



ADOT PROJECT NO. 019 SC 007 H8401 01L  
FEDERAL PROJECT NO. 019-A(217)A  
EAST FRONTAGE ROAD, RUBY ROAD–RIO RICO DRIVE (MP 7.71 – MP 10.88)  
NOGALES–TUCSON HIGHWAY  
INTERSTATE 19

**FINAL  
PROJECT ASSESSMENT**

JUNE 2014

PREPARED FOR:



ARIZONA DEPARTMENT OF TRANSPORTATION  
INTERMODAL TRANSPORTATION DIVISION  
ROADWAY ENGINEERING GROUP  
ROADWAY PREDESIGN SECTION

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## **A. INTRODUCTION**

Project 019 SC 007 H8401 01L, I-19 East Frontage Road, Ruby Road – Rio Rico Drive (MP 7.71 – MP 10.88) [Federal Project No. 019-A(217)A], is a study to evaluate and recommend operational improvements at the intersection of the I-19 East Frontage Road and Ruby Road.

The project is located approximately eight miles north of the US–Mexico border and the City of Nogales in Santa Cruz County, Arizona, within the Arizona Department of Transportation's (ADOT's) Tucson District. The study area includes the I-19 east frontage road from Ruby Road to Rio Rico Drive and is generally bounded by I-19 to the west and the Union Pacific Railroad (UPRR) to the east. Ruby Road is also designated as State Route (SR) 289.

The intersection of the east frontage road and Ruby Road experiences high levels of congestion in peak travel periods. An industrial park east of the east frontage road (Rio Rico South Industrial Park) and a Pilot Truck Stop at the northeast corner of Ruby Road and the east frontage road attract a high volume of truck traffic. The left-turn lanes are end-to-end in the center lane of Ruby Road and the queues of left-turning vehicles destined for either direction of I-19 can exceed the available storage space, leading to traffic congestion and delay. Furthermore, the close proximity of the signalized intersections on Ruby Road between the northbound ramps and the east frontage road does not provide space for left-turning queues in peak periods. As such, trucks exiting I-19 in both the northbound and southbound directions can back up on the exit ramps, sometimes extending onto the mainline.

The project scope consists of preparing Initial and Final Project Assessments and preliminary cost estimates to document the development and evaluation of the alternatives.

The project is not listed in the Tentative 2015–2019 Five-Year Transportation Facilities Construction Program. However, the project is expected to progress to design and construction when the scoping phase is complete and funding is available.

The estimated construction cost for the improvements ranges from \$5,670,000 for Alternative A to \$10,697,000 for Alternative D.

## **B. BACKGROUND DATA**

From I-19 mile post (MP) 7.71 to MP 10.08, the east frontage road is two-way and serves an industrial park with relatively dense development, mostly agricultural produce distribution facilities. The frontage road was improved in 2005 with ADOT Project STP-019-A(010)N, which included construction of a one-way (northbound) frontage road connection between Kipper Street (MP 10.08) and the I-19 northbound exit ramp to Rio Rico Drive (10.77). The combined northbound off-ramp/northbound frontage road roadway connects to Rio Rico Drive at MP 10.88.

East of the one-way ramp/frontage road and south of Rio Rico Drive, an access road exists inside ADOT right-of-way from MP 10.63 to MP 10.88. This separate two-way road provides access to Stable Lane, a private roadway which currently serves an equestrian facility. The access road intersects Rio Rico Drive approximately 400 feet east of the combined ramp/frontage road intersection.

ADOT's milepost strip map indicates the following projects were constructed within or adjacent to the project limits, sorted by construction date:

**TABLE 1 – RECORD DRAWINGS**

PROJECT NUMBER	DATE	BEGIN MILEPOST	END MILEPOST	DESCRIPTION
HPP-STP-019-A(010)N	2005	7.02	10.88	I-19, RUBY RD T.I. TO RIO RICO T.I.
IM-10-1(142)	2003	10.50	11.30	CALABASAS T.I. (RIO RICO T.I.)
N-900-0-543	1999	7.70	N/A	MINOR T.I. IMPROVEMENT PROGRAM
IR-19-1(89)	1987	10.40	16.00	NOGALES – TUCSON HIGHWAY
I-19-1(10)	1972	6.08	10.41	NOGALES – TUCSON HIGHWAY
I-19-1(22)	1965	10.42	16.08	NOGALES – TUCSON HIGHWAY

The Milepost Log indicates no milepost equations within the project limits.

**Roadway**

Roadway functional classifications are as follows:

I-19	Interstate (part of National Highway System)
Ruby Road	Major Collector
Rio Rico Drive	Major Collector
East Frontage Road	Not Classified (local road)(urban)
West Frontage Road	Not Classified (local road)(urban)

ADOT’s *Roadway Design Guidelines* indicate that frontage roads without a functional classification should be designed as urban arterials.

The study area consists of level terrain with an average elevation of 3500 feet.

The east frontage road has 12-foot wide travel lanes, a 2-foot west-side shoulder, and a 6-8 foot east-side shoulder. The east frontage road is paved with asphaltic concrete and crowned at the construction centerline; the cross slope in tangent sections is 2%.

The posted speed limit of the east frontage road varies. The posted speed is 25 mph at the Ruby Road intersection, 40 mph through the industrial park, and 30 mph through the one-way northbound segment north of Kipper Street. Ruby Road is posted at 25 mph. Rio Rico Drive is posted at 30 mph.

An AASHTO Controlling Design Criteria Report has been prepared for the I-19 Ruby Road and Rio Rico Drive traffic interchange (TI) ramps, crossroad, and the east frontage road for this project.

**Traffic**

The design year is 2040.

ADOT’s Multimodal Planning Division (MPD) provided average annual daily traffic (AADT) volumes for 2010, 2020, and 2040 by segment on I-19 as shown in Table 2:

**TABLE 2 – ADOT MPD PROJECTIONS**

Segment No.	Alignment	Segment	AADT		
			2010	2020	2040
1	I-19	South of Ruby Road	34,195	46,100	70,000
2	I-19	Ruby Road to Rio Rico Drive	26,759	35,500	53,000
3	I-19	North of Rio Rico Drive	18,878	24,500	36,000

Consistent with previous methods used by ADOT MPD, two separate compounding growth rates were calculated for each of the segments, one from 2010 to 2020 and another from 2020 to 2040. Splitting the compounding growth rates into two separate horizons allows for conservative estimates of future traffic. The study team used the future volume forecasts on I-19 to calculate growth rates that could be applied to the other roadways in the study area.

Traffic counts were taken February 9-10, 2012, during the peak import season for Mexican produce so that this project could address the congestion generated by the trucks utilizing the industrial park. The 24-hour machine counts were taken on the east frontage road north of Ruby Road and north of Kipper Street. AM, mid-day and PM peak hour intersection turning movement counts were collected at eleven intersections within the study area. Mid-day turning movement counts were included to supplement the morning and afternoon peak hour counts to capture the arrival pattern of trucks. A mid-day surge is typical in this area once queues clear the border, which opens at 6:00 AM. The typical routing of trucks in the area is to travel from the U.S.-Mexico border Mariposa Land Port of Entry (LPOE), drop off goods in the industrial park, and either return to the LPOE or proceed north on I-19.

The AADT and traffic factors (K, D, and T) for the east frontage road are estimated as shown in the following table:

**TABLE 3 – TRAFFIC DATA**

ROUTE	LOCATION	AADT		Design Factors (%)		
		2012	2040	K (Design Hour Factor)	D (Directional Distribution Factor)	T (Truck and RV Factor)
East Frontage Road	North of Ruby Rd	8,920 *	15,800 **	8	59	46

\* Collected by TRA, February 2012

\*\* 2040 no build volume calculated as described in the traffic study

The ADOT *Roadway Design Guidelines*, Table 103.2A, provide level of service (LOS) and capacity performance thresholds for various Arizona state highway classification and terrain combinations. The study area is classified as an urban area. Based on Table 103.2A, the established threshold is LOS D or better.

The Traffic Study (April 2014) describes the projected 2040 traffic volumes, turning movements, and levels of service for the No Build and build alternatives.

**Crash Data**

Crash data was obtained from ADOT for the I-19/Ruby Road service interchange ramps, the I-19/Rio Rico Drive service interchange ramps, and the east frontage road from Ruby Road to Rio Rico Drive. The data covers a five-year period from January 2007 through December 2011; the crash data is detailed in the traffic report.

During the five-year period, a total of 122 collisions were reported within the project limits. These include 2 incapacitating injury, 8 non-incapacitating injury, 11 possible injury, and 101 non-injury collisions. Sixty-two percent of the collisions occurred during daylight hours. There were no fatal crashes.

**Drainage**

Drainage within the project vicinity generally flows from the southwest to the northeast and discharges into the Santa Cruz River. Ruby Road crosses Potrero Creek, a tributary of the Santa Cruz River, on a two-lane bridge approximately 1000 feet east of I-19. The study area includes two named washes, Calabasas Canyon Wash at MP 10.28 and Caralampi Canyon Wash at MP 10.77, and several unnamed washes.

Calabasas Canyon Wash flows are conveyed eastward through a 3-12 ft. x 8 ft. reinforced concrete box culvert (RCBC) and Caralampi Canyon Wash flows are conveyed eastward through a 3-10 ft. x 8 ft. RCBC.

In the vicinity of the Ruby Road TI, the washes are unnamed. One wash crosses I-19 just north of Old Tucson Road via a 6 ft. x 7 ft. RCBC. Another wash crosses both Ruby Road and I-19 in the northwest quadrant of the interchange through 2-8 ft. x 7 ft. RCBCs under each roadway.

Existing drainage structures include RCBCs, corrugated metal pipe culverts (CMP), catch basins, and spillways. Table 4 lists major drainage structures within the study area:

**TABLE 4 – EXISTING DRAINAGE STRUCTURES**

<b>ROADWAY</b>	<b>MP</b>	<b>DESCRIPTION</b>	<b>SIZE (FT.)</b>
I-19	7.49	RCBC	6 x 7
Ruby Road west of I-19	7.80	RCBC	2-8 x 7
I-19	8.00	RCBC	2-8 x 7
I-19	8.36	RCBC	5 x 5
I-19	8.60	RCBC	2-10 x 7
I-19	8.96	RCBC	6 x 3
I-19	9.15	RCBC	6 x 4
I-19	9.73	RCBC	2-8 x 3
I-19	10.28	Calabasas Canyon RCBC	3-12 x 8
I-19	10.77	RCBC NB & Off Ramp	3-10 x 8
I-19	10.77	RCBC SB	3-10 x 8

ADOT Tucson District plans to improve an existing drainage structure on the east frontage road at MP 8.88 under a separate project. There are no other known drainage problems in the study area.

**Structures**

The following major structures shown in Table 5 are listed in the ADOT Bridge Record:

**TABLE 5 – EXISTING STRUCTURES**

ROUTE	STR NO.	MP	STRUCTURE NAME	WIDTH (FEET)	MAX SPAN LENGTH (FEET)	VERTICAL CLR. (FEET)	YEAR BUILT	SUFFICIENCY RATING
I-19	1240	7.70	Ruby Rd TI UP	70	258	16.26	1967	95.00
I-19	5771	8.60	RCB	2 x 10	12	N/A	1951	80.42
I-19	5773	10.28	Calabasas Canyon RCB	3 x 12	14	N/A	1951	80.42
I-19	5775	10.77	RCB NB & Off Ramp	3 x 10	10	N/A	1951	81.71
I-19	5776	10.77	RCB	3 x 10	10	N/A	1966	96.94
I-19	933	10.96	Rio Rico EB TI UP	26	252	16.41	1967	86.87
I-19	2727	10.97	Rio Rico WB TI UP	39	252	16.47	2000	97.88

**Utilities**

ADOT’s Tucson District Utility Permit Log, Arizona Blue Stake, record drawings, and field observations indicate the presence of multiple underground and overhead utilities both crossing and alongside the east frontage road, Ruby Road, and Rio Rico Drive:

**TABLE 6 – EXISTING UTILITIES**

UTILITY	I-19 MP	FACILITY
CenturyLink	7.35 10.88	Aerial crossings
Unisource Energy Services	7.33 7.33 – 7.74 7.43 10.02 – 10.27	Gas line crossing I-19 Gas line along I-19 Gas line crossing I-19 Gas line along I-19
	7.35 7.35–7.70 9.11 – 10.70	Overhead power crossing I-19 Overhead power along I-19 Overhead power along I-19
Frontier Communications Co	8.43 10.09	Aerial crossing Aerial crossing
Santa Cruz Unified School District	8.44 – 8.50	Sewer along frontage road and across I-19
Rio Rico Utilities	8.45 10.62	12" water across I-19 Sewer line
GAC Prop Inc of AZ	10.70	8" Sewer

ADOT Utilities & Railroad Section indicated that CenturyLink may have unpermitted utilities in the project area. These facilities are anticipated to be within the existing easements shown on ADOT's right-of-way maps.

To the east of the study area, UPRR tracks run in a north-south alignment between 500 feet and 2500 feet away from I-19. Ruby Road crosses the railroad at-grade approximately 1500 feet east of I-19. This project is not anticipated to affect the railroad.

### ***Right-of-Way***

Within the study area, ADOT's I-19 right-of-way width varies from a minimum of approximately 360 feet to over 1000 feet at the Ruby Road TI and Rio Rico Drive TI. ADOT's right-of-way includes the east frontage road and, where it exists, the west frontage road.

South of Kipper Street, ADOT's existing access control runs between the mainline and east frontage road. North of Kipper Street, ADOT controls access along the one-way east frontage road/northbound exit ramp. A break in access control is provided on the two-way segment of access road at Stable Lane. At the Ruby Road TI, ADOT's right-of-way plans describe the access control line based on an unconstructed design concept; as such, it is assumed that ADOT's existing access control runs between the I-19 northbound ramps and the east frontage road.

## **C. PROJECT SCOPE**

This project assessment includes an evaluation of a No Build alternative, four build alternatives, and one sub-alternative. The alternatives are listed below with a brief description and are explained and evaluated in more detail on the following pages. An alternative will be selected by the project team in the future for advancement to design and construction.

- The **No Build Alternative** assumes that no major improvements would be made to any of the roadways within the study area.
- **Alternative A** would extend the two-way east frontage road from Kipper Street to Rio Rico Drive. The east frontage road would be disconnected from the northbound I-19 exit ramp, converted to two-way traffic, and realigned to intersect Rio Rico Drive approximately 400 feet east of the existing combined ramp/frontage road intersection. The northbound I-19 ramp intersection would remain in its current location. A figure showing Alternative A is included in Appendix B.
- **Alternative B** would combine the east frontage road and northbound I-19 exit ramp south of Ruby Road into a one-way northbound roadway that intersects Ruby Road west of the existing east frontage road intersection. Southbound traffic south of Ruby Road would travel on a new two-way access road that would connect to the east frontage road south of its gore with the northbound exit ramp and to Ruby Road across from the truck stop canopy. A figure showing Alternative B is included in Appendix B.
- **Alternative B1** is a sub-alternative of Alternative B. Alternative B1 would provide the same features as Alternative 2 except the new access road would not be included. As such, southbound traffic would not be accommodated on the east frontage road south of Ruby Road. Alternative B1 is shown in Appendix B.



