

**I-5 Interchange 33 (Central Point):
Interchange Area Management Plan
Jackson County**

**DRAFT Technical Memorandum #4
Alternatives Analysis**

Prepared for

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4. ALTERNATIVES ANALYSIS

This technical memorandum presents the conceptual development of improvements to address deficiencies within the Interchange 33 Area Management Plan influence area as identified through existing and future baseline analysis.

4.1. Concept Development

The alternatives analysis focused on four areas for consideration within the Interchange 33 influence area:

- **Enhanced Network** – This network incorporates most of the improvements identified in the E Pine Street Plan which are not currently included in the financially-constrained list of projects in the 2009-2034 Regional Transportation Plan (RTP).
- **Interchange Improvements** – These concepts identify potential improvements that address deficiencies at the interchange ramps that would still remain with the Enhanced Network.
- **West Side Improvements** – These concepts focus on the 10th Street/Freeman Road intersection and identify potential improvements to address deficiencies remaining with the Enhanced Network. The concepts build on the downtown 4-lane to 3-lane conversion work that has been done to-date and focus on the area between the southbound ramp terminal and the 10th Street/Freeman Road intersection.
- **East Side Improvements** – These concepts identify potential improvements east of the interchange ramp terminals that would still remain with the Enhanced Network.

The Interchange, West Side, and East Side concepts all build on the assumptions in the enhanced network and could ultimately be combined in various ways within the study area network.

4.2. Alternatives Evaluation

The alternatives analysis includes traffic operations and safety, road geometries and right-of-way requirements, environmental and land use consequences, and cost opinions. In some cases, cost opinions from other documents have been provided. Some concepts do not have improvement layouts or cost opinions at this time because they build on other improvements..

4.2.1. Traffic Operations and Safety

Traffic operations were evaluated for concepts that were identified as having future operational deficiencies. The operational deficiencies assessment focuses on the volume-to-capacity (v/c) ratio and level of service (LOS) for the 2034 future condition. Operational results

for the alternatives were compared to the mobility standards set forth in the Highway Design Manual¹ (HDM) for the state facilities and local agency standards for other locations.

Two forecast development scenarios were evaluated for each category of concepts. The first forecast development scenario is consistent with the Rogue Valley Metropolitan Planning Organization (RVMPO) land use forecasts assumed in the preparation of the RTP. The second forecast development scenario includes an alternative land use scenario (ALUS) to assess the operational sensitivity to changes in land use. The assumptions for these scenarios are discussed in more detail in *Revised Draft Technical Memorandum #3: Future Baseline Traffic Conditions*.

Traffic volumes for the interchange ramps were also developed for the AM peak hour because peaking characteristics at the interchange are very different in the morning and afternoon. The AM volumes were developed for both the baseline scenario and the ALUS.

The 2010 existing, 2034 RTP land use, ALUS traffic volumes are presented in Figure 4-1 for easy reference.

Some improvements address safety as well as traffic operations deficiencies. Crash patterns from the five-year analysis period (2005 through 2009) are discussed for those improvements that address safety.

4.2.2. Basic Roadway Geometries and Right-of-Way Requirements

Illustrations of basic roadway geometry and right-of-way (ROW) needs were developed for concepts that involve infrastructure improvements. The drawings approximate roadway centerlines, edge of roadway and ROW using available base mapping.

4.2.3. Environmental and Land Use Assessment

Impacts to resources were qualitatively assessed based on the data assembled for the environmental and land use reconnaissance. The level of analysis of the study area is designed to identify those areas judged to have considerable potential for conflict.

4.2.4. Concepts Cost Opinions

Rough order of magnitude cost opinions have been developed for some concepts using present day dollars and are consistent with standard estimating methods. The estimates include a contingency factor but do not include ROW costs, utility relocation, or mitigation of hazardous materials sites. The cost opinions are intended to help differentiate alternatives by approximating the relative costs of each project.

¹ Table 10-1: 20 Year Design-Mobility Standards (Volume/Capacity [V/C] Ratio), Highway Design Manual, 2003, online reference: http://egov.oregon.gov/ODOT/HWY/ENGSERVICES/hwy_manuals.shtml

4.3. Enhanced Network

The enhanced network combines the future financially-constrained (funded) projects from the RTP with the improvements identified in the East Pine Street Transportation Plan (completed in October 2004 by JRH Transportation Engineering). The East Pine Street Plan recommends a number of improvements; however, not all improvements were included in the analysis for the enhanced network. A brief summary of the improvements assumed in the enhanced network is presented in Table 4-1 and shown in Figure 4-2.

Table 4-1. Enhanced Network Improvements

Projects from E Pine Street Plan Included in Network	Projects from E Pine Street Plan Not Included in Network
<ul style="list-style-type: none"> • Peninger: Remove signal and convert to right-in/right-out • E Pine from I-5 NB Ramp to Table Rock: Widen to add third westbound through lane • New connections across Bear Creek: Peninger to Beebe and Peninger to Hamrick • New north-south street connecting Beebe and new connection to south located between Peninger and Hamrick • Hamrick extension to Peninger south of E Pine • E Pine/Table Rock – Dual eastbound left-turn lanes 	<ul style="list-style-type: none"> • Interchange 33 – Replace left-turn lanes with loop ramps • E Pine from I-5 SB Ramp to I-5 NB Ramp: Widen to add third westbound through lane • E Pine/Hamrick – Dual eastbound left-turn lanes with second northbound receiving lane • No southern extension of Peninger

The Enhanced Network provides additional connectivity, supports development of lands north and south of E Pine Street, and addresses some of the operational issues highlighted in the future baseline analysis. This concept is evaluated with the future baseline forecast volumes as well as the ALUS forecast volume set.

Enhanced Network Traffic Operations and Safety

The traffic operations with the Enhanced Network concept are summarized in Table 4-2. Results are presented for the intersections that would remain signalized within the study area. These locations do not include Peninger, which would be converted to right-in/right-out movements only, or the intersection formed by the new north-south street between Beebe and development south of E Pine Street. The latter location was excluded because it is assumed that the intersection would be designed with adequate capacity to meet mobility standards with forecast demand.

Table 4-2: Intersection Operations with Enhanced Network Concept

Intersection	V/C Ratio	LOS	Queuing Issues	Mobility Standard
Operations with 2034 RTP Forecasts (AM Peak Hour)				
I-5 SB Ramps:	V/C = 0.94	LOS = C	Queuing – WB Left, SB	V/C ≤ 0.80 ¹
I-5 NB Ramps:	V/C = 0.61	LOS = B	Queuing – None	V/C ≤ 0.80 ¹
Operations with 2034 RTP Forecasts (PM Peak Hour)				
10th/Freeman:	V/C = 0.86	LOS = D	Queuing – WB Left, SB Left	V/C ≤ 0.85 ² /LOS D ³
I-5 SB Ramps:	V/C = 0.78	LOC = B	Queuing – WB Left	V/C ≤ 0.80 ¹
I-5 NB Ramps:	V/C = 0.86	LOC = C	Queuing – NB	V/C ≤ 0.80 ¹
Hamrick:	V/C = 0.94	LOC = C	Queuing – EB Left, SB	V/C ≤ 0.85 ²
Table Rock:	V/C = 0.88	LOS = D	Queuing – SB Left	V/C ≤ 0.85 ²
Operations with ALUS Forecasts (AM Peak Hour)				
I-5 SB Ramps:	V/C = 0.95	LOS = D	Queuing – EB, WB Left, SB	V/C ≤ 0.80 ¹
I-5 NB Ramps:	V/C = 0.71	LOS = B	Queuing – None	V/C ≤ 0.80 ¹
Operations with ALUS Forecasts (PM Peak Hour)				
10th/Freeman:	V/C = 0.95	LOS = D	Queuing – EB, WB Left, SB Left	V/C ≤ 0.85 ² /LOS D ³
I-5 SB Ramps:	V/C = 0.90	LOC = B	Queuing – WB	V/C ≤ 0.80 ¹
I-5 NB Ramps:	V/C = 0.96	LOC = C	Queuing – NB	V/C ≤ 0.80 ¹
Hamrick:	V/C = 1.05	LOC = D	Queuing – EB Left, SB	V/C ≤ 0.85 ²
Table Rock:	V/C = 1.05	LOS = E	Queuing – NB, SB Left	V/C ≤ 0.85 ²

Notes:

1. Table 10-1: 20 Year Design-Mobility Standards (Volume/Capacity Ratio), 2003 Highway Design Manual.
2. Jackson County Transportation System Plan, Ordinance 2005-3, p. 61.
3. City of Central Point Transportation System Plan, 2008-2030, p. 26.

Shaded results indicate where mobility standards are not met

Source: Synchro HCM Intersection Analysis Report

The combination of the 2034 RTP land use forecasts with the enhanced network for the PM peak hour would result in forecast operations that exceed mobility standards at four of five signalized intersections during the PM peak hour although none are expected to have demand which exceeds capacity. Only the I-5 southbound ramps are expected to operate below the mobility standards during the PM peak hour; however, the southbound ramps would exceed standards during the AM peak hour. Although overall LOS at the signalized intersections would be D or better, a number of individual movements would experience extensive queuing and long delays.

Operations with the ALUS forecasts would worsen at all locations. During the PM peak hour, all five signalized intersections would exceed mobility standards with two intersections, Hamrick and Table Rock, which would have demand that exceeds capacity. Extensive queuing at many approaches would occur.

Although the improvements associated with the Enhanced Network concept would improve operations at many of the study area intersections, queues at many locations would remain a significant safety concern. On the freeway ramps, rear end collisions may increase as traffic exiting the freeway would have less distance to slow and come to a stop and queues could

cause some additional turbulence on the freeway itself as drivers have to slow in the mainline travel lanes in anticipation of stopping on the ramp. At other locations, queues that spill out of storage bays into the adjacent through lane may result in an increase of rear end or sideswipe collisions as drivers encounter stopped traffic or change lanes to avoid stopped traffic.

Basic Roadway Geometries and Right-of-Way Requirements

No illustrations of basic roadway geometry and ROW needs were developed for the Enhanced Network concept because all of the projects are already listed in the Central Point Transportation System Plan (TSP).

Environmental and Land Use Assessment

No environmental or land use assessment was performed for the Enhanced Network concept because all of the projects are already listed in the Central Point TSP.

Concepts Cost Opinions

The Central Point TSP includes the cost estimates shown in Table 4-3 for the projects included in the Enhanced Network.

Table 4-3. Enhanced Network Costs

Improvement Project	Central Point TSP Reference Number	Estimated Cost
East Pine/Table Rock – Dual eastbound left-turn lanes	#218 – Tier 1 Long Term	\$500,000
East Pine from I-5 NB Ramp to Table Rock: Widen to add third westbound through lane	#255– Tier 2	\$7,000,000
New connections across Bear Creek: Peninger to Beebe and Peninger to Hamrick & New north-south street connecting Beebe and new connection to south located between Peninger and Hamrick & Peninger: Remove signal and convert to right-in/right-out	#245 & #240 – Tier 2	\$11,000,000
Hamrick extension to Peninger south of E Pine	#234 – Tier 2	\$1,200,000

4.4. Interchange Improvements

Seven potential interchange improvements were identified during the conceptual development to bring the operations up to state standards, provide additional capacity, or address safety concerns. Some of these projects are standalone concepts while others may ultimately be combined into an overall interchange concept. A brief summary of the projects is presented in Table 4-4.

Table 4-4. Summary of Interchange 33 Concepts – Interchange Improvements

ID	Location	General Description	Reason
I-1	I-5 Northbound Off-ramp	Widen the northbound off-ramp to add a second right-turn lane	Safety and Capacity
I-2	I-5 Northbound Off-ramp	Add Northbound loop off-ramp to accommodate high demand for traffic destined for west along E Pine Street	Safety and Capacity
I-3	I-5 Southbound On-ramp	Widen E Pine to provide second westbound left-turn lane	Safety and Capacity
I-4	I-5 Southbound On-ramp	Add Southbound loop on-ramp to accommodate high demand for traffic destined for west along E Pine Street	Safety and Capacity
I-5	I-5 Northbound and Southbound ramp terminals	Modify interchange to create a diverging diamond (with existing structure)	Safety and Capacity
I-6	I-5 Northbound and Southbound ramp terminals	Modify interchange to create a diverging diamond (widening or replacement of structure)	Safety and Capacity
I-7	I-5 Northbound and Southbound ramp terminals	Bridge (Overpass) Widening or Replacement depending on combination of concepts I-1 through I-4	Safety and Capacity

4.4.1. Concept I-1 – I-5 Northbound Off-Ramp – Dual Right-Turn Lanes

Concept I-1 would widen the I-5 northbound off-ramp to add a second right-turn lane at the approach to E Pine Street. The current approach has three lanes (left turn only, left-through, and right turn only). As illustrated in Figure 4-3, the improvement would add a second right-turn lane to provide approximately 350 feet of additional storage for the right-turn movement.

Concept I-1 Traffic Operations and Safety

The traffic operations with Concept I-1 are summarized in Table 4-5. With the 2034 RTP forecasts, the intersection would meet state mobility standards for both AM and PM peak hours. With the ALUS forecasts, the PM peak hour would be slightly higher than the standard but substantially improved when compared with the Enhanced Network concept.

Table 4-5: Intersection Operations for Concept I-1

Intersection	V/C Ratio	LOS	Queuing Issues	Mobility Standard
Operations with 2034 RTP Forecasts				
I-5 NB Ramps AM:	V/C = 0.56	LOS A	Queuing – None	V/C ≤ 0.80 ¹
I-5 NB Ramps PM:	V/C = 0.72	LOS B	Queuing – None	V/C ≤ 0.80 ¹
Operations with ALUS Forecasts				
I-5 NB Ramps AM:	V/C = 0.62	LOS B	Queuing – None	V/C ≤ 0.80 ¹
I-5 NB Ramps PM:	V/C = 0.82	LOS B	Queuing – None	V/C ≤ 0.80 ¹

Notes:

1. Table 10-1: 20 Year Design-Mobility Standards (Volume/Capacity Ratio), 2003 Highway Design Manual.

Shaded results indicate where mobility standards are not met

Source: Synchro HCM Intersection Analysis Report

The five-year crash analysis, conducted as part of the existing conditions evaluation, identified 30 crashes at this intersection, including 15 rear end, 11 turning, 1 pedestrian, 3 other assorted collisions. Concept I-1 would reduce the length of the queues on the ramp while also providing additional storage capacity. As a result, the safety issues associated with long queues extending in the deceleration zone on the ramp would not be a concern. Furthermore, improved operations could mean that fewer vehicles would be required to stop at the intersection, which could reduce the potential for rear end crashes. Improved operations would not have a substantial affect on turning crashes. If no turn on red is permitted for the dual northbound right-turn movement, there may be some improvement in conditions for pedestrians.

Concept I-1 Basic Roadway Geometries and Right-of-Way Requirements

Concept I-1 would widen the I-5 northbound off-ramp to add a second right-turn lane at the approach to E Pine Street. As illustrated in Figure 4-3, the improvement would add a second right-turn lane to provide approximately 350 feet of additional storage for the right-turn movement. Most of the improvement could be accommodated within the existing ROW; however, the second right-turn lane would likely require some additional ROW at the intersection with the current design shown.

Concept I-1 Environmental and Land Use Assessment

Some additional ROW would likely be needed on the ramp near E Pine Street to accommodate the second right-turn lane. This could have some minor impact to the parcel on the southeast corner of the intersection.

