

DRAFT Design Concept Report

# Valencia Road Alvernon Way to Wilmot Road

Pima County Department of Transportation

Pima County Project No. 4VAKDP

May 17, 2011





**DRAFT DESIGN CONCEPT REPORT**

**VALENCIA ROAD**

**ALVERNON WAY  
TO  
WILMOT ROAD**

Pima County Project No. 4VAKDP

Prepared for the Pima County Department of Transportation  
by Psomas

Psomas  
800 E. Wetmore Road, Suite 110  
Tucson, Arizona 85719  
(520) 292-2300

May 17, 2011

Psomas Project No. 7PIM090302



## EXECUTIVE SUMMARY

The Valencia Road, Alvernon Way to Wilmot Road project (4VAKDP) is located in eastern Pima County, within Sections 10, 11, 12, 13, 14 and 15 of Township 15 South, Range 14 East. The project lies within the jurisdictions of both unincorporated Pima County and the City of Tucson. Figure 1-1, on page 1, shows the project location.

The project consists of widening Valencia Road from four to six lanes from 900' east of Alvernon Way to 750' east of Wilmot Road. The underpass at Interstate 10 (I-10) and the Union Pacific Railroad (UPRR) bridge will also be widened. At the west end, the project will tie into the Alvernon Way/Valencia Road intersection improvement project, which is currently advertised for construction. The east end of the project will tie into the Valencia Road, Wilmot Road to Kolb Road project, which is also under design.

Design Year – 2035

Estimated Cost – \$37.9 million

Funding - \$46.3 million (includes segment from Wilmot Road to Kolb Road)

Funding Source – RTA Sales Tax and City of Tucson Funds

The proposed project is needed to respond to a number of deficiencies that exist along Valencia Road from Alvernon Way to Wilmot Road, including meeting 2035 traffic demands, increasing safety, improving multi-modal connectivity, and relieving congestion. Traffic congestion has been a concern in the project area for a number of years, and it is becoming more prevalent as traffic volumes increase. Valencia Road carries a daily traffic volume of 24,600 to 26,500 vehicles and is projected to carry between 39,400 and 42,400 vehicles per day in 2035. Currently, Valencia Road experiences heavy traffic volumes during peak travel hours along many segments, resulting in a poor level of service that impedes the efficient movement of traffic in this area. Congested travel in the project area increases local and regional travel times and transportation costs.

The project proposes to widen Valencia Road between Alvernon Way and Wilmot Road to a six-lane divided road in order to provide capacity for existing and future travel needs. The project is proposed due to recognition that if the project is not built, there could be increased congestion, delay and accidents as traffic volumes increase over time as a result of local development and increased regional traffic volumes. The purpose of the project is to reduce delays caused by heavy traffic volumes during peak travel hours and reduce future traffic congestion on Valencia Road by providing additional capacity and more efficient intersection operation. The project will also improve pedestrian mobility through the provision of six-foot sidewalks and six-foot multi-use lanes for bicycle access, while meeting ADA requirements. These amenities will be located on the north and south side of Valencia Road. The Valencia Road and Littletown Road intersection will be realigned and a traffic signal added in order to improve traffic operations and safety. The project will also provide for an expanded bridge crossing at the UPRR overpass. The underpass at Interstate 10 will be expanded to six lanes with sidewalks. These goals are consistent with the RTA Plan that identifies specific improvements to address cross-town mobility, reduce traffic congestion, improve safety and security, improve travel modes, and improve bicycle and pedestrian options in the region.

The design concept development process and alternatives analysis resulted in the following recommendations:

- Valencia Road will be widened along the existing horizontal and vertical alignment to 6 travel lanes
- Continuous sidewalk and multi-use lanes in both directions will be added through the entire project area.
- The pavement section will be reconstructed to provide adequate design life.
- Rubberized asphalt will be used throughout the project to reduce roadway noise.

- The I-10 underpass will be widened to accommodate 6 lanes, adding concrete barrier to protect the bridge piers, and adding enhanced pedestrian and bicycle facilities.
- The UPRR bridge will be symmetrically widened in accordance with the approved concept submitted to the UPRR.
- Slope easements will be acquired for the embankment slopes approaching the UPRR bridge.
- Littletown Road will be realigned to provide an adequate radius for the design speed, a longer tangent section before the intersection and better signal spacing.
- One new traffic signal location at Littletown Road and conduit for a future signal at Craycroft Road will be installed with this project. Existing traffic signals at Desert View High School, Benson Highway/Swan Road, the I-10 Ramps and Wilmot Road will be upgraded to accommodate the proposed roadway improvements.
- Turn lanes will be improved at Benson Highway/Swan Road, Craycroft Road and Wilmot Road.
- All cross drainages will be designed for 100-year storm flows.
- The roadway storm drain system will be designed for the 10-year storm with one “dry” travel lane open in each direction. For the 100-year storm, the maximum depth will be 1 foot, in accordance with Section 2.10 of the *Pima County Roadway Design Manual*.

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## CHAPTER 1 PROJECT OVERVIEW

The Valencia Road, Alvernon Way to Wilmot Road project (4VAKDP) is located in eastern Pima County, within Sections 10, 11, 12, 13, 14 and 15 of Township 15 South, Range 14 East. The project lies within the jurisdictions of both unincorporated Pima County and the City of Tucson. Figure 1-1 shows the project location.

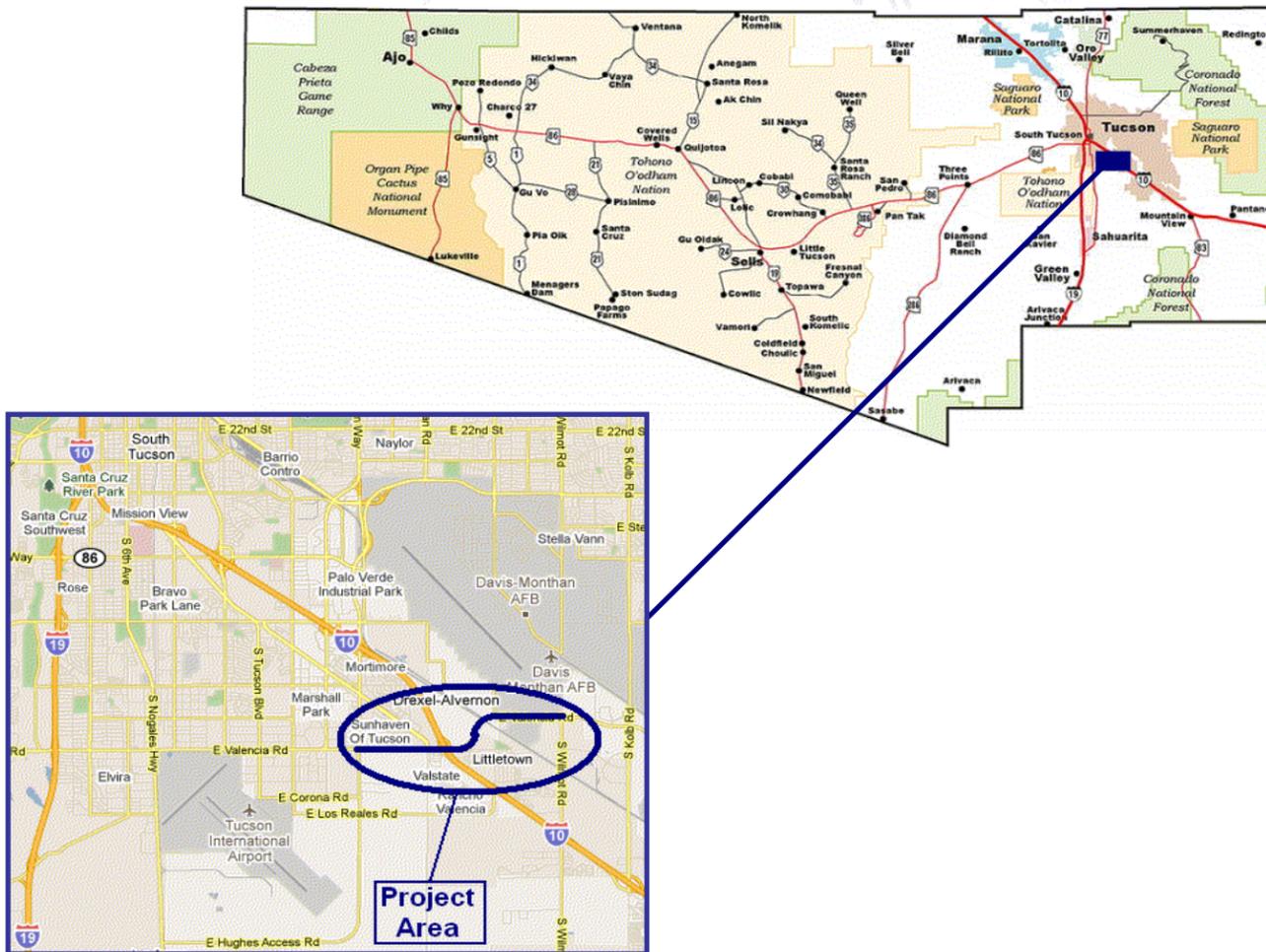
The project is a part of the Regional Transportation Authority's (RTA) Transportation Plan approved by voters in 2006. The project is included in the 2<sup>nd</sup> period of the RTA Plan with funding as follows:

RTA Sales Tax	\$43,298,000
City of Tucson Funds	<u>\$ 3,000,000</u>
<b>Total</b>	<b>\$46,298,000</b>

The project is anticipated to begin construction in Fiscal Year 2012/2013.