- **Alternative C** would reconstruct the I-19/Ruby Road TI to a roundabout interchange. Two six-leg roundabouts on Ruby Road, one on each side of I-19, would combine the frontage roads and ramps into the same intersection. A figure showing Alternative C is included in Appendix A.
- **Alternative D** would reconstruct the I-19/Ruby Road TI to a diverging diamond interchange (DDI). The DDI configuration crosses traffic to the opposite side of the road and then crosses it back; this allows the right and left turns to and from the freeway ramps to act as free-flow movements. Alternative D is shown in Appendix B.

The design elements and assumptions used for the conceptual development of each alternative are discussed in the following sections. Although the west frontage road intersections with Ruby Road were not directly impacted by every alternative, Alternatives B, C, and D include reconstruction of the west frontage road intersection to provide an acceptable level of service for the entire Ruby Road TI.

**No Build Alternative**

Under the No Build Alternative, traffic operations would continue to deteriorate as volumes increase, further increasing traffic congestion and delay.

A LOS analysis was performed for design year 2040 peak hour volumes. Based on the existing geometry and 2040 peak hour volumes, the analysis shows that the study intersections would operate at LOS in the design year as reflected in the following table. Although the Ruby Road TI and east frontage road intersection are the focus of this study, all of the intersections in the study area are included in the table for comparison to the build alternatives.

No.	Study Intersection	AM Peak	Midday Peak	PM Peak
		LOS	LOS	LOS
1	Rio Rico Drive and West Frontage Road	B	B	B
2	Rio Rico Drive and I-19 SB ramps	C	B	B
3	Rio Rico Drive and I-19 NB ramps	C	C	C
4	Rio Rico Drive and East Frontage Road*	E	D	D
5	Kipper Street and East Frontage Road*	A	B	B
6	Ruby Road and West Frontage Road (north leg)*	F	C	C
7	Ruby Road and West Frontage Road (south leg)*	F	D	E
8	Ruby Road and I-19 SB ramps	C	C	C
9	Ruby Road and I-19 NB ramps	F	F	E
10	Ruby Road and East Frontage Road	F	F	F
11	Ruby Road and Pilot Truck Stop driveway*	C	B	B

\*Two way stop control – Worst movement LOS reported

**Alternative A – Two-Way East Frontage Road, Kipper Street to Rio Rico Drive**

Alternative A would reduce traffic congestion at the east frontage road/Ruby Road intersection by providing additional access to the industrial park from the Rio Rico TI, which is located on I-19 approximately three miles north of the Ruby Road TI.

A LOS analysis was performed for design year 2040 peak hour volumes. Based on the proposed Alternative A geometry and 2040 peak hour volumes, the analysis shows that the study intersections would operate as follows in the design year:

No.	Study Intersection	AM Peak	Midday Peak	PM Peak
		LOS	LOS	LOS
1	Rio Rico Drive and West Frontage Road	B	A	B
2	Rio Rico Drive and I-19 SB ramps	C	C	C
3	Rio Rico Drive and I-19 NB ramps	C	C	C
4	Rio Rico Drive and East Frontage Road	A	A	B
5	Kipper Street and East Frontage Road *	A	B	B
6	Ruby Road and west side West Frontage Road *	F	C	C
7	Ruby Road and east side West Frontage Road *	F	D	E
8	Ruby Road and I-19 SB ramps	B	B	C
9	Ruby Road and I-19 NB ramps	F	E	E
10	Ruby Road and East Frontage Road	F	F	F
11	Ruby Road and Pilot Truck Stop driveway *	C	B	B

\* Two way stop control – Worst movement LOS reported

Major scope items for Alternative A would include the following:

- Widen and reconstruct the existing east frontage road from Kipper Street to Rio Rico Drive and convert the one-way northbound roadway to two-way.
- Obliterate the existing east frontage road connection to the I-19 northbound exit ramp.
- Realign the new two-way frontage road eastward and intersect Rio Rico Drive approximately 400 feet east of the existing northbound I-19 ramp intersection at the same location as the existing two-way access road.
- Install a new traffic signal on Rio Rico Drive at the new two-way frontage road intersection.
- Reconnect the driveway to Stable Lane to the realigned two-way east frontage road.
- No modifications to the I-19/Rio Rico TI UP bridge would be required with this alternative.
- Minor widening on Rio Rico Drive would be required with this alternative.

- Construct vertical curb at the east frontage road intersection with Rio Rico Drive. The need for a closed storm drainage system is not anticipated.
- Construct new concrete barrier near the new 3-10 ft. x 12 ft. drainage culvert to shield the roadway from side slopes greater than 4H:1V.
- Obliterate roadway segments no longer needed for traffic operations on Rio Rico Drive at the I-19 ramps.
- Construct a new 3-10 ft. x 8 ft. RCBC under the realigned east frontage road south of Rio Rico Drive. This culvert would be required to preserve the eastward flow path for the Caralampi Canyon Wash crossing I-19 about 0.25 mile south of Rio Rico Drive. No modifications to the existing 3-10 ft. x 8 ft. concrete box culvert approximately 580 feet north of Kipper Street are anticipated.
- Construct scuppers to drain storm water from the curb returns at the east frontage road/ Rio Rico Drive intersection.
- Install extruded thermoplastic pavement markings.
- Install new intersection lighting on Rio Rico Drive at the new two-way east frontage road intersection.
- Approximately 5.52 acres of new right-of-way would be required with this alternative. The new right-of-way is in the southeast quadrant of the I-19/Rio Rico TI and is currently privately owned.
- The need for temporary construction easements (TCE) is not anticipated.
- Utility relocations would be required. The proposed east frontage road realignment would conflict with an overhead power line that runs along (both within and outside of) the existing ADOT right-of-way.

**Alternative B – One-Way East Frontage Road South of Ruby Road, New Access Road**

Alternative B would convert the east frontage road south of Ruby Road to one-way northbound and combine it with the northbound I-19 exit ramp.

A LOS analysis was performed for design year 2040 peak hour volumes. Based on the proposed Alternative B geometry and 2040 peak hour volumes, the analysis shows that the study intersections would operate as shown in the following table in the design year. The Rio Rico Drive TI and Kipper Street intersections are not included in the LOS results for Alternatives B, C, or D since they are not improved with these alternatives.

No.	Study Intersection	AM Peak	Midday Peak	PM Peak
		LOS	LOS	LOS
6-7	Ruby Road and West Frontage Road	C	B	C
8	Ruby Road and I-19 SB ramps	C	B	C
10	Ruby Road and East Frontage Road	C	D	D
11	Ruby Road and Pilot Truck Stop driveway*	C	B	C

\*Two way stop control – Worst movement LOS reported

Major scope items for Alternative B would include the following:

- Construct a new northbound exit ramp/one-way northbound frontage road that intersects Ruby Road approximately 320 feet east of the I-19/Ruby Road TI bridge. The combined roadway would widen to four lanes south of Ruby Road.
- South of the new I-19 northbound exit ramp/one-way frontage road gore, shift the two-way east frontage road east to provide space for the new I-19 northbound exit ramp.
- Construct a new southbound access road for east frontage road continuity that intersects Ruby Road 780 feet east of the I-19/Ruby Road TI UP bridge. The new access road would intersect the two-way east frontage road south of the northbound exit ramp/frontage road gore. If desired, the new access road could accommodate two-way traffic; if so, it would provide one lane in each direction and would be approximately 1200 feet long.
- Realign the east frontage road north of Ruby Road to match the location of the new combined ramp/frontage road south of Ruby Road.
- No modifications to the I-19/Ruby Road TI UP bridge would be required with this alternative.
- Widen Ruby Road to provide additional turn lanes at the new northbound ramp/east frontage road intersection. Construct vertical curb along reconstructed segments of Ruby Road.
- Construct new concrete barrier where needed to match into existing barrier or shield the roadway from side slopes greater than 4H:1V. Concrete barrier will likely be required along the realigned west frontage road to shield tall embankments and along the new northbound exit ramp where adjacent to the realigned east frontage road.
- Obliterate roadway segments no longer needed for traffic operations.
- Extend the existing 6 ft. x 7 ft. RCBC located about 500 feet north of the Old Tucson Road intersection to accommodate the widening of the northbound exit ramp and east frontage road. In addition, the outlet channel for this RCBC on the east side of I-19 will need to be lined with either wire-tied riprap or concrete. Improvements include the addition of CMP culverts under the access road and frontage road/northbound exit ramp roadways in the southeast quadrant to properly drain infield areas.
- Construct catch basins, storm drains, and scuppers to drain storm water from curbed roadway segments.
- Construct a new retaining wall east of the realigned east frontage road beginning approximately 1400 feet south of Ruby Road. The wall would be approximately 150 feet long and would be required to prevent the northbound exit ramp fill slope from encroaching into the new drainage channel. This retaining wall and drainage channel would be within the existing right-of-way.
- No modifications to the existing flood gate and chain link right-of-way fence adjacent to the U.S. Forest Service (USFS) property just north of Old Tucson Road are anticipated.

- Widen Ruby Road to four lanes at the west frontage road intersection and add a traffic signal.
- Widen and realign the west frontage road south of Ruby Road to match the location of the west frontage road north of Ruby Road. The realignment would extend approximately 850 feet south of Ruby Road. The cross section of the west frontage road south of the signalized Ruby Road intersection would consist of four lanes with an additional northbound right-turn lane.
- Widen the west frontage road to four lanes north of the signalized Ruby Road intersection. The widening would taper to match the existing roadway width approximately 750 feet north of Ruby Road.
- Construct a new 2-8 ft. x 7 ft. RCBC under the ramp in the southwest quadrant of the interchange and a new drainage channel between the new RCBC and existing RCBC under Ruby Road. This would maintain the flow path for the wash approaching from the southwest and direct it to the existing RCBC under Ruby Road west of I-19.
- Approximately 3.18 acres of new right-of-way would be required with this alternative. The new right-of-way needs are as follows:
  - Northeast quadrant – 0.01 acres, private ownership (Pilot Truck Stop)
  - Northwest quadrant – 0.22 acres, private ownership
  - Southwest quadrant – 1.26 acres, private ownership
  - Southeast quadrant – 1.64 acres, private ownership (potential future Love's Travel Stop); 0.05 acres, public ownership (USFS)
- Install extruded thermoplastic pavement markings.
- Install new intersection lighting on Ruby Road at the I-19 ramps and frontage roads intersections.
- This alternative would require relocation of the Unisource Energy Services gas line to accommodate the box culvert extension. This alternative may require relocation of Unisource Energy Services overhead power and CenturyLink communications lines, which run parallel to the east frontage road at the proposed new access road intersection.

#### **Alternative B1 – One-Way East Frontage Road South of Ruby Road, Southbound Access via I-19**

Alternative B1 is a sub-alternative of Alternative B. Because the land in the southeast quadrant of the I-19/Ruby Road TI is privately owned and may be developed as a truck stop, it may not be feasible to acquire part of the parcel for the access road included in Alternative B. Alternative B1 would not provide direct southbound access in the southeast quadrant of the Ruby TI; rather, southbound traffic south of Ruby Road would need to use I-19 or the west frontage road to access homes and businesses south of Ruby Road and east of I-19.

Based on the proposed Alternative B geometry and 2040 peak hour volumes (which include the proposed truck stop), the analysis shows that the study intersections would operate as follows in the design year:

No.	Study Intersection	AM Peak	Midday Peak	PM Peak
		LOS	LOS	LOS
6-7	Ruby Road and West Frontage Road	C	C	C
8	Ruby Road and I-19 SB ramps	B	C	C
10	Ruby Road and East Frontage Road	D	D	C
11	Ruby Road and Pilot Truck Stop driveway*	C	B	B

\*Two way stop control – Worst movement LOS reported

- Approximately 1.56 acres of new right-of-way would be required with this alternative as follows:
  - Northeast quadrant – 0.01 acres, private ownership (Pilot Truck Stop)
  - Northwest quadrant – 0.22 acres, private ownership
  - Southwest quadrant – 1.26 acres, private ownership
  - Southeast quadrant – 0.02 acres, private ownership (potential future Love’s Travel Stop); 0.05 acres, public ownership (USFS)
- This alternative would require relocation of the Unisource Energy Services gas line to accommodate the box culvert extension. This alternative may require relocation of Unisource Energy Services power and CenturyLink communications lines, which run parallel to the east frontage road at the proposed new access road intersection.

**Alternative C – Roundabout Interchange**

Alternative C would reconstruct the I-19/Ruby Road TI as a roundabout interchange.

A LOS analysis was performed for design year 2040 peak hour volumes. Based on the proposed Alternative C geometry and 2040 peak hour volumes, the analysis shows that the study intersections would operate as follows in the design year:

No.	Study Intersection	AM Peak	Midday Peak	PM Peak
		LOS	LOS	LOS
6-8	Ruby Road and west roundabout	B	N/A	B
9-10	Ruby Road and east roundabout	A	N/A	B
11	Ruby Road and Pilot Truck Stop driveway*	C	B	B

\*Two way stop control – Worst movement LOS reported

Major scope items for Alternative C would include the following:

- Construct a new multi-lane, six-leg roundabout on Ruby Road east of I-19 that would connect to the northbound I-19 ramps and east frontage road. The center of the east roundabout intersection would be approximately 230 feet east of the bridge over I-19.

- Construct a new multi-lane, six-leg roundabout on Ruby Road west of I-19 that would connect to the southbound I-19 ramps and west frontage road. The center of the west roundabout intersection would be approximately 210 feet west of the bridge over I-19.
- No substantial modifications to the I-19/Ruby Road TI UP bridge would be required with this alternative. New vertical curb would be added in the center lane of the bridge to channelize the eastbound and westbound roadways.
- Realign all intersecting roadways for proper roundabout approach and departure spacing, horizontal curvature, and skew angle. The approximate limits of reconstruction would be as follows:

East Roundabout

- Ruby Road – 600 feet east and 230 feet west of roundabout
- I-19 northbound exit ramp – 850 feet south of roundabout
- I-19 northbound entrance ramp – 550 feet north of roundabout
- East frontage road – 950 feet south and 850 feet north of roundabout

West Roundabout

- Ruby Road – 210 feet east and 700 feet west of roundabout
  - I-19 southbound entrance ramp – 500 feet south of roundabout
  - I-19 southbound exit ramp – 1000 feet north of roundabout
  - West frontage road – 1000 feet south and 750 feet north of roundabout
- Provide up to three lanes in the circular roadway with an inscribed circle diameter of 220 feet. The number of lanes is based on the traffic analysis described in the traffic report for this project. The roundabouts would provide a 12-foot concrete truck apron and would accommodate a WB-67 design vehicle.
  - Near the roundabout intersections, construct channelizing vertical curb along each intersecting roadway and, where two-way traffic is accommodated, splitter islands between opposing directions of traffic.
  - Construct new concrete barrier where needed to match into existing barrier or shield the roadway from side slopes greater than 4H:1V.
  - Obliterate roadway segments no longer needed for traffic operations and remove the existing traffic signals on Ruby Road at the I-19 ramps and east frontage road.
  - Construct a retaining wall along the southbound exit ramp to contain embankment material from encroaching into the drainage channel.
  - Construct a new 2-8 ft. x 7 ft. RCBC that extends from the southwest quadrant of the interchange to the northwest quadrant. This would preserve the path for flows approaching from the southwest that are routed to the RCBC under I-19 located about 0.25 mile north of Ruby Road. At the outlet of the RCBC, a riprap basin would be required to replace the riprap basin removed for the construction of the frontage road in the northwest quadrant of the interchange.
  - Extend the 2-8 ft. x 7 ft. RCBC under I-19 north of the interchange to accommodate the widened southbound off-ramp.
  - For the roundabouts, a system of catch basins and a small-diameter storm drain pipe would be required to drain the curb and gutter section at the core of the roundabout.