The area around the interchange is disturbed by existing development. It lies within the 500-year floodplain for Bear Creek but improvements would not have any direct impact on the creek. There is a hazardous materials site located near the intersection, which will need to be considered if this concept is carried forward.

Concept I-1 Concepts Cost Opinions

The estimate for this concept is \$1.3 million. This cost does not include acquisition of additional ROW, utility relocation, or costs to address potential hazardous waste.

4.4.2. Concept I-2 – I-5 Northbound Off-Ramp – New Loop Ramp

Concept I-2 presents an alternative solution to addressing capacity and queuing concerns on the I-5 northbound off-ramp. Rather than providing more capacity on the existing ramp, as considered with Concept I-1, this concept would add a loop ramp on the north side of the interchange to accommodate high demand by traffic heading westbound on E Pine Street. The existing northbound ramp would remain in place but would be restriped to allow the through movement across E Pine Street and dual right turns for highway traffic heading eastbound on E Pine Street. This improvement was also identified in the E Pine Street Plan. Figure 4-4 illustrates the concept.

Concept I-2 Traffic Operations and Safety

The traffic operations with the Concept I-2 are summarized in Table 4-6. The results are very similar to those associated with the ramp widening considered with Concept I-1. With the 2034 RTP forecasts, the intersection would meet state mobility standards for both AM and PM peak hours. With the ALUS forecasts, the PM peak hour would be slightly higher than the standard but substantially improved when compared with the Enhanced Network concept.

Table 4-6: Intersection Operations for Concept I-2

Intersection	V/C Ratio	LOS	Queuing Issues	Mobility Standard
Operations with 2034 RTP Forecasts				
I-5 NB Ramps AM:	V/C = 0.57	LOS A	Queuing – None	V/C ≤ 0.80 ¹
I-5 NB Ramps PM:	V/C = 0.71	LOS B	Queuing – None	V/C ≤ 0.80 ¹
Operations with ALUS Forecasts				
I-5 NB Ramps AM:	V/C = 0.64	LOS B	Queuing – None	V/C ≤ 0.80 ¹
I-5 NB Ramps PM:	V/C = 0.82	LOS B	Queuing – None	V/C ≤ 0.80 ¹

Notes:

1. Table 10-1: 20 Year Design-Mobility Standards (Volume/Capacity Ratio), 2003 Highway Design Manual.

Shaded results indicate where mobility standards are not met

Source: Synchro HCM Intersection Analysis Report

Similar to Concept I-1, Concept I-2 would provide several safety benefits. It would reduce the length of the queues on the northbound off-ramp and the safety issues associated with long queues extending in the deceleration zone on the ramp would not be a concern. Improved operations could mean that fewer vehicles would be required to stop at the intersection, which could reduce the potential for rear end crashes. Improved operations would not have a substantial affect on turning crashes. If no turn on red is permitted for the dual southbound right-turn movement, there may be some improvement in conditions for pedestrians on the south side of E Pine Street but an additional conflict point between vehicles and pedestrians would be added on the north side where the sidewalk crosses the bridge.

Concept I-2 Basic Roadway Geometries and Right-of-Way Requirements

Concept I-2 would add a loop ramp on the north side of the interchange to accommodate high demand by traffic heading westbound on E Pine Street, as illustrated in Figure 4-4. The ramp would provide approximately 400 to 450 feet of storage in two lanes.

Adding the loop ramp would require substantial structural work to replace two existing bridge spans with a single span and a substantial retaining wall. Only minimal clearance would be available between the loop ramp barrier and the remaining bridge columns.

The loop ramp would also require realignment of the existing northbound entrance ramp bringing it much closer to Peninger Road. Adding a barrier between the ramp and Peninger would likely be necessary.

These improvements can all be constructed within the existing ROW for I-5 or the abutting ROW for Peninger Road.

Concept I-2 Environmental and Land Use Assessment

The area around the interchange is disturbed by existing development. It lies within the 500-year floodplain for Bear Creek but improvements would not have any direct impact on the creek.

No land use or natural resource impacts are anticipated.

Concept I-2 Concepts Cost Opinions

The estimate for this concept is \$9.7 million. This cost does not include acquisition of additional ROW or utility relocation.

4.4.3. Concept I-3 – I-5 Southbound On-Ramp – Dual Westbound Left-Turn Lanes

Concept I-3 would widen E Pine Street to add dual westbound left-turn lanes onto the I-5 southbound on-ramp, as illustrated in Figure 4-5. The southbound on-ramp would be widened to provide two receiving lanes that merge before traffic enters the freeway. The widening of E Pine Street would begin just west of the bridge structure and the second left-turn lane would have 150 to 200 feet of additional storage. The existing left-turn lane would be restriped to provide additional storage as well.

Concept I-3 Traffic Operations and Safety

The traffic operations with Concept I-3 are summarized in Table 4-7. The intersection would meet state mobility standards for both AM and PM peak hours with both the 2034 RTP and ALUS forecasts.

Table 4-7: Intersection Operations for Concept I-3

Intersection	V/C Ratio	LOS	Queuing Issues	Mobility Standard
Operations with 2034 RTP Forecasts				
I-5 SB Ramps AM:	V/C = 0.74	LOS B	Queuing – None	V/C ≤ 0.80 ¹
I-5 SB Ramps PM:	V/C = 0.66	LOS B	Queuing – None	V/C ≤ 0.80 ¹
Operations with ALUS Forecasts				
I-5 SB Ramps AM:	V/C = 0.79	LOS B	Queuing – None	V/C ≤ 0.80 ¹
I-5 SB Ramps PM:	V/C = 0.79	LOS B	Queuing – None	V/C ≤ 0.80 ¹

Notes:

1. Table 10-1: 20 Year Design-Mobility Standards (Volume/Capacity Ratio), 2003 Highway Design Manual.

Shaded results indicate where mobility standards are not met

Source: Synchro HCM Intersection Analysis Report

The five-year crash analysis, conducted as part of the existing conditions evaluation, identified 19 crashes at this intersection, including 9 rear end, 6 turning, 4 assorted collisions. Concept I-3

would reduce the queue spillover on the westbound approach which would reduce future safety hazards at the intersection. Improved operations could mean that fewer vehicles would be required to stop at the intersection, which could reduce the potential for rear end crashes. Improved operations would not have a substantial affect on turning crashes.

Concept I-3 Basic Roadway Geometries and Right-of-Way Requirements

Concept I-3 would widen E Pine Street to add dual westbound left-turn lanes onto the I-5 southbound on-ramp, as illustrated in Figure 4-5. The southbound on-ramp would be widened to provide two receiving lanes that merge before traffic enters the freeway. The widening of E Pine Street would begin just west of the bridge structure and the second left-turn lane would have 150 to 200 feet of additional storage.

The concept as illustrated, assumes that widening would occur on the south side only and was based on a 30 mph design speed, which could require a design exception. Some widening and realignment for a distance of 350 to 400 feet would be needed on the west side of the intersection to minimize the through lane offset for eastbound traffic. This widening would impact ROW in the southwest quadrant of the intersection.

Widening to both sides would allow a 35 mph design speed but would impact ROW in the northwest quadrant of the intersection as well.

Concept I-3 Environmental and Land Use Assessment

Some additional ROW would likely be needed along E Pine Street west of the southbound ramp to accommodate the second left-turn lane. This could have some impact to several parcels in the southwest quadrant of the intersection. No structure impacts are expected based on the basic roadway geometries.

The area around the interchange is disturbed by existing development. There are several hazardous materials sites located in the southwest quadrant of the intersection, which will need to be considered if this concept is carried forward.

Concept I-3 Concepts Cost Opinions

The estimate for this concept is \$1.7 million. This cost does not include acquisition of additional ROW, utility relocation, or costs to address potential hazardous waste.

4.4.4. Concept I-4 – I-5 Southbound On-Ramp – New Loop Ramp

Concept I-4 presents an alternative solution to addressing capacity and queuing concerns at the I-5 southbound ramp intersection. Rather than providing more capacity for the westbound left-turn movement from E Pine Street, as considered with Concept I-3, this concept would add a loop ramp on the north side of the interchange to accommodate the high demand from traffic heading westbound on E Pine Street to southbound I-5. The existing southbound ramp would remain in place but would only serve traffic heading eastbound on E Pine Street. This improvement was also identified in the E Pine Street Plan. Figure 4-6 illustrates the concept.

Concept I-4 would reduce the number of travel lanes on the bridge. With fewer travel lanes, a sidewalk on the south side of E Pine Street could be added without widening the bridge although some widening on the south side would be needed near the northbound ramp terminal. Adding sidewalk was not included in basic roadway geometry for this concept.

Concept I-4 Traffic Operations and Safety

The traffic operations with the Concept I-4 are summarized in Table 4-8. The results are very similar to those associated with the ramp widening considered with Concept I-3. The intersection would meet state mobility standards for both AM and PM peak hours with both the 2034 RTP and ALUS forecasts.

Table 4-8: Intersection Operations for Concept I-4

Intersection	V/C Ratio	LOS	Queuing Issues	Mobility Standard
Operations with 2034 RTP Forecasts				
I-5 SB Ramps AM:	V/C = 0.53	LOS B	Queuing – None	V/C ≤ 0.80 ¹
I-5 SB Ramps PM:	V/C = 0.66	LOS B	Queuing – None	V/C ≤ 0.80 ¹
Operations with ALUS Forecasts				
I-5 SB Ramps AM:	V/C = 0.58	LOS B	Queuing – None	V/C ≤ 0.80 ¹
I-5 SB Ramps PM:	V/C = 0.74	LOS A	Queuing – None	V/C ≤ 0.80 ¹

Notes:

1. Table 10-1: 20 Year Design-Mobility Standards (Volume/Capacity Ratio), 2003 Highway Design Manual.

Shaded results indicate where mobility standards are not met

Source: Synchro HCM Intersection Analysis Report

Similar to Concept I-3, Concept I-4 would provide several safety benefits. It would remove the westbound left-turn movement which would eliminate any queue spillover and also reduce the number of conflict movements. Reduced turning conflicts could result in few turning collisions. However, an additional conflict point between vehicles and pedestrians would be added on the north side of E Pine Street where the sidewalk crosses the bridge.

Concept I-4 Basic Roadway Geometries and Right-of-Way Requirements

Concept I-4 would add a loop ramp on the north side of the interchange to accommodate high demand from traffic heading westbound on E Pine Street to southbound I-5, as illustrated in Figure 4-6. A free flow right-turn configuration was not utilized with the loop ramp because it would require substantial realignment of existing SB exit ramp to fit minimum radius curve.

Adding the loop ramp would require substantial structural work to replace two existing bridge spans with a single span and a substantial retaining wall. Only minimal clearance would be available between the loop ramp barrier and the remaining bridge columns.

The loop ramp would also require extending the existing southbound entrance ramp to meet standard spacing for consecutive entrance ramps. Extending the existing ramp would have significant ROW requirements from the parcels adjacent to the ramp and along the highway. It

will also require some retaining walls because of the grade differential with the adjacent properties.

Although not included in the basic roadway geometry for Concept I-4, a sidewalk on the south side of E Pine Street could be added because there would be fewer travel lanes on the bridge. Some widening on the south side would be needed near the northbound ramp terminal.

Concept I-4 Environmental and Land Use Assessment

Additional ROW would be needed along the existing southbound on-ramp and a stretch of I-5. This would impact several parcels in the southwest quadrant of the intersection. No structure impacts are expected based on the basic roadway geometries but loss of parking for some businesses would be likely even with substantial retaining walls.

The area around the interchange is disturbed by existing development. There are several hazardous materials sites located in the southwest quadrant of the intersection, which will need to be considered if this concept is carried forward.

Concept I-4 Concepts Cost Opinions

The estimate for this concept is \$11.0 million. This cost does not include acquisition of additional ROW, utility relocation, or costs to address potential hazardous waste.

No cost opinion was prepared for adding a sidewalk to the south side of E Pine Street.

4.4.5. Concept I-5 – Diverging Diamond Interchange with No Bridge Widening

Concept I-5 would modify the entire interchange to a diverging diamond interchange (DDI) form, as illustrated in Figure 4-7. The DDI design can sometimes result in a smaller footprint at high volume interchange locations. At the same time, the DDI provides a number of operational and safety benefits over traditional interchange designs. Concept I-5 was developed to determine if a DDI could be created using the existing bridge across the freeway. Concept I-6 considers a DDI with bridge widening.

Concept I-5 Traffic Operations and Safety

Although the initial concept appears complicated, a DDI actually simplifies the traffic movements through an interchange. Some of the general operational and safety benefits include:

- All turning movements become “free” left or right turns onto and off of the ramps.
- The crossover intersections would remain signalized but would only have two phases of operation, which increases capacity and can allow for shorter cycle lengths and better progression between traffic lights.
- Increased capacity for left-turn movements without having to add more turn lanes.

- Fewer vehicular conflict points (i.e., locations where vehicle paths cross, merge, or separate).
- Shorter pedestrian crossings can be created that have fewer conflict points with vehicles.

Traffic operations with the DDI in Concept I-5 are summarized in Table 4-9. Because of the lane limitations imposed by maintaining the existing bridge cross-section, the east crossover intersection (near the northbound ramps) would exceed the mobility standard during both the AM and PM peak hours with the 2034 RTP forecasts. Some minor queuing would be present at both of the signalized crossovers that could impact nearby intersections (10th/Freeman to the west and Peninger to the east). Conditions would worsen with the ALUS with significant congestion at the east crossover intersection during both peak hours and an overall v/c ratio that would exceed mobility standards at the west crossover intersection (near the southbound ramps). Queuing across the bridge would affect the southbound off-ramp as well.

Table 4-9: Intersection Operations for Concept I-5

Intersection	V/C Ratio	LOS	Queuing Issues	Mobility Standard
Operations with 2034 RTP Forecasts				
West Crossover AM:	V/C = 0.56	LOS B	Queuing – EB	V/C ≤ 0.80 ¹
East Crossover AM:	V/C = 0.88	LOS C	Queuing – None	V/C ≤ 0.80 ¹
West Crossover PM:	V/C = 0.75	LOS B	Queuing – EB	V/C ≤ 0.80 ¹
East Crossover PM:	V/C = 0.91	LOS C	Queuing – WB, EB	V/C ≤ 0.80 ¹
Operations with ALUS Forecasts				
West Crossover AM:	V/C = 0.64	LOS B	Queuing – EB	V/C ≤ 0.80 ¹
East Crossover AM:	V/C = 0.96	LOS D	Queuing – EB	V/C ≤ 0.80 ¹
West Crossover PM:	V/C = 0.82	LOS B	Queuing – EB	V/C ≤ 0.80 ¹
East Crossover PM:	V/C = 1.07	LOS E	Queuing – EB, WB	V/C ≤ 0.80 ¹

Notes:

1. Table 10-1: 20 Year Design-Mobility Standards (Volume/Capacity Ratio), 2003 Highway Design Manual.

Shaded results indicate where mobility standards are not met

Source: Synchro HCM Intersection Analysis Report

The five-year crash analysis, conducted as part of the existing conditions evaluation, identified 49 crashes at the two ramp intersections, including 24 rear end, 17 turning, 2 angle, 1 pedestrian, and 5 assorted collisions. Concept I-5 would eliminate many of the conflicts that can result in turning or angle collisions. With fewer vehicles stopping at the traffic signals, there may also be some reduction in rear end collisions. Shorter crossing distances and few simultaneous conflict points could improve pedestrian safety but the benefits could be off-set by more unsignalized pedestrian crossings.

