

## **VIII. ENGINEERING AND ENVIRONMENTAL EVALUATION –INTERSECTION IMPROVEMENTS – SOUTHERN**

For the southern end of the corridor, traffic volumes are expected to increase over existing levels. The Phase A Report identified the need for improvements at Sawmill, Zia and Siringo Roads in order to maintain operation at normally accepted levels of service. In addition, construction of auxiliary lanes on St. Francis Drive at St. Michael's Drive was evaluated as the addition of the third lane with the maintenance project in 2005 made the merge maneuver from St. Michael's Drive onto St. Francis Drive a rather abrupt movement. To avoid the expense of widening or re-constructing the St. Francis Drive bridge over St. Michael's Drive, an alternative to convert the interchange to a full diamond was evaluated to allow the merge to be north of the bridge. However this necessitates the extension of the auxiliary lane through the San Mateo intersection, thus creating impacts to the northeast corner of San Mateo and St. Francis Drive.

### **A. Traffic**

The traffic analysis prepared in the Phase A *Initial Evaluation of Alternatives – Appendix C Existing/Horizon Year Conditions Analysis Report* clearly indicates that traffic operations would be substantially degraded without the addition of the third southbound lane (in each direction) from San Mateo to Interstate 25. Each segment of the Corridor between traffic signals from Interstate 25 to San Mateo would be operating at LOS F in one or both peak hour periods if the 2-lane section were in place, while with the 3-lane section they operate from LOS B to E. The Phase A analysis also shows that future operations on the Corridor in this section will be severely congested in the 3-lane section, and indeed, improvements are indicated by increased delays without the addition of a fourth lane at the Sawmill and Zia intersections. This further supports the decision to add the third lanes to St. Francis Drive in 2005.

In the *St. Francis Corridor Study – Existing/Horizon Year Conditions Analysis Report, June 2009*, the St. Francis Drive/West Zia Road intersection has been identified as a location where future levels of service (LOS) will be unacceptable; several alternatives for improvements to this location are analyzed as part of this analysis:

- No-build (no improvements)
- Full interchange
- Diamond interchange
- Single-point interchange
- Frontage roads (along St. Francis Drive)
- St. Francis Drive overpass
- St. Francis Drive underpass
- Intersection improvements (additional lanes, etc.)

### **No-Build**

This alternative would not add any improvements to St. Francis Drive or the intersection of St. Francis Drive at West Zia Road. The operations analysis completed by HDR Engineering, Inc. has shown that the

intersection will have unacceptable levels of service (LOS) in the horizon year of 2030 if no improvements are made aside from optimizing traffic signal timings, as shown below in Table 5.

Table 5 – Horizon Year Signalized Intersection LOS Summary																			
SIGNALIZED INTERSECTION OPERATIONS LOS SUMMARY - 2030 Horizon Year Volumes																			
INTERSECTION	PEAK PERIOD	MAXIMUM V/C RATIO	LEVEL OF SERVICE & DELAY BY APPROACH MOVEMENT																
			EB			WB			NB			SB			INT. DELAY (sec/veh)	LOS			
			L	T	R	L	T	R	L	T	R	L	T	R					
			F	E	E		E	E	F		D	F	A				F	D	A
St. Francis Dr. at West Zia Road	AM	1.26	F	E	E		E	E	F		D	F	A		F	D	A	78.0	F
	PM	1.01	F	E	E		F	F	B		E	C	A		E	D	B	42.3	D

In order to achieve acceptable levels of service in the 2030 horizon year, the No-Build alternative is not an option.

#### Full Interchange

There are several types of full interchanges. The most common type of full interchange is the cloverleaf interchange. In order for traffic to turn right from one road to the other, there are off-ramps that connect to the other road; however, traffic turning left must go over or under the other roadway and then enter a loop-shaped ramp that has a tight radius.

Full interchanges are the most expensive type of interchange. They require the construction of a bridge, and also require substantial amounts of right-of-way. At least 700 feet of width is needed to accommodate all of the on/off ramps and approach grades to the bridge. Due to the prohibitive costs as well as the lack of necessary right-of-way, a full interchange is not possible at the St. Francis/West Zia Road intersection.

#### Diamond Interchange

A diamond interchange is another common type of interchange in which a grade-separated crossing is provided and where on/off ramps provide access to and from the mainline facility to the cross street. A diamond interchange has some advantages over a full cloverleaf interchange:

- construction costs are usually less than with a full interchange
- less right-of-way is needed, since the design of a diamond interchange is narrower
- diamond interchanges are fairly common, and therefore meet driver expectations

There are also some disadvantages to a diamond interchange

- a bridge would need to be constructed (for either the mainline or the side street depending on design constraints);
- on/off ramps require considerable storage lengths, which require additional right-of-way;
- traffic signals would likely be required at the intersections of the ramps and cross street, adding to project costs

Figure 11 shows a standard diamond interchange layout at the St. Francis/West Zia Drive intersection.