Other drainage improvements include small diameter (24-inch) CMP culverts under the frontage roads and ramps in the southwest and southeast quadrants of the interchange.

- Install extruded thermoplastic pavement markings.
- Install new roundabout lighting.
- Approximately 1.37 acres of new right-of-way would be required with this alternative, plus TCEs at several driveways onto the east frontage road north of Ruby Road. The new right-of-way needs are as follows:
  - Northeast quadrant – 0.01 acres, private ownership (Pilot Truck Stop)
  - Northwest quadrant – 0.12 acres, private ownership
  - Southwest quadrant – 1.24 acres, private ownership

**Alternative D – Diverging Diamond Interchange**

Alternative D would reconstruct the I-19/Ruby Road TI to a DDI. With a DDI interchange, crossroad traffic crosses to the opposite side of the roadway within the limits of the interchange to allow free right and left turns to and from the I-19 ramps.

A LOS analysis was performed for design year 2040 peak hour volumes. Based on the proposed Alternative D geometry and 2040 peak hour volumes, the analysis shows that the study intersections would operate as follows in the design year:

No.	Study Intersection	AM Peak	Midday Peak	PM Peak
		LOS	LOS	LOS
6-7	Ruby Road and West Frontage Road	C	B	C
8	EB Ruby Road and WB Ruby Road	A	B	B
82	I-19 SB left turns	A	A	A
9	EB Ruby Road and WB Ruby Road	B	B	C
10	Ruby Road and East Frontage Road	C	C	C
91	I-19 NB left turns	A	A	A
11	Ruby Road and Pilot Truck Stop driveway*	C	B	B

\*Two way stop control – Worst movement LOS reported

Major scope items for Alternative D would include the following:

- Construct a new signalized crossover intersection on Ruby Road east of I-19 that would shift eastbound and westbound traffic to the opposite sides of the roadway. The center of the east crossover intersection would be approximately 150 feet east of the bridge over I-19.
- Construct a new signalized crossover intersection on Ruby Road west of I-19 that would shift eastbound and westbound traffic to the opposite sides of the roadway. The center of the west crossover intersection would be approximately 150 feet west of the bridge over I-19.



- No substantial modifications to the I-19/Ruby Road TI UP bridge would be required with this alternative. New vertical curb would be added in the center lane of the bridge for channelization of eastbound and westbound roadways.
- Realign the east frontage road approximately 100 feet east at Ruby Road to increase the separation between the frontage road and the adjacent crossover intersection. The approximate reconstruction limits of the east frontage road are as follows:
  - South of Ruby Road – 950 feet
  - North of Ruby Road – 1150 feet
- Realign the west frontage road to form one intersection with Ruby Road 130 feet west of the existing northern leg of the west frontage road. The realignment is necessary to consolidate the intersections on Ruby Road and to increase the separation between the frontage road and western crossover intersection. The approximate reconstruction limits of the east frontage road are as follows:
  - South of Ruby Road – 1050 feet
  - North of Ruby Road – 700 feet
- The reconstructed east frontage road intersection would require additional turn lanes on Ruby Road. The number of lanes is based on the analysis described in the traffic report for this project. The design vehicle is a WB-67 tractor trailer.
- Near the crossover intersections, construct channelizing vertical curb along each intersecting roadway and, where two-way traffic is accommodated, median islands between opposing directions of traffic.
- Construct new concrete barrier where needed to match into existing barrier or shield the roadway from side slopes steeper than 4H:1V.
- Obliterate roadway segments no longer needed for traffic operations.
- Extend the 2-8 ft. x 7 ft. RCBC under the west leg of Ruby Road to the north and south to accommodate the widened roadway section. The riprap basin located on the north end of the RCBC would be modified to accommodate the RCBC extension. The new west frontage road configuration would require a new 2-8 ft. x 7 ft. RCBC to maintain the flow path for flows approaching from the southwest.
- Add catch basins between the east frontage road and the west frontage road to drain the curb and gutter sections of the interchange. Pavement runoff would be conveyed by small-diameter storm drain pipe and directed to infield areas of the interchange. In addition, a small-diameter CMP culvert would be needed under the east frontage road in the southeast quadrant of the interchange to drain the southeast infield area.
- Install extruded thermoplastic pavement markings.
- Install new intersection lighting.
- Approximately 4.37 acres of new right-of-way would be required with this alternative. The right-of-way needs are as follows:
  - Northeast quadrant – 0.08 acres, private ownership (Pilot Truck Stop)
  - Northwest quadrant – 1.53 acres, private ownership
  - Southwest quadrant – 2.76 acres, private ownership

### ***Previously-Eliminated Alternatives***

Other concept-level alternatives were discussed with and eliminated from further consideration by the study team earlier in project development, including the following:

- Signing, pavement marking, and signal timing improvements to Ruby Road and the east frontage road. Eliminated as a standalone solution because LOS goals were not met.
- Continuous two-way east frontage road, Ruby Road to Rio Rico Drive, with the northbound east frontage road traffic merging with the I-19 northbound exit ramp and a grade separation for southbound east frontage road traffic over northbound traffic (similar to I-19/Continental Road TI). Solutions involving the construction of major structures were deemed cost prohibitive.
- Southbound east frontage road to northbound I-19 bypass lane. Eliminated because, when modeled, the bypass didn't draw enough traffic from Ruby Road to substantially improve the LOS.
- One-way east frontage road north of Ruby Road with southbound traffic crossover to west frontage road (slip ramp to west frontage road). Eliminated because a one-way restriction on the east frontage road could undesirably restrict business park access and because solutions involving the construction of major structures were deemed cost prohibitive.
- One-way east frontage road north of Ruby Road with southbound traffic crossover to west frontage road (T-Intersection with west frontage road). Eliminated because a one-way restriction on the east frontage road could undesirably restrict business park access and because solutions involving the construction of major structures were deemed cost prohibitive.
- New interchange on I-19 between Ruby Road and Rio Rico Drive in the median with left-exit ramps. Eliminated because FHWA will not approved left exits in non-HOV conditions and because solutions involving the construction of major structures were deemed cost prohibitive.
- Four roundabouts: The four intersections on Ruby Road with the west frontage road, southbound ramps, northbound ramps, and east frontage road would be converted to roundabouts. Eliminated because of high right-of-way needs and circulation restrictions for Pilot truck stop.

### ***Alternatives Evaluation***

The No Build alternative and Alternatives A, B, B1, C and D were evaluated to help differentiate the major features of the various alternatives. The results of the alternative evaluation are summarized in Table 7. The alternatives with the most favorable characteristics for each criterion are identified in the 'Advantage' column.

**TABLE 7 – ALTERNATIVES EVALUATION MATRIX**

Criterion	No Build	Alternative A Two-way frontage road extension to Rio Rico Drive	Alternative B One-way NB ramp/frontage road south of Ruby Road—New SB access road	Alternative B1 One-way NB ramp/frontage road south of Ruby Road—SB access via I-19	Alternative C Two Roundabouts (Combined Ramps/Frontage Roads)	Alternative D Diverging Diamond Interchange (DDI)	Advantage*
<b>Level of Service (LOS) (2040)</b> Ruby Road/EFR Rio Rico Dr/EFR	F E	F B	D E	D E	B E	C E	<b>C, then D</b>
<b>Circulation</b>	No changes to existing circulation.	A two-way frontage road the entire length between Ruby Rd. and Rio Rico Dr. would allow ingress to the business park from both adjacent I-19 TIs, thereby reducing backtracking. However, the Ruby Rd TI intersections are not improved.	The combined ramp/one-way NB frontage road would allow NB industrial park traffic to cross Ruby Rd. at one traffic signal without otherwise disrupting Ruby Rd. through traffic. SB east frontage road traffic would need to use Ruby Rd. and the new access road to continue south of Ruby Road.	The combined ramp/one-way NB frontage road would allow NB industrial park traffic to cross Ruby Rd. at one traffic signal without otherwise disrupting Ruby Rd. through traffic. Southbound east frontage road traffic would need to use I-19 or west frontage road to continue south of Ruby Road.	No substantial changes to circulation are anticipated; all existing movements would be provided with the roundabout interchange.	No substantial changes to circulation are anticipated; all existing movements would be provided with the diverging diamond interchange.	<b>B, C, D</b>

Criterion	No Build	Alternative A Two-way frontage road extension to Rio Rico Drive	Alternative B One-way NB ramp/frontage road south of Ruby Road—New SB access road	Alternative B1 One-way NB ramp/frontage road south of Ruby Road—SB access via I-19	Alternative C Two Roundabouts (Combined Ramps/Frontage Roads)	Alternative D Diverging Diamond Interchange (DDI)	Advantage*
<b>Structure Considerations/ Retaining Walls</b>	None.	No changes to major structures are required.	A new retaining wall along the east frontage road would be required.	A new retaining wall along the east frontage road would be required.	No major modifications to the existing I-19 Ruby Rd TI UP bridge would be required; however, a new raised island in the center lane and new roadway approaches would be constructed.	No major modifications to the existing I-19 Ruby Rd TI UP bridge would be required; however, a new raised island in the center lane and new roadway approaches would be constructed. No retaining walls would be required.	<b>A, D</b>
<b>Offsite Drainage</b>	No changes.	New 3-10 ft. x 12 ft. box culvert at Caralampi Canyon (MP 10.77).	Extension of 6 ft. x 7 ft. box culvert under the east frontage road. New 2-8 ft. x 7 ft. box culvert under the realigned west frontage road south of Ruby Rd. Extension of the 2-8 ft. x 7 ft. box culvert under Ruby Rd.	Extension of 6 ft. x 7 ft. box culvert under the east frontage road. New 2-8 ft. x 7 ft. box culvert under the realigned west frontage road south of Ruby Rd. Extension of the 2-8 ft. x 7 ft. box culvert under Ruby Rd.	New 2-8 ft. x 7 ft. box culvert under Ruby Rd. Extension of the 2-8 ft. x 7 ft. box culvert under I-19 (MP 7.80).	New 2-8 ft. x 7 ft. box culvert under the realigned west frontage road south of Ruby Rd. Extend 2-8 ft. x 7 ft. box culvert under Ruby Rd.	<b>A</b>

Criterion	No Build	Alternative A Two-way frontage road extension to Rio Rico Drive	Alternative B One-way NB ramp/frontage road south of Ruby Road—New SB access road	Alternative B1 One-way NB ramp/frontage road south of Ruby Road—SB access via I-19	Alternative C Two Roundabouts (Combined Ramps/Frontage Roads)	Alternative D Diverging Diamond Interchange (DDI)	Advantage*
<b>Utility Impacts</b>	None.	Conflicts with overhead power line outside of ADOT south of Rio Rico Dr. May conflict with additional underground utilities.	Conflicts with overhead power line outside of ADOT south of Ruby Rd. May conflict with additional underground utilities.	Conflicts with overhead power line outside of ADOT south of Ruby Rd. May conflict with additional underground utilities.	No overhead utilities would be impacted. May conflict with underground utilities.	No overhead utilities would be impacted. May conflict with underground utilities.	C, D
<b>Land Use Impacts</b>	None.	Reduces size of private parcel in southeast quadrant of Rio Rico TI.	Reduces size of private parcel south of Ruby Rd. planned for future truck stop; access road bisects parcel.  Reduces size of parcels in western quadrants.	Reduces access to developable parcel in SE quadrant.  Reduces size of parcels in western quadrants.	Reduces size of parcels in western quadrants.	Reduces size of parcels in western quadrants.	A, C, D
<b>Floodplain</b>	None.	SE quadrant of Rio Rico TI in floodplain (Zone A).	Relocated west frontage road south of Ruby Rd. encroaches on floodplain (Zone A).	Relocated west frontage road south of Ruby Rd. encroaches on floodplain (Zone A).	Relocated west frontage road south of Ruby Rd. encroaches on floodplain (Zone A).	Relocated west frontage road south of Ruby Rd. encroaches on floodplain (Zone A).	--
<b>Implementation</b>	Not applicable.	Implement as one project.	May implement as one project or two separate projects, one east of I-19 and the other west of I-19.	May implement as one project or two separate projects, one east of I-19 and the other west of I-19.	Implement as one project.	Implement as one project.	B, B1

Criterion	No Build	Alternative A Two-way frontage road extension to Rio Rico Drive	Alternative B One-way NB ramp/frontage road south of Ruby Road—New SB access road	Alternative B1 One-way NB ramp/frontage road south of Ruby Road—SB access via I-19	Alternative C Two Roundabouts (Combined Ramps/Frontage Roads)	Alternative D Diverging Diamond Interchange (DDI)	Advantage*
<b>Constructability</b>	No restrictions or impacts to traffic.	Minor impacts to traffic during construction.	Major impacts to traffic during construction.	Major impacts to traffic during construction.	Major impacts to traffic during construction.	Major impacts to traffic during construction.	A
<b>New Right-of-Way</b>	None	5.52 acres	3.18 acres	1.56 acres	1.37 acres	4.37 acres	C, B1
<b>Estimated Right-of-Way Cost **</b>	None	\$2,208,000	\$1,272,000	\$624,000	\$548,000	\$1,748,000	C, B1
<b>Estimated Construction Cost</b>	\$0	\$3,462,000	\$8,019,000	\$7,290,000	\$9,942,000	\$8,949,000	A

\* If the No Build Alternative ranked highest, the most favorable Build alternative was listed because the No Build alternative does not satisfy the purpose of the project.

\*\* R/W costs are based on an estimated unit price of \$400,000 per acre and are intended to provide an order-of-magnitude estimate for comparison between alternatives.

### ***Recommendation***

**Alternative C** provides the greatest operational improvement among the alternatives and would provide the best long-term solution for this area for the following reasons:

- Two roundabout intersections result in the lowest delay of all the alternatives.
- Alternative C provides the highest value in terms of cost per incremental improvement in LOS.
- Alternative C requires the smallest amount of new right-of-way acquisition and no appreciable loss of developable property is required.
- Alternative C received more public support than the other Ruby Road TI alternatives but less public support than Alternative A; however, Alternative A would not improve LOS at Ruby Road TI.
- Roundabout intersections are becoming more widely used in Arizona and throughout the U.S. for their operational and safety benefits.
- The roundabout intersections do not require vehicles to stop and wait at intersections when no other vehicles are present.
- Roundabout intersections typically have fewer and less severe conflict points than signalized intersections.
- Only four lanes are required across the Ruby Road TI bridge where five lanes exist today; the additional bridge width could be used to provide a dedicated pedestrian and bicycle corridor across I-19.