Concept I-5 Basic Roadway Geometries and Right-of-Way Requirements

Concept I-5 would modify the entire interchange to a diverging diamond interchange (DDI) form, as illustrated in Figure 4-7. The layout was developed using the existing bridge across the

freeway. It includes two travel lanes in each direction, bike lanes in both directions, and a pedestrian pathway in the center of the bridge, as shown in the DDI cross-section.

Bicycles would remain on the right side of the travel lanes as they move through the interchange. Bicycle-vehicle conflict points would remain at four locations (westbound to northbound on-ramp, southbound to westbound off-ramp, eastbound to southbound on-ramp, and northbound to eastbound off-ramp) but would be eliminated at the traffic signals since no turns would be made.

Pedestrians would connect to a center pathway using the two signalized crossover intersections at either end of the interchange. The center pathway would connect to sidewalks on both the north and south sides of E Pine Street. By relocating the sidewalk from the north side of the bridge to the center of the bridge, this concept would address the existing deficiency of no sidewalks on the south side of E Pine Street. Pedestrian-vehicle conflict points would remain at four locations (westbound to northbound on-ramp, southbound to westbound off-ramp, eastbound to southbound on-ramp, and northbound to eastbound off-ramp) but would be eliminated at the traffic signals since no turns would be made.

Because I-5 crosses E Pine Street at a skewed angle rather than a right angle, some of the ramps would be more sharply curved than others. The sharper curves already exist for the northbound and southbound entrance ramps but accommodating the DDI design may be more difficult with some of the terrain.

Additional ROW would be needed on both sides of the interchange. The east crossover and northbound ramp connections could potentially shift further west to reduce impacts to the parcels on the south side of E Pine Street (southeast quadrant of the interchange). The west crossover and southbound ramps would have significant ROW needs on the north side of E Pine Street (northwest quadrant) due to three lanes westbound. Some ROW would also be needed along the south side of E Pine Street in the southwest quadrant of the interchange. The crossover could potentially be shifted southwards to reduce impacts on the north side of E Pine Street.

Concept I-5 Environmental and Land Use Assessment

Additional ROW would be needed with DDI in several quadrants. Some additional ROW could be needed from the corner parcel in the southeast quadrant but a shift in the crossover and ramps could possibly avoid impacts. More significant ROW impacts would occur on the west side of the interchange. As laid out in Figure 4-7, the gas station in the northwest quadrant would be significantly impacted by construction and there would be some minor ROW acquisition needed in the southwest quadrant. If the intersection is shifted to the south, the gas station impacts could potentially be reduced but impacts on the south side of E Pine Street would be greater.

There are several hazardous materials sites located around the interchange which will need to be considered if this concept is carried forward.

Concept I-5 Concepts Cost Opinions

The estimate for this concept is \$8.6 million. This cost does not include acquisition of additional ROW, utility relocation, or costs to address potential hazardous waste.

4.4.6. Concept I-6 – Diverging Diamond with Bridge Widening

Concept I-6 would also modify the entire interchange to a diverging diamond interchange (DDI) form but would widen the bridge across the freeway to provide a third westbound travel lane and a wider center pathway. In Figure 4-8, the widening of the bridge is shown to occur on the south side of the structure.

Concept I-6 Traffic Operations and Safety

Traffic operations with the DDI in Concept I-6 are summarized in Table 4-10. Without lane limitations on the bridge, both the east and west crossover intersections would meet mobility standards with the 2034 RTP forecasts during the AM and PM peak hours. Conditions would worsen with the ALUS and mobility standards would not be met during either the AM or PM peak hours. However, neither of the crossover intersections would have demand that exceeds capacity. While there would be some queuing, impacts to the off ramps would occur only occasionally rather than throughout the peak.

Table 4-10: Intersection Operations for Concept I-6

Intersection	V/C Ratio	LOS	Queuing Issues	Mobility Standard
Operations with 2034 RTP Forecasts				
West Crossover AM:	V/C = 0.55	LOS B	Queuing – EB	V/C ≤ 0.80 ¹
East Crossover AM:	V/C = 0.75	LOS C	Queuing – None	V/C ≤ 0.80 ¹
West Crossover PM:	V/C = 0.74	LOS B	Queuing – EB	V/C ≤ 0.80 ¹
East Crossover PM:	V/C = 0.76	LOS C	Queuing – EB	V/C ≤ 0.80 ¹
Operations with ALUS Forecasts				
West Crossover AM:	V/C = 0.63	LOS B	Queuing – EB	V/C ≤ 0.80 ¹
East Crossover AM:	V/C = 0.82	LOS D	Queuing – EB	V/C ≤ 0.80 ¹
West Crossover PM:	V/C = 0.81	LOS B	Queuing – WB, EB	V/C ≤ 0.80 ¹
East Crossover PM:	V/C = 0.89	LOS D	Queuing – EB	V/C ≤ 0.80 ¹

Notes:

1. Table 10-1: 20 Year Design-Mobility Standards (Volume/Capacity Ratio), 2003 Highway Design Manual.

Shaded results indicate where mobility standards are not met

Source: Synchro HCM Intersection Analysis Report

Safety benefits of Concept I-6 would be similar to those identified for Concept I-5.

Concept I-6 Basic Roadway Geometries and Right-of-Way Requirements

A revised layout has not been prepared for Concept I-6 but Figure 4-8 illustrates where the roadway would be wider than Concept I-5. It includes two travel lanes in the eastbound

direction, three travel lanes in the westbound direction, bike lanes in both directions, and a pedestrian pathway in the center of the bridge, as shown in the DDI cross-section.

To provide the additional travel lane and wider center pedestrian pathway, the bridge across the freeway would need to be widened. Figure 4-8 indicates widening to the south, which is where the original portion of the bridge is located. The original bridge was constructed in the 1960's and still has a sufficiency rating of 75.

Bicycle and pedestrian movements through the interchange would be the same as those discussed with Concept I-5.

ROW needs would not be significantly different than those discussed for Concept I-5. Some minor impacts are shown in the southeast quadrant which might be minimized by shifting the crossover and ramps to the west. More significant impacts would occur on the west side of the interchange in both the northwest and southwest quadrants.

Concept I-6 Environmental and Land Use Assessment

Additional ROW needs for Concept I-6 would be basically the same as those identified for Concept I-5. Some additional ROW could be needed from the corner parcel in the southeast quadrant but a shift in the crossover and ramps could possibly avoid impacts. More significant ROW impacts would occur on the west side of the interchange. As laid out in Figure 4-7, the gas station in the northwest quadrant would be significantly impacted by construction and there would be some minor ROW acquisition needed in the southwest quadrant. If the intersection is shifted to the south, the gas station impacts could potentially be reduced but impacts on the south side of E Pine Street would be greater.

There are several hazardous materials sites located around the interchange which will need to be considered if this concept is carried forward.

Concept I-6 Concepts Cost Opinions

Cost opinions have not been developed for this concept at this time; however, widening the bridge would substantially increase the cost estimated for Concept I-5.

4.4.7. Concept I-7 – Bridge (Overpass) Widening or Replacement

The existing bridge over I-5 provides two through travel lanes in each direction, a center refuge lane, bike lanes in both direction of travel, and a sidewalk on the north side only. While some solutions address capacity deficiencies at the interchange ramps, many do not address the sidewalk deficiency on the south side of the overpass.

Concept I-7 is intended to be paired with some combination of the first four interchange concepts and will vary depending on the preferred concepts selected. The extent of the widening and/or the potential replacement of the bridge are discussed for the different pairings of concepts Table 4-11.

Interchange Concept Combination	Concept I-7 Improvements
Option 1: <i>I-1 – I-5 NB Off-Ramp – Dual NB Right-Turn Lanes</i> <i>I-3 – I-5 SB On-Ramp – Dual WB Left-Turn Lanes</i>	<ul style="list-style-type: none"> • Widen bridge to add sidewalk to south side of E Pine Street • Potentially widen more extensively to extend second WB left-turn to provide greater storage distance
Option 2: <i>I-2 – I-5 NB Off-Ramp – New Loop Ramp</i> <i>I-3 – I-5 SB On-Ramp – Dual WB Left-Turn Lanes</i>	<ul style="list-style-type: none"> • Widen bridge to add sidewalk to south side of E Pine Street • Potentially widen more extensively to extend second WB left-turn to provide greater storage distance
Option 3: <i>I-1 – I-5 NB Off-Ramp – Dual NB Right-Turn Lanes</i> <i>I-4 – I-5 SB On-Ramp – New Loop Ramp</i>	<ul style="list-style-type: none"> • Add sidewalk to south side of E Pine Street which may be accomplished without widening
Option 4: <i>I-2 – I-5 NB Off-Ramp – New Loop Ramp</i> <i>I-4 – I-5 SB On-Ramp – New Loop Ramp</i>	<ul style="list-style-type: none"> • Consider bridge replacement because combination of significant structural work at either end may require as much work as replacement • Add sidewalk to south side of E Pine Street which may be accomplished without any widening

Concept I-7 Traffic Operations and Safety

The traffic operations with Concept I-7 would depend on the option considered. The findings from Table 4-5 through Table 4-9 would apply at the intersections.

Improvements to safety would also depend on the option considered; however, in all cases, a sidewalk would be included on the south side of E Pine Street. Pedestrians traveling along the roadway between origins and destinations south of E Pine Street would no longer be required to cross over to the north side of the roadway. As a result, pedestrian-vehicle conflict points would be reduced from four crossings to two crossings. Thus pedestrian safety as well as convenience would be improved.

Concept I-7 Basic Roadway Geometries and Right-of-Way Requirements

Concept I-7 is intended to be paired with some combination of the first four interchange concepts. No layouts have been prepared at this point in the analysis because the extent of improvements will vary depending on the preferred concepts selected. The range of potential improvements is listed below from least cost to greatest cost:

- Add sidewalk to south side of E Pine Street without any widening
- Widen bridge to add sidewalk to south side of E Pine Street
- Widen bridge to add sidewalk to south side of E Pine Street and to extend second WB left-turn to provide greater storage distance
- Replace bridge because combination of structural work at either end may require as much work as replacement

Any of these improvements could likely be implemented without additional ROW acquisition beyond the impacts identified under Concepts I-1 through I-4.

Concept I-7 Environmental and Land Use Assessment

The potential bridge improvements could likely be implemented without additional ROW acquisition beyond the impacts identified under Concepts I-1 through I-4.

Concept I-7 Concepts Cost Opinions

Cost opinions have not been developed for this concept at this time.

4.5. West Side Improvements

Four potential intersection improvements were identified to improve traffic flow, provide additional capacity, or address safety concerns. A brief summary of the projects is presented in Table 4-12.

Table 4-12. Summary of Interchange 33 Concepts – West Side Improvements

ID	Location	General Description	Reason
W-1	I-5 southbound ramps terminal to 10 th St/Freeman Rd	<ul style="list-style-type: none"> • <u>Jewett School Rd</u>: Restrict access to right-in/right-out • <u>E Pine St</u>: Add second westbound left-turn lane onto Freeman and minimize ROW impacts by reducing number of eastbound through travel lanes • <u>Freeman Rd</u>: Add second southbound receiving lane on Freeman from E Pine to Oak • <u>10th Street</u>: Extend left-turn lane striping to Manzanita 	Safety and Capacity
W-2	I-5 southbound ramps terminal to 10 th St/Freeman Rd	<ul style="list-style-type: none"> • <u>Jewett School Rd</u>: Restrict access to right-in/right-out • <u>E Pine St</u>: Add second westbound left-turn lane onto Freeman • <u>Freeman Rd</u>: Add second southbound receiving lane on Freeman from E Pine to Oak • <u>10th Street</u>: Extend left-turn lane striping to Manzanita 	Safety and Capacity
W-3	I-5 southbound ramps terminal to 7 th Street	<ul style="list-style-type: none"> • <u>Jewett School Rd</u>: Restrict access to right-in/right-out • <u>10th St/Freeman Rd</u>: Restrict access to right-in/right-out/left-in (left out and through movements diverted) • <u>7th St</u>: Add signal to accommodate shift in left-turn and through movements and keep 4 lanes on E Pine 	Safety and Capacity
W-4	I-5 southbound ramps terminal to 7 th Street	<ul style="list-style-type: none"> • <u>Jewett School Rd</u>: Restrict access to right-in/right-out • <u>10th St/Freeman Rd</u>: Restrict access to right-in/right-out/left-in (left out and through movements diverted) • <u>7th St</u>: Add signal and widen for left-turn lanes but reduce E Pine to 3 lanes 	Safety and Capacity

4.5.1. Concept W-1 – 10th Street/Freeman Road Improvements – Option 1

Concept W-1 was developed to address capacity and safety concerns between the I-5 southbound ramp terminal and 10th Street/Freeman Road. As illustrated in Figure 4-9, the concept would include the following elements:

- **Jewett School Road:** Restrict access to right-in/right-out and create public connection or easement to 10th Street opposite Manzanita Street to accommodate other turn movements.
- **E Pine Street:** Add second westbound left-turn lane onto Freeman Road and minimize ROW impacts by reducing number of eastbound through travel lanes from three lanes to two lanes through the intersection.
- **Freeman Road:** Add second southbound receiving lane on Freeman from E Pine Street to Oak Street
- **10th Street:** Extend left-turn lane striping to Manzanita Street.
- Private access points along E Pine Street between the freeway ramps and 10th Street/Freeman Road may also be closed as part of the plan to improve safety and capacity. At minimum, all accesses would need to be restricted to right-in/right-out with the dual left-turn lanes at Freeman Road.

Concept W-1 Traffic Operations and Safety

The traffic operations with Concept W-1 are summarized in Table 4-13. With the 2034 RTP forecasts, the intersection would meet City and County mobility standards for the PM peak hours. With the ALUS forecasts, the PM peak hour would exceed the County standard but meet the City standard. The benefits of the dual left-turn lanes associated with this concept would be limited by the reduction in eastbound through travel lanes.

Table 4-13: Intersection Operations for Concept W-1

Intersection	V/C Ratio	LOS	Queuing Issues	Mobility Standard
Operations with 2034 RTP Forecasts				
10 th /Freeman:	V/C = 0.85	LOS C	Queuing – EB, SB Left	V/C <= 0.85 ¹ /LOS D ²
Operations with ALUS Forecasts				
10 th /Freeman:	V/C = 0.94	LOS D	Queuing – EB, SB Left	V/C <= 0.85 ¹ /LOS D ²

Notes:

1. Jackson County Transportation System Plan, Ordinance 2005-3, p. 61.
2. City of Central Point Transportation System Plan, 2008-2030, p. 26.

Shaded results indicate where mobility standards are not met

Source: Synchro HCM Intersection Analysis Report

Queuing in the westbound left-turn lanes would be substantially reduced with the addition of the dual left-turn lane and the turn limitations at Jewett School Road. However, queuing would be present on the eastbound approach, making it harder to turn out of the unsignalized intersection at 9th Street. Queuing in the southbound left-turn lane would still spill over into the adjacent through lane even with the turn lane extension.