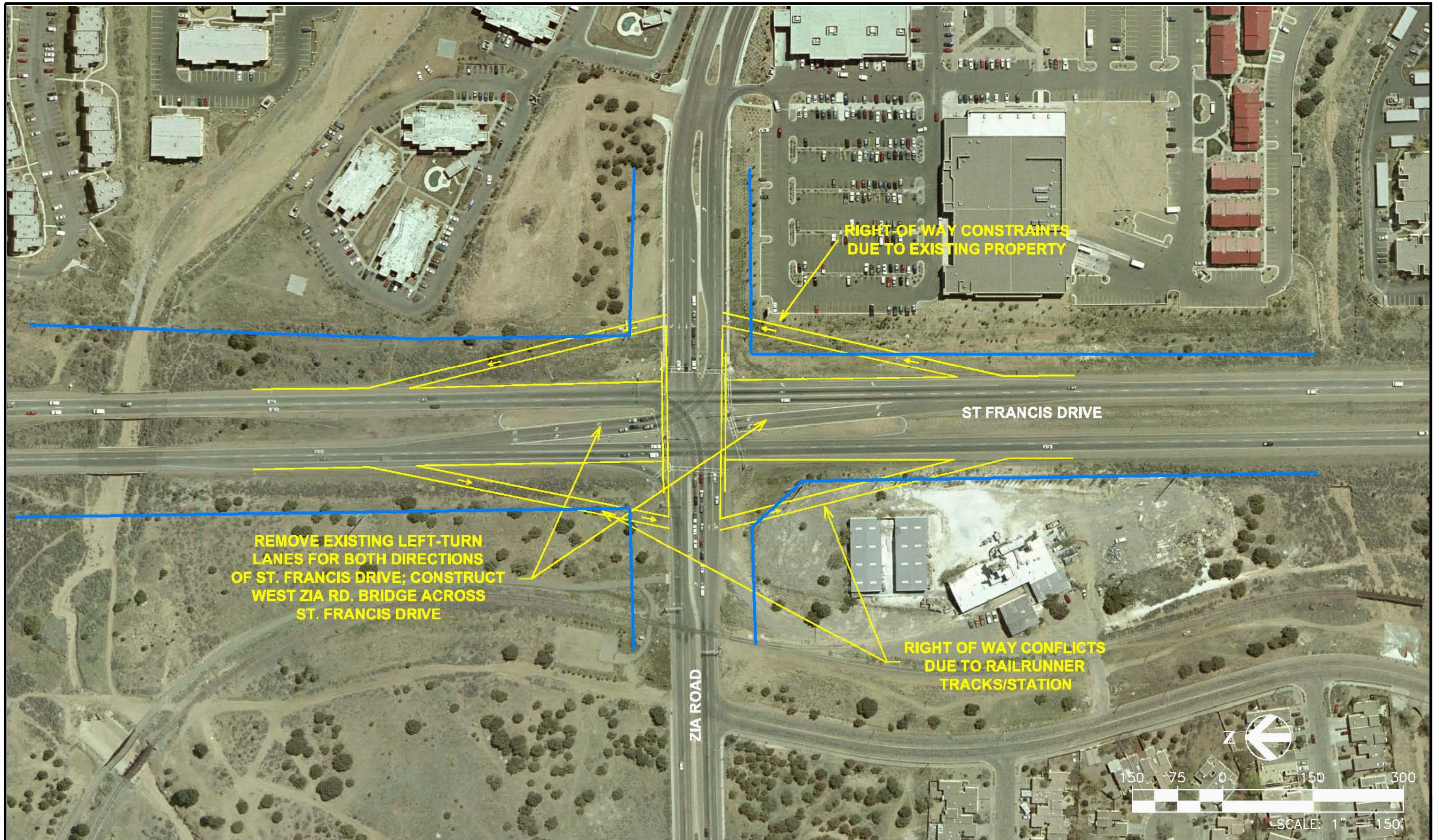
#### Single-point interchange

A single-point interchange is similar to the diamond interchange; however, the single-point interchange requires much less right-of-way width than the diamond interchange because instead of having two intersections (one on each side of the mainline facility) as the diamond interchange has, the single-point interchange has one large intersection within the middle of the interchange that allows left-turns from the mainline to proceed simultaneously. Therefore, only one traffic signal is needed, compared to two signals that are usually needed for diamond interchanges.

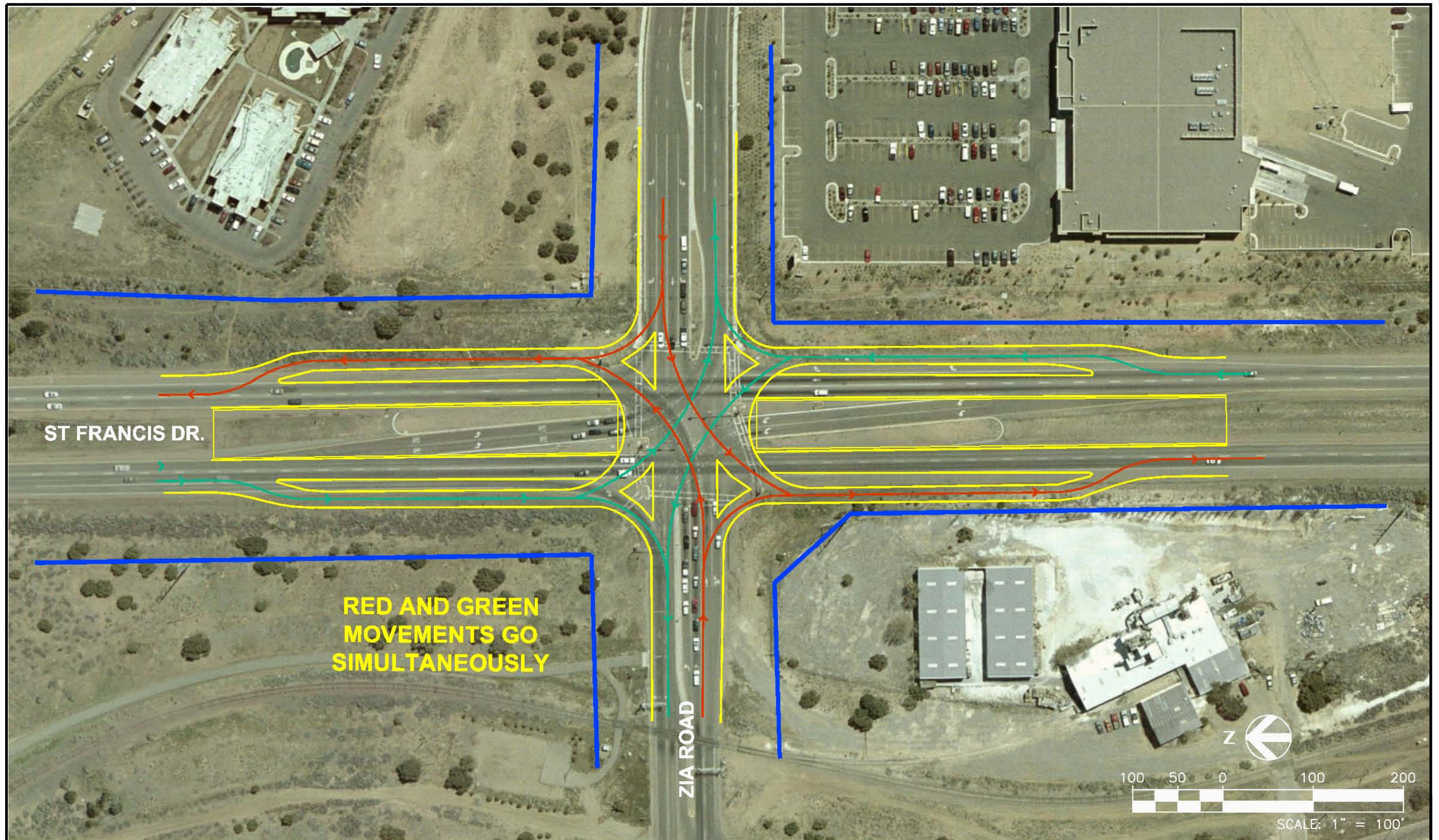
Although a single-point interchange would require less right-of-way than the full or diamond-type interchanges; however, right-of-way would still be an issue, as additional property would need to be purchased on at least one side of St. Francis Drive in order for there to be sufficient room for a single-point interchange.

Figure 12 shows a single point interchange layout at the St. Francis/West Zia Drive intersection.











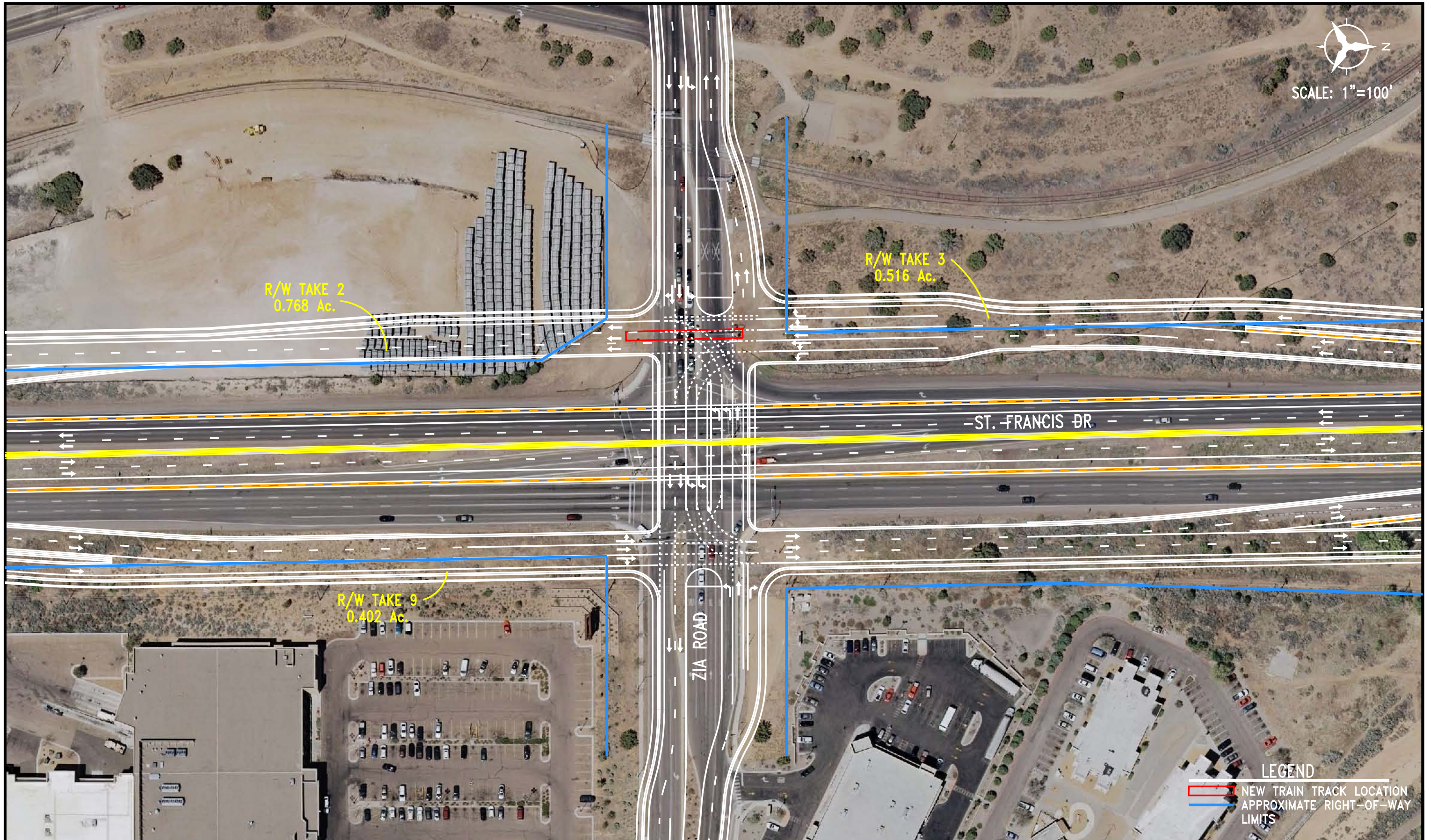
#### Frontage roads along St. Francis Drive