The proposed project is needed to respond to a number of deficiencies that exist along Valencia Road from Alvernon Way to Wilmot Road, including meeting 2035 traffic demands, increasing safety, improving multi-modal connectivity, and relieving congestion. Traffic congestion has been a concern in the project area for a number of years, and it is becoming more prevalent as traffic volumes increase. Valencia Road carries a daily traffic volume of 24,600 to 26,500 vehicles and is projected to carry between 39,400 and 42,400 vehicles per day in 2035. Currently, Valencia Road experiences heavy traffic volumes during peak travel hours along many segments, resulting in a poor level of service that impedes the efficient movement of traffic in this area. Congested travel in the project area increases local and regional travel times and transportation costs.

The project proposes to widen Valencia Road between Alvernon Way and Wilmot Road to a six-lane divided road in order to provide capacity for existing and future travel needs. The project is proposed due to recognition that if the project is not built, there could be increased congestion, delay and accidents as traffic volumes increase over time as a result of local development and increased regional traffic volumes. The purpose of the project is to reduce delays caused by heavy traffic volumes during peak travel hours and reduce future traffic congestion on Valencia Road by providing additional capacity and more efficient intersection operation. The project will also improve pedestrian mobility through the provision of six-foot sidewalks and six-foot multi-use lanes for bicycle access, while meeting ADA requirements. These amenities will be located on the north and south side of Valencia Road. The Valencia Road and Littletown Road intersection will be realigned and a traffic signal added in order to improve traffic operations and safety. The project will also provide for an expanded bridge crossing at the UPRR overpass. The underpass at Interstate 10 will be expanded to six lanes with sidewalks. These goals are consistent with the RTA Plan that identifies specific improvements to address cross-town mobility, reduce traffic congestion, improve safety and security, improve travel modes, and improve bicycle and pedestrian options in the region.



**Figure 1-1 – Project Location**

The project consists of widening Valencia Road from four to six lanes from 900 feet east of Alvernon Way to 750 feet east of Wilmot Road. The underpass at Interstate 10 (I-10) and the Union Pacific Railroad (UPRR) bridge will also be widened. At the west end, the project will tie into the Alvernon Way/Valencia Road intersection improvement project, which is currently under construction. The east end of the project will tie into the Valencia Road, Wilmot Road to Kolb Road project, which is also under design.

**CHAPTER 2  
PROJECT DESCRIPTION**

**2.1 Project Type, Termini, and Length**

The proposed project involves the widening and reconstruction of Valencia Road from 900 feet east of Alvernon Way to 750 feet east of Wilmot Road, a total length of approximately 3.25 miles. The proposed project will include widening the roadway under the existing I-10 bridges, widening the existing bridge over the UPRR, realigning Littletown Road and adding signalization at the new intersection, and improving turn lanes on Benson Highway/Swan Road, Craycroft Road, and Wilmot Road. The project is located in eastern Pima County, in the southeast corner of the Tucson metropolitan region. Figure 1-1 shows the project location.

**2.2 Design and Posted Speeds**

The design speed for Valencia Road as part of this project will be 55 mph, with a posted speed of 50 mph. The design speed for Benson Highway, Littletown Road, Craycroft Road, and Wilmot Road will be 50 mph with a posted speed limit of 45 mph, and design speed for Swan Road will be 30 mph with a posted speed of 25 mph approaching the intersection. Design speeds for the I-10 ramps will be ten mph less than the I-10 mainline design speed in accordance with Arizona Department of Transportation (ADOT) policy, or 55 mph in this situation.

**2.3 Nominal Right-of-Way Width**

Right-of-way widths along the Valencia Road corridor vary. To the west of I-10, the right-of-way is nominally between 225 and 250 feet and is not centered on the roadway, while to the east of I-10 it is nominally 150 feet wide and is generally centered on the roadway. No new right-of-way needs are anticipated as part of the proposed project.

**2.4 Roadway Section**

The proposed project will include a six-lane roadway (three lanes in each direction) with a raised median, multi-use lanes, curb, and sidewalk on both sides of the road. At the I-10 underpass, the multi-use lane and sidewalk on each side of the roadway will be combined and raised up behind the bridge piers to limit the disturbance to the slope in front of the bridge abutments. Figure 2-1 and Appendix A-1 show the typical cross sections for the project.

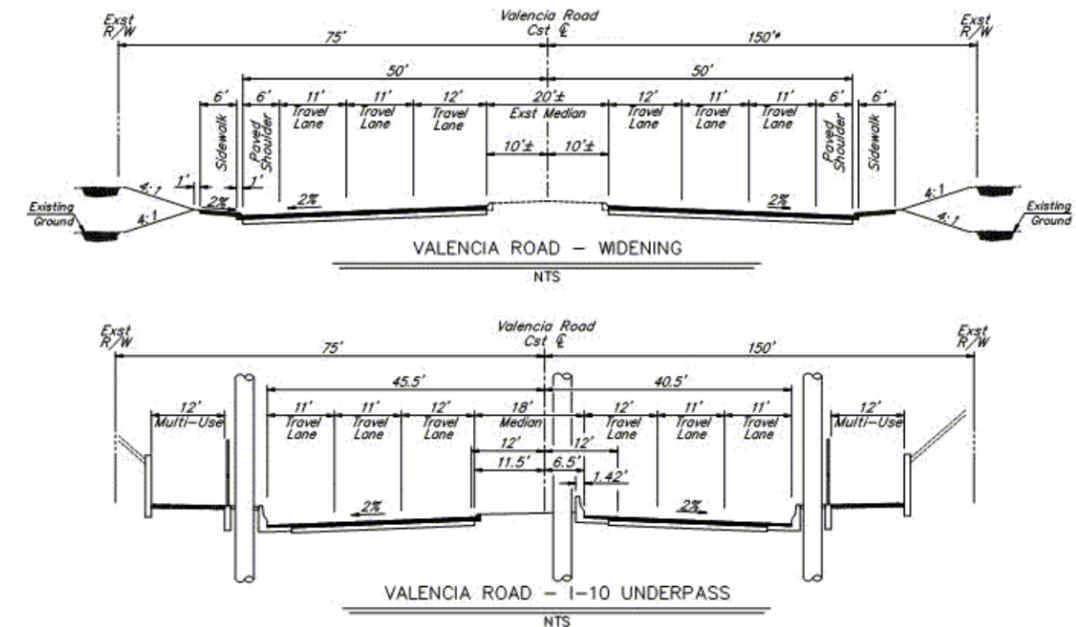
**2.5 Drainage Improvements**

There is one major drainage crossing along the roadway corridor at the Julian Wash which is currently passing under the roadway through a 5-10'x9' reinforced concrete box culvert (RCBC). This culvert will be extended outside of the clear zone, and two reinforced concrete pipe (RCP) culverts will also be improved. There is also extensive storm drain along the project corridor. To the east of I-10, the existing catch basins will be relocated to the new curb line, and a portion of the storm drain trunk line will be upsized to capture the additional drainage flow from the expanded pavement section. To the west of I-10, the existing catch basins will be relocated to the new curb line and will tie into existing pipes which outlet directly into an adjacent channel.

**2.6 Utility and Railroad Impacts**

There are numerous utilities running through the project corridor, including overhead electric, gas, communication lines, and water, as well as existing storm drain and sanitary sewer. The existing overhead electric line that runs from Alvernon Way through I-10 will need to be relocated to the south, as the existing power poles are located within the proposed pavement limits. There are also several communication line vaults within the proposed pavement limits that will need to be relocated. Other utility impacts may arise as the conflicts with drainage and roadway elements are assessed during the project.

