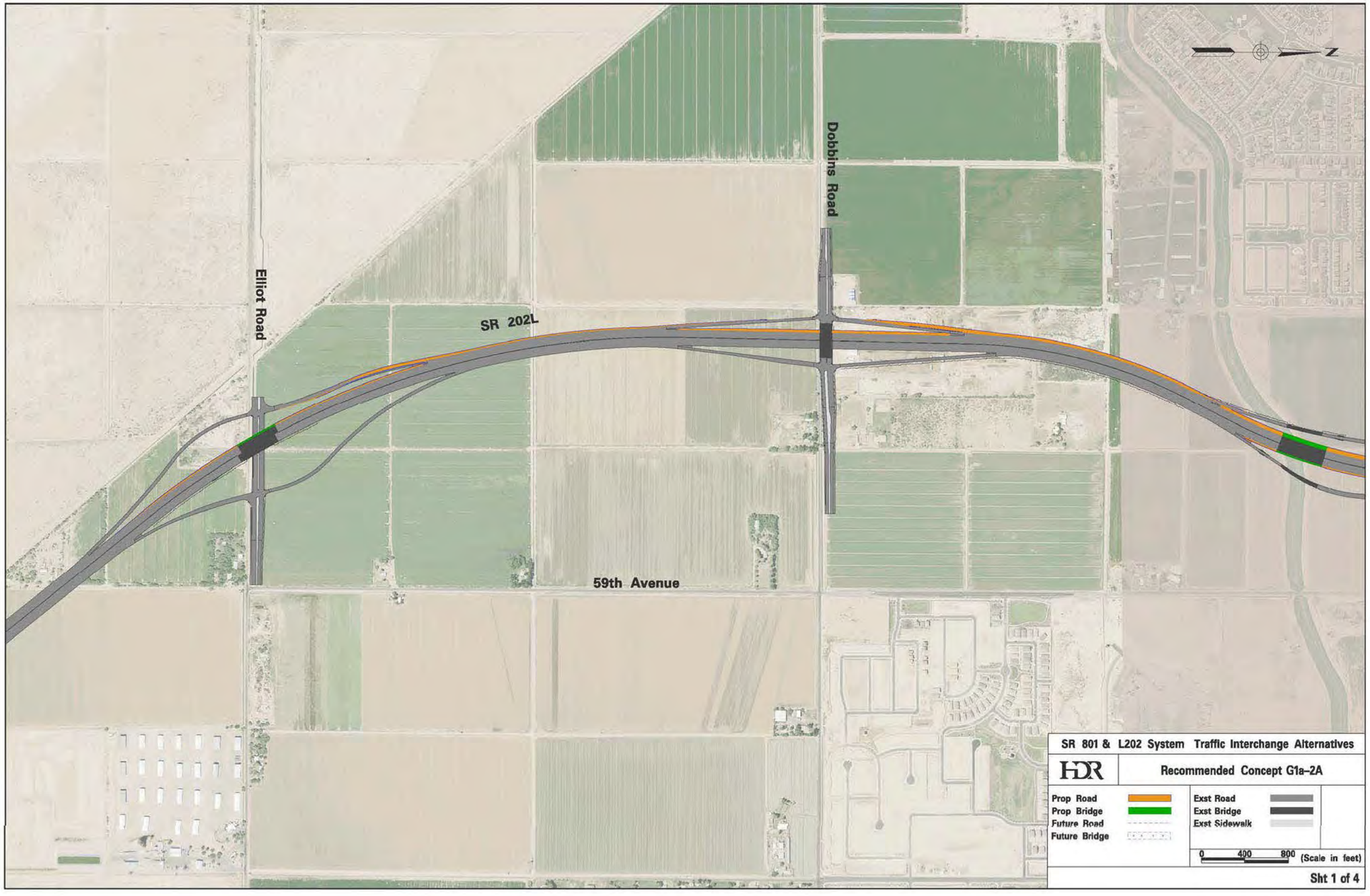


Figure 7-1. Three-legged concept, with no HOV (continued)

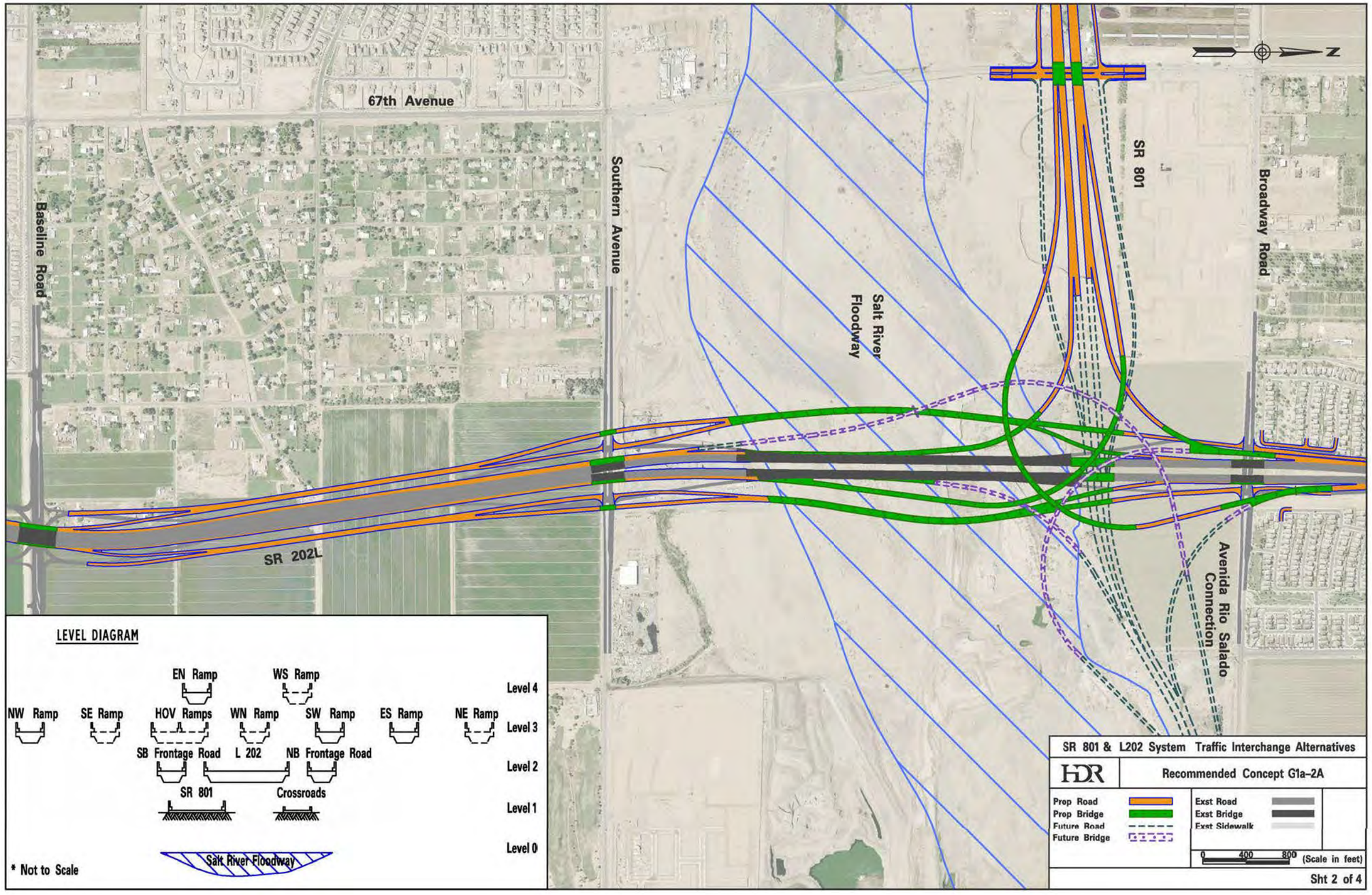


Figure 7-1. Three-legged concept, with no HOV (continued)

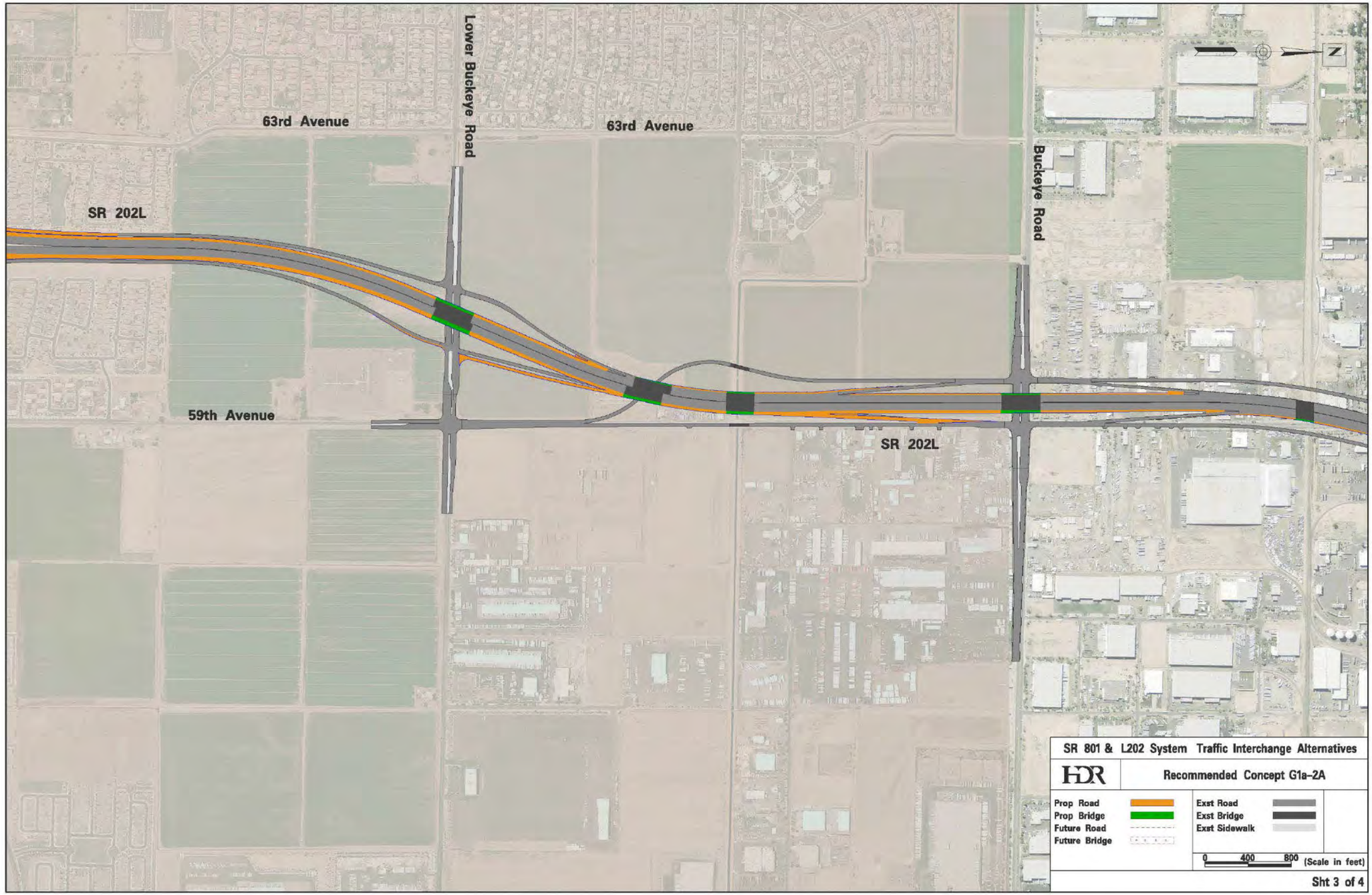


Figure 7-1. Three-legged concept, with no HOV (continued)

N

SR 202L north of Van Buren Street not shown.

Refer to SR 202L documents for I-10 connection information.

SR 801 & L202 System Traffic Interchange Alternatives

HDR | Recommended Concept G1a-2A

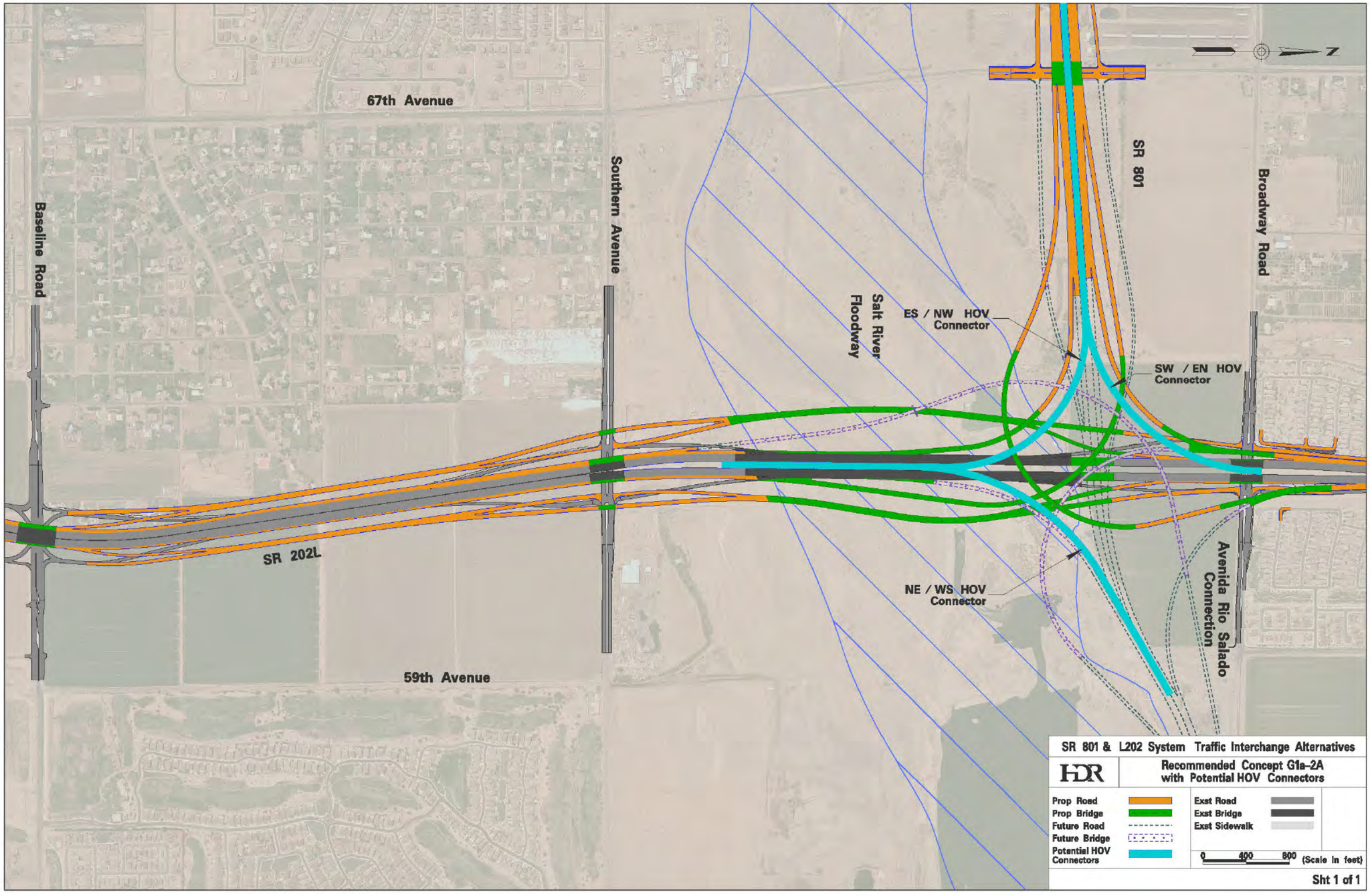
Prop Road
Prop Bridge
Future Road
Future Bridge

Exst Road
Exst Bridge
Exst Sidewalk

0 400 800 (Scale in feet)

Sht 4 of 4

Figure 7-2. Three-legged concept, with three HOV options



Chapter 8. 2018 ISR Addendum to Recommended Concept

The SR 801/SR 202L system TI recommended concept discussed in this ISR (dated May 2010) was revised in the spring of 2018 to address several changes between 2010 and 2017 that affect this TI design. Note that the general conclusions of the original ISR pertaining to the recommended TI configuration and local access strategies have been retained with the revised TI design included in this ISR Addendum. The following is a summary of the changes:

- SR 801 was redesignated SR 30. The TI is now referred to as the SR 30/SR 202L TI.
- In 2010, SR 202L (South Mountain Freeway) was only a proposed freeway, and the SR 30/SR 202L TI design was based on an assumed SR 202L corridor design. As of 2017, the SR 202L project is under construction as a design-build project. The SR 30/SR 202L TI redesign used the latest available design information from the SR 202L design-build team at the time of this addendum preparation. With this information, we determined that the actual design of SR 202L had been altered in several ways (horizontal, vertical, TI configurations, etc.) from what was initially assumed. These changes required altering the design of the proposed SR 30/SR 202L TI in the following manner:
  - First, changes to the profile of the SR 202L main line at the location of the proposed crossing of SR 30 necessitated adjustments to the TI's stack order. The initial recommended concept placed the SR 30 main line at the lowest stack level 1—at grade on the northern bank of the Salt River. The SR 202L main line was directly above SR 30 as stack level 2, with the river bridge proposed to be extended two or three spans to the north to accommodate this future SR 30 crossing. The actual SR 202L profile no longer provides sufficient vertical clearance for the SR 30 main line or proposed transit corridor to cross under SR 202L. The adjacent Salt River water surface elevation limits the ability to drop SR 30 lower to achieve the needed clearance. Furthermore, the actual SR 202L design does not extend the Salt River bridge north to accommodate this undercrossing. In response, the recommended concept documented in this addendum revises the TI's stack order to reverse the stack order of SR 202L and SR 30 at the main line crossing point—placing SR 30 and the proposed transit corridor at level 2 in the stack. This TI revision maintains the initial recommended concept configuration as much as possible while connecting the ramps with the new stack order on each of the four legs of the TI.
  - Second, the local access service TIs along SR 202L were also altered from what was initially assumed. As a result, changes to the system TI design were made to reflect this updated "existing" condition for the SR 30 project so that the original intent of the local access would be perpetuated in this design.
- In 2017, the Maricopa Association of Governments (MAG) added a new segment of freeway to the *Regional Transportation Plan*. This new freeway would be the extension of SR 30 from SR 202L to I-17 near the Durango Curve. While the original 2010 SR 30/SR 202L TI design had a provision for a future eastern leg, it was envisioned to connect with a future Avenida Rio Salado Parkway facility planned by the City of Phoenix. Because that connection would be to an arterial roadway, the system TI ramps for the eastern leg were planned as only single-lane ramps. However, since 2010, the City of Phoenix has concluded that this parkway is not feasible. Given MAG's decision to extend SR 30 to I-17, it was apparent that the east-side system TI ramps also needed to be dual-lane ramps, consistent with ADOT's policy to make all system TI ramps as dual-lane configurations. In addition to the lane configuration changes, the SR 30 eastern leg alignment was also realigned to swing more to the northeast in the direction of I-17—staying north of the Salt River, rather than crossing over the Salt River as the initial 2010 TI design had assumed.

As with the original 2010 TI configuration, this 2018 TI configuration incorporates the same local connections to adjacent service TIs and includes the opportunity to add future HOV ramps.

This 2018 TI design is recommended because it provides a new optimized design consistent with current site constraints, maximizes the future expansion opportunities with the least impact on existing traffic, handles the anticipated travel demand for approximately 20 years after opening, matches the current construction improvements along SR 202L, has support from project stakeholders, and minimizes environmental impacts in the study area.

The L/DCR and EA documents will fully evaluate and detail this new 2018 version of the SR 30/SR 202L system TI, and will compare the proposed SR 30 Recommended Build Alternative corridor between Sarival Avenue and SR 202L against the No-Build Alternative. Draft versions of these documents will present the results of this detailed assessment at a public hearing for review and comment, scheduled for late 2018.

Figures 8-1 to 8-4 show the layout of the proposed 2018 SR 30/SR 202L TI recommended concept in its full form. Figures 8-5 to 8-8 show the same layout with the proposed lane lines and signing included.

8.1 Overview of the ISR Addendum Recommended Concept

The SR 30/SR 202L system TI includes modifications to several surrounding elements, including elements within the system TI itself. The following sections summarize the mobility improvements included in the recommended concept.

8.1.1 Adjacent Service Traffic Interchanges

The 2018 ISR Addendum concept includes modifications expanding outward from the central system TI at SR 30 and SR 202L. To the west, the revisions extend to 75th Avenue, to the north they extend to Buckeye Road, to the south they extend to Dobbins Road, and to the east they extend to 51st Avenue. This addendum discusses the service TI on each leg of the system TI.

SR 30 Western Leg

- 75th Avenue – Neither the 2010 or the 2018 configurations include a service TI at 75th Avenue. This is proposed as a grade separation.
- 67th Avenue – The service TI is a traditional diamond configuration with ramp connections to and from SR 30. The ramps to and from SR 30 would not connect with SR 202L. The east-side 67th Avenue ramps are braided within the SR 30/SR 202L system TI, and would not be constructed until SR 30 is extended east of SR 202L toward I-17. The on-ramps include metering for traffic management during peak hours and single-lane parallel connections.

SR 30 Eastern Leg

- No service TIs are planned on the eastern leg within the immediate influence of the SR 30/SR 202L TI.

SR 202L Southern Leg

- Southern Avenue – This service TI is a tight diamond configuration with ramp connections to and from the collector-distributor road along SR 202L. The interchange also includes bridges outside the tight diamond to continue the collector-distributor road through the TI without stops at traffic signals. This unique collector-distributor road design keeps the weaving movements along the collector-distributor road north and south of Southern Avenue to a minimum for improved operations. The collector-distributor road and off-ramp connection in the southbound direction to Southern Avenue is designed to fit close to SR 202L to avoid private property impacts on the adjacent parcel.

- Baseline Road – The standard diamond TI at Baseline Road is the end of the collector-distributor system in both the northbound and southbound directions. The on ramp to southbound SR 202L is metered for traffic management capabilities.
- Dobbins Road – The SR 202L improvements to accommodate the SR 30 TI end within the Dobbins Road TI, retaining the standard diamond configuration proposed with the SR 202L project. The on and off ramps on the northern side of the TI are realigned to accommodate the 2018 ISR Addendum recommended concept.

SR 202L Northern Leg

- Broadway Road – The diamond configuration at this service TI being proposed with SR 202L would be modified with the SR 30 TI. To the south, the ramps connect with the proposed collector-distributor roadway system, becoming the northern terminus of the collector-distributor roadway system. To the north, the diamond ramps are removed and replaced with one-way access roads up to Lower Buckeye Road. These access roads are geometrically identical to frontage roads, but, unlike frontage roads, are fully access-controlled. System ramps and future HOV direct connection ramps all cross over Broadway Road on bridges. The HOV ramp, in particular, is still at level 3 when it crosses Broadway Road, necessitating coordination with the high-voltage power transmission line along Broadway Road for forward compatibility. An attempt has been made for the SR 202L design-build team to relocate this facility to accommodate this HOV ramp.
- Lower Buckeye Road – The diamond configuration at this service TI being proposed with SR 202L would be modified with the SR 30 TI. To the north, the diamond ramps remain intact, although they may require some modifications for the system ramp lane run outs. To the south, the diamond ramps are removed and replaced with one-way access roads up to Broadway Road. The on ramp to northbound SR 202L is metered to manage traffic at this location.
- Buckeye Road – The standard diamond TI is the northern terminus of the SR 30 TI improvements, with lane taper run outs for the 2018 ISR Addendum recommended concept.

8.1.2 System-to-system Ramps

The 2018 ISR Addendum recommended concept includes system-to-system ramps for all legs of the TI. Consistent with ADOT policy, each ramp is designed with two lanes.

The system TI ramps for the westbound-to-southbound and eastbound-to-northbound directions are on level 4, which is the highest level in the TI. The system ramps for right turns from one freeway to the other are all on level 2, transitioning from SR 202L on level 1 and SR 30 on level 2. The system ramps for the southbound-to-eastbound and northbound-to-westbound directions are on level 3, above the SR 30 main line. The system ramp connections do not allow access to the adjacent service TIs at 67th Avenue, Southern Avenue, or Broadway Road.

8.1.3 High-occupancy Vehicle Lanes

The 2018 ISR Addendum recommended concept provides three alternatives for direct HOV connections between SR 202L and SR 30:

1. Southbound SR 202L to westbound SR 30 coupled with eastbound SR 30 to northbound SR 202L
2. Northbound SR 202L to westbound SR 30 coupled with eastbound SR 30 to southbound SR 202L
3. Northbound SR 202L to eastbound SR 30 coupled with westbound SR 30 to southbound SR 202L

Of the three connections, numbers 1 and 3 could both be implemented together to provide dual direct HOV connections at the TI. However, if connection number 2 is constructed, it would be the only direct HOV connection that can be constructed at the TI. The concept does not include a potential direct HOV connection between the eastern leg of SR 30 and northern leg of SR 202L because demand for this HOV movement would be very low compared with the other three described above. The three connections listed above are deemed more important to minimizing delay and improving operations, safety, and connectivity on the overall highway system. The direct HOV connections exiting and entering SR 30 are required to split onto separate structures to cross over the future transit corridor in the SR 30 median. All direct HOV connection ramps are single-lane ramps (one lane in each direction) with parallel ramp gore designs.

8.1.4 Future Transit Corridor

The 2018 ISR Addendum recommended concept accommodates a future transit corridor in the median of SR 30 through the system TI. The transit mode and technology are unknown at this time, but the corridor has been designed to accommodate all modes up to and including intercity high-speed rail. Most other known transit modes could fit into a high-speed rail corridor, should one of those be selected instead. The entire SR 30 corridor is being designed with this provision, although for most of the SR 30 route, the transit corridor is along the south right of way line. However, as it approaches 75th Avenue, it crosses over eastbound SR 30 into the median of SR 30 to cross through the SR 30/SR 202L TI at the same level as SR 30. The future transit corridor is designed to include 23.5 feet of vertical clearance through the TI.

Figure 8-1. 2018 ISR Addendum recommended concept (1 of 4)

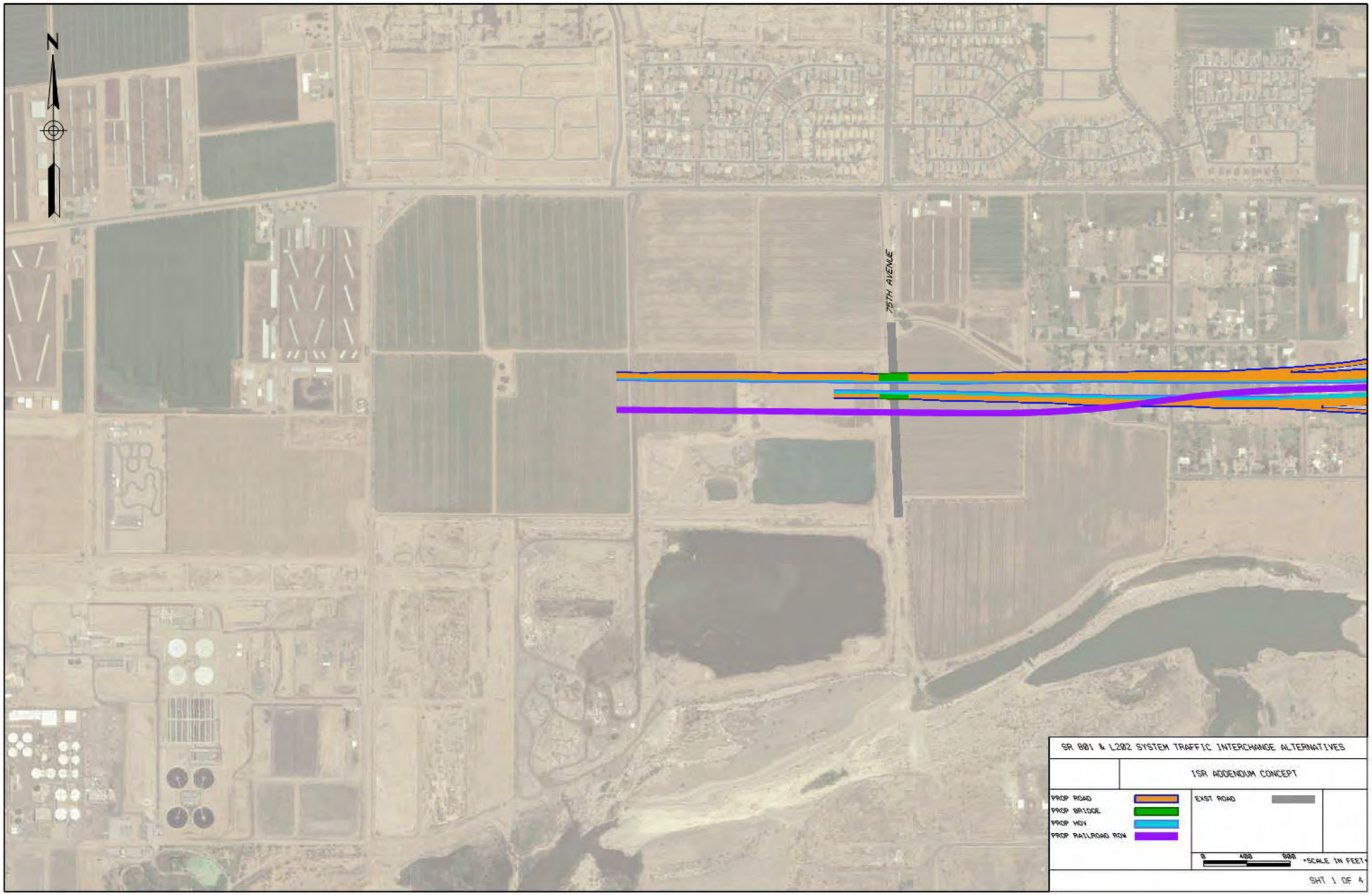


Figure 8-2. 2018 ISR Addendum recommended concept (2 of 4)

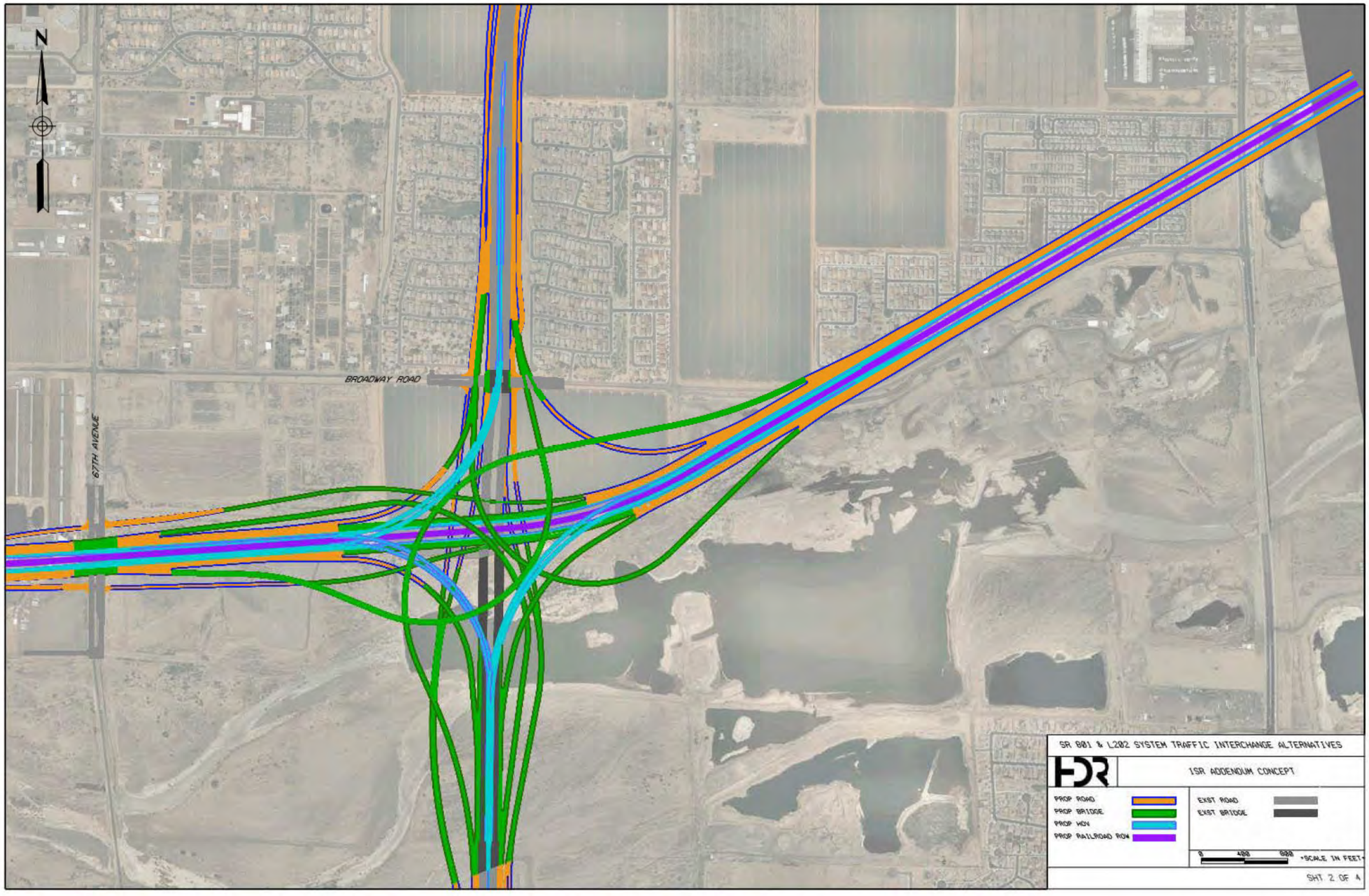


Figure 8-3. 2018 ISR Addendum recommended concept (3 of 4)

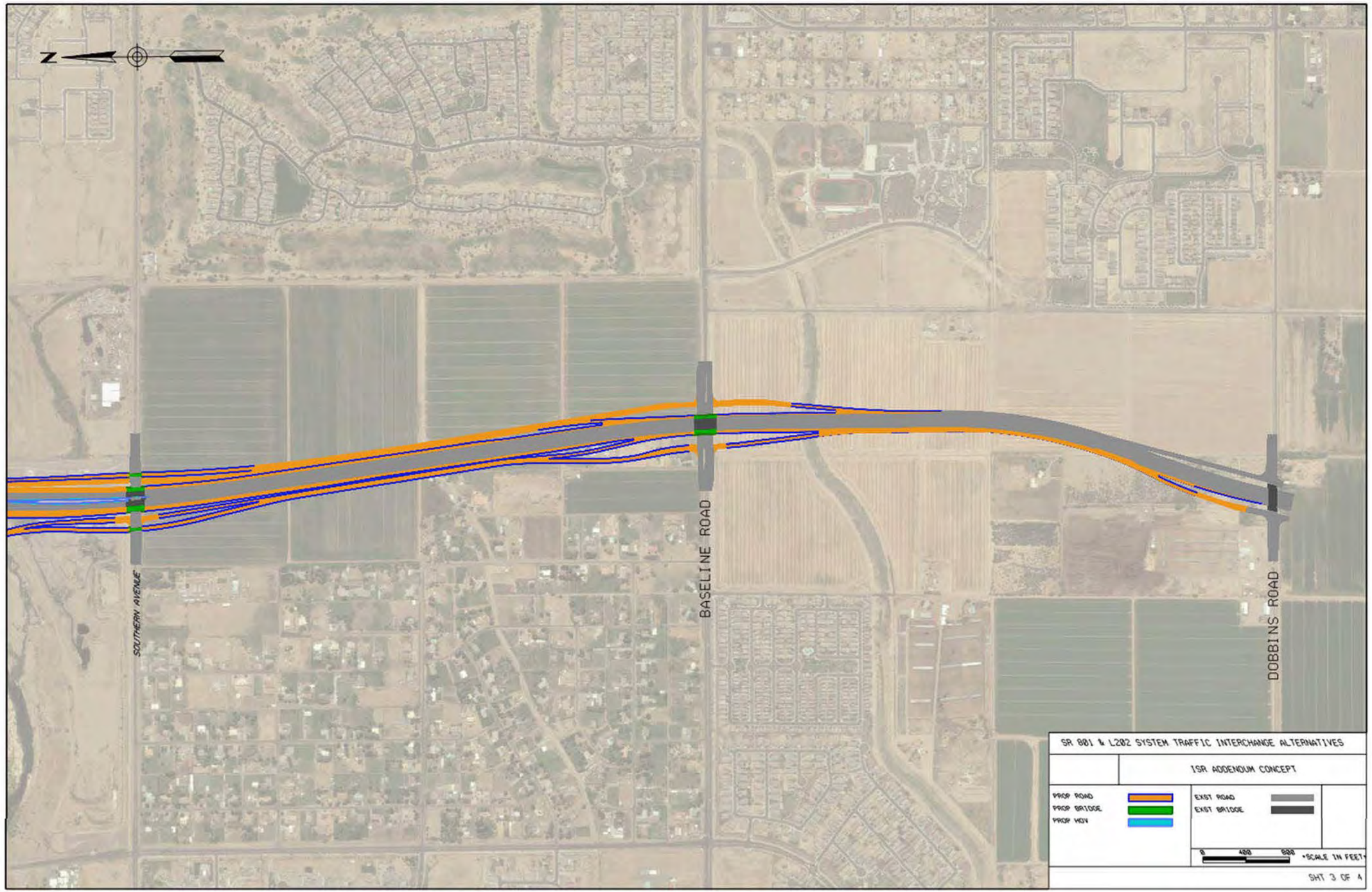


Figure 8-4. 2018 ISR Addendum recommended concept (4 of 4)

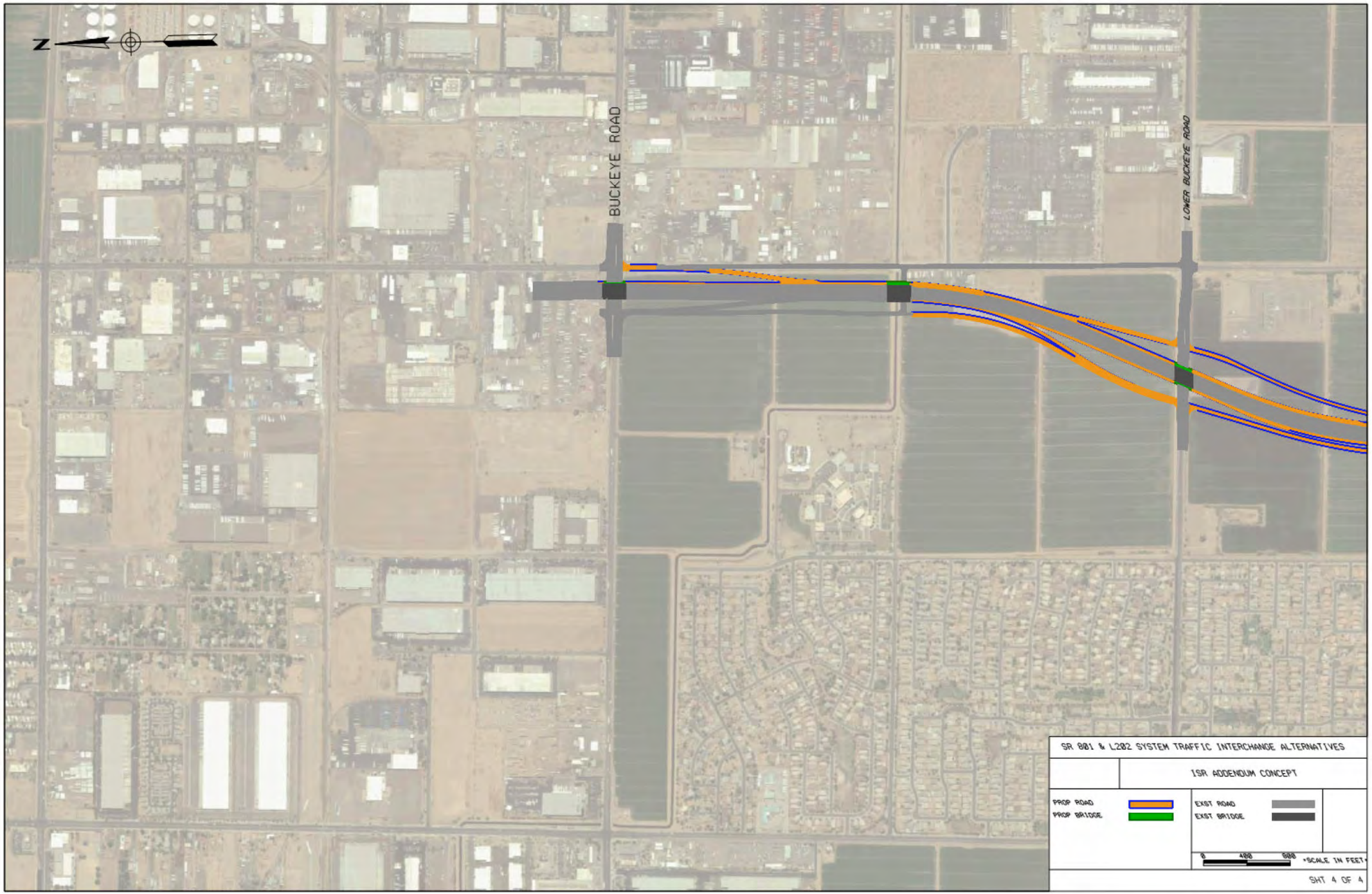


Figure 8-5. 2018 ISR Addendum recommended concept signing and striping (1 of 4)

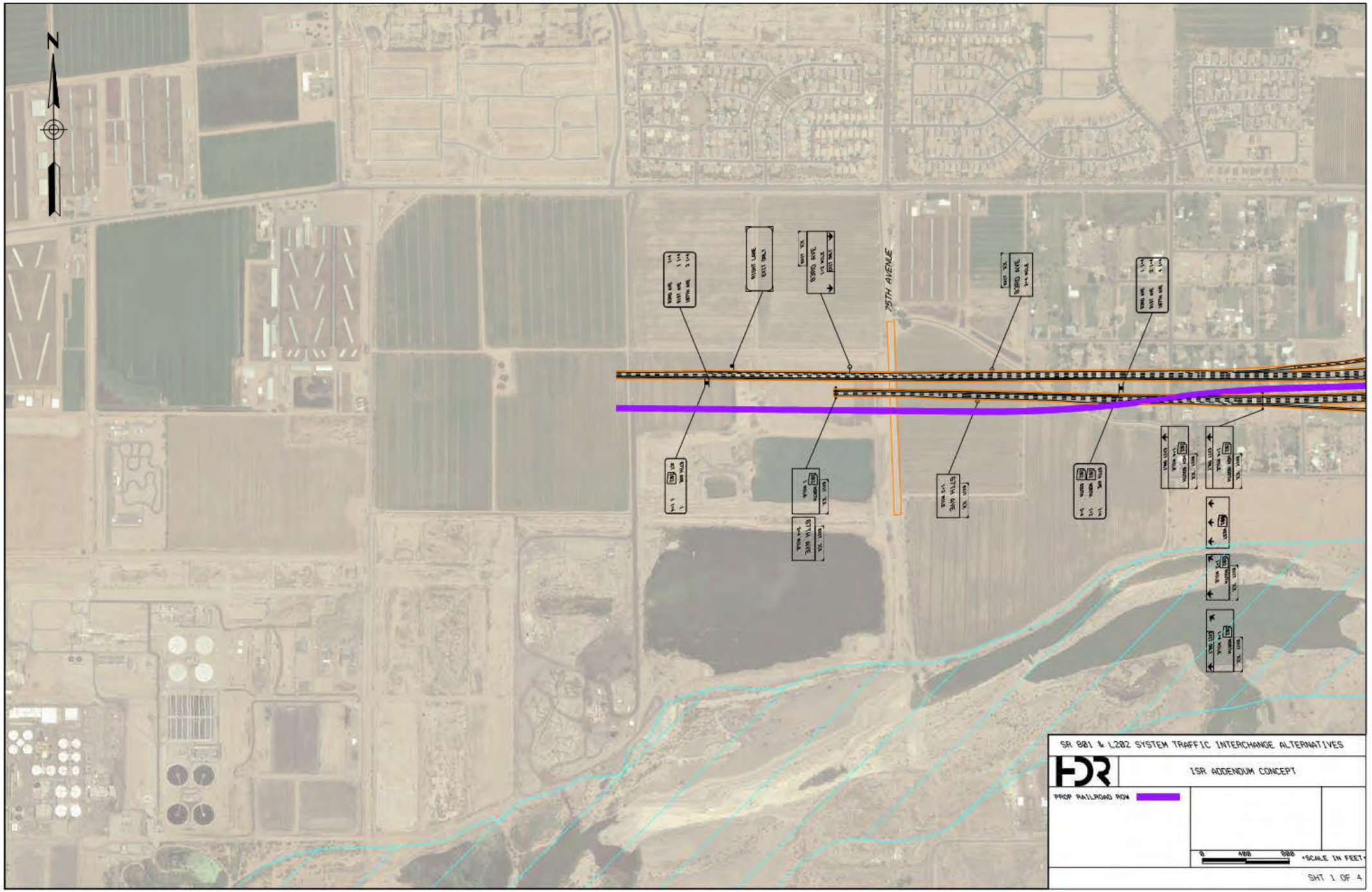


Figure 8-6. 2018 ISR Addendum recommended concept signing and striping (2 of 4)

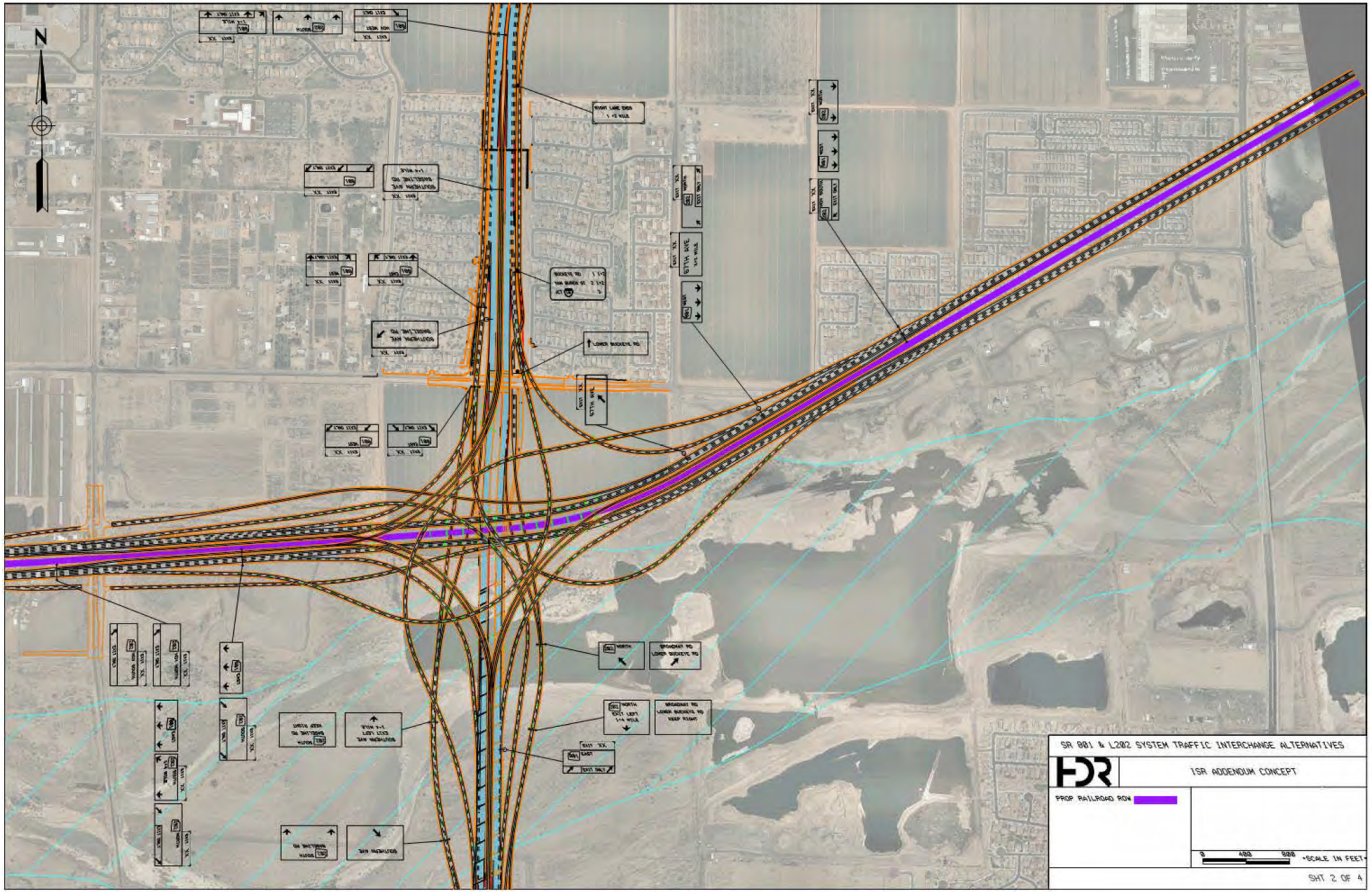


Figure 8-7. 2018 ISR Addendum recommended concept signing and striping (3 of 4)