Frontage roads are a commonly-used method to add additional capacity to a mainline facility by providing a secondary roadway parallel to the mainline facility. Frontage roads are frequently in heavily urbanized areas along freeways. For the St. Francis Drive Corridor, right-of-way availability and conflicts with existing land uses would again be an issue, as frontage roads require substantial additional right-of-way to allow for proper design.

Also, frontage roads require a lengthy distance for transitions to and from the mainline facility – the St. Francis Corridor has right-of-way limitations not only in the vicinity of the West Zia Road intersection, but also along most of the Corridor within the project study area. Also, the distance between the adjacent intersections north and south of West Zia Road is approximately 3,600 feet; including transitions to and from the mainline, this distance is really not sufficient for frontage road construction - the frontage roads would serve a greater purpose by constructing them for the full distance between Sawmill Road and Siringo Road. Of course, the longer the distance of frontage roads, the greater the construction costs.

Figure 13 shows a theoretical layout of frontage roads in the vicinity of the St. Francis Road/West Zia Road intersection.







### St. Francis Drive Overpass

Mainline overpasses are sometime used in areas where traffic from intersections creates heavy periods of congestions, especially in peak hours. An overpass typically does not have a connection to the side street(s), thus eliminating the intersection and allowing for improved traffic flow on the mainline facility.

There are challenges to installing an overpass on St. Francis Drive at West Zia Road. First, in order to achieve safe and acceptable grades on St. Francis Drive approaching the overpass, there needs to be sufficient distance in advance of the intersection being crossed (in this case, West Zia Road). Also, there must be adequate right of way to allow for bridge construction. Lastly, traffic that currently uses West Zia Road to access St. Francis Drive would be forced to use alternative routes to get to St. Francis Drive (most likely either Sawmill Road or Siringo Road). Additional traffic at both the Sawmill Road/Siringo Road intersections with St. Francis Drive will lead to potential traffic operational issues, especially in the 2030 horizon year.

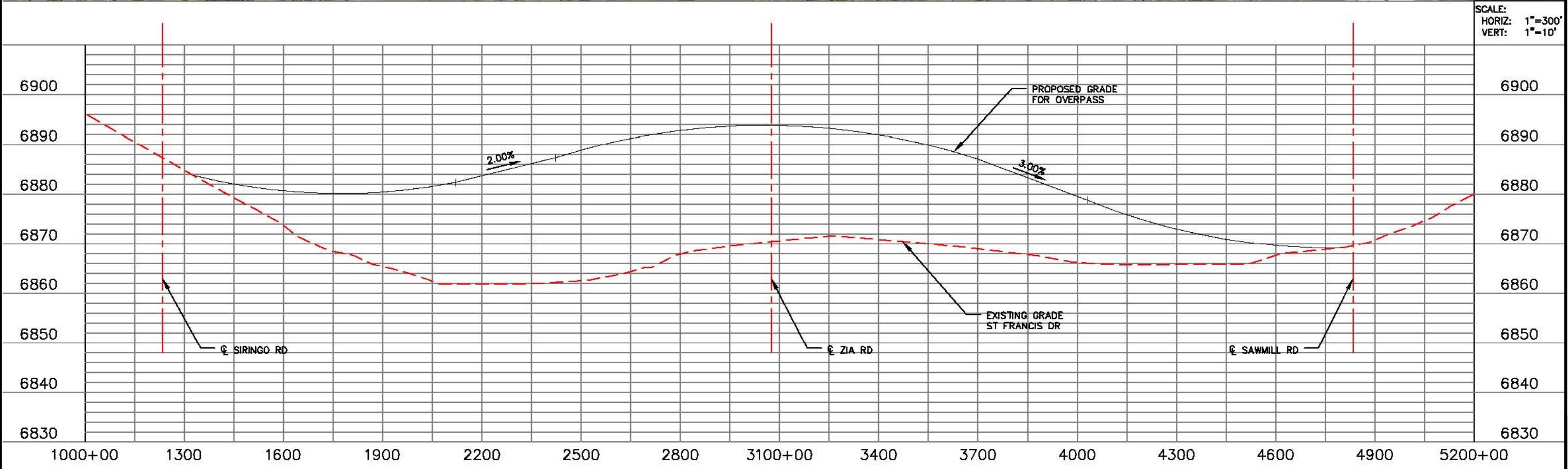
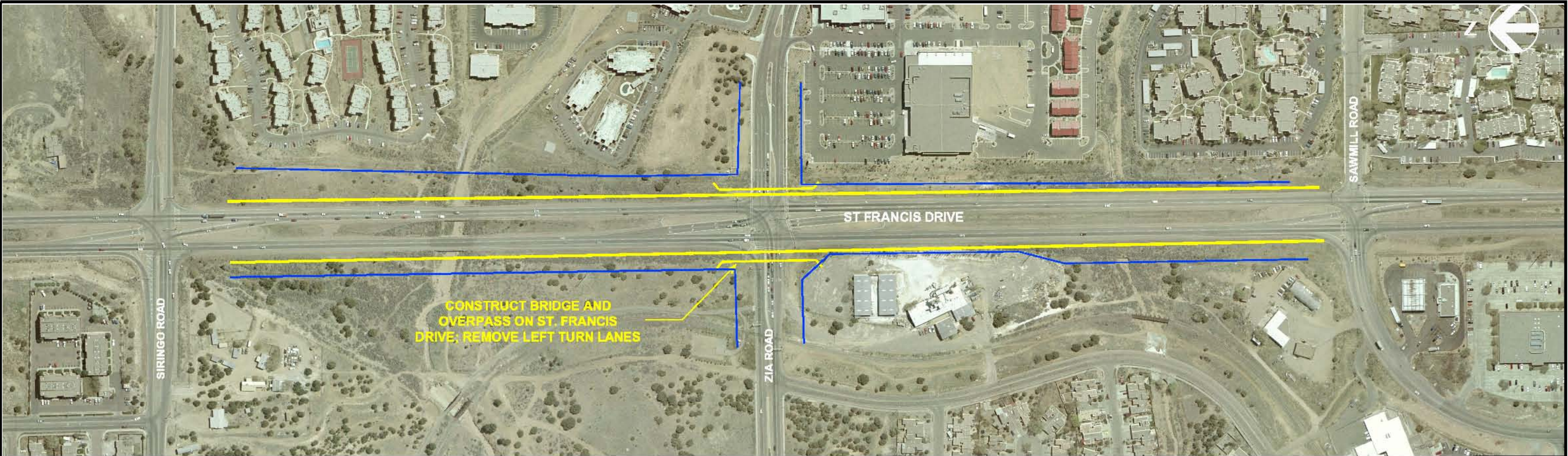
There is approximately 1,800 feet between intersections along St. Francis Drive in this area. In order to allow for a 3% grade on St. Francis Drive in advance of the West Zia intersection, most of that distance between St. Francis Drive/West Zia Road intersection and the adjacent intersections of St. Francis Drive at Sawmill Road and St. Francis Drive at Siringo Road would be affected, and there could possibly be modifications required to the Sawmill Road/Siringo Road intersections to accommodate the overpass construction.