However, while the PEL process does not prohibit the identification of a preferred alternative, it does require that all reasonable alternatives be carried forward into NEPA. Alternatives can only be eliminated during the PEL process if they are fatally flawed. If an alternative happens to score lower in a comparative scheme, it is not necessarily fatally flawed even if the comparative scheme is based on the purpose and need. While Alternative C is recommended by the project team, Alternatives A, B, B1, and D were not found to have fatal flaws and thus should be carried forward into the NEPA process with Alternative C.

### **D. DEVELOPMENT CONSIDERATIONS**

ADOT Communications will coordinate project information with the public and project stakeholders. Coordination to date has included a public scoping meeting (May 2012) and stakeholder meetings with several groups, including Fresh Produce Association of the Americas and Rio Rico community associations.

Additional stakeholder meetings and a public meeting were held in January 2014 in Rio Rico, Arizona, to present the alternatives.

The study team met with Santa Cruz County on January 14, 2014, and with the City of Nogales and the Fresh Produce Association of the Americas on January 22, 2014, to inform them of the upcoming public meeting and to review the alternatives.

The purpose of the public meeting was to provide additional information about the study, present the alternatives, and provide the opportunity for attendees to ask questions and submit comments. A total of 60 people attended the public meeting. The meeting was held on Wednesday, January 29, from 5:00 p.m. to 7:30 p.m. (with a presentation at 5:30 p.m.) at the Esplendor Resort, 1069 Camino Caralampi, Rio Rico, AZ 85648.

Public comments ranged from issues associated with traffic management and business access to suggestions for alternatives and concerns with overall costs. Many similar comments were received from multiple commenters. Comments were classified into the following categories:

- Traffic Management
- Safety Concerns
- Economics
- No Build Preferred

During the comment period, comments could be submitted in a variety of ways: by mail, telephone, email, and online. A total of 39 comments were received during the comment period, which ended February 14, 2014.

The comments are quantified by issue below:

Category	Comments Received for this Category*
Traffic Management	33
Safety Concerns	2
Economics	1
Emergency Access	2
Miscellaneous	1
Alternatives	17-Alt A; 2-Alt B; 5-Alt C; 1-Alt D

\*Responses may have included more than one issue

Additional information about the meeting and comments are available in the *Public Scoping Summary* prepared by ADOT Communications, March 2014.

School bus circulation and emergency vehicle access should be considered during construction.

ADOT has evaluated modifications to the west frontage road between Ruby Road and Rio Rico Drive under a separate project (019 SC 008 H8204 01C); however, the project is not currently active.

Santa Cruz County is conducting a study to widen the Ruby Road bridge over Potrero Creek. Recommendations from the study are not yet available. Of the three alternatives under study, two appear to be compatible with the ADOT study alternatives presented herein.

ADOT's Tucson District is preparing a sign to indicate to southbound vehicles that there is no access to the industrial park from Rio Rico Drive. Once the sign has been installed and results observed, the need for additional signing on the Rio Rico Drive crossroad will be evaluated.

Redevelopment of the existing retail plaza in the northwest quadrant of the Rio Rico TI is planned. Projected retail plaza traffic volumes are included in the 2040 volumes for this study.

New roadway elements will be designed in accordance with ADOT's *Roadway Design Guidelines*, 2012 Edition, with current updates, AASHTO's *A Policy on Geometric Design of Roads and Streets*, 2011 6<sup>th</sup> Edition, and AASHTO's *Roadside Design Guide*, 2011, 4<sup>th</sup> Edition.



The design speeds used for the preliminary design alternatives are as follows:

I-19	70 mph
Ruby Road	35 mph
Rio Rico Drive	35 mph
East Frontage Road	50 mph*
West Frontage Road	50 mph*

\*The east and west frontage road design speed is reduced near the crossroad termini.

A Change of Access Report would be required with Alternatives A, B, or B1. A Change of Access Report likely would not be required with Alternatives C or D since those alternatives would require relatively minor modifications to the ramp/crossroad intersection configurations.

The need for new right-of-way and temporary construction easements varies by alternative.

ADOT will need to coordinate with private property owners for access changes and driveway connections. Onsite circulation improvements at the Pilot truck stop are recommended to ensure that trucks can circulate to the available routes. Without onsite improvements, a raised median may be considered to restrict left-turns into the farthest-east Pilot driveway.

Local agency encroachment permits from Santa Cruz County will be required for work outside ADOT's right-of-way.

The washes that cross the I-19 corridor are flood zones that are designated as a Special Flood Hazard Area, Zone A, on FEMA Flood Insurance Rate Maps (FIRMs) for Santa Cruz County. Zone A is defined by FEMA as an area that is subject to inundation by the 1% annual chance flood and has no base flood elevations determined.

With the proposed improvements at one or both of the interchanges, the impact to the flood zone will need to be considered. Filling of the flood zone may trigger the need for a Conditional Letter of Map Revision (CLOMR). A CLOMR would not be needed if it can be shown that: 1) the project provides for an equal compensatory volume that is displaced with improvements or 2) by hydraulic modeling, improvements do not adversely impact the flood zone by causing an increase in the water surface elevation at any particular location.

Drainage design for the intersection improvements shall be completed in accordance with the ADOT hydrologic and hydraulic methodologies and criteria. I-19 is designated with a Drainage Frequency of Class 1, requiring offsite drainage features designed to convey the 50-year storm event. Onsite drainage systems shall be designed to convey the 10-year storm.

Temporary and permanent erosion control and scour mitigation will be incorporated into the project. Temporary erosion control measures will be accomplished and shown on the Storm Water Pollution Prevention Plans (SWPPP) and details. Permanent scour mitigation will include riprap scour aprons and energy dissipators as needed at the outlets of the new culverts and along the earthen ditches. Riprap sizing and placement will be determined during final design.

Design-level mapping should be requested early so that it is available at the beginning of final design.

Existing survey monuments and section corner monuments may be located within the project limits. These locations will be investigated during final design. Provisions should be made to avoid disturbing the monuments. If any monuments are disturbed during construction, they shall be reset to the current standards.

Utility conflicts are anticipated as detailed in the alternatives discussions. Prior rights have not been determined. Final design should include locating the existing utilities to ASCE quality level B/A; this can be done using an ADOT on-call subsurface utility engineering contractor.

A review of the AASHTO Controlling Design Criteria indicates that design exceptions may be required. With Alternative A, the existing Rio Rico Drive profile and corresponding vertical stopping sight distance would remain as-is. With Alternatives B, B1, C, and D, the portions of the east frontage road that are reconstructed would conform to current AASHTO criteria; however, the majority of the east frontage road between Ruby Road and Rio Rico Drive would remain as-is. A request for design exceptions and design variances will be prepared during final design.

Estimated construction duration varies by alternative:

- Alternative A – 120 calendar days
- Alternative B/B1 – 240 calendar days
- Alternative C – 240 calendar days
- Alternative D – 240 calendar days

The ADOT Environmental Planning Group (EPG) will investigate and prepare the required environmental documentation for this project.

*Biological Resources:* No Threatened or Endangered species have been identified. A biologist will visit the project area and prepare a Biological Review to address the potential for the project to affect federally-listed threatened and endangered species. A letter requesting information on the presence of state species of concern will be sent to the Arizona Game and Fish Department.

*Cultural Resources:* No cultural issues have been identified. Cultural resource surveys have been completed in the project area and data recovery has taken place for previous ADOT work in the vicinity. However, previously-completed surveys and data recovery will need to be researched further prior to the start of environmental clearance documentation to determine the need for additional surveys and/or potential to impact cultural resources.

*Hazardous Materials:* A Preliminary Initial Site Assessment will be conducted for the project. It is anticipated that concrete and painted structures and features will be modified as part of the project. Prior to construction, and possibly as part of the environmental clearance process, asbestos-containing material and lead-based paint testing will be needed.

*Water Quality:* There are several washes that cross under I-19 and the frontage roads that are likely waters of the US (Waters). Nationwide Section 404 permits are anticipated; however, additional coordination and evaluation will be needed to determine the extent of impacts and potential need for preliminary delineation of Waters and preconstruction notification to the US Army Corps of Engineers.

The Arizona Department of Environmental Quality (ADEQ) designation of the Santa Cruz River is impaired; however, the river is east of the project limits and will not be affected by any of the alternatives.

Because this project is anticipated to result in more than one acre of ground disturbance, an Arizona Pollutant Discharge Elimination System general permit and a SWPPP will be required. The Tucson District and the contractor will submit the Notice of Intent and the Notice of Termination to ADEQ.

As noted previously, parts of the project area are located within floodplains.

In accordance with Federal Regulation 23 CFR, Part 650, Subpart B, construction projects that are federally funded shall provide design features to reduce erosion and minimize sedimentation during and after construction, when applicable.

*Air Quality:* This project is located in the Nogales non-attainment area for particulate matter smaller than 10 microns (PM<sub>10</sub>). The proposed operational improvements are anticipated to improve traffic operations and benefit overall air quality in the vicinity of the project.

*Noise:* No noise modeling is anticipated since no sensitive noise receivers are located near the proposed improvements and improvements will improve operations and are not anticipated to increase the overall capacity of the roadway.

The need for geotechnical investigation is anticipated for retaining wall foundation design. A geotechnical environmental clearance will be needed prior to the start of geotechnical testing.

No location has been identified within the project limits for construction staging and materials storage for the contractor. The contractor will need to coordinate staging and storage areas with ADOT or private adjacent land owners. If staging and storage locations are identified, they need to be environmentally cleared by ADOT's EPG.

#### **E. OTHER REQUIREMENTS**

The CPS ID is MU1L. The project is not listed in the Tentative 2015--2019 Five-Year Transportation Facilities Construction Program. When funding is available, this project is expected to progress to design and construction. A funding source for the project has not been identified.

The Predesign Project Manager is Tami Wollaston, (602) 712-8485.

This project will be administered under the FHWA Operating Partnership Agreement under Category T (Delegated/State administered).

The need for weekend or holiday restrictions on construction is not anticipated. However, because industrial park traffic is highest in January, construction should be limited to April through October. Short-term lane and shoulder closures will be required for paving operations.

Traffic control requirements will be in accordance with the current edition of the *Manual on Uniform Traffic Control Devices (MUTCD)* and *Arizona Supplement* to the current edition of the *MUTCD*, and/or by special provisions.

Within two weeks of the design kick-off meeting, the project manager will develop a customized project schedule that will reflect the full scope of the work. ADOT's Program and Project Management Section will provide the necessary technical support to the design team during the schedule development.

#### **F. ESTIMATED COST**

The estimated construction and right-of-way costs for the improvements vary by alternative as follows:

<u>Alternative</u>	<u>Estimated Construction Cost</u>	<u>Estimated Right-of-Way Cost*</u>	<u>Estimated Total Project Cost*</u>
<b>Alternative A</b>	\$3,462,000	\$2,208,000	<b>\$5,670,000</b>
<b>Alternative B</b>	\$8,019,000	\$1,272,000	<b>\$9,291,000</b>
<b>Alternative B1</b>	\$7,290,000	\$624,000	<b>\$7,914,000</b>
<b>Alternative C</b>	\$9,942,000	\$548,000	<b>\$10,490,000</b>
<b>Alternative D</b>	\$8,949,000	\$1,748,000	<b>\$10,697,000</b>

\* See note below regarding estimated right-of-way costs

Estimated costs are based on the following assumptions and methodology. For items not mentioned, estimated costs are based on unit prices from bid tabs of recently-advertised projects.

- Item No. 2020301, Roadway Excavation – Estimated based on the length of new roadways and an average height of embankment fill. During final design, when topographic mapping is available, a more precise earthwork estimate will be generated.
- The existing roadways will be fully removed and reconstructed within the construction limits. Asphaltic concrete pavement is assumed for all new roadways. The new pavement structural section used in the estimate includes 9" AC on 8" AB (Class 2).
- Drainage Items (Item Nos. 50XXXXX) – Accounts for new catch basins, storm drains and pipe culverts for on-site drainage. It is assumed that on-site drainage would discharge into existing or new infield areas and follow the existing grading course. No retention or detention basins are included.
- Item No. 7010001, Maintenance and Protection of Traffic – Calculated at 10% of the detailed estimate subtotal with contingency.
- Item No. 70800XX, Pavement Marking – Lump sum estimate of pavement marking cost based on the preliminary design and concept-level quantities.
- Item No. 709XX01, Signing – Lump sum estimate of signing cost based on the preliminary design and concept-level quantities.
- Item No. 730XX01, Lighting – Lump sum estimate of lighting cost based on the preliminary design and concept-level quantities.
- Right-of-way costs estimates are included to provide an "order-of-magnitude" figure to include in the estimate for each alternative; however, they are not based on appraisals or local real estate information. A unit cost of \$400,000 per acre was assumed.
- Since prior rights for the utilities have not been determined, no costs have been estimated for utility reconstruction.
- A cost for public involvement based on one percent of the subtotal with mobilization (subtotal #3) is included.

**G. REQUIRED ACTION BY THE PRIORITY PLANNING ACTION COMMITTEE (PPAC) AND/OR PROJECT REVIEW BOARD (PRB):**

This project will be submitted by the ADOT Tucson District to the Priority Programming Section of the Multimodal Planning Division for inclusion in the Five-Year Transportation Facilities Construction Program.