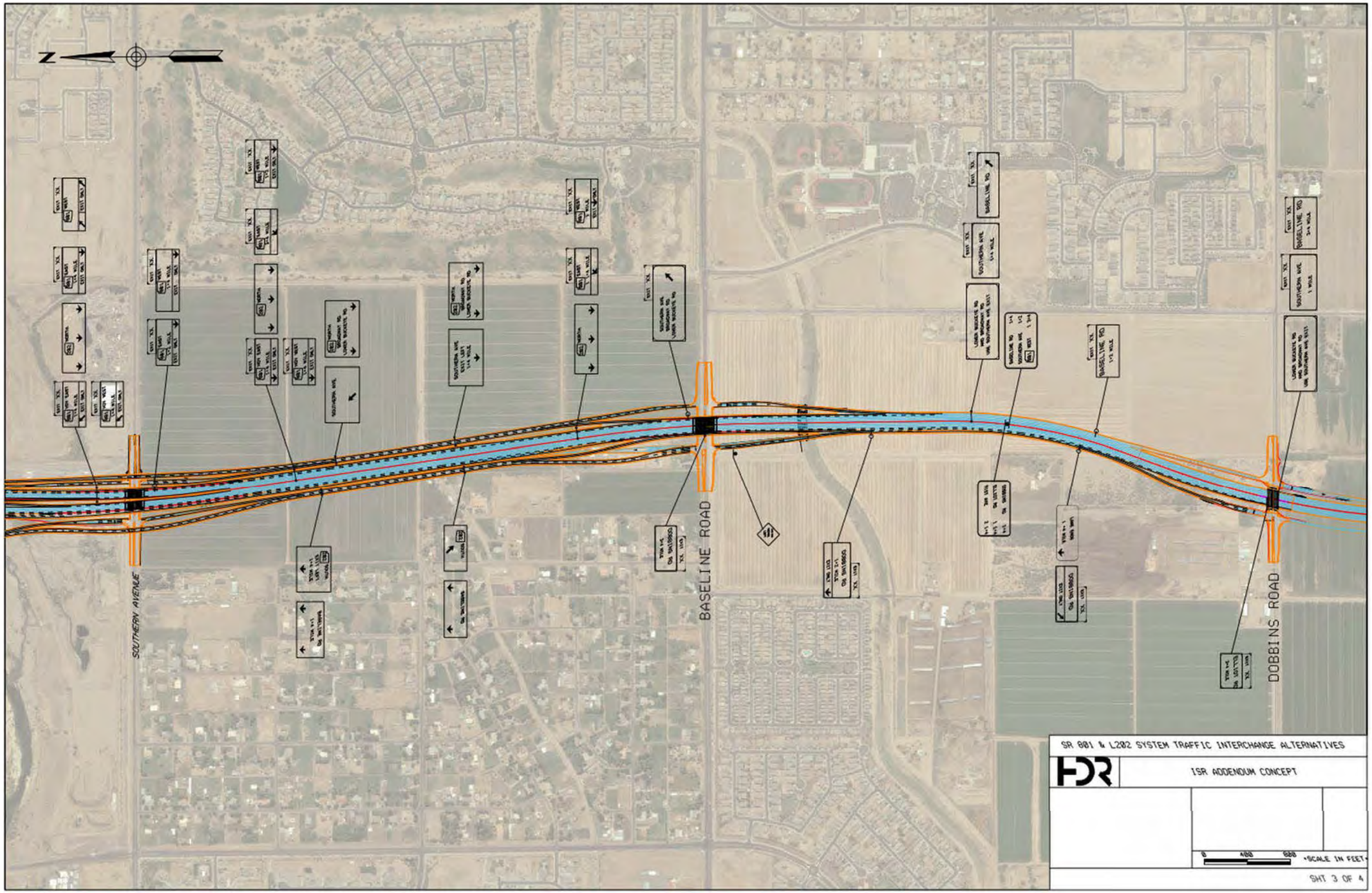
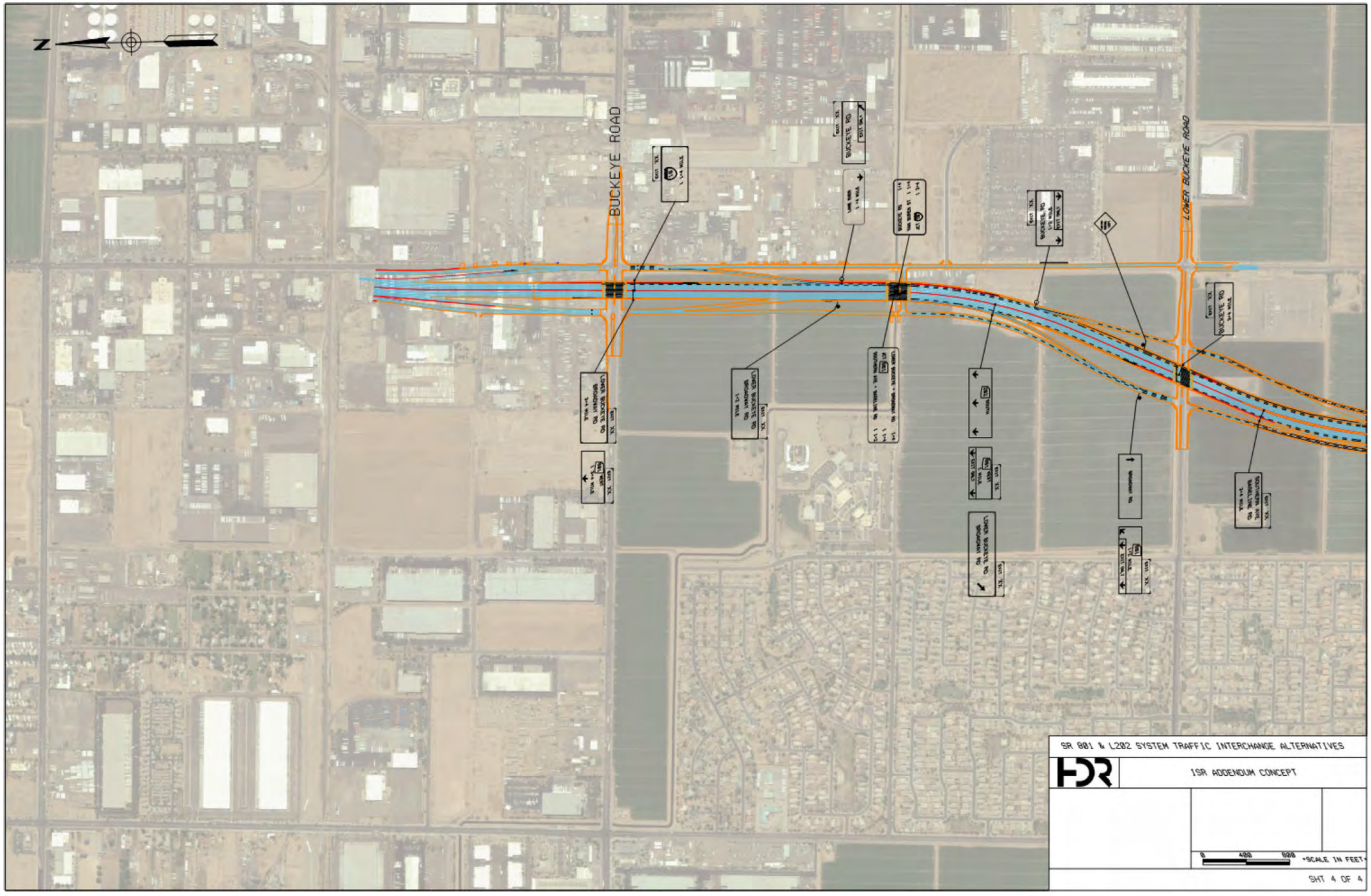


Figure 8-8. 2018 ISR Addendum recommended concept signing and striping (4 of 4)



Appendix A – Roadway Design Criteria Report

Final

Roadway Design Criteria

in support of the
Technical Studies to the
Environmental Document and Location/Design Concept Report

SR801, SR 303L to SR 202L
in Maricopa County, Arizona

Arizona Department of Transportation
Federal Highway Administration
in cooperation with
United States Army Corps of Engineers

May 2010
ADOT TRACS No. 801 MA 000 H6876 01L
FHWA Federal Aid Project No. NH-801-B(ARG)

Abstract: This document addresses the design criteria to be used for all roadway alternatives developed as part of the SR 801 Environmental Document and Location/Design Concept Report process. This version supersedes all previous versions.

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INTRODUCTION

The following information addresses the roadway design criteria to be used during all phases of the Environmental Documentation and Location/Design Concept Report processes for the planned SR801 freeway.

This version of the *Roadway Design Criteria Report* replaces the *Roadway Design Criteria Report* issued for this project in June 2006. It is being reissued to address specific details that have emerged as the SR 801 corridor has been developed.

FREEWAY DESIGN CRITERIA

As stated in the Scope of Service, *Section 300: Design Criteria*, the ultimate freeway facility will be designed in accordance with Arizona Department of Transportation (ADOT) through use of their *Roadway Design Guidelines* (2007) (ARDG), *"Interim" Auxiliary Lane Design Guidelines* (1996), and ADOT Standard Drawings (all with current revisions and updates), as well as *A Policy on Geometric Design of Highways and Streets* (Green Book) and *Roadside Design Guide* (RSDG), both published by the American Association of State Highway and Transportation Officials (AASHTO). Crossroads in the project corridor that are currently under the jurisdiction of Maricopa County, the City of Phoenix, the City of Avondale and the City of Goodyear will be designed using local jurisdiction's guidelines.

Any deviations from the policies or criteria mentioned above will be subject to approval by ADOT.

The following design criteria are proposed.

MAINLINE

We recommend the following criteria for determining whether the freeway mainline should go over the major arterials or whether the major arterials should go over the freeway. These criteria apply to both the interim six-lane freeway (Figure 1) and the anticipated ultimate ten-lane freeway (Figure 2).

- In urbanized, developed areas, or areas where plats and building permits have already been approved and issued, the freeway mainline should be carried over the arterial to reduce the cost of restricting access along these routes by allowing the arterial to remain at grade.
- In rural, undeveloped areas, the freeway mainline should remain at grade and the arterial should be carried over.

These criteria apply only in areas where the major arterial will remain continuous. Ultimately several factors, including environmental, political, earthwork, and other factors, will determine the type of grade separation.

The interim and ultimate bridge crossing the Agua Fria River is shown in Figures 3 and 4.

While the ultimate freeway criteria presented below allow for high occupancy vehicle lanes (HOV), they do not account for auxiliary lanes, frontage roads, or a collector-distributor system. The criteria for these elements are presented in the following sections.

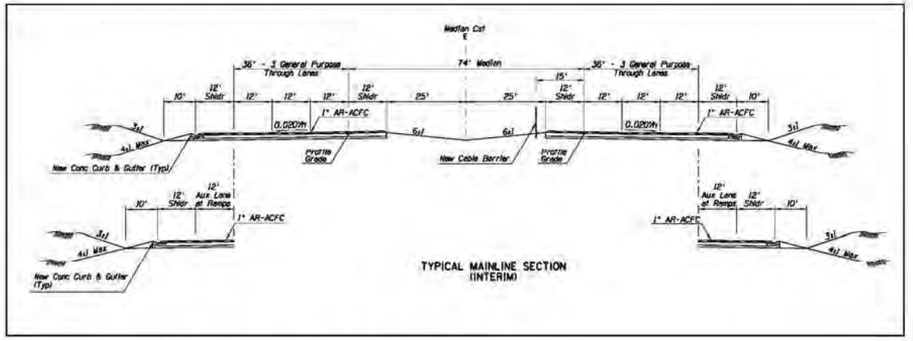


Figure 1 - Six-Lane Interim Freeway (3GP in each direction)

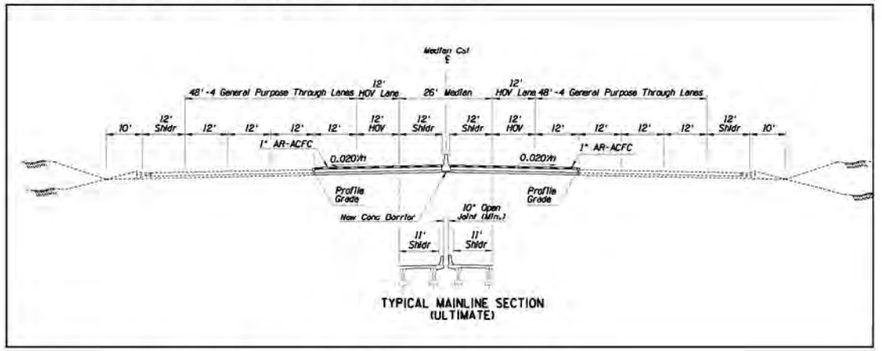


Figure 2 - Ten-Lane Ultimate Freeway (4GP + 1HOV in each direction)

Table 1 lists the freeway design criteria for the interim six-lane facility:

Table 1 - Six-Lane Interim Freeway Characteristics

Item Description	Interim Characteristic
Typical Section	ARDG Figure 306.4B (with median widened from 50' to 74')
Design Year	2030
Design Vehicle	WB-67
Design Speed	65 mph (Minimum)

Table 1 - Six-Lane Interim Freeway Characteristics (Continued)

Item Description	Interim Characteristic
Superelevation Table	0.06 ft/ft Max
Minimum Vertical Curve	800 ft
Maximum Gradient	3%
Maximum Angle Break	45 Minutes
Horizontal Curve	1° 45' 00" (Maximum Degree of Curvature), R = 3274 ft Min based on providing horizontal SSD around ultimate median barrier on a 3% downgrade, Min L = 975 ft (See RDG Section 203.5); (Spiral transitions will not be used.)
Median Width	74 ft
Half Roadway Width (Incl. Shldrs)	56 ft
Lane Width	12 ft
Median Shoulder Width	12 ft
Outside Shoulder Width	12 ft (no additional shy distanced added)
Recovery Area	Per ARDG
Cross Slope	0.02 ft/ft
Pavement Design Life	20 years
Barrier Type	Outside: Concrete (Per ADOT Construction Stds) Median: Use of Median Cable Barrier To Be Evaluated By ADOT for Interim
Curb and Gutter Type	Per ARDG if required
Access Control	Full
Right-of-Way	Minimum 10 ft outside toe of slope Desirable 20 ft outside toe of slope
Tapers (See Figures in ARDG)	50:1, To Drop Mainline Lanes Added By On-Ramp Lane (Fig 504.8A) Design Speed:1, To Drop Mainline Thru Lane or Shoulder 25:1, To Add Lane or Shoulder
Utilities	ADOT *Guide for Accommodating Utilities on Highway Rights-of-Way*
Lighting	Full Outside

Table 2 lists the freeway design criteria for the ultimate ten-lane facility:

Table 2 - Ten-Lane Ultimate Freeway Characteristics

Item Description	Ultimate Characteristic
Ultimate Typical Section	ARDG Figure 306.4B (modified to include HOV)
Median Width	26 ft
Half Roadway Width	88 ft
Median Shoulder Width	12 ft including on Agua Fria Bridge (11 ft on other bridges)
Barrier Type	Median: Concrete (Per ADOT Construction Standards)
Lighting	Median Mounted

*Note: Only criteria different from those in Table 1 are presented.

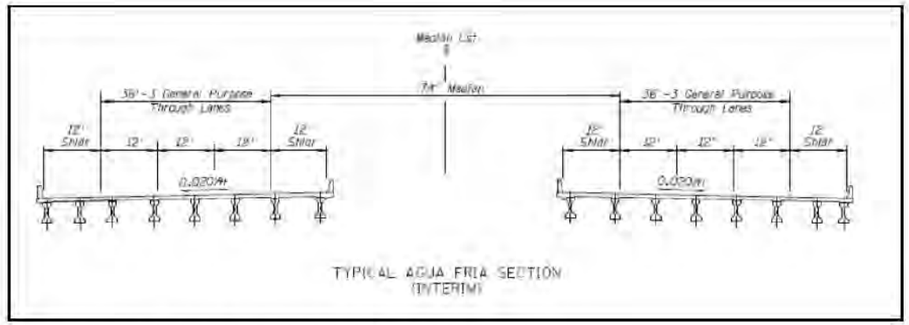


Figure 3 – Agua Fria Bridge Interim (3GP in each direction)

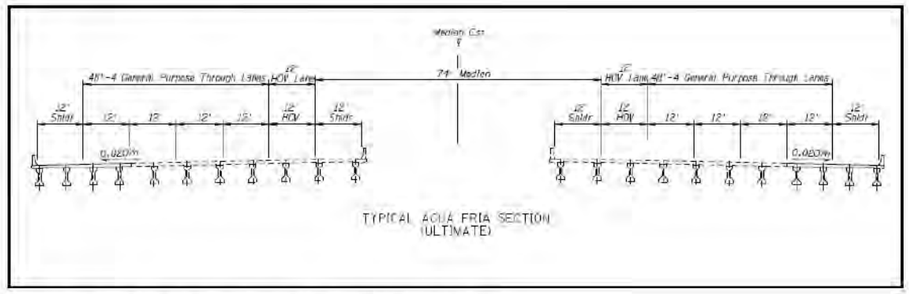


Figure 4 – Agua Fria Bridge Ultimate (4GP in each direction)

TRAFFIC INTERCHANGES & RAMPS

As stated in the ARDG, compact diamond interchanges are the most commonly used type of interchange for a freeway-to-arterial connection. Compact diamond interchanges require a minimal amount of right-of-way and function effectively with frontage roads. The following design criteria are proposed for locations where traffic projections indicate the need for an interchange. An illustration of the typical compact diamond interchange is shown in ARDG Figure 502.1 and discussed in Section 502.2. Typical sections for exit and entrance ramps are shown in Figure 5.

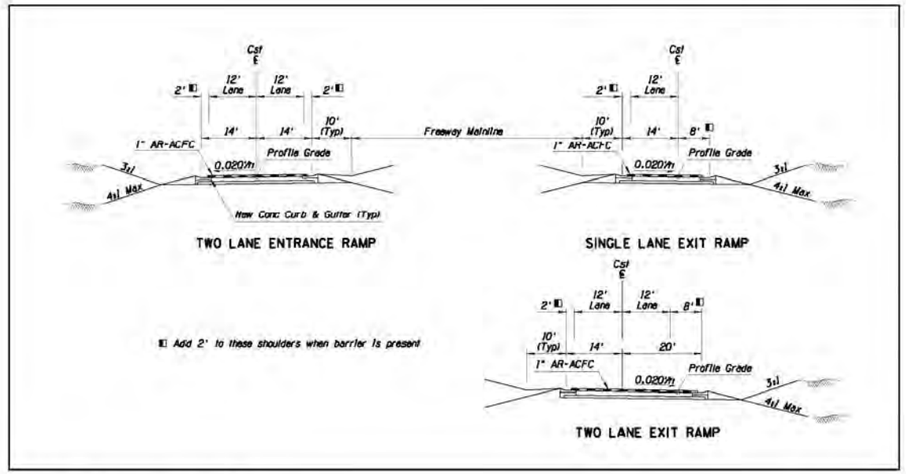


Figure 5 – Entrance and Exit Ramps

Table 3 lists the service ramp design criteria:

Table 3 – Entrance and Exit Ramps Characteristics

Item Description	Entrance Ramp Characteristics	Exit Ramp Characteristics
Design Vehicle	WB-67	WB-67
Design Speed	55 mph (Mainline Gore Area); 50 mph (CD Road Gore Area) 50 mph (Ramp Body) 35 mph (Intersection)	60 mph (Mainline Gore Area); 50 mph (CD Road Gore Area) 50 mph (Ramp Body) 35 mph (Intersection)
Superelevation Table	0.06ft/ft Max	0.06ft/ft Max
Maximum Gradient	4% up / 5% down	4% up / 5% down
Horizontal Curve: **Min H Curve L=300'** **(near intersections)** **Min H Curve L=500'** **(body of ramp)**	2° 00' (Max. Dc at Gore, 2% Breakover) 1° 23' (Des. Dc at Gore, 1% Breakover) 0° 50' (Des. Dc at Gore, 0% Breakover) 6° 53' (Max. Dc in Body) 18° 19' (Max. Dc at Intersection)	1° 41' (Max. Dc at Gore, 2% Breakover) 1° 15' (Des. Dc at Gore, 1% Breakover) 0° 43' (Des. Dc at Gore, 0% Breakover) 6° 53' (Max. Dc in Body) 18° 19' (Max. Dc at Intersection)
Roadway Width	28 ft (Ramp Body) w/ Ramp Meter Varies Through and Beyond Gore Per ARDG Fig 504.8b	22 ft Single Lane (Gore/Ramp Body) 34 ft Dual Lane Varies at Intersection per ARDG Fig 504.5
Lane Width	12 ft	12 ft
Number of Left-Turn Lanes at Intersection	—	Based on Traffic Analysis
Number of Right-Turn	—	Based on Traffic Analysis

Table 3 – Entrance and Exit Ramps Characteristics (Continued)

Item Description	Entrance Ramp Characteristics	Exit Ramp Characteristics
Lanes at Intersection		
Recovery Area	Per ARDG	Per ARDG
Pavement Design Life	20 years	20 years
Barrier Type	Concrete (Per ADOT Construction Stds)	Concrete (Per ADOT Construction Stds)
Curb and Gutter Type	Per ARDG if required	Per ARDG if required
Right-of-Way	20' Desirable From Toe of Slope 10' Min From Toe of Slope	20' Desirable From Toe of Slope 10' Min From Toe of Slope
Ramp VC Min L	400' Min, 200' Min at Intersection.	400' Min, 200' Min at Intersection.

Details of ramp geometry for entrance and exit ramps are presented in ARDG (2007) Figures 504.8A and 504.7, respectively. Sections 504.7 and 504.8A also state that all new or reconstructed exit and entrance ramps within the urban or urban fringe areas of Metropolitan Phoenix or Tucson shall be designed as parallel-type ramps except in the vicinity of a directional interchange where an analysis should be done to determine the preferred type. Two-lane exit and entrance ramps should be provided where indicated by capacity and traffic projections; otherwise standard one-lane ramps are sufficient. The number of dedicated left-turn, right-turn, and through-movement lanes will also be decided based on capacity analysis and traffic projections.

In keeping with ADOT practice on urban freeway systems, service interchanges can be provided along the SR801 at the major mile crossroads, but ideally are spaced at two miles. Physical constraints, environmental constraints, or a lack of traffic may also justify not providing a particular interchange.

AUXILIARY LANES

As stated in the ARDG Section 504.9, auxiliary lanes should be provided between entrance and exit ramps to facilitate the weaving movements of vehicles entering and exiting the freeway mainline. Auxiliary lanes will be assumed between every crossroad less than 1.5 miles apart and will be evaluated for operational effectiveness when the distance is greater than 1.5 miles.

Auxiliary lanes will be designed according to the ARDG and *"Interim" Auxiliary Lane Design Guidelines* (1996) using the same criteria presented for the freeway mainline. Auxiliary Lanes will be 12 feet wide.

FRONTAGE ROADS

As stated in the Section 104.3 of the ARDG, frontage roads are generally not constructed when the highway is on new alignment. However, frontage roads are sometimes provided along highways to replace local street circulation and property access lost by the construction of the

facility. Frontage roads may also be provided if the freeway would cause unreasonably circuitous travel. Frontage roads are typically justified by economic analysis that compares the cost of construction and right-of-way acquisition versus the cost of providing another feasible way to access frontage properties.

Section 309 of the ARDG is to be utilized in the event frontage roads are used. Typical sections are shown in Figures 309A and 309B of the ARDG as well. Figure 6 shows the assumed frontage road section.

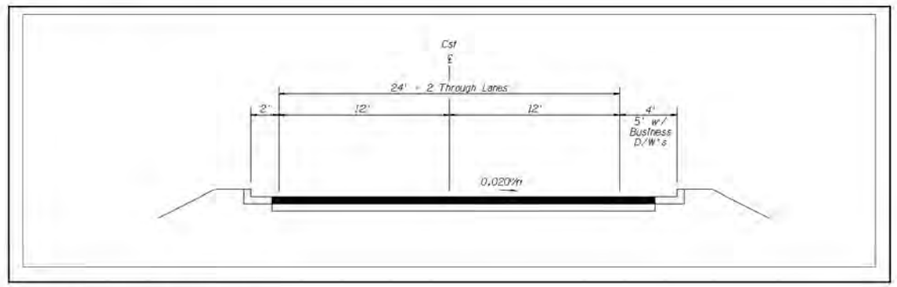


Figure 6 –Frontage Road Roadway

Table 4 lists the frontage road design criteria:

Table 4 – Frontage Road Characteristics

Item Description	Characteristics
Design Vehicle	WB-50
Design Speed	50 mph
Pavement Design Life	20 years
Drainage (Pavement)	Per ARDG or local government as required
Clear Zone Width	Per ARDG

Note: Inclusion of sidewalks, lighting, curb and gutter, and bike lanes are treated similarly to crossroads.

COLLECTOR-DISTRIBUTOR ROADS

The ARDG does not discuss collector-distributor (CD) roads; however, the AASHTO Green Book does provide some minimal guidance. In addition, ADOT has developed some CD road guidelines for the I-10 Corridor Improvement Study currently under development. Using the guidance developed for the I-10 Corridor Improvement Study, the following design criteria are presented for locations where CD roads are being considered (Figure 7).

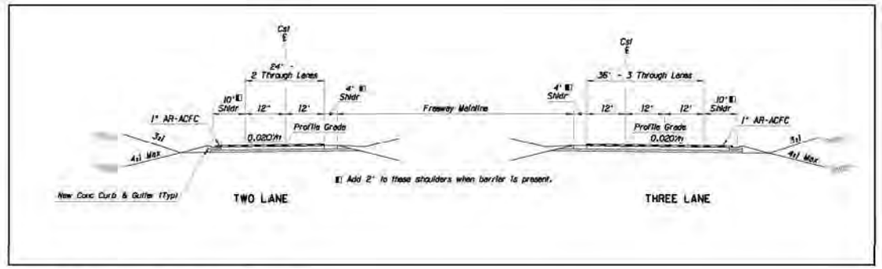


Figure 7 - Collector-Distributor Road

Table 5 lists the collector-distributor road design criteria:

Table 5 - Collector-Distributor Road Characteristics

Item Description	Characteristic
Design Vehicle	WB-67
Design Speed	10 mph less than the mainline speed
Superelevation Table	0.06 ft/ft Max
Minimum Vertical Curve	800 ft
Maximum Gradient	3%
Horizontal Curve	6° 53' 00" (Maximum Degree of Curvature)
Roadway Width	38 ft (2-Lane); 50 ft (3-Lane)
Lane Width	12 ft
Inside Shoulder Width	4 ft (6' with barrier)
Outside Shoulder Width	10 ft (12' with barrier)
Separation from Mainline	4' min (excluding shoulder widths) using 42" High Median Barrier
Recovery Area	Per ARDG
Cross Slope	0.02 ft/ft
Pavement Design Life	20 years
Barrier Type	Concrete (Per ADOT Construction Stds)
Curb and Gutter Type	Per ARDG if required
Access Control	Full
Right-of-Way	Desirable 20' From Toe of Slope, Min 10' From Toe of Slope
Tapers	50:1 (Drops for Ramp and Mainline Lanes) 25:1 (Add)
Utilities	ADOT *Guide for Accommodating Utilities on Highway Rights-of-Way*
Lighting	Full

HIGH OCCUPANCY VEHICLE LANES

As shown on the freeway typical sections, future HOV lanes will be provided for along the SR801 freeway. These lanes, if constructed, will be constructed as part of the future ultimate build out. No HOV buffer will be used on the SR801 freeway.

SYSTEM INTERCHANGES

As stated in the ARDG, fully directional interchanges provide maximums in convenience, efficiency, and safety. The following design criteria are proposed for locations where the SR801 freeway intersects another freeway facility. An illustration of the typical fully directional interchange is shown in ARDG Figure 502.1. A typical section of a directional ramp is shown in Figure 8 – Directional Ramps. As a practical mater for conceptual design, no less than two-lane directional ramps will be assumed when on structures.

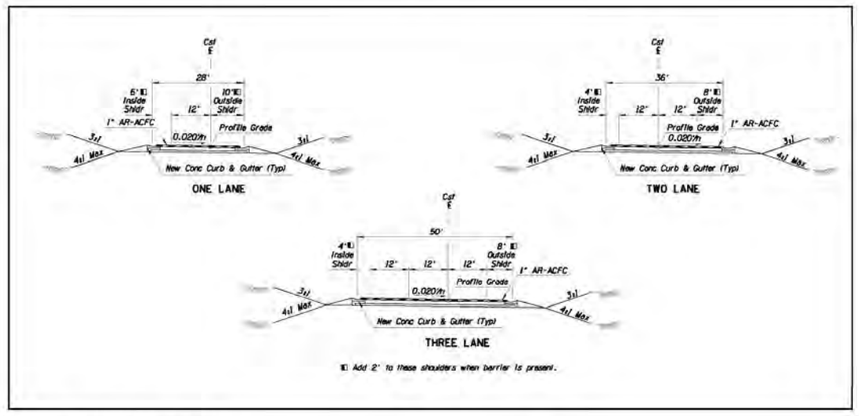


Figure 8 - Directional Ramps

Table 6 lists the directional ramp design criteria:

Table 6 - Directional Ramp Characteristics

Item Description	Directional Ramp Characteristics
Design Vehicle	WB-67
Design Speed	65 mph (Mainline Exit Gore Area) 55mph (Mainline Entrance Gore Area) 50 mph (CD Road Gore Area) 55 mph (Ramp Body) or 50 mph (if connecting to CD Roads)
Superelevation	0.06ft/ft (Maximum)
Maximum Gradient	4% up / 5% down

Table 6 - Directional Ramp Characteristics (Continued)

Item Description	Directional Ramp Characteristics
Horizontal Curve	5° 24' (Max. Degree of Curvature)
Roadway Width	28 ft (1 lane); 36 ft (2 lane); 50 ft (3 lane); Shy distance applies to 2 and 3 Lane options.
Lane Width	12 ft
Recovery Area	Per ARDG
Pavement Design Life	20 years
Barrier Type	Concrete (Per ADOT Construction Stds)
Curb and Gutter Type	Per ARDG if required

CROSSROADS

Because the SR801 freeway alignment will affect the continuity and capacity requirements of all major arterials it contacts, we propose the following design criteria for all major arterials. Table 7 lists the design criteria for the major arterial crossings:

Table 7 - Major Arterial Characteristics

Item Description	Cross Street – Principal Arterial Characteristics
Crossroad Typical Section	City of Phoenix Detail No. P1010 Section B City of Goodyear G-3120 & G-3122 City of Avondale Major Arterial Section
Design Vehicle	WB-50
Design Speed	50 mph (45 mph at interchanges)
Roadway Width	Varies by Jurisdiction and Classification
Number of Through Lanes	4 or 6 Lanes depending on City's General Plan
Assumed Number of Left-Turn Lanes at Interchange	Depends on traffic demand
Assumed Number of Right-Turn Lanes Prior to Interchange	1 lane
Bike Lane	Varies by Jurisdiction
Pavement Design Life	20 years
Drainage (Pavement)	10 years
Right-of-Way	Varies
Lane Width	Varies by Jurisdiction and Type
Clear Zone Width	1.5 ft from face of curb minimum, 6 ft desirable
Roadway Foreslope	3:1
Median	14 ft (4 ft on Interchange)
Curb and Gutter Type	MAG Std Detail 220 & 222 (ADOT curb within access control)
Control of Access	Per ADOT RDG Section 506 (minimum), but will strive for more per *ADOT Draft Access Control Model for Crossroads on Access Controlled Highways (2006).*

Note: Sidewalks will be replaced in kind but new sidewalks will not be added.

PROJECT AREA EARTHWORK

The discussion of earthwork in ARDG simply states that the profile grade line should fit but not follow the existing topography. The earthwork for a construction project should be balanced unless other design factors take precedence.

VERTICAL CLEARANCES

The ARDG states the following minimum vertical clearances.

- Structures over arterials: 16.5 feet (consider falsework provisions for future bridge widening over traffic)
- Structures over state highways: 16.5 feet
- Pedestrian overpasses: 17.5 feet
- Tunnels: 16 feet on state highways, 15.5 feet on other arterials
- Structures over rail: 23 feet from top of rail

SURFACING

All freeway pavement will be Portland cement concrete pavement (PCCP) except the inside shoulders of the interim freeway, which will be asphaltic concrete. Ramps, auxiliary lanes and CD roads will also be PCCP. The pavement surfaces of crossroads and frontage roads are typically determined by which jurisdiction will be maintaining it (local government or ADOT). Areas that will be maintained by ADOT will be paved with PCCP, and asphaltic concrete will be used for other areas. However, within the interchange, the crossroad will be paved with PCCP within the control of access limits.

With the implementation of the Quiet Pavement Program it is assumed that the application of Asphalt Rubber-Asphaltic Concrete Friction Course (AR-ACFC) on the freeway and ramp roadways will occur.

RIGHT-OF-WAY REQUIREMENTS

During the initial screening process used to reduce the number of alternatives considered, the following assumptions are to be used for right-of-way (R/W) widths. For all rights-of-way presented below, it is assumed that the maximum vertical shift in profile from grade would be 5 feet (up or down), not including areas where grade separations are anticipated. All system interchange movements were assumed to function as two-lane ramps. Table 8 presents the rights-of-way that were used in the screening.

Table 8 – Minimum Right-of-Way Requirements (Screening)

Roadway Configuration	Min. R/W Width
Six-Lane/Ten-Lane Freeway	300' without channel and 400' with channel
Freeway with Interchange	Varies (700'-800')
Freeway with CD Road System	400' without channel
Freeway with Frontage Roads	400' without channel

GLOSSARY

AASHTO	American Association of State Highway and Transportation Officials
ADOT	Arizona Department of Transportation
ARDG	ADOT Roadway Design Guidelines
CD	collector-distributor
CST	construction
EA	Environmental Assessment
FHWA	Federal Highway Administration
ft	feet
HOV	High Occupancy Vehicle
in.	inches
L/DCR	Location/Design Concept Report
MAG	Maricopa Association of Governments
mph	miles per hour
PCCP	Portland cement concrete pavement
PGL	profile grade line
RSDG	Roadside Design Guidelines (AASHTO)
R/W	right-of-way
ARDG	ADOT Roadway Design Guidelines
SR	State Route

Appendix B – Analysis for the Removal of the Southern Avenue Traffic Interchange on SR 202L

HDR | ONE COMPANY *Many Solutions™*

Draft Memo

To:	South Mountain and SR 801 East Project Teams		
From:	Brian Bombardier	Project:	SMF EIS & L/DCR and SR 801 East EA & L/DCR
CC:	Project Files		
Date:	October 22, 2009	Job No:	39220, 33114

RE: Analysis for the Removal of the Southern Avenue Traffic Interchange on SR 202L

Introduction

This memo was created in response to agency requests to analyze cost savings and compatibility issues with the State Route (SR) 801 connection associated with the potential elimination of the Southern Avenue traffic interchange (TI) from the SR 202L (South Mountain Freeway) planning documents. The following sections describe the benefits and impacts of this change on implementation strategies, traffic distribution and operations, right-of-way cost, and construction cost.

Figure 1. Preliminary SR 202L Traffic Interchange Locations

Location

Previous studies on the SR 202L project have preliminarily located a Southern Avenue traffic interchange west of 59th Avenue and south of the Salt River along the South Mountain Freeway (see Figure 1). It would be located 1 mile south of the Broadway Road traffic interchange and 1 mile north of the Baseline Road traffic interchange. Southern Avenue extends east of the proposed SR 202L for many miles, but ends 1.5 miles west of the proposed SR 202L where it intersects the Salt River. Current City of Phoenix planning documents do not indicate a Salt River crossing because Southern Avenue would run into the 91st Avenue Wastewater Treatment Plant.

The Southern Avenue traffic interchange has become a point of focus because of its relation to the future SR 801 freeway connection to SR 202L (System TI). At this time, the SR 801 would intersect the SR 202L along the north bank of the Salt River, about ¾ mile north of Southern Avenue. Southern Avenue's proximity to this

future system TI could be problematic from an operational perspective (ie: weaves, braided ramps, etc.) and expensive because of the Salt River bridges needed to make the complex connections.

Background

The original 1988 plan for the South Mountain Freeway showed a traffic interchange at Southern Avenue. Conversely, no interchange was proposed at Broadway Road. When the new SR 202L study began in 2001, interchanges were considered at all major arterials intersecting the freeway alignment. This allowed traffic projections and impacts to be analyzed considering the maximum possible footprint and allowed ADOT and local agencies flexibility in selecting which traffic interchanges would remain in the final plan.

Since the SR 801 study has identified a potential system TI location along the SR 202L, it has been concluded that the SR 202L service interchange locations should be reevaluated based on this new information. The reevaluation should include physical, cost and operational considerations as well as compatibility with a future system TI.

Scenarios

Five scenarios have been identified and developed that depict a range of alternatives for the SR 202L in the area of the future SR 801 connection. This area extends from Baseline Road to Lower Buckeye Road on the SR 202L and is the focus of this analysis. Each of the five scenarios is depicted on the following pages.

The scenario descriptions and figures use several terms that are defined as follows:

- Full Local Access = direct SR 202L access to Baseline, Southern, Broadway and Lower Buckeye Roads
- Reduced / Partial Local Access = direct SR 202L access to one or more of four crossroads is eliminated or altered
- Initial Construction = refers to the SR 202L construction project
- Ultimate Construction = refers to the SR 801 connection to SR 202L construction project

<u>Scenario A (Base Case):</u>

Scenario A (shown in Figure 2) represents the 2001 SR 202L study that considered interchanges at every mile arterial. Under this scenario, service interchanges would be constructed at Lower Buckeye, Broadway, Southern, and Baseline with auxiliary lanes between each. No provisions were made for a future SR 801 connection because the SR 801 study had not yet begun. Scenario A represents the base case assumed in the SR 202L documents currently under development and is the basis for cost comparisons made below and in Table 2.

Because access would be provided at every mile crossing, it was assumed that this condition would be perpetuated with the addition of the SR 801 connection. A connector road and slip ramp system would be required to maintain full local access while giving traffic priority to the system interchange movements. A pair of one-half mile-long river crossings between Southern Avenue and Broadway Road would be required. It should be noted that a portion of the auxiliary lanes over the river bridge between the Southern Avenue and Broadway Road ramps built with the initial SR 202L construction would revert to 24-foot wide right shoulders over the bridge when the SR 801 connection is made – in essence, a $5M temporary solution. The remainder of the auxiliary lanes would be reused for portions of the SR 801 system TI ramp runouts. This is because when SR 801 is constructed, the auxiliary lane users would be relocated to the new connector roadways on new bridges adjacent to the SR 202L bridges.

<u>Scenario B:</u>

Scenario B (shown in Figure 3) is a reduced access version of the base case in which the north side Southern Avenue ramps are removed. These two ramps represent a large cost both for the SR 202L and the SR 801 construction because of the proximity to the Salt River. Removing these two ramps would remove the need for the auxiliary lanes over the Salt River during the initial SR 202L construction, representing a $16M cost savings for the SR 202L over scenario A (see Table 2).

When the SR 801 connection is made, an additional cost benefit would be realized because access to the north side of Southern Avenue would not have to be maintained or replaced. In addition, connector roadways over the Salt River would not be needed; reducing the relative construction cost of the system TI compared to scenario A (see Table 3).

The addition of the system TI would impact the mile between Broadway and Lower Buckeye Road. The service ramps built with the initial SR 202L construction would have to be reconstructed into a connector road system and the auxiliary lanes would be converted to SR 801 ramp auxiliary lanes.

Scenario C:

Scenario C (shown in Figure 4) removes the south side ramps of the Southern Avenue interchange as well. This scenario is considered because it was observed that the south side ramps carry very little traffic (less than 20 vph) in the 2030 peak hour. Even though these ramps would not be unusually expensive; the low traffic volumes suggest that these ramps may not be cost effective. Eliminating the half diamond interchange saves an additional $15M over scenario B by eliminating two underutilized ramps. In addition, this scenario simplifies the SR 202L weaves between the SR 801 ramps and the Baseline Road ramps after the SR 801 connection is constructed.

Within the Broadway to Lower Buckeye section of SR 202L, the same alterations would be required as discussed in scenario B when the SR 801 interchange is constructed.

Scenario D:

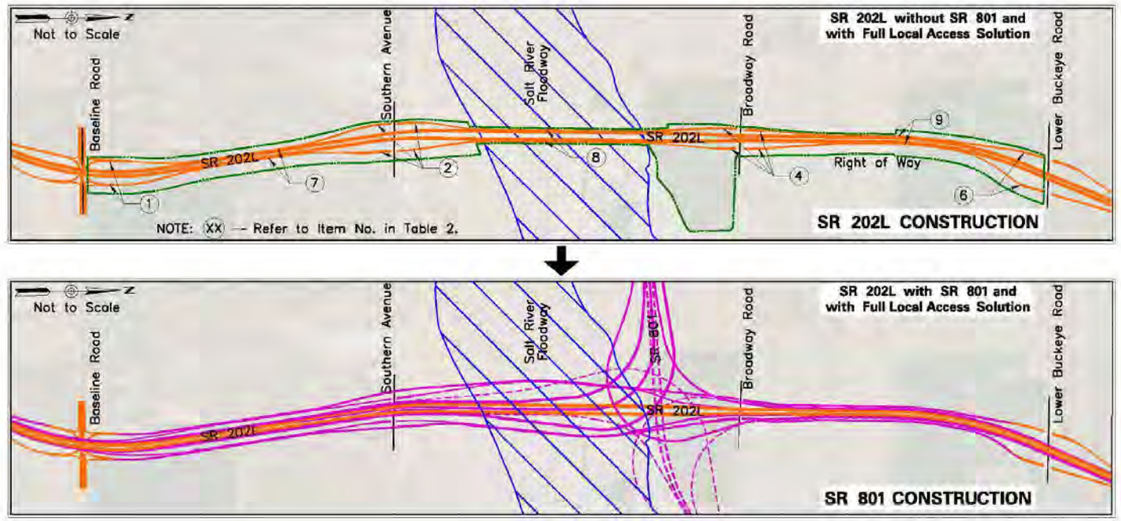
Scenario D (shown in Figure 5) would construct the ultimate partial local access solution along SR 202L shown in scenario C with the initial construction of the SR 202L. This concept includes building the interchange at Baseline Road, a grade separation at Southern Avenue, and a split diamond interchange between Broadway and Lower Buckeye Roads linked by connector roadways. This scenario simplifies the construction phasing and would save an additional $14M over scenario C because the at-grade connector roads would be cheaper than the four service ramps. This scenario is estimated to be the least costly solution for both the SR 202L construction and the SR 801 interchange construction (See Table 3), while avoiding major reconstruction or traffic impacts during the SR 801 construction.

Scenario E:

Scenario E (shown in Figure 6) constructs the ultimate local access solution along the SR 202L developed by the SR 801 project team in early 2009 and shown in scenario A with the initial SR 202L construction. This concept would construct full connector roadways between Baseline Road and Lower Buckeye Road with slip ramps connecting to the mainline just north of Baseline Road and just south of Broadway Road. In addition, an embedded diamond interchange between Southern Avenue and the connector roadway would be included.

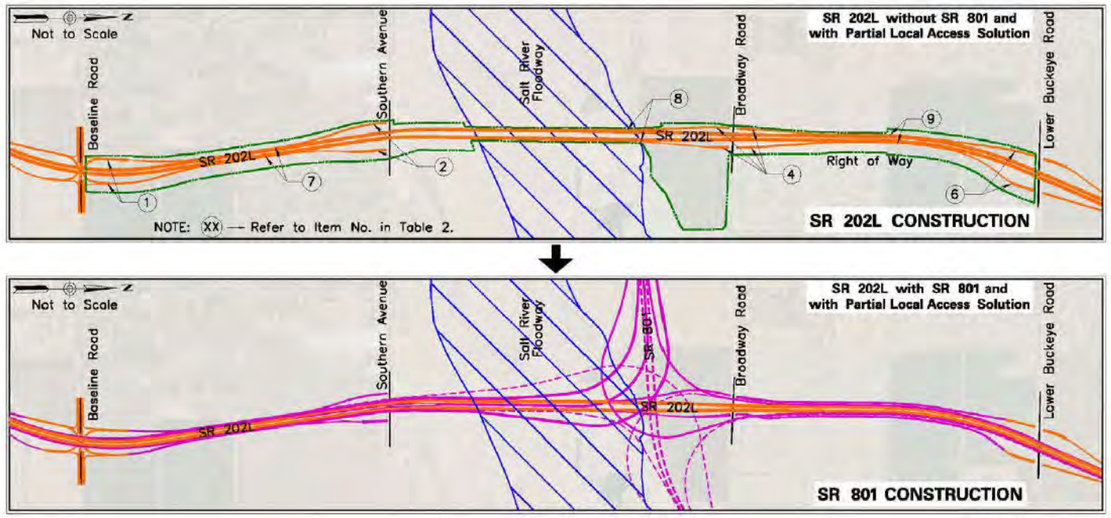
If full local access is ultimately required (ie: interchanges every mile along SR 202L), there would be operational and construction phasing advantages to constructing the ultimate local access solution with the initial SR 202L project. In this scenario, the local access solution would add $65M to the initial SR 202L base case project (scenario A). However, it would reduce the SR 801 cost and minimize impacts to traffic during the SR 801 construction. In addition, no temporary elements of work are needed.

Figure 2. Scenario A – Four Interchanges



SCENARIO A

Figure 3. Scenario B – Three and a half Interchanges

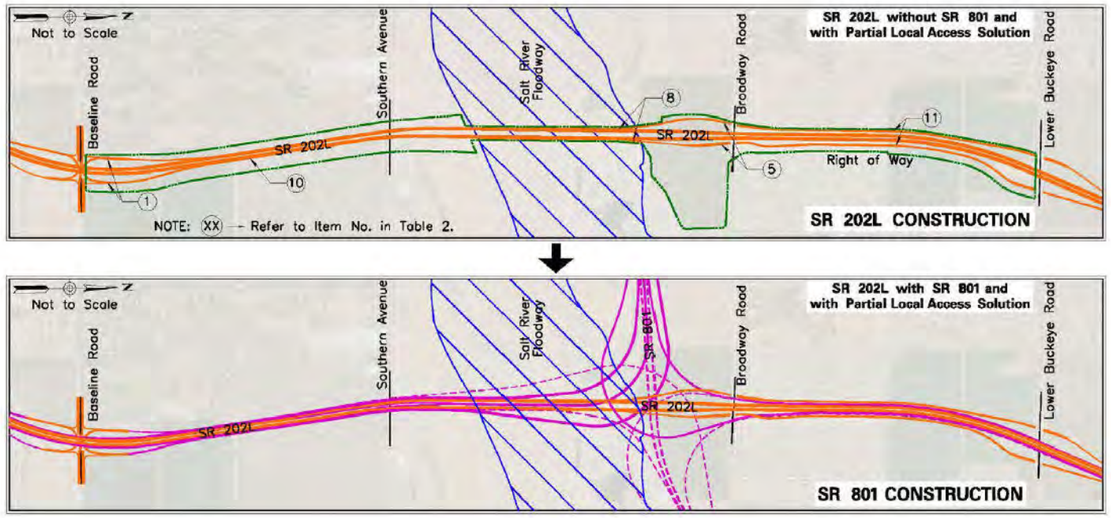


SCENARIO B

Figure 4. Scenario C – Three Interchanges

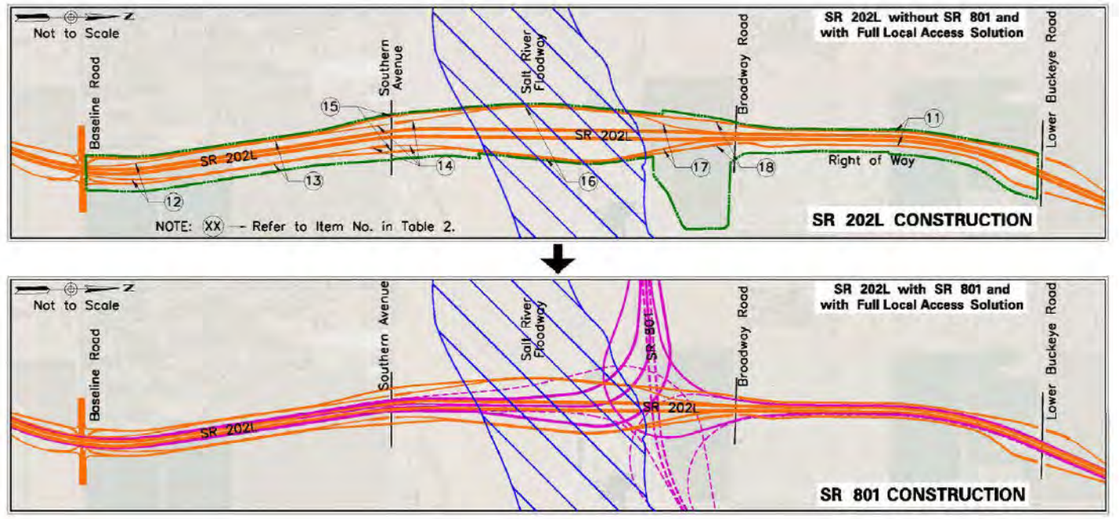
SCENARIO C

Figure 5. Scenario D – Partial Local Access



SCENARIO D

Figure 6. Scenario E – Full Local Access



SCENARIO E

Traffic Distribution and Operations

Service Interchanges

This discussion focuses on the service interchanges and does not address the SR 801 system interchange as those volumes are the same regardless of the scenario being evaluated. Figure 7 shows 2030 peak hour traffic volumes for three SR 202L local access solutions between Baseline Road and Lower Buckeye Road based on a 4+1 typical section on the SR 202L. (The 4+1 assumption was used for comparison consistency with prior MAG models runs for the SR 801 study and because the 4+1 volumes would be more conservative than the 3+1.) The top diagram depicts the SR 202L scenario A full local access concept with four interchanges with no provisions for the SR 801 (base case). The middle diagram depicts the reduced/partial local access solution shown in scenario D that avoids the river crossing components and accommodates the future SR 801 system TI. The bottom diagram depicts a full local access solution that accommodates SR 801 as shown in scenario E. Traffic distribution for scenarios B and C would be similar to scenario D.