The five-year crash analysis, conducted as part of the existing conditions evaluation, identified 21 crashes at the 10th Street/Freeman Road intersection; most were rear end collisions on northbound Freeman Road. Although Concept W-1 may not substantially reduce the likelihood

of the northbound collisions, the additional westbound storage may reduce the potential for rear end collisions associated with queue spillover. The turn restrictions at Jewett School Road will reduce the number of conflict points at that intersection, which would also improve safety on the adjacent stretch of E Pine Street.

Concept W-1 Basic Roadway Geometries and Right-of-Way Requirements

Concept W-1 would address capacity and safety concerns between the I-5 southbound ramp terminal and 10th Street/Freeman Road through a combination of improvements, as illustrated in Figure 4-9.

Access at Jewett School Road would be restricted to right-in/right-out movements only. This action would not require any construction although a raised median should be considered for enforcement because of the dual left-turn lanes on E Pine Street at Freeman Road. To minimize the impacts to adjacent businesses, a public connection or easement through the school property to 10th Street opposite Manzanita Street would be desirable.

A second westbound left-turn lane onto Freeman Road would be added to E Pine Street. To minimize ROW impacts from the widening, the eastbound through travel lanes would be reduced from three lanes to two lanes through the intersection. By limiting the number of lanes on E Pine Street to a total of six, the conceptual cross-section could potentially be accommodated within the existing 100-foot ROW. However, even with the through travel lane reduction, there could be some ROW required east of the intersection to provide for lane tapers and alignment. West of 10th Street/Freeman Road, the ROW on E Pine Street is 90 feet. Some additional ROW acquisition may be needed just west of 10th Street/Freeman Road to accommodate lane tapers and alignment.

Freeman Road would need to be widened to accommodate a second southbound receiving lane for the dual westbound left turn from E Pine Street. The roadway geometry assumes that Freeman Road would be widened to a three-lane cross-section from E Pine Street to Oak Street. The existing ROW on Freeman Road is 60 feet, which could accommodate three travel lanes with bike lanes and sidewalks but exceptions may be required. Therefore, some additional ROW may be needed. Although Concept W-1 illustrates the Freeman Road widening along its existing alignment, some consideration should be given to straightening the curves which might help reduce the number of rear end collisions in the northbound direction.

Concept W-1 Environmental and Land Use Assessment

Some additional ROW would likely be needed along both E Pine Street and Freeman Road. Concept W-1 focuses on minimizing ROW impacts to adjacent properties but there would still be some impacts along E Pine Street. The widening on Freeman Road could possibly be accommodated within existing ROW but it is more likely that some ROW acquisitions from adjacent properties would be necessary.

Turn limitations at Jewett School Road and driveway restrictions, consolidations, and/or closures along E Pine Street between the freeway ramps and 10th Street/Freeman Road would

also impact properties. Alternative access via Jewett School Road and formalized access to 10th Street would mitigate some of the business impacts associated with the changes.

There are some hazardous materials sites located both north and south of E Pine Street, which will need to be considered if this concept is carried forward.

Concept W-1 Concepts Cost Opinions

The estimate for this concept is \$2.2 million. This cost does not include acquisition of additional ROW, utility relocation, or costs to address potential hazardous waste.

4.5.2. Concept WS-2 – 10th Street/Freeman Road Improvements – Option 2

Concept W-2 is similar to Concept W-1 but does not reduce the number of eastbound travel lanes in order to maximize capacity at the intersection. As illustrated in Figure 4-10, the concept would include the following elements:

- Jewett School Road: Restrict access to right-in/right-out and create public connection or easement to 10th Street opposite Manzanita Street to accommodate other turn movements.
- E Pine St: Add second westbound left-turn lane onto Freeman Road.
- Freeman Rd: Add second southbound receiving lane on Freeman from E Pine Street to Oak Street
- 10th Street: Extend left-turn lane striping to Manzanita Street.
- Private access points along E Pine Street between the freeway ramps and 10th Street/Freeman Road may also be closed as part of the plan to improve safety and capacity. At minimum, all accesses would need to be restricted to right-in/right-out with the dual left-turn lanes at Freeman Road.

Concept W-2 Traffic Operations and Safety

The traffic operations with Concept W-2 are summarized in Table 4-14. Both City and County mobility standards would be met for the PM peak hours under both future land use scenarios.

Table 4-14: Intersection Operations for Concept W-2

Intersection	V/C Ratio	LOS	Queuing Issues	Mobility Standard
Operations with 2034 RTP Forecasts				
10 th /Freeman:	V/C = 0.73	LOS C	Queuing – SB	V/C <= 0.85 ¹ /LOS D ²
Operations with ALUS Forecasts				
10 th /Freeman:	V/C = 0.79	LOS C	Queuing – SB	V/C <= 0.85 ¹ /LOS D ²

Notes:

1. Jackson County Transportation System Plan, Ordinance 2005-3, p. 61.
2. City of Central Point Transportation System Plan, 2008-2030, p. 26.

Shaded results indicate where mobility standards are not met

Source: Synchro HCM Intersection Analysis Report

Compared with Concept W-1, queuing would be reduced on all approaches; however, the southbound left-turn lane would still sometimes spill over into the adjacent through lane.

Safety benefits for Concept W-2 would be similar to those listed for Concept W-1. Additional storage for turning vehicles and a reduced number of conflict points would improve safety along E Pine Street. One disadvantage of Concept W-2 versus W-1 is the increase pedestrian crossing distance on E Pine Street.

Concept W-2 Basic Roadway Geometries and Right-of-Way Requirements

Concept W-2 would address capacity and safety concerns between the I-5 southbound ramp terminal and 10th Street/Freeman Road through a combination of improvements, as illustrated in Figure 4-10.

Access at Jewett School Road would be restricted to right-in/right-out movements only. This action would not require any construction although a raised median should be considered for enforcement because of the dual left-turn lanes on E Pine Street at Freeman Road. To minimize the impacts to adjacent businesses, a public connection or easement through the school property to 10th Street opposite Manzanita Street would be desirable.

Concept W-2 would add a second westbound left-turn lane from E Pine Street onto Freeman Road; but unlike Concept W-1, there would be no change to the existing number of eastbound through travel lanes. The wider cross-section would require additional ROW along E Pine Street both east and west of the intersection. The seven-lane cross-section east of 10th Street/Freeman Road could not be accommodated within the existing 100-foot ROW. The extent of the impacts to adjacent properties is hard to determine without more detailed design layouts; however, it is possible that there could be structure as well as property impacts. Some additional roadway widening would also be needed west of the intersection to provide adequate lane tapers and alignment. Additional ROW would be needed beyond the current 90 feet.

Freeman Road would need to be widened to accommodate a second southbound receiving lane for the dual westbound left turn from E Pine Street. The roadway geometry assumes that Freeman Road would be widened to a three-lane cross-section from E Pine Street to Oak Street. The existing ROW on Freeman Road is 60 feet, which could accommodate three travel lanes with bike lanes and sidewalks but exceptions may be required. Therefore, some additional ROW may be needed. Although Concept W-2 illustrates the Freeman Road widening along its existing alignment, some consideration should be given to straightening the curves which might help reduce the number of rear end collisions in the northbound direction.

Concept W-2 Environmental and Land Use Assessment

Additional ROW would be required along E Pine Street both east and west of the 10th Street/Freeman Road intersection. The extent of the impacts to adjacent properties is hard to determine without more detailed design layouts; however, it is possible that there could be

structure as well as property impacts east of the intersection while only property impacts are likely west of the intersection.

The widening on Freeman Road could possibly be accommodated within existing ROW but it is more likely that some ROW acquisitions from adjacent properties would be necessary.

Turn limitations at Jewett School Road and driveway restrictions, consolidations, and/or closures along E Pine Street between the freeway ramps and 10th Street/Freeman Road would also impact properties. Alternative access via Jewett School Road and formalized access to 10th Street would mitigate some of the business impacts associated with the changes.

There are some hazardous materials sites located both north and south of E Pine Street, which will need to be considered if this concept is carried forward.

Concept W-2 Concepts Cost Opinions

The estimate for this concept is \$2.6 million. This cost does not include acquisition of additional ROW, utility relocation, or costs to address potential hazardous waste.

4.5.3. Concept W-3 – 10th Street/Freeman Road Turn Restrictions – Option 1

There are two ways to improve operations at an intersection: one is to increase capacity, the other is to reduce demand. Concept W-3 focuses on demand reduction rather increasing capacity. As illustrated in Figure 4-11, the concept would include the following elements:

- E Pine Street & 10th Street/Freeman Road Intersection: Add a median barrier along E Pine Street to restrict turning movements to right-in/right-out/left-in on 10th Street and Freeman Road. Left-turn movements from 10th Street and Freeman Road would not be permitted onto E Pine Street and through movements between the two roadways would also be prohibited. Traffic that previously made these left-turn and through movements would need to divert to other roadways.
- E Pine Street & 7th Street: To accommodate some of the traffic diverted from 10th Street and Freeman Road, a traffic signal would be installed on E Pine Street at 7th Street. Concept W-3 assumes that the existing four-lane cross-section on E Pine Street would remain in place to maintain capacity through the intersection. (Note that Concept W-4 assumes the conversion to three lanes.)

Other access control measures are also assumed to be in place along E Pine Street between the freeway ramps and 10th Street/Freeman Road as part of the plan to improve safety and capacity. At minimum, all accesses could be restricted to right-in/right-out but some could eventually be closed.

Concept W-3 Traffic Operations and Safety

The traffic operations with Concept W-3 are summarized in Table 4-15. The 10th Street/Freeman Road intersection would meet the mobility standards which was the intent of the concept. However, while the 7th Street would meet the city mobility standards queuing would

be present along E Pine Street due to the new traffic signal, which would sometimes affect operations at other nearby intersections. With the ALUS forecasts, longer queues would form, spilling back through other nearby intersections.

Table 4-15: Intersection Operations for Concept W-3

Intersection	V/C Ratio	LOS	Queuing Issues	Mobility Standard
Operations with 2034 RTP Forecasts				
7th:	V/C = 0.80	LOS C	Queuing – WB, SB	LOS D ¹
10 th /Freeman:	V/C = 0.67	LOS B	Queuing – WB	V/C <= 0.85 ² /LOS D ¹
Operations with ALUS Forecasts				
7th:	V/C = 0.80	LOS C	Queuing – EB, WB, SB	LOS D ¹
10 th /Freeman:	V/C = 0.73	LOS B	Queuing – WB	V/C <= 0.85 ² /LOS D ¹

Notes:

1. City of Central Point Transportation System Plan, 2008-2030, p. 26.
2. Jackson County Transportation System Plan, Ordinance 2005-3, p. 61.

Shaded results indicate where mobility standards are not met

Source: Synchro HCM Intersection Analysis Report

The five-year crash analysis, conducted as part of the existing conditions evaluation, identified 21 crashes at the 10th Street/Freeman Road intersection and one crash at the 7th Street intersection. The reduced traffic demand on Freeman Road may result in fewer northbound crashes at that location but diverted traffic may increase crash frequency at other locations. Crash rates at 7th Street would likely increase because traffic signals generally have higher crash rates than locations with STOP control.

Concept W-3 Basic Roadway Geometries and Right-of-Way Requirements

A design layout was not prepared for Concept W-3. The changes in traffic control and turn prohibitions could largely be achieved within existing ROW.

Concept W-3 Environmental and Land Use Assessment

Although this concept would not require additional ROW, the changes in traffic control and turn prohibitions would impact businesses in the area. By permitting the left-in movement at 10th Street and Freeman Road, the ability to gain access into nearby businesses would be similar to Concepts W-1 and W-2. However, most movements exiting the area businesses would likely be restricted to right-out movements, which could discourage some visitors in the area.

In the vicinity of 7th Street, added traffic congestion would affect adjacent properties on both E Pine Street and 7th Street.

Traffic volumes on 7th Street, Manzanita Street, and Oak Street would all be higher with this concept than other concepts under consideration. While this higher pass-by traffic could benefit some adjacent businesses, most property owners are likely to perceive the higher volumes negatively.

Concept W-3 Concepts Cost Opinions

No cost opinion was prepared for Concept W-3 at this time.

4.5.4. Concept W-4 – 10th Street/Freeman Road Turn Restrictions – Option 2

Concept W-4 is similar to Concept W-3 but assumes conversion of E Pine Street from a four-lane roadway to a three-lane roadway in downtown Central Point. As illustrated in Figure 4-12, the concept would include the following elements:

- E Pine Street & 10th Street/Freeman Road Intersection: Improvements at this location would be the same as those detailed for Concept W-3. Add a median barrier along E Pine Street to restrict turning movements to right-in/right-out/left-in on 10th Street and Freeman Road. Prohibit left-turn movements from 10th Street and Freeman Road onto E Pine Street and through movements between the two roadways. Traffic that previously made these movements (left-turn and through) would need to divert to other roadways.
- E Pine Street & 7th Street: Concept W-4 assumes a three-lane cross-section on E Pine Street. To accommodate some of the traffic diverted from 10th Street and Freeman Road, 7th Street would be widened to include separate left-turn lanes with at least 100 feet of storage for left-turning vehicles. A traffic signal would be installed on E Pine Street at 7th Street.

Other access control measures are also assumed to be in place along E Pine Street between the freeway ramps and 10th Street/Freeman Road as part of the plan to improve safety and capacity. At minimum, all accesses could be restricted to right-in/right-out but some could eventually be closed.

Concept W-4 Traffic Operations and Safety

The traffic operations with Concept W-4 are summarized in Table 4-15. The 10th Street/Freeman Road intersection would meet the mobility standards which was the intent of the concept. However, while the 7th Street would meet the city mobility standards queuing would be present along E Pine Street due to the new traffic signal, which would sometimes affect operations at other nearby intersections. With the ALUS forecasts, the demand at the intersection would begin to approach the capacity of the intersection and longer queues would form, spilling back through other nearby intersections.

Concept W-4 would have similar safety benefits and impacts to Concept W-3. Some areas would benefit from a reduction in traffic demand while others could see higher crash rates. The traffic signal would likely result in more crashes at the 7th Street intersection with E Pine Street.

Table 4-16: Intersection Operations for Concept W-4

Intersection	V/C Ratio	LOS	Queuing Issues	Mobility Standard
Operations with 2034 RTP Forecasts				
7th:	V/C = 0.82	LOS C	Queuing – EB, WB	LOS D ¹
10 th /Freeman:	V/C = 0.67	LOS B	Queuing – WB	V/C ≤ 0.85 ² /LOS D ¹
Operations with ALUS Forecasts				
7th:	V/C = 0.93	LOS C	Queuing – EB, WB, SB	LOS D ¹
10 th /Freeman:	V/C = 0.73	LOS B	Queuing – WB	V/C ≤ 0.85 ² /LOS D ¹

Notes:

1. City of Central Point Transportation System Plan, 2008-2030, p. 26.
2. Jackson County Transportation System Plan, Ordinance 2005-3, p. 61.

Shaded results indicate where mobility standards are not met

Source: Synchro HCM Intersection Analysis Report

Concept W-4 Basic Roadway Geometries and Right-of-Way Requirements

A design layout was not prepared for Concept W-4. The changes in traffic control and turn prohibitions could largely be achieved within existing ROW with the exception of the addition of left-turn lanes on 7th Street. The existing roadway width is approximately 32 feet within a 60-foot ROW. The current roadway is not wide enough to restripe for left-turn lanes. On-street parking would need to be eliminated and the roadway would need to be reconstructed to a width of approximately 40 feet without on-street parking. Sidewalks would need to be relocated, possibly on both sides of the street, depending on whether widening occurs on only one side of the roadway or not.