### St. Francis Drive Underpass

An underpass would have St. Francis Drive go under West Zia Road. At this location, construction of an underpass would have to be such that St. Francis Drive would be low enough to go below the current elevation of West Zia Road, because there is little room to allow for the elevation of West Zia Road (adjacent properties along West Zia Road on both sides of St. Francis Drive would be affected, especially the NM Rail Runner Express facilities on the southwest corner of St. Francis Drive at West Zia Road).

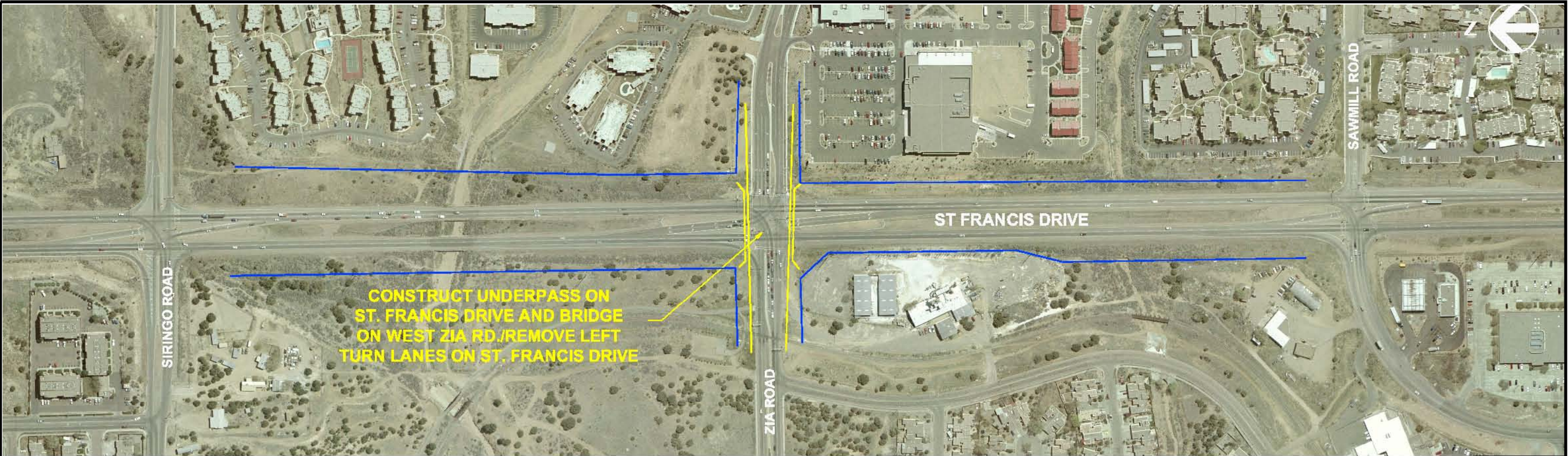
The challenges of constructing an underpass are very similar to those when constructing an overpass. The operational issues would also be very similar. Figures 5 and 6 show the layout of an overpass and an underpass at the St. Francis Drive/West Zia Road intersection.



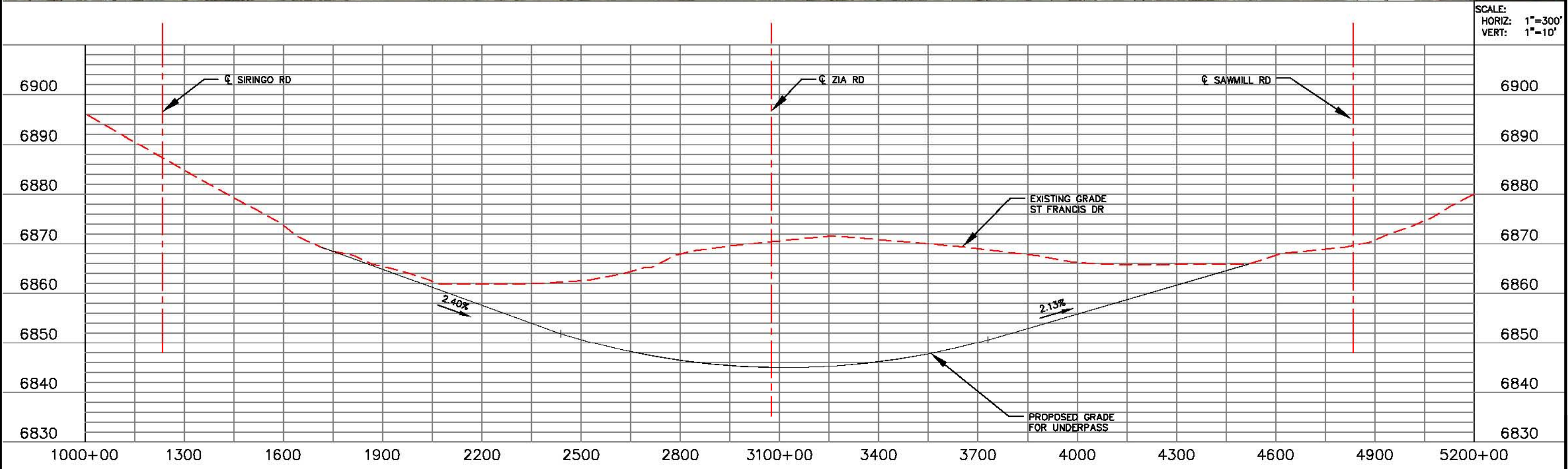


SCALE:  
HORIZ: 1"=300'  
VERT: 1"=10'





CONSTRUCT UNDERPASS ON  
ST. FRANCIS DRIVE AND BRIDGE  
ON WEST ZIA RD./REMOVE LEFT  
TURN LANES ON ST. FRANCIS DRIVE



SCALE:  
HORIZ: 1"=300'  
VERT: 1"=10'

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ST. FRANCIS DRIVE CORRIDOR STUDY  
INITIAL EVALUATION OF ALTERNATIVES



FIGURE 15  
UNDERPASS AT ST. FRANCIS  
DRIVE/WEST ZIA ROAD



Miscellaneous Intersection Improvements – St. Francis Drive at West Zia Road

The operations analysis summarized in Table 5 shows that the overall intersection of St. Francis Drive at West Zia Road will operate at unacceptable LOS in both peak periods (AM and PM) in the horizon year of 2030. In addition, the AM and PM peak hours will have several movements with deficient LOS.