Traffic projections from the Maricopa Association of Government's (MAG) regional travel demand model (2008 Emme2) were used to determine the traffic distribution in the three diagrams. [Note: The contents of this report reflect the analysis performed by HDR, who is responsible for the facts and accuracy of the data presented herein. The contents do not necessarily reflect the official views or policies of MAG and have not been approved or endorsed by MAG.]

All concepts appear to function within acceptable operational measures. Ramp volumes and weave lengths all fall within common ranges for similar service interchange ramps around the Phoenix area. Over the next couple of months, all scenarios will be thoroughly modeled, but we do not anticipate results that would differ substantially.

Operationally, all concepts appear to be viable solutions, and as a result, operational characteristics do not substantially differentiate the scenarios being evaluated.

Mainline

Generally speaking, the mainline functions better as the number of ramps accessing the mainline and weave sections decreases.

Table 1. Number of SR 202L Ramps and Weave Section between Baseline Road and Lower Buckeye Road by Scenario

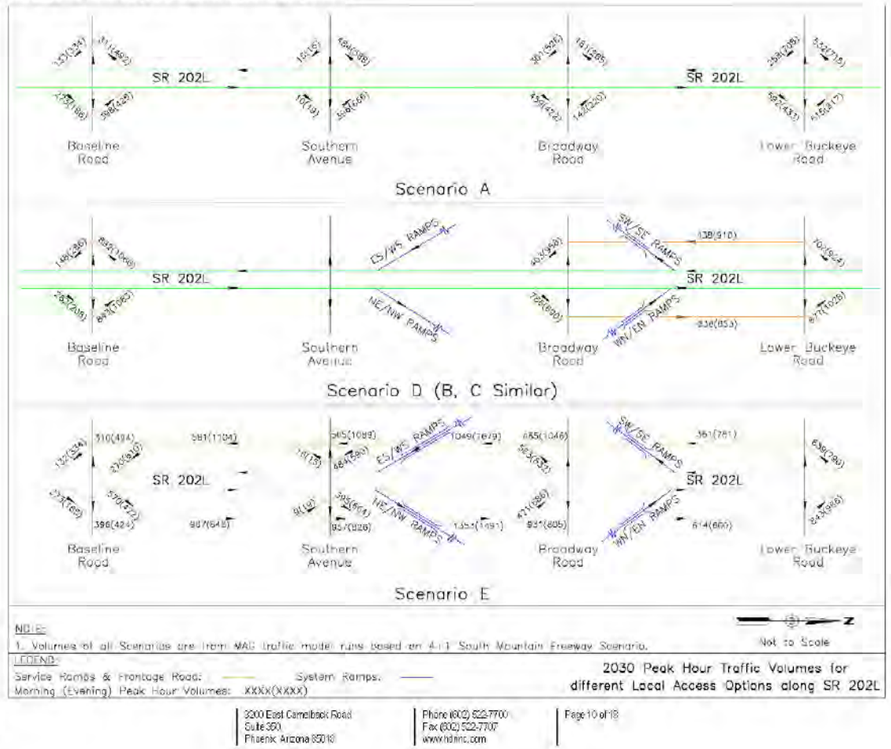
	No. of SR 202L Ramps	No. of SR 202L Weaves
Scenario A	12	6
Scenario B	10	4
Scenario C	8	2
Scenario D	4	0
Scenario E	4	0

Based on Table 1, scenarios D and E would offer the best mainline level of service, scenario A would offer the worst, and B and C fall somewhere in between.

Arterial Streets

With no interchange at Southern Avenue, volumes on Southern Avenue would decrease in the vicinity of the SR 202L. Because the MAG models indicate that this traffic would divert to the Baseline Road interchange, the traffic volumes on 67th Avenue, 59th Avenue, and Baseline Road would increase. Based on the MAG data received, the AADT's expected on these roadways would all be less than 31,000 vpd, which would result in LOS C or better even if the arterials were all only four lanes wide.

Figure 7. 2030 Peak Hour Traffic Volumes by Local Access Option along SR 202L



SR 202L Right-of-way Cost

Figures 2 through 6 show the initial SR 202L right-of-way needs for each of the five scenarios (shown with the green lines). The right-of-way costs were estimated and are tabulated in Table 2. Little difference exists in right-of-way costs between scenarios A through D; however, scenario E would incur approximately 25% more right-of-way cost than the other scenarios because the full local access connector road system requires more space. The right-of-way shown for scenarios D and E would be adequate for both the initial SR 202L and ultimate SR 801 construction phases. Scenarios A, B and C would require additional right-of-way along SR 202L when SR 801 is constructed.

Table 2. Estimated SR 202L Right-of-Way Costs between Baseline Road and Lower Buckeye Road by Scenario

	Estimated SR 202L Right-of-Way			
SR 202L Local Access Option	**Location**	**Quantity**	**Cost**	**SR 202L R/W Cost**
Scenario A*	Vacant Land	169 Ac.	$33,800,000	**$37,725,000**
	Salt River	18 Ac.	$2,700,000	
	Homes at Broadway Rd	7 Homes	$1,225,000	
Scenario B*	Vacant Land	164 Ac.	$32,800,000	**$36,575,000**
	Salt River	17 Ac.	$2,550,000	
	Homes at Broadway Rd	7 Homes	$1,225,000	
Scenario C*	Vacant Land	158 Ac.	$31,600,000	**$35,375,000**
	Salt River	17 Ac.	$2,550,000	
	Homes at Broadway Rd	7 Homes	$1,225,000	
Scenario D**	Vacant Land	169 Ac.	$33,800,000	**$37,575,000**
	Salt River	17 Ac.	$2,550,000	
	Homes at Broadway Rd	7 Homes	$1,225,000	
Scenario E**	Vacant Land	188 Ac.	$37,600,000	**$48,125,000**
	Salt River	62 Ac.	$9,300,000	
	Homes at Broadway Rd	7 Homes	$1,225,000	

*The right-of-way information shown for these scenarios is for the SR 202L phase of construction only. Additional right-of-way would be required for the SR 801 construction phase along the SR 202L.
**The right-of-way information shown for these scenarios is adequate for both the SR 202L and SR 801 construction phases. No additional right-of-way is required for the SR 801 construction phase along SR 202L.

Right-of-Way Cost Assumptions

Location	Unit Price
Vacant Land	$ 200,000 /Acre
Salt River	$ 150,000 /Acre
Homes at Broadway Rd	$ 175,000 /Home***

***Includes the land value, appraisal cost, and contingency for potential condemnation and legal expenses

SR 202L Construction Cost

The scenarios without the Southern Avenue traffic interchange (scenarios C and D) results in reduced construction cost for both the initial SR 202L construction as well as the future SR 801 project. The savings are attributed to:

- fewer bridges over the Salt River (including elimination of throw-away river bridge elements)
- less earthwork and pavement for ramps, Southern Avenue improvements, and auxiliary lanes
- shorter bridge and culvert structures across Southern Avenue
- less traffic infrastructure including signals and lighting

Table 3 shows the relative costs of major items of work for each of the initial SR 202L construction scenarios. Based on construction cost, scenario D is the lowest for both the initial SR 202L and future SR 801 connection.

Table 3. Initial SR 202L Local Access Construction Cost by Scenario

		South Mountain Freeway (SR 202L) Local Access Option				
Item No.	**Description**	**Scenario A**	**Scenario B**	**Scenario C**	**Scenario D**	**Scenario E**
		Construction Cost ($ Million)				
1	Baseline Road TI North Ramps only	$14	$14	$14	$14	-
2	Southern Avenue Diamond TI	$23	-	-	-	-
3	Southern Avenue TI South Ramps only	-	$12	-	-	-
4	Broadway Road Diamond TI	$23	$23	$23	-	-
5	Broadway Road TI South Ramps only	-	-	-	$12	-
6	Lower Buckeye Road TI South Ramps only	$12	$12	$12	-	-
7	Auxiliary Lane Between Baseline Rd and Southern Ave TIs	$5	$5	-	-	-
8	Bridge Area between Southern Ave and Broadway Rd TIs	$10*	$5	$5	$5	-
9	Auxiliary Lane Between Broadway Rd and Lower Buckeye Rd TIs	$5	$5	$5	-	-
10	Baseline Road TI Ramp Run out	-	-	$2	$2	-
11	Connector Roads between Broadway and Lower Buckeye Road	-	-	-	$14	$14
12	Slip Ramps North of Baseline Road	-	-	-	-	$14
13	Connector Road between Baseline Road and Salt River Bridges	-	-	-	-	$24
14	Southern Avenue Ramps with Retaining Walls	-	-	-	-	$28
15	Bridges on Connector Road at Southern Avenue	-	-	-	-	$3
16	Connector Road Bridges on Salt River	-	-	-	-	$48
17	Slip Ramps South of Broadway Road	-	-	-	-	$12
18	Connector Road between Salt River Bridges and Broadway Road	-	-	-	-	$14
	TOTAL COST =	**$92**	**$76**	**$61**	**$47**	**$157**
	Delta =	**Base**	**Base minus $16**	**Base minus $31**	**Base minus $45**	**Base plus $65**

*Approximately half of this work would be throw-away as the auxiliary lane over the Salt River Bridge would not be needed when the SR 801 TI was constructed.

Because the SR 801 TI configuration has not yet been fully detailed, only a qualitative comparison can be made. Table 4 illustrates the relative construction cost of both phases of construction (the initial SR 202L and the ultimate SR 801 TI) among the five scenarios. Scenario D is the least expensive solution for both the SR 202L and SR 801. Scenarios C and D eliminate the Southern Avenue interchange but include the Broadway Road interchange.

Table 4. Relative Construction Cost for Initial SR 202L and the Ultimate SR 801 Construction Phases

Corridor	Scenario A	Scenario B	Scenario C	Scenario D	Scenario E
Initial SR 202L	$$$$	$$$	$$	$	$$$$$
Ultimate SR 801 TI	$$$$$	$$$	$$	$	$

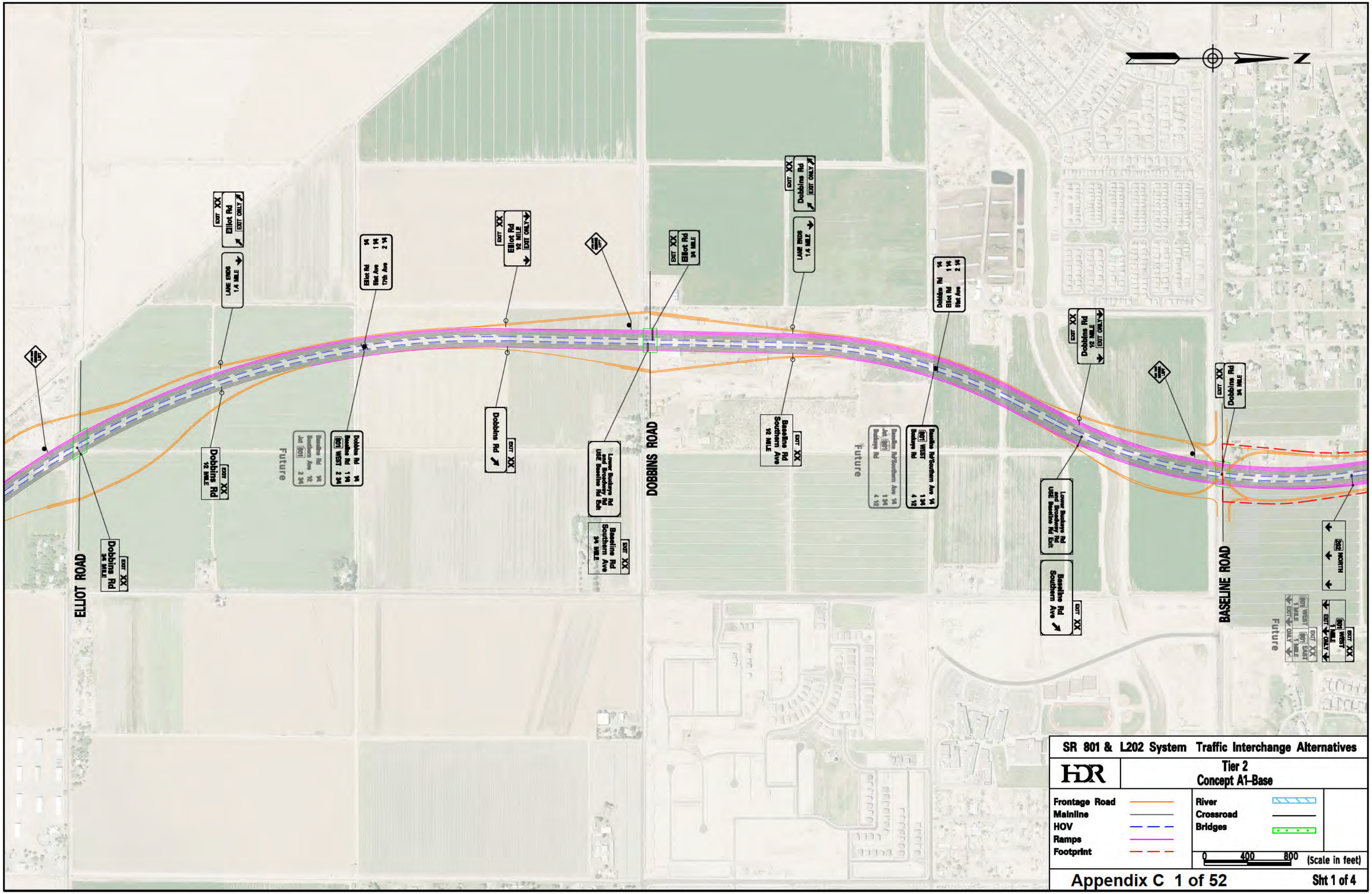
$ = Least Expensive; $$$$$ = Most Expensive

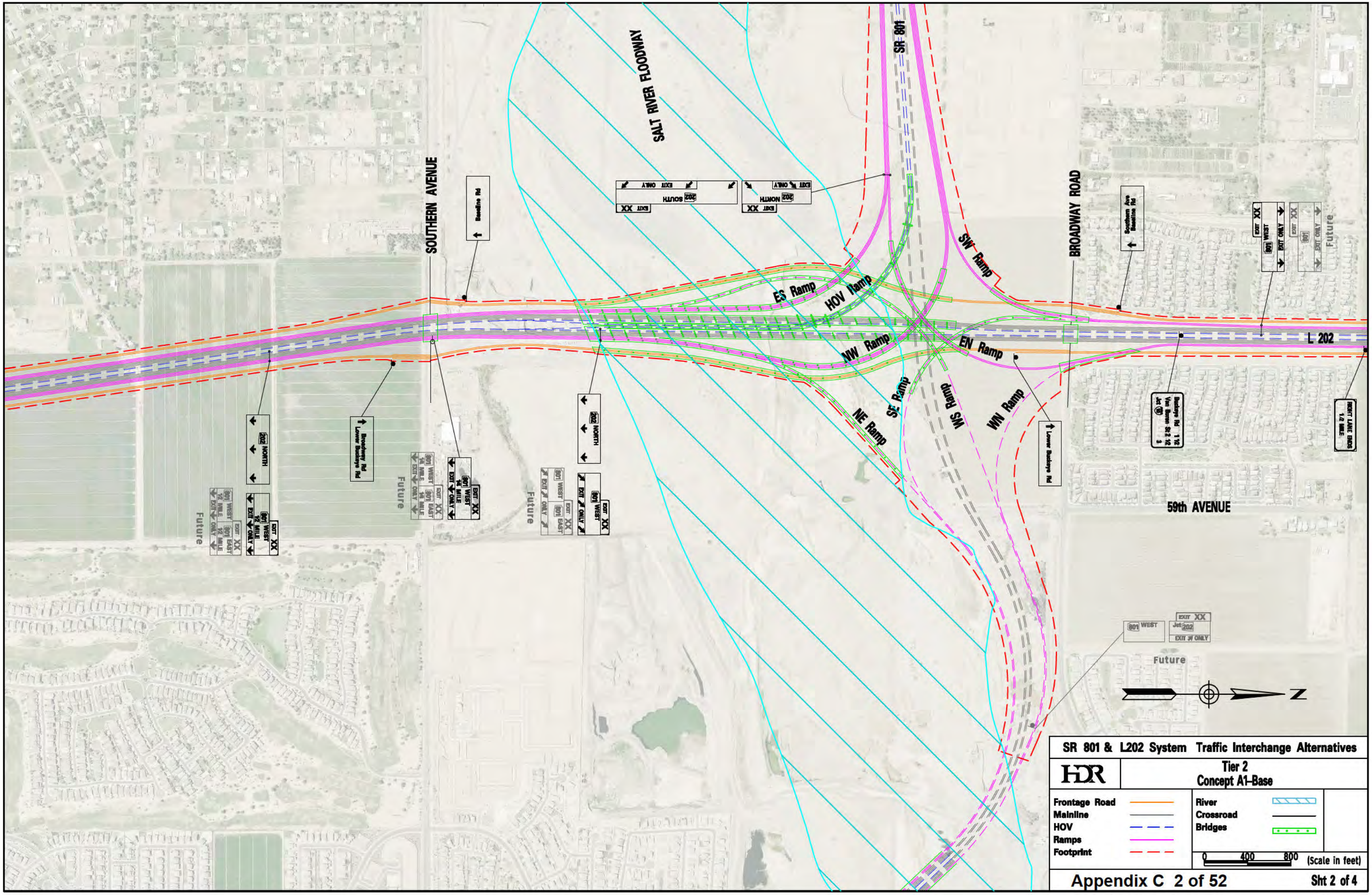
Table 5 below summarizes the features of each scenario evaluated.

Table 5. Scenario Comparison Summary

	Scenario A	Scenario B	Scenario C	Scenario D	Scenario E
Future SR 801 Compatibility	Worst	Good	Good	Best	Best
SR 202L Mainline Operations	Worst	Fair	Fair	Best	Best
Arterial Street Operations	Good	Fair	Fair	Fair	Good
SR 202L R/W Cost	$38M	$37M	$35M	$38M	$48M
Additional R/W Cost along SR 202L needed for SR 801	$10M	$3M	$3M	$0	$0
SR 202L Local Access Construction Cost	$92M	$76M	$61M	$47M	$157M
Relative SR 801 TI Construction Cost	$$$$$	$$$	$$	$	$
Total Cost Ranking (1=Best)	4	3	2	1	4

Appendix C –Tier 2 Concepts


N
ELLIOT ROAD
DOBBINS ROAD
BASELINE ROAD
Future
Future
Future
EXIT XX
Elliot Rd
EXIT ONLY
LANE ENDS
1/4 MILE
Elliot Rd
1/2 MILE
EXIT ONLY
Elliot Rd
3/4 MILE
EXIT ONLY
Dobbins Rd
EXIT ONLY
Dobbins Rd
1/2 MILE
EXIT ONLY
Dobbins Rd
3/4 MILE
EXIT ONLY
Baseline Rd
Southern Ave
1/2 MILE
EXIT XX
Baseline Rd
Southern Ave
3/4 MILE
EXIT XX
Baseline Rd
Southern Ave
EXIT XX
Lower Buckeye Rd
and Broadway Rd
USE Baseline Rd Exit
NORTH
801 WEST
1 MILE
EXIT ONLY
EXIT XX
801 WEST
EXIT ONLY
EXIT XX
801 EAST
EXIT ONLY
EXIT XX
SR 801 & L202 System Traffic Interchange Alternatives
HDR
Tier 2
Concept A1-Base
Frontage Road
Mainline
HOV
Ramps
Footprint
River
Crossroad
Bridges
0 400 800
(Scale in feet)
Appendix C 1 of 52
Sht 1 of 4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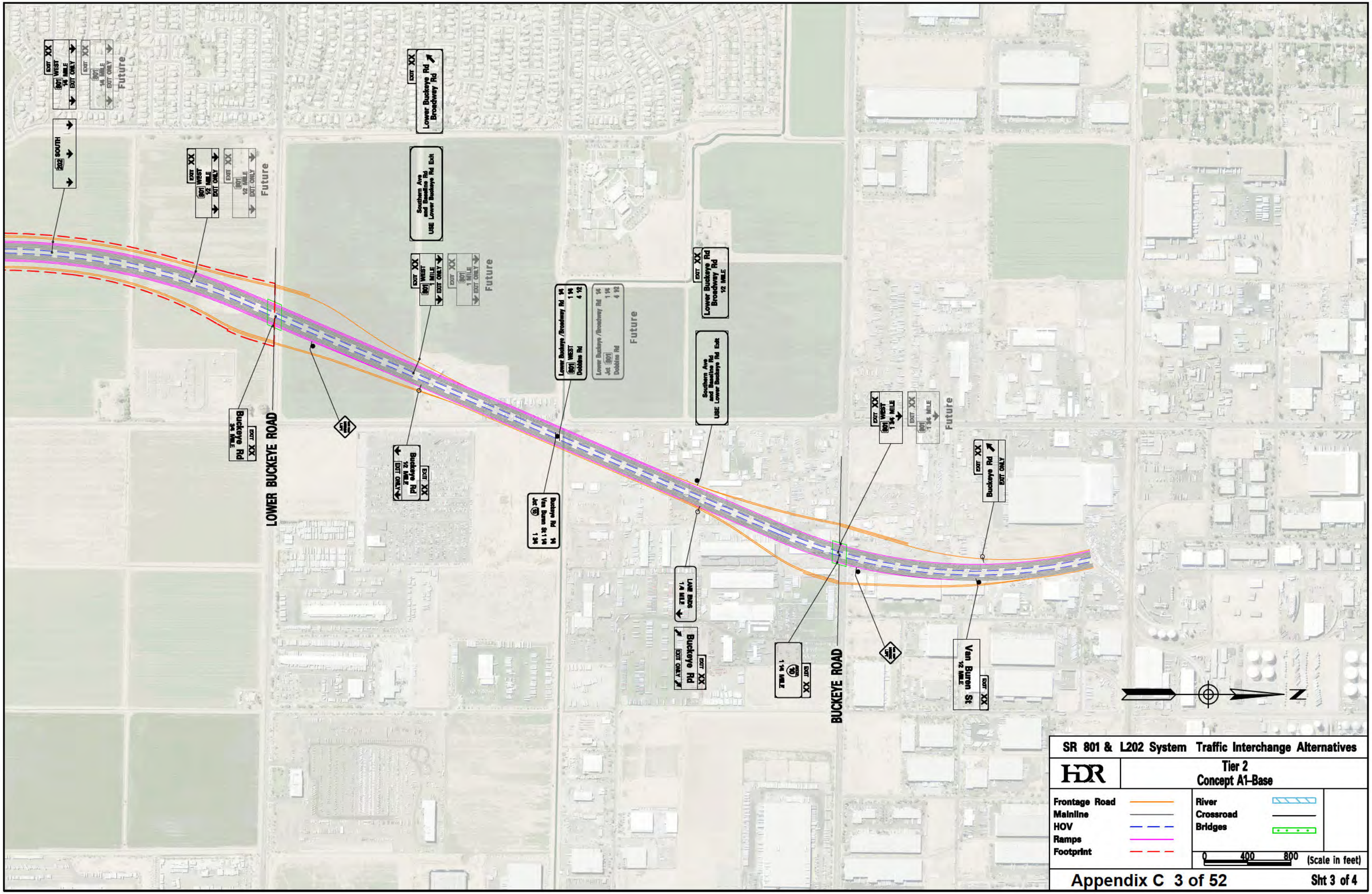
SR 801
SOUTHERN AVENUE
BROADWAY ROAD
59th AVENUE
Baseline Rd
Southern Ave
Broadway Rd
Lower Buckeye Rd
Buckeye Rd
L 202
SW Ramp
ES Ramp
HOV Ramp
NW Ramp
EN Ramp
NE Ramp
SE Ramp
WS Ramp
WN Ramp
202 NORTH
202 SOUTH
801 WEST
801 EAST
EXIT XX
EXIT ONLY
Future
RIGHT LANE ENDS 1/2 MILE
SR 801 & L202 System Traffic Interchange Alternatives
HDR
Tier 2
Concept A1-Base
Frontage Road
Mainline
HOV
Ramps
Footprint
River
Crossroad
Bridges
0 400 800 (Scale in feet)
Appendix C 2 of 52
Sht 2 of 4


LOWER BUCKEYE ROAD
BUCKEYE ROAD
Future
Southern Ave and Baseline Rd USE Lower Buckeye Rd Exit
Lower Buckeye Rd Broadway Rd
Lower Buckeye Rd Broadway Rd 1/2 MILE
Lower Buckeye /Broadway Rd 1/4 Jct Dobbins Rd
Buckeye Rd 1/2 MILE
Buckeye Rd 3/4 MILE
Buckeye Rd 1 MILE
Buckeye Rd 1/4 MILE
Van Buren St 1/2 MILE
SOUTH
WEST 1/4 MILE
WEST 1/2 MILE
WEST 1 MILE
WEST 1 1/4 MILE
WEST 1 3/4 MILE
1/4 MILE
1/2 MILE
1 MILE
1 1/4 MILE
1 3/4 MILE
EXIT ONLY
EXIT XX
Buckeye Rd 3/4 MILE
Buckeye Rd 1 MILE
Buckeye Rd 1/4 MILE
Van Buren St 1/2 MILE
Buckeye Rd 1/2 MILE
Buckeye Rd 1 1/4 Van Buren St 1/4
Lower Buckeye /Broadway Rd 1/4 Jct Dobbins Rd
Lower Buckeye /Broadway Rd 1/4 Dobbins Rd
Southern Ave and Baseline Rd USE Lower Buckeye Rd Exit
Lower Buckeye Rd Broadway Rd 1/2 MILE
Lower Buckeye /Broadway Rd 1/4 Dobbins Rd
LAMB RADS 1/4 MILE
Buckeye Rd
1/4 MILE
Van Buren St 1/2 MILE
Buckeye Rd
N
SR 801 & L202 System Traffic Interchange Alternatives
HDR
Tier 2
Concept A1-Base
Frontage Road
Mainline
HOV
Ramps
Footprint
River
Crossroad
Bridges
0 400 800 (Scale in feet)
Appendix C 3 of 52
Sht 3 of 4

SALT RIVER FLOODWAY

SR 801

75th AVENUE

67th AVENUE

RIGHT LANE EXIT ONLY

83rd Ave 1/2 MILE EXIT ONLY

83rd Ave 3/4 MILE

67th Ave 3/4 MILE

67th Ave 1/2 MILE

67th Ave

Future

83rd Ave 1 1/4
91st Ave 2 1/4
107th Ave 4 1/4

N

SR 801 & L202 System Traffic Interchange Alternatives

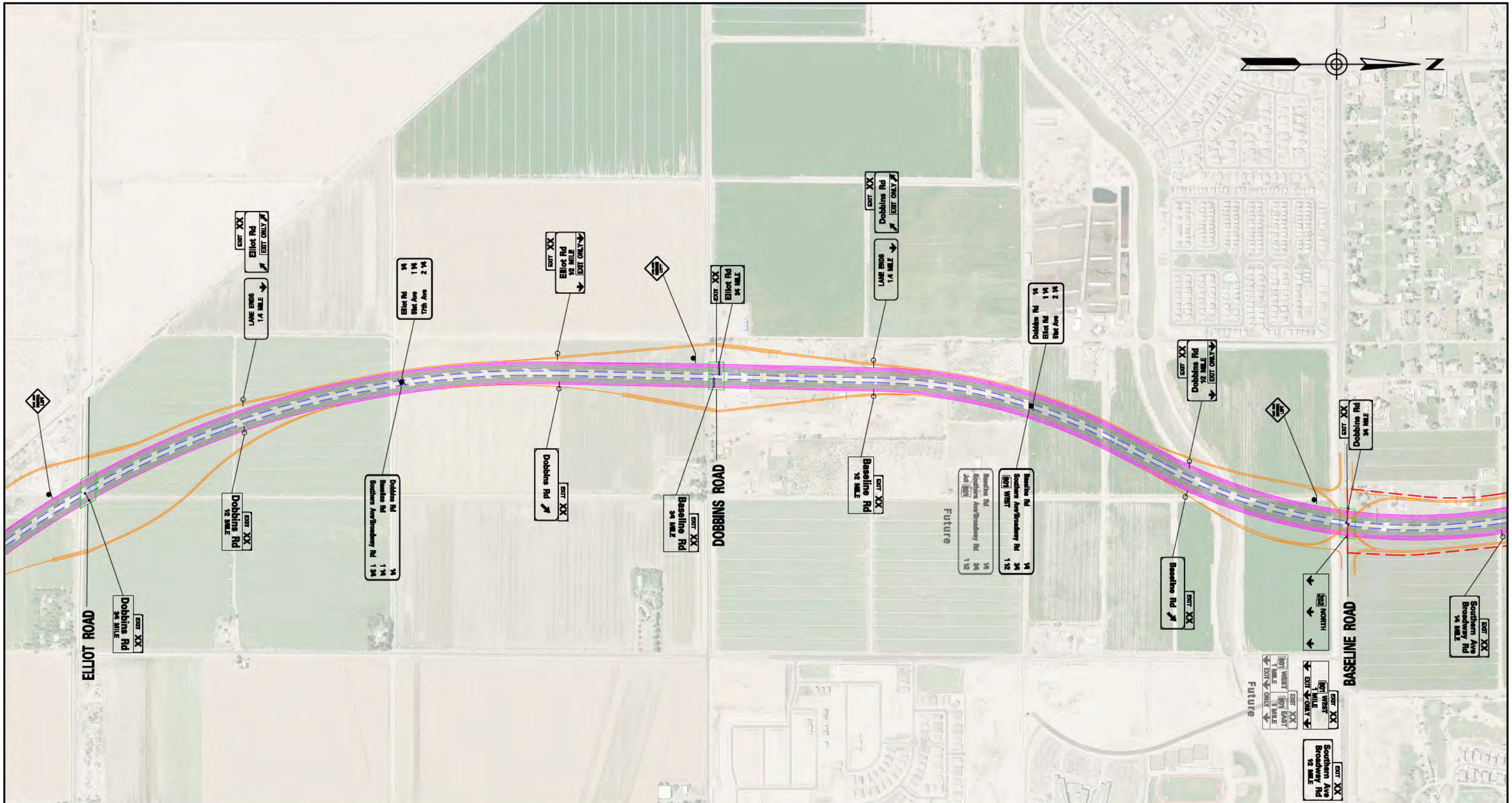
HDR

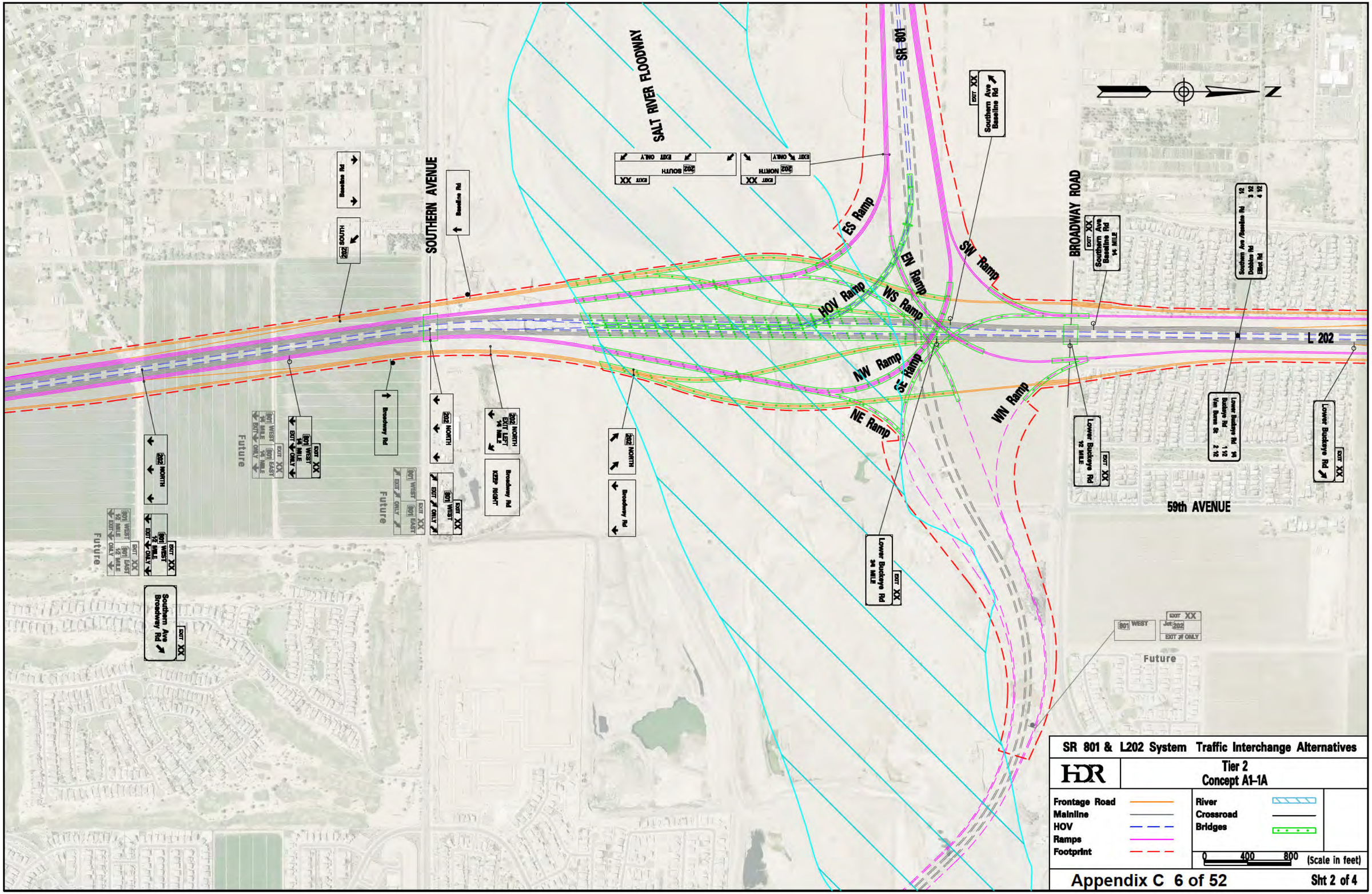
Tier 2
Concept A1-Base

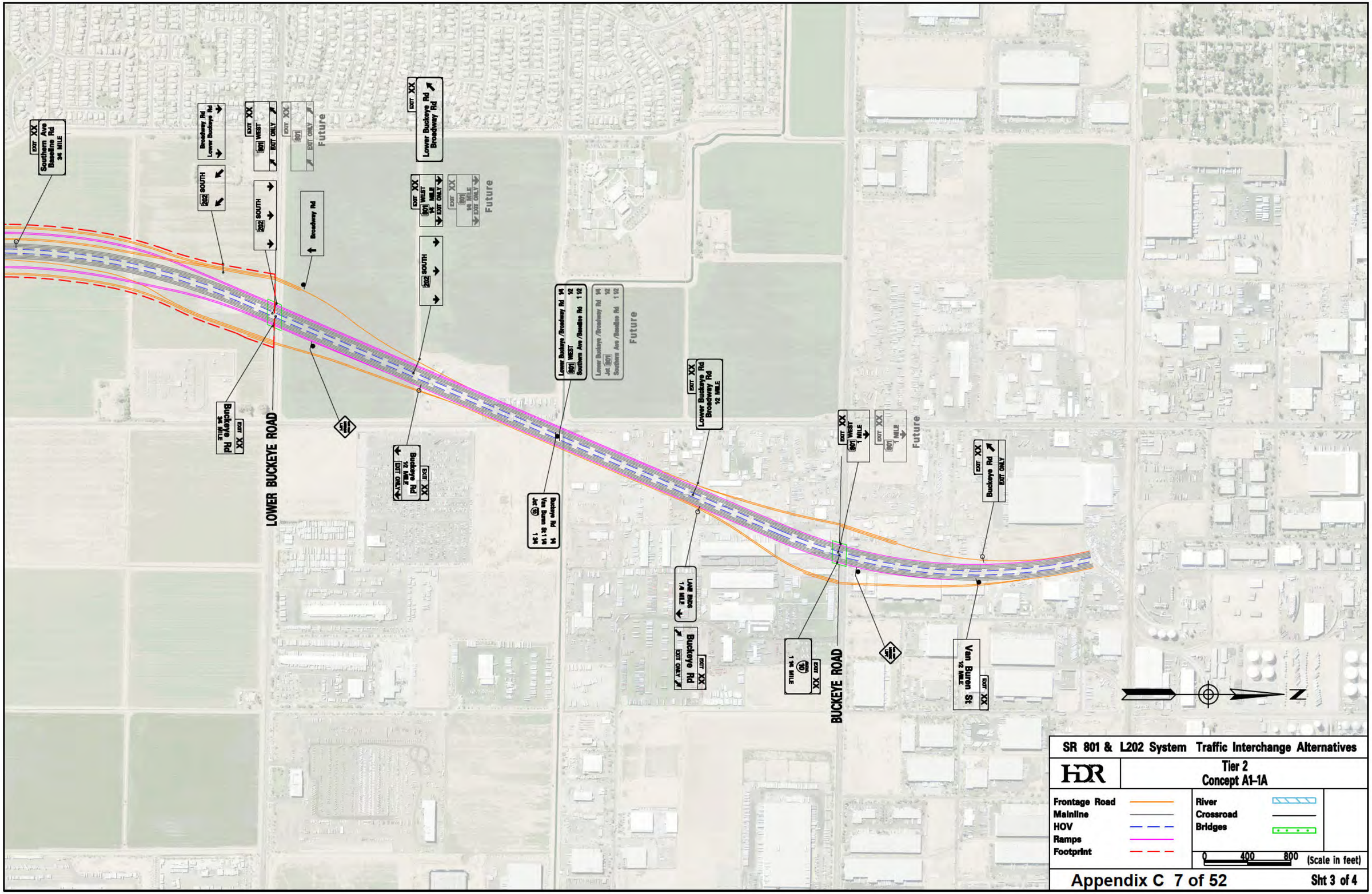
Frontage Road
Mainline
HOV
Ramps
Footprint

River
Crossroad
Bridges

0 400 800 (Scale in feet)


N
ELLIOT ROAD
DOBBINS ROAD
BASELINE ROAD
Future
Future
Future
Elliot Rd
LANE ENDS 1/4 MILE
Elliot Rd 1/2 MILE EXIT ONLY
Elliot Rd 3/4 MILE
Dobbins Rd
LANE ENDS 1/4 MILE
Dobbins Rd 1/2 MILE EXIT ONLY
Dobbins Rd 3/4 MILE
Baseline Rd 1/2 MILE
Baseline Rd 3/4 MILE
Southern Ave/Broadway Rd 1/4 MILE
Southern Ave/Broadway Rd 1/2 MILE
Southern Ave Broadway Rd 1/4 MILE
202 NORTH
801 WEST 1/2 MILE EXIT ONLY
801 WEST 1 MILE EXIT ONLY
801 EAST 1 MILE EXIT ONLY
SR 801 & L202 System Traffic Interchange Alternatives
HDR
Tier 2
Concept A1-1A
Frontage Road
Mainline
HOV
Ramps
Footprint
River
Crossroad
Bridges
0 400 800 (Scale in feet)
Appendix C 5 of 52
Sht 1 of 4


SALT RIVER FLOODWAY
SR 801
SOUTHERN AVENUE
BROADWAY ROAD
59th AVENUE
L 202
ES Ramp
EN Ramp
SW Ramp
HOV Ramp
WS Ramp
NW Ramp
SE Ramp
NE Ramp
WN Ramp
Baseline Rd
Broadway Rd
Southern Ave Baseline Rd
Southern Ave Broadway Rd
Lower Buckeye Rd
Future
N
SR 801 & L202 System Traffic Interchange Alternatives
HDR
Tier 2
Concept A1-1A
Frontage Road
Mainline
HOV
Ramps
Footprint
River
Crossroad
Bridges
0 400 800 (Scale in feet)
Appendix C 6 of 52
Sht 2 of 4


Southern Ave
Baseline Rd
94 MILE
Broadway Rd
Lower Buckeye Rd
SOUTH
WEST
EXIT ONLY
Future
Lower Buckeye Rd
Broadway Rd
Broadway Rd
LOWER BUCKEYE ROAD
Buckeye Rd
94 MILE
Buckeye Rd
12 MILE
Lower Buckeye /Broadway Rd
WEST
Southern Ave /Baseline Rd
Lower Buckeye Rd
Broadway Rd
12 MILE
Buckeye Rd
1 MILE
LANE ENDS
1/4 MILE
Buckeye Rd
1 3/4 MILE
BUCKEYE ROAD
Van Buren St
12 MILE
N
SR 801 & L202 System Traffic Interchange Alternatives
HDR
Tier 2
Concept A1-1A
Frontage Road
Mainline
HOV
Ramps
Footprint
River
Crossroad
Bridges
0
400
800
(Scale in feet)
Appendix C 7 of 52
Sht 3 of 4

SALT RIVER FLOODWAY

SR 801

75th AVENUE

67th AVENUE

EXIT XX
202 NORTH
1 3/4 MILES

RIGHT LANE
EXIT ONLY

EXIT XX
83rd Ave
1/2 MILE
EXIT ONLY

EXIT XX
67th Ave
3/4 MILE

EXIT XX
67th Ave
1/2 MILE

EXIT XX
83rd Ave
3/4 MILE

Future
XX
67th Ave 1/2
Jct 202 1

83rd Ave 1 1/4
91st Ave 2 1/4
107th Ave 4 1/4

67th Ave
EXIT XX

202 SOUTH
3/4 MILE
EXIT XX

202 NORTH
3/4 MILE
EXIT XX

Future
801 WEST

202 SOUTH
1/2 MILE
EXIT ONLY
EXIT XX

202 NORTH
1/2 MILE
EXIT ONLY
EXIT XX

N

SR 801 & L202 System Traffic Interchange Alternatives

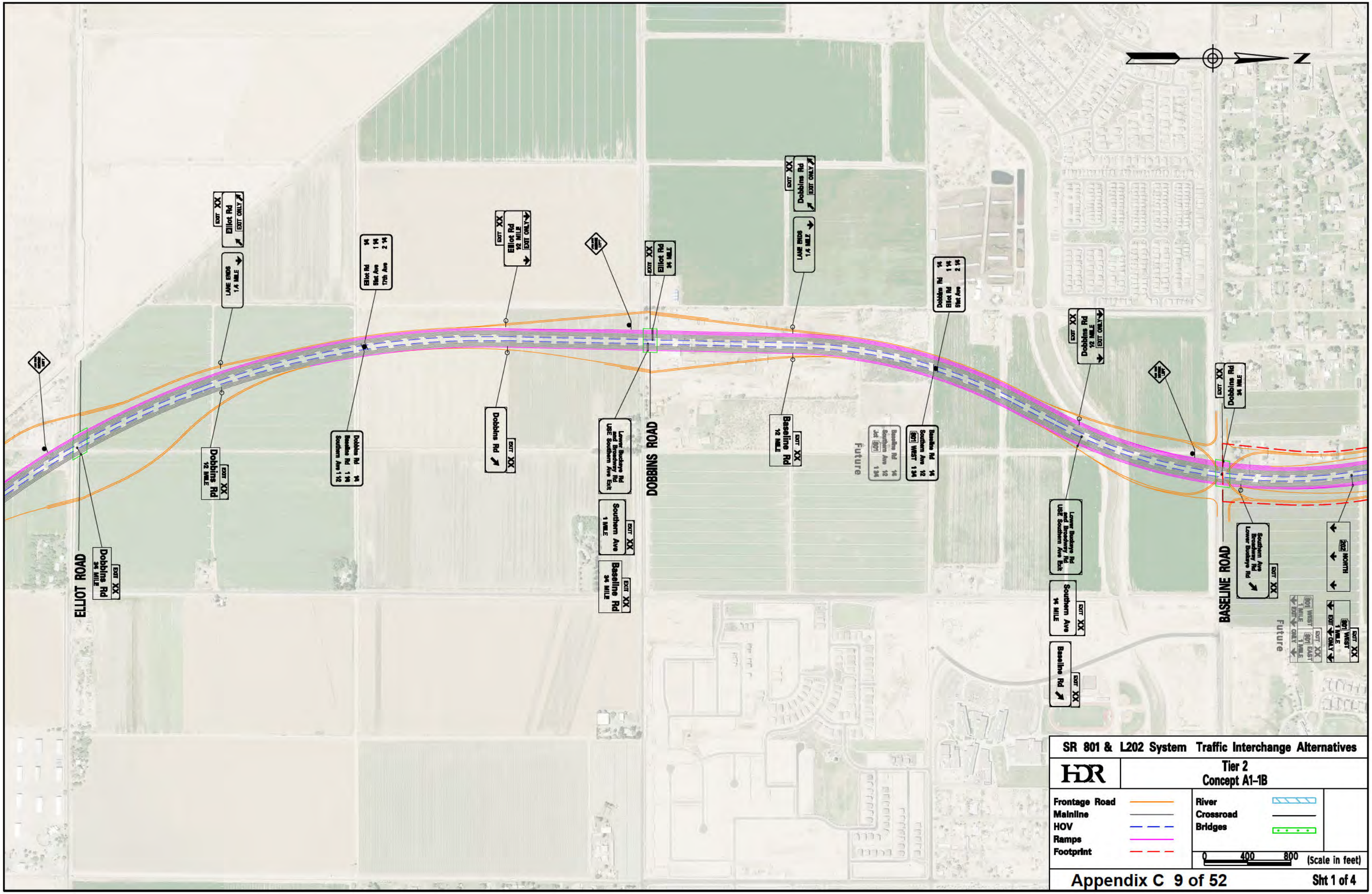
HDR

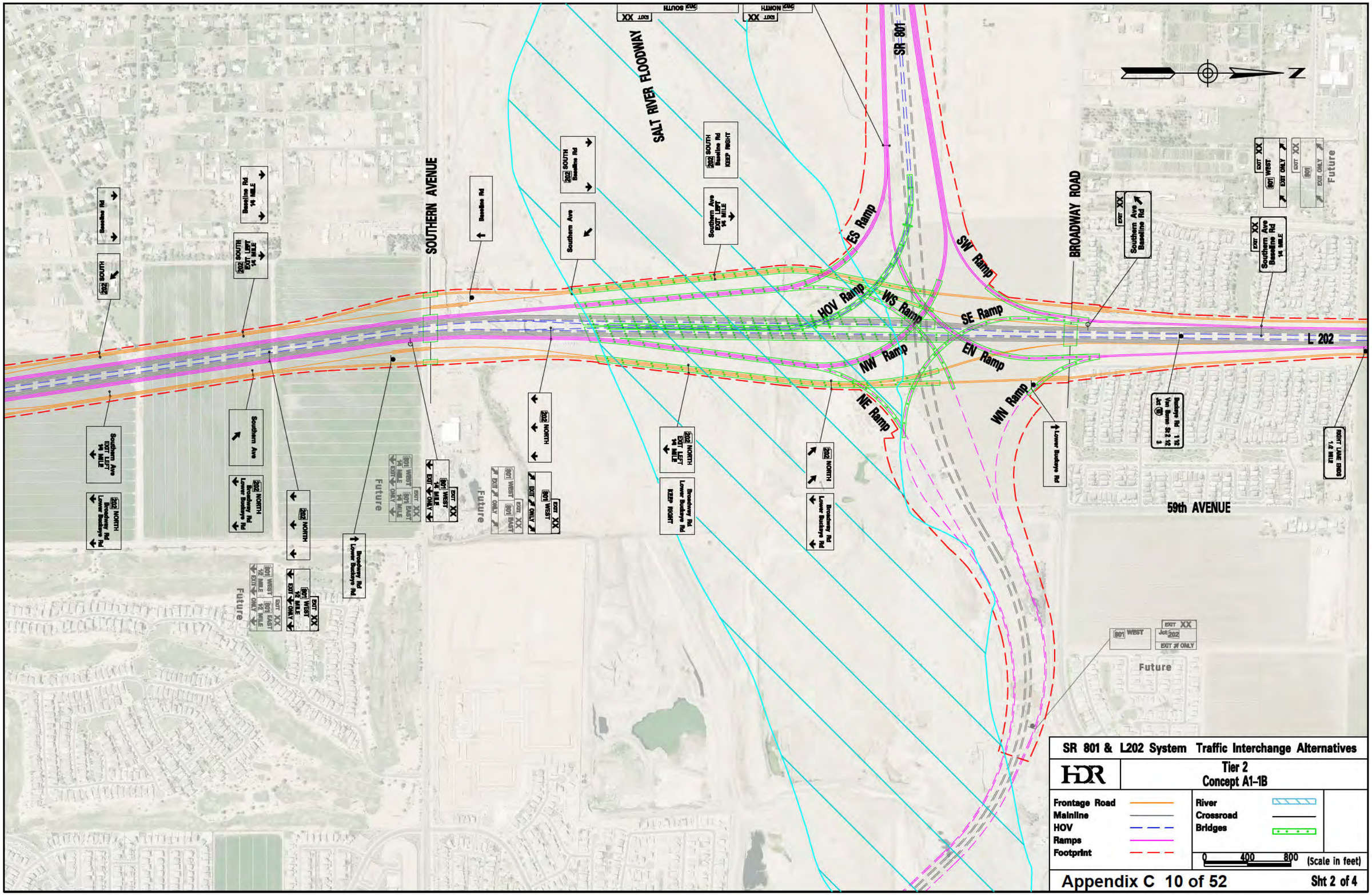
Tier 2
Concept A1-1A

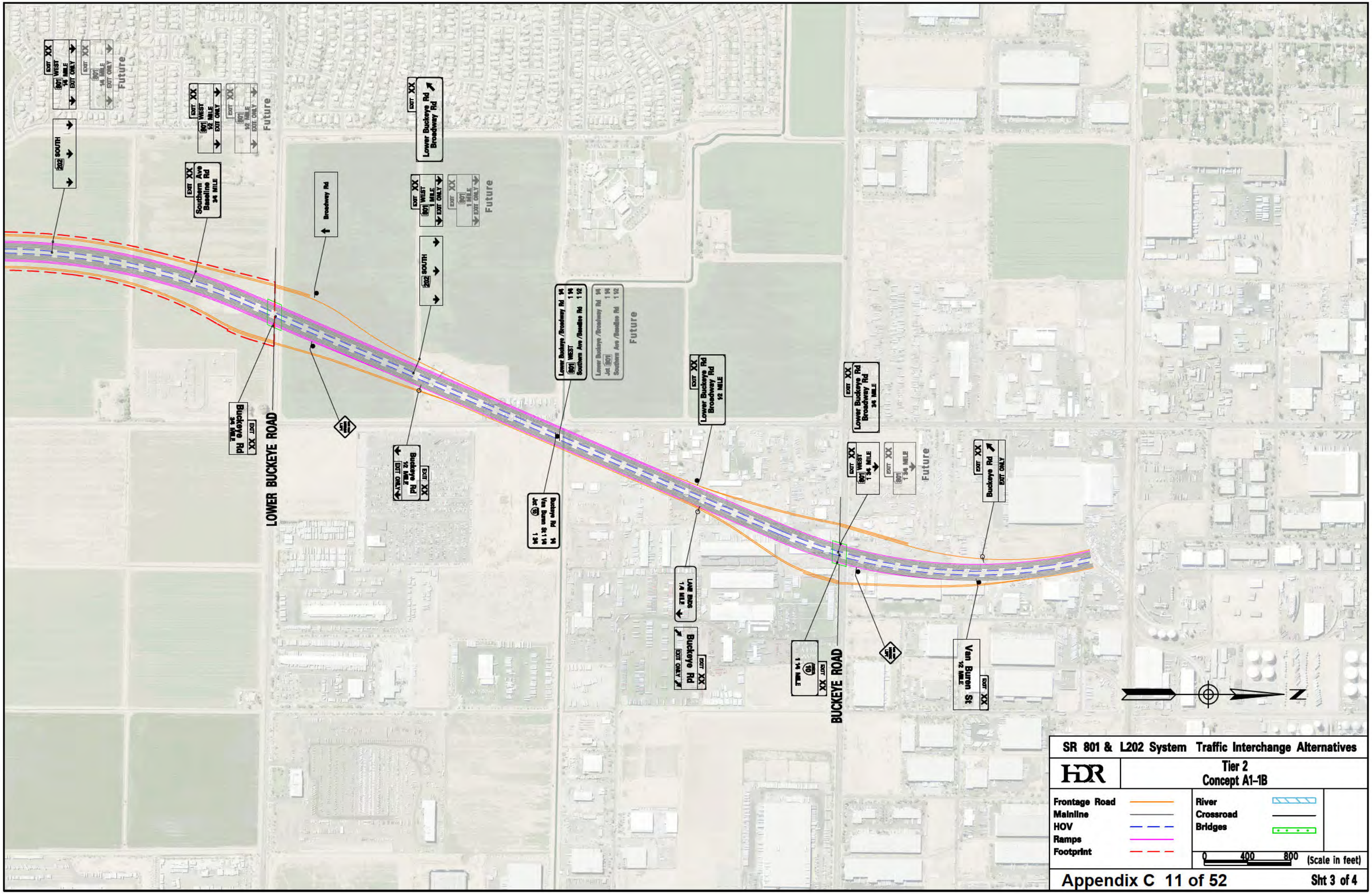
Frontage Road
Mainline
HOV
Ramps
Footprint