**H. INVOLVEMENT SHEET**

**TRACS No.** 019 SC 007 H8401 01L  
**Project Name:** I-19 East Frontage Road, Ruby Road – Rio Rico Drive  
**Location:** Nogales – Tucson Highway

CONTACTED	FIELD REVIEW	ORGANIZATION	INVOLVEMENT				COMMENTS  (ISSUES WHICH MAKE INVOLVEMENT SIGNIFICANT OR MINIMAL)
			SIGNIFICANT	MINIMUM	NONE	UNKNOWN	
X	X	ADOT PREDESIGN	X				PREDESIGN PROJECT MANAGER: TAMI WOLLASTON (602) 712-8485
X	X	TUCSON DISTRICT	X				CONSTRUCTION ENGINEERING AND ADMINISTRATION
X	X	STATEWIDE PROJECT MANAGEMENT	X				MANAGE DESIGN
X	X	RIGHT-OF-WAY	X				ACQUIRE NEW RIGHT-OF-WAY AND TEMPORARY CONSTRUCTION EASEMENTS IF NEEDED
X	X	ROADWAY DESIGN		X			REVIEW PLANS
X	X	TRAFFIC DESIGN		X			REVIEW PLANS
X	X	BRIDGE DESIGN		X			REVIEW PLANS
X		DRAINAGE DESIGN		X			REVIEW PLANS
X		PAVEMENT DESIGN	X				MATERIALS DESIGN REPORT & PAVEMENT DESIGN SUMMARY
X		GEOTECH SECTION	X				GEOTECHNICAL INVESTIGATION & PAVEMENT DESIGN
X	X	ENVIRONMENTAL PLANNING	X				PREPARE ENVIRONMENTAL DOCUMENTATION AND CLEARANCE
X	X	UTILITIES & RAILROAD	X				COORDINATE UTILITY RELOCATIONS, UTILITY CLEARANCE LETTER
X	X	COMMUNICATIONS		X			COORDINATE WITH PROPERTY OWNERS, PUBLIC.
X		PHOTOGRAMMETRY & MAPPING	X				PREPARE TOPOGRAPHIC MAPPING FOR DESIGN PRIOR TO DESIGN KICKOFF
X		ROADSIDE DEVELOPMENT		X			PREPARE SEEDING SPECIFICATIONS; REVIEW SWPPP
X		CONTRACTS & SPECIFICATIONS	X				PREPARE P S & E PACKAGE; ADVERTISE PROJECT
X		FHWA		X			FEDERAL FUNDING, ADOT/FHWA PARTNERSHIP AGREEMENT, CATEGORY T
X	X	SANTA CRUZ COUNTY		X			COORDINATION
X		CITY OF NOGALES		X			COORDINATION

**I. ITEMIZED COST ESTIMATE**

ESTIMATE OF PROBABLE CONSTRUCTION COST  
I-19 EAST FRONTAGE ROAD, RUBY ROAD – RIO RICO DRIVE – ALTERNATIVE A

ITEM NO.	ITEM DESCRIPTION	UNIT OF	QUANTITY	UNIT PRICE	TOTAL
2020021	REMOVAL OF CONCRETE CURB AND GUTTER	L.FT.		\$ 4.00	\$ 0
2020023	REMOVE EXISTING TRAFFIC SIGNALS	L.SUM		\$ 15,000.00	\$ 0
2020025	REMOVAL OF CONCRETE SIDEWALKS, DRIVEWAYS AND SLABS	SQ.FT.		\$ 2.50	\$ 0
2020027	REMOVAL OF CONCRETE BARRIER	L.FT.		\$ 15.00	\$ 0
2020036	REMOVAL OF ASPHALTIC CONCRETE PAVEMENT	SQ.YD.	12,541	\$ 5.00	\$ 62,705
2020045	REMOVAL OF RIPRAP	CU.YD.		\$ 10.00	\$ 0
2020050	REMOVE DRAINAGE STRUCTURES	L.SUM		\$ 25,000.00	\$ 0
2020153	REMOVE (SIGNS, FOUNDATIONS, AND POSTS)	L.SUM	1	\$ 2,000.00	\$ 2,000
2020154	REMOVE (SIGN STRUCTURE)	EACH	3	\$ 2,500.00	\$ 7,500
2020057	REMOVE AND SALVAGE (END TREATMENTS)	EACH		\$ 300.00	\$ 0
2030301	ROADWAY EXCAVATION	CU.YD.	36,000.00	\$ 10.00	\$ 360,000
3030022	AGGREGATE BASE, CLASS 2	CU.YD.	4,885	\$ 34.00	\$ 166,090
4040111	BITUMINOUS TACK COAT	TON	12	\$ 400.00	\$ 4,800
4040116	APPLY BITUMINOUS TACK COAT	HOUR	20	\$ 150.00	\$ 3,000
4040282	ASPHALT BINDER (PG 76-16)	TON	451	\$ 550.00	\$ 248,050
4160004	ASPHALTIC CONCRETE - EP (3/4" MX)	TON	9,022	\$ 32.00	\$ 288,704
4160031	MINERAL ADMXTURE (FOR 3/4" MX)	TON	86	\$ 90.00	\$ 7,740
5010011	PIPE, CORRUGATED METAL, 24"	L.FT.		\$ 60.00	\$ 0
5012524	STORM DRAIN PIPE, 24"	L.FT.		\$ 80.00	\$ 0
5014524	FLARED END SECTION, 24" (C-13.20 OR C-13.25) (PIPE CULVERT)	EACH		\$ 300.00	\$ 0
5030051	CONCRETE CATCH BASIN (C-15.20) SUMP ONLY, WING, H=8' OR LESS (	EACH		\$ 2,800.00	\$ 0
5030141	CONCRETE CATCH BASIN (MEDIAN)	EACH		\$ 4,000.00	\$ 0
5041901	DRAINAGE STRUCTURE (3 - 10 X 8 RCB CULVERT)	EACH	1	\$ 273,802.00	\$ 273,802
5041902	DRAINAGE STRUCTURE (6 X 7 RCB CULVERT EXTENSION)	EACH		\$ -	\$ 0
5041903	DRAINAGE STRUCTURE (2 - 8 X 7 RCB CULVERT UNDER FRONTAGE ROAD)	EACH		\$ -	\$ 0
5041904	DRAINAGE STRUCTURE (RCB CULVERT UNDER RUBY ROAD)	EACH		\$ -	\$ 0
5041905	DRAINAGE STRUCTURE (RCB CULVERT EXTENSION UNDER I19)	EACH		\$ -	\$ 0
60700XX	SIGNING	L.SUM	1	\$ 3,000.00	\$ 3,000
70800XX	PAVEMENT MARKING	L.SUM	1	\$ 10,000.00	\$ 10,000
73300XX	TRAFFIC SIGNAL	L.SUM	1	\$ 150,000.00	\$ 150,000
9050025	GUARD RAIL TERMINAL (ET-PLUS OR SKT-350)	EACH		\$ 2,500.00	\$ 0
9050430	THREE-BEAM GUARD RAIL TRANSITION SYSTEM	EACH		\$ 4,500.00	\$ 0
9080051	CONCRETE CURB AND GUTTER (C-05.10) (TYPE A)	L.FT.		\$ 16.00	\$ 0
9080084	CONCRETE CURB AND GUTTER (TYPE D OR D-1)	L.FT.		\$ 15.00	\$ 0
9080245	CONCRETE (TRUCK APRON FOR ROUNDABOUT)	SQ.YD.		\$ 100.00	\$ 0
9100001	CONCRETE BARRIER	L.FT.		\$ 50.00	\$ 0
9100117	CONCRETE BARRIER TRANSITION (C-10.71)	EACH		\$ 4,000.00	\$ 0
9130008	RIPRAP (DUMPED) (12")	CU.YD.		\$ 140.00	\$ 0
9130051	RIPRAP (DUMPED) (6")	CU.YD.		\$ 80.00	\$ 0
9140155	RETAINING WALL	SQ.FT.		\$ 50.00	\$ 0
9201006	CONCRETE CHANNEL LINING (6")	SQ.YD.		\$ 60.00	\$ 0
9210011	MEDIAN PAVING	SQ.YD.		\$ 30.00	\$ 0
<b>DETAILED ESTIMATE SUBTOTAL</b>					<b>\$ 1,587,391</b>
934XX01	MISCELLANEOUS WORK (15%)	COST	15.00%		\$ 238,109
<b>Subtotal 1</b>					<b>\$ 1,825,500</b>
207XX01	DUST PALLIATIVE (1%)	COST	1.00%		\$ 18,255
209XX01	FURNISH WATER (1%)	COST	1.00%		\$ 18,255
7010001	MAINTENANCE AND PROTECTION OF TRAFFIC (10%)	COST	10.00%		\$ 182,550
810XX01	EROSION CONTROL AND POLLUTION PREVENTION (1%)	COST	1.00%		\$ 18,255
924XX02	CONTRACTOR QUALITY CONTROL (2%)	COST	2.00%		\$ 36,510
925XX01	CONSTRUCTION SURVEYING AND LAYOUT (1%)	COST	1.00%		\$ 18,255
<b>Subtotal 2</b>					<b>\$ 2,117,500</b>
9010001	MOBILIZATION (10%)	COST	10.0%		\$ 211,758
<b>Subtotal 3</b>					<b>\$ 2,329,338</b>
951X001	CONSTRUCTION ENGINEERING		15.00%		\$ 349,401
951XXXX	PUBLIC INVOLVEMENT		1.00%		\$ 23,294
951X002	CONSTRUCTION CONTINGENCY		5.00%		\$ 116,467
951X010	INDIRECT COST ALLOWANCE (9.46%)		9.46%		\$ 220,355
<b>DETAILED ESTIMATE</b>					<b>\$ 3,038,855</b>
416X002	ASPHALTIC CONCRETE (3/4" MX) MATERIALS QUALITY INCENTIVE	TON	9,022	\$ 3.00	\$ 27,066
<b>PROJECT WIDE</b>					<b>\$ 27,000</b>
	FINAL DESIGN COSTS (8%)	COST	8.00%		\$ 243,108
	RIGHT-OF-WAY	ACRES	5.52	\$ 400,000.00	\$ 2,208,000
	UTILITY RELOCATIONS	COST	5.00%		\$ 151,943
<b>OTHER COSTS</b>					<b>\$ 2,603,051</b>
<b>SUMMARY</b>					
<b>DETAILED ESTIMATE</b>					<b>\$ 3,039,000</b>
<b>PROJECT WIDE</b>					<b>\$ 27,000</b>
<b>OTHER COSTS</b>					<b>\$ 2,604,000</b>
<b>TOTAL CONSTRUCTION COSTS</b>					<b>\$ 5,670,000</b>

ESTIMATE OF PROBABLE CONSTRUCTION COST  
I-19 EAST FRONTAGE ROAD, RUBY ROAD – RIO RICO DRIVE – ALTERNATIVE B

ITEM NO.	ITEM DESCRIPTION	UNIT OF	QUANTITY	UNIT PRICE	TOTAL
2020021	REMOVAL OF CONCRETE CURB AND GUTTER	L.F.T.	2,026	\$ 4.00	\$ 8,104
2020023	REMOVE EXISTING TRAFFIC SIGNALS	L.SUM	1	\$ 15,000.00	\$ 15,000
2020025	REMOVAL OF CONCRETE SIDEWALKS, DRIVEWAYS AND SLABS	SQ.FT.	15,056	\$ 2.50	\$ 37,640
2020027	REMOVAL OF CONCRETE BARRIER	L.F.T.	2,245	\$ 15.00	\$ 33,675
2020036	REMOVAL OF ASPHALTIC CONCRETE PAVEMENT	SQ.YD.	46,988	\$ 5.00	\$ 234,940
2020045	REMOVAL OF RIPRAP	CU.YD.		\$ 10.00	\$ 0
2020050	REMOVE DRAINAGE STRUCTURES	L.SUM		\$ 25,000.00	\$ 0
2020153	REMOVE (SIGNS, FOUNDATIONS, AND POSTS)	L.SUM	1	\$ 15,000.00	\$ 15,000
2020154	REMOVE (SIGN STRUCTURE)	EACH	3	\$ 2,500.00	\$ 7,500
2020057	REMOVE AND SALVAGE (END TREATMENTS)	EACH	4	\$ 300.00	\$ 1,200
2030301	ROADWAY EXCAVATION	CU.YD.	35,000	\$ 10.00	\$ 350,000
3030022	AGGREGATE BASE, CLASS 2	CU.YD.	12,800	\$ 34.00	\$ 435,200
4040111	BITUMINOUS TACK COAT	TON	34	\$ 400.00	\$ 13,600
4040116	APPLY BITUMINOUS TACK COAT	HOUR	60	\$ 150.00	\$ 9,000
4040082	ASPHALT BINDER (PG 76-16)	TON	1,290	\$ 550.00	\$ 709,500
4160004	ASPHALTIC CONCRETE - EP (3/4" MIX)	TON	25,794	\$ 32.00	\$ 825,408
4160003	MINERAL ADMXTURE (FOR 3/4" MIX)	TON	246	\$ 90.00	\$ 22,140
5010011	PIPE, CORRUGATED METAL, 24"	L. FT.	170	\$ 60.00	\$ 10,200
5012524	STORM DRAIN PIPE, 24"	L.F.T.		\$ 80.00	\$ 0
5014524	FLARED END SECTION, 24" (C-13.20 OR C-13.25) (PIPE CULVERT)	EACH	4	\$ 300.00	\$ 1,200
5030051	CONCRETE CATCH BASIN (C-15.20) SUMP ONLY, WNG, H-8" OR LESS (	EACH		\$ 2,800.00	\$ 0
5030141	CONCRETE CATCH BASIN (MEDIAN)	EACH		\$ 3,000.00	\$ 0
5041901	DRAINAGE STRUCTURE (3 - 10 X 8 RCB CULVERT)	EACH		\$ -	\$ 0
5041902	DRAINAGE STRUCTURE (6 X 7 RCB CULVERT EXTENSION)	EACH	1	\$ 70,569.60	\$ 70,570
5041903	DRAINAGE STRUCTURE (2 - 8 X 7 RCB CULVERT UNDER FRONTAGE ROAD)	EACH	1	\$ 141,828.80	\$ 141,829
5041904	DRAINAGE STRUCTURE (RCB CULVERT UNDER RUBY ROAD)	EACH		\$ -	\$ 0
5041905	DRAINAGE STRUCTURE (RCB CULVERT EXTENSION UNDER I-19)	EACH		\$ -	\$ 0
60700XX	SIGNING	L.SUM	1	\$ 30,000.00	\$ 30,000
70800XX	PAVEMENT MARKING	L.SUM	1	\$ 61,000.00	\$ 61,000
73300XX	TRAFFIC SIGNAL	L.SUM	1	\$ 350,000.00	\$ 350,000
9050025	GUARD RAIL TERMINAL (ET-PLUS OR SKT-350)	EACH	4	\$ 2,500.00	\$ 10,000
9050430	THREE-BEAM GUARD RAIL TRANSITION SYSTEM	EACH	4	\$ 4,500.00	\$ 18,000
9080051	CONCRETE CURB AND GUTTER (C-05.10) (TYPE A)	L.F.T.		\$ 18.00	\$ 0
9080084	CONCRETE CURB AND GUTTER (TYPE D OR D-1)	L.F.T.	2,447	\$ 15.00	\$ 36,705
9080245	CONCRETE (TRUCK APRON FOR ROUNDABOUT)	SQ.YD.		\$ 100.00	\$ 0
9100001	CONCRETE BARRIER	L.F.T.	2,584	\$ 50.00	\$ 129,200
9100117	CONCRETE BARRIER TRANSITION (C-10.71)	EACH	4	\$ 4,000.00	\$ 16,000
9130008	RIPRAP (DUMPED) (12")	CU.YD.		\$ 140.00	\$ 0
9130051	RIPRAP (DUMPED) (6")	CU.YD.	20	\$ 80.00	\$ 1,600
9140155	RETAINING WALL	SQ.FT.	1,300	\$ 50.00	\$ 65,000
9201006	CONCRETE CHANNEL LINING (6")	SQ. YD.	194	\$ 60.00	\$ 11,640
9210011	MEDIAN PAVING	SQ.YD.		\$ 30.00	\$ 0
DETAILED ESTIMATE SUBTOTAL					\$ 3,670,851
934XX01	MISCELLANEOUS WORK (15%)	COST	15.00%		\$ 550,628
Subtotal 1					\$ 4,221,479
207XX01	DUST PALLIATIVE (1%)	COST	1.00%		\$ 42,215
209XX01	FURNISH WATER (1%)	COST	1.00%		\$ 42,215
7010001	MAINTENANCE AND PROTECTION OF TRAFFIC (10%)	COST	10.00%		\$ 422,148
810XX01	EROSION CONTROL AND POLLUTION PREVENTION (1%)	COST	1.00%		\$ 42,215
924XX02	CONTRACTOR QUALITY CONTROL (2%)	COST	2.00%		\$ 84,430
925XX01	CONSTRUCTION SURVEYING AND LAYOUT (1%)	COST	1.00%		\$ 42,215
Subtotal 2					\$ 4,896,917
9010001	MOBILIZATION (10%)	COST	10.0%		\$ 489,692
Subtotal 3					\$ 5,386,609
951X001	CONSTRUCTION ENGINEERING		15.00%		\$ 807,992
951XXXX	PUBLIC INVOLVEMENT		1.00%		\$ 53,867
951X002	CONSTRUCTION CONTINGENCY		5.00%		\$ 269,330
951X010	INDIRECT COST ALLOWANCE (9.46%)		9.46%		\$ 509,573
DETAILED ESTIMATE					\$ 7,027,372
416X002	ASPHALTIC CONCRETE (3/4" MIX) MATERIALS QUALITY INCENTIVE	TON	25,794	\$ 3.00	\$ 77,382
PROJECT WIDE					\$ 77,000
	FINAL DESIGN COSTS (8%)	COST	8.00%		\$ 562,190
	RIGHT-OF-WAY	ACRES	3.18	\$ 400,000.00	\$ 1,272,000
	UTILITY RELOCATIONS	COST	5.00%		\$ 351,369
OTHER COSTS					\$ 2,185,558
<b>SUMMARY</b>					
DETAILED ESTIMATE					\$ 7,028,000
PROJECT WIDE					\$ 77,000
OTHER COSTS					\$ 2,186,000
TOTAL CONSTRUCTION COSTS					\$ 9,291,000