The proposed project has one existing bridge crossing with the UPRR. The proposed project will widen the existing bridge to six lanes with pedestrian facilities and maintain the existing vertical clearance for the railroad. No permanent railroad impacts or right-of-way needs are anticipated for the bridge widening.



**Figure 2-1 – Valencia Road Typical Sections**

**2.7 Access Control**

Access to Valencia Road will be controlled by Pima County permit. There is currently ADOT access control along ADOT right-of-way at the I-10 interchange. No changes to this access control are anticipated as part of the proposed project.

**2.8 Signalization and Lighting**

Within the project limits, there are existing traffic signals at the entrance to Desert View High School, Benson Highway/Swan Road, the eastbound and westbound I-10 ramps, and Wilmot Road. These signals will be modified to accommodate the roadway widening and turn lane improvements at these intersections as part of the proposed project. The proposed project will also include a new traffic signal at the new Littletown Road intersection and conduit for a future traffic signal at the Craycroft Road intersection. Street lighting will be included as part of the traffic signals at all signalized intersections.

**2.9 Intersection Improvements**

There are several intersection improvements planned as part of the proposed project. A new signalized intersection with Littletown Road will be included approximately 500 feet east of the existing Littletown Road intersection. The new intersection will have a longer tangent section leading into the intersection, and will approach Valencia Road at a nearly perpendicular angle, both of which will enhance sight distance and safety. At the Benson Highway/Swan Road, Craycroft Road, and Wilmot Road intersections, the side streets will be widened to include left- and right-turn lanes onto Valencia Road to aid in safety and improve level of service.

## 2.10 Landscaping

The landscape concept for the Valencia Road corridor will strive to transition the roadway improvements aesthetically into the existing landscape and developed uses. As the road is a scenic corridor, the landscape will serve to enhance the overall roadway experience. The landscape will focus on a design based on sustainable objectives and will serve as a sustainable landscape requiring limited irrigation and reduced maintenance. The overall design will incorporate indigenous and/or adaptable vegetation from the Arizona Department of Water Resources plant material list.

The desert-adapted plant palette will reduce irrigation requirements. The landscape planting shall be designed with low water consumptive plant materials, cactus and native grasses along with decomposed granite rock mulch. A low-water-use drip irrigation system with a solar controller will also be utilized as a water conserving and low maintenance design to establish the plant material.

The use of passive rainwater harvesting methods will be integrated to reduce potable water demand for irrigation, including micro basins located along the roadway to capture the seasonal rain events to supplement landscape irrigation demands. Temporary irrigation will be considered as an alternative once the planting scheme is developed and efficiency of the irrigation system can be evaluated. A consideration for the landscape will be the potential incorporation of a vegetated bio-swale to assist in the treatment of stormwater and will be accomplished by developing a grading plan which will incorporate the swales that will be used for drainage and filtration.

## 2.11 Safety Features

There are several safety improvements planned as part of the proposed project. At the I-10 underpass widening, new concrete barrier with crash cushion end treatments will be installed to protect traffic from the existing bridge piers, and the pedestrian facilities will be raised and separated from the roadway to enhance safety. Additionally, new ADA-compliant handicap ramps will be included at all intersections, and the proposed project will add continuous sidewalk on both sides of the road through the length of the proposed project. At the approaches to the UPRR bridge, new guardrail will be installed, and the widened bridge will include pedestrian facilities that are protected from traffic by a concrete barrier.

## 2.12 Public Art

Las Artes has been selected to complete the public art component of this project. The design team will coordinate with the artist during the development of the project construction documents to incorporate the artwork into the plans.

## CHAPTER 3

### PROJECT AREA CHARACTERISTICS

#### 3.1 Surrounding Topography and Terrain

The surrounding topography is generally flat terrain. The topography generally rises in grade from west to east. The elevations range from 2,650 to 2,750 feet above mean sea level.

#### 3.2 Existing Roadway

The existing intersection of Valencia Road/Alvernon Way consists of three through lanes, dual left-turn lanes and a right-turn lane in each direction, east and west. In the north and south directions the lane configuration consists of two through lanes, a single left-turn and a single right-turn lane in each direction. Valencia Road east of Alvernon Way narrows to two through lanes in each direction with a 20-foot curbed median. The pavement width in each direction is 28 feet. This is the typical roadway section through the project limits.

The existing intersection of Valencia Road/Benson Highway/Swan Road consists of two through lanes, a single left-turn lane and a single right-turn lane in the east and west directions. Benson Highway consists of one through lane with a single left-turn lane and a single right-turn lane in the southbound direction and two through lanes in the northbound direction. Swan Road one through lane in each direction with a single left-turn lane and a single right-turn lane in the northbound direction.

The existing interchange of Valencia Road/I-10 consists of two through lanes along Valencia Road in each direction. A single left-turn lane and a single right-turn lane provide access to I-10 from Valencia Road in each direction. I-10 is elevated at Valencia Road.

The existing intersection of Valencia Road/Littletown Road is a T-intersection. Valencia Road consists of two through lanes and a left-turn lane in each direction, with a right-turn lane in the eastbound direction. Littletown Road consists of a right-lane and a left-turn lane.

The existing intersection of Valencia Road/UPRR consists of an overpass structure that bridges the railroad tracks.

The existing intersection of Valencia Road/Wilmot Road consists of two through lanes and single left-turn lane in each direction, east and west. Wilmot Road consists of one through lane in each direction, north and south.

The existing roadway has a five-foot paved shoulder in each direction, outside curb and gutter, a curbed median and sidewalk is sporadically present, mainly at newer developments within the project limits.

The existing horizontal alignment generally is an east/west direction, except for a reverse curve that begins east of I-10 and ends just east of Craycroft Road. There are three horizontal curves located within the project limits.

There are six sag vertical curves and five crest vertical curves located within the project limits.

The posted speed limit is 45 mph from Alvernon Way to Columbus Boulevard and 50 mph from Columbus Boulevard to Wilmot Road.

#### 3.3 Roadway Geometric Deficiencies

The superelevation rate of 2% for the two horizontal curves, with a centerline radius of 1528.05 feet, east of I-10 does not meet American Association of State Highway and Transportation Officials (AASHTO) standards.

#### 3.4 Existing Right-of-Way

The existing right-of-way along the East Frontage Road is owned and maintained by Pima County and the width varies throughout the project limits as shown in Figure 3-1. The existing right-of-way width varies from 150 feet to 285 feet from Alvernon Way to Craycroft Road. The existing right-of-way is 150 feet from Craycroft Road to Wilmot Road.

#### 3.5 Drainage Characteristics

In general, offsite runoff originates to the southeast and is conveyed via channels or shallow sheet flow to the northwest. The vast majority of offsite flow is conveyed to the Julian Wash (which crosses Valencia Road between its intersections with Littletown Road and Craycroft Road) or is collected and conveyed by the unnamed channel toward the regional detention basin located south of the project limits. This leaves just a few small watersheds contributing to drainage crossings under Valencia Road. All other runoff affecting this project is generated within the roadway and is conveyed through various stormdrain systems.



Julian Wash

Between Alvernon Way and I-10, there is an unnamed channel along the south side of Valencia Road that conveys offsite and roadway runoff to the west to a regional detention facility. Between Swan Road and the I-10 there is a ditch that conveys offsite runoff from the north to a culvert crossing that then discharges into the previously mentioned unnamed channel. East of I-10, there is a channel along the south side of the roadway that collects offsite runoff from the south and conveys it east to the Julian Wash. There is a channel from the outlet of the stormdrain mainline at Craycroft Road that conveys the flow to the Julian Wash to the west.

There is a cross culvert (4-24" RCP) immediately east of Benson Highway/Swan Road that conveys flow from the north side of the road to the south where it is then conveyed west in the unnamed channel to the regional detention facility. The next culvert crossing to the east of this is located under the I-10 eastbound off ramp which conveys runoff to the west towards the 4-24" RCP culverts. Just east of the I-10 westbound on ramp, there is a cross culvert that conveys offsite runoff from the south under Valencia Road to the north. Continuing east, there is a 5-10'x9' RCBC that conveys the Julian Wash flow under Valencia Road. At the UPRR crossing, at the toe of the east abutment, there is a 36 inch RCP culvert that has a drop inlet on the south side of the road and conveys flow to the north.