River
Crossroad
Bridges

0 400 800 (Scale in feet)


N
ELLIOT ROAD
DOBBINS ROAD
BASELINE ROAD
Future
Future
LANE ENDS 1/4 MILE
Elliot Rd EXIT ONLY
Elliot Rd 1/2 MILE EXIT ONLY
Elliot Rd 3/4 MILE
Dobbins Rd EXIT ONLY
Dobbins Rd 1/2 MILE EXIT ONLY
Dobbins Rd 3/4 MILE
Baseline Rd 1/2 MILE
Baseline Rd 3/4 MILE
Southern Ave 1 MILE
Lower Buckeye Rd and Broadway Rd Use Southern Ave Exit
Southern Ave Broadway Rd Lower Buckeye Rd
Baseline Rd Southern Ave 1/2 SR 801 WEST 1 3/4
Dobbins Rd Baseline Rd 1/4 Southern Ave 1 1/2
Elliot Rd 1/4 Rita Ave 1 3/4 17th Ave 2 3/4
Dobbins Rd Elliot Rd 1/4 Rita Ave 1 3/4 17th Ave 2 3/4
SR 801 WEST 1 MILE EXIT ONLY
SR 801 EAST 1 MILE EXIT ONLY
SR 202 MOUNTN
SR 202 EAST
SR 202 WEST
SR 801 WEST 1 MILE
SR 801 EAST 1 MILE
SR 801 EAST 1 MILE EXIT ONLY
SR 801 WEST 1 MILE EXIT ONLY
SR 801 & L202 System Traffic Interchange Alternatives
HDR
Tier 2
Concept A1-1B
Frontage Road
Mainline
HOV
Ramps
Footprint
River
Crossroad
Bridges
0 400 800 (Scale in feet)
Appendix C 9 of 52
Sht 1 of 4


SOUTHERN AVENUE
SALT RIVER FLOODWAY
SR 801
BROADWAY ROAD
59th AVENUE
L 202
ES Ramp
SW Ramp
HOV Ramp
WS Ramp
SE Ramp
NW Ramp
EN Ramp
NE Ramp
WN Ramp
Future
N
SR 801 & L202 System Traffic Interchange Alternatives
HDR
Tier 2
Concept A1-1B
Frontage Road
Mainline
HOV
Ramps
Footprint
River
Crossroad
Bridges
0 400 800 (Scale in feet)
Appendix C 10 of 52
Sht 2 of 4



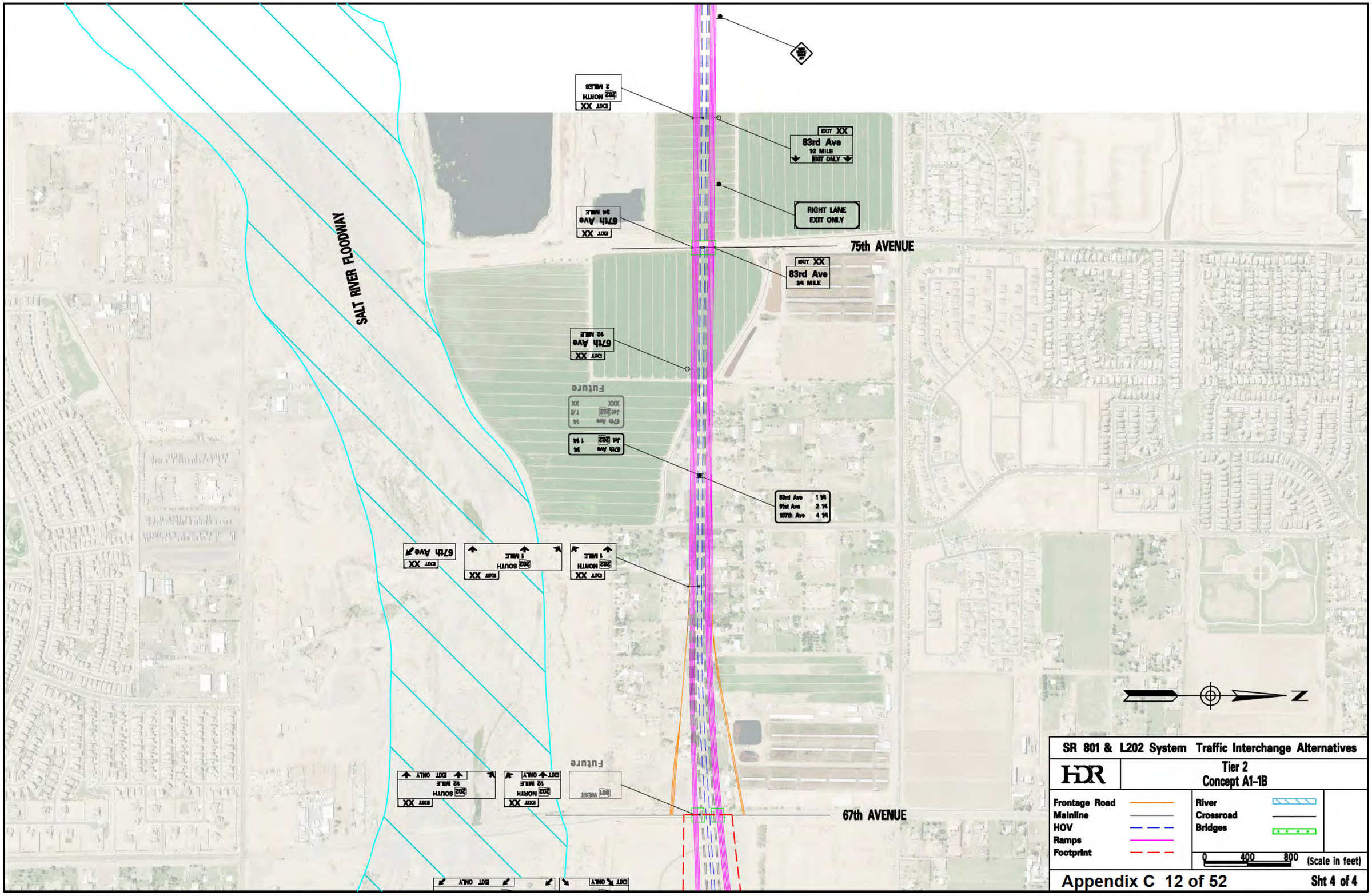
SR 801 & L202 System Traffic Interchange Alternatives

HDR

Tier 2
Concept A1-1B

Frontage Road	River
Mainline	Crossroad
HOV	Bridges
Ramps	
Footprint	

0 400 800 (Scale in feet)



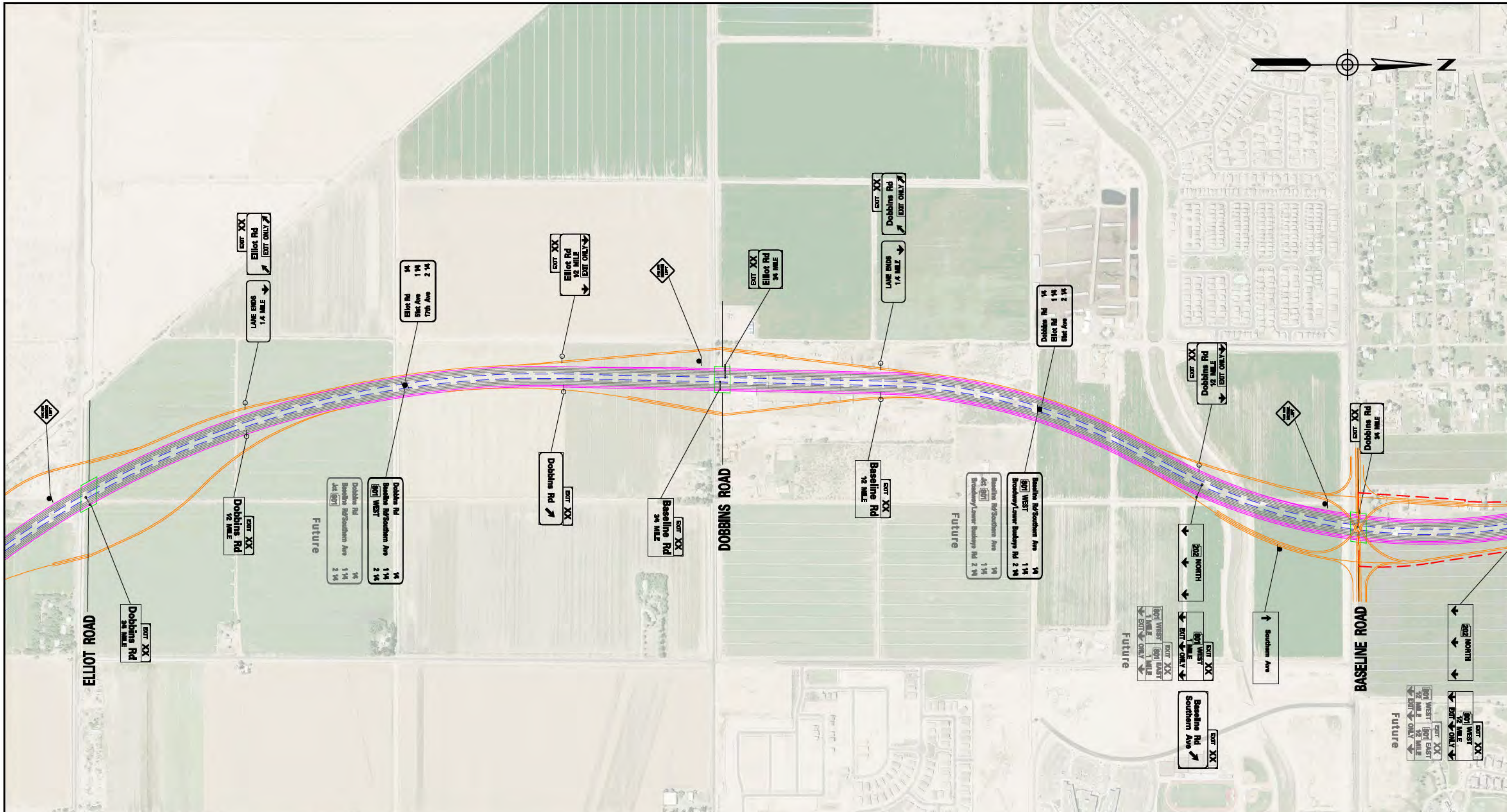
SR 801 & L202 System Traffic Interchange Alternatives

HDR

Tier 2
Concept A1-1B

Frontage Road	River
Mainline	Crossroad
HOV	Bridges
Ramps	
Footprint	

0 400 800 (Scale in feet)



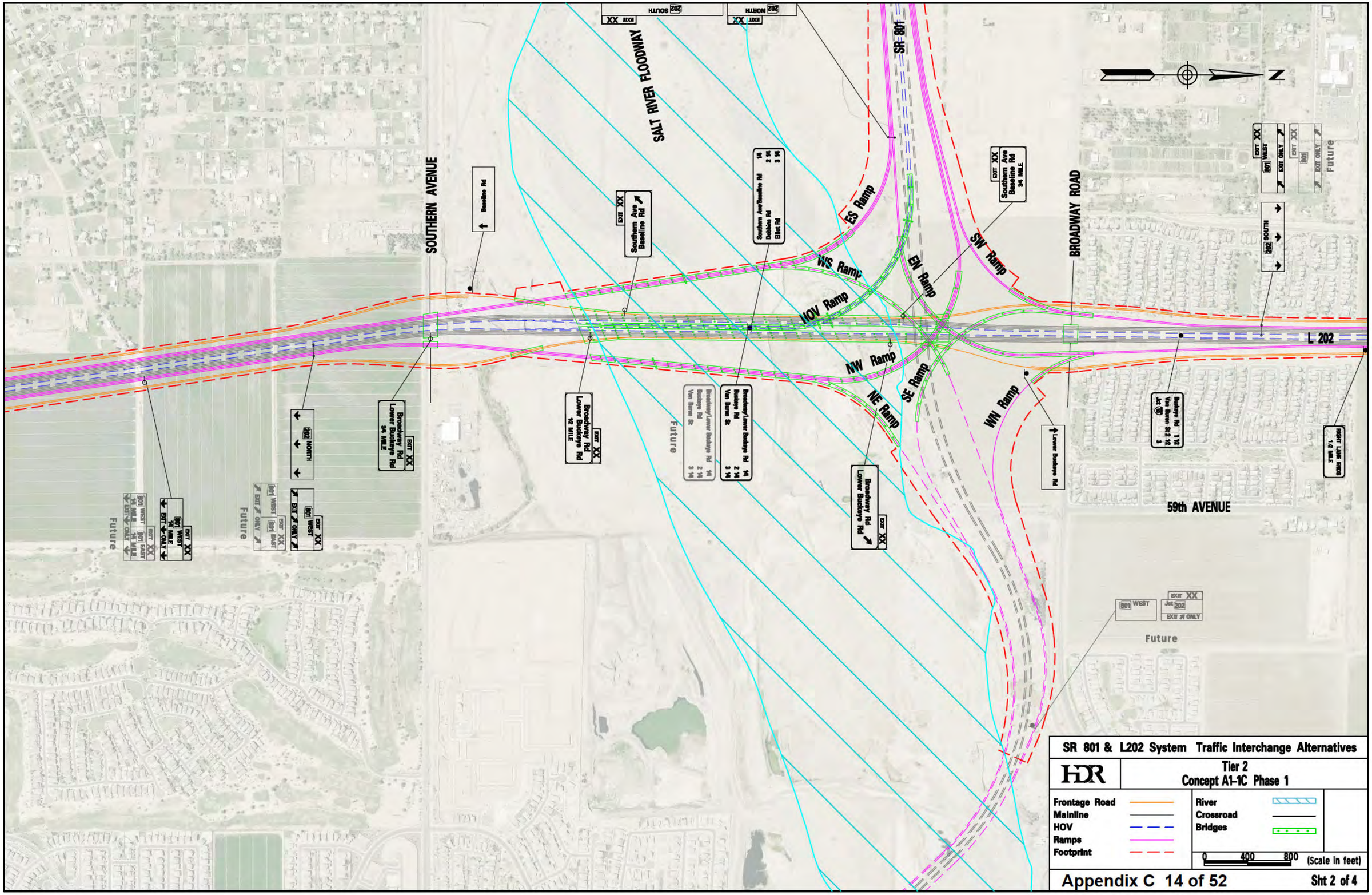
SR 801 & L202 System Traffic Interchange Alternatives

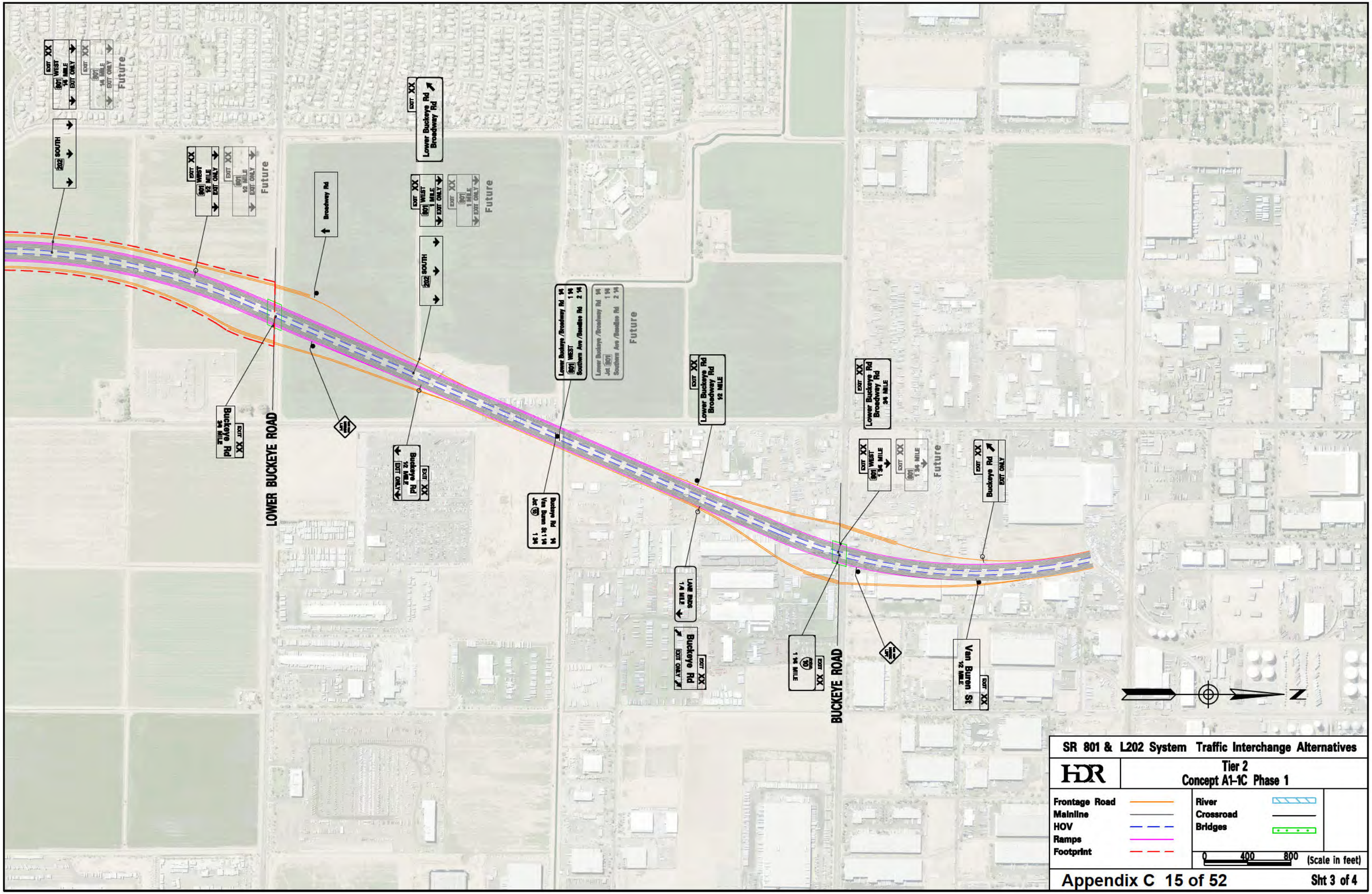
HDR

Tier 2
Concept A1–1C Phase 1

Legend		Legend	
Frontage Road		River	
Mainline		Crossroad	
HOV		Bridges	
Ramps			
Footprint			

0 400 800 (Scale in feet)


SOUTHERN AVENUE
SALT RIVER FLOODWAY
SR 801
BROADWAY ROAD
59th AVENUE
L 202
ES Ramp
WS Ramp
EN Ramp
SW Ramp
HOV Ramp
NW Ramp
NE Ramp
SE Ramp
WN Ramp
Baseline Rd
Southern Ave Baseline Rd
Broadway Rd Lower Buckeye Rd
Broadway/Lower Buckeye Rd
Lower Buckeye Rd
Future
SR 801 & L202 System Traffic Interchange Alternatives
HDR
Tier 2
Concept A1-1C Phase 1
Frontage Road
Mainline
HOV
Ramps
Footprint
River
Crossroad
Bridges
0 400 800 (Scale in feet)
Appendix C 14 of 52
Sht 2 of 4


LOWER BUCKEYE ROAD
BUCKEYE ROAD
Broadway Rd
Future
Lower Buckeye Rd /Broadway Rd 1 MI
WEST Southern Ave /Baseline Rd 2 MI
Lower Buckeye /Broadway Rd 1 MI
Jct Southern Ave /Baseline Rd 2 MI
Lower Buckeye Rd Broadway Rd ½ MILE
Lower Buckeye Rd Broadway Rd ¾ MILE
Buckeye Rd ½ MILE EXIT ONLY
Buckeye Rd ¾ MILE
Van Buren St ½ MILE
Van Buren St 1 ¼ MILE
LAMP RDS 1/4 MILE
Buckeye Rd EXIT ONLY
SOUTH
WEST ¾ MILE EXIT ONLY
WEST 1 MILE EXIT ONLY
1 MILE EXIT ONLY
1 ¼ MILE
Buckeye Rd ¾ MILE
Buckeye Rd EXIT ONLY
N
SR 801 & L202 System Traffic Interchange Alternatives
HDR
Tier 2
Concept A1-1C Phase 1
Frontage Road
Mainline
HOV
Ramps
Footprint
River
Crossroad
Bridges
0 400 800 (Scale in feet)

SALT RIVER FLOODWAY

SR 801

75th AVENUE

67th AVENUE

EXIT XX
83rd Ave
12 MILE
EXIT ONLY

RIGHT LANE
EXIT ONLY

EXIT XX
83rd Ave
34 MILE

EXIT XX
67th Ave
34 MILE

EXIT XX
67th Ave
12 MILE

EXIT XX
202 NORTH
2 MILES

Future

83rd Ave 1 mi
91st Ave 2 mi
107th Ave 4 mi

EXIT XX
67th Ave

EXIT XX
202 SOUTH
1 MILE

EXIT XX
202 NORTH
1 MILE

EXIT XX
202 SOUTH
1/2 MILE
EXIT ONLY

EXIT XX
202 NORTH
1/2 MILE
EXIT ONLY

Future

EXIT ONLY

EXIT ONLY

EXIT ONLY

N

SR 801 & L202 System Traffic Interchange Alternatives

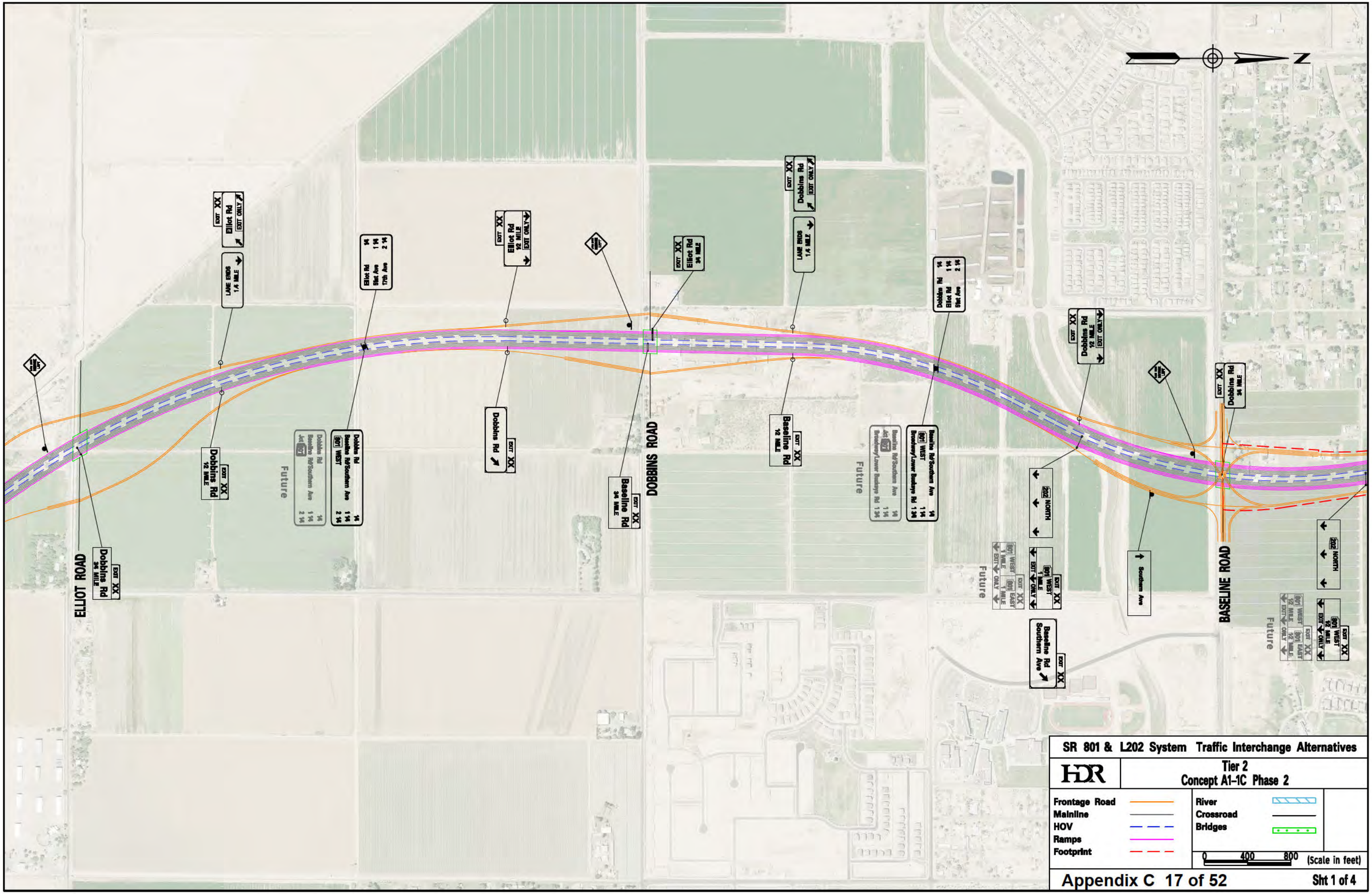
HDR

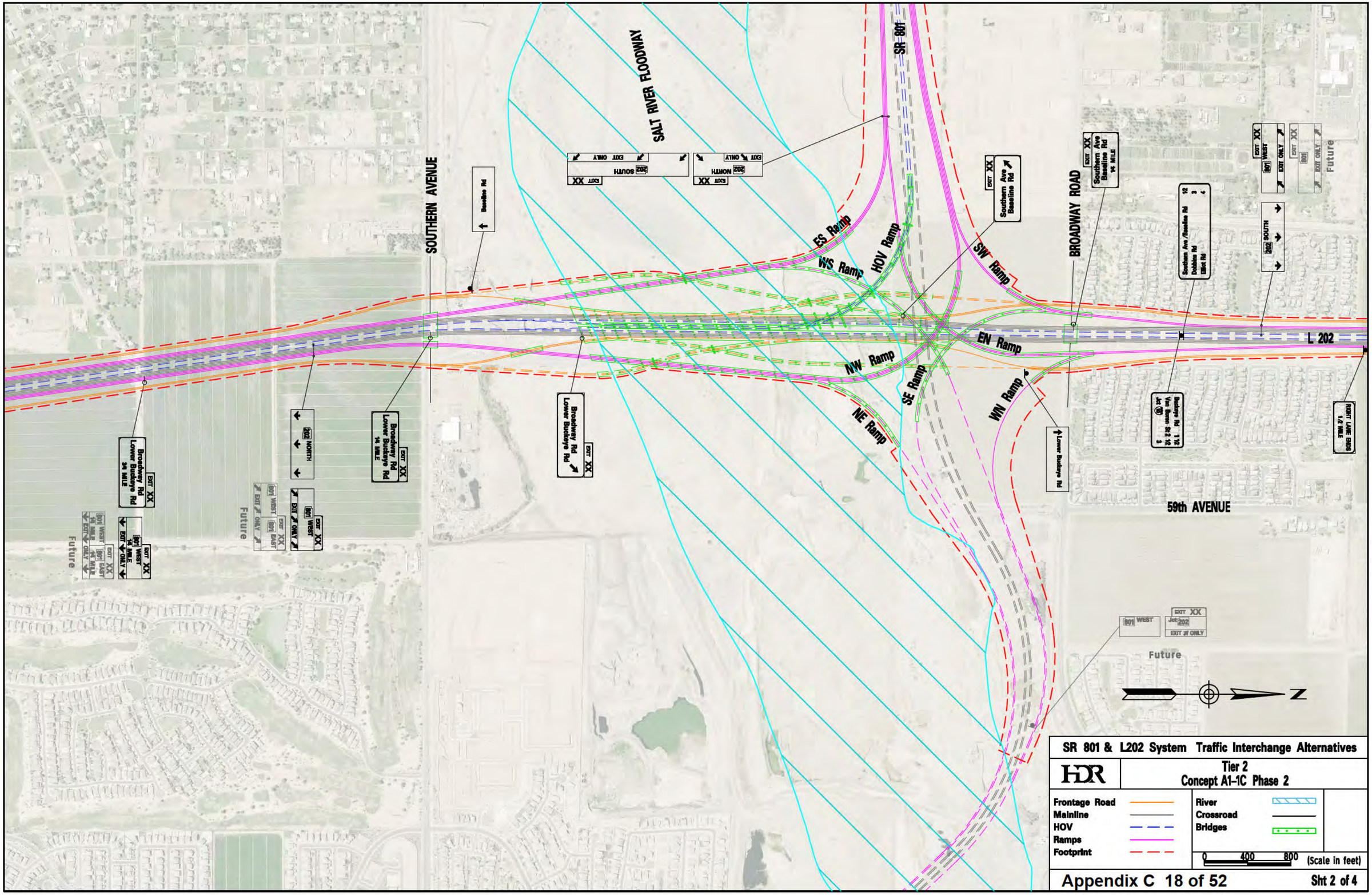
Tier 2
Concept A1-1C Phase 1

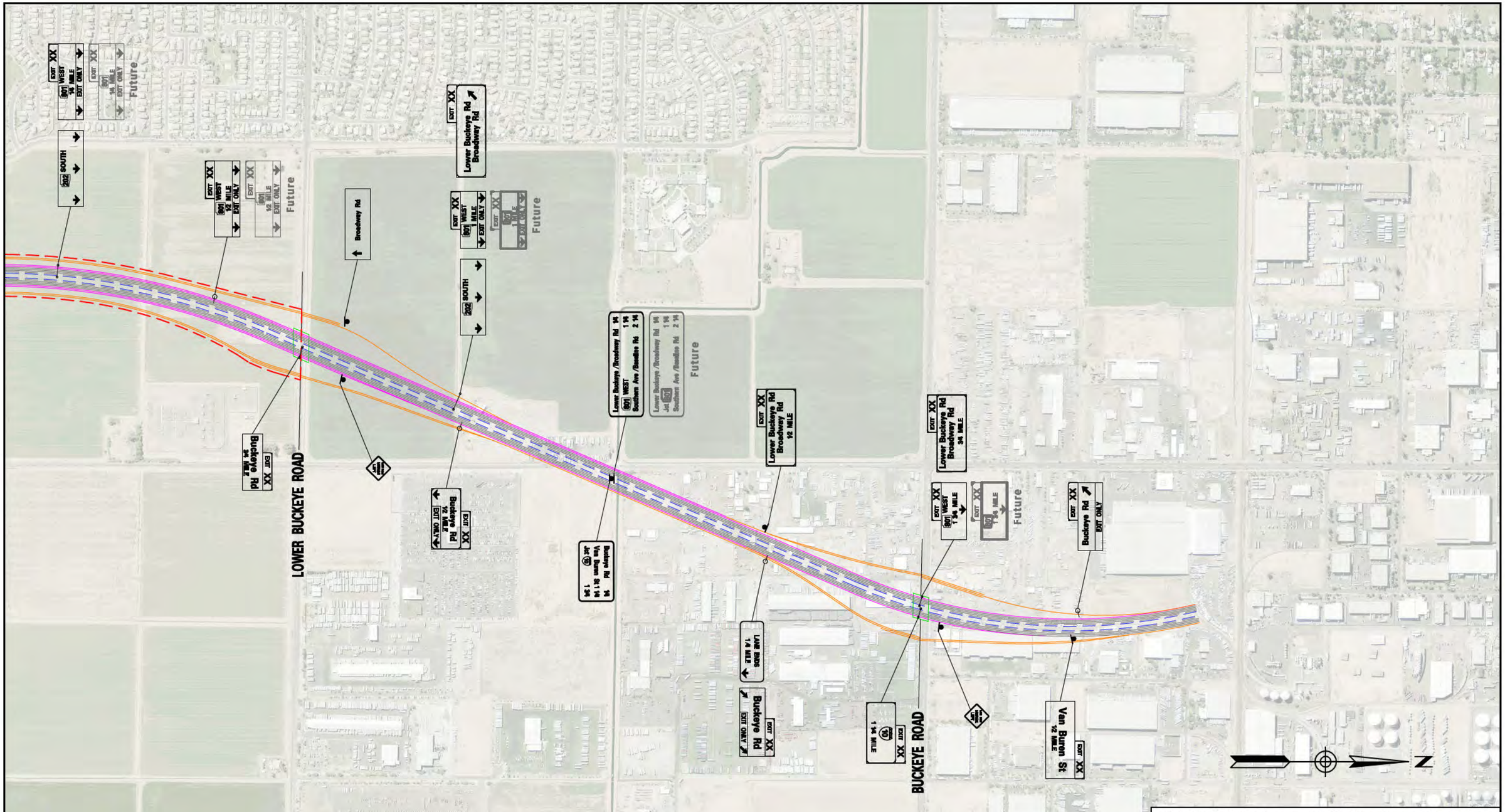
Frontage Road
Mainline
HOV
Ramps
Footprint

River
Crossroad
Bridges

0 400 800 (Scale in feet)


N
ELLIOT ROAD
DOBBINS ROAD
BASELINE ROAD
Elliot Rd
Dobbins Rd
Baseline Rd
Baseline Rd/Southern Ave
Southern Ave
202 NORTH
LANE ENDS 1/4 MILE
Future
SR 801 & L202 System Traffic Interchange Alternatives
HDR
Tier 2
Concept A1-1C Phase 2
Frontage Road
Mainline
HOV
Ramps
Footprint
River
Crossroad
Bridges
0 400 800 (Scale in feet)
Appendix C 17 of 52
Sht 1 of 4


SALT RIVER FLOODWAY
SR 801
SOUTHERN AVENUE
BROADWAY ROAD
59th AVENUE
L 202
ES Ramp
WS Ramp
HOV Ramp
SW Ramp
EN Ramp
NW Ramp
SE Ramp
NE Ramp
WN Ramp
Baseline Rd
Broadway Rd
Lower Buckeye Rd
Southern Ave
Baseline Rd
Southern Ave /Baseline Rd
Dobbins Rd
Elliot Rd
Buckeye Rd
Van Buren St
Jct
RIGHT LANE ENDS
1/2 MILE
NORTH
SOUTH
WEST
EAST
EXIT ONLY
Future
SR 801 & L202 System Traffic Interchange Alternatives
HDR
Tier 2
Concept A1-1C Phase 2
Frontage Road
Mainline
HOV
Ramps
Footprint
River
Crossroad
Bridges
0 400 800 (Scale in feet)
Appendix C 18 of 52
Sht 2 of 4



SR 801 & L202 System Traffic Interchange Alternatives

HDR

Tier 2
Concept A1-1C Phase 2

Frontage Road	River
Mainline	Crossroad
HOV	Bridges
Ramps	
Footprint	

0 400 800 (Scale in feet)

SALT RIVER FLOODWAY

SR 801

75th AVENUE

67th AVENUE

RIGHT LANE EXIT ONLY

EXIT XX
83rd Ave
½ MILE
EXIT ONLY

EXIT XX
67th Ave
¾ MILE

EXIT XX
67th Ave
¼ MILE

EXIT XX
83rd Ave
¾ MILE

Future

83rd Ave 1 ¼
91st Ave 2 ¼
107th Ave 4 ¼

EXIT XX
202 NORTH
1 ½ MILES

EXIT XX
67th Ave

EXIT XX
202 SOUTH
½ MILE

EXIT XX
202 NORTH
½ MILE

EXIT XX
202 SOUTH
¼ MILE
EXIT ONLY

EXIT XX
202 NORTH
¼ MILE
EXIT ONLY

801 WEST

N

SR 801 & L202 System Traffic Interchange Alternatives

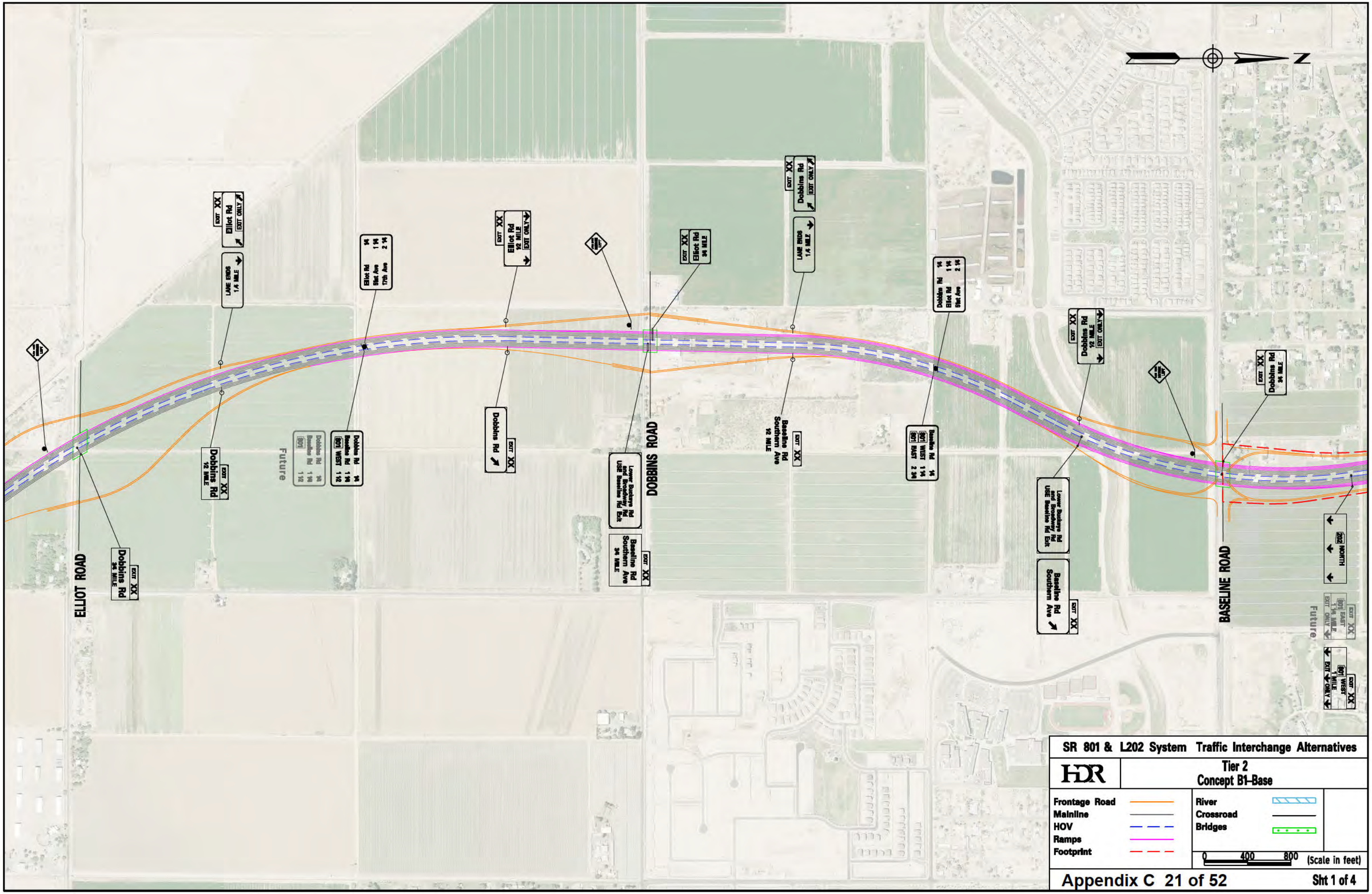
HDR

Tier 2
Concept A1-1C Phase 2

Frontage Road
Mainline
HOV
Ramps
Footprint

River
Crossroad
Bridges

0 400 800 (Scale in feet)



SR 801 & L202 System Traffic Interchange Alternatives

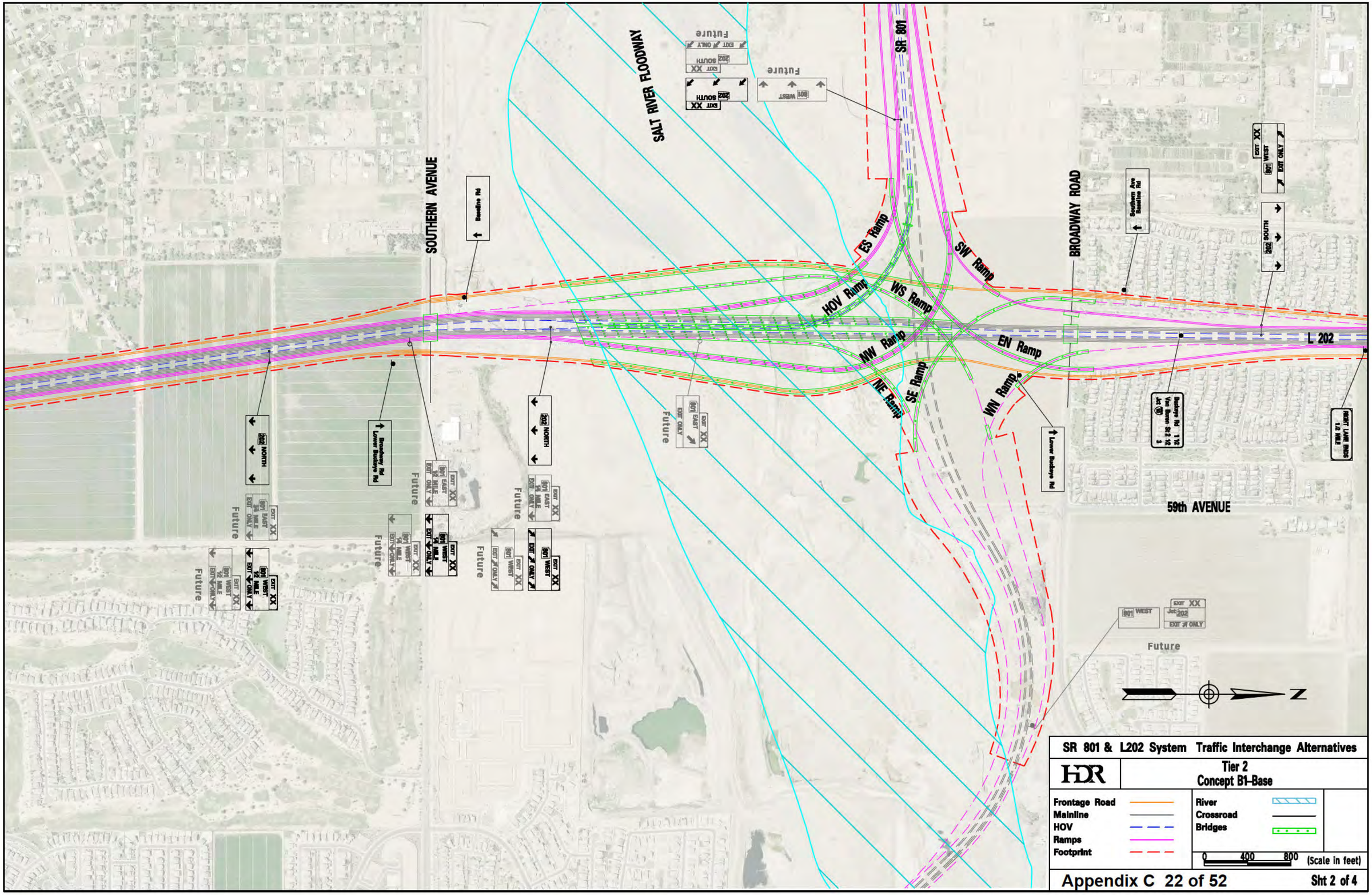
HDR

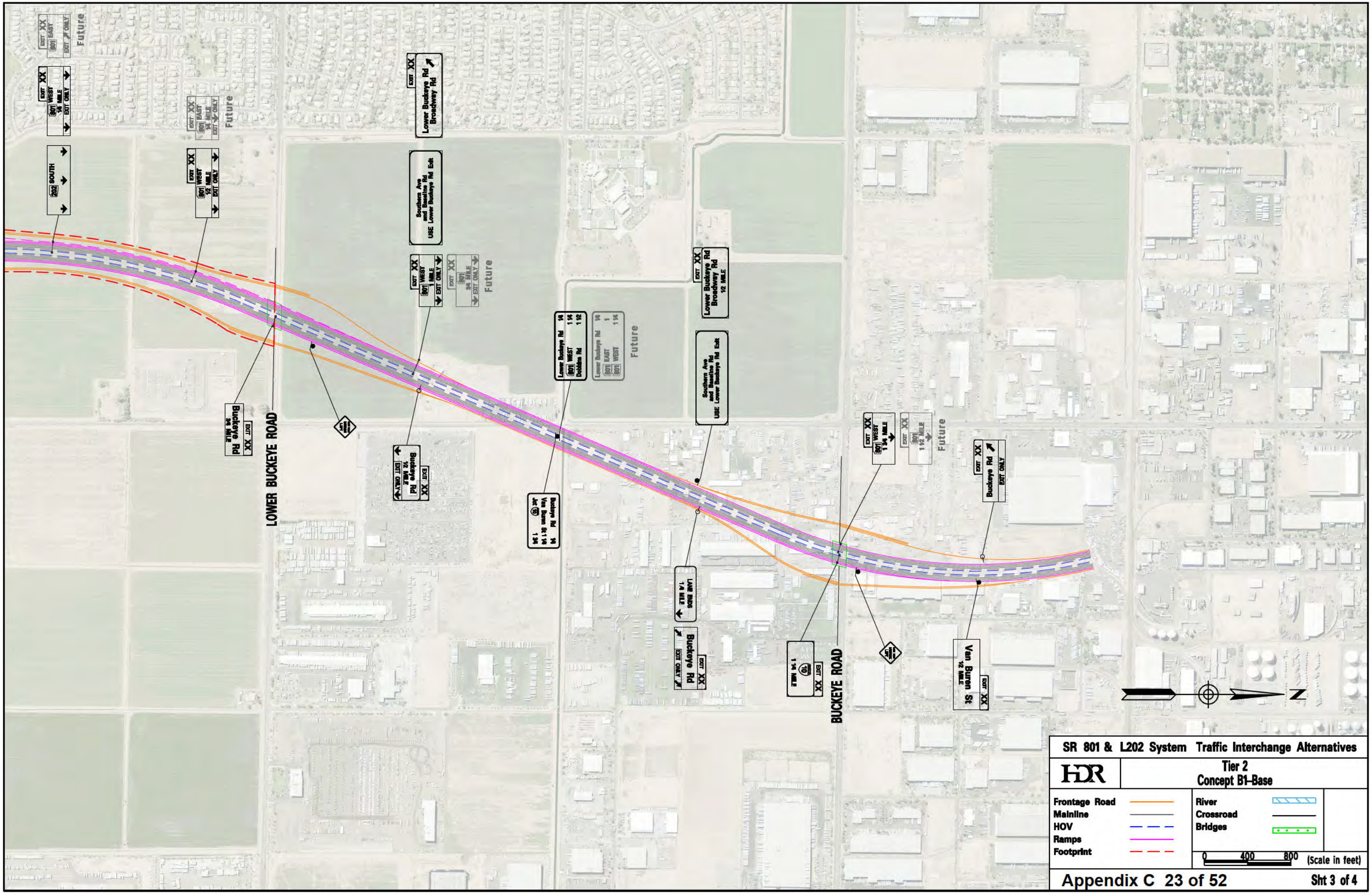
Tier 2
Concept B1-Base

Frontage Road
Mainline
HOV
Ramps
Footprint

River
Crossroad
Bridges

0 400 800 (Scale in feet)