To achieve acceptable LOS at the deficient movements this intersection the following improvements are needed:

- EB left turns: even with the addition of a third left turn lane, the LOS only improves to E in AM peak (it improves from F to D in PM peak). The AM peak hour has a very heavy left turn movement with 580 vehicles
- EB through lanes: adding a third through lane improves this movement LOS from E to C in both the AM and PM peak hours
- WB left turns: construction of a third left turn lane improves LOS in the AM peak hour from E to D, and in the PM peak hour from F to D
- WB through lanes: signal timing adjustments improve LOS from E to D in the AM peak hour and from F to D in PM peak hour
- NB left turns: signal timing adjustments improve LOS from E to D in the PM peak hour
- NB through lanes: addition of a fourth through lane improves the LOS from F to C in the AM peak hour
- SB left turns: signal timing adjustments/other intersection improvements results in LOS improving from F to B in the AM peak hour and from E to D in the PM peak hour

With the above improvements, overall intersection LOS for horizon year (2030) conditions in the peak hours improves as shown in Table 6:

Table 6 - Zia Road Intersection Improvements LOS								
2030 Horizon Year – Intersection LOS	AM PEAK HOUR				PM PEAK HOUR			
	w/o Improvements		with improvements		w/o improvements		with improvements	
	LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay
St. Francis Drive/West Zia Road	E	78.4	D	38.4	D	42.3	C	26.6

The following is a summary of possible intersection improvements:

- addition of a third left-turn lane for both directions of West Zia Road
- addition of a fourth through lane for NB St. Francis Drive
- adjustments to traffic signal timings/coordination through Corridor



As Section IV.B discussed the changes in traffic volumes that would result from improvements considered in the I-25 Corridor Study (primarily the Richards Interchange) it is recommended that the improvements at Zia Road and St. Francis Drive be revisited when those recommendations are complete. It is likely that a grade-separated interchange will be very difficult to construct at Zia due to the right-of-way required, therefore the required intersection improvements should be evaluated based on the regional improvements planned at that time. However it is recommended that pedestrian improvements be constructed to coincide with the opening of the Zia Platform that serves the NM Rail Runner Express.

In addition to the Zia Road intersection, improvements to the St. Michaels Drive interchange were also evaluated in this Phase B report. These improvements were considered to address two main concerns: 1) the sharp merge movement that resulted from the additional lane added in 2005, and 2) the lack of sidewalks on St. Michael's Drive under St. Francis. These improvements are shown in Figure 16 through Figure 20. Re alignment of the interchange into a diamond will allow auxiliary lanes to be constructed for both northbound and southbound entering traffic. As shown in Figure 20, extension of the northbound auxiliary lane through the San Mateo Road intersection would result in impact to the parcel at the southeast corner of the intersection. The addition of the auxiliary lane through the San Mateo intersection would likely result in the driveway to the property being very close to the intersection and likely considered for closure if this alternative were to be implemented.

The Phase A Report also evaluated intersection improvements at Sawmill Road and at Siringo Road. These improvements are still considered valid and appropriate for further consideration by the NMDOT and City of Santa Fe. The full listing is included in Appendix D.

## **B. Safety**

Construction of the interchange options would remove mainline traffic from the intersection, with a likely reduction in crash rates due to the reduced exposure.

Construction of the intersection improvements would likely not result in a reduction of crash rates, as the through traffic would still be traveling through the intersection. The additional crossing distance that would result from the additional travel lanes would increase the exposure of pedestrians and bicyclists, possibly leading to additional crashes involving these modes.

## **C. Drainage**

The wide variety of alternatives considered in this section would require complete drainage analysis prior to implementation. Drainage modifications for individual intersections will need to be addressed on a case-by-case basis depending on the specific components of each alternative. However, in general it is likely that interchange modifications would require relocation of existing inlets and any associated laterals. It is assumed that interchange modifications would entail addition of turning lanes, which would increase the runoff rates at a given area. The expansion of the pavement may also require modifications to existing



culverts, roadside ditches or storm drains in an area. The underpass alternative would require a pump station and associated equipment and infrastructure to pump the runoff to an appropriate outfall.

**D. Constructability**

The constructability of the alternatives in the section is high; however it is likely that utilities, street lighting, and traffic signals would have to be re-located.

**E. Right-of-Way**

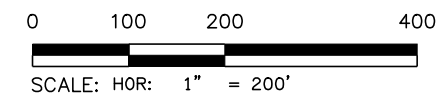
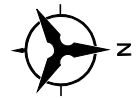
Even though this section of the Corridor has some of the largest available right-of-way, there still is not sufficient right-of-way to construct the interchange alternatives. However there is sufficient right-of-way to implement the intersection improvement options.

**F. Costs**

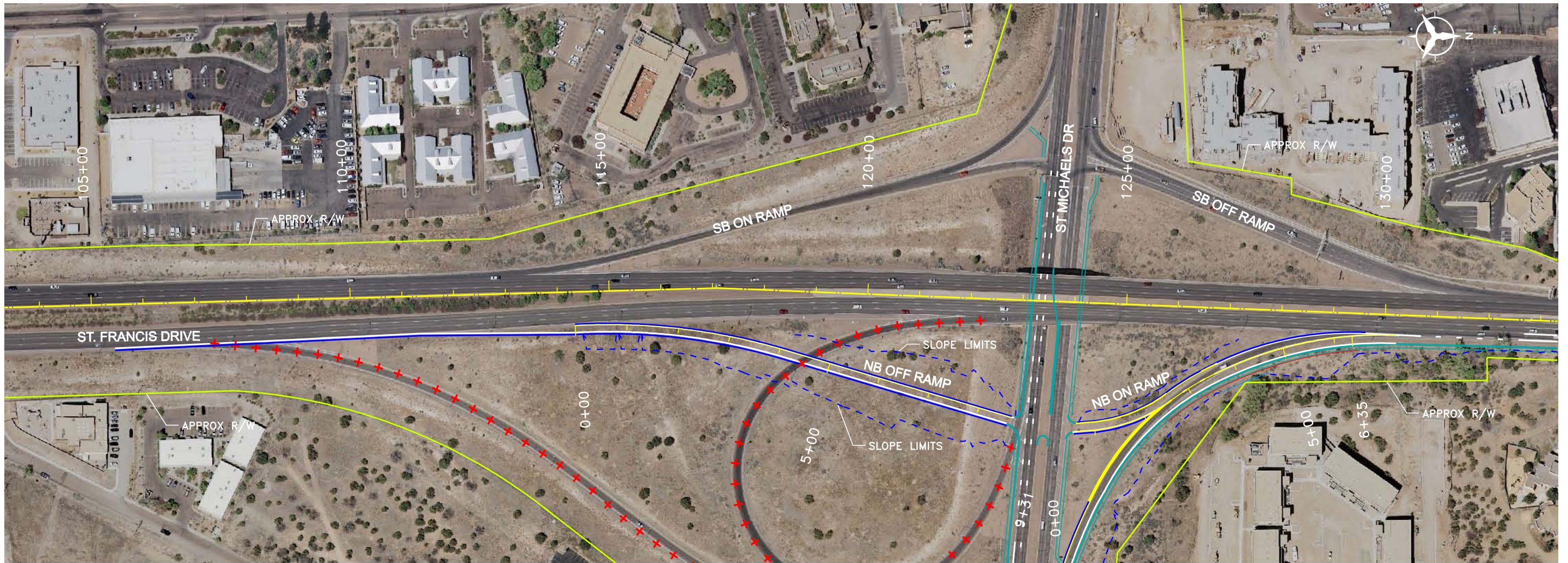
Detailed cost estimates were not prepared for the Zia alternative due to scope and fee constraints, however it is expected that the interchange options would be in the \$10-\$15 million range, with intersection improvements, likely one-third to one-half of that amount, depending on the ultimate configuration selected.