Between Alvernon Way and I-10, there are numerous catch basins located along the north and south sides of the roadway that collect the pavement runoff and discharge into an unnamed channel along the south side of the road that flows west to a regional detention basin. Between I-10 and the UPRR crossing to the east, there are two short storm drain systems. Immediately east of I-10, the first system collects pavement runoff and discharges to the north adjacent to the westbound on ramp. The second stormdrain system to the east discharges the pavement runoff into the Julian Wash box culvert where it will then flow to the north. Between the UPRR and Wilmot Road, there is a single stormdrain system collecting pavement runoff as well as some offsite runoff from the south. This system outlets south of Valencia Road at the Craycroft Road intersection where the runoff is directed west under the railroad tracks and eventually discharges into the Julian Wash.

**3.6 Structures**

I-10 spans Valencia Road with two four-span concrete bridges. Valencia Road spans the UPRR tracks with a three-span concrete bridge. The structures at I-10 and UPRR were constructed in 1985 as part of a reconstruction of Valencia Road to a four-lane roadway with outside curb and a curbed median.



**UPRR Bridge**

**3.7 Signalization and Lighting**

Currently there are six traffic signals within the project limits. The signals are located at Alvernon Way, Desert View High School, Benson Highway/Swan Road, the eastbound I-10 ramps, the westbound I-10 ramps and Wilmot Road.

There is no street lighting along this segment of Valencia Road, except for safety lighting at the signalized intersections listed above.

**3.8 Existing Utilities**

This portion of Valencia Road includes service, distribution, and transmission of gas, electric, communications, potable water, and wastewater. The majority of utility facilities run parallel to Valencia Road on both sides of the roadway and along all major cross streets.

Utility company base files were created using as-built and mapping records provided by the utility companies, and field survey of aboveground features and Blue Stake marking provided by utility companies, as part of the cultural survey activity.

The existing utility locations within the project limits are summarized below:

***AT&T***

AT&T has an underground facility that crosses Valencia Road in a northwest direction at approximate station 194+05.

***Cox Communications***

Cox Communications has underground facilities located along the north side of Valencia Road from approximate station 158+50 to 162+60. Cox has overhead facilities that cross Valencia Road from North to South at approximate station 162+60 and head east along the south side of Valencia Road to approximate station 176+25. These facilities are located on TEP 46 Kv poles.

***El Paso Gas***

El Paso Gas has facilities that that cross Valencia Road in a northwest direction at approximate station 280+60.

***Kinder Morgan***

Kinder Morgan has 16, 12, 8 and 6 inch lines located along the south side of the UPRR right-of-way at the Valencia Road UPRR Bridge. There is a six inch Kinder Morgan line located along the south side of Valencia Road from approximate station 251+44 to 293+66. This six inch line crosses Valencia Road at approximate station 293+66 and continues north along the west side of Wilmot Road.

***Level 3***

Level 3 has facilities the run north and south along the west side of Wilmot Road and cross Valencia Road at approximate station 293+48. Level 3 also has facilities located along the south side of the UPRR right-of-way.

***Pima County Wastewater***

Pima County Wastewater has several sewer facilities located along the project limits. There is a 12 inch sewer located along the south side of Valencia Road from approximate station 242+00 to 294+78. This 12 inch sewer line continues east across Wilmot Road along the south side of Valencia Road. There is an eight inch sewer line along the south side of Valencia Road from approximate station 195+52 to station 217+40. There is a 12 inch sewer line that crosses Valencia Road at Swan Road at approximate station 176+03.

***Qwest***

There are Qwest underground facilities from station 131+00 to 199+00. There is a Qwest underground facility that crosses Valencia Road north to south at approximate station 162+82. There are Qwest underground facilities

located along the north side of Valencia Road from 158+86 to 171+35. Qwest has underground crossings along Valencia Road at approximate stations 134+08, 162+35, 194+03, and 194+45. There are underground facilities located along the south side of Valencia Road from approximate station 242+00 to 293+80. At station 293+80 these facilities head north and south along Wilmot Road. There are Qwest underground facilities located along the north and south side of Valencia Road east of Wilmot Road. Qwest also has facilities north of the UPRR right-of-way at the Valencia Road UPRR bridge.

***Qwest National***

Qwest National is located within the UPRR right-of-way.

***Ray Water Company***

Ray Water Company has facilities located north of the project area, west of Swan Road.

***Southwest Gas***

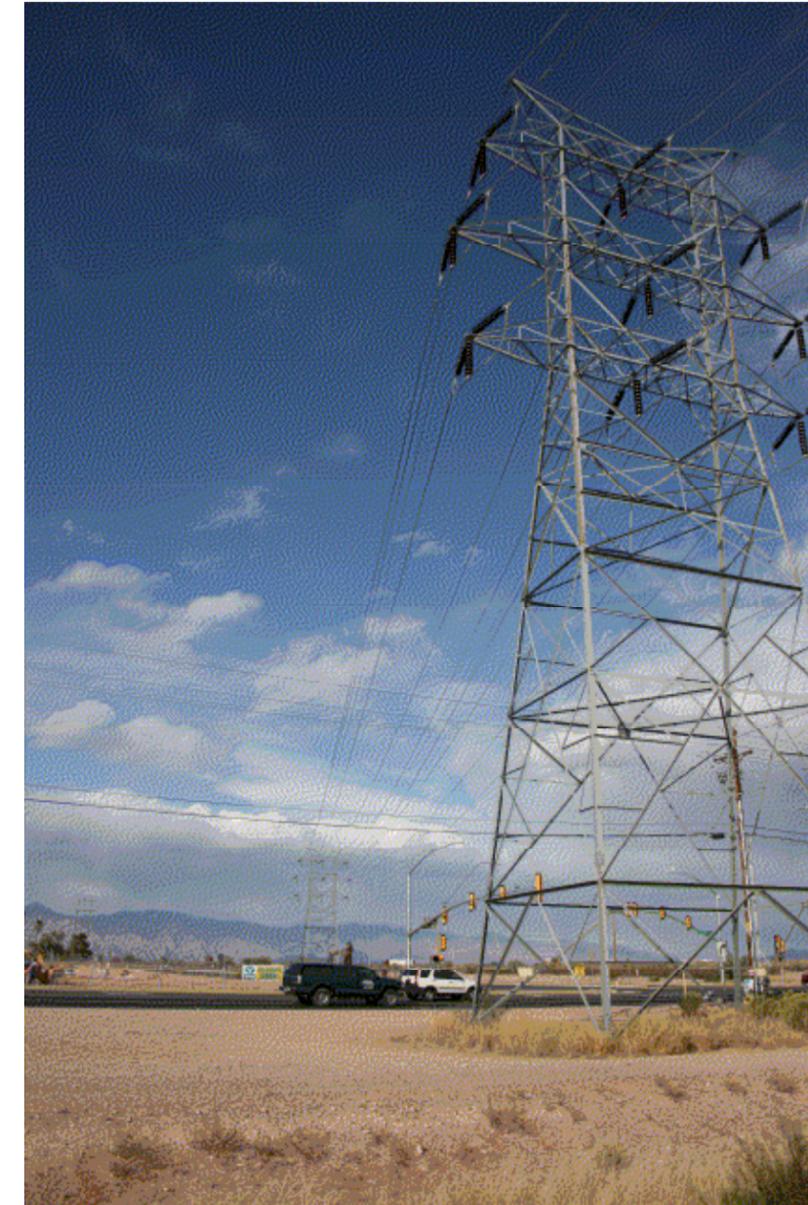
Southwest Gas has several facilities located within the project area. There is a four inch line located within Valencia Road from approximate station 140+18 to 175+92 and from 196+60 to 200+96. There is a two inch line that runs north and south within Wilmot Road and crosses the Valencia Road intersection at approximate station 294+18. There is a four inch line that originates north of Valencia Road at Wilmot Road at station 294+30 and then heads east to 302+00.

***Tucson Electric Power Company***

Tucson Electric Power has 46 Kv overhead facilities along the south side of Valencia Road from station 131+00 to 199+10. There is an underground crossing at 134+98 with a pull box along the existing southern curb line. There is an underground facility crossing Valencia Road at approximate station 147+70 and a 46 Kv overhead crossing at station 162+60. There is a 138 Kv transmission tower located at the southwest corner of the Valencia Road and Swan Road intersection at approximate 175+00. There is an overhead facility along the west side of Wilmot Road that crosses Valencia Road at approximate station 293+87. TEP has underground facilities along the south side of Valencia Road east of Wilmot Road.