SOUTHERN AVENUE
SALT RIVER FLOODWAY
SR 801
BROADWAY ROAD
59th AVENUE
L 202
ES Ramp
SW Ramp
HOV Ramp
WS Ramp
NW Ramp
EN Ramp
NE Ramp
SE Ramp
WN Ramp
Baseline Rd
Southern Ave
Broadway Rd
Lower Buckeye Rd
Future
N
SR 801 & L202 System Traffic Interchange Alternatives
HDR
Tier 2
Concept B1-Base
Frontage Road
Mainline
HOV
Ramps
Footprint
River
Crossroad
Bridges
0 400 800 (Scale in feet)
Appendix C 22 of 52
Sht 2 of 4


LOWER BUCKEYE ROAD
BUCKEYE ROAD
Future
Lower Buckeye Rd
Broadway Rd
Southern Ave
and Baseline Rd
USE Lower Buckeye Rd Exit
Buckeye Rd
Van Buren St
LANE ENDS
1/4 MILE
SOUTH
WEST
EAST
EXIT ONLY
SR 801 & L202 System Traffic Interchange Alternatives
HDR
Tier 2
Concept B1-Base
Frontage Road
Mainline
HOV
Ramps
Footprint
River
Crossroad
Bridges
0 400 800 (Scale in feet)
Appendix C 23 of 52
Sht 3 of 4

SALT RIVER FLOODWAY

SR 801

75th AVENUE

67th AVENUE

RIGHT LANE EXIT ONLY

EXIT XX
83rd Ave
1/2 MILE
EXIT ONLY

EXIT XX
83rd Ave
3/4 MILE

Future

N

SR 801 & L202 System Traffic Interchange Alternatives

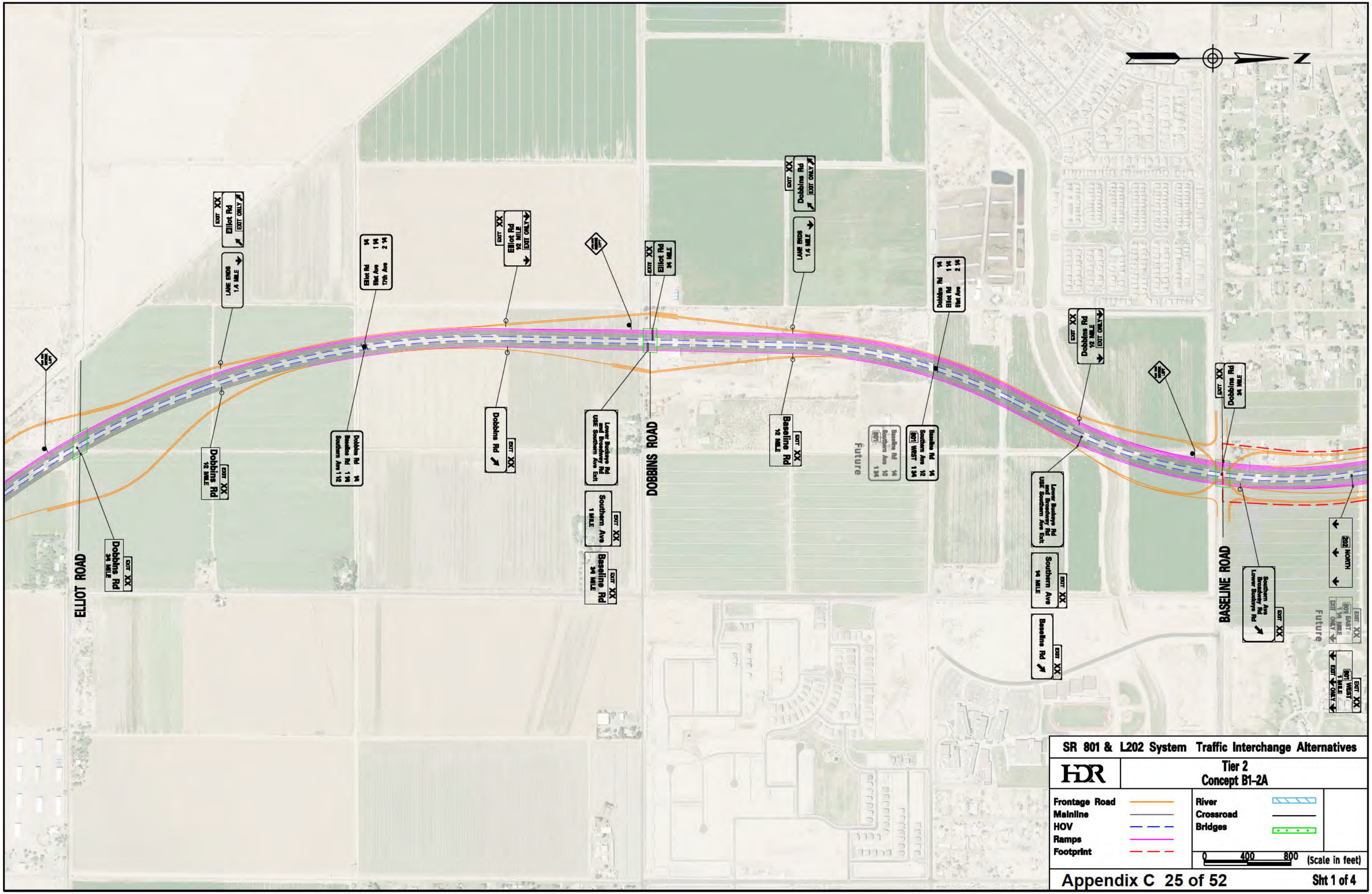
HDR

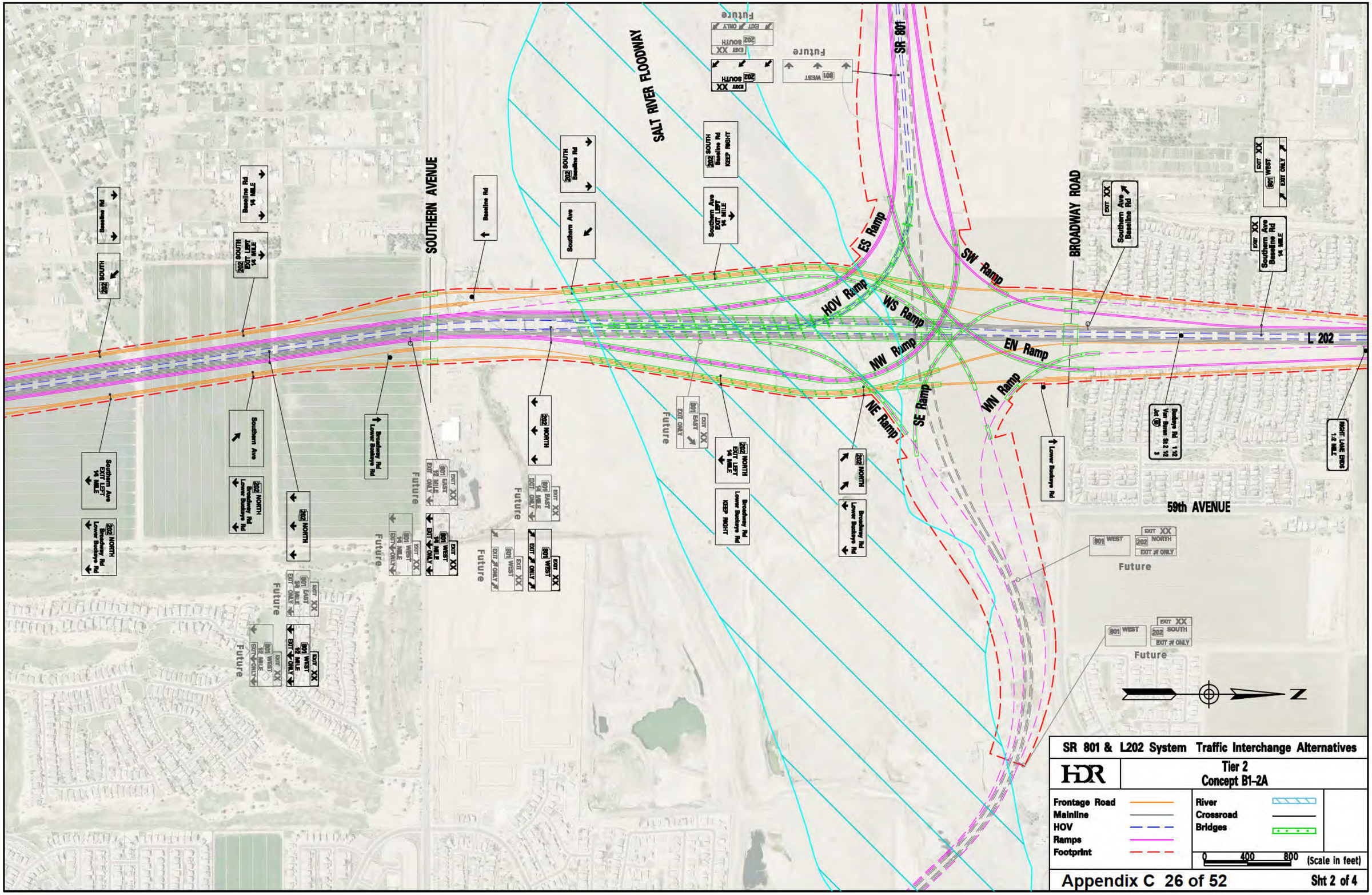
Tier 2
Concept B1-Base

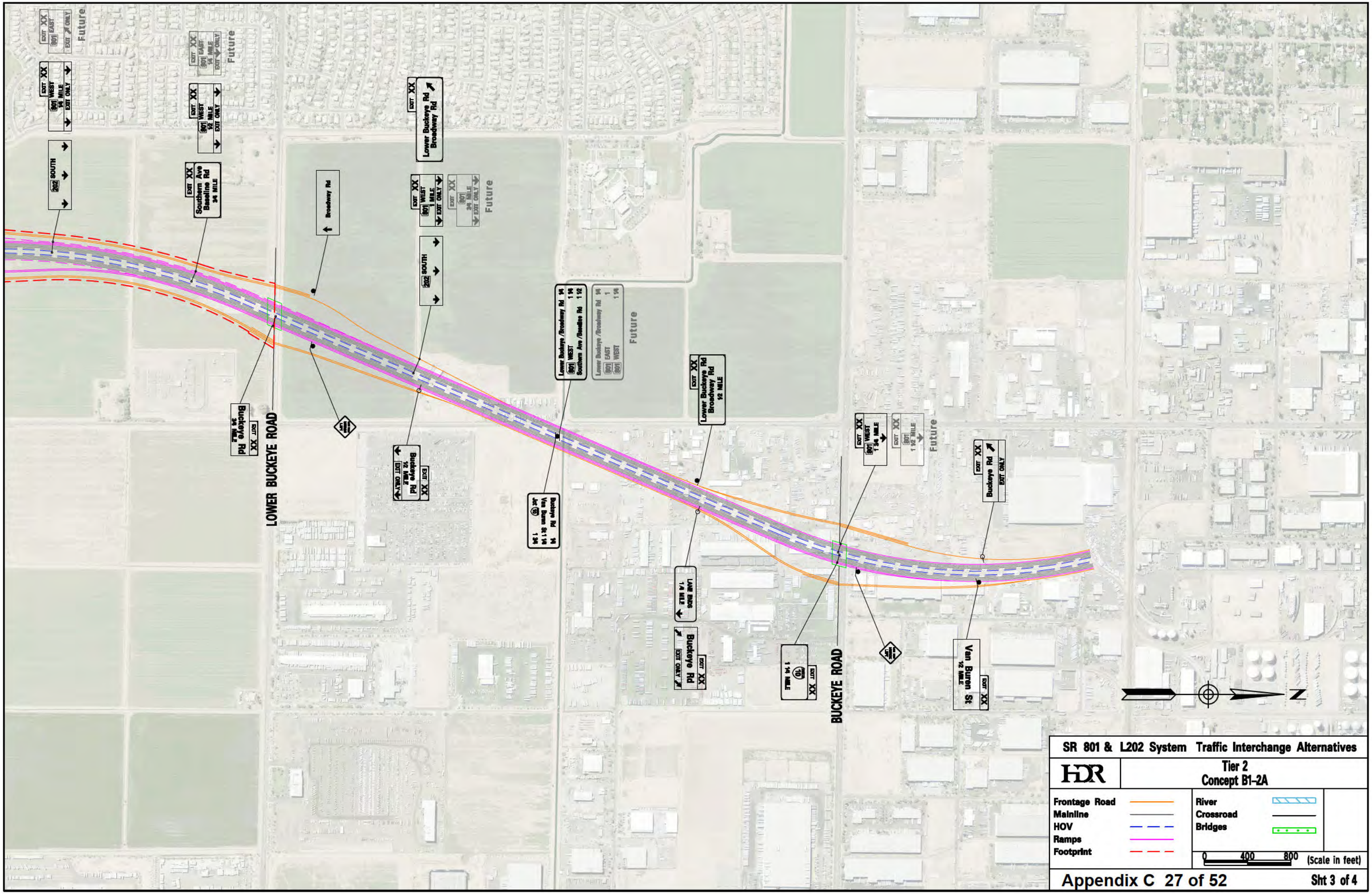
Frontage Road
Mainline
HOV
Ramps
Footprint

River
Crossroad
Bridges

0 400 800 (Scale in feet)


N
ELLIOT ROAD
DOBBINS ROAD
BASELINE ROAD
Elliot Rd
Dobbins Rd
Baseline Rd
Southern Ave
Lower Buckeye Rd
Future
NORTH
EAST
WEST
1 MILE
EXIT ONLY
LANE ENDS 1/4 MILE
SR 801 & L202 System Traffic Interchange Alternatives
HDR
Tier 2
Concept B1-2A
Frontage Road
Mainline
HOV
Ramps
Footprint
River
Crossroad
Bridges
0 400 800 (Scale in feet)
Appendix C 25 of 52
Sht 1 of 4


SOUTHERN AVENUE
SALT RIVER FLOODWAY
SR 801
BROADWAY ROAD
59th AVENUE
L 202
ES Ramp
SW Ramp
HOV Ramp
WS Ramp
NW Ramp
EN Ramp
NE Ramp
SE Ramp
WN Ramp
Future
Baseline Rd
Southern Ave
Broadway Rd
Lower Buckeye Rd
Buckeye Rd
Van Buren St
SOUTH
NORTH
EAST
WEST
EXIT XX
EXIT ONLY
KEEP RIGHT
1/4 MILE
1/2 MILE
RIGHT LANE ENDS
N
SR 801 & L202 System Traffic Interchange Alternatives
HDR
Tier 2
Concept B1-2A
Frontage Road
Mainline
HOV
Ramps
Footprint
River
Crossroad
Bridges
0
400
800
(Scale in feet)
Appendix C 26 of 52
Sht 2 of 4


LOWER BUCKEYE ROAD
BUCKEYE ROAD
Broadway Rd
Southern Ave Baseline Rd 3/4 MILE
Lower Buckeye Rd Broadway Rd
Lower Buckeye Rd Broadway Rd 1/2 MILE
Lower Buckeye /Broadway Rd 3/4 1 1/4
Southern Ave /Baseline Rd 1 1/2
Lower Buckeye /Broadway Rd 3/4 1 1 1/4
EAST
WEST
202 SOUTH
Buckeye Rd 3/4 MILE EXIT ONLY
Buckeye Rd 1/2 MILE EXIT ONLY
Buckeye Rd 1 1/4 MILE EXIT ONLY
Buckeye Rd 1 3/4 MILE EXIT ONLY
Buckeye Rd Van Buren St 1 3/4
LANE ENDS 1/4 MILE
Van Buren St 1/2 MILE
EXIT XX
Future
SR 801 & L202 System Traffic Interchange Alternatives
HDR
Tier 2
Concept B1-2A
Frontage Road
Mainline
HOV
Ramps
Footprint
River
Crossroad
Bridges
0 400 800 (Scale in feet)
Appendix C 27 of 52
Sht 3 of 4

SALT RIVER FLOODWAY

SR 801

75th AVENUE

67th AVENUE

RIGHT LANE EXIT ONLY

EXIT XX
83rd Ave
1/2 MILE
EXIT ONLY

EXIT XX
83rd Ave
3/4 MILE

83rd Ave 1/4
91st Ave 1 1/4
107th Ave 3 1/4

83rd Ave 1 1/4
91st Ave 2 1/4
107th Ave 4 1/4

Future

Future

Future

SR 801 & L202 System Traffic Interchange Alternatives

HDR

Tier 2
Concept B1-2A

Frontage Road
Mainline
HOV
Ramps
Footprint

River
Crossroad
Bridges

0 400 800 (Scale in feet)

N

ELLIOT ROAD

DOBBINS ROAD

BASELINE ROAD

Future

SR 801 & L202 System Traffic Interchange Alternatives

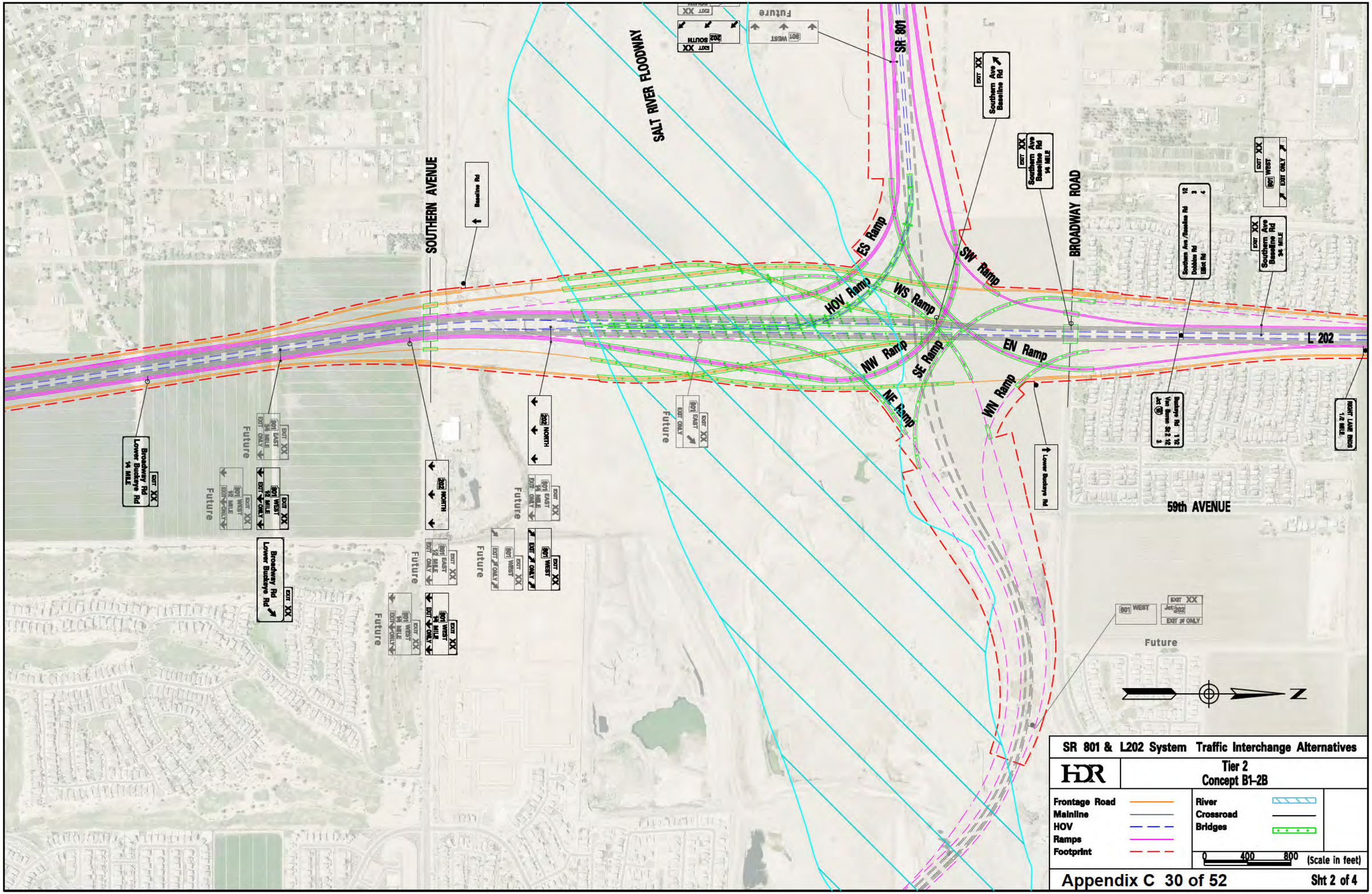
HDR

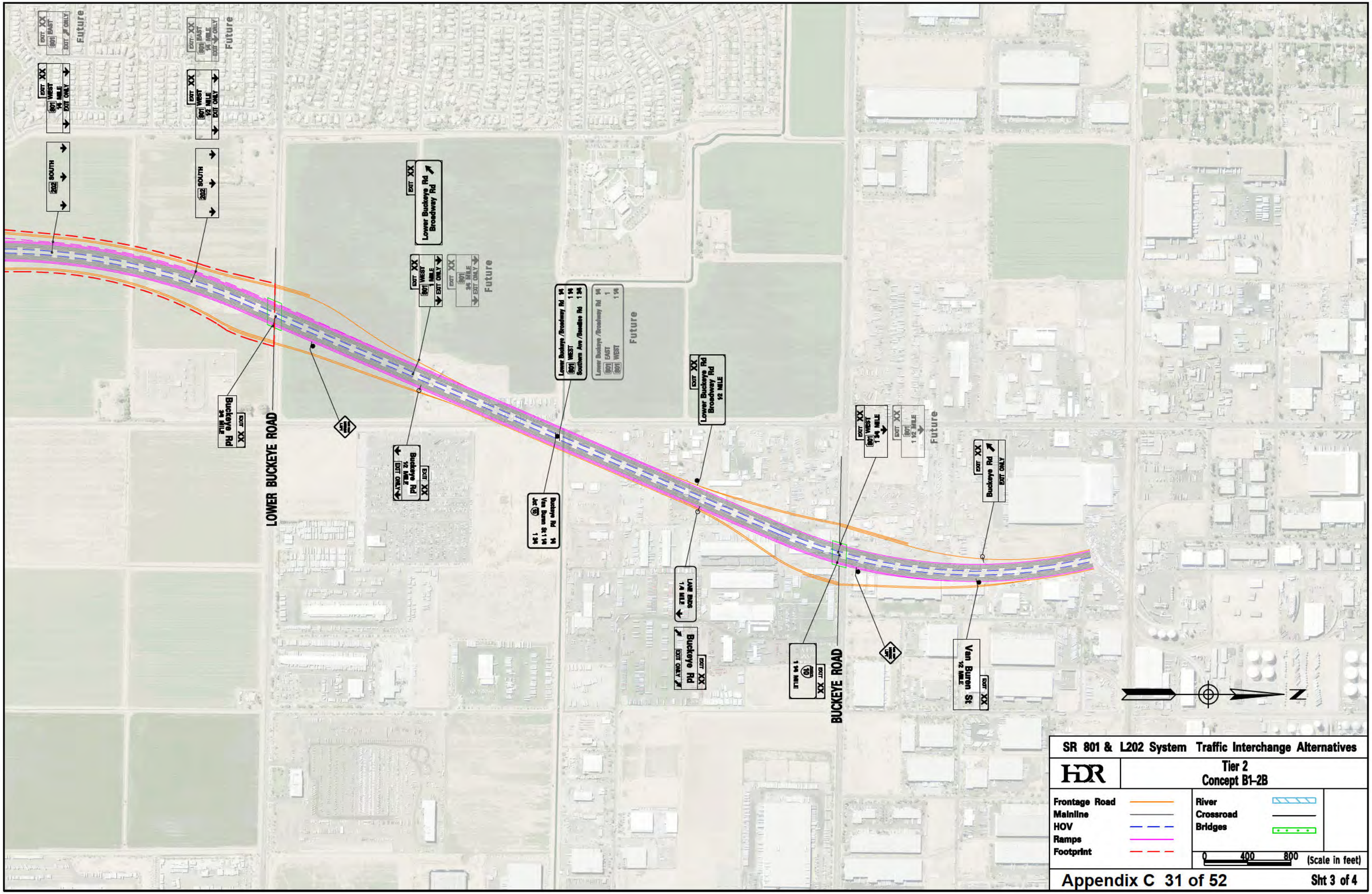
Tier 2
Concept B1-2B

Frontage Road
Mainline
HOV
Ramps
Footprint

River
Crossroad
Bridges

0 400 800 (Scale in feet)


SOUTHERN AVENUE
SALT RIVER FLOODWAY
SR 801
BROADWAY ROAD
59th AVENUE
Baseline Rd
Lower Buckeye Rd
Broadway Rd
Future
NORTH
WEST
EAST
EXIT XX
EXIT ONLY
Southern Ave Baseline Rd
1/4 MILE
1/2 MILE
3/4 MILE
ES Ramp
SW Ramp
HOV Ramp
WS Ramp
NW Ramp
SE Ramp
NE Ramp
EN Ramp
WN Ramp
L 202
Southern Ave /Baseline Rd
Dobbins Rd
Elliot Rd
Broadway Rd
Van Buren St
RIGHT LANE ENDS
1/2 MILE
SR 801 & L202 System Traffic Interchange Alternatives
HDR
Tier 2
Concept B1-2B
Frontage Road
Mainline
HOV
Ramps
Footprint
River
Crossroad
Bridges
0
400
800
(Scale in feet)
Appendix C 30 of 52
Sht 2 of 4


LOWER BUCKEYE ROAD
BUCKEYE ROAD
Buckeye Rd ¾ MILE
Lower Buckeye Rd Broadway Rd
Lower Buckeye Rd Broadway Rd ½ MILE
Van Buren St ½ MILE
Future
SR 801 & L202 System Traffic Interchange Alternatives
HDR
Tier 2
Concept B1-2B
Frontage Road
Mainline
HOV
Ramps
Footprint
River
Crossroad
Bridges
0 400 800 (Scale in feet)
Appendix C 31 of 52
Sht 3 of 4

SALT RIVER FLOODWAY

SR 801

75th AVENUE

67th AVENUE

83rd Ave 1/4
91st Ave 1 1/4
107th Ave 3 1/4

RIGHT LANE
EXIT ONLY

EXIT XX
83rd Ave
1/2 MILE
EXIT ONLY

EXIT XX
83rd Ave
3/4 MILE

83rd Ave 1 1/4
91st Ave 2 1/4
107th Ave 4 1/4

Future

Future

Future

Future

N

SR 801 & L202 System Traffic Interchange Alternatives

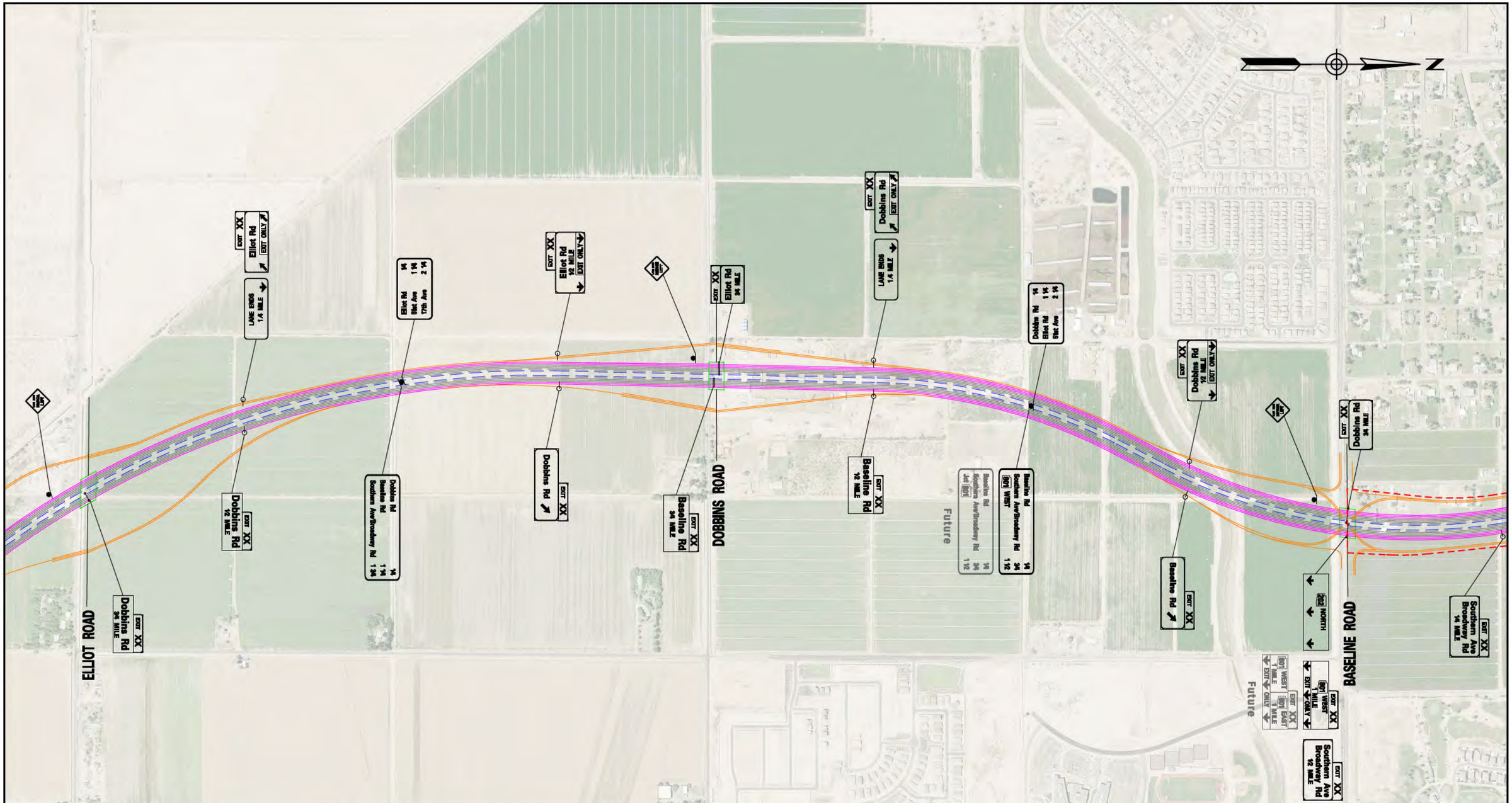
HDR

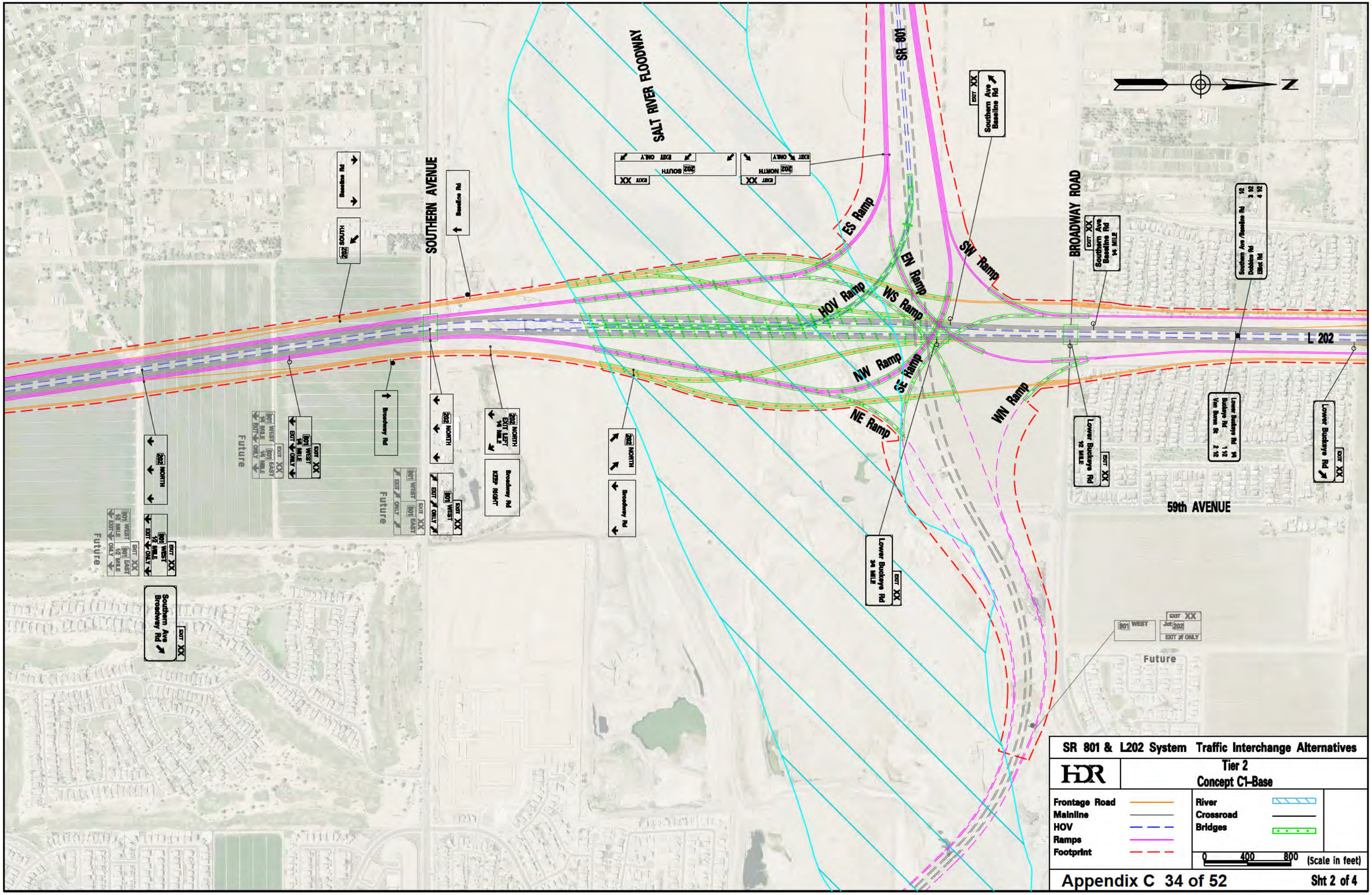
Tier 2
Concept B1-2B

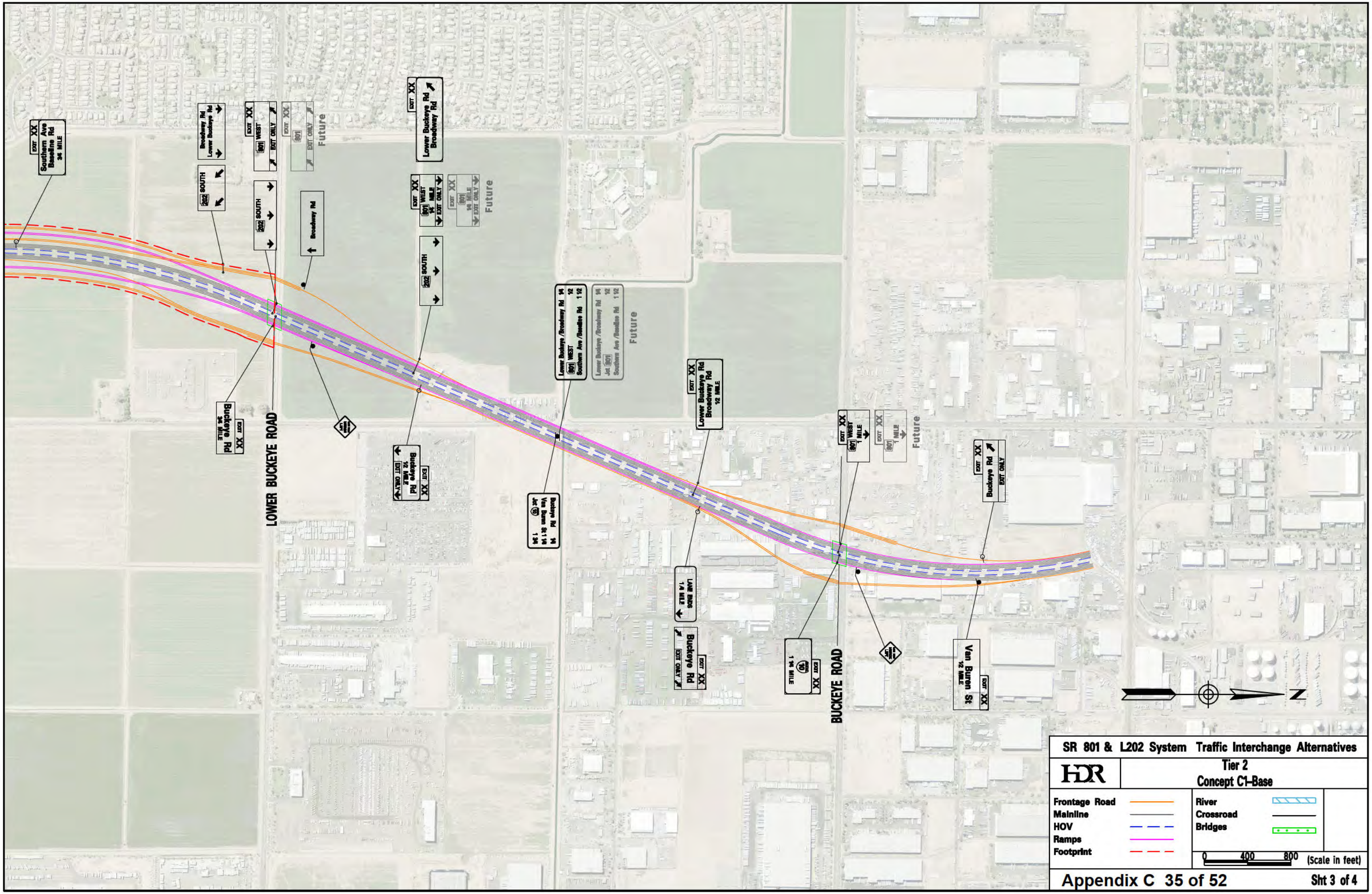
Frontage Road
Mainline
HOV
Ramps
Footprint

River
Crossroad
Bridges

0 400 800 (Scale in feet)


N
ELLIOT ROAD
DOBBINS ROAD
BASELINE ROAD
Future
Future
Future
Elliot Rd
LANE ENDS 1/4 MILE
Elliot Rd 1/2 MILE EXIT ONLY
Elliot Rd 3/4 MILE EXIT ONLY
Dobbins Rd EXIT ONLY
LANE ENDS 1/4 MILE
Dobbins Rd 1/2 MILE EXIT ONLY
Dobbins Rd 3/4 MILE
Baseline Rd 1/2 MILE
Baseline Rd 3/4 MILE
Southern Ave/Broadway Rd 1/2 MILE
Southern Ave/Broadway Rd 1/4 MILE
Dobbins Rd 1/2 MILE
Dobbins Rd 3/4 MILE
Baseline Rd
Southern Ave/Broadway Rd 1/4 MILE
Southern Ave/Broadway Rd 1/2 MILE
Southern Ave/Broadway Rd 1/4 MILE
202 NORTH
WEST 1/2 MILE EXIT ONLY
WEST 1 MILE EXIT ONLY
EAST 1 MILE EXIT ONLY
Southern Ave/Broadway Rd 1/2 MILE
Southern Ave/Broadway Rd 1/4 MILE
SR 801 & L202 System Traffic Interchange Alternatives
HDR
Tier 2
Concept C1-Base
Frontage Road
Mainline
HOV
Ramps
Footprint
River
Crossroad
Bridges
0 400 800 (Scale in feet)


SALT RIVER FLOODWAY
SR 801
SOUTHERN AVENUE
BROADWAY ROAD
59th AVENUE
L 202
ES Ramp
EN Ramp
SW Ramp
HOV Ramp
WS Ramp
NW Ramp
SE Ramp
NE Ramp
WN Ramp
Baseline Rd
Broadway Rd
Southern Ave Baseline Rd
Lower Buckeye Rd
Future
N
SR 801 & L202 System Traffic Interchange Alternatives
Tier 2
Concept C1-Base
Frontage Road
Mainline
HOV
Ramps
Footprint
River
Crossroad
Bridges
0 400 800 (Scale in feet)
Appendix C 34 of 52
Sht 2 of 4


LOWER BUCKEYE ROAD
BUCKEYE ROAD
Broadway Rd
Future
Southern Ave
Baseline Rd
Lower Buckeye Rd
Broadway Rd
Buckeye Rd
Van Buren St
SOUTH
WEST
EAST
EXIT ONLY
SR 801 & L202 System Traffic Interchange Alternatives
HDR
Tier 2
Concept C1-Base
Frontage Road
Mainline
HOV
Ramps
Footprint
River
Crossroad
Bridges
0
400
800
(Scale in feet)
Appendix C 35 of 52
Sht 3 of 4