ESTIMATE OF PROBABLE CONSTRUCTION COST  
I-19 EAST FRONTAGE ROAD, RUBY ROAD – RIO RICO DRIVE – ALTERNATIVE B-1

ITEM NO.	ITEM DESCRIPTION	UNIT OF	QUANTITY	UNIT PRICE	TOTAL
2020021	REMOVAL OF CONCRETE CURB AND GUTTER	L.F.T.	2,026	\$ 4.00	\$ 8,104
2020023	REMOVE EXISTING TRAFFIC SIGNALS	L.SUM	1	\$ 15,000.00	\$ 15,000
2020025	REMOVAL OF CONCRETE SIDEWALKS, DRIVEWAYS AND SLABS	SQ.FT.	15,056	\$ 2.50	\$ 37,640
2020027	REMOVAL OF CONCRETE BARRIER	L.F.T.	2,245	\$ 15.00	\$ 33,675
2020036	REMOVAL OF ASPHALTIC CONCRETE PAVEMENT	SQ.YD.	48,988	\$ 5.00	\$ 234,940
2020045	REMOVAL OF RIPRAP	CU.YD.		\$ 10.00	\$ 0
2020050	REMOVE DRAINAGE STRUCTURES	L.SUM		\$ 25,000.00	\$ 0
2020153	REMOVE (SIGNS, FOUNDATIONS, AND POSTS)	L.SUM	1	\$ 15,000.00	\$ 15,000
2020154	REMOVE (SIGN STRUCTURE)	EACH	3	\$ 2,500.00	\$ 7,500
2020057	REMOVE AND SALVAGE (END TREATMENTS)	EACH	4	\$ 300.00	\$ 1,200
2030301	ROADWAY EXCAVATION	CU.YD.	27,000	\$ 10.00	\$ 270,000
3030022	AGGREGATE BASE, CLASS 2	CU.YD.	11,769	\$ 34.00	\$ 400,146
4040111	BITUMINOUS TACK COAT	TON	30	\$ 400.00	\$ 12,000
4040116	APPLY BITUMINOUS TACK COAT	HR	52	\$ 150.00	\$ 7,800
4040282	ASPHALT BINDER (PG 76-16)	TON	1,124	\$ 550.00	\$ 618,200
4160004	ASPHALTIC CONCRETE - EP (3/4" MX)	TON	22,489	\$ 32.00	\$ 719,648
4160031	MINERAL ADMXTURE (FOR 3/4" MX)	TON	214	\$ 90.00	\$ 19,260
5010011	PIPE, CORRUGATED METAL, 24"	L.F.T.	110	\$ 60.00	\$ 6,600
5012524	STORM DRAIN PIPE, 24"	L.F.T.		\$ 80.00	\$ 0
5014524	FLARED END SECTION, 24" (C-13.20 OR C-13.25) (PIPE CULVERT)	EACH	2	\$ 300.00	\$ 600
5030051	CONCRETE CATCH BASIN (C-15.20) SUMP ONLY, WING, H=8" OR LESS (	EACH		\$ 2,800.00	\$ 0
5030141	CONCRETE CATCH BASIN (MEDIAN)	EACH		\$ 3,000.00	\$ 0
5041901	DRAINAGE STRUCTURE (3 - 10 X 8 RCB CULVERT)	EACH		\$ -	\$ 0
5041902	DRAINAGE STRUCTURE (6 X 7 RCB CULVERT EXTENSION)	EACH	1	\$ 70,269.60	\$ 70,270
5041903	DRAINAGE STRUCTURE (2 - 8 X 7 RCB CULVERT UNDER FRONTAGE ROAD)	EACH	1	\$ 143,238.80	\$ 143,239
5041904	DRAINAGE STRUCTURE (RCB CULVERT UNDER RUBY ROAD)	EACH		\$ -	\$ 0
5041905	DRAINAGE STRUCTURE (RCB CULVERT EXTENSION UNDER I-19)	EACH		\$ -	\$ 0
60700XX	SIGNING	L.SUM	1	\$ 30,000.00	\$ 30,000
70800XX	PAVEMENT MARKING	L.SUM	1	\$ 51,000.00	\$ 51,000
73300XX	TRAFFIC SIGNAL	L.SUM	1	\$ 350,000.00	\$ 350,000
9050025	GUARD RAIL TERMINAL (ET-PLUS OR SKT-350)	EACH	4	\$ 2,500.00	\$ 10,000
9050430	THREE-BEAM GUARD RAIL TRANSITION SYSTEM	EACH	4	\$ 4,500.00	\$ 18,000
9080051	CONCRETE CURB AND GUTTER (C-05.10) (TYPE A)	L.F.T.		\$ 16.00	\$ 0
9080084	CONCRETE CURB AND GUTTER (TYPE D OR D-1)	L.F.T.	2,368	\$ 15.00	\$ 35,520
9080245	CONCRETE (TRUCK APRON FOR ROUNDABOUT)	SQ.YD.		\$ 100.00	\$ 0
9100001	CONCRETE BARRIER	L.F.T.	2,594	\$ 50.00	\$ 129,700
9100117	CONCRETE BARRIER TRANSITION (C-10.71)	EACH	4	\$ 4,000.00	\$ 16,000
9130008	RIPRAP (DUMPED) (12")	CU.YD.		\$ 140.00	\$ 0
9130051	RIPRAP (DUMPED) (6")	CU.YD.	10	\$ 80.00	\$ 800
9140155	RETAINING WALL	SQ.FT.	1,300	\$ 50.00	\$ 65,000
9201006	CONCRETE CHANNEL LINING (6")	SQ. YD.	194	\$ 60.00	\$ 11,640
9210011	MEDIAN PAVING	SQ.YD.		\$ 30.00	\$ 0
<b>DETAILED ESTIMATE SUBTOTAL</b>					<b>\$ 3,338,482</b>
934XX01	MISCELLANEOUS WORK (15%)	COST	15.00%		\$ 500,773
<b>Subtotal 1</b>					<b>\$ 3,839,255</b>
207XX01	DUST PALLIATIVE (1%)	COST	1.00%		\$ 38,393
209XX01	FURNISH WATER (1%)	COST	1.00%		\$ 38,393
7010001	MAINTENANCE AND PROTECTION OF TRAFFIC (10%)	COST	10.00%		\$ 383,926
810XX01	EROSION CONTROL AND POLLUTION PREVENTION (1%)	COST	1.00%		\$ 38,393
924XX02	CONTRACTOR QUALITY CONTROL (2%)	COST	2.00%		\$ 76,786
925XX01	CONSTRUCTION SURVEYING AND LAYOUT (1%)	COST	1.00%		\$ 38,393
<b>Subtotal 2</b>					<b>\$ 4,453,539</b>
9010001	MOBILIZATION (10%)	COST	10.0%		\$ 445,354
<b>Subtotal 3</b>					<b>\$ 4,898,893</b>
951X001	CONSTRUCTION ENGINEERING		15.00%		\$ 734,834
951XXXX	PUBLIC INVOLVEMENT		1.00%		\$ 48,989
951X002	CONSTRUCTION CONTINGENCY		5.00%		\$ 244,945
951X010	INDIRECT COST ALLOWANCE (9.46%)		9.46%		\$ 463,435
<b>DETAILED ESTIMATE</b>					<b>\$ 6,391,096</b>
416X002	ASPHALTIC CONCRETE (3/4" MX) MATERIALS QUALITY INCENTIVE	TON	22,489	\$ 3.00	\$ 67,467
<b>PROJECT WIDE</b>					<b>\$ 67,000</b>
	FINAL DESIGN COSTS (8%)	COST	8.00%		\$ 511,288
	RIGHT-OF-WAY	ACRES	1.56	\$ 400,000.00	\$ 624,000
	UTILITY RELOCATIONS	COST	5.00%		\$ 319,555
<b>OTHER COSTS</b>					<b>\$ 1,454,842</b>
<b>SUMMARY</b>					
<b>DETAILED ESTIMATE</b>					<b>\$ 6,392,000</b>
<b>PROJECT WIDE</b>					<b>\$ 67,000</b>
<b>OTHER COSTS</b>					<b>\$ 1,455,000</b>
<b>TOTAL CONSTRUCTION COSTS</b>					<b>\$ 7,914,000</b>