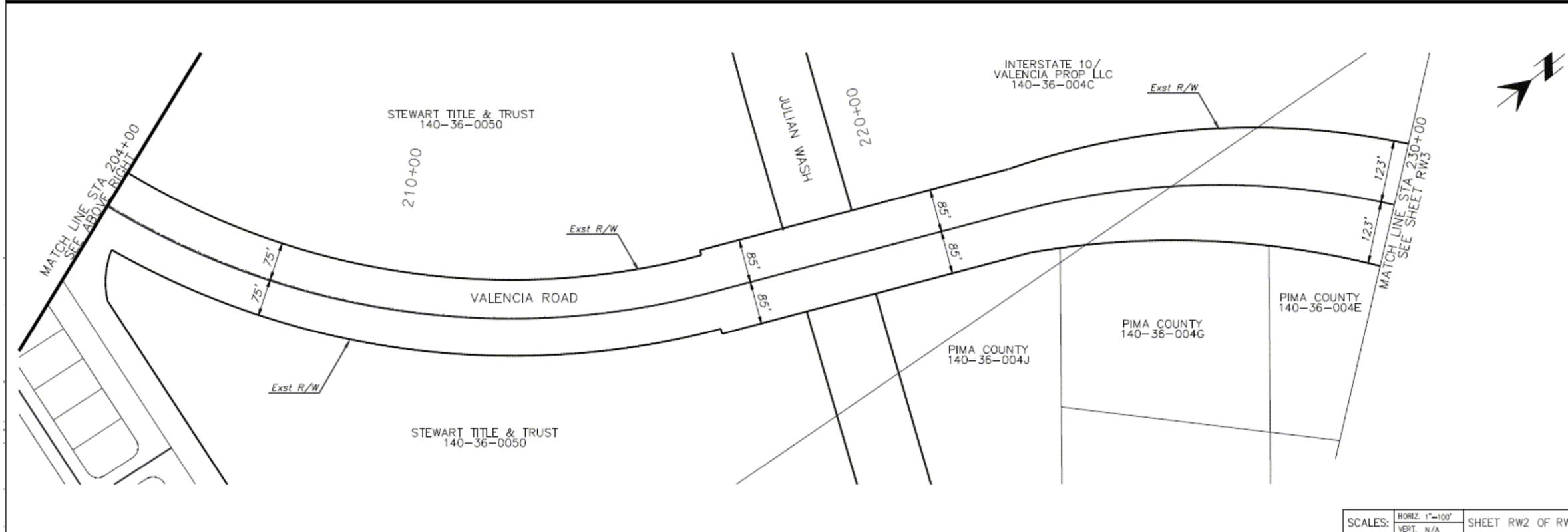
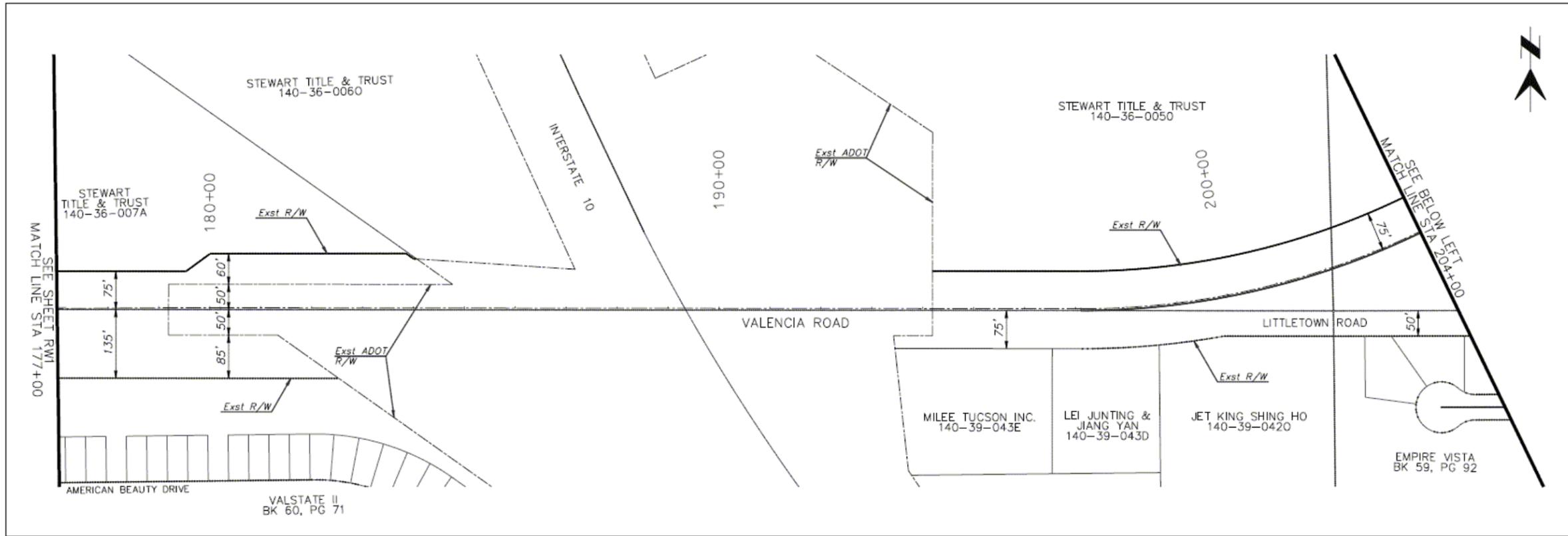
***Tucson Water***

Tucson Water has facilities located along the project limits. There is a 12 inch water line located along the south side of Valencia Road from approximate station 247+21 to 267+93. There is a 16 inch water line located along the north side of Valencia Road from approximate station 130+97 to 193+43. These facilities cross Valencia Road to the south at approximate station 193+43 and head east along the south side of Valencia Road. There is a 16 inch water line crossing Valencia Road at approximate station 175+80.