SALT RIVER FLOODWAY

SR 801

75th AVENUE

67th AVENUE

RIGHT LANE EXIT ONLY

EXIT XX 202 NORTH 1 3/4 MILES

EXIT XX 83rd Ave 1/2 MILE EXIT ONLY

EXIT XX 67th Ave 3/4 MILE

EXIT XX 83rd Ave 3/4 MILE

EXIT XX 67th Ave 1/2 MILE

Future

EXIT XX 67th Ave 1/4 MILE

EXIT 202 1 MILE

83rd Ave 1 1/4
91st Ave 2 1/4
107th Ave 4 1/4

EXIT XX 67th Ave

202 SOUTH 3/4 MILE

EXIT XX 202 NORTH 3/4 MILE

EXIT XX 202 SOUTH 1/2 MILE EXIT ONLY

EXIT XX 202 NORTH 1/2 MILE EXIT ONLY

Future

801 WEST

N

SR 801 & L202 System Traffic Interchange Alternatives

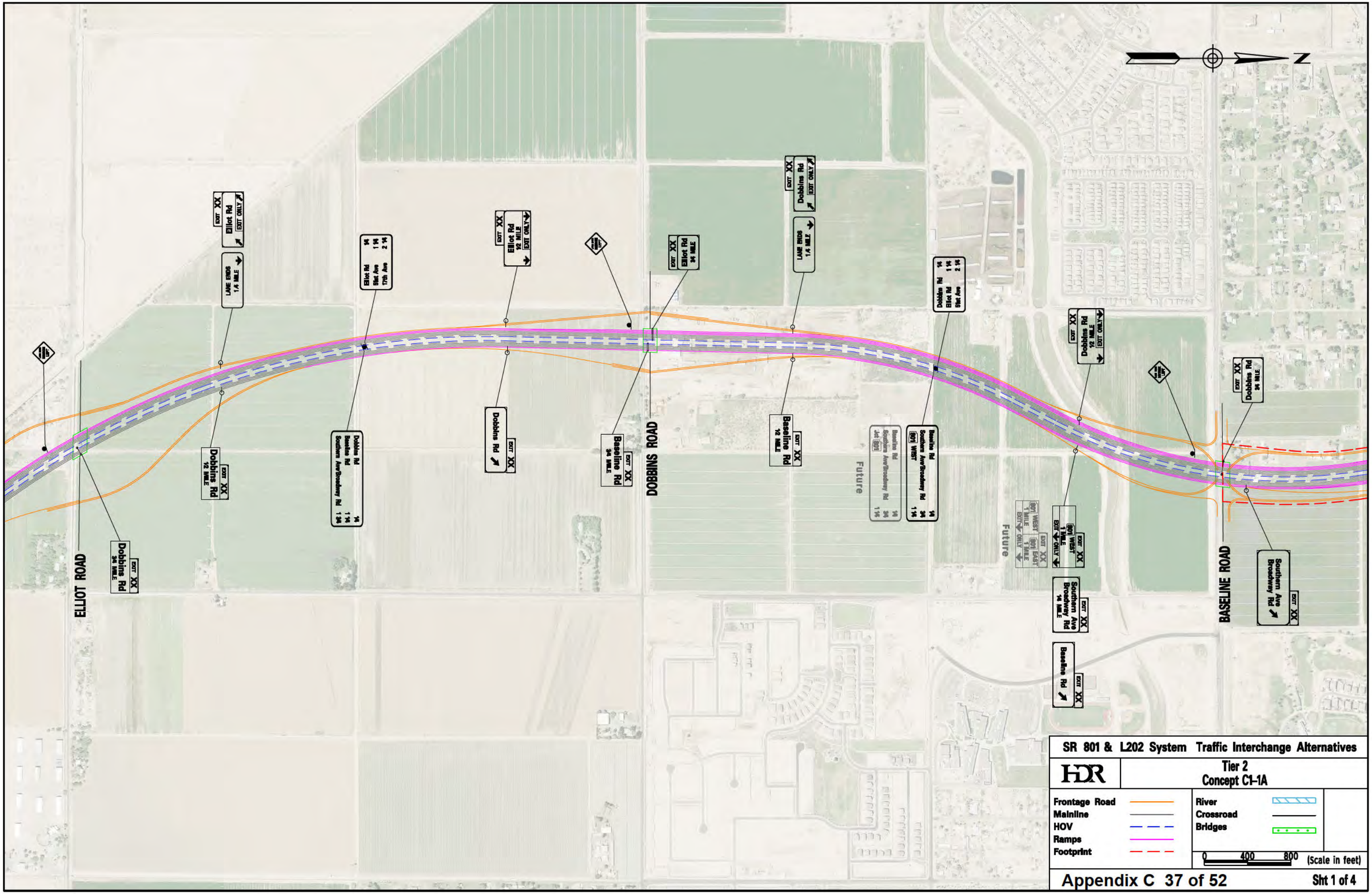
HDR

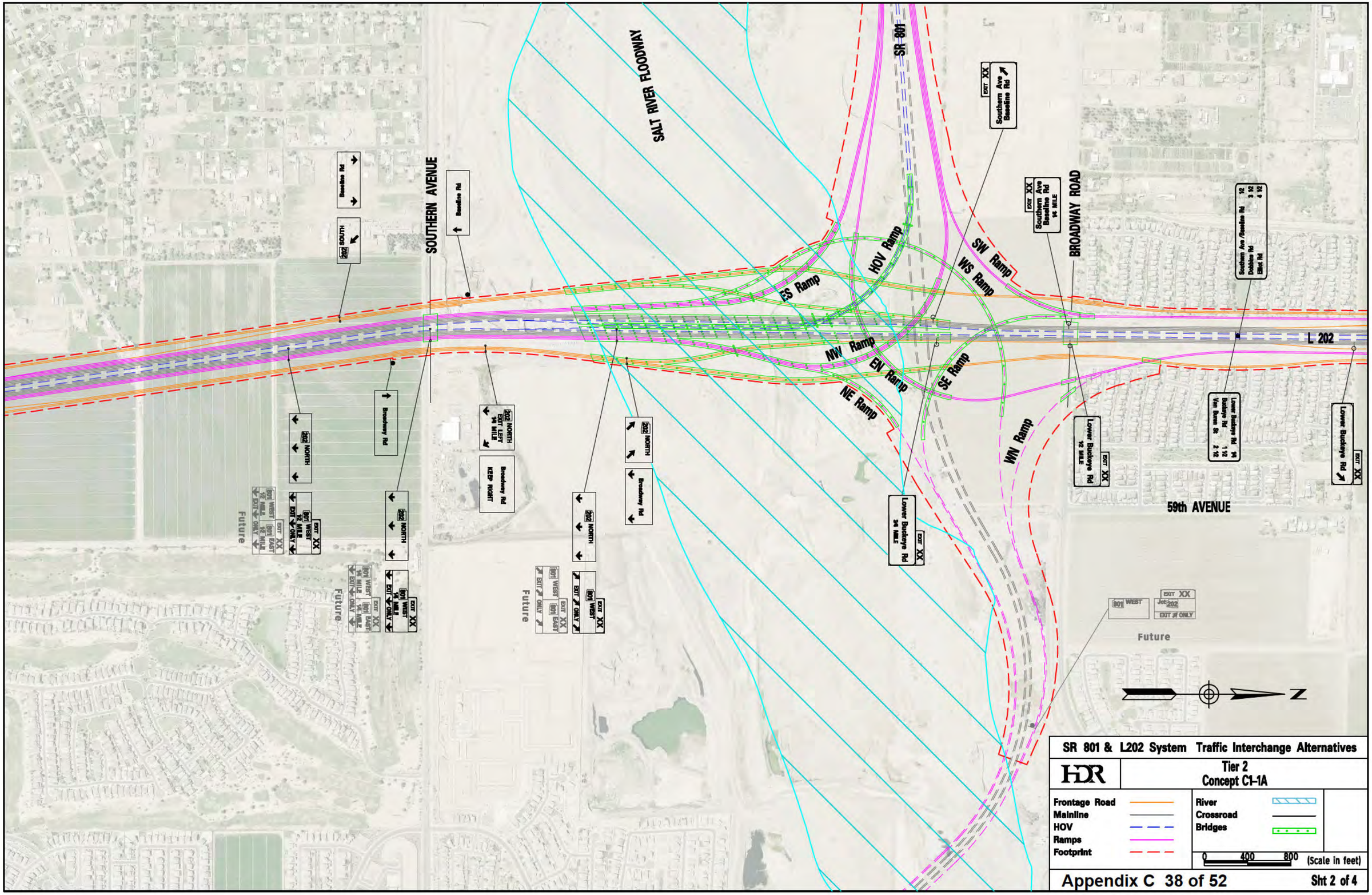
Tier 2
Concept C1-Base

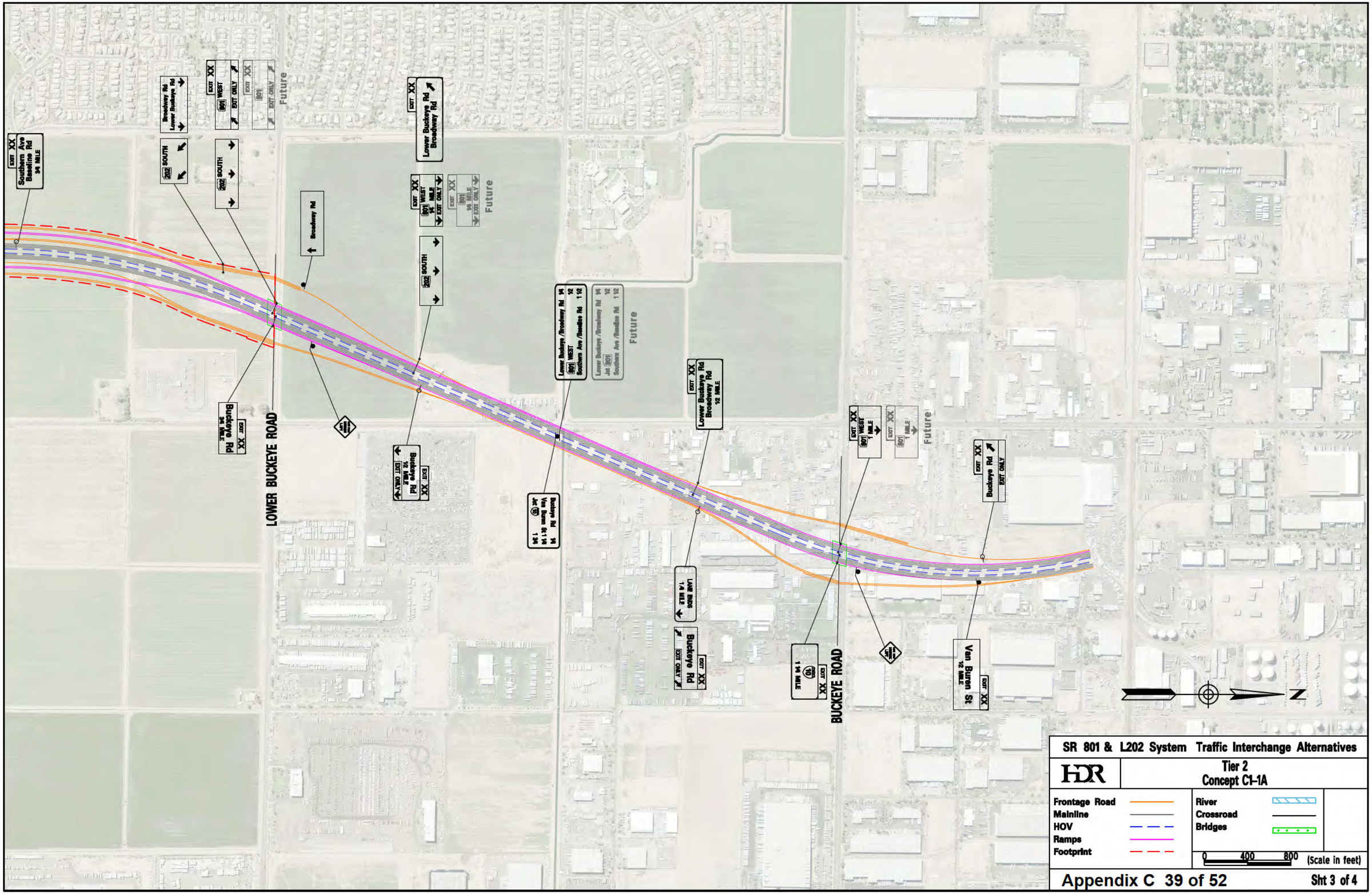
Frontage Road
Mainline
HOV
Ramps
Footprint

River
Crossroad
Bridges

0 400 800 (Scale in feet)


N
ELLIOT ROAD
DOBBINS ROAD
BASELINE ROAD
Future
Future
LANE ENDS 1/4 MILE
Elliot Rd 1/2 MILE EXIT ONLY
Elliot Rd 3/4 MILE
Dobbins Rd EXIT ONLY
LANE ENDS 1/4 MILE
Dobbins Rd 1/2 MILE EXIT ONLY
Dobbins Rd 3/4 MILE
Baseline Rd 1/2 MILE
Baseline Rd 3/4 MILE
Southern Ave/Broadway Rd (SR 801) WEST
Southern Ave/Broadway Rd (SR 801) EAST
Southern Ave Broadway Rd 1/4 MILE EXIT ONLY
Southern Ave Broadway Rd 1/4 MILE
Baseline Rd
Southern Ave Broadway Rd
SR 801 & L202 System Traffic Interchange Alternatives
HDR
Tier 2
Concept C1-1A
Frontage Road
Mainline
HOV
Ramps
Footprint
River
Crossroad
Bridges
0 400 800 (Scale in feet)
Appendix C 37 of 52
Sht 1 of 4


SALT RIVER FLOODWAY
SOUTHERN AVENUE
SR 801
BROADWAY ROAD
59th AVENUE
L 202
ES Ramp
HOV Ramp
SW Ramp
WS Ramp
NW Ramp
EN Ramp
SE Ramp
NE Ramp
WN Ramp
Baseline Rd
Broadway Rd
Southern Ave Baseline Rd
Southern Ave Baseline Rd 1/4 MILE
Southern Ave /Baseline Rd Dobbins Rd Elliot Rd
Lower Buckeye Rd 1/4 MILE
Lower Buckeye Rd 1/2 MILE
Lower Buckeye Rd 3/4 MILE
Lower Buckeye Rd Jct 202
Broadway Rd KEEP RIGHT
Future
N
SR 801 & L202 System Traffic Interchange Alternatives
HDR
Tier 2
Concept C1-1A
Frontage Road
Mainline
HOV
Ramps
Footprint
River
Crossroad
Bridges
0 400 800 (Scale in feet)
Appendix C 38 of 52
Sht 2 of 4



SR 801 & L202 System Traffic Interchange Alternatives

HDR

Tier 2
Concept C1-1A

Frontage Road	River
Mainline	Crossroad
HOV	Bridges
Ramps	
Footprint	

0 400 800 (Scale in feet)

SALT RIVER FLOODWAY

SR 801

75th AVENUE

67th AVENUE

RIGHT LANE EXIT ONLY

EXIT XX 83rd Ave ½ MILE EXIT ONLY

EXIT XX 67th Ave ¾ MILE

EXIT XX 83rd Ave ¾ MILE

EXIT XX 67th Ave ½ MILE

Future

83rd Ave 1 ¼
91st Ave 2 ¼
107th Ave 4 ¼

EXIT XX 67th Ave

EXIT XX SOUTH ½ MILE

EXIT XX NORTH ½ MILE

EXIT ONLY SOUTH ¾ MILE

EXIT ONLY NORTH ¾ MILE

EXIT WEST

EXIT ONLY SOUTH

EXIT ONLY NORTH

N

SR 801 & L202 System Traffic Interchange Alternatives

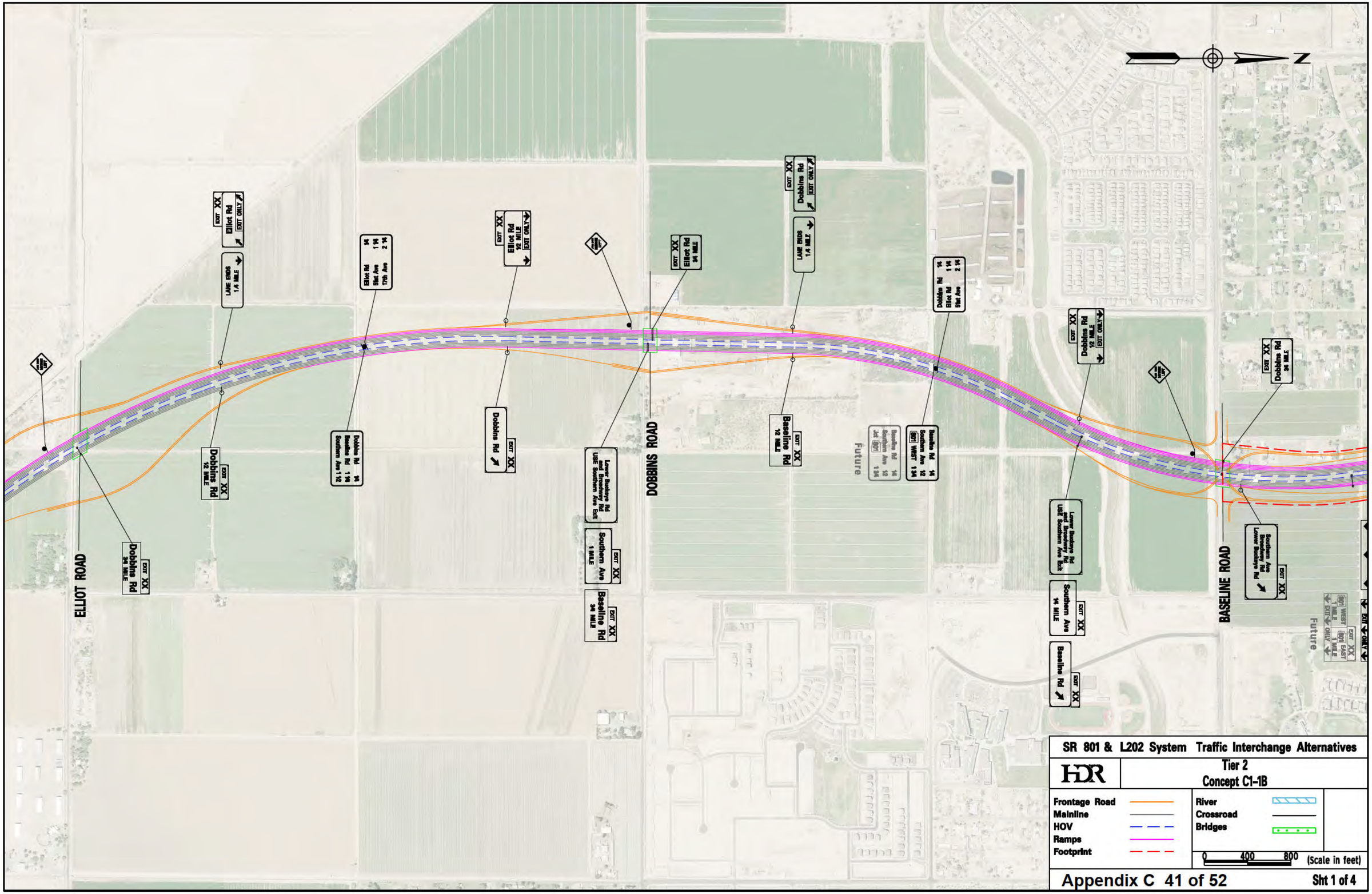
HDR

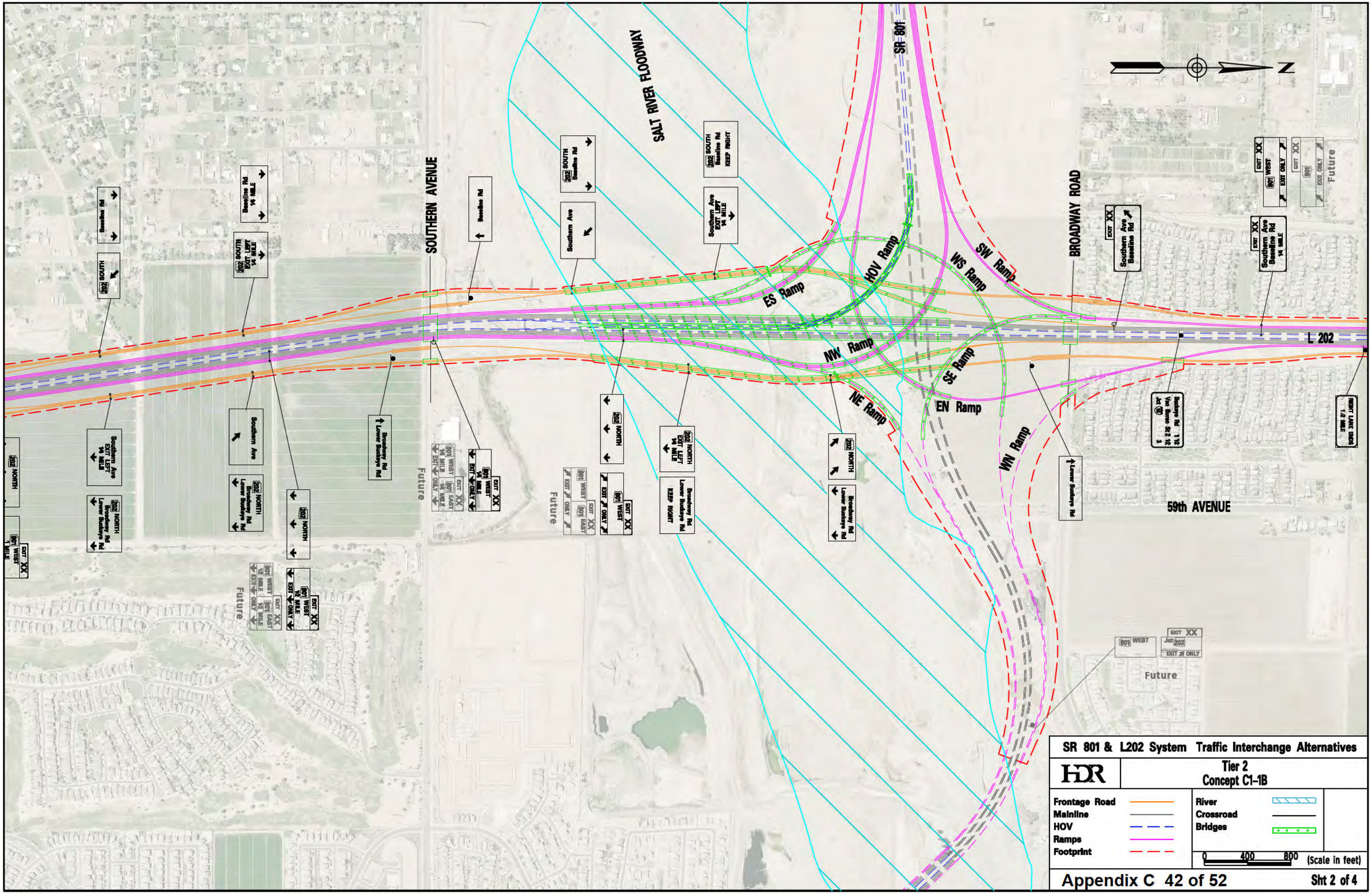
Tier 2
Concept C1-1A

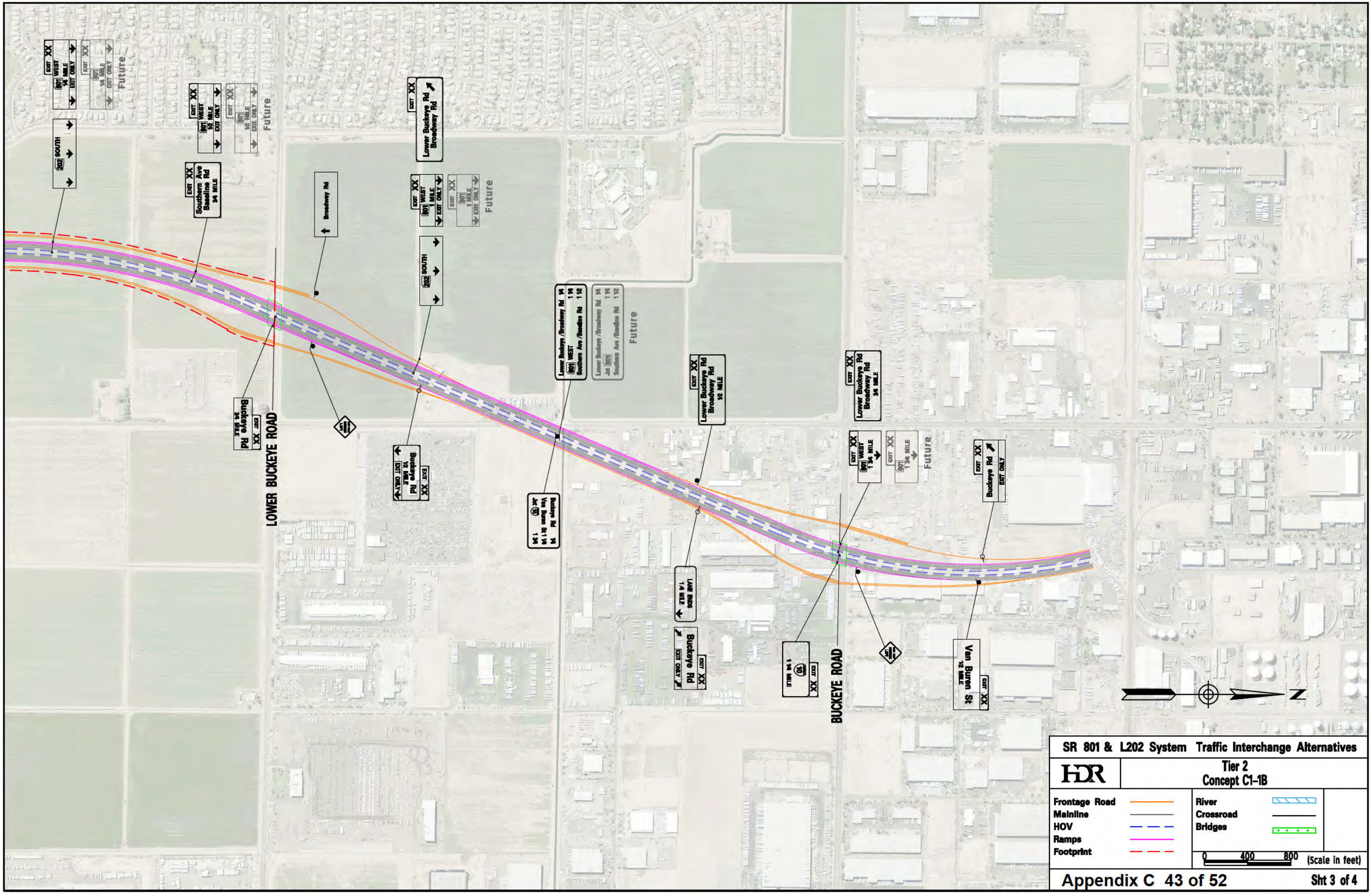
Frontage Road
Mainline
HOV
Ramps
Footprint

River
Crossroad
Bridges

0 400 800 (Scale in feet)


N
ELLIOT ROAD
DOBBINS ROAD
BASELINE ROAD
Future
Future
Elliot Rd
LANE ENDS 1/4 MILE
Elliot Rd 1/2 MILE EXIT ONLY
Elliot Rd 3/4 MILE EXIT ONLY
Dobbins Rd EXIT ONLY
LANE ENDS 1/4 MILE
Dobbins Rd 1/2 MILE EXIT ONLY
Dobbins Rd 3/4 MILE EXIT ONLY
Dobbins Rd
Dobbins Rd 1/2 MILE
Dobbins Rd 3/4 MILE
Baseline Rd 1/2 MILE
Baseline Rd 3/4 MILE
Southern Ave 1 MILE
Lower Buckeye Rd and Broadway Rd USE Southern Ave East
Southern Ave 1/2 MILE
Southern Ave 1 MILE
Southern Ave Broadway Rd Lower Buckeye Rd
Baseline Rd
Baseline Rd
Southern Ave 1/2 MILE
Southern Ave 1 MILE
Lower Buckeye Rd and Broadway Rd USE Southern Ave East
Southern Ave 1/2 MILE
Southern Ave 1 MILE
Baseline Rd
Baseline Rd
SR 801 & L202 System Traffic Interchange Alternatives
HDR
Tier 2
Concept C1-1B
Frontage Road
Mainline
HOV
Ramps
Footprint
River
Crossroad
Bridges
0 400 800 (Scale in feet)
Appendix C 41 of 52
Sht 1 of 4


SOUTHERN AVENUE
SALT RIVER FLOODWAY
SR 801
BROADWAY ROAD
59th AVENUE
L 202
SW Ramp
WS Ramp
HOV Ramp
ES Ramp
NW Ramp
NE Ramp
SE Ramp
EN Ramp
WN Ramp
Future
N
SR 801 & L202 System Traffic Interchange Alternatives
HDR
Tier 2
Concept C1-1B
Frontage Road
Mainline
HOV
Ramps
Footprint
River
Crossroad
Bridges
0 400 800 (Scale in feet)
Appendix C 42 of 52
Sht 2 of 4



SR 801 & L202 System Traffic Interchange Alternatives

HDR

Tier 2
Concept C1-1B

Frontage Road	River
Mainline	Crossroad
HOV	Bridges
Ramps	
Footprint	

0 400 800 (Scale in feet)

SALT RIVER FLOODWAY

SR 801

75th AVENUE

67th AVENUE

RIGHT LANE EXIT ONLY

83rd Ave 1/2 MILE EXIT ONLY

67th Ave 3/4 MILE

83rd Ave 3/4 MILE

67th Ave 1/2 MILE

Future

83rd Ave 1 1/4
91st Ave 2 1/4
107th Ave 4 1/4

67th Ave

202 SOUTH 1/2 MILE

202 NORTH 1/2 MILE

202 SOUTH 1/4 MILE EXIT ONLY

202 NORTH 1/4 MILE EXIT ONLY

202 SOUTH EXIT ONLY

202 NORTH EXIT ONLY

SR 801 & L202 System Traffic Interchange Alternatives

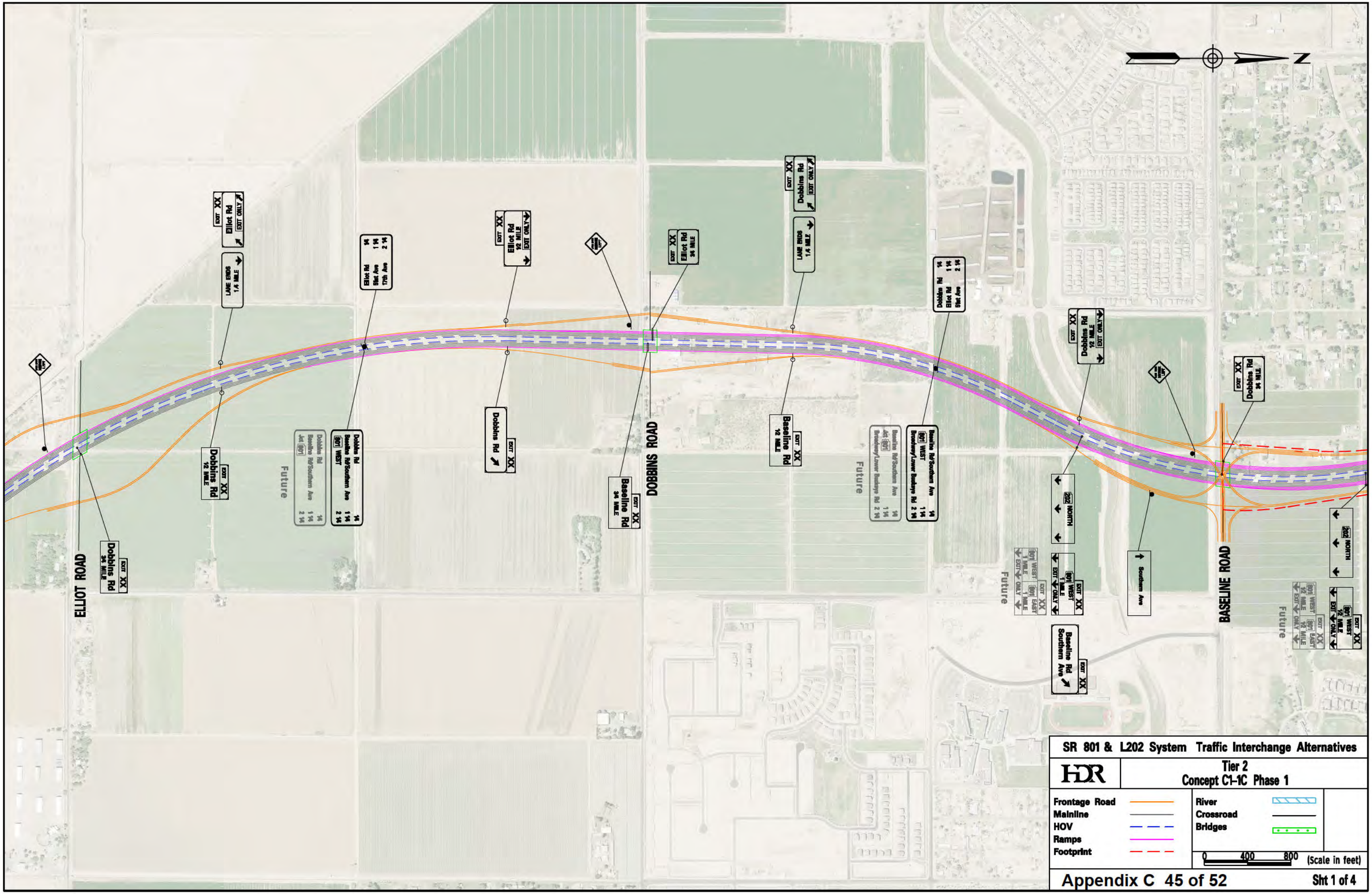
HDR

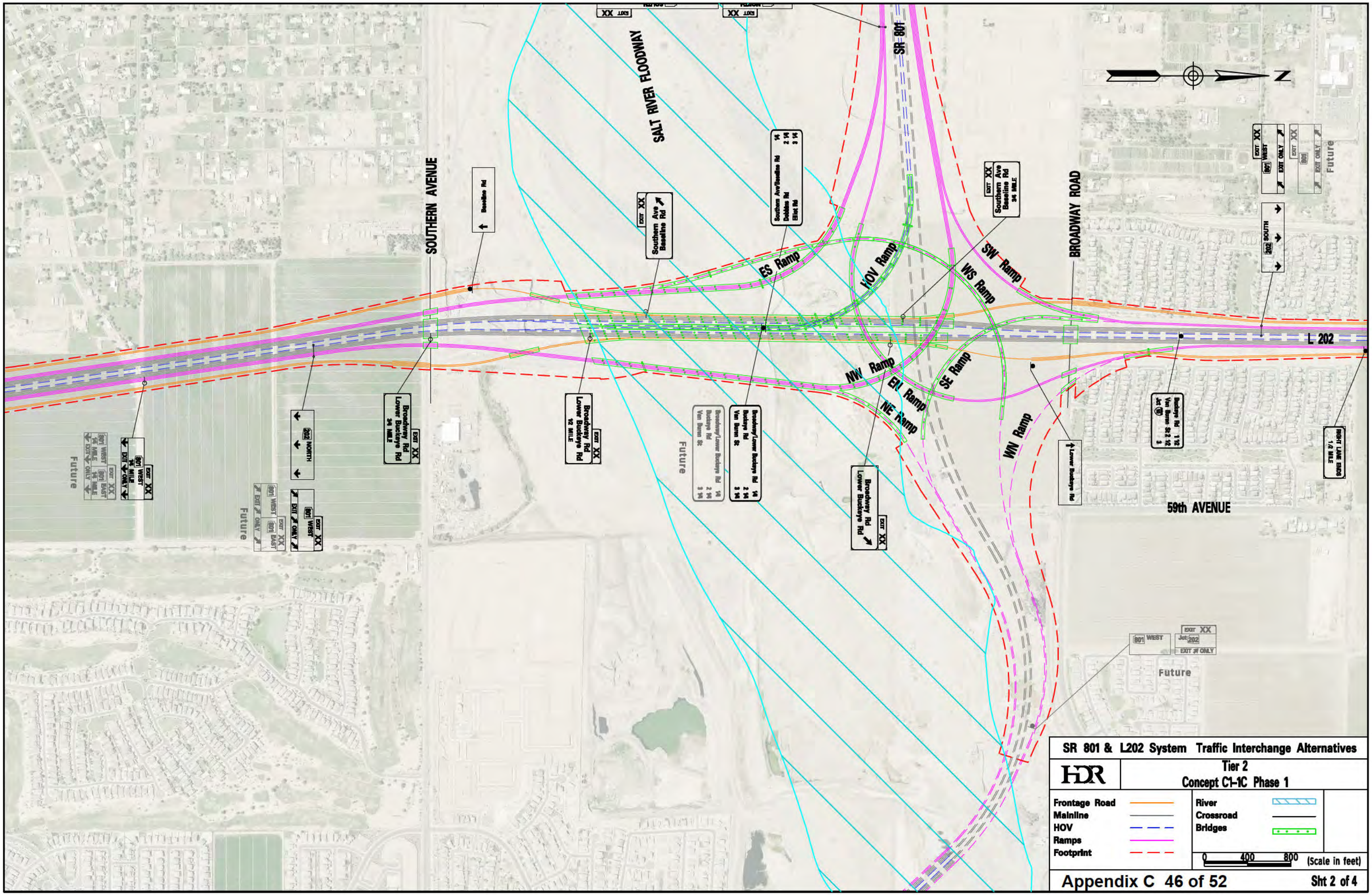
Tier 2
Concept C1-1B

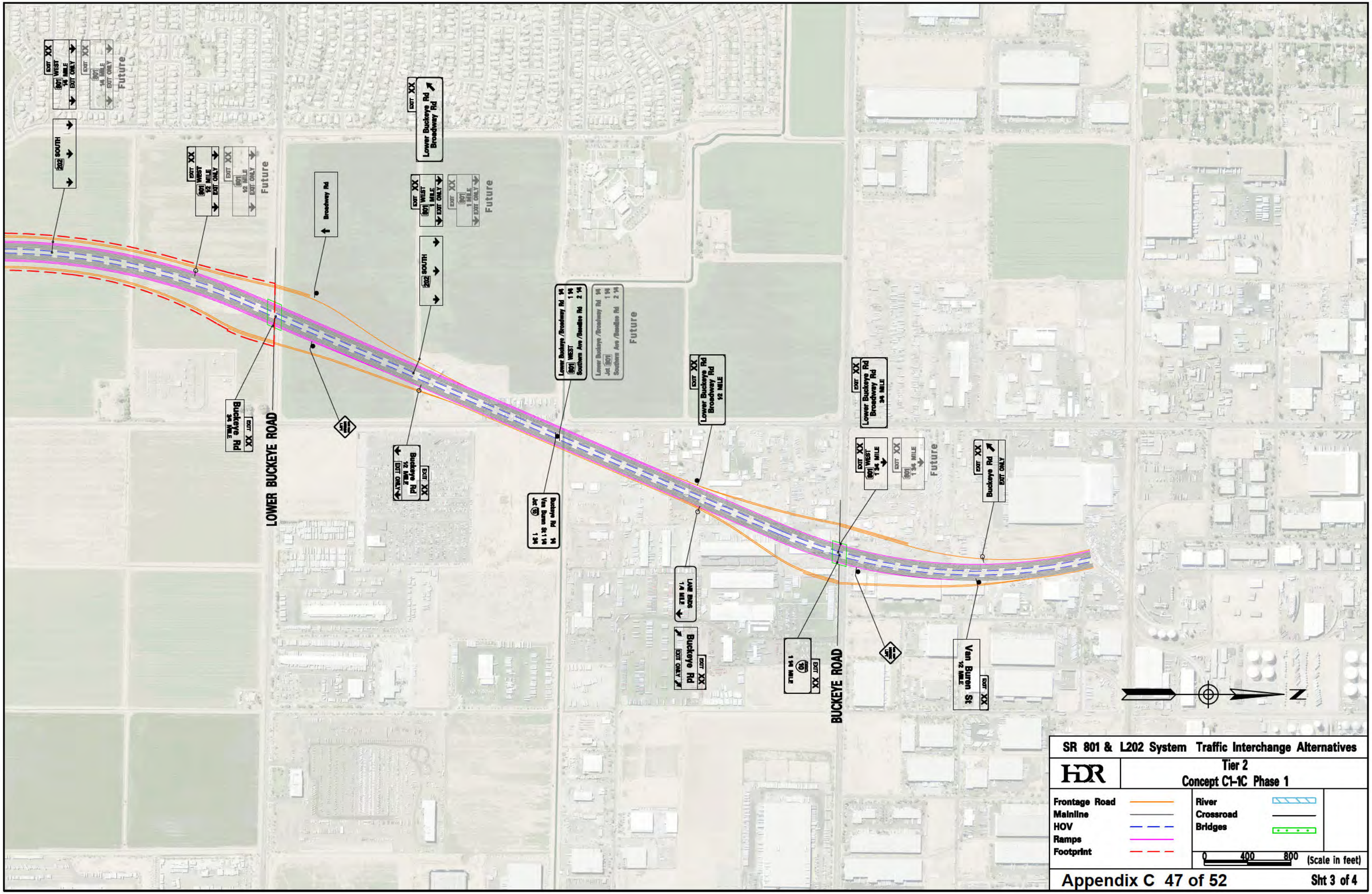
Frontage Road
Mainline
HOV
Ramps
Footprint

River
Crossroad
Bridges

0 400 800 (Scale in feet)


N
ELLIOT ROAD
DOBBINS ROAD
BASELINE ROAD
LANE ENDS 1/4 MILE
Elliot Rd 1/2 MILE
Elliot Rd 3/4 MILE
Dobbins Rd 1/2 MILE
Dobbins Rd 3/4 MILE
Baseline Rd 1/2 MILE
Baseline Rd 3/4 MILE
Baseline Rd/Southern Ave
Broadway/Lower Buckeye Rd
Elliot Rd 1/4 Mile 1/2 Mile 3/4 Mile 1 Mile 17th Ave
Dobbins Rd 1/4 Mile 1/2 Mile 3/4 Mile 1 Mile 91st Ave
Baseline Rd/Southern Ave 1/4 Mile 1/2 Mile 3/4 Mile 1 Mile
Broadway/Lower Buckeye Rd 1/4 Mile 1/2 Mile 3/4 Mile 1 Mile
Dobbins Rd Baseline Rd/Southern Ave 1/4 Mile 1/2 Mile 3/4 Mile 1 Mile
Baseline Rd/Southern Ave 1/4 Mile 1/2 Mile 3/4 Mile 1 Mile
202 NORTH
Southern Ave
Future
SR 801 & L202 System Traffic Interchange Alternatives
HDR
Tier 2
Concept C1-1C Phase 1
Frontage Road
Mainline
HOV
Ramps
Footprint
River
Crossroad
Bridges
0 400 800 (Scale in feet)
Appendix C 45 of 52
Sht 1 of 4


SOUTHERN AVENUE
SALT RIVER FLOODWAY
SR 801
BROADWAY ROAD
59th AVENUE
L 202
ES Ramp
HOV Ramp
WS Ramp
SW Ramp
MW Ramp
EN Ramp
NE Ramp
SE Ramp
WN Ramp
Baseline Rd
Southern Ave Baseline Rd
Broadway Rd Lower Buckeye Rd
Broadway/Lower Buckeye Rd Buckeye Rd Van Buren St
Southern Ave/Baseline Rd Dobbins Rd Elliot Rd
Buckeye Rd Van Buren St
Lower Buckeye Rd
RIGHT LANE EXITS 1/2 MILE
EXIT XX
801 WEST
801 EAST
EXIT ONLY
202 SOUTH
202 NORTH
Jct 202
Future
N
SR 801 & L202 System Traffic Interchange Alternatives
HDR
Tier 2
Concept C1-1C Phase 1
Frontage Road
Mainline
HOV
Ramps
Footprint
River
Crossroad
Bridges
0 400 800 (Scale in feet)
Appendix C 46 of 52
Sht 2 of 4



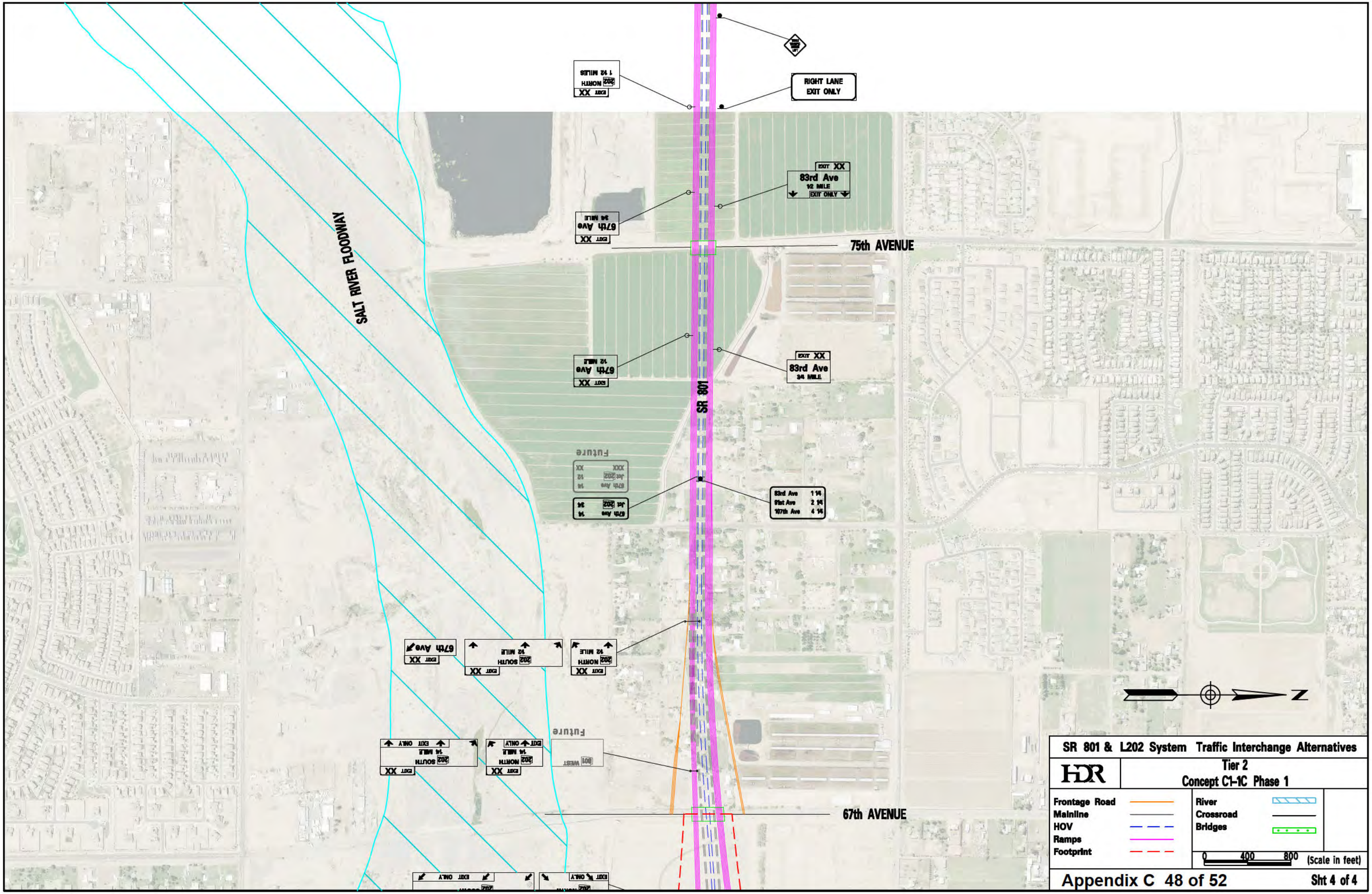
SR 801 & L202 System Traffic Interchange Alternatives

HDR

Tier 2
Concept C1-1C Phase 1

Frontage Road	River
Mainline	Crossroad
HOV	Bridges
Ramps	
Footprint	

0 400 800 (Scale in feet)