ESTIMATE OF PROBABLE CONSTRUCTION COST  
I-19 EAST FRONTAGE ROAD, RUBY ROAD – RIO RICO DRIVE – ALTERNATIVE C

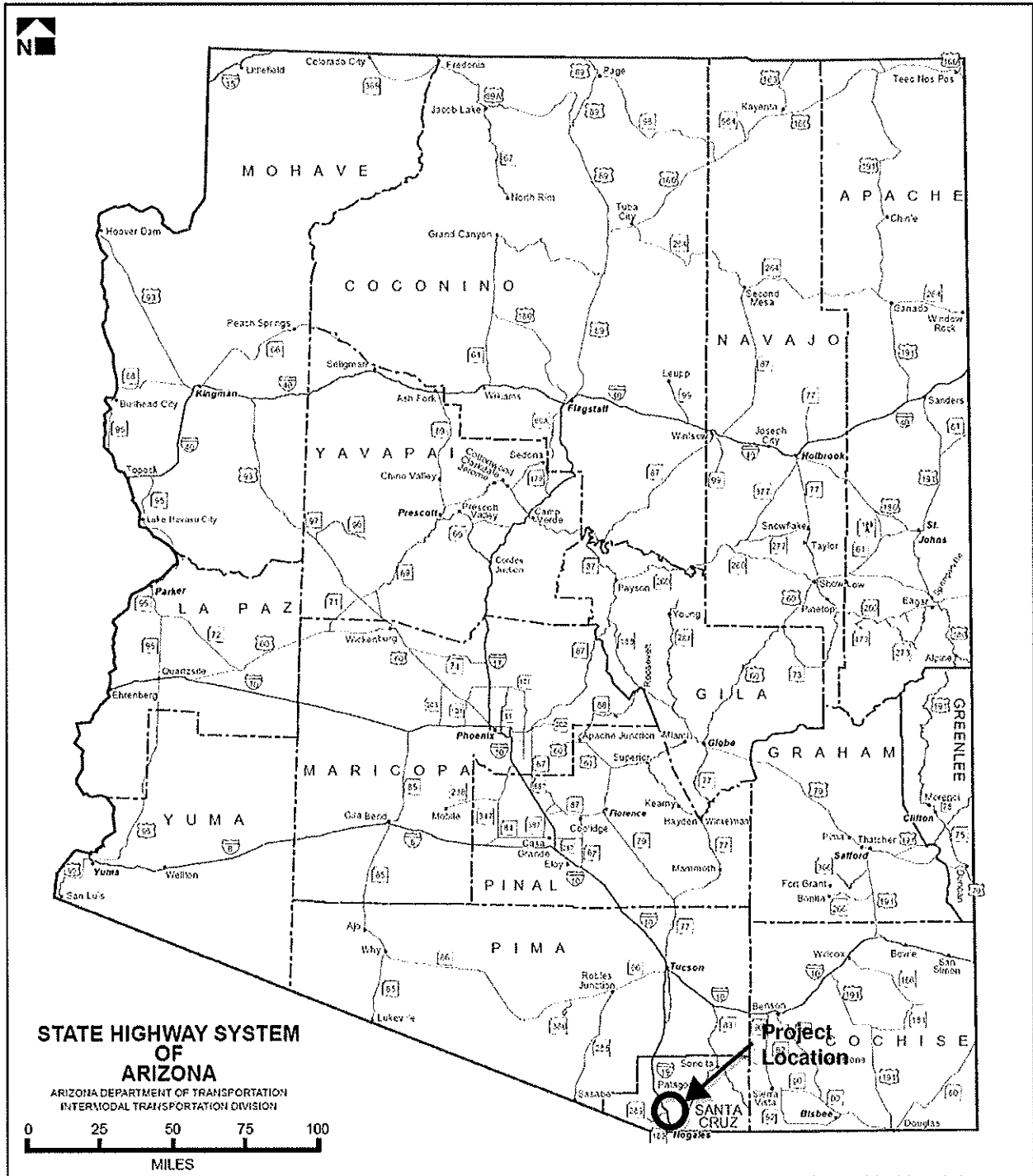
ITEM NO.	ITEM DESCRIPTION	UNIT OF	QUANTITY	UNIT PRICE	TOTAL
2020021	REMOVAL OF CONCRETE CURB AND GUTTER	L.F.T.	2,026	\$ 4.00	\$ 8,104
2020023	REMOVE EXISTING TRAFFIC SIGNALS	L.SUM	1	\$ 45,000.00	\$ 45,000
2020025	REMOVAL OF CONCRETE SIDEWALKS, DRIVEWAYS AND SLABS	SQ.FT.	15,056	\$ 2.50	\$ 37,640
2020027	REMOVAL OF CONCRETE BARRIER	L.F.T.	3,477	\$ 15.00	\$ 52,155
2020036	REMOVAL OF ASPHALTIC CONCRETE PAVEMENT	SQ.YD.	42,541	\$ 5.00	\$ 212,707
2020045	REMOVAL OF RIPRAP	CU.YD.	300	\$ 15.00	\$ 4,500
2020050	REMOVE DRAINAGE STRUCTURES	L.SUM	1	\$ 4,380.00	\$ 4,380
2020153	REMOVE (SIGNS, FOUNDATIONS, AND POSTS)	L.SUM	1	\$ 20,000.00	\$ 20,000
2020154	REMOVE (SIGN STRUCTURE)	EACH	3	\$ 2,500.00	\$ 7,500
2020057	REMOVE AND SALVAGE (END TREATMENTS)	EACH	5	\$ 300.00	\$ 1,500
2030301	ROADWAY EXCAVATION	CU.YD.	95,000	\$ 10.00	\$ 950,000
3030022	AGGREGATE BASE, CLASS 2	CU.YD.	9,925	\$ 34.00	\$ 337,450
4040111	BITUMINOUS TACK COAT	TON	25	\$ 400.00	\$ 10,000
4040116	APPLY BITUMINOUS TACK COAT	TON	44	\$ 150.00	\$ 6,600
4040282	ASPHALT BINDER (PG 76-16)	TON	934	\$ 550.00	\$ 513,700
4160004	ASPHALTIC CONCRETE - EP (3/4" MX)	TON	18,685	\$ 32.00	\$ 597,920
4160031	MINERAL ADMIXTURE (FOR 3/4" MX)	TON	178	\$ 90.00	\$ 16,020
5010011	PIPE, CORRUGATED METAL, 24"	L. FT.	380	\$ 60.00	\$ 22,800
5012524	STORM DRAIN PIPE, 24"	L.F.T.	750	\$ 80.00	\$ 60,000
5014524	FLARED END SECTION, 24" (C-13.20 OR C-13.25) (PIPE CULVERT)	EACH	8	\$ 300.00	\$ 2,400
5030051	CONCRETE CATCH BASIN (C-15.20) SUMP ONLY, WING, H=8" OR LESS (	EACH	10	\$ 2,900.00	\$ 28,000
5030141	CONCRETE CATCH BASIN (MEDIAN)	EACH	2	\$ 3,000.00	\$ 6,000
5041901	DRAINAGE STRUCTURE (3 - 10 X 8 RCB CULVERT)	EACH		\$ -	\$ 0
5041902	DRAINAGE STRUCTURE (6 X 7 RCB CULVERT EXTENSION)	EACH		\$ -	\$ 0
5041903	DRAINAGE STRUCTURE (2 - 8 X 7 RCB CULVERT UNDER FRONTAGE ROAD)	EACH		\$ -	\$ 0
5041904	DRAINAGE STRUCTURE (RCB CULVERT UNDER RUBY ROAD)	EACH	1	\$ 524,518.00	\$ 524,518
5041905	DRAINAGE STRUCTURE (RCB CULVERT EXTENSION UNDER I-19)	EACH	1	\$ 85,914.80	\$ 85,915
60700XX	SIGNING	L.SUM	1	\$ 160,000.00	\$ 160,000
70800XX	PAVEMENT MARKING	L.SUM	1	\$ 49,000.00	\$ 49,000
73300XX	TRAFFIC SIGNAL	L.SUM		\$ 150,000.00	\$ 0
9050025	GUARD RAIL TERMINAL (ET-PLUS OR SKT-350)	EACH		\$ 2,500.00	\$ 0
9050430	THREE-BEAM GUARD RAIL TRANSITION SYSTEM	EACH		\$ 4,500.00	\$ 0
9080051	CONCRETE CURB AND GUTTER (C-05.10) (TYPE A)	L.F.T.	6,954	\$ 16.00	\$ 111,264
9080084	CONCRETE CURB AND GUTTER (TYPE D OR D-1)	L.F.T.	8,159	\$ 15.00	\$ 122,385
9080245	CONCRETE (TRUCK APRON FOR ROUNDABOUT)	SQ.YD.	1,061	\$ 100.00	\$ 106,145
9100001	CONCRETE BARRIER	L.F.T.	1,070	\$ 50.00	\$ 53,500
9100117	CONCRETE BARRIER TRANSITION (C-10.71)	EACH		\$ 4,000.00	\$ 0
9130008	RIPRAP (DUMPED) (12")	CU.YD.	300	\$ 140.00	\$ 42,000
9130051	RIPRAP (DUMPED) (6")	CU.YD.	40	\$ 80.00	\$ 3,200
9140155	RETAINING WALL	SQ.FT.	4,800	\$ 50.00	\$ 240,000
9201006	CONCRETE CHANNEL LINING (6")	SQ. YD.		\$ 60.00	\$ 0
9210011	MEDIAN PAVING	SQ.YD.	4,232	\$ 30.00	\$ 126,950
<b>DETAILED ESTIMATE SUBTOTAL</b>					<b>\$ 4,569,253</b>
934XX01	MISCELLANEOUS WORK (15%)	COST	15.00%		\$ 685,388
<b>Subtotal 1</b>					<b>\$ 5,254,641</b>
207XX01	DUST PALLIATIVE (1%)	COST	1.00%		\$ 52,547
209XX01	FURNISH WATER (1%)	COST	1.00%		\$ 52,547
7010001	MAINTENANCE AND PROTECTION OF TRAFFIC (10%)	COST	10.00%		\$ 525,465
810XX01	EROSION CONTROL AND POLLUTION PREVENTION (1%)	COST	1.00%		\$ 52,547
924XX02	CONTRACTOR QUALITY CONTROL (2%)	COST	2.00%		\$ 105,093
925XX01	CONSTRUCTION SURVEYING AND LAYOUT (1%)	COST	1.00%		\$ 52,547
<b>Subtotal 2</b>					<b>\$ 6,095,387</b>
9010001	MOBILIZATION (10%)	COST	10.0%		\$ 609,539
<b>Subtotal 3</b>					<b>\$ 6,704,926</b>
951X001	CONSTRUCTION ENGINEERING		15.00%		\$ 1,005,739
951XXXX	PUBLIC INVOLVEMENT		1.00%		\$ 67,050
951X002	CONSTRUCTION CONTINGENCY		5.00%		\$ 335,246
951X010	INDIRECT COST ALLOWANCE (9.46%)		9.46%		\$ 634,286
<b>DETAILED ESTIMATE</b>					<b>\$ 8,747,247</b>
416X002	ASPHALTIC CONCRETE (3/4" MX) MATERIALS QUALITY INCENTIVE	TON	18,685	\$ 3.00	\$ 56,055
<b>PROJECT WIDE</b>					<b>\$ 56,000</b>
	FINAL DESIGN COSTS (8%)	COST	8.00%		\$ 699,780
	RIGHT-OF-WAY	ACRES	1.37	\$ 400,000.00	\$ 548,000
	UTILITY RELOCATIONS	COST	5.00%		\$ 437,362
<b>OTHER COSTS</b>					<b>\$ 1,685,142</b>

SUMMARY	
<b>DETAILED ESTIMATE</b>	<b>\$ 8,748,000</b>
<b>PROJECT WIDE</b>	<b>\$ 58,000</b>
<b>OTHER COSTS</b>	<b>\$ 1,686,000</b>
<b>TOTAL CONSTRUCTION COSTS</b>	<b>\$ 10,490,000</b>

ESTIMATE OF PROBABLE CONSTRUCTION COST  
 I-19 EAST FRONTAGE ROAD, RUBY ROAD – RIO RICO DRIVE – ALTERNATIVE D

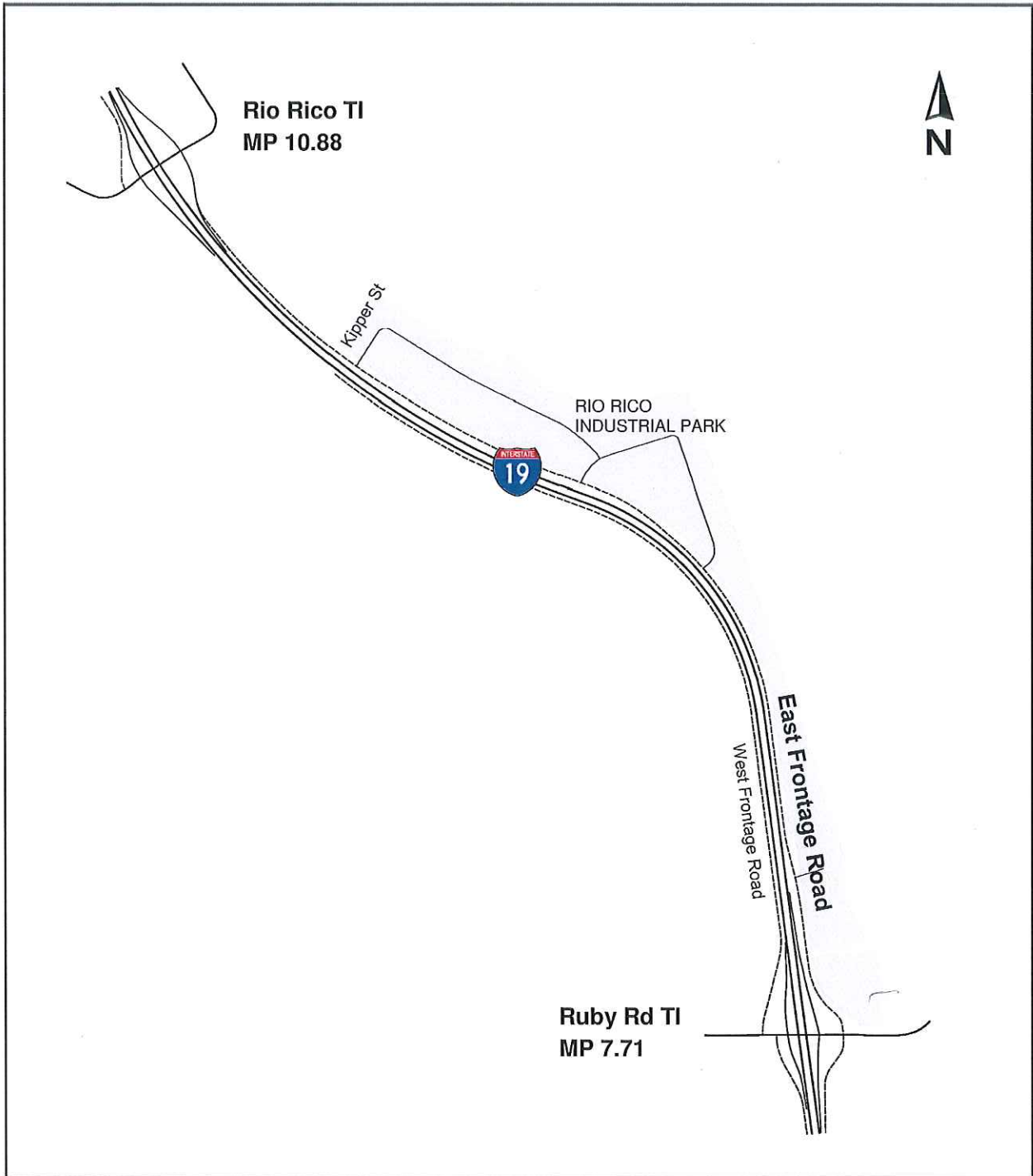
ITEM NO.	ITEM DESCRIPTION	UNIT OF	QUANTITY	UNIT PRICE	TOTAL
2020021	REMOVAL OF CONCRETE CURB AND GUTTER	L.FT.	2,026	\$ 4.00	\$ 8,104
2020023	REMOVE EXISTING TRAFFIC SIGNALS	L.SUM	1	\$ 45,000.00	\$ 45,000
2020025	REMOVAL OF CONCRETE SIDEWALKS, DRIVEWAYS AND SLABS	SQ.FT.	15,056	\$ 2.50	\$ 37,640
2020027	REMOVAL OF CONCRETE BARRIER	L.FT.	2,555	\$ 15.00	\$ 38,325
2020036	REMOVAL OF ASPHALTIC CONCRETE PAVEMENT	SQ.YD.	37,278	\$ 5.00	\$ 186,393
2020045	REMOVAL OF RIPRAP	CU.YD.		\$ 10.00	\$ 0
2020050	REMOVE DRAINAGE STRUCTURES	L.SUM		\$ 25,000.00	\$ 0
2020153	REMOVE (SIGNS, FOUNDATIONS, AND POSTS)	L.SUM	1	\$ 20,000.00	\$ 20,000
2020154	REMOVE (SIGN STRUCTURE)	EACH	2	\$ 2,500.00	\$ 5,000
2020057	REMOVE AND SALVAGE (END TREATMENTS)	EACH	4	\$ 300.00	\$ 1,200
2030301	ROADWAY EXCAVATION	CU.YD.	70,000	\$ 10.00	\$ 700,000
3030022	AGGREGATE BASE, CLASS 2	CU.YD.	10,393	\$ 34.00	\$ 353,362
4040111	BITUMINOUS TACK COAT	TON	27	\$ 400.00	\$ 10,800
4040116	APPLY BITUMINOUS TACK COAT	HOUR	48	\$ 150.00	\$ 7,200
4040282	ASPHALT BINDER (PG 76-16)	TON	1,021	\$ 550.00	\$ 561,550
4160004	ASPHALTIC CONCRETE - EP (3/4" MIX)	TON	20,412	\$ 32.00	\$ 653,184
4160031	MINERAL ADMXTURE (FOR 3/4" MIX)	TON	194	\$ 90.00	\$ 17,460
5010011	PIPE, CORRUGATED METAL, 24"	L.FT.	130	\$ 60.00	\$ 7,800
5012524	STORM DRAIN PIPE, 24"	L.FT.	600	\$ 80.00	\$ 48,000
5014524	FLARED END SECTION, 24" (C-13.20 OR C-13.25) (PIPE CULVERT)	EACH	6	\$ 300.00	\$ 1,800
5030051	CONCRETE CATCH BASIN (C-15.20) SUMP ONLY, WING, H-8" OR LESS (	EACH	8	\$ 2,800.00	\$ 22,400
5030141	CONCRETE CATCH BASIN (MEDIAN)	EACH		\$ 3,000.00	\$ 0
5041901	DRAINAGE STRUCTURE (3 - 10 X 8 RCB CULVERT)	EACH		\$ -	\$ 0
5041902	DRAINAGE STRUCTURE (6 X 7 RCB CULVERT EXTENSION)	EACH		\$ -	\$ 0
5041903	DRAINAGE STRUCTURE (2 - 8 X 7 RCB CULVERT UNDER FRONTAGE ROAD	EACH	1	\$ 158,252.00	\$ 158,252
5041904	DRAINAGE STRUCTURE (RCB CULVERT UNDER RUBY ROAD)	EACH	1	\$ 142,638.80	\$ 142,639
5041905	DRAINAGE STRUCTURE (RCB CULVERT EXTENSION UNDER I-19)	EACH		\$ -	\$ 0
60700XX	SIGNING	L.SUM	1	\$ 260,000.00	\$ 260,000
70800XX	PAVEMENT MARKING	L.SUM	1	\$ 43,000.00	\$ 43,000
73300XX	TRAFFIC SIGNAL	L.SUM	1	\$ 500,000.00	\$ 500,000
9050025	GUARD RAIL TERMINAL (ET-PLUS OR SKT-350)	EACH	1	\$ 2,500.00	\$ 2,500
9050430	THREE-BEAM GUARD RAIL TRANSITION SYSTEM	EACH	1	\$ 4,500.00	\$ 4,500
9080051	CONCRETE CURB AND GUTTER (C-05.10) (TYPE A)	L.FT.	5,236	\$ 16.00	\$ 83,776
9080084	CONCRETE CURB AND GUTTER (TYPE D OR D-1)	L.FT.	865	\$ 15.00	\$ 12,975
9080245	CONCRETE (TRUCK APRON FOR ROUNDABOUT)	SQ.YD.		\$ 100.00	\$ 0
9100001	CONCRETE BARRIER	L.FT.	734	\$ 50.00	\$ 36,700
9100117	CONCRETE BARRIER TRANSITION (C-10.71)	EACH	1	\$ 4,000.00	\$ 4,000
9130008	RIPRAP (DUMPED) (12")	CU.YD.	150	\$ 140.00	\$ 21,000
9130051	RIPRAP (DUMPED) (6")	CU.YD.		\$ 80.00	\$ 0
9140155	RETAINING WALL	SQ.FT.		\$ 50.00	\$ 0
9201006	CONCRETE CHANNEL LINING (6")	SQ.YD.		\$ 60.00	\$ 0
9210011	MEDIAN PAVING	SQ.YD.	3,787	\$ 30.00	\$ 113,620
<b>DETAILED ESTIMATE SUBTOTAL</b>					<b>\$ 4,108,180</b>
934XX01	MISCELLANEOUS WORK (15%)	COST	15.00%		\$ 616,227
<b>Subtotal 1</b>					<b>\$ 4,724,407</b>
207XX01	DUST PALLIATIVE (1%)	COST	1.00%		\$ 47,245
209XX01	FURNISH WATER (1%)	COST	1.00%		\$ 47,245
7010001	MAINTENANCE AND PROTECTION OF TRAFFIC (10%)	COST	10.00%		\$ 472,441
810XX01	EROSION CONTROL AND POLLUTION PREVENTION (1%)	COST	1.00%		\$ 47,245
924XX02	CONTRACTOR QUALITY CONTROL (2%)	COST	2.00%		\$ 94,489
925XX01	CONSTRUCTION SURVEYING AND LAYOUT (1%)	COST	1.00%		\$ 47,245
<b>Subtotal 2</b>					<b>\$ 5,480,317</b>
9010001	MOBILIZATION (10%)	COST	10.0%		\$ 548,032
<b>Subtotal 3</b>					<b>\$ 6,028,349</b>
951X001	CONSTRUCTION ENGINEERING		15.00%		\$ 904,253
951XXXX	PUBLIC INVOLVEMENT		1.00%		\$ 60,284
951X002	CONSTRUCTION CONTINGENCY		5.00%		\$ 301,417
951X010	INDIRECT COST ALLOWANCE (9.46%)		9.46%		\$ 570,282
<b>DETAILED ESTIMATE</b>					<b>\$ 7,964,585</b>
416X002	ASPHALTIC CONCRETE (3/4" MIX) MATERIALS QUALITY INCENTIVE	TON	20,412	\$ 3.00	\$ 61,236
<b>PROJECT WIDE</b>					<b>\$ 61,000</b>
	FINAL DESIGN COSTS (8%)	COST	8.00%		\$ 629,167
	RIGHT-OF-WAY	ACRES	4.37	\$ 400,000.00	\$ 1,748,000
	UTILITY RELOCATIONS	COST	5.00%		\$ 393,229
<b>OTHER COSTS</b>					<b>\$ 2,770,396</b>
<b>SUMMARY</b>					
<b>DETAILED ESTIMATE</b>					<b>\$ 7,865,000</b>
<b>PROJECT WIDE</b>					<b>\$ 61,000</b>
<b>OTHER COSTS</b>					<b>\$ 2,771,000</b>
<b>TOTAL CONSTRUCTION COSTS</b>					<b>\$ 10,697,000</b>