The cost of the St. Michael's Drive interchange improvements is approximately \$3 million.

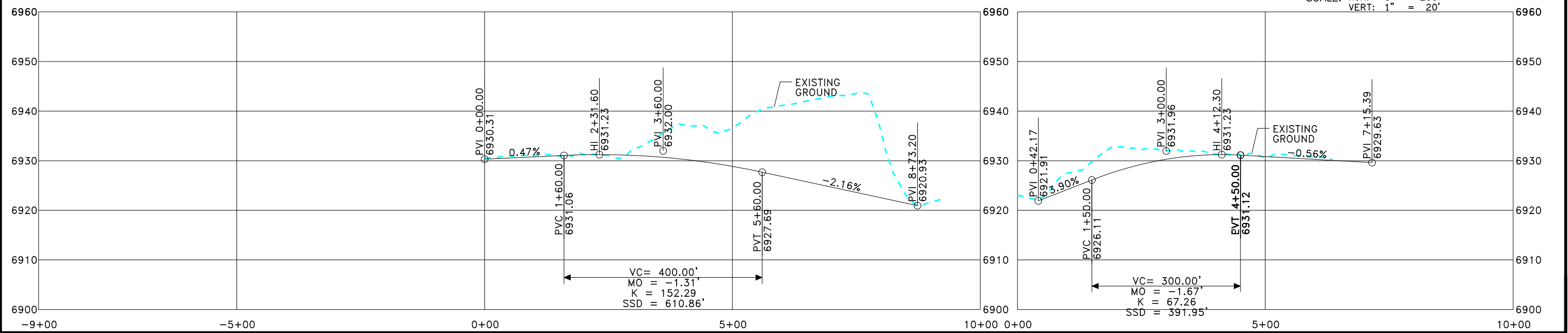




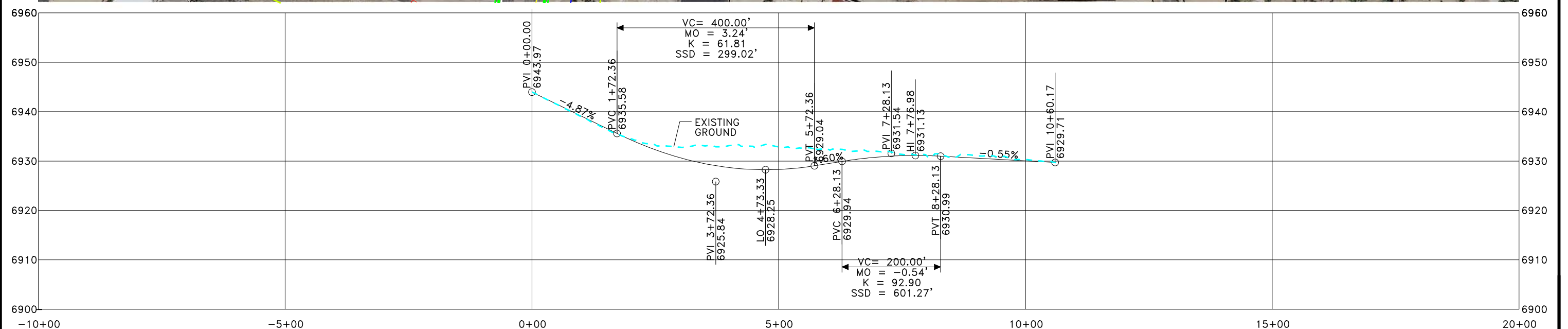
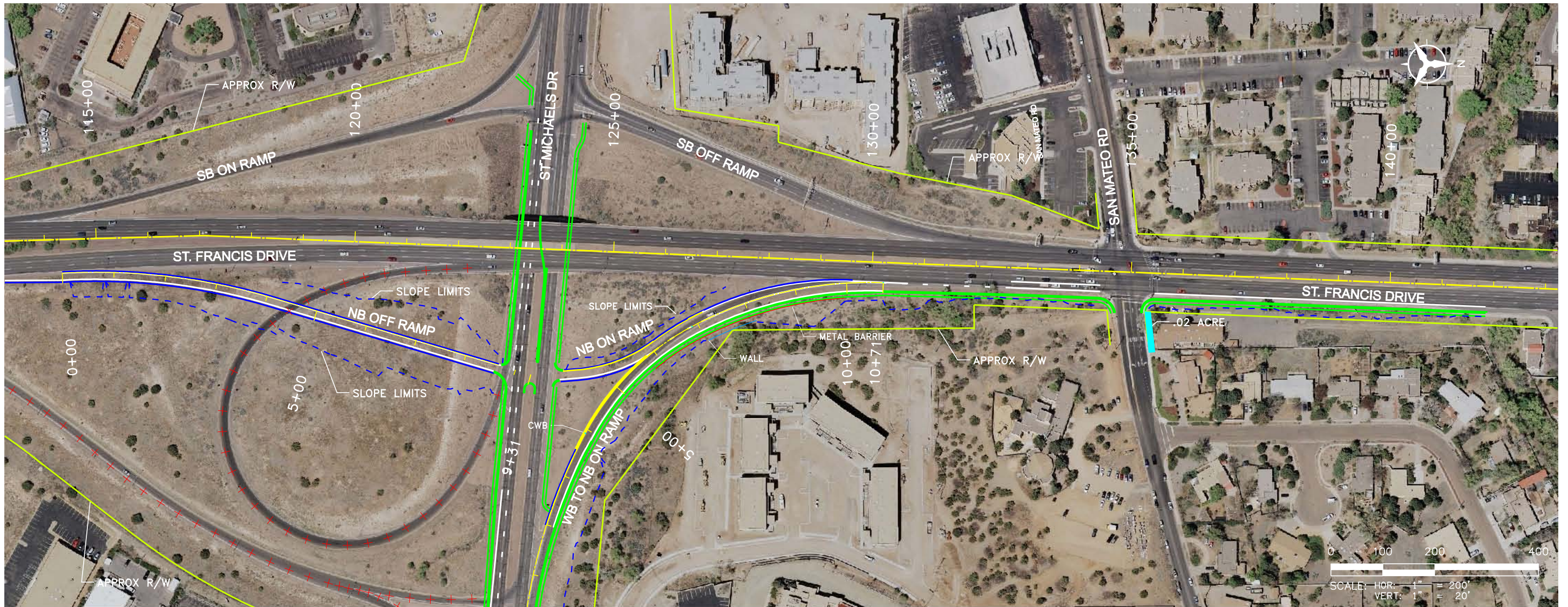