SR 801 & L202 System Traffic Interchange Alternatives

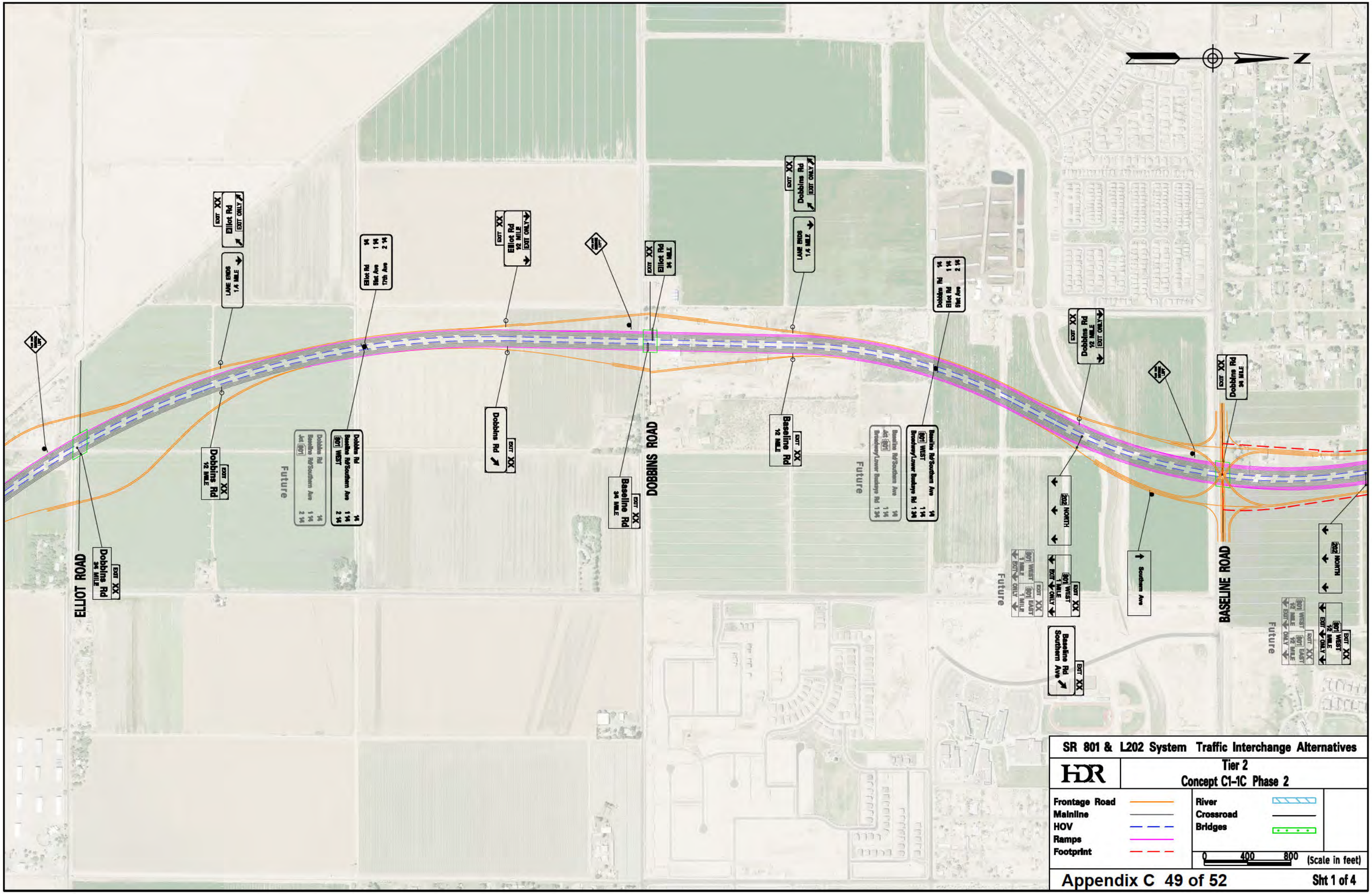
HDR

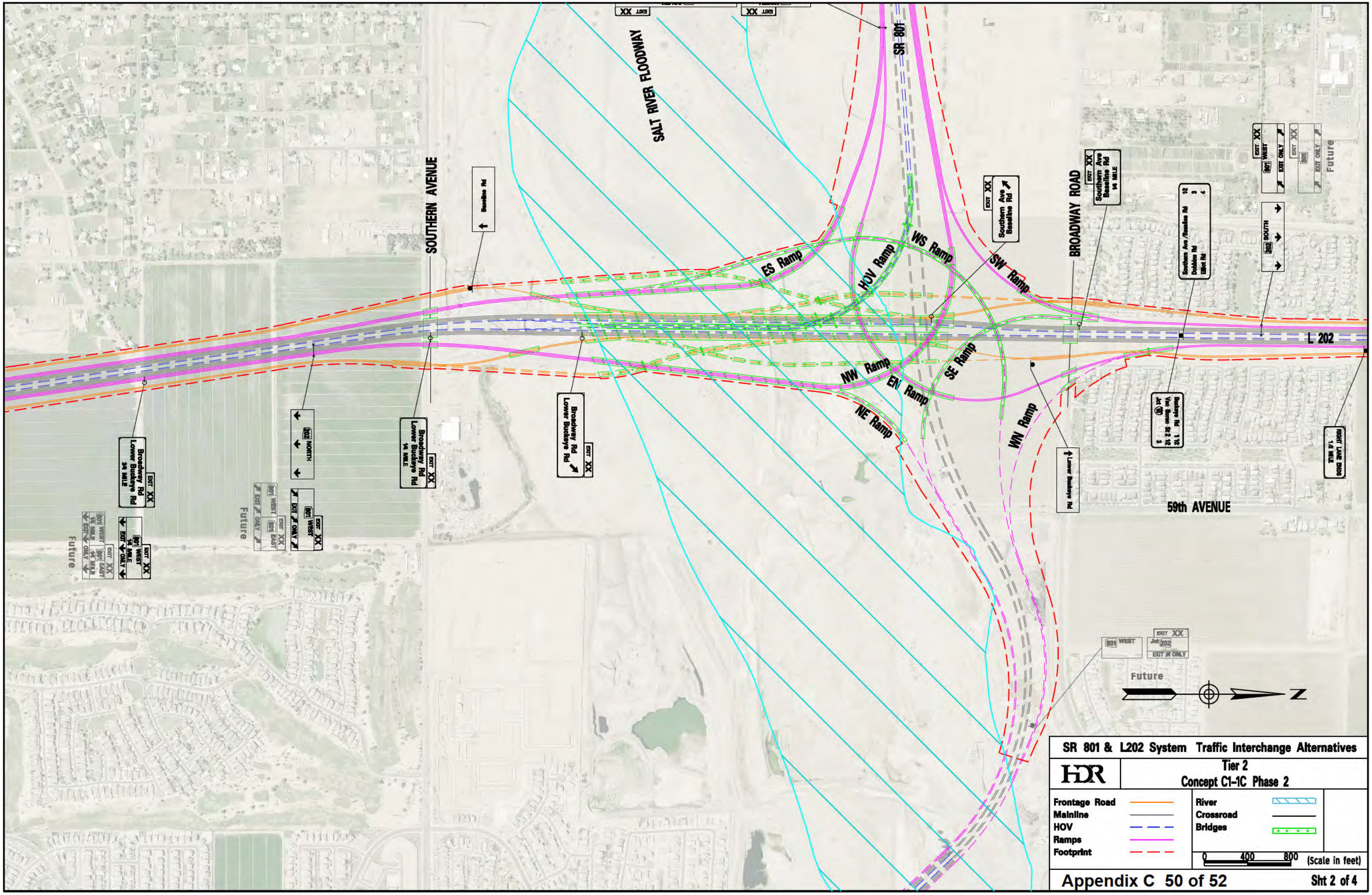
Tier 2
Concept C1-1C Phase 1

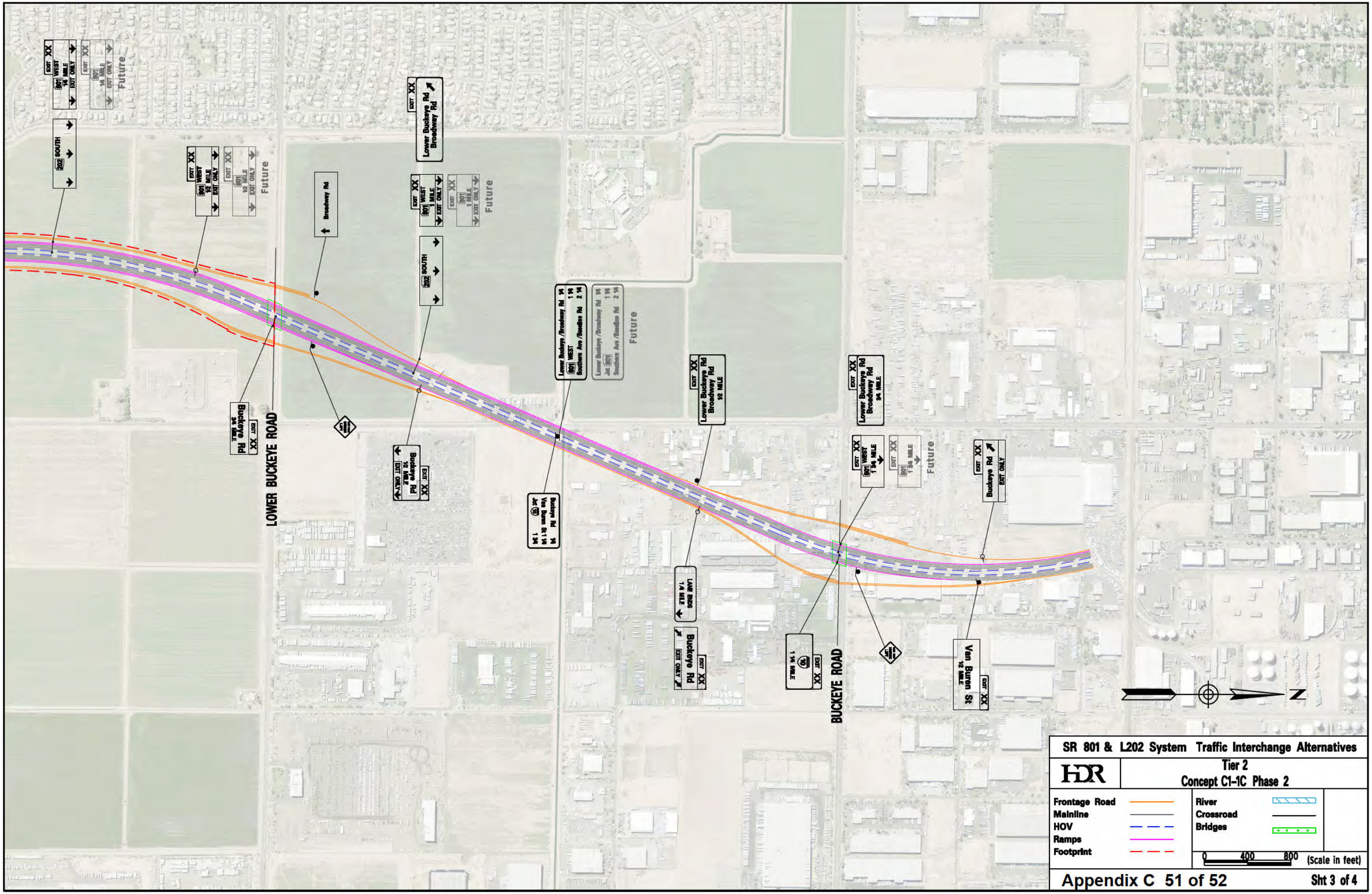
Frontage Road
Mainline
HOV
Ramps
Footprint

River
Crossroad
Bridges

0 400 800 (Scale in feet)


N
ELLIOT ROAD
DOBBINS ROAD
BASELINE ROAD
Future
LANE ENDS 1/4 MILE
Elliot Rd EXIT ONLY
Elliot Rd 1/2 MILE EXIT ONLY
Elliot Rd 3/4 MILE
Dobbins Rd EXIT ONLY
Dobbins Rd 1/2 MILE EXIT ONLY
Dobbins Rd 3/4 MILE
Baseline Rd 1/2 MILE
Baseline Rd 3/4 MILE
Baseline Rd/Southern Ave
Southern Ave
202 NORTH
801 WEST
801 EAST
SR 801 & L202 System Traffic Interchange Alternatives
HDR
Tier 2
Concept C1-1C Phase 2
Frontage Road
Mainline
HOV
Ramps
Footprint
River
Crossroad
Bridges
0 400 800 (Scale in feet)
Appendix C 49 of 52
Sht 1 of 4


SOUTHERN AVENUE
SALT RIVER FLOODWAY
SR 801
Baseline Rd
ES Ramp
WS Ramp
HOV Ramp
SW Ramp
SE Ramp
NW Ramp
EN Ramp
NE Ramp
WN Ramp
BROADWAY ROAD
Southern Ave Baseline Rd
Broadway Rd Lower Buckeye Rd
L 202
59th AVENUE
Future
NORTH
SOUTH
WEST
EAST
EXIT ONLY
RIGHT LANE ENDS 1/2 MILE
Z
SR 801 & L202 System Traffic Interchange Alternatives
HDR
Tier 2
Concept C1-1C Phase 2
Frontage Road
Mainline
HOV
Ramps
Footprint
River
Crossroad
Bridges
0 400 800 (Scale in feet)


LOWER BUCKEYE ROAD
BUCKEYE ROAD
Broadway Rd
Future
SOUTH
WEST
EXIT ONLY
Lower Buckeye Rd
Broadway Rd
Buckeye Rd
Van Buren St
LAMP RDS
Lower Buckeye /Broadway Rd
Southern Ave /Baseline Rd
Lower Buckeye Rd
Broadway Rd
Buckeye Rd
Buckeye Rd
Van Buren St
SR 801 & L202 System Traffic Interchange Alternatives
HDR
Tier 2
Concept C1-1C Phase 2
Frontage Road
Mainline
HOV
Ramps
Footprint
River
Crossroad
Bridges
0
400
800
(Scale in feet)
Appendix C 51 of 52
Sht 3 of 4

SALT RIVER FLOODWAY

SR 801

75th AVENUE

67th AVENUE

RIGHT LANE EXIT ONLY

EXIT XX 83rd Ave ½ MILE EXIT ONLY

EXIT XX 67th Ave ¾ MILE

EXIT XX 83rd Ave ¾ MILE

EXIT XX 67th Ave ½ MILE

Future

83rd Ave 1 ¼
91st Ave 2 ¼
107th Ave 4 ¼

202 NORTH ½ MILE

202 SOUTH ½ MILE

202 NORTH ½ MILE

202 SOUTH ¼ MILE EXIT ONLY

202 NORTH ¼ MILE EXIT ONLY

801 WEST

N

SR 801 & L202 System Traffic Interchange Alternatives

HDR

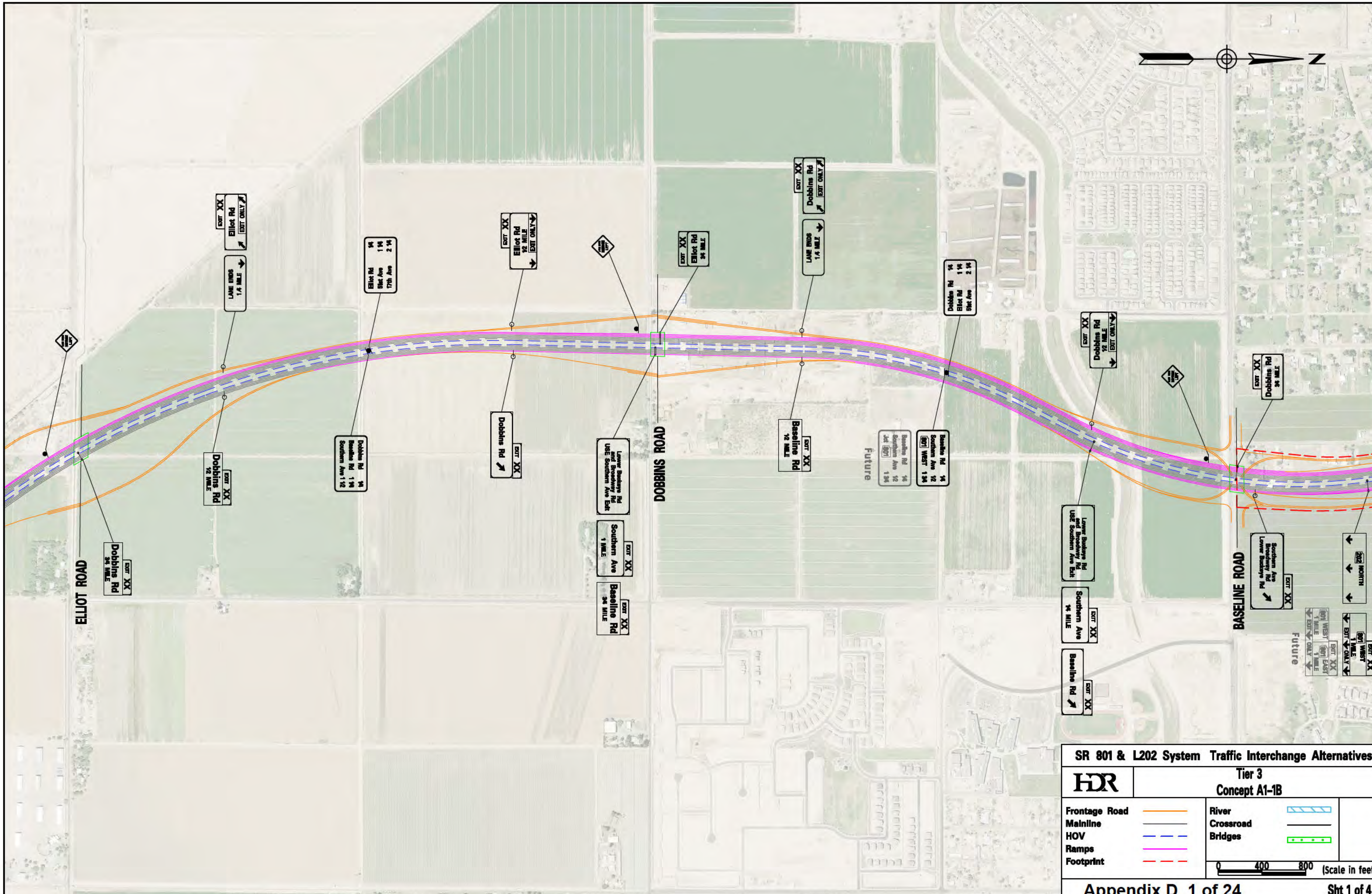
Tier 2
Concept C1-1C Phase 2

Frontage Road
Mainline
HOV
Ramps
Footprint

River
Crossroad
Bridges

0 400 800 (Scale in feet)

Appendix D –Tier 3 Concepts



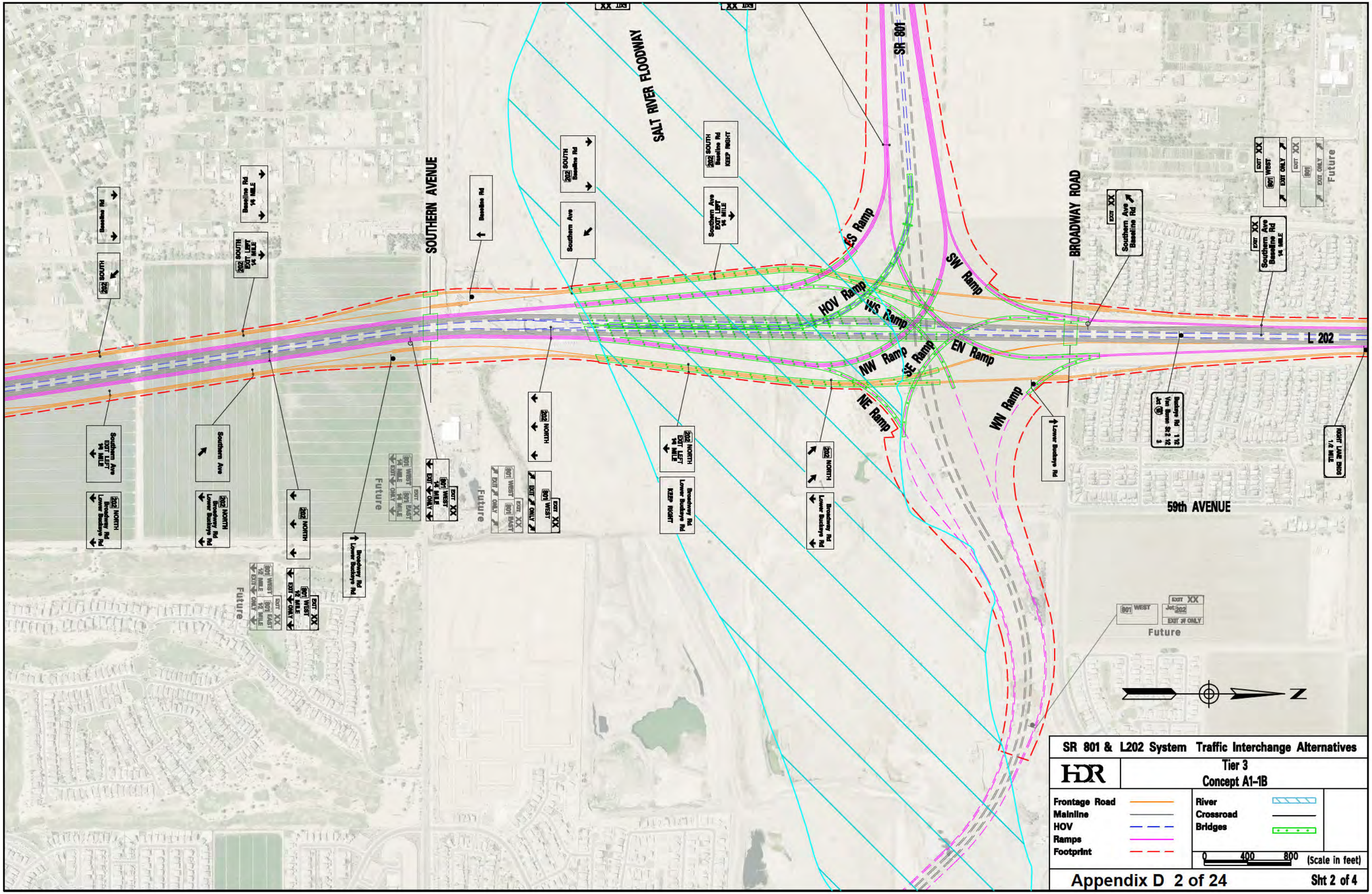
SR 801 & L202 System Traffic Interchange Alternatives

HDR

Tier 3
Concept A1-1B

Frontage Road		River	
Mainline		Crossroad	
HOV		Bridges	
Ramps			
Footprint			

0 400 800 (Scale in feet)



SR 801 & L202 System Traffic Interchange Alternatives

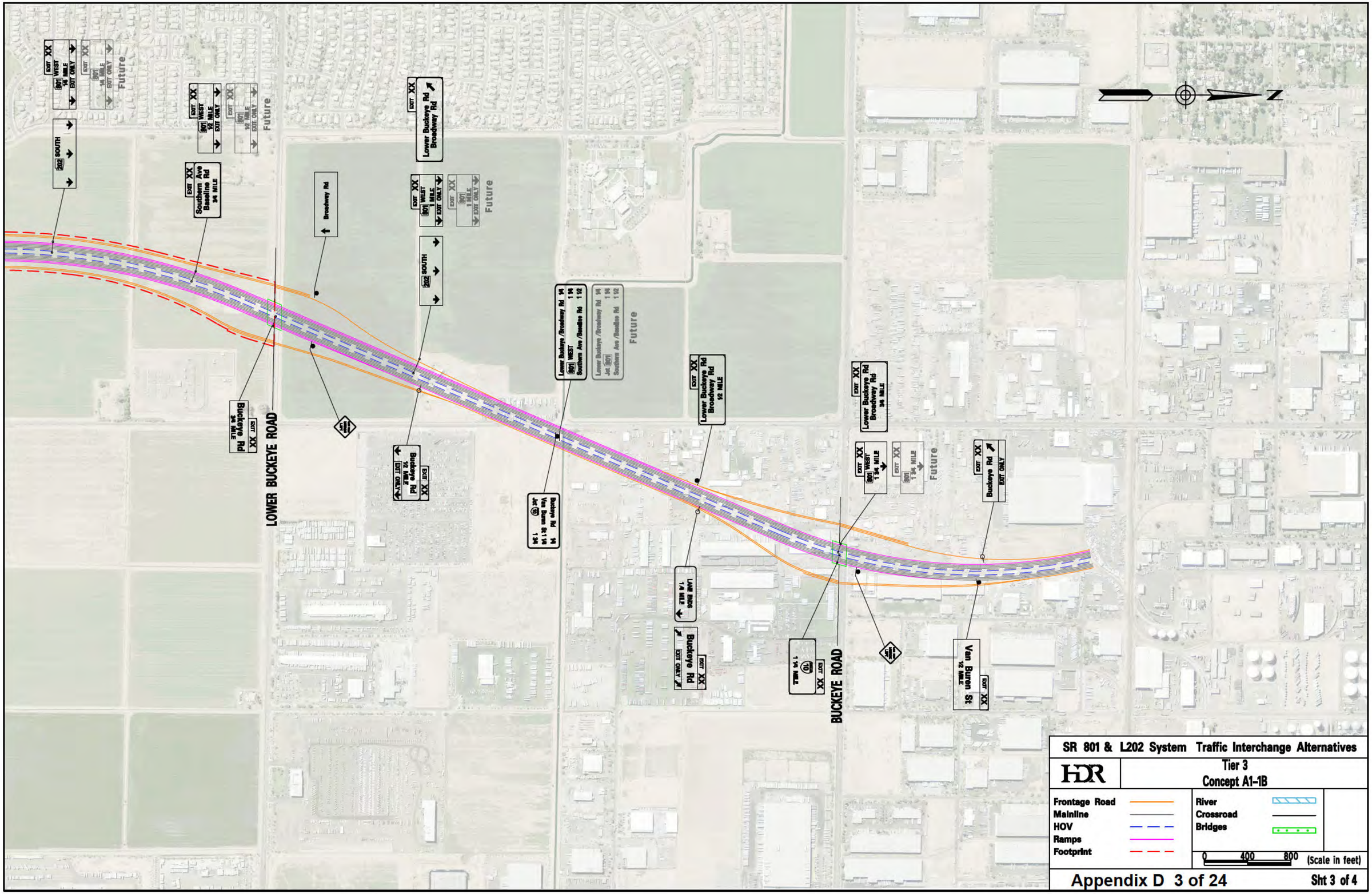
HDR

Tier 3
Concept A1-1B

Frontage Road
Mainline
HOV
Ramps
Footprint

River
Crossroad
Bridges

0 400 800 (Scale in feet)


Future
EXIT XX
WEST
¼ MILE
EXIT ONLY
SOUTH
202
Southern Ave
Baseline
¾ MILE
Broadway Rd
Lower Buckeye Rd
Broadway Rd
WEST
1 MILE
Lower Buckeye /Broadway Rd ¾
WEST 1 ¼
Southern Ave /Baseline Rd 1 ½
Lower Buckeye Rd
Broadway Rd
½ MILE
Buckeye Rd
¾ MILE
LOWER BUCKEYE ROAD
Buckeye Rd ¾
Van Buren St 1 ¼
LAMP RDS
1.4 MILE
Buckeye Rd
1 ¼ MILE
BUCKEYE ROAD
Van Buren St
½ MILE
N
SR 801 & L202 System Traffic Interchange Alternatives
HDR
Tier 3
Concept A1-1B
Frontage Road
Mainline
HOV
Ramps
Footprint
River
Crossroad
Bridges
0
400
800
(Scale in feet)
Appendix D 3 of 24
Sht 3 of 4

SALT RIVER FLOODWAY

SR 801

75th AVENUE

67th AVENUE

EXIT XX
83rd Ave
1/2 MILE
EXIT ONLY

RIGHT LANE
EXIT ONLY

EXIT XX
83rd Ave
3/4 MILE

EXIT XX
67th Ave
3/4 MILE

EXIT XX
67th Ave
1/2 MILE

Future

83rd Ave 1 1/4
91st Ave 2 1/4
107th Ave 4 1/4

EXIT XX
67th Ave

EXIT XX
202 SOUTH
1 MILE

EXIT XX
202 NORTH
1 MILE

Future

EXIT ONLY
202 SOUTH
1/2 MILE
EXIT XX

EXIT ONLY
202 NORTH
1/2 MILE
EXIT XX

101 WEST

EXIT ONLY
202 SOUTH

EXIT ONLY
202 NORTH

N

SR 801 & L202 System Traffic Interchange Alternatives

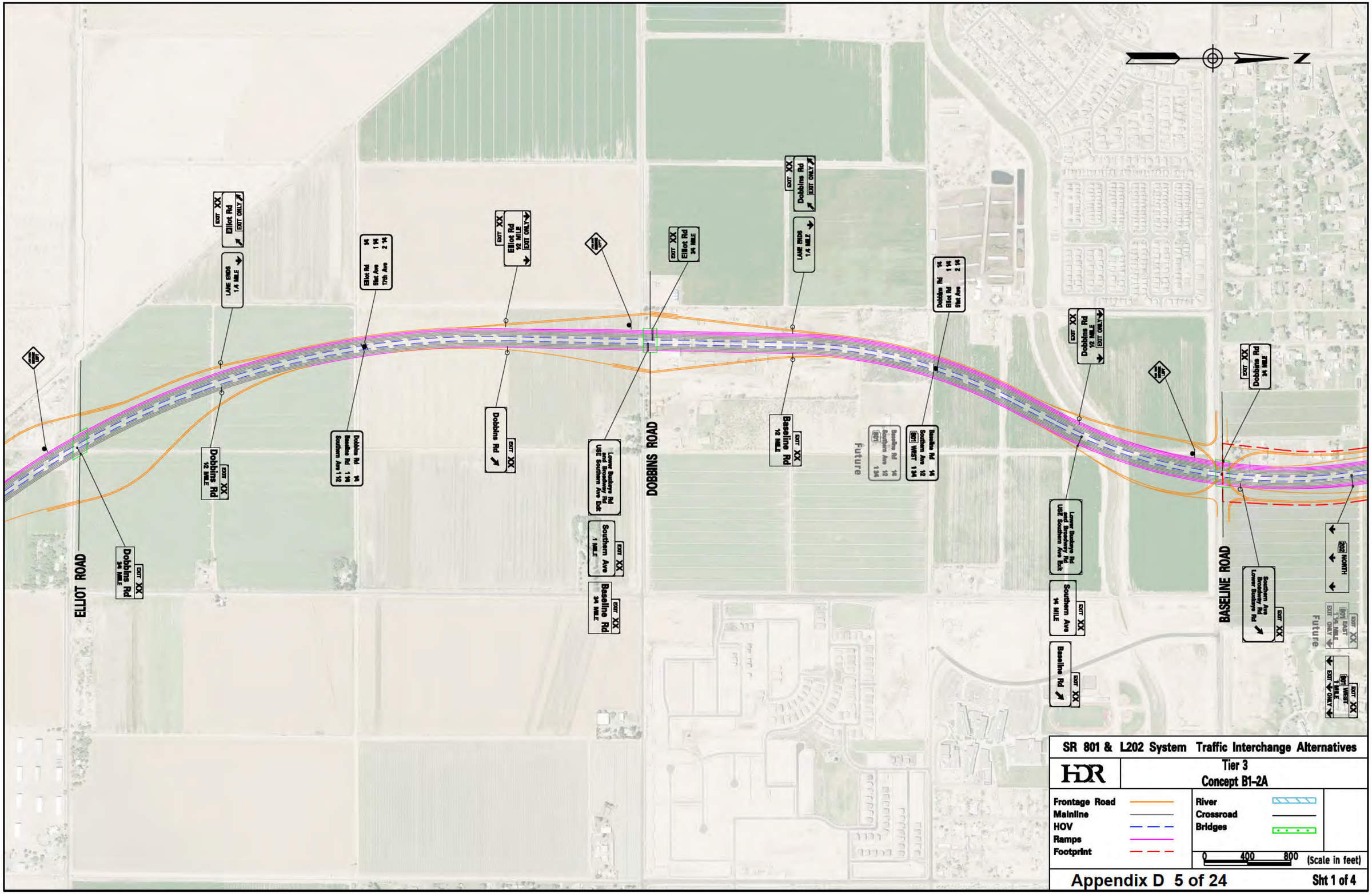
HDR

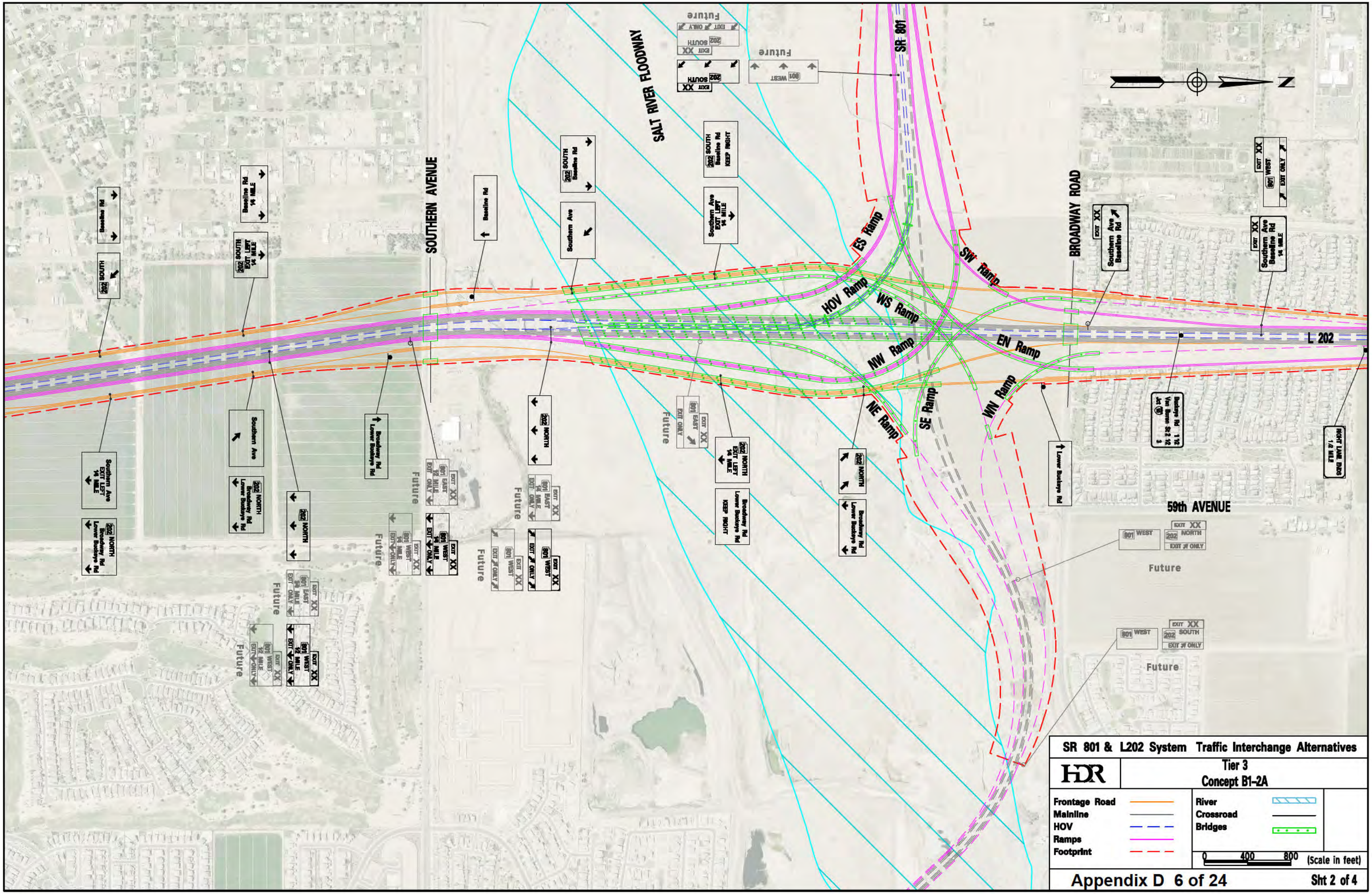
Tier 3
Concept A1-1B

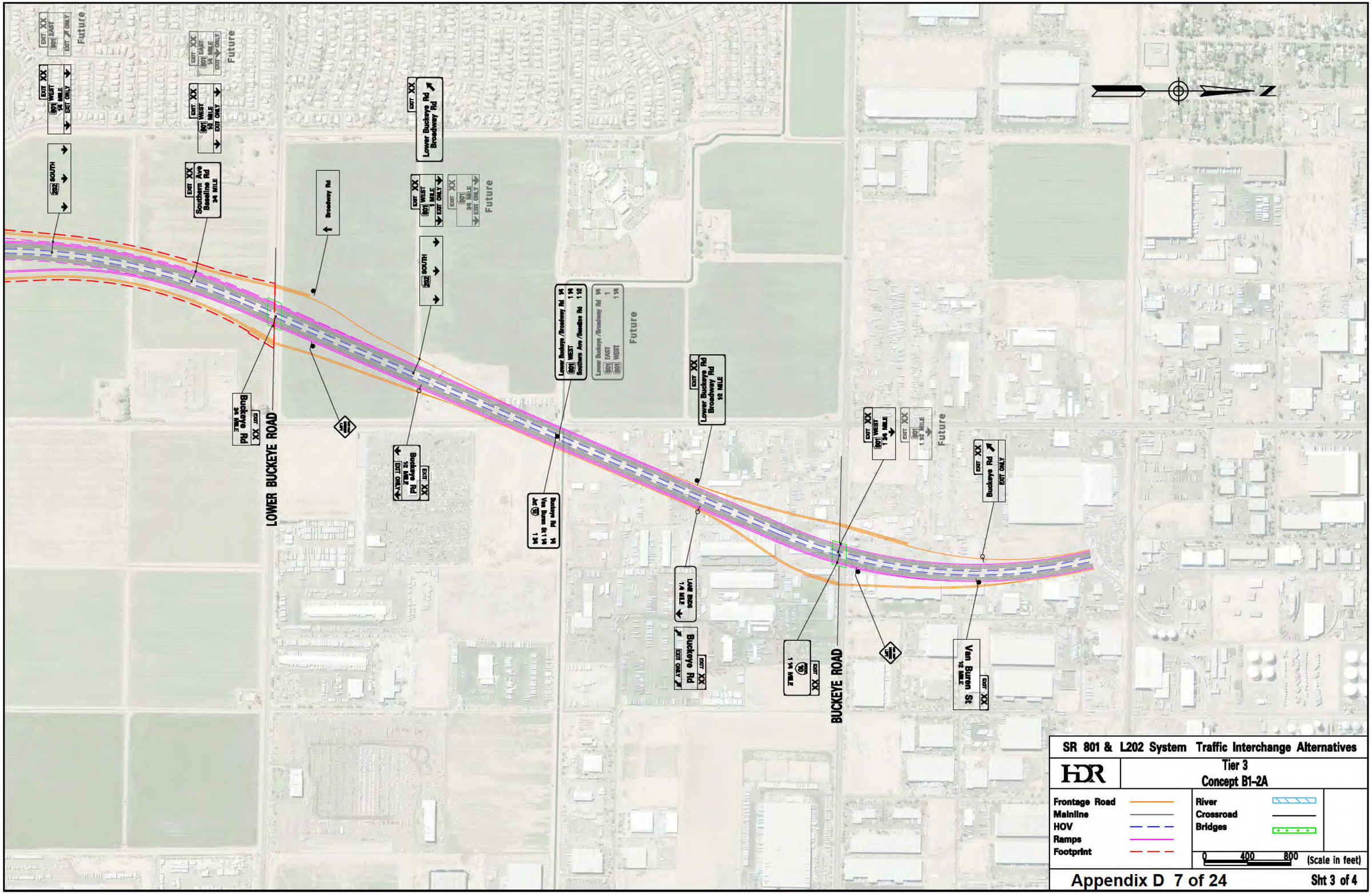
Frontage Road
Mainline
HOV
Ramps
Footprint

River
Crossroad
Bridges

0 400 800 (Scale in feet)


N
ELLIOT ROAD
DOBBINS ROAD
BASELINE ROAD
Future
Future
LANE ENDS 1/4 MILE
Elliot Rd 1/4 MILE
Elliot Rd 1/2 MILE
Elliot Rd 3/4 MILE
Dobbins Rd 1/2 MILE
Dobbins Rd 3/4 MILE
Dobbins Rd 1/4 MILE
Baseline Rd 1/2 MILE
Baseline Rd 3/4 MILE
Southern Ave 1 MILE
Lower Buckeye Rd and Broadway Rd USE Southern Ave Exit
Southern Ave Lower Buckeye Rd
202 NORTH
202 EAST
202 WEST
SR 801 & L202 System Traffic Interchange Alternatives
HDR
Tier 3
Concept B1-2A
Frontage Road
Mainline
HOV
Ramps
Footprint
River
Crossroad
Bridges
0 400 800 (Scale in feet)
Appendix D 5 of 24
Sht 1 of 4


SOUTHERN AVENUE
SALT RIVER FLOODWAY
SR 801
BROADWAY ROAD
59th AVENUE
L 202
ES Ramp
SW Ramp
HOV Ramp
WS Ramp
NW Ramp
EN Ramp
NE Ramp
SE Ramp
WN Ramp
Baseline Rd
Southern Ave
Broadway Rd
Lower Buckeye Rd
Future
N
SR 801 & L202 System Traffic Interchange Alternatives
HDR
Tier 3
Concept B1-2A
Frontage Road
Mainline
HOV
Ramps
Footprint
River
Crossroad
Bridges
0 400 800 (Scale in feet)
Appendix D 6 of 24
Sht 2 of 4



SR 801 & L202 System Traffic Interchange Alternatives

HDR

Tier 3
Concept B1-2A

Frontage Road
Mainline
HOV
Ramps
Footprint

River
Crossroad
Bridges

0 400 800 (Scale in feet)

SALT RIVER FLOODWAY

SR 801

75th AVENUE

67th AVENUE

RIGHT LANE EXIT ONLY

EXIT XX
83rd Ave
1/2 MILE
EXIT ONLY

EXIT XX
83rd Ave
3/4 MILE

Future

Future

Future

N

SR 801 & L202 System Traffic Interchange Alternatives

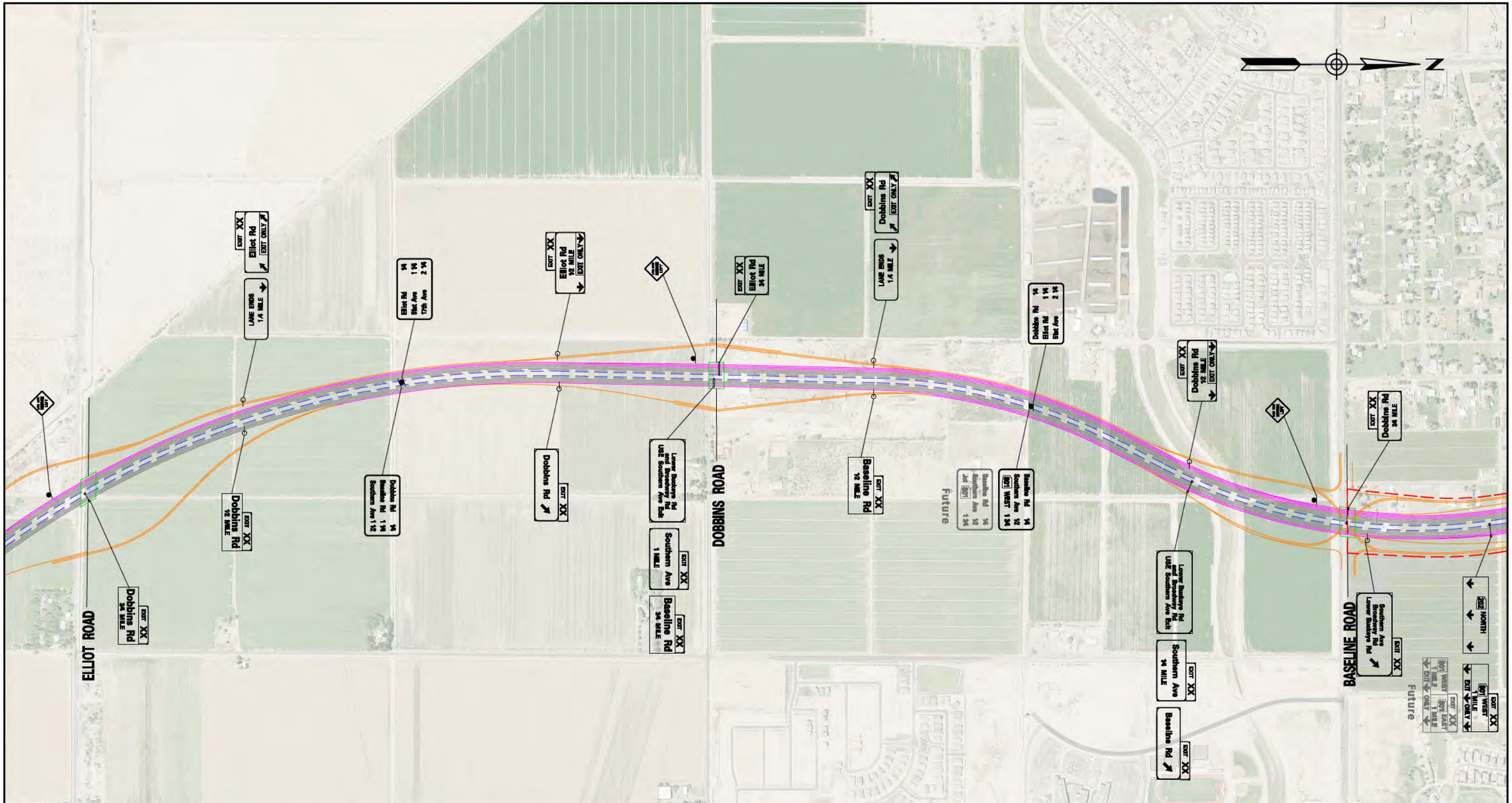
HDR

Tier 3
Concept B1-2A

Frontage Road
Mainline
HOV
Ramps
Footprint

River
Crossroad
Bridges

0 400 800 (Scale in feet)



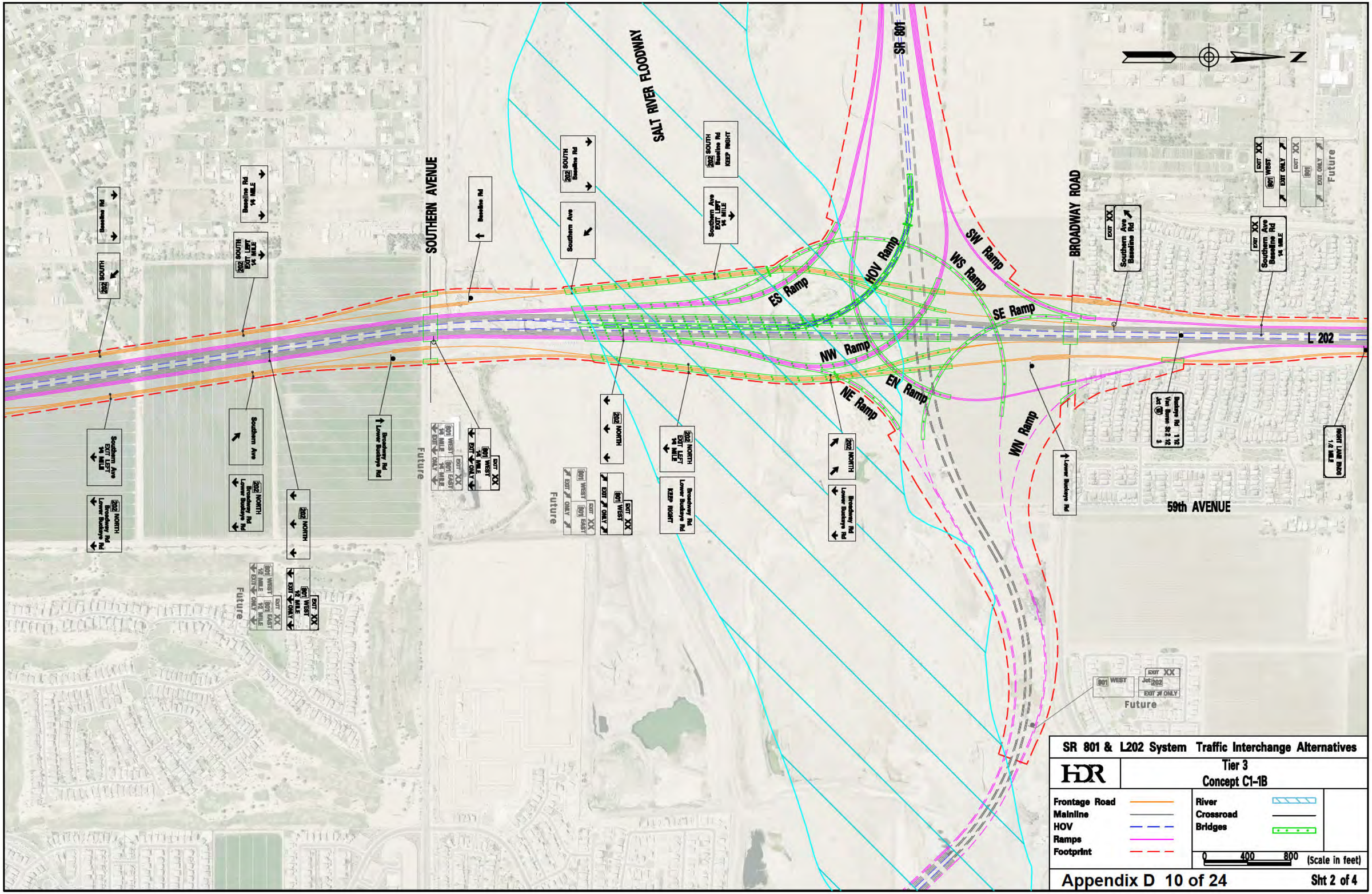
SR 801 & L202 System Traffic Interchange Alternatives

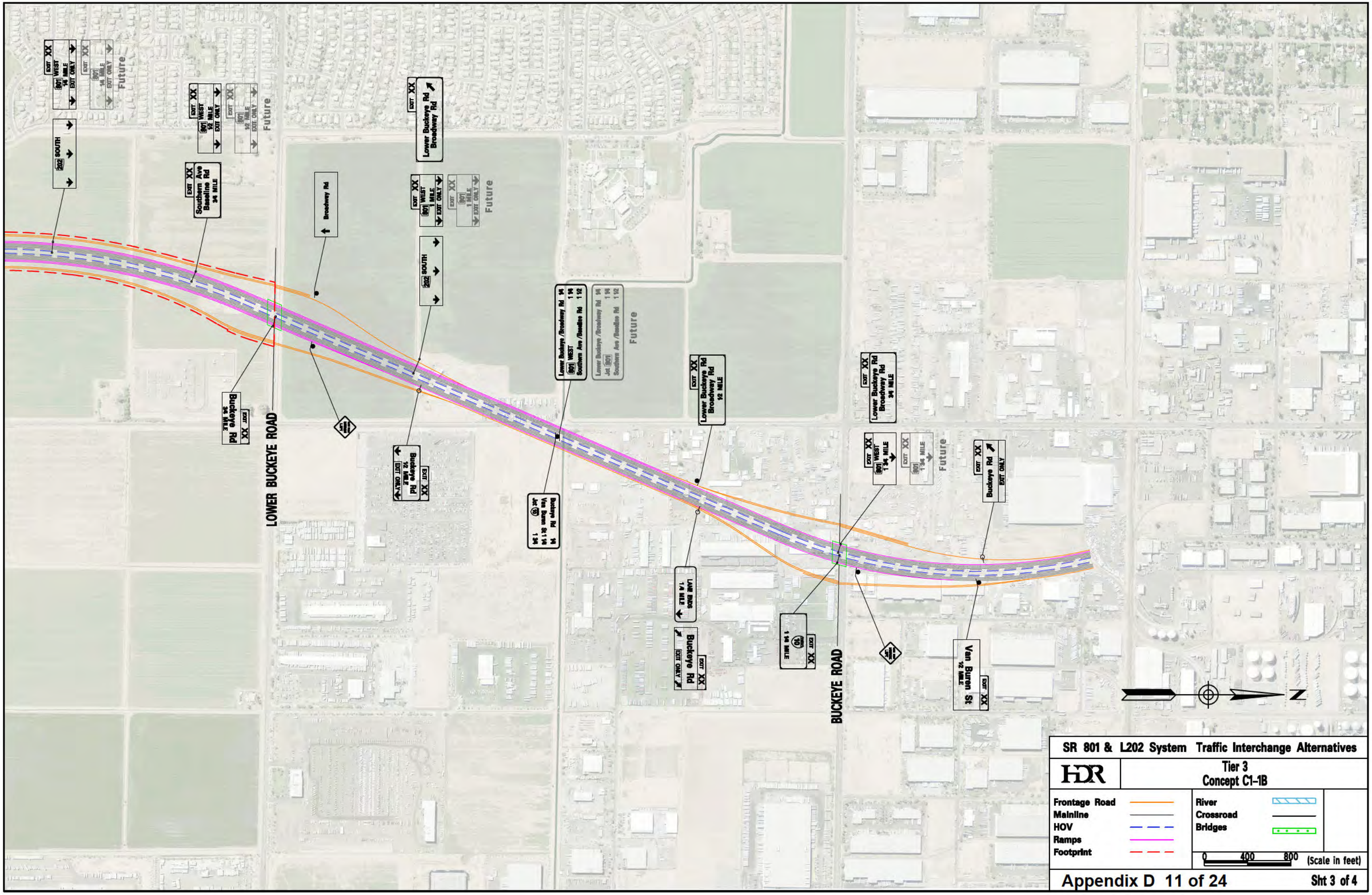
HDR

Tier 3
Concept C1-1B

Frontage Road	River
Mainline	Crossroad
HOV	Bridges
Ramps	
Footprint	

0 400 800 (Scale in feet)