Concept W-4 Environmental and Land Use Assessment

Concept W-4 would have similar land use benefits and impacts to Concept W-3 due to access restrictions and changes in traffic volumes.

The biggest difference between the two concepts is that 7th Street would need to be widened from its current width of approximately 32 feet to approximately 40 feet. The on-street parking would still be eliminated with the roadway widening.

Concept W-4 Concepts Cost Opinions

No cost opinion was prepared for Concept W-4 at this time.

4.6. East Side Improvements

Three potential intersection improvements were identified to improve traffic flow, provide additional capacity, or address safety concerns. A brief summary of the projects is presented in Table 4-17.

Table 4-17. Summary of Interchange 33 Concepts – East Side Improvements

ID	Location	General Description	Reason
E-1	Hamrick Road	<ul style="list-style-type: none"> • <u>E Pine St</u>: Add second eastbound left-turn lane • <u>Hamrick Rd</u>: Add second northbound receiving lane 	Capacity
E-2	Table Rock Road	<ul style="list-style-type: none"> • <u>Table Rock Rd</u>: Widen Table Rock south of E Pine to 5-lane cross-section and add second southbound left-turn lane along Table Rock. 	Capacity
E-3	Hamrick Road/ Table Rock Road	<ul style="list-style-type: none"> • <u>Hamrick Rd</u>: Restrict allocation of green time for eastbound left turn and southbound right turn to encourage traffic shift to Table Rock Rd in combination with other traffic calming measures on Hamrick Rd • <u>Table Rock Road</u>: Add southbound right-turn lane in addition to improvements identified in E-2 	Capacity

4.6.1. Concept E-1 – Hamrick Road – Dual Eastbound Left-Turn Lanes

The E Pine Street/Hamrick Road intersection is expected to exceed mobility standards with the 2034 RTP land use forecasts and would fail with the ALUS forecast. The Central Point TSP includes a project (reference number 216) to add a second left-turn lane on the eastbound approach of E Pine Street and a second northbound receiving lane on Hamrick Road. This project is identified as a medium-term, Tier 1 project, and is also included in the RTP. Concept E-1 evaluates this improvement for comparison with other options for addressing this deficiency. The Concept E-1 lane configuration for Hamrick Road is illustrated in Figure 4-13.

Hamrick Road runs north-south from E Pine Street but eventually turns east-west and becomes Vilas Road, an arterial through Medford. These two roads together provide a slightly shorter route to the intersection of Vilas Road and Table Rock Road. Thus, many drivers currently choose to travel through this neighborhood, as indicated by the traffic volumes show in Figure 4-1.

The concern with the high use of this “short-cut” is that Hamrick Road runs through residential neighborhoods with a major park abutting a portion of the roadway. As these neighborhoods continue to develop, there may be increasing conflicts between residents accessing the park as pedestrians and traffic traveling through the area to get somewhere else. There is a 25 mph posted speed in the vicinity of the park entrance on New Haven Road.

Concept E-1 Traffic Operations and Safety

The traffic operations with Concept E-1 are summarized in Table 4-18. The intersection would meet County mobility standards for the PM peak hour with both the 2034 RTP and ALUS forecasts. No queuing issues are identified.

Table 4-18: Intersection Operations for Concept E-1

Intersection	V/C Ratio	LOS	Queuing Issues	Mobility Standard
Operations with 2034 RTP Forecasts				
Hamrick:	V/C = 0.65	LOS C	Queuing – None	V/C ≤ 0.85 ¹
Operations with ALUS Forecasts				
Hamrick:	V/C = 0.73	LOS C	Queuing – None	V/C ≤ 0.85 ¹

Notes:

1. Jackson County Transportation System Plan, Ordinance 2005-3, p. 61.

Shaded results indicate where mobility standards are not met

Source: Synchro HCM Intersection Analysis Report

The five-year crash analysis, conducted as part of the existing conditions evaluation, identified 16 crashes at the Hamrick Road intersection; including 5 rear end, 10 turning, and 1 other collision. Most of the turning collisions involved eastbound vehicles turning north onto Hamrick Road. With the high demand and queuing present right now in the eastbound left-turn lane, drivers may be taking risks rather than waiting through multiple signal cycles. The increased capacity for this movement may alter this type of risky behavior.

Concept E-1 Basic Roadway Geometries and Right-of-Way Requirements

A layout has not been prepared for Concept E-1 because the enhanced network substantially changes the nature of E Pine Street east of the freeway. ROW along E Pine Street varies considerably in the vicinity of Hamrick Road. If the second left-turn lane is added before other improvements are made, it could potentially be accommodated in the 100-foot cross section immediately west of Hamrick Road. However, there could be some additional ROW needed to the east Hamrick Road for the taper and lane alignment since this section has approximately 80 feet of ROW available.

Existing ROW along Hamrick Road is 80 feet, which could be adequate to accommodate a second northbound lane. However, if a separate southbound right-turn lane is added, as suggested in the Enhanced Network concept, then additional ROW may be needed on Hamrick Road as well.

Concept E-1 Environmental and Land Use Assessment

Some additional ROW could be needed on both E Pine Street and Hamrick Road, depending on whether this project is constructed before or after other improvements identified in the Enhanced Network concept. Some of the adjacent lands are currently vacant, which could make ROW acquisition easier, if needed.

By facilitating the eastbound left-turn movement, “short-cut” traffic will continue to travel through the residential areas along Hamrick Street.

Concept E-1 Concepts Cost Opinions

No cost opinion was prepared for this concept but the project cost is estimated as \$0.6 million in the Central Point TSP.

4.6.2. Concept E-2 – Table Rock Road Improvements

Although the Table Rock Road intersection with Biddle Road (E Pine Street) is not part of the IAMP study area, it does play an important role in the transportation network. Concept E-2 examines the types of improvements that would be needed to accommodate the forecast demand at Table Rock Road based on the improvements identified in the Enhanced Network concept.

The Enhanced Network concept includes the addition of a second eastbound left-turn lane on Biddle Road at Table Rock Road. With that improvement, the intersection is expected to operation at a v/c ratio of 0.88 with the 2034 RTP forecasts and over capacity (v/c ratio 1.05) with the ALUS forecasts. These operations for the RTP forecasts would be slightly over the County mobility standard of 0.85, and greatly over the standard for the ALUS forecasts.

To bring intersection operations below 0.85, the five-lane cross-section on Table Rock Road was assumed to continue south of Biddle Road. The RTP has Jackson County project 821 to “widen to 3 & 5 lanes, curb, gutter, & sidewalk + bike lanes” list as long-term, Tier 1. It’s not clear from this description where the five-lane sections would be located but Concept E-2 does appear to be consistent with County plans in the corridor.

The Concept E-2 lane configuration for Table Rock Road is illustrated in Figure 4-13.

Concept E-2 Traffic Operations and Safety

The traffic operations with Concept E-2 are summarized in Table 4-19. The intersection would be well below the County mobility standards for the PM peak hour with the 2034 RTP.

Although operations would improve somewhat with the ALUS forecasts, demand would still exceed capacity.

Table 4-19: Intersection Operations for Concept E-2

Intersection	V/C Ratio	LOS	Queuing Issues	Mobility Standard
Operations with 2034 RTP Forecasts				
Table Rock:	V/C = 0.75	LOS C	Queuing – SB	V/C ≤ 0.85 ¹
Operations with ALUS Forecasts				
Table Rock:	V/C = 1.01	LOS D	Queuing – All approaches	V/C ≤ 0.85 ¹

Notes:

1. Jackson County Transportation System Plan, Ordinance 2005-3, p. 61.

Shaded results indicate where mobility standards are not met

Source: Synchro HCM Intersection Analysis Report

No crash data was analyzed for this intersection because it is outside the IAMP study area.

Concept E-2 Basic Roadway Geometries and Right-of-Way Requirements

A layout has not been prepared for Concept E-2 because it lies outside the IAMP study area boundary. From tax maps, it appears that Table Rock Road has about 60 feet of ROW south of Biddle Road. Additional ROW would be needed to widen the roadway to five lanes.

Concept E-2 Environmental and Land Use Assessment

Additional ROW would be needed on Table Rock Road south of Biddle Road to widen to a five-lane cross-section. Most of the adjacent lands in the vicinity are currently vacant.

Concept E-2 Concepts Cost Opinions

No cost opinion was prepared for this concept but RTP Project 821 is estimated at \$2.7 million for improvements on Table Rock Road from the I-5 Crossing to Biddle Road.

4.6.3. Concept E-3 – Hamrick Road to Table Rock Road Traffic Shifts

Concept E-3 examines what improvements would be needed if through traffic were discouraged from using Hamrick Road and encouraged to use Table Rock Road instead. The combined elements of this concept include:

- Discourage through traffic on Hamrick with traffic calming measures.
- Restrict allocation of green time at Hamrick to encourage a shift in eastbound lefts and southbound rights to Table Rock. (No second left-turn lane added.)
- Add a second southbound left-turn lane and a southbound right-turn lane on Table Rock in addition to the improvements in E-2.

The Concept E-3 lane configurations for both Hamrick Road and Table Rock Road are illustrated in Figure 4-14.

Concept E-3 Traffic Operations and Safety

For the traffic analysis, a 30 percent shift in through traffic was assumed to occur. The eastbound left-turn volume and southbound right-turn volumes at the Hamrick Road/E Pine Street intersection were each reduced by 30 percent. That reduction was then added to the same turning movements at the Table Rock Road/Biddle Road intersection. It should be noted that the shifted traffic would still travel through the Hamrick Road/E Pine Street intersection but as east-west through movements rather than the original turning movements.

The traffic operations with Concept E-3 are summarized in Table 4-20. Both intersections would be well below the County mobility standards for the PM peak hour with the 2034 RTP. Improvements on the southbound Table Rock Road approach could potentially be limited to just the right-turn lane. With the ALUS forecasts, both intersections would exceed the mobility standards.

Table 4-20: Intersection Operations for Concept E-3

Intersection	V/C Ratio	LOS	Queuing Issues	Mobility Standard
Operations with 2034 RTP Forecasts				
Hamrick:	V/C = 0.77	LOS C	Queuing – None	V/C ≤ 0.85 ¹
Table Rock:	V/C = 0.75	LOS C	Queuing – None	V/C ≤ 0.85 ¹
Operations with ALUS Forecasts				
Hamrick:	V/C = 0.91	LOS C	Queuing – EB Left	V/C ≤ 0.85 ¹
Table Rock:	V/C = 0.97	LOS D	Queuing – NB Left	V/C ≤ 0.85 ¹

Notes:

1. Jackson County Transportation System Plan, Ordinance 2005-3, p. 61.

Shaded results indicate where mobility standards are not met

Source: Synchro HCM Intersection Analysis Report

The focus on this improvement was to improve safety on Hamrick Road in the residential area and near the park facility on New Haven Road, particularly for pedestrians. The lower volumes would reduce the number of potential conflicts.

An overall reduction in congestion would also benefit safety.

Concept E-3 Basic Roadway Geometries and Right-of-Way Requirements

A layout has not been prepared for Concept E-3 because it lies outside the IAMP study area boundary. From tax maps, it appears that Table Rock Road has about 90 feet of ROW north of Biddle Road and 60 feet of ROW to the south. Additional ROW would be needed to widen the roadway to provide the two additional turn lanes. There would be some impact to the south side of the intersection as well to account for tapers and lane alignment.

Concept E-3 Environmental and Land Use Assessment

One focus of this option was to improve the neighborhood environment along Hamrick Road, the lower and slower traffic volumes would achieve this affect. Traffic would remain in areas zoned for commercial and industrial uses.

Additional ROW would be needed on Table Rock Road both north and south of Biddle Road to increase capacity. Most of the adjacent lands south of the intersection are currently vacant but the adjacent lands are developed on the north side. The northwest quadrant has a structure close to the intersection which would likely be impacted by any widening.

Concept E-3 Concepts Cost Opinions

No cost opinion was prepared for this concept.

4.7. Evaluation Matrix

The information presented in this memo will also be summarized in a separate matrix for comparison of alternatives.

Attachments:

Figure 4-1. Study Area Traffic Volumes

Figure 4-2. Enhanced Network Concept

Figure 4-3. Concept I-1 – I-5 Northbound Off-Ramp – Dual Northbound Right-Turn Lanes

Figure 4-4. Concept I-2 – I-5 Northbound Off-Ramp – New Loop Ramp

Figure 4-5. Concept I-3 – I-5 Southbound On-Ramp – Dual Westbound Left-Turn Lanes

Figure 4-6. Concept I-4 – I-5 Southbound On-Ramp – New Loop Ramp

Figure 4-7. Concept I-5 – Diverging Diamond Interchange with No Bridge Widening

Figure 4-8. Concept I-6 – Diverging Diamond Interchange with Bridge Widening

Figure 4-9. Concept W-1 – 10th Street/Freeman Road Improvements – Option 1

Figure 4-10. Concept W-2 – 10th Street/Freeman Road Improvements – Option 2

Figure 4-11. Concept W-3 – 10th Street/Freeman Road Turn Restrictions – Option 1

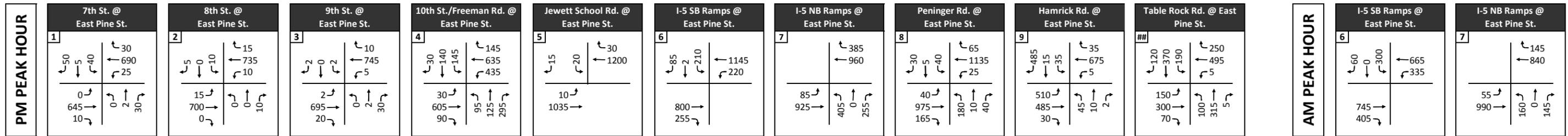
Figure 4-12. Concept W-4 – 10th Street/Freeman Road Turn Restrictions – Option 2

Figure 4-13. Concept E-1 – Hamrick Road and Concept E-2 – Table Rock Road

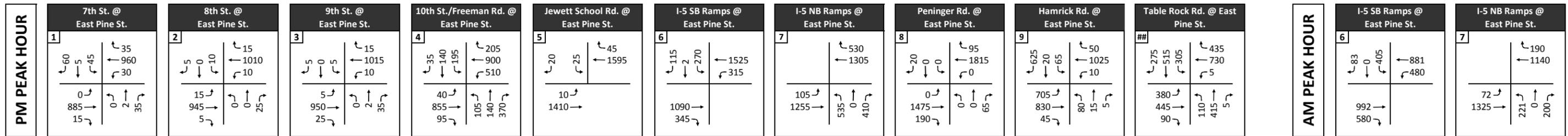
Figure 4-14. Concept E-3 – Hamrick Road to Table Rock Road Traffic Shifts