### J. VICINITY MAP



I-19 East Frontage Road, Ruby Road – Rio Rico Drive  
ADOT Project No.: 019 SC 007 H8401 01L  
Federal Aid No.: 019-A(217)A  
Figure 1 – Project Location Map

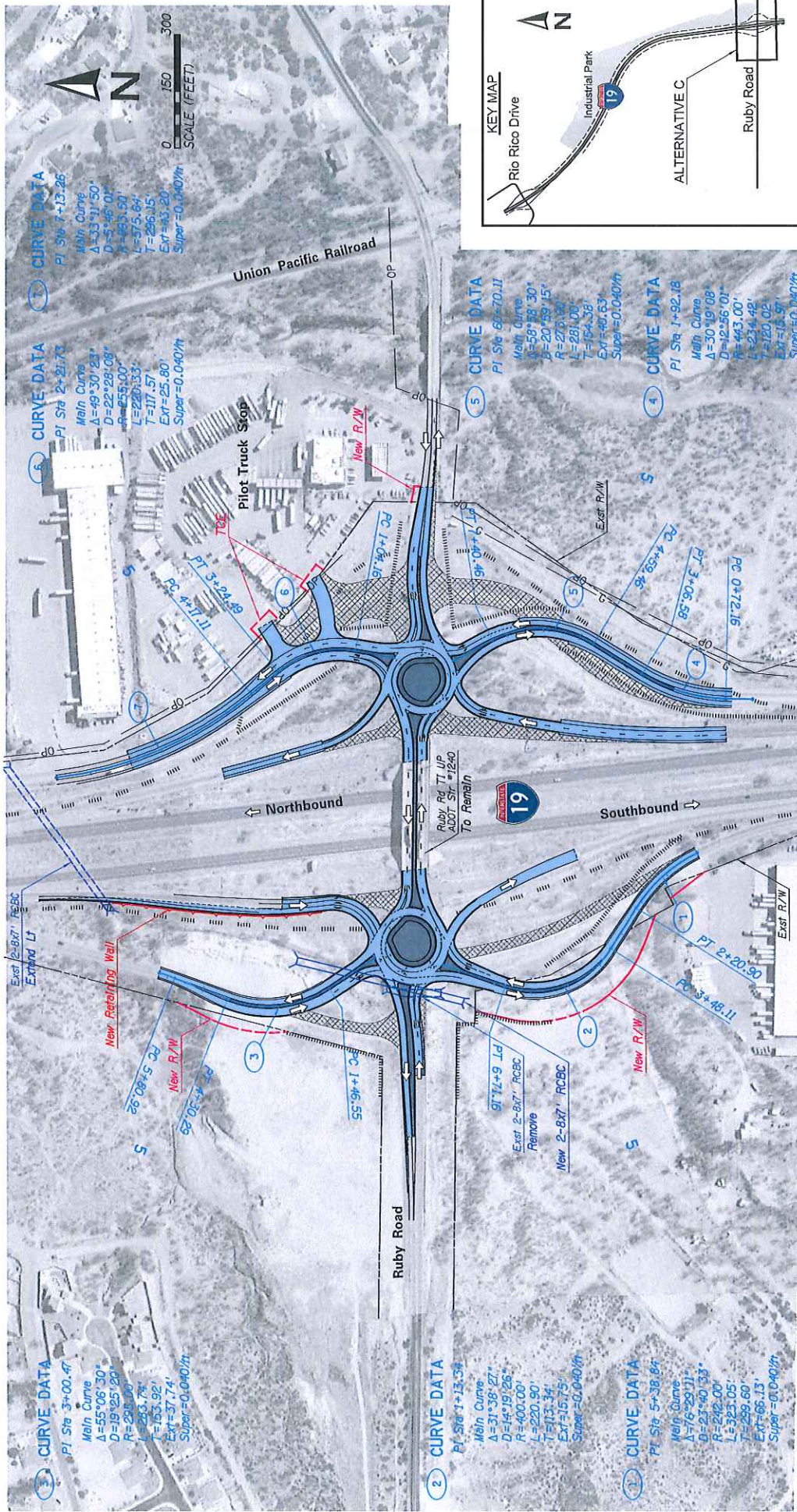
**J. VICINITY MAP (CONTINUED)**



I-19 East Frontage Road, Ruby Road – Rio Rico Drive  
ADOT Project No.: 019 SC 007 H8401 01L  
Federal Aid No.: 019-A(217)A  
Figure 2 – Project Vicinity Map

APPENDIX A

Recommended Alternative Concept Plan Sheet (Alternative C)



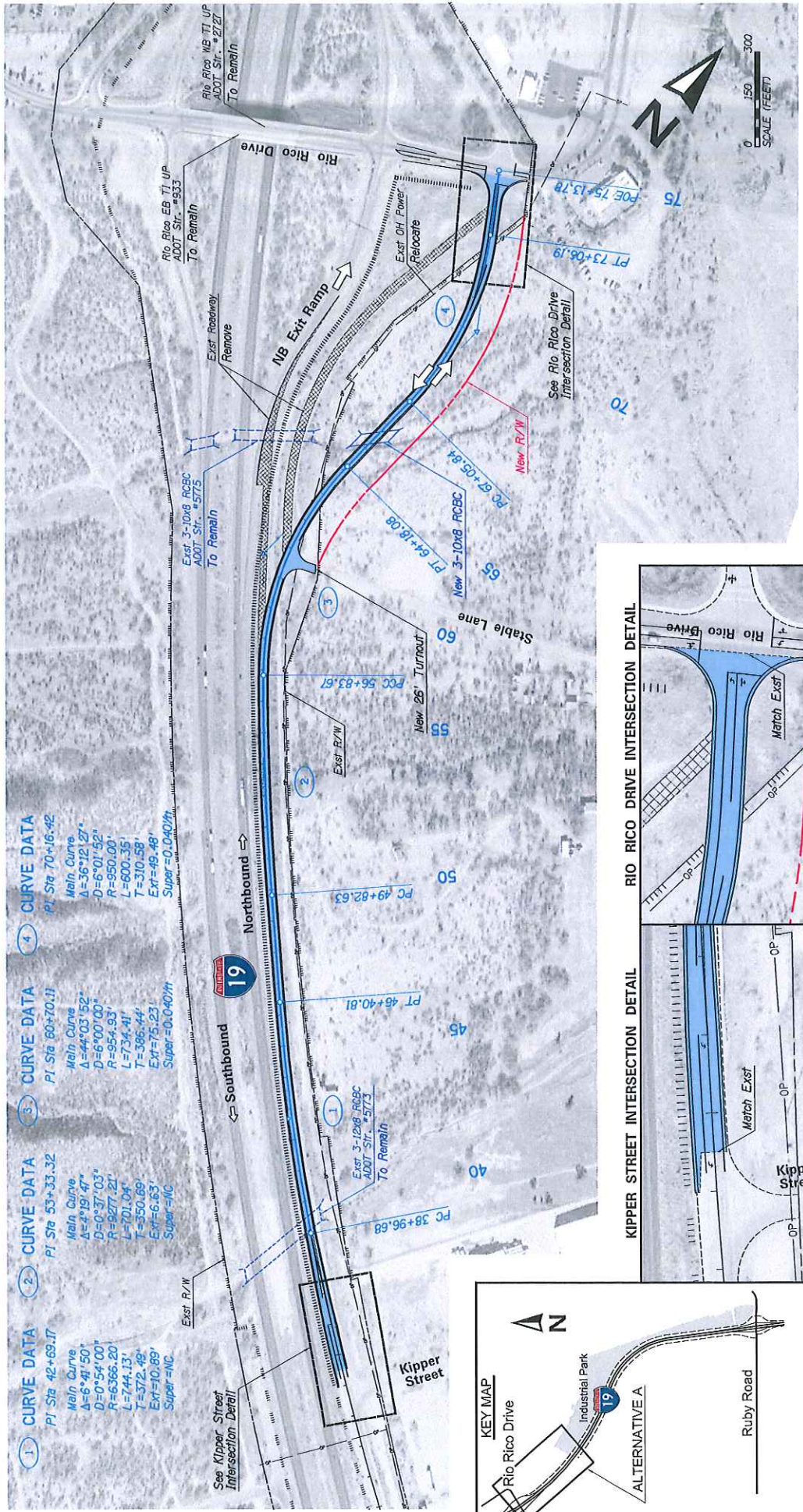
I-19 East Frontage Road, Ruby Road-Rio Rico Drive  
 ADOT Project No. 019 SC 007 H8401 01L  
 Federal Project No. 019-A(217A)  
 Figure 4

**ALTERNATIVE C**  
**ROUNDABOUT INTERCHANGE**

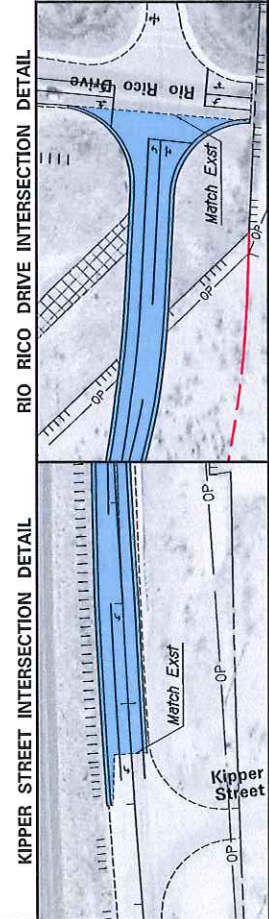
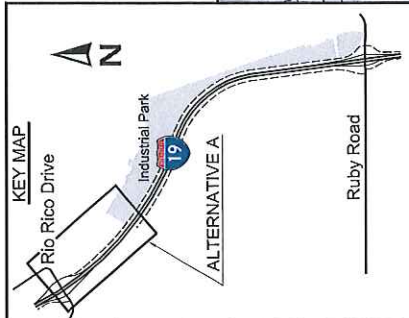


**APPENDIX B**

**Alternatives A, B, B1, and D Concept Plan Sheets**



Station	Curve Data
PI Sta 42+69.17	<p><b>1</b> CURVE DATA</p> <p>Main Curve  <math>\Delta = 6^{\circ}41'50''</math>  <math>D = 0^{\circ}54'00''</math>  <math>R = 6366.20'</math>  <math>L = 744.13'</math>  <math>T = 572.46'</math>  <math>EXT = 10.89'</math>  <math>Super = MC</math></p>
PI Sta 53+33.32	<p><b>2</b> CURVE DATA</p> <p>Main Curve  <math>\Delta = 4^{\circ}19'47''</math>  <math>D = 0^{\circ}37'03''</math>  <math>R = 9277.21'</math>  <math>L = 701.04'</math>  <math>T = 350.69'</math>  <math>EXT = 6.65'</math>  <math>Super = MC</math></p>
PI Sta 60+70.11	<p><b>3</b> CURVE DATA</p> <p>Main Curve  <math>\Delta = 4^{\circ}03'52''</math>  <math>D = 6^{\circ}01'52''</math>  <math>R = 954.93'</math>  <math>L = 734.41'</math>  <math>T = 386.44'</math>  <math>EXT = 75.23'</math>  <math>Super = 0+0+40.74</math></p>
PI Sta 70+16.42	<p><b>4</b> CURVE DATA</p> <p>Main Curve  <math>\Delta = 36^{\circ}12'27''</math>  <math>D = 6^{\circ}01'52''</math>  <math>R = 950.00'</math>  <math>L = 600.35'</math>  <math>T = 310.58'</math>  <math>EXT = 49.48'</math>  <math>Super = 0+0+40.74</math></p>



I-19 East Frontage Road, Ruby Road-Rio Rico Drive  
 ADOT Project No. 019 SC 007 H8401 01L  
 Federal Project No. 019-A(217)A  
 Figure 1

## ALTERNATIVE A

### TWO-WAY EAST FRONTAGE ROAD, KIPPER STREET - RIO RICO DRIVE