SOUTHERN AVENUE
SALT RIVER FLOODWAY
SR 801
BROADWAY ROAD
59th AVENUE
L 202
ES Ramp
HOV Ramp
SW Ramp
WS Ramp
SE Ramp
NW Ramp
EN Ramp
NE Ramp
WN Ramp
Baseline Rd
Southern Ave
Broadway Rd
Lower Buckeye Rd
Future
N
SR 801 & L202 System Traffic Interchange Alternatives
HDR
Tier 3
Concept C1-1B
Frontage Road
Mainline
HOV
Ramps
Footprint
River
Crossroad
Bridges
0
400
800
(Scale in feet)
Appendix D 10 of 24
Sht 2 of 4


Future
EXIT XX
801 WEST
1/4 MILE
EXIT ONLY
801
1/4 MILE
EXIT ONLY
202 SOUTH
EXIT XX
Southern Ave
Baseline
3/4 MILE
EXIT XX
801 WEST
1/2 MILE
EXIT ONLY
801
1/2 MILE
EXIT ONLY
EXIT XX
Lower Buckeye Rd
Broadway Rd
Broadway Rd
202 SOUTH
EXIT XX
801 WEST
1 MILE
EXIT ONLY
801
1 MILE
EXIT ONLY
Lower Buckeye /Broadway Rd 3/4
801 WEST 1 1/4
Southern Ave /Baseline Rd 1 1/2
Lower Buckeye /Broadway Rd 3/4
Jct 801 1 1/4
Southern Ave /Baseline Rd 1 1/2
EXIT XX
Lower Buckeye Rd
Broadway Rd
1/2 MILE
EXIT XX
Lower Buckeye Rd
Broadway Rd
3/4 MILE
LOWER BUCKEYE ROAD
Buckeye Rd
1/2 MILE
EXIT ONLY
EXIT XX
Buckeye Rd 1/2
Van Buren St 1 1/4
Jct 85 1 3/4
LANE ENDS
1/4 MILE
Buckeye Rd
EXIT ONLY
EXIT XX
10
1 1/4 MILE
EXIT XX
801 WEST
1 3/4 MILE
EXIT XX
801
1 3/4 MILE
Future
EXIT XX
Buckeye Rd
EXIT ONLY
BUCKEYE ROAD
EXIT XX
Van Buren St
1/2 MILE
EXIT XX
N
SR 801 & L202 System Traffic Interchange Alternatives
HDR
Tier 3
Concept C1-1B
Frontage Road
Mainline
HOV
Ramps
Footprint
River
Crossroad
Bridges
0 400 800 (Scale in feet)
Appendix D 11 of 24
Sht 3 of 4

SALT RIVER FLOODWAY

SR 801

75th AVENUE

67th AVENUE

RIGHT LANE EXIT ONLY

EXIT XX 83rd Ave ½ MILE EXIT ONLY

EXIT XX 67th Ave ¾ MILE

EXIT XX 67th Ave ½ MILE

EXIT XX 83rd Ave ¾ MILE

Future

83rd Ave 1 ¼
91st Ave 2 ¼
107th Ave 4 ¼

67th Ave

202 SOUTH ½ MILE

202 NORTH ½ MILE

202 SOUTH ¾ MILE EXIT ONLY

202 NORTH ¾ MILE EXIT ONLY

Future

801 WEST

202 SOUTH EXIT ONLY

202 NORTH EXIT ONLY

N

SR 801 & L202 System Traffic Interchange Alternatives

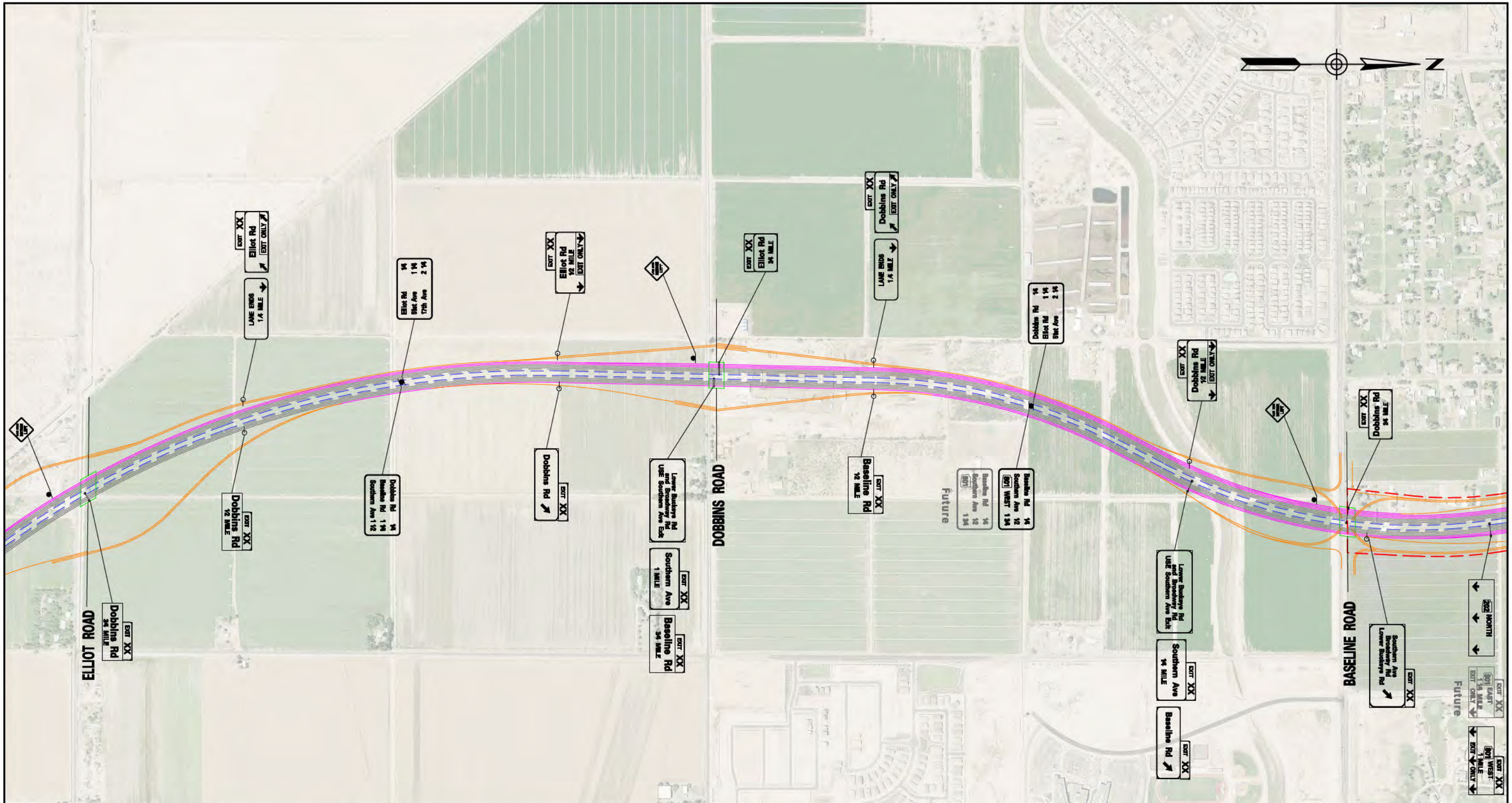
HDR

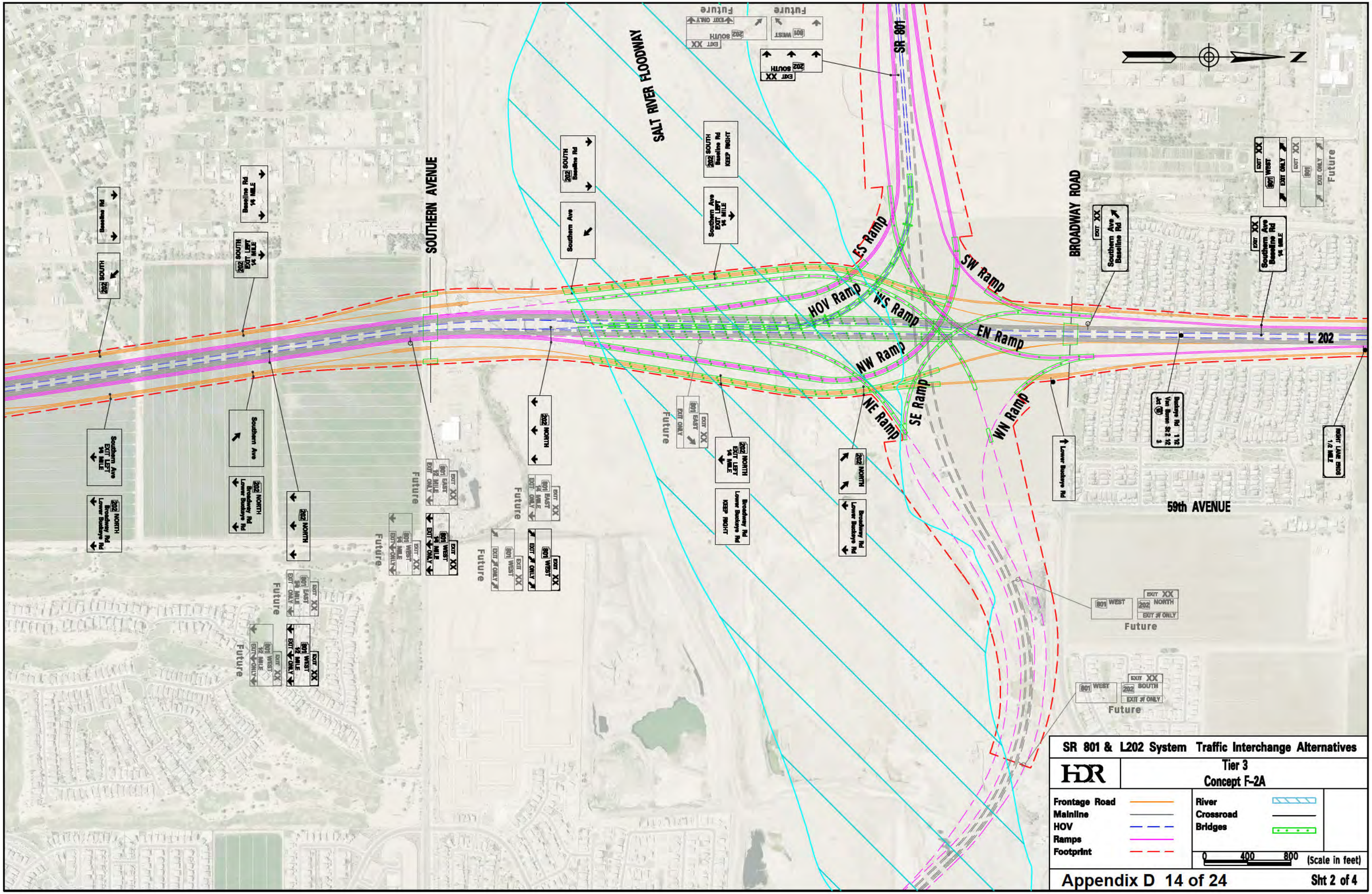
Tier 3
Concept C1-1B

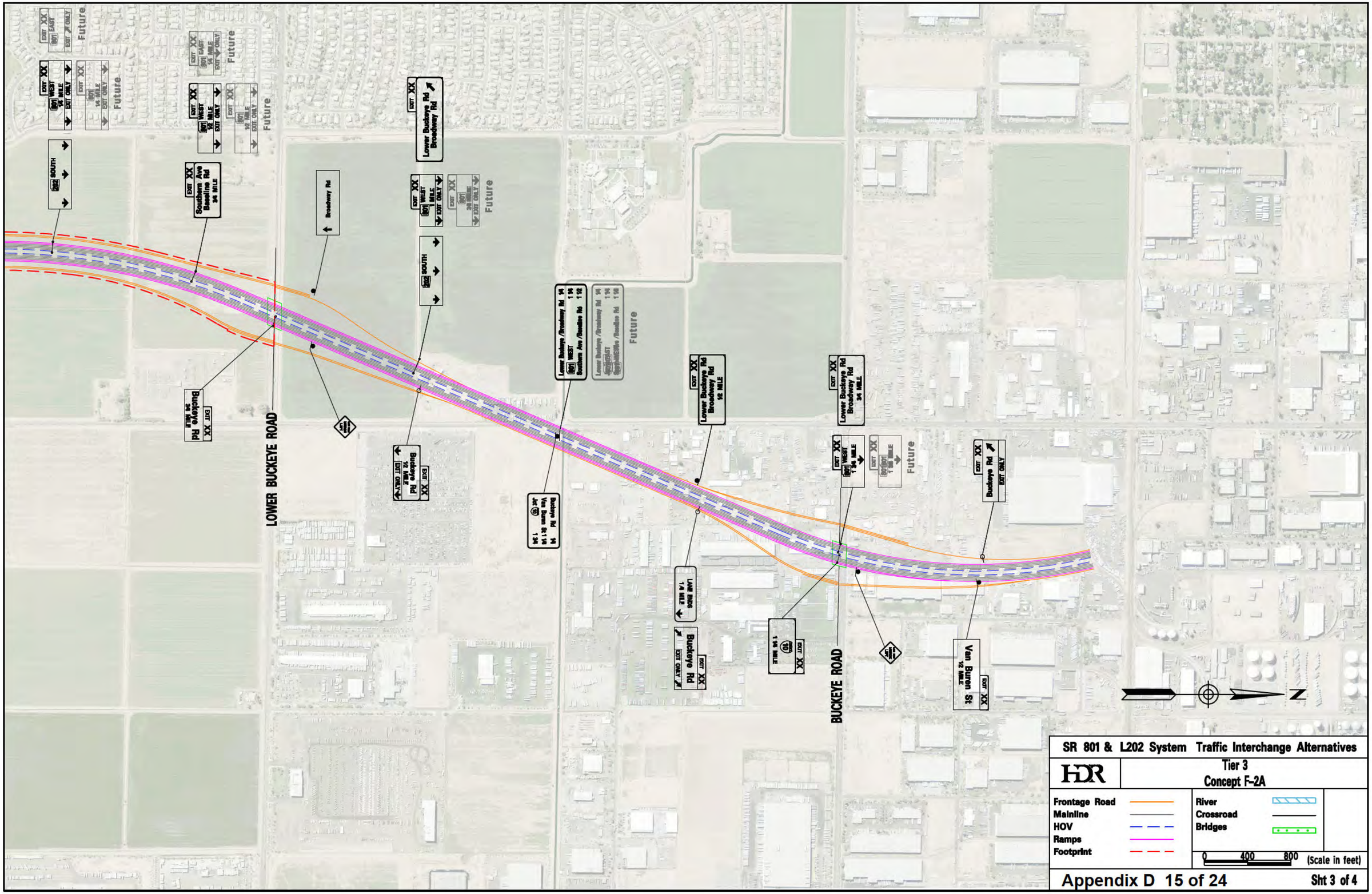
Frontage Road
Mainline
HOV
Ramps
Footprint

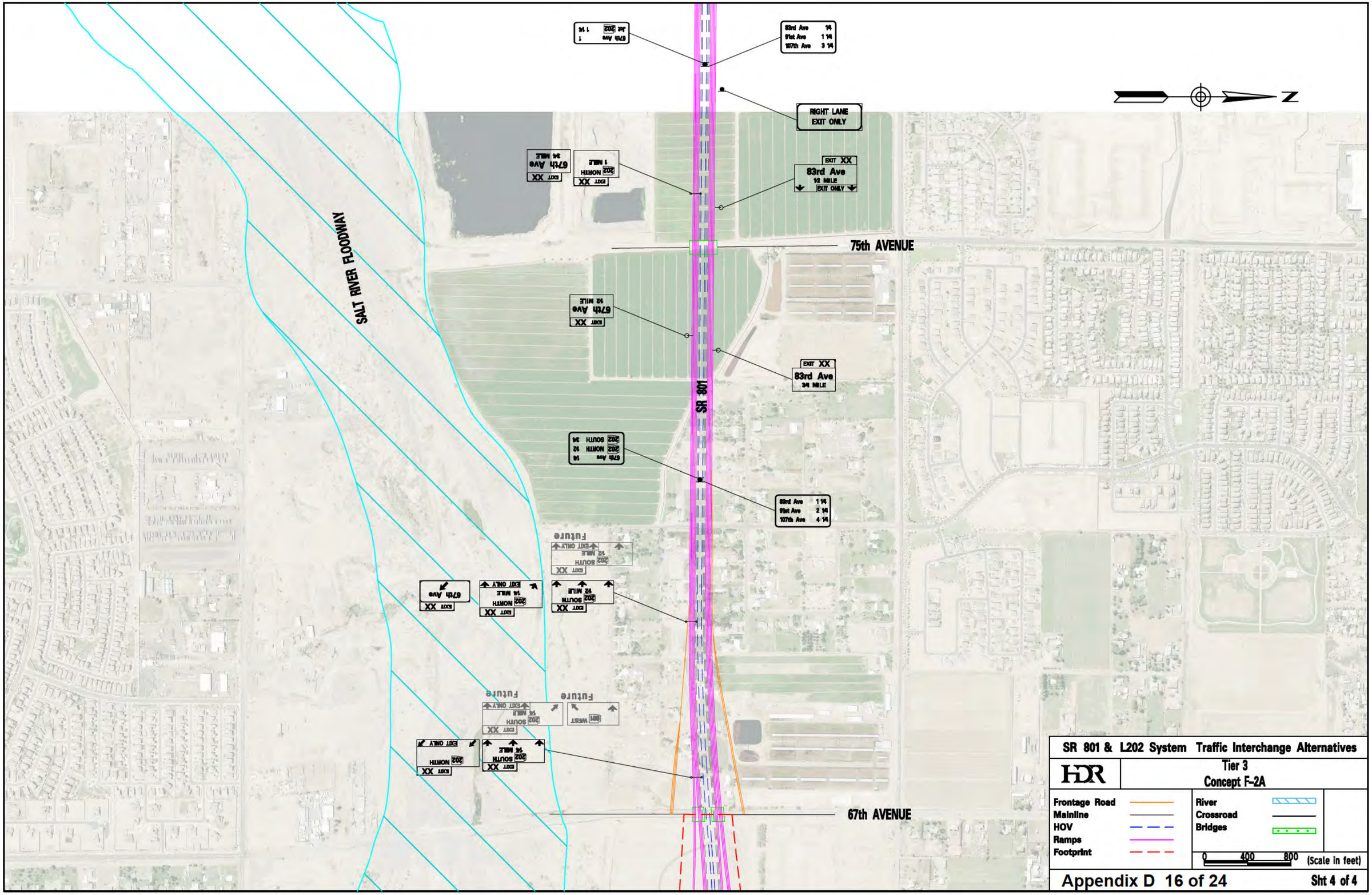
River
Crossroad
Bridges

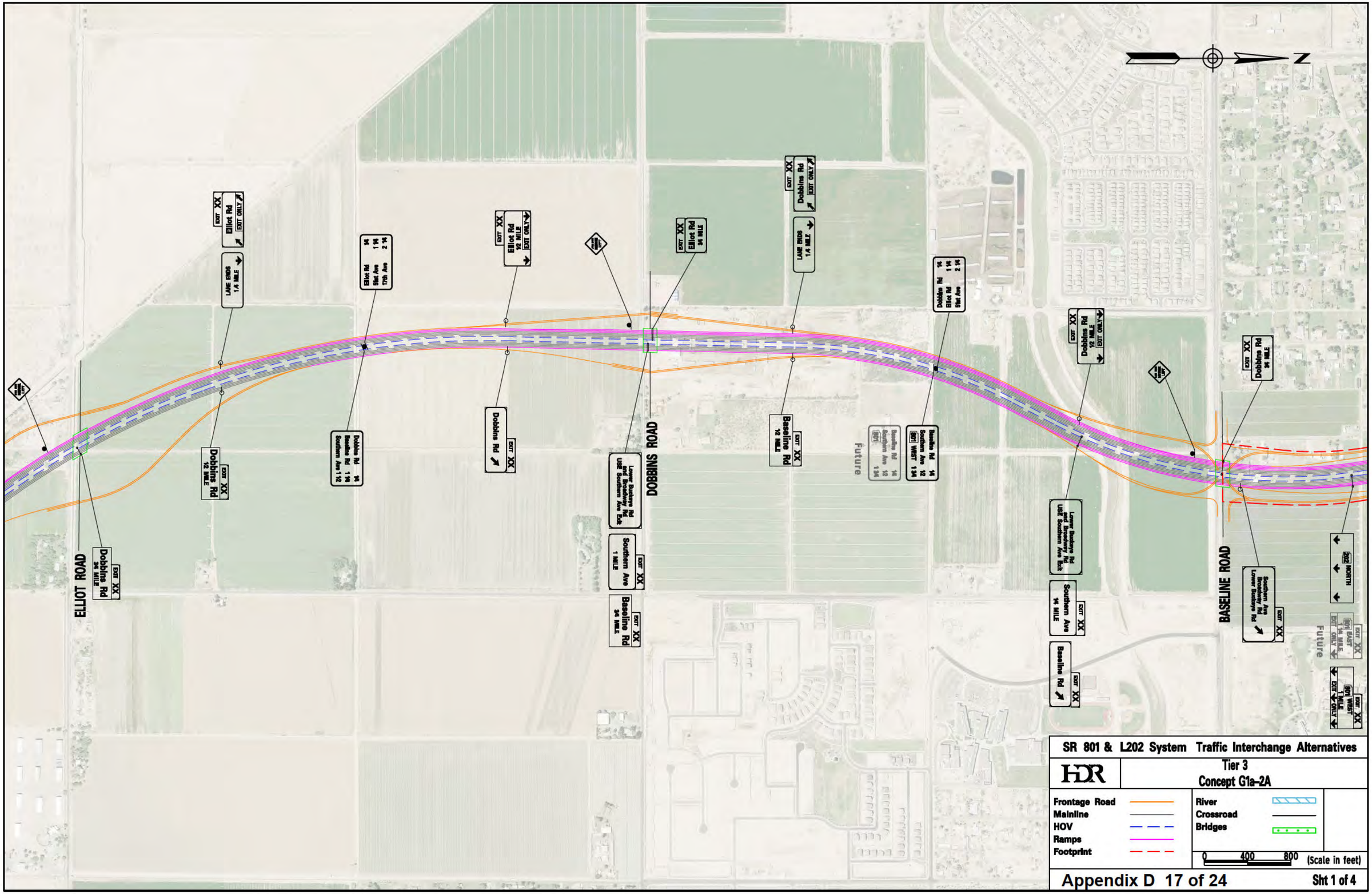
0 400 800 (Scale in feet)

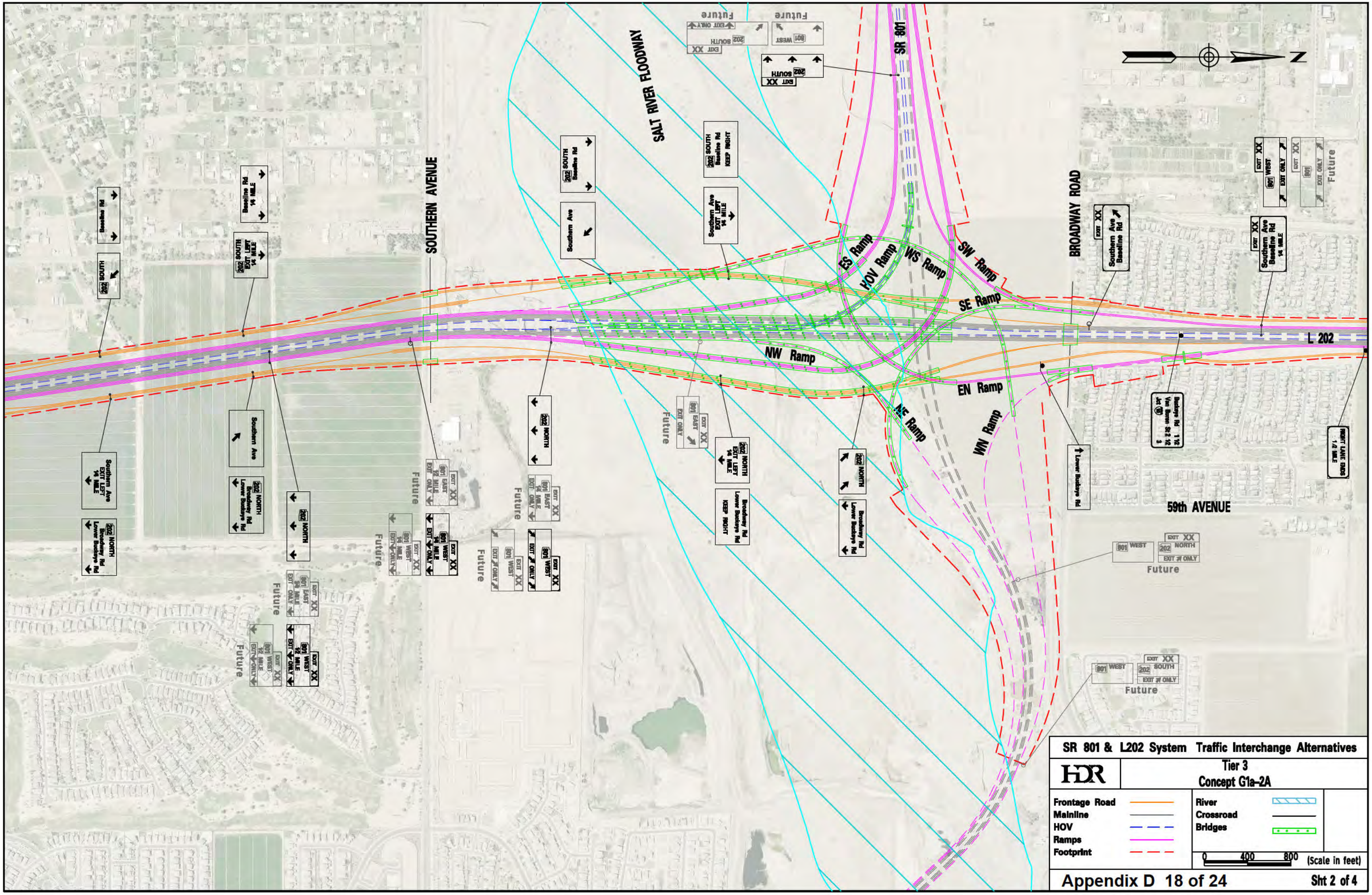

N
ELLIOT ROAD
DOBBINS ROAD
BASELINE ROAD
Future
Future
LANE ENDS 1/4 MILE
Elliot Rd EXIT ONLY
Elliot Rd 1/2 MILE EXIT ONLY
Elliot Rd 3/4 MILE
Dobbins Rd EXIT ONLY
Dobbins Rd 1/2 MILE EXIT ONLY
Dobbins Rd 3/4 MILE
Baseline Rd 1/2 MILE
Baseline Rd 3/4 MILE
Southern Ave 1 MILE
Lower Buckeye Rd and Broadway Rd U&E Southern Ave Exit
Southern Ave 1/2 MILE
Southern Ave 1 MILE
Southern Ave Lower Buckeye Rd
Southern Ave 1/4 MILE EAST EXIT ONLY
Southern Ave 1/4 MILE WEST EXIT ONLY
202 NORTH
SR 801 & L202 System Traffic Interchange Alternatives
HDR
Tier 3
Concept F-2A
Frontage Road
Mainline
HOV
Ramps
Footprint
River
Crossroad
Bridges
0 400 800 (Scale in feet)
Appendix D 13 of 24
Sht 1 of 4

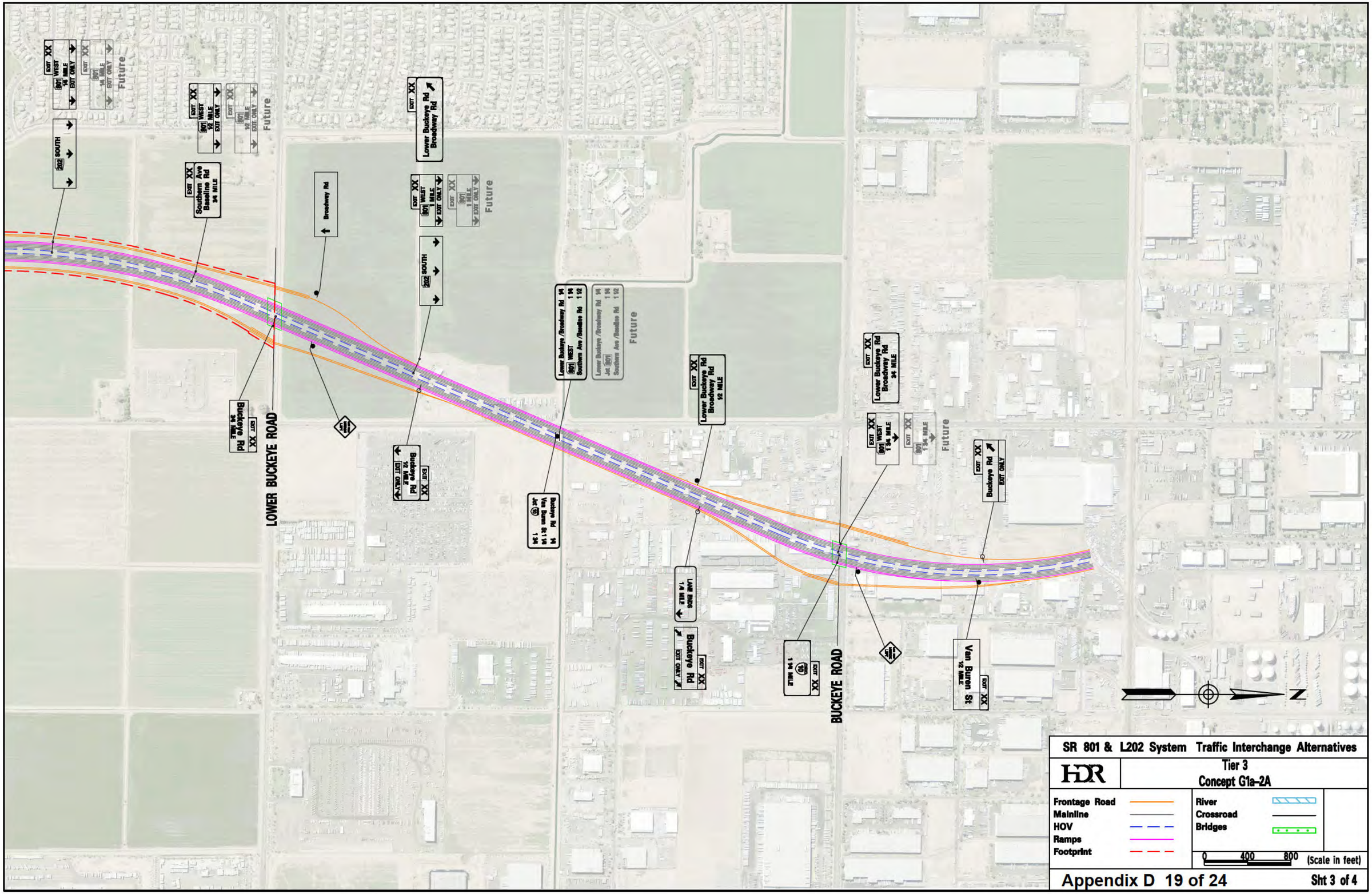

SOUTHERN AVENUE
SALT RIVER FLOODWAY
SR 801
BROADWAY ROAD
59th AVENUE
L 202
ES Ramp
SW Ramp
HOV Ramp
WS Ramp
EN Ramp
NW Ramp
NE Ramp
SE Ramp
WN Ramp
Future
Baseline Rd
Southern Ave
Broadway Rd
Lower Buckeye Rd
SOUTH
NORTH
EAST
WEST
EXIT XX
EXIT ONLY
KEEP RIGHT
1/4 MILE
1/2 MILE
Buckeye Rd 1 1/2 Mile Num: 32 32 5
RIGHT LANE ENDS 1/2 MILE
N
SR 801 & L202 System Traffic Interchange Alternatives
HDR
Tier 3
Concept F-2A
Frontage Road
Mainline
HOV
Ramps
Footprint
River
Crossroad
Bridges
0 400 800 (Scale in feet)
Appendix D 14 of 24
Sht 2 of 4

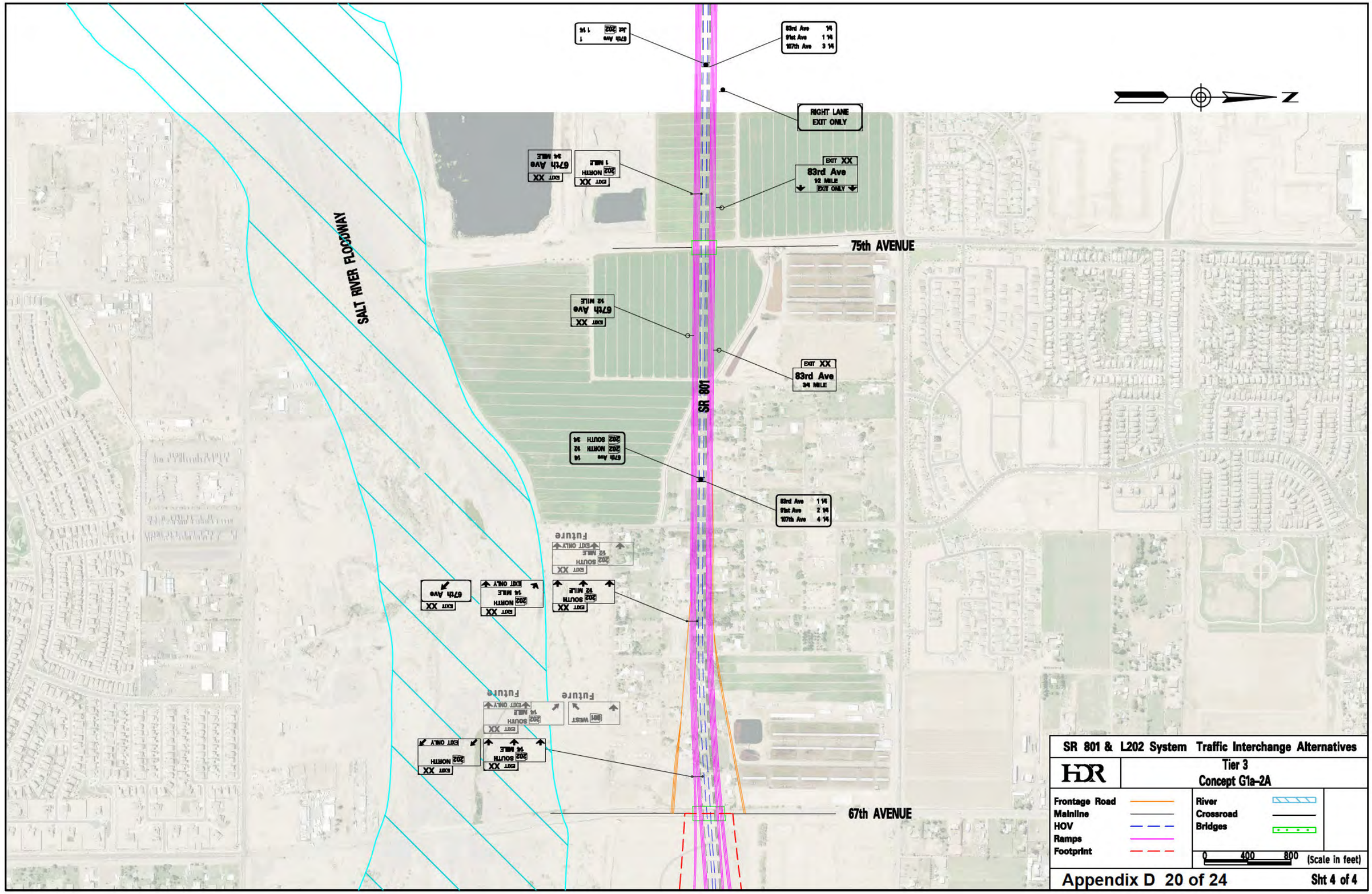

LOWER BUCKEYE ROAD
BUCKEYE ROAD
Broadway Rd
Southern Ave Baseline Rd 3/4 MILE
Buckeye Rd 3/4 MILE
Lower Buckeye Rd Broadway Rd
Lower Buckeye Rd Broadway Rd 1/2 MILE
Lower Buckeye Rd Broadway Rd 3/4 MILE
Buckeye Rd 1/2 MILE
Van Buren St 1/2 MILE
Future
SOUTH
EXIT ONLY
SR 801 & L202 System Traffic Interchange Alternatives
HDR
Tier 3
Concept F-2A
Frontage Road
Mainline
HOV
Ramps
Footprint
River
Crossroad
Bridges
0 400 800 (Scale in feet)
Appendix D 15 of 24
Sht 3 of 4


SALT RIVER FLOODWAY
SR 801
75th AVENUE
67th AVENUE
RIGHT LANE
EXIT ONLY
83rd Ave
1/2 MILE
EXIT ONLY
EXIT XX
83rd Ave
3/4 MILE
67th Ave
1/2 MILE
67th Ave
1 MILE
67th Ave
3/4 MILE
83rd Ave 1 1/4
91st Ave 2 1/4
107th Ave 4 1/4
Future
Future
Future
N
SR 801 & L202 System Traffic Interchange Alternatives
HDR
Tier 3
Concept F-2A
Frontage Road
Mainline
HOV
Ramps
Footprint
River
Crossroad
Bridges
0 400 800 (Scale in feet)
Appendix D 16 of 24
Sht 4 of 4


N
ELLIOT ROAD
DOBBINS ROAD
BASELINE ROAD
Future
Future
LANE ENDS 1/4 MILE
Elliot Rd 1/4 MILE
Elliot Rd 1/2 MILE
Elliot Rd 3/4 MILE
Dobbins Rd 1/2 MILE
Dobbins Rd 3/4 MILE
Baseline Rd 1/2 MILE
Baseline Rd 3/4 MILE
Southern Ave 1 MILE
Southern Ave 1/4 MILE
Lower Broadway Rd and Broadway Rd UseE Southern Ave Exit
Southern Ave Lower Broadway Rd
NORTH
EAST 1/4 MILE EXIT ONLY
WEST 1 MILE EXIT ONLY
SR 801 & L202 System Traffic Interchange Alternatives
HDR
Tier 3
Concept G1a-2A
Frontage Road
Mainline
HOV
Ramps
Footprint
River
Crossroad
Bridges
0 400 800 (Scale in feet)
Appendix D 17 of 24
Sht 1 of 4


SALT RIVER FLOODWAY
SOUTHERN AVENUE
SR 801
BROADWAY ROAD
59th AVENUE
L 202
ES Ramp
HOV Ramp
WS Ramp
SW Ramp
SE Ramp
NW Ramp
NE Ramp
EN Ramp
WN Ramp
Future
Baseline Rd
Southern Ave
Broadway Rd
Lower Buckeye Rd
SOUTH
NORTH
WEST
EAST
EXIT ONLY
KEEP RIGHT
1/4 MILE
SR 801 & L202 System Traffic Interchange Alternatives
HDR
Tier 3
Concept G1a-2A
Frontage Road
Mainline
HOV
Ramps
Footprint
River
Crossroad
Bridges
0 400 800 (Scale in feet)
Appendix D 18 of 24
Sht 2 of 4


LOWER BUCKEYE ROAD
BUCKEYE ROAD
Broadway Rd
Future
Lower Buckeye Rd Broadway Rd
Southern Ave Baseline Rd
Van Buren St
Buckeye Rd
SOUTH
WEST
EAST
EXIT ONLY
LANE ENDS
SR 801 & L202 System Traffic Interchange Alternatives
HDR
Tier 3
Concept G1a-2A
Frontage Road
Mainline
HOV
Ramps
Footprint
River
Crossroad
Bridges
0
400
800
(Scale in feet)
Appendix D 19 of 24
Sht 3 of 4



SR 801 & L202 System Traffic Interchange Alternatives

HDR

Tier 3
Concept G1a-2A

Frontage Road
Mainline
HOV
Ramps
Footprint

River
Crossroad
Bridges

0 400 800 (Scale in feet)

N

ELLIOT ROAD

DOBBINS ROAD

BASELINE ROAD

Future

Future

SR 801 & L202 System Traffic Interchange Alternatives

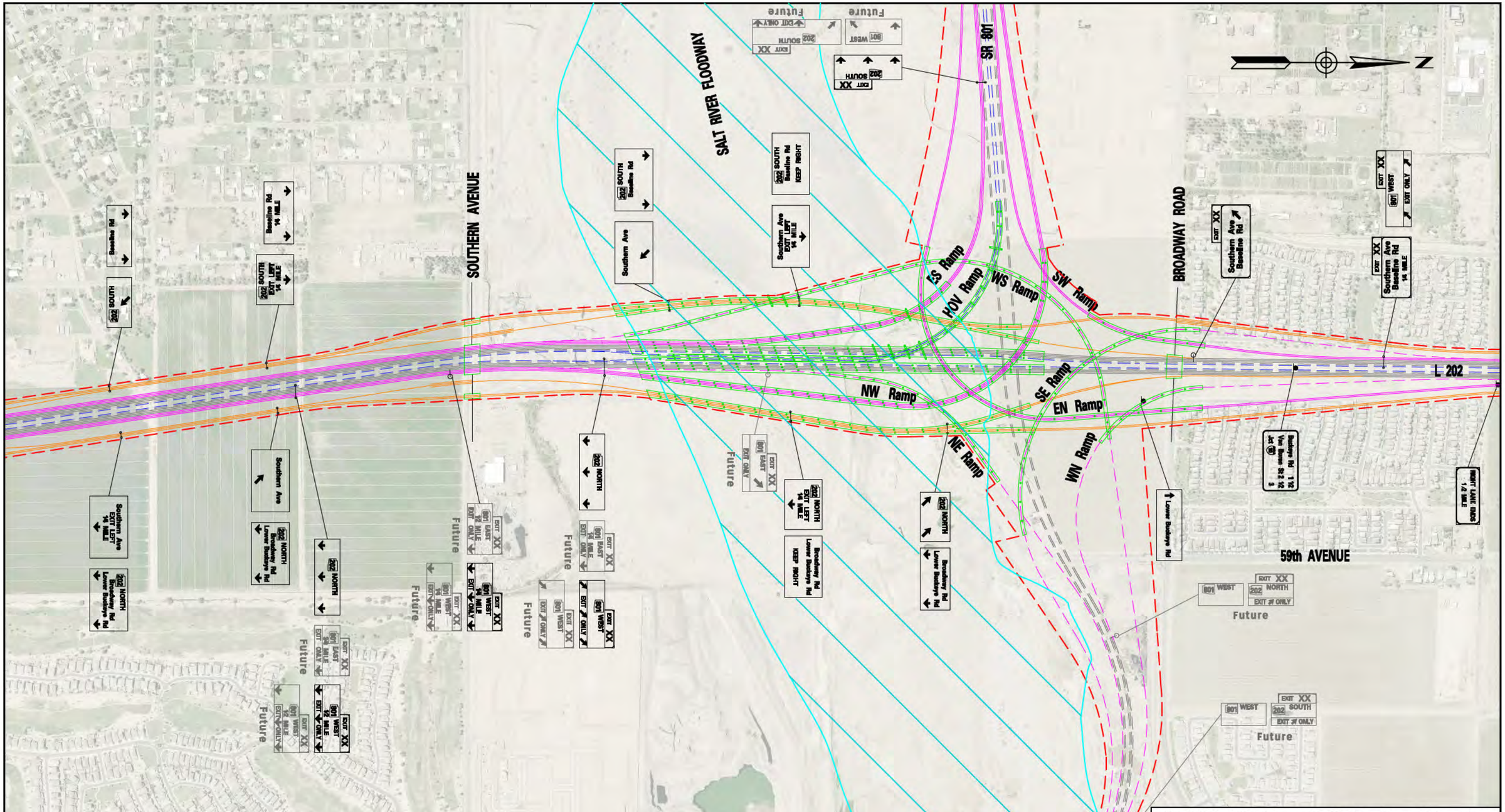
HDR

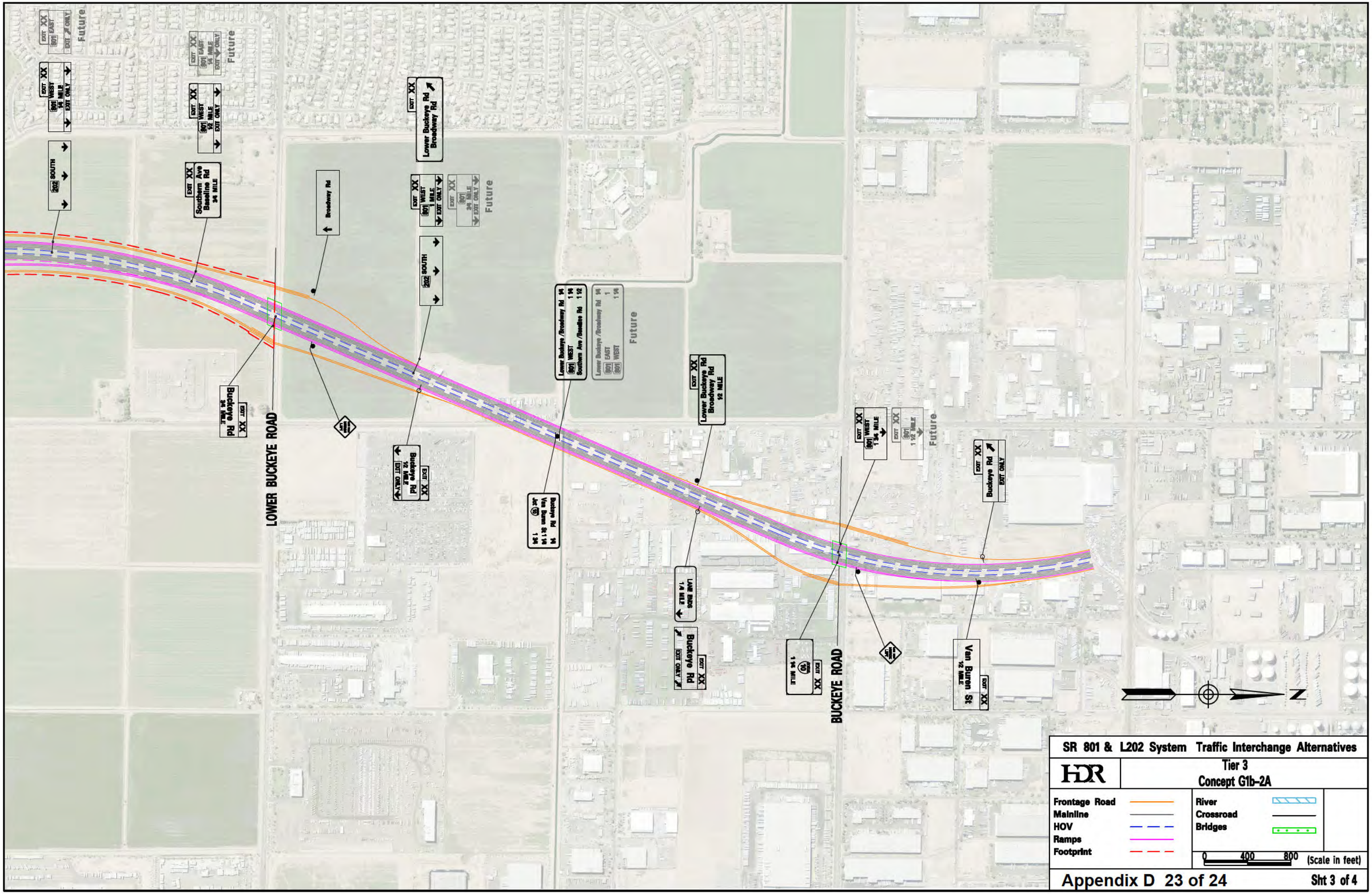
Tier 3
Concept G1b-2A

Frontage Road
Mainline
HOV
Ramps
Footprint

River
Crossroad
Bridges

0 400 800 (Scale in feet)


SOUTHERN AVENUE
SALT RIVER FLOODWAY
SR 801
BROADWAY ROAD
59th AVENUE
L 202
NW Ramp
NE Ramp
SE Ramp
EN Ramp
WN Ramp
ES Ramp
HOV Ramp
WS Ramp
SW Ramp
Future
N
SR 801 & L202 System Traffic Interchange Alternatives
HDR
Tier 3
Concept G1b-2A
Frontage Road
Mainline
HOV
Ramps
Footprint
River
Crossroad
Bridges
0 400 800 (Scale in feet)
Appendix D 22 of 24
Sht 2 of 4



SR 801 & L202 System Traffic Interchange Alternatives

HDR

Tier 3
Concept G1b-2A

Frontage Road	River
Mainline	Crossroad
HOV	Bridges
Ramps	
Footprint	

0 400 800 (Scale in feet)

SALT RIVER FLOODWAY

SR 801

75th AVENUE

67th AVENUE

RIGHT LANE
EXIT ONLY

EXIT XX
83rd Ave
1/2 MILE
EXIT ONLY

EXIT XX
83rd Ave
3/4 MILE

Future

Future

Future

N

SR 801 & L202 System Traffic Interchange Alternatives

HDR

Tier 3
Concept G1b-2A

Frontage Road
Mainline
HOV
Ramps
Footprint

River
Crossroad
Bridges

0 400 800 (Scale in feet)