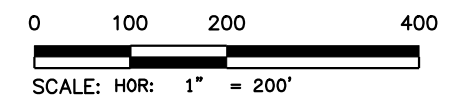
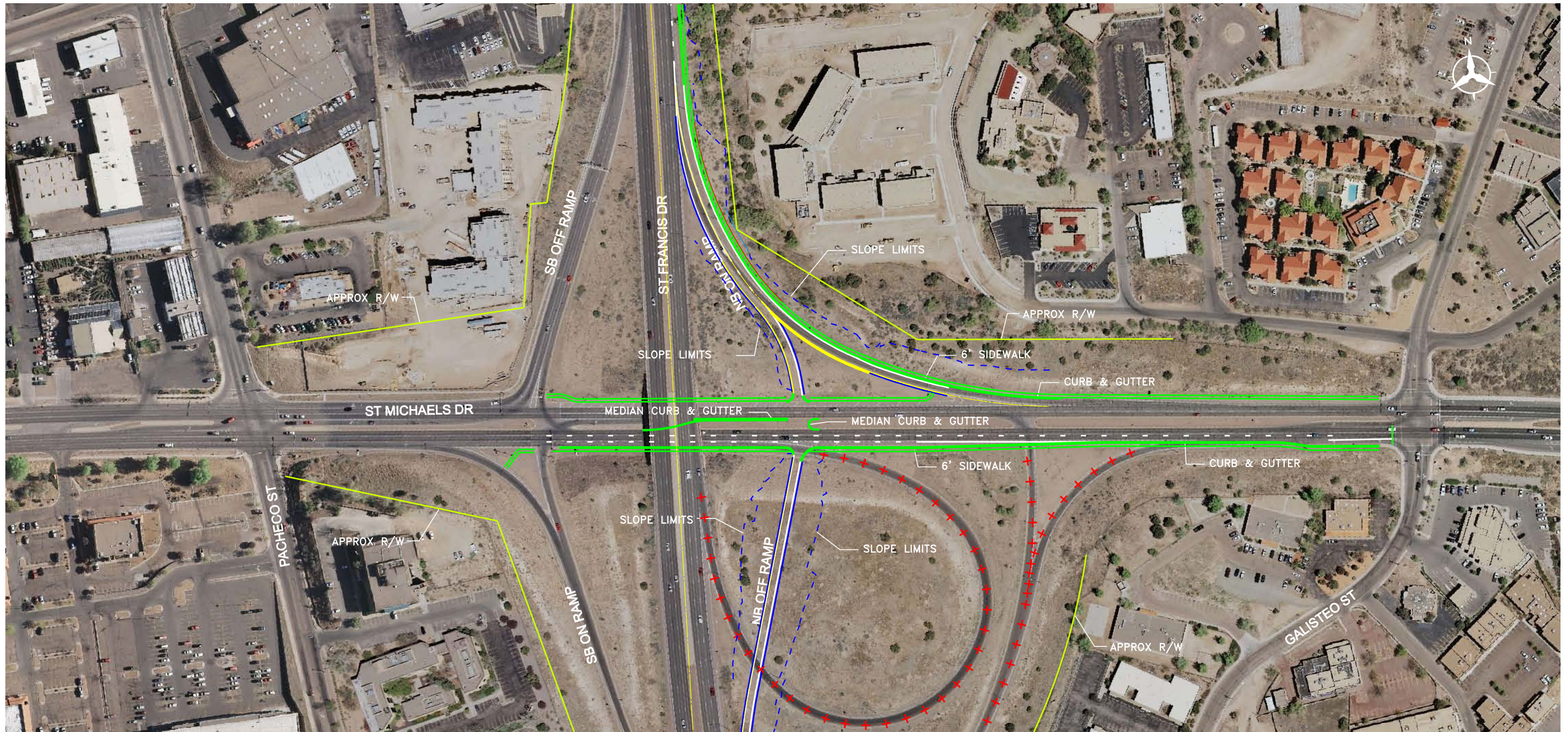
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VERT: 1" = 20'



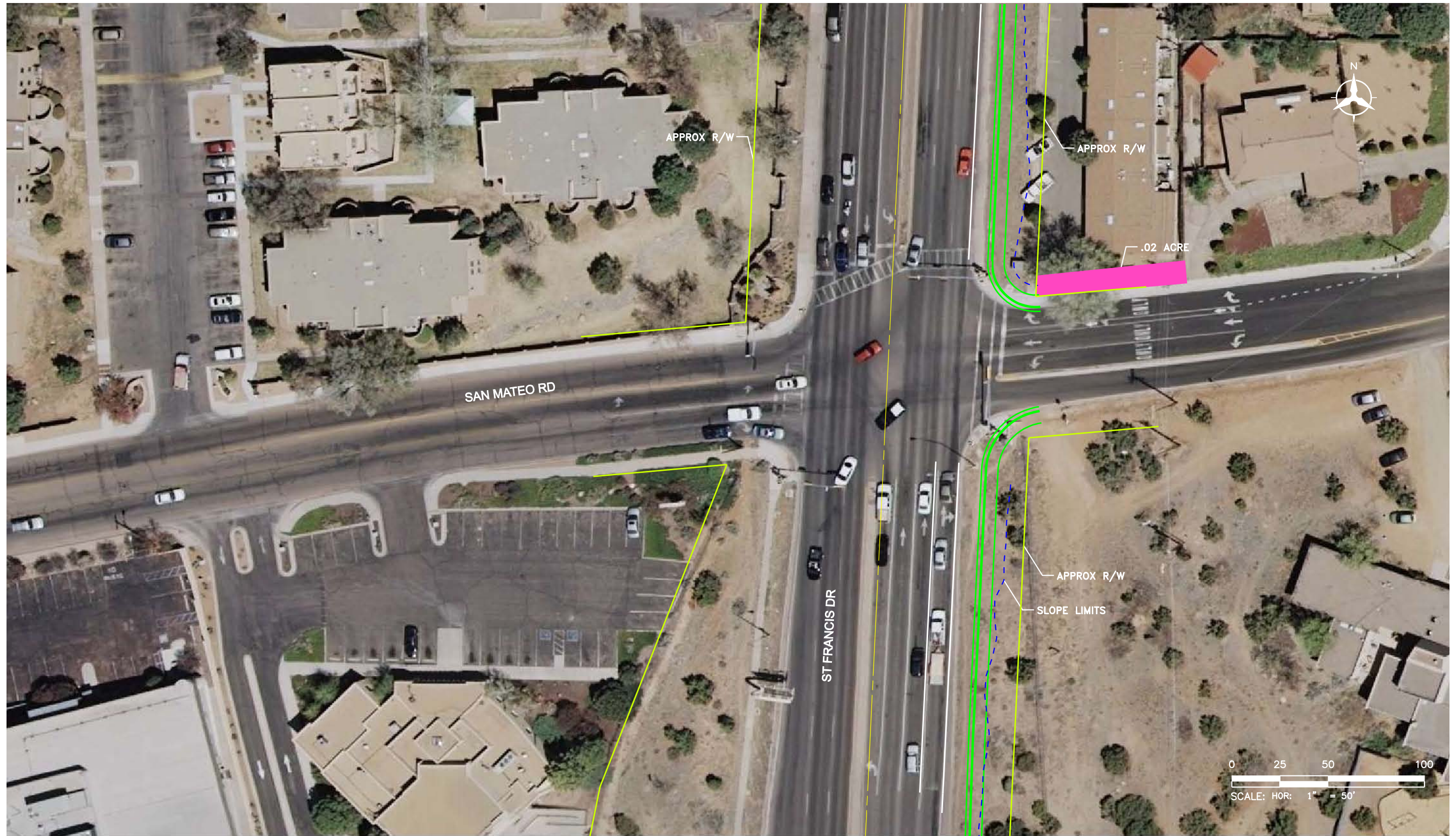














**G. Environmental / Mitigation: Zia Rd at St. Francis Dr Intersection**

**1. Biological Resources**

Soils

Since the majority of the soils located within the project Corridor are well drained soils that exhibit negligible to medium surface runoff and moderate permeability, there are negligible to minor impacts expected from the roadway improvements. However, if the proposed lane additions at the Zia Rd and St. Francis Dr intersection disturb more than one acre of land, then a Storm Water Pollution Prevention Plan (SWPPP) under the National Pollutant Discharge Elimination System (NPDES) of the Clean Water Act (CWA) would be required to prevent erosion during construction.

Vegetation

Due to the urban land use at this intersection, negligible impacts to native vegetation are expected to result from the proposed lane additions.

Threatened and Endangered Species

No federally listed threatened or endangered species are expected to occur within the project Corridor. However, the State of New Mexico sensitive species, the Gunnison prairie dog (*Cynomys gunnisoni*) may occur at this intersection. The City of Santa Fe Ordinance No. 2001-35 ordains the humane relocation of the Gunnison prairie dog and would apply to any prairie dog populations present at the proposed alternative. A biological survey of the proposed project area at this intersection would need to be completed to determine the presence or absence of the Gunnison prairie dog.