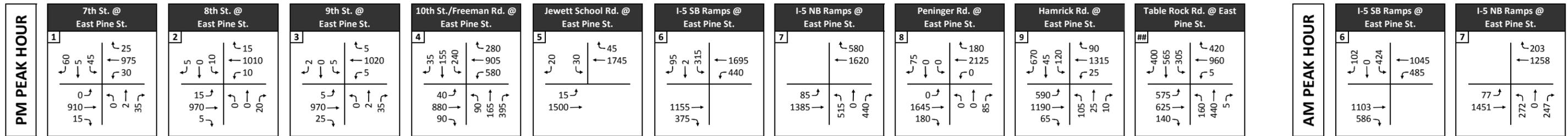
2010 Existing Conditions



2034 Regional Transportation Plan Scenario with Enhanced Network

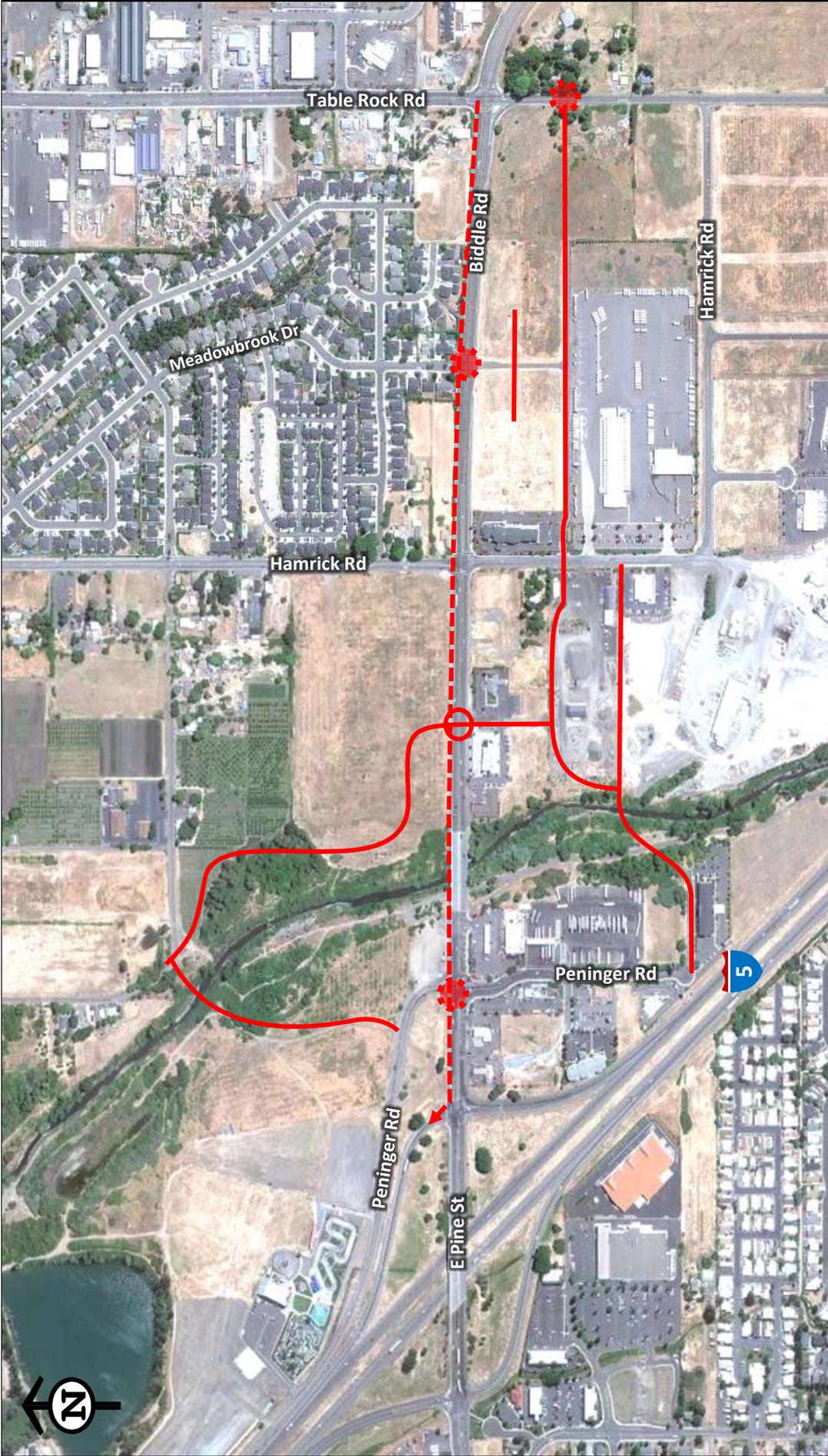


Alternative Land Use Scenario with Enhanced Network



Legend
 Turning Movement
Traffic Volume

P:\0\0007000068\0600\INFO\0670\reports\TM4 - Alternatives Analysis\Traffic Volumes.xlsx:Traffic Volumes.xlsx:Figure 4-1



Interchange Area Management Plan 33

DRAFT Figure 4-2

Enhanced Network Concept

- Legend**
-  New Roadway
 -  New Travel Lane
 -  New Traffic Signal
 -  Limited Access



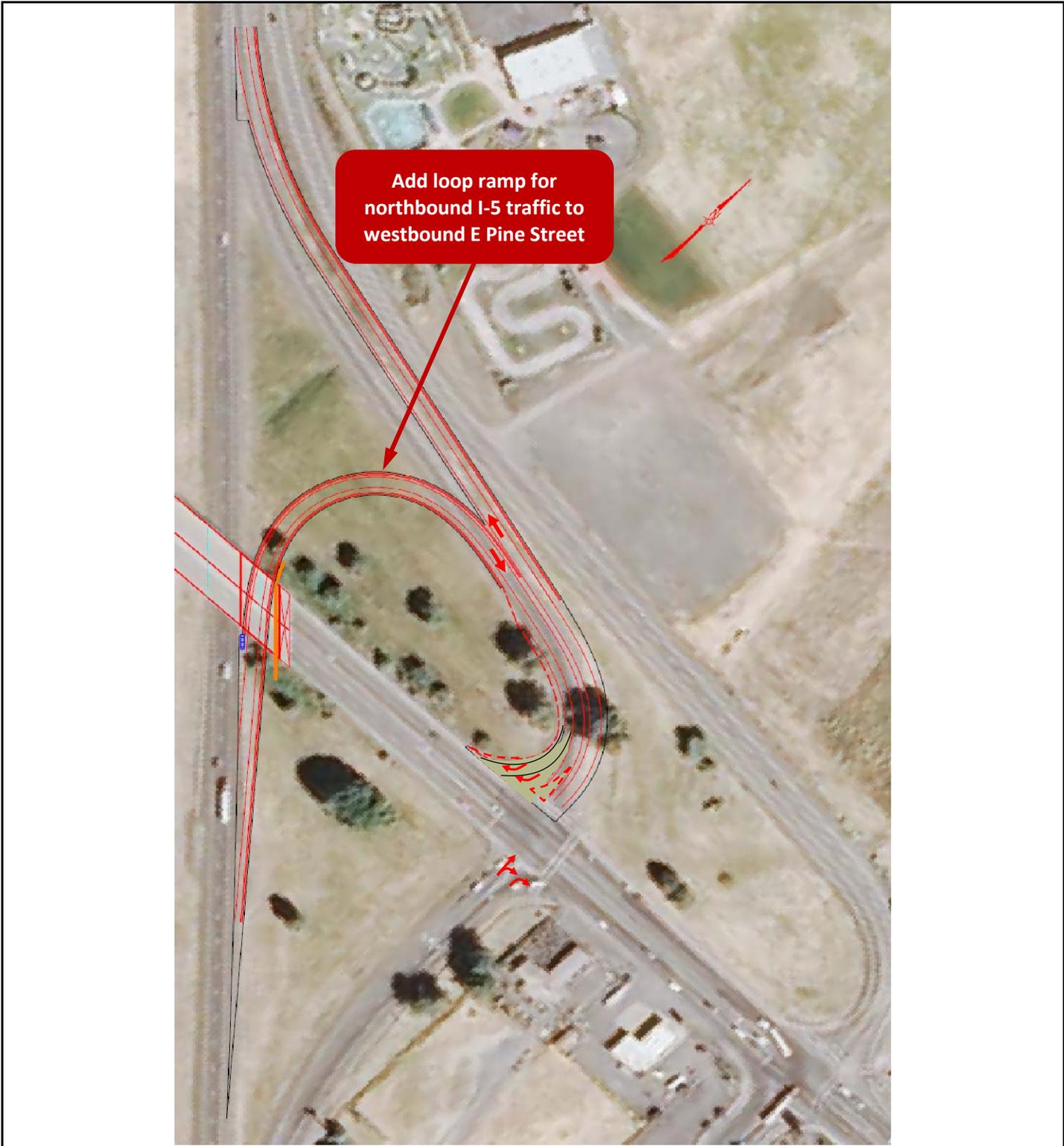
Interchange Area Management Plan 33

DRAFT Figure 4-3

Legend

-  Right of Way Line
-  Edge of Pavement

*Concept I-1
I-5 Northbound Off-Ramp
Dual Northbound Right-Turn Lanes*



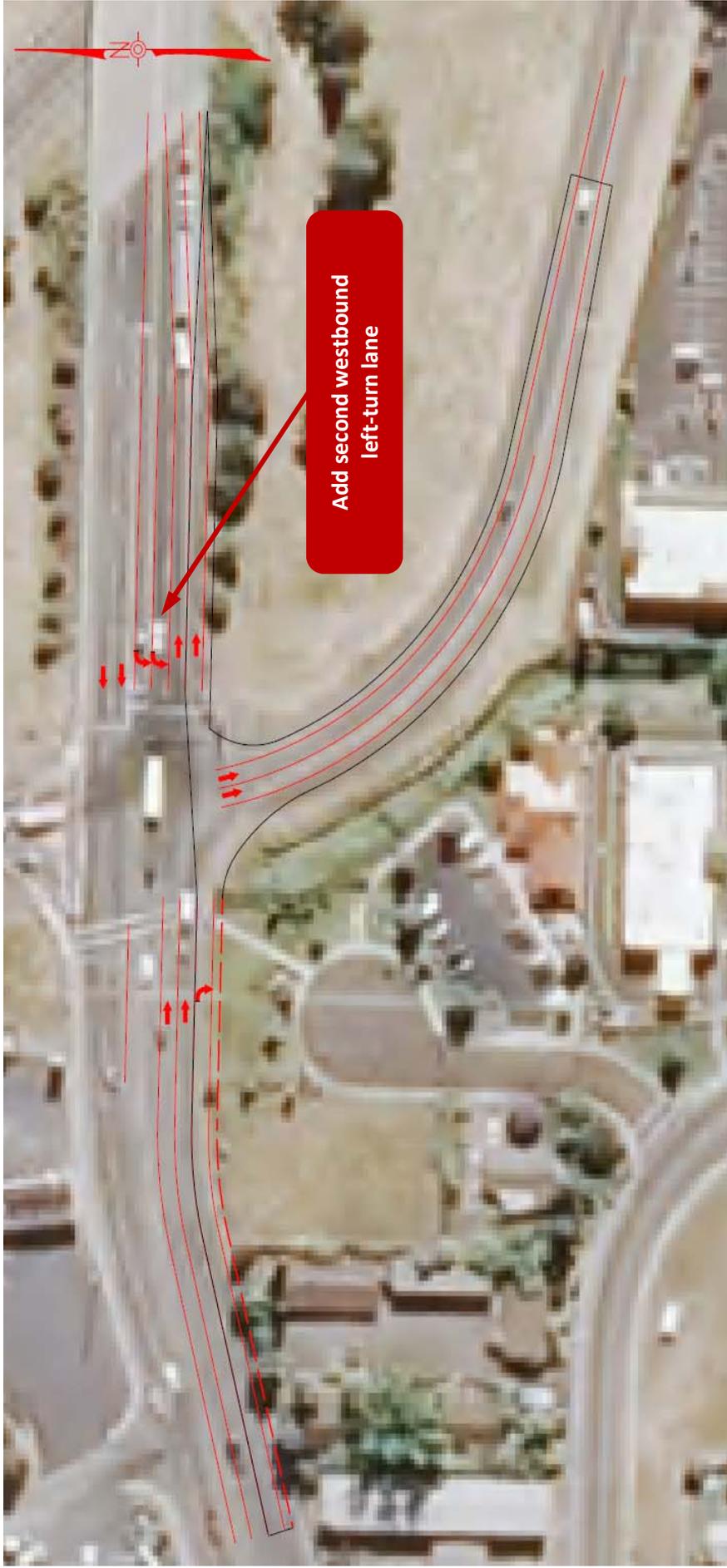
Interchange Area Management Plan 33

DRAFT Figure 4-4

Legend

- Right of Way Line
- Edge of Pavement

*Concept I-2
I-5 Northbound Off-Ramp
New Loop Ramp*



Interchange Area Management Plan 33

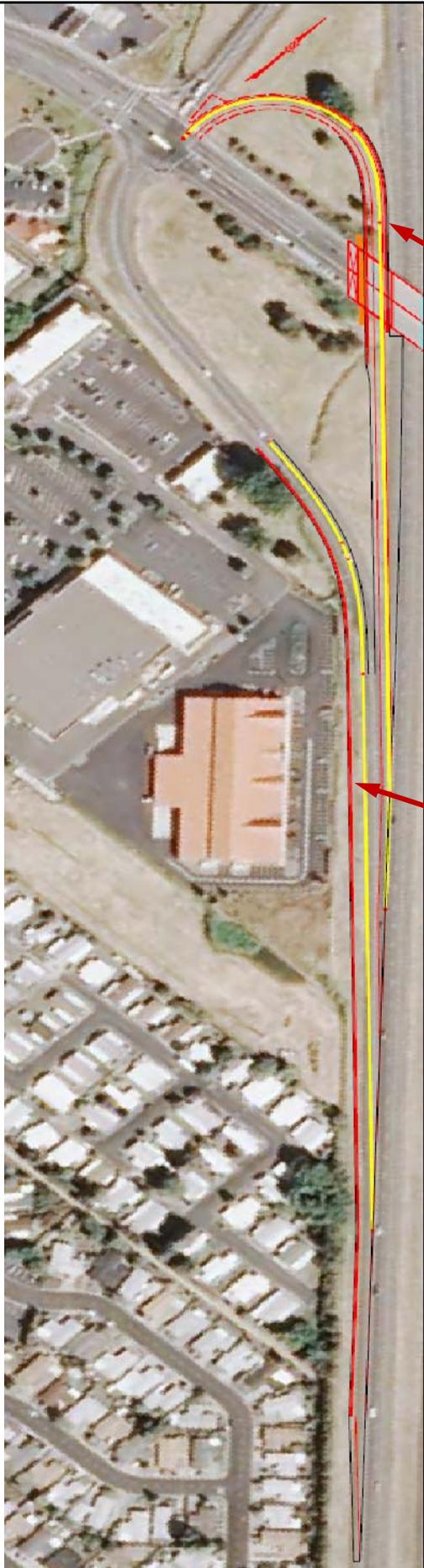
DRAFT Figure 4-5

Concept I-3

I-5 Southbound On-Ramp
Dual Westbound Left-Turn Lanes

Legend

- Right of Way Line
- Edge of Pavement



Add loop ramp for westbound on E Pine Street to southbound I-5

Extend existing southbound entrance ramp to meet standard spacing for consecutive entrance ramps