**TEP - 138 Kv Transmission Tower**





PRISCILLA S. CORNELIO, P.E., DIRECTOR

DESIGNED:	DATE
SS	04/11
DRAWN:	04/11
CHECKED:	04/11
PROJ. ENG.:	04/11

NO.	REVISION DESCRIPTION	DIV. ENGINEER	DATE

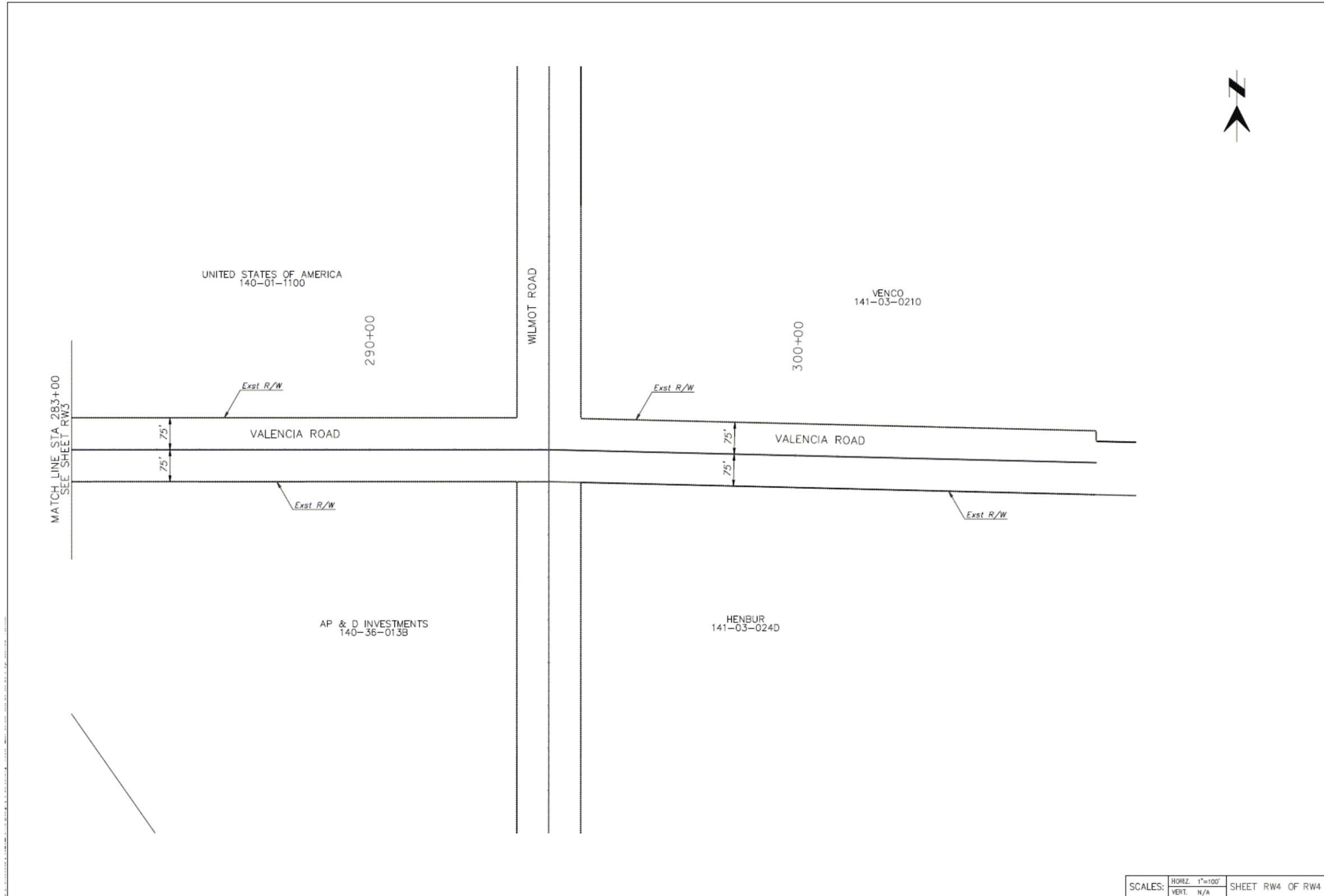
PIMA COUNTY DEPARTMENT OF TRANSPORTATION

**PSOMAS**  
800 E. WILSON ROAD, SUITE 110  
(520) 242-2300 (520) 242-1291 (FAX)

EXISTING RIGHT-OF-WAY FOR  
VALENCIA ROAD  
ALVERNON WAY TO WILMOT ROAD  
STA 177+00 TO STA 230+00

SCALES:	HORIZ. 1"=100'	SHEET RW2 OF RW4	FIGURE 3-1
	VERT. N/A		





PIMA COUNTY DEPARTMENT OF TRANSPORTATION		PRISCILLA S. CORNELIO, P.E., DIRECTOR																	
EXISTING RIGHT-OF-WAY FOR VALENCIA ROAD ALVERNON WAY TO WILMOT ROAD STA. 283+00 TO STA. 307+00		<table border="1"> <tr> <th>NO.</th> <th>REVISION DESCRIPTION</th> <th>DATE</th> </tr> <tr> <td> </td> <td> </td> <td> </td> </tr> </table>		NO.	REVISION DESCRIPTION	DATE													
NO.	REVISION DESCRIPTION	DATE																	
<p><b>PSOMAS</b> Professional Engineer No. E. License No. 8853, State of AZ (520) 242-1300 (520) 242-1292 (fax)</p>		<table border="1"> <tr> <th>DESIGNED:</th> <th>DATE</th> </tr> <tr> <td>SS</td> <td>04/11</td> </tr> <tr> <th>DRAWN:</th> <th>DATE</th> </tr> <tr> <td>PRE</td> <td>04/11</td> </tr> <tr> <th>CHECKED:</th> <th>DATE</th> </tr> <tr> <td>PS</td> <td>04/11</td> </tr> <tr> <th>PROJ. ENG.:</th> <th>DATE</th> </tr> <tr> <td>RTT</td> <td>04/11</td> </tr> </table>		DESIGNED:	DATE	SS	04/11	DRAWN:	DATE	PRE	04/11	CHECKED:	DATE	PS	04/11	PROJ. ENG.:	DATE	RTT	04/11
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SCALES: HORIZ. 1"=100'  
VERT. N/A

SHEET RW4 OF RW4

FIGURE 3-1

### 3.9 Existing Vegetation and Landscaping

The Valencia Road corridor traverses Sonoran Desert Scrub plant community. A majority of the corridor has seen some level of disturbance resulting in a revegetation of native and non-native plant material. Vegetation commonly occurring includes scattered mesquite, foothill palo verde, creosote, desert broom, Englemann prickly pear, barrel cactus, and mixed grasses. Vegetation adjacent to developed and disturbed areas includes a mix of native and non-native species. Noxious weeds are present throughout the project area.

### 3.10 Biological Resources

The project area is located in on the northern edge of the range for the endangered Pima pineapple cactus (PPC). Surveys were conducted in October 2010. No PPC or evidence of plants was observed within the project area. Other special status species including the western burrowing owl and cliff swallows, both listed under the Migratory Bird Treaty Act (MBTA) were not found in the project area. Other non-federally listed bat species were not observed at project area bridges, underpasses, or drainage culverts. Though the cactus ferruginous pygmy owl (CFPO) is not listed with the U.S. Fish and Wildlife Service (USFWS), it remains on the Arizona Game and Fish Department (AGFD) special status species list and the County's Priority Vulnerable Species List. Protocol surveys for CFPO of the project area were completed in 2010. No CFPOs were detected during surveys.

### 3.11 Archaeological and Historic Resources

A cultural resources survey of the project area was conducted to evaluate the project's potential to affect archeological properties listed in or eligible for listing in the National Register of Historic Places (NRHP). The survey of the project area resulted in the identification of three previously recorded historic-age sites/structures, one newly recorded archeological site, and ten isolated occurrences. The previously recorded historic-age sites/structures are (1) outside of the project area, (2) considered non-contributing components of the site's NRHP eligibility, or (3) an active pipeline currently exempt from National Historic Preservation Act (NHPA) Section 106. The newly recorded archeological site and isolated occurrences are recommended to be not eligible for listing. One of the isolated occurrences is a roadside memorial for which the Pima County Department of Transportation (PCDOT) has special procedures to follow in the event that such a feature will be disturbed by the project.

Because no properties listed in or eligible for the Arizona Register of Historic Places (ARHP) or NRHP will be affected, the Pima County Cultural Resources and Historic Preservation Office made a determination of no historic properties affected. The Pima County cultural resources consultation process has been completed and no treatment measures need to be implemented prior to construction of the proposed project.

### 3.12 Visual Resources

The existing Valencia Road corridor from Alvernon Way to Wilmot Road has open vistas to all four surrounding Tucson mountain ranges, flat topography, native vegetation, and high voltage overhead power lines. Valencia Road is designated as a Scenic Route as part of the Pima County *Major Streets and Scenic Routes (MS&SR) Plan*.

The Pima County MS&SR Plan defines a Scenic Route as "defining the community's character, has unique and significant views of the mountains." This definition accurately describes Valencia Road. The visual appearance of a Scenic Route should contribute to a unique driving experience.

More than half of the corridor is currently undeveloped. The south side of the corridor from Alvernon Way to Benson Highway/Swan Road is undeveloped. The majority of the north side is developed and includes Desert View High School, Desert Vista Terrace (a high-density residential development with typical lot sizes of 1/10 acre), a commercial development and a section that is undeveloped. Long range views of the Tucson Mountains, Catalina Mountains, Rincon Mountains and Santa Rita Mountains are maintained through this portion of the corridor.

The south side of the corridor from Benson Highway/Swan Road to Littletown Road is developed and includes Valstate II and Empire Vista (are high-density residential developments) with typical lot sizes of 1/10 acre), a commercial development and a section that is undeveloped. The north side of the corridor is undeveloped. Views of the interchange with I-10 are present on both the north and south sides of the corridor. Long range views of the Catalina Mountains, Rincon Mountains and Santa Rita Mountains are maintained through this portion of the corridor.

The south side of the corridor from Littletown Road to Wilmot Road is largely undeveloped other than the Pima Air and Space Museum. The corridor boasts the unique visual resource of the Pima Air and Space Museum. The Valencia Road corridor and has an unobstructed view of the airplane collection from the roadway. The north side of the corridor is undeveloped. The runway for Davis-Monthan Air Force Base (DMAFB) is located approximately 1200 feet north of the corridor. Long range views of the Tucson Mountains, Catalina Mountains, Rincon Mountains and Santa Rita Mountains are maintained through this portion of the corridor.