Wildlife

Due to the urban composition of the project Corridor, negligible to minor impacts to wildlife or migratory birds are expected as a result of the proposed lane additions at this intersection.

**2. Air Quality/Noise**

Air Quality

As Santa Fe is in attainment for the six criteria pollutants managed under the Clean Air Act (CAA), no significant impacts to air quality are expected as a result of the proposed intersection improvements. Construction-related air quality issues will be controlled as recommended by the New Mexico Environment Department (NMED).

Noise

The expansion of the Zia roadway is not anticipated to result in traffic noise impacts.

**3. Visual**

No significant visual impacts to the viewshed at the Zia Rd and St. Francis Dr intersection are expected as a result of the proposed lane addition alternative.



#### **4. Social**

There is potential for a positive impact on community cohesion as a result from the intersection improvements. The proposed lane additions would add capacity to the traffic flow in this area and would alleviate traffic congestion, and provide better access to the neighborhoods located to the southwest of the intersection. Improved access for all modes of travel has the potential to increase economic development opportunities. Economic development opportunities not only provide increased sales tax revenue but also promote new job growth and new businesses.

#### **5. Cultural**

A review of historic aerial photos, as well as the records of the New Mexico Cultural Resource Information System of the Archaeological Records Management Section (ARMS), was performed to identify existing archeological, cultural, and historic resources within the general project vicinity. Results of the research, to date, indicate that there are hundreds of cultural resources identified that have the potential to occur within the project area, including properties listed in and eligible for listing in both the National Register of Historic Places (NRHP) and the State Register of Cultural Properties.

A more detailed investigation, including field surveys, and further coordination with the State Historic Preservation Officer (SHPO) will be required once the area of potential effect is defined for the proposed intersection improvements.

#### **6. Water Resources**

There are no drainages, wetlands, or floodplains located at the intersection of Zia Rd and St. Francis; therefore there are no anticipated impacts to water resources at this location.

#### **7. Hazardous Materials**

Contamination of soils or waterways is a concern related to right-of-way acquisition and construction activity due to liability with regard to cleanup and human health issues.

In order to gain more information on potentially contaminated properties, an initial site assessment (ISA) may be recommended for the proposed intersection alternative. Appropriate clean up, avoidance, or mitigation measures will then be taken in accordance with the NMDOT's *Handbook of Hazardous Waste Management* (August 1999).

### **H. Environmental / Mitigation: Zia Rd at St. Francis Dr Interchange**

#### **1. Biological Resources**

##### Soils

If the proposed interchange at the Zia Rd and St. Francis Dr intersection disturbs more than one acre of land, a SWPPP would be required to prevent erosion during construction.



### Vegetation

Due to the urban land use at this intersection, negligible impacts to native vegetation are expected to result from the proposed interchange.

### Threatened and Endangered Species

No federally listed threatened or endangered species are expected to occur within the project Corridor. A biological survey of the proposed project area at this interchange would need to be completed to determine the presence or absence of the Gunnison prairie dog. The City of Santa Fe Ordinance No. 2001-35 ordains the humane relocation of the Gunnison prairie dog and would apply to any prairie dog populations present at the proposed alternative.

### Wildlife

Due to the urban composition of the project Corridor, negligible to minor impacts to wildlife or migratory birds are expected as a result of the proposed interchange alternative.

## **2. Air Quality/Noise**

### Air Quality

Since Santa Fe is in attainment for the six criteria pollutants managed under the CAA, no significant impacts to air quality are expected as a result from the proposed interchange improvements. Construction-related air quality issues will be controlled as recommended by the NMED.

### Noise

The addition of an interchange at this location could result in a traffic noise impact; an additional analysis of noise levels and mitigation measures may be required for this alternative.

## **3. Visual**

There will be a limited impact from the proposed interchange on the existing view shed at this location.

## **4. Social**

There is potential for a positive impact on community cohesion as a result from the interchange improvements. The proposed interchange would add capacity to the area and would alleviate traffic congestion, and provide better access to the neighborhoods located to the southwest of the interchange.

## **5. Cultural**

A review of historic aerial photos, as well as the records of the New Mexico Cultural Resource Information System of the Archaeological Records Management Section (ARMS), was performed to identify existing archeological, cultural, and historic resources within the general project vicinity. Results of the research, to date, indicate that there are hundreds of cultural resources identified that



have the potential to occur within the project area, including properties listed in and eligible for listing in both the National Register of Historic Places (NRHP) and the State Register of Cultural Properties.

A more detailed investigation, including field surveys, and further coordination with the State Historic Preservation Officer (SHPO) will be required once the area of potential effect is defined for the proposed interchange improvements.

**6. Water Resources**

There are no drainages, wetlands, or floodplains located at the Zia Rd and St. Francis intersection; therefore there are no anticipated impacts to water resources at this location.

**7. Hazardous Materials**

In order to gain more information on potentially contaminated properties, an ISA may be recommended for the proposed interchange alternative.

**I. Environmental / Mitigation: Southern interchange: St. Michaels Rd at St. Francis Dr**

**1. Biological Resources**

Soils

If the proposed interchange at the St. Michaels Rd and St. Francis Dr intersection disturbs more than one acre of land, a SWPPP would be required to prevent erosion during construction.

Vegetation

Due to the urban land use at this intersection, negligible impacts to native vegetation are expected to result from the proposed interchange.

Threatened and Endangered Species

No federally listed threatened or endangered species are expected to occur within the project Corridor. A biological survey of the proposed project area at this interchange would need to be completed to determine the presence or absence of the Gunnison prairie dog. The City of Santa Fe Ordinance No. 2001-35 ordains the humane relocation of the Gunnison prairie dog and would apply to any prairie dog populations present at the proposed alternative.

Wildlife

Due to the urban composition of the project Corridor, negligible to minor impacts to wildlife or migratory birds are expected as a result of the proposed interchange alternative.

**2. Air Quality/Noise**

Air Quality

Since Santa Fe is in attainment for the six criteria pollutants managed under the CAA, no significant impacts to air quality are expected as a result from the proposed interchange improvements. Construction-related air quality issues will be controlled as recommended by the NMED.



### Noise

The addition of an interchange at this location could result in a traffic noise impact; an additional analysis of noise levels and mitigation measures may be required for this alternative.

### **3. Visual**

There will be a limited impact from the proposed interchange on the existing view shed at this location.

### **4. Social**

There is potential for a positive impact on community cohesion as a result from the interchange improvements. The proposed interchange would provide better access to St. Francis with the addition of a new access ramp on westbound St. Michael's Dr. and would be a positive improvement for pedestrians with the addition of a sidewalk on St. Michael's Dr. Improved access will have potential to increase economic development opportunities which in turn could increase sales tax revenue and promote new job growth and new businesses.

### **5. Cultural**

A review of historic aerial photos, as well as the records of the New Mexico Cultural Resource Information System of the Archaeological Records Management Section (ARMS), was performed to identify existing archeological, cultural, and historic resources within the general project vicinity. Results of the research, to date, indicate that there are hundreds of cultural resources identified that have the potential to occur within the project area, including properties listed in and eligible for listing in both the National Register of Historic Places (NRHP) and the State Register of Cultural Properties.

A more detailed investigation, including field surveys, and further coordination with the State Historic Preservation Officer (SHPO) will be required once the area of potential effect is defined for the proposed interchange improvements.

### **6. Water Resources**

There are no drainages, wetlands, or floodplains located at the St. Michael's Dr. and St. Francis intersection; therefore there are no anticipated impacts to water resources at this location.

### **7. Hazardous Materials**

In order to gain more information on potentially contaminated properties, an ISA may be recommended for the proposed interchange alternative.