Legend

- Right of Way Line
- Edge of Pavement

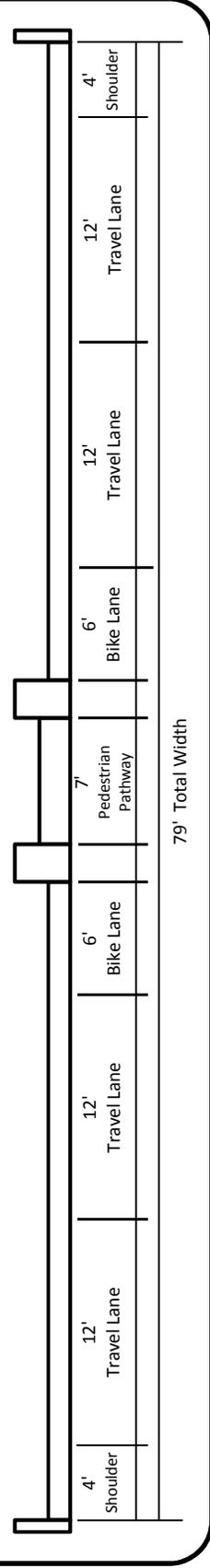
Interchange Area Management Plan 33

DRAFT Figure 4-6

*Concept I-4
I-5 Southbound On-Ramp
New Loop Ramp*



DIVERGING DIAMOND CROSS-SECTION ON EXISTING FREEWAY OVERPASS



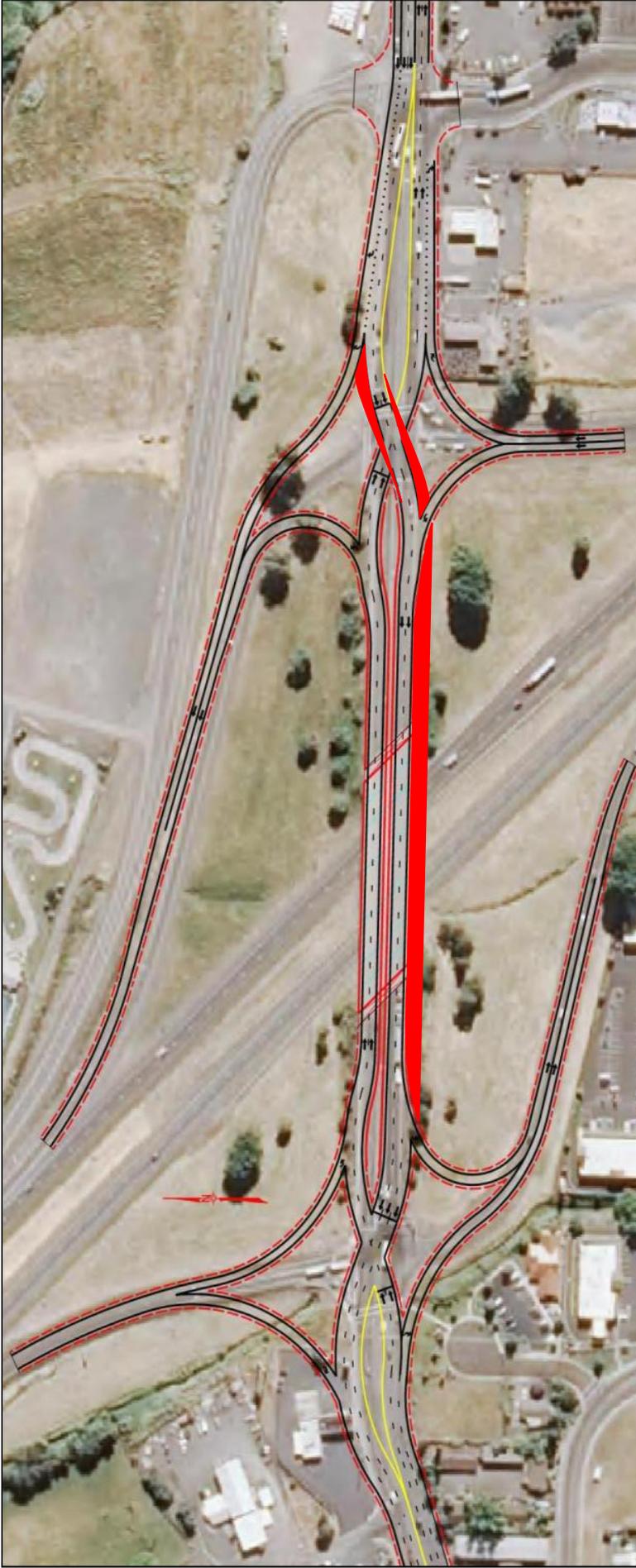
Interchange Area Management Plan 33

DRAFT Figure 4-7

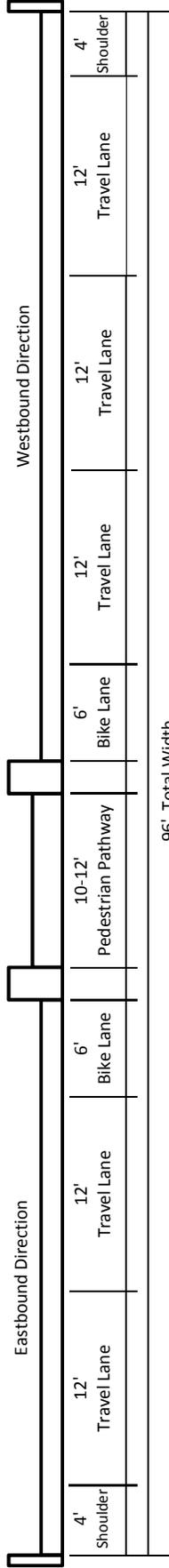
Concept I-5
Diverging Diamond Interchange
with No Bridge Widening

Legend

- Edge of Pavement
- Right of Way Line



DIVERGING DIAMOND CROSS-SECTION ON WIDENED FREEWAY OVERPASS



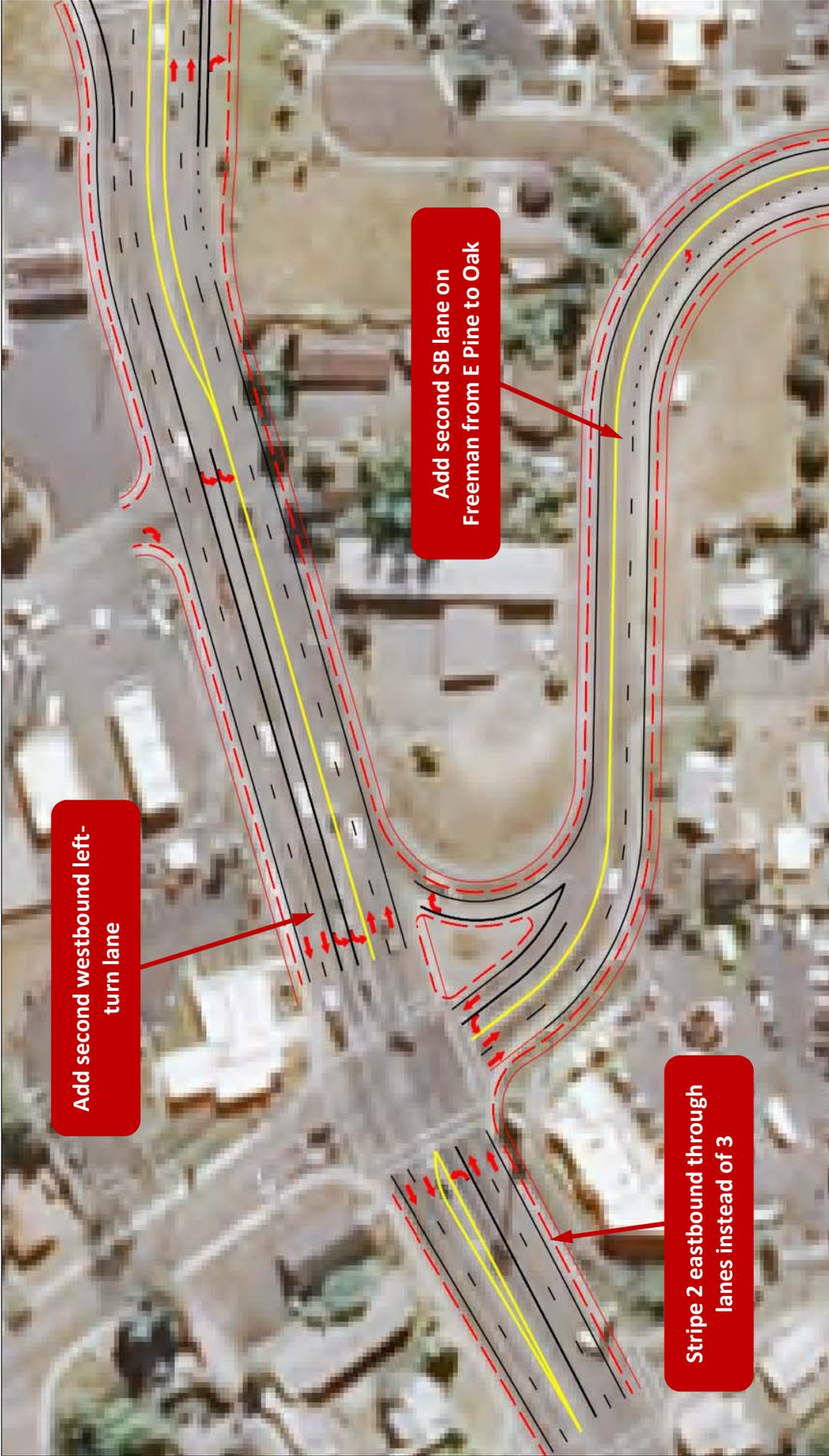
Interchange Area Management Plan 33

DRAFT Figure 4-8

**Concept I-6
Diverging Diamond Interchange
with Bridge Widening**

Legend

-  Edge of Pavement
-  Right of Way Line
-  Additional Widening to Provide 3 Westbound Lanes and wider center pathway