### 3.13 Existing Land Use

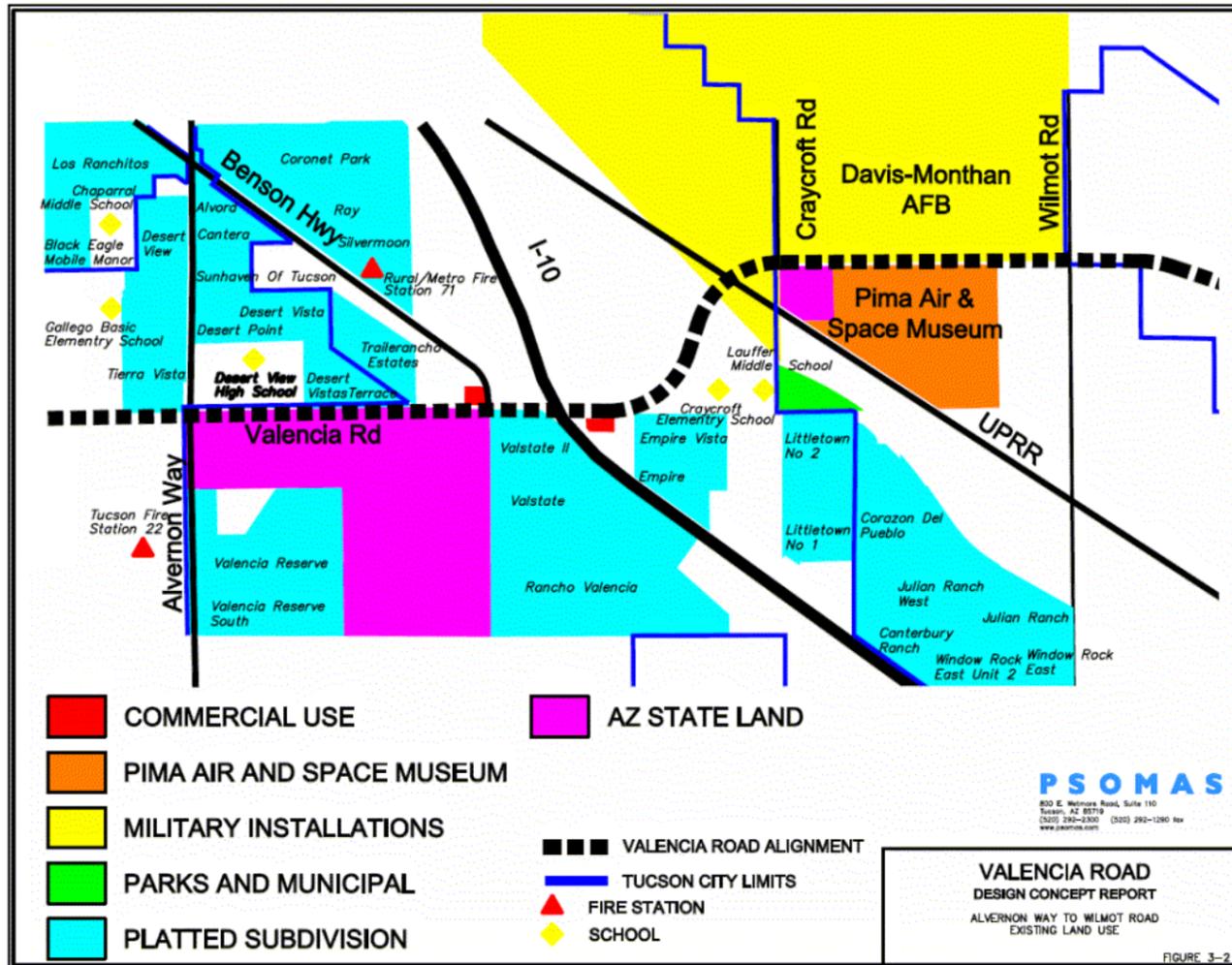
The existing land use along Valencia Road is varied with residential developments, commercial developments, DMAFB, Pima Air and Space Museum and vacant lands present along the corridor. Figure 3-2 illustrates the existing land uses in the project area.

Along Valencia Road, land use on both sides of the road from Alvernon Way to Craycroft Road alternates between residential, commercial and vacant land. Between Craycroft Road and Wilmot Road the north side is occupied by DMAFB and on the south are the Pima Air and Space Museum and vacant land. The major residential subdivisions along the corridor include:

#### *Major Residential Subdivisions*

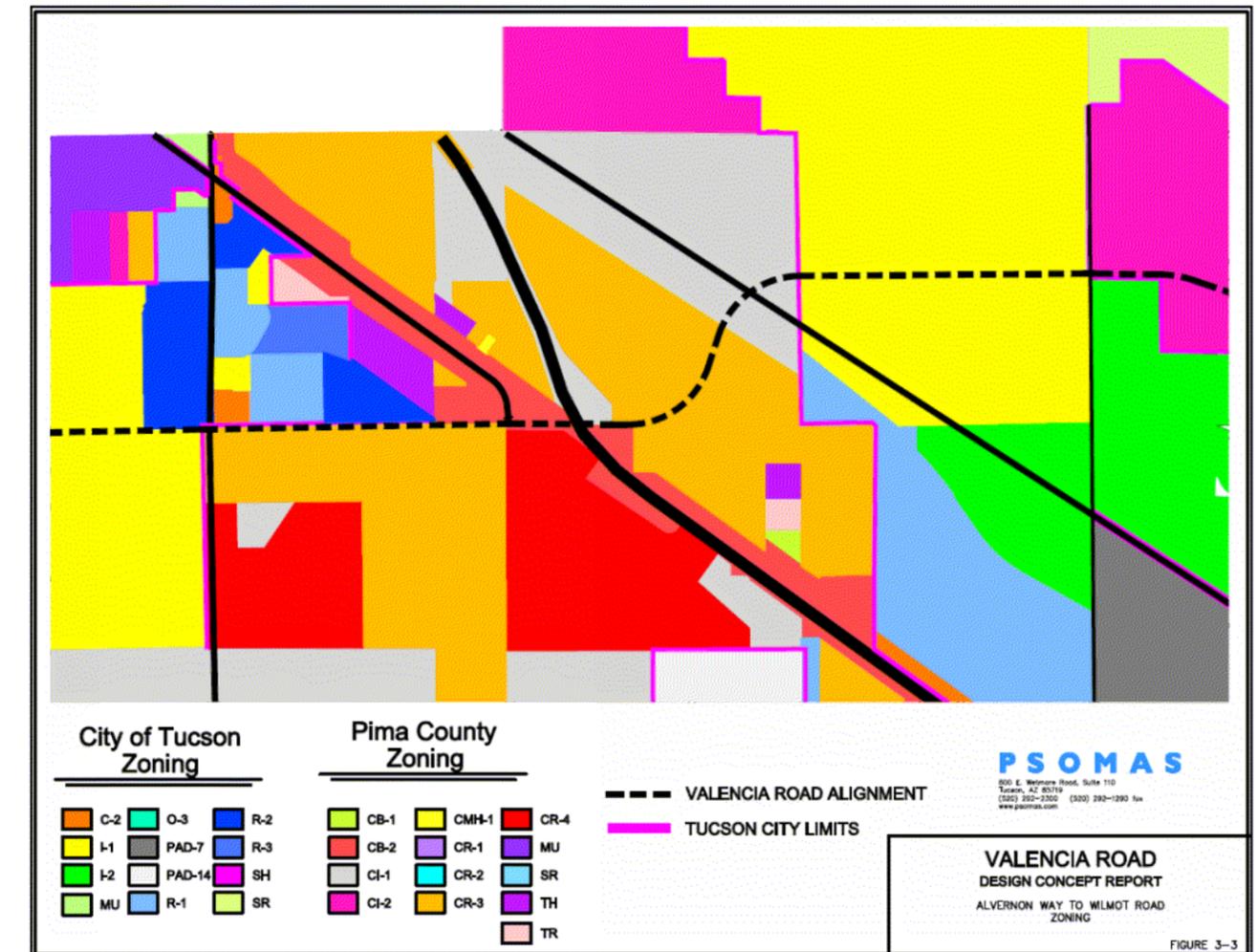
- Desert Terrace Vista
- Valstate II
- Empire Vista

On the south side of Valencia Road between Alvernon Way and Benson Highway/Swan Road, the land is owned by the State of Arizona. The land owned by the state totals approximately 468 acres.



**3.15 Current Zoning**

Figure 3-3 shows the current zoning for the area bounded by Alvernon Way to the west, Wilmot Road to the east and approximately one mile north and south of Valencia Road. Table 3-1 lists the approximate acreage of the major zoning classifications found in the immediate area surrounding Valencia Road.



**3.14 Future Land Use**

The southeast area of Tucson is a growing area. The Regional Transportation Plan estimates that the Pima County population will grow from one million today to 1.5 million by 2030. The area in the vicinity of Valencia Road is expected to accommodate that growth in population.

The future development of this area will be guided by the Pima County Comprehensive Land Use Plan, Rincon Southeast/Santa Rita Subregion, which was adopted by the Pima County Board of Supervisors on October 13, 1992 and readopted on December 18, 2001. The subregion covers 400 square miles, with the majority being rural and sparsely populated.

High intensity industrial and park-industrial planned land use respond to existing development patterns within or adjacent to the I-10 corridor and DMAFB, which are located within the project corridor.