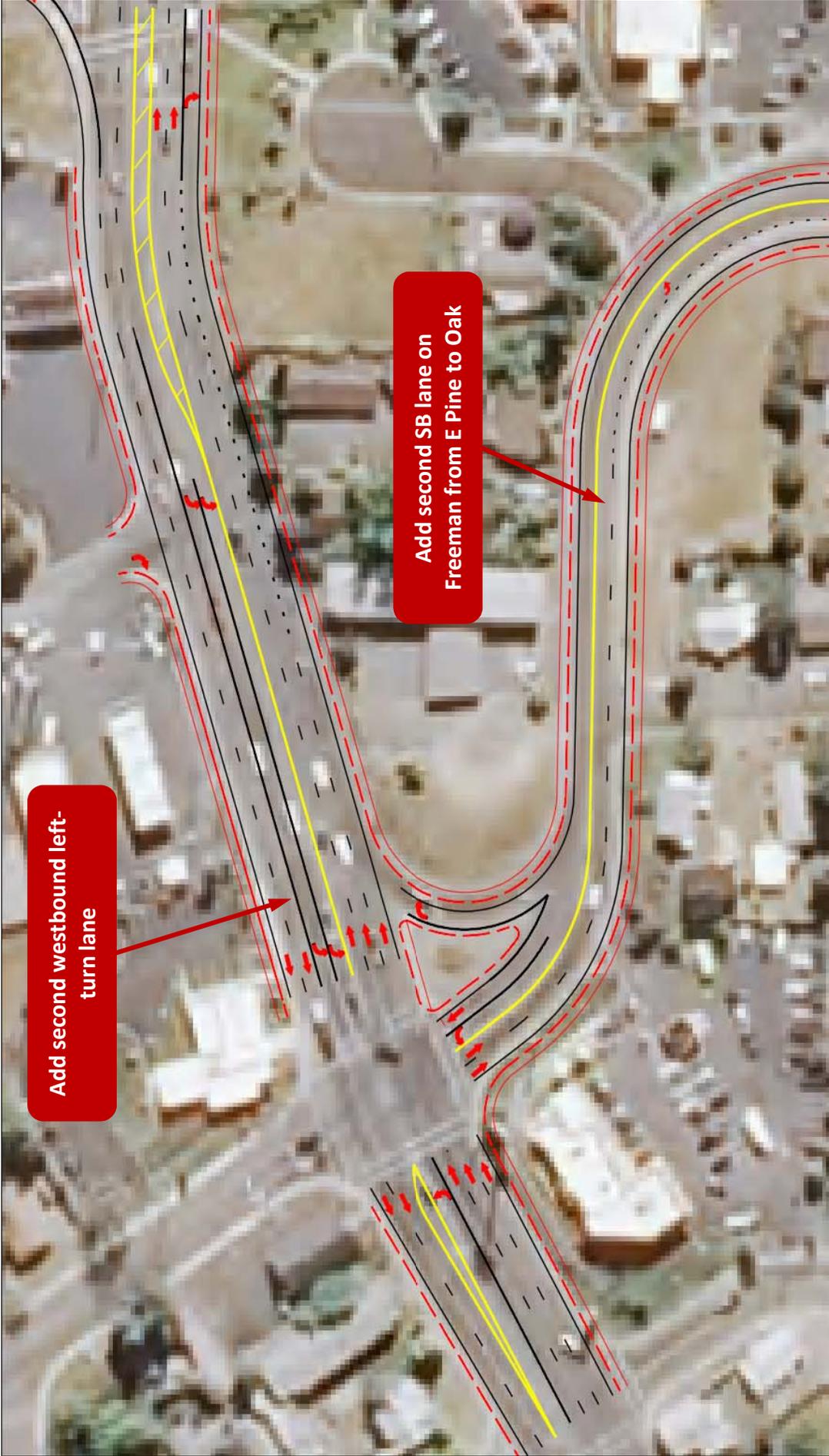


Interchange Area Management Plan 33

DRAFT Figure 4-9
Concept W-1
10th Street/Freeman Road Improvements
- Option 1

Legend

- Edge of Pavement
- Right of Way Line
- Centerline Striping



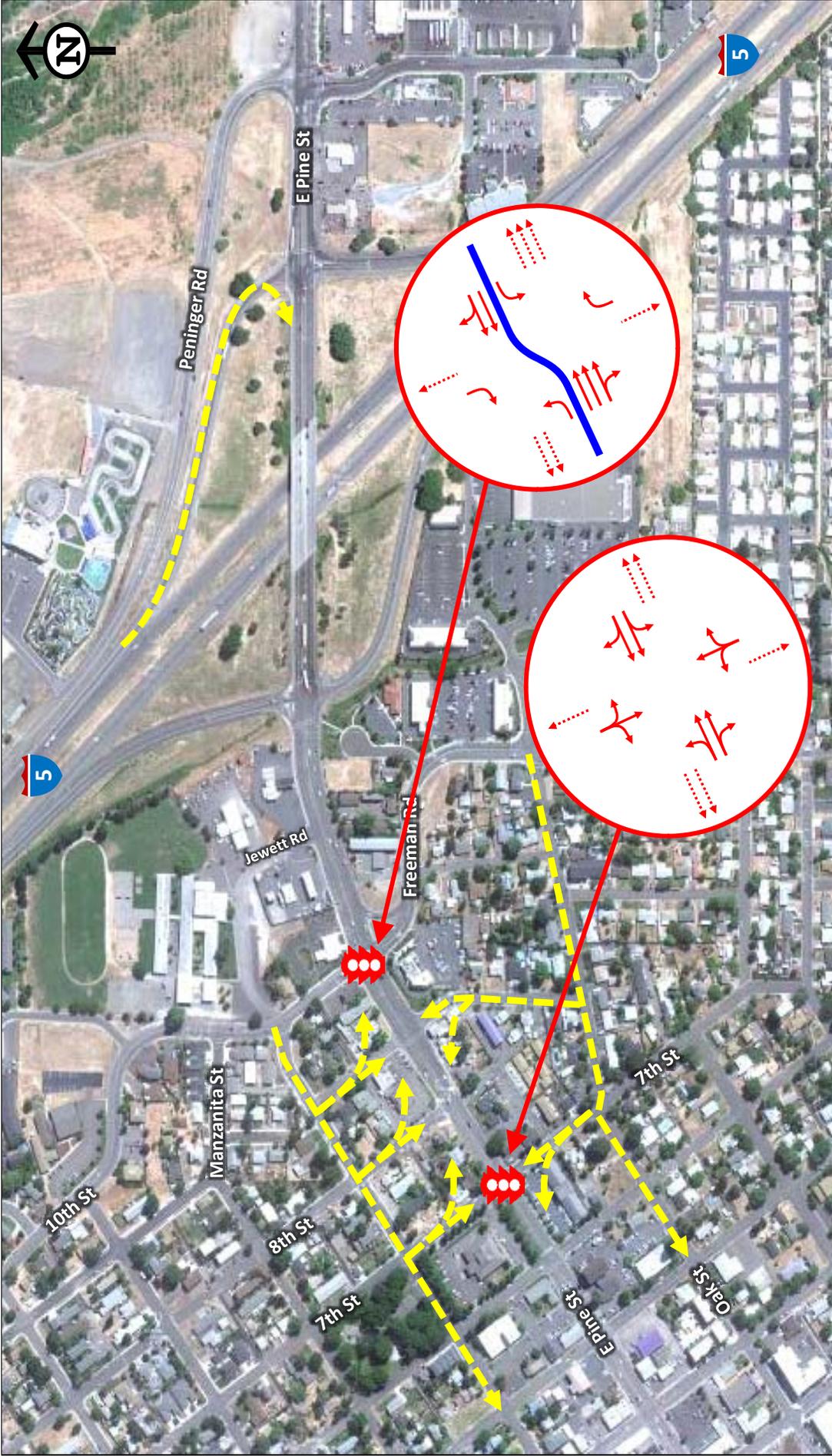
Interchange Area Management Plan 33

DRAFT Figure 4-10

Concept W-2
10th Street/Freeman Road Improvements
- Option 2

Legend

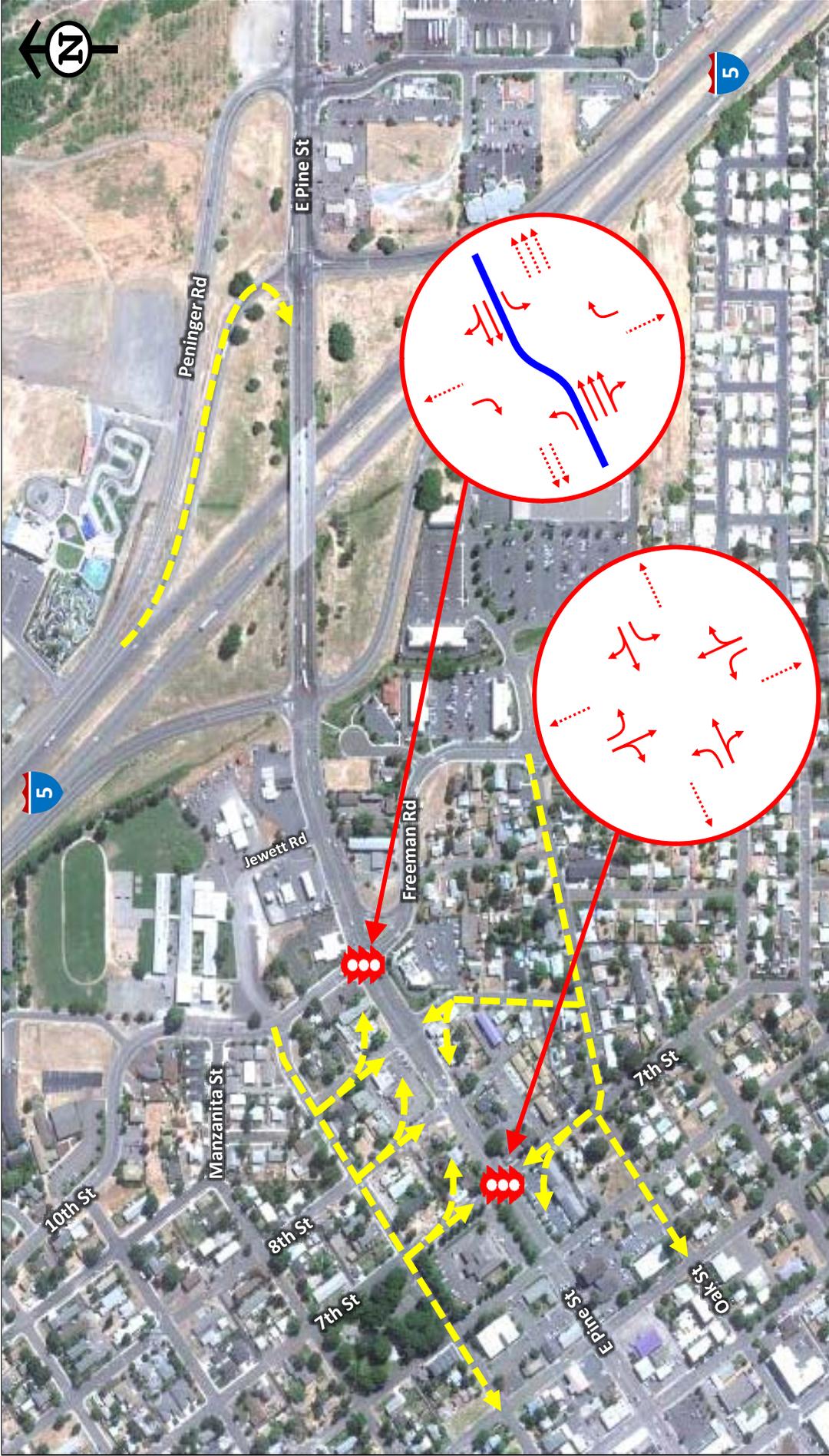
- Edge of Pavement
- Right of Way Line
- Centerline Striping



Interchange Area Management Plan 33

DRAFT Figure 4-11
Concept W-3
10th Street/Freeman Road Turn
Restrictions – Option 1

- Legend**
-  Turning Movement
 -  Receiving Lane
 -  Raised Barrier
 -  Diverted Traffic Routes
 -  Traffic Signal



Interchange Area Management Plan 33

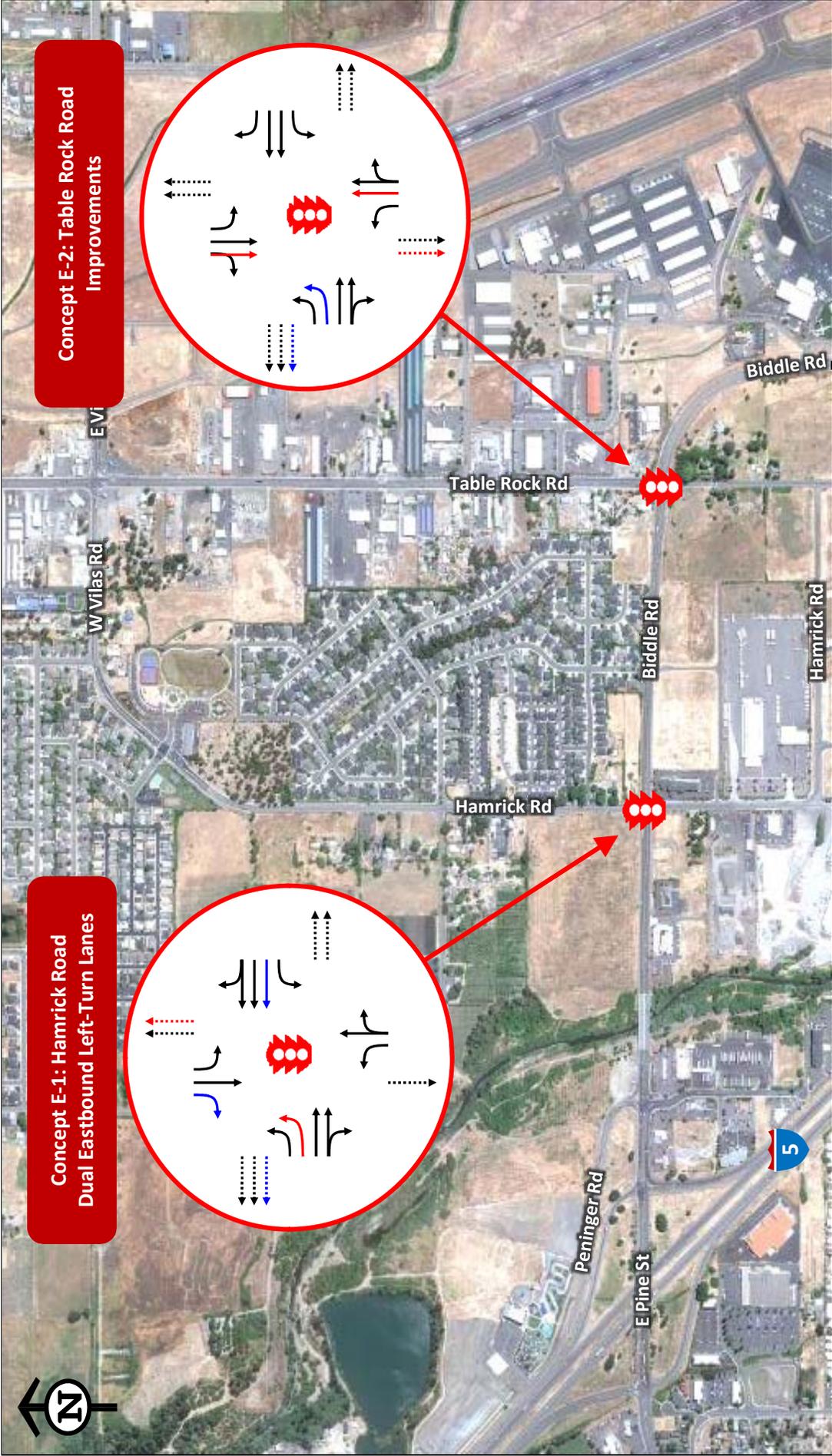
DRAFT Figure 4-12

Concept W-4
 10th Street/Freeman Road Turn
 Restrictions – Option 2

Legend

-  Turning Movement
-  Receiving Lane
-  Raised Barrier
-  Diverted Traffic Routes

 Traffic Signal



**Concept E-1: Hamrick Road
Dual Eastbound Left-Turn Lanes**

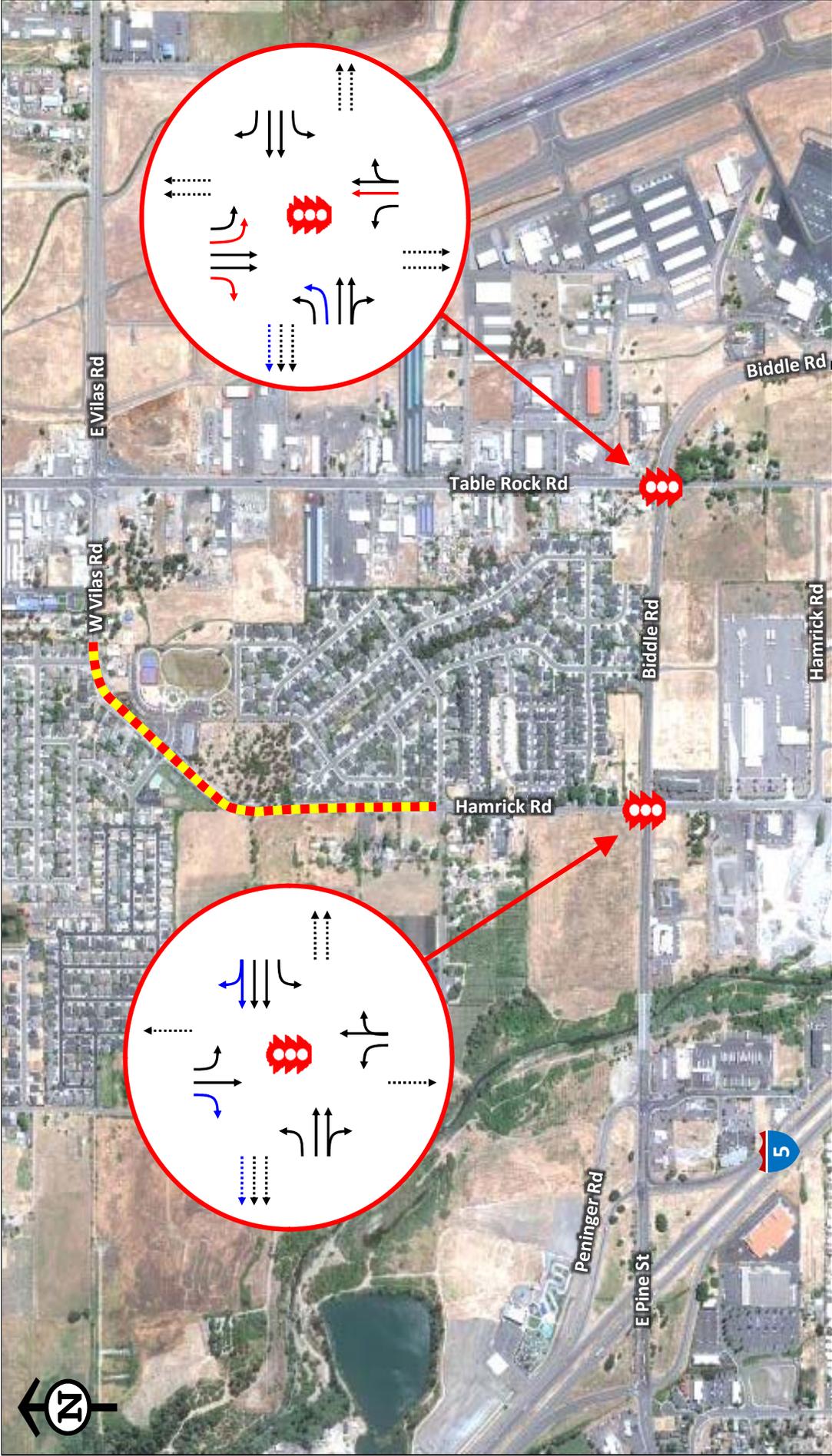
**Concept E-2: Table Rock Road
Improvements**

Interchange Area Management Plan 33

DRAFT Figure 4-13

**Concept E-1 – Hamrick Road and
Concept E-2 – Table Rock Road**

- Legend**
- Existing Turning Movement
 - Existing Receiving Lane
 - Enhanced Network Turning Movement
 - Enhanced Network Receiving Lane
 - Concept Turning Movement
 - Concept Receiving Lane
 - Traffic Signal



Interchange Area Management Plan 33

DRAFT Figure 4-14
Concept E-3 – Hamrick Road to Table
Rock Road Traffic Shifts

- Legend**
- Existing Turning Movement
 - Enhanced Network Turning Movement
 - Concept Turning Movement
 - Traffic Signal
 - Existing Receiving Lane
 - Enhance Network Receiving Lane
 - Concept Receiving Lane
 - Traffic Calming Measures