**Table 3-1. Zoning in the Area of Valencia Road**

Zoning	Description	Area (Acres)
CB-2	General Business	235
CI-1	Light Industrial/Warehousing	432
CI-2	General Industrial	436
CR-3	Residential, Lots > 8,000 SF	795
CR-4	Residential Mixed Dwelling, Lots > 7,000 SF	267
C-2	Commercial, Medium Density	10
I-1	Light Industrial (City of Tucson)	1575
I-2	Heavy Industrial (City of Tucson)	438
R-1	School (City of Tucson)	39
R-2	Residential, Lots > 5,000 SF (City of Tucson)	34

As shown in the table, the majority of the land in the vicinity of Valencia Road is currently zoned for industrial uses. A large portion of the area zoned industrial is occupied by DMAFB, the Pima Air and Space Museum and a National Guard Recruiting Center. The industrial zoning is generally located along the I-10 corridor north of Valencia Road and east of the UPRR.

Residential zonings include Single Family Residence (CR-3), Single & Multi-Family Residence (CR-4) and Medium Density Residential (R-2). Desert View High School has a residential zoning (R-1) associated with the parcel. Residential zoning is scattered along the corridor from Alvernon Way to the Julian Wash.

The remainder of the land is zoned commercial (CB-2 & C-2). The commercial zoning is located at the northeast corner of Valencia Road and Alvernon Way, the northwest corner of Valencia Road and Benson Highway and the northwest and southeast corners of Valencia Road and I-10.

**3.16 Proposed Developments**

There is one property, owned by Diamond Ventures and located north of Valencia Road near the Littletown Road intersection that is beginning the development process. Littletown Road will be completely realigned as part of the proposed project in accordance with a development agreement with Diamond Ventures.

**3.17 Potentially Affected Community Facilities**

Desert View High School is located on the north side of Valencia Road, approximately 700 feet east of Alvernon Way. Lauffer Middle School is on Littletown Road approximately one-quarter mile east of Valencia Road. Craycroft Elementary School is on Littletown Road just east of Lauffer Middle School.

Thomas Jay/Littletown Regional Park, a recreational area that includes outdoor playing fields, basketball courts and a recreation center, is located one-half a mile east of Valencia Road on Littletown Road.

Rural/Metro Fire Department’s Station 71 is in the vicinity of the project, as it is located on the north side of Benson Highway approximately one-half mile northwest of the intersection of Valencia Road and Benson Highway.

Pima Air and Space Museum is located on the south side of Valencia Road approximately 1000 feet east of Craycroft Road.



**Pima Air and Space Museum**

**3.18 Public Lands within the Project Area**

Public lands adjacent to the Valencia Road project include:

- 468 acres owned by the State of Arizona on the south side of Valencia Road between Alvernon Way and Swan Road
- Nine acres owned by Pima County on the south side of Valencia Road between Julian Wash and UPRR
- 313 acres owned by the United States of America on the north side of Valencia Road between Craycroft Road and Wilmot Road (DMAFB)
- 20 acres owned by the State of Arizona at the southeast corner of Valencia Road and Craycroft Road (National Guard Recruiting Center)
- 204 acres owned by Pima County on the south side of Valencia Road approximately 1000 feet east of Craycroft Road (Pima Air and Space Museum)

**3.19 Tribal Lands**

There are no tribal lands within the project area.

### 3.20 Intergovernmental and Development Agreements

An intergovernmental agreement (IGA) between Pima County and the RTA is in place for the design and construction of the Valencia Road improvements. In addition, approximately 1.8 miles of Valencia Road are within City of Tucson jurisdiction. Although an agreement is not in place yet, an IGA will be executed between the two entities prior to construction, as the City of Tucson will contribute \$3 million for the construction of the segment between Alvernon Way and Kolb Road.

Littletown Road will be completely realigned as part of the proposed project in accordance with a development agreement with Diamond Ventures.

In addition to the agreements mentioned, coordination between the project team, ADOT and UPRR will continue during the project development.

**CHAPTER 4  
TRAFFIC AND ACCIDENT DATA**

**4.1 Traffic Analysis**

**Source of Data**

The primary source of data is the *Traffic Engineering Report Valencia Road, Alvernon Way to Wilmot Road*, prepared by Psomas as part of this project. Additional sources of traffic data referenced in the *Traffic Engineering Report* include:

- *Littletown Road and Valencia Road Traffic Signal Warrant Analysis*. PCDOT, Traffic Engineering Division, December 2010.
- Regional Transportation Authority Plan, 2006.
- *Major Streets and Scenic Routes Plan*. Pima County, 2009.
- *Major Streets and Routes Map*. City of Tucson, 2008.
- *Tucson Metro Bike Map*. PCDOT, December 2010.
- *New South Gate Transportation Engineering Study, Davis-Monthan Air Force Base, Arizona*. Environmental Consulting and Training Services, Wilbur Smith Associates, Mayes and Associates PLC, June 2007.

In addition, Pima County and ADOT provided recent traffic volume counts for the project area. Additional daily volumes and turning movement counts were collected by Pima County for this project in November 2010. Further, a classification count was conducted on Valencia Road in December 2010. Speed study results were also provided by Pima County and ADOT.

**Traffic Data**

**Existing Conditions**

Figure 4-1 shows the Average Daily Traffic (ADT) and peak hour volumes for Valencia Road and the major side streets in the project area. As shown in the Figure, the ADT on Valencia Road was found to be 26,488 vehicles per day west of I-10, and 24,613 vehicles per day east of I-10. The AM and PM peak hours were found to be from 7:15 AM to 8:15 AM and from 4:00 PM to 5:00 PM, respectively.

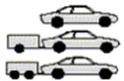
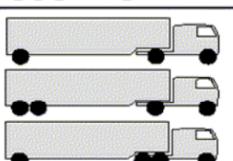
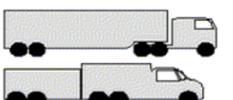
In addition to the characteristics described above, Table 4-1 shows the K and D factors for the peak hour of travel. K is the percent of ADT in the peak hour and D is the directional distribution during the peak hour. The statistics are shown for Valencia Road based on volumes at two locations; one west of I-10 and one east of I-10. Also note that the direction of travel shown in the table refers to the direction on each roadway that carries the higher volume during a 24-hour period.

**Table 4-1  
Existing K and D Factors During Peak Hour**

Roadway Segment	Direction of Travel	Peak Hour	K	D
Valencia Road, Alvernon Way to I-10	EB	PM	0.08	0.67
Valencia Road, I-10 to Wilmot Road	WB	AM	0.09	0.65

original ADOT data is shown in Table 4-2, and the adjusted percentages are shown in Table 4-3. The classification data for Valencia Road east of I-10 (near the Pima Air and Space Museum) is shown in Table 4-4.

**Table 4-2  
Existing Vehicle Classification, Valencia Road West of I-10**

Class	Type	Vehicle Type	Class Percentage	
1	Cars		Motorcycles	0.96%
2			Passenger cars, cars with 1- or 2-axle trailers	71.36%
3	LT (Light Truck)		Pick-ups, vans	15.62%
4	Bus		Buses	4.03%
5	MT (Medium Trucks)		2-axle Single Unit Truck	3.04%
6			3-axle Single Unit Truck	0.50%
7			4-axle Single Unit Truck	0.04%
8	TS (Tractor Semi-Trailer)		4 or fewer axle, single trailer	3.30%
9	TT (Tractor-Trailer)		5-axle single trailer	0.55%
10			6 or more axles, single trailer	0.01%
11	TST (Tractor Semi-Trailer Trailer)		5-axle multi-trailer	0.34%
12			6-axle multi-trailer	0.26%
<b>TOTAL</b>			<b>100.0%</b>	

The truck percentage and overall vehicle composition was obtained by performing a vehicle classification count on Valencia Road near the Pima Air and Space Museum. Additional classification data for Valencia Road west of I-10 (between Benson Highway and I-10) was provided by ADOT. The ADOT data indicated a bus percentage of 4%, which seems unreasonably high, and was adjusted for use in noise and pavement design analyses. The

**Table 4-3**  
**Adjusted Vehicle Classification, Valencia Road West of I-10**

Type	Class	Original Percentage	Adjusted Percentage
Cars (1 and 2)	1, 2	72.3%	72.3%
Light Truck	3	15.6%	19.0%
Bus	4	4.0%	0.6%
Medium Trucks	5, 6, 7	3.6%	3.6%
Tractor Semi-Trailer	8	3.3%	3.3%
Tractor-Trailer	9, 10	0.6%	0.6%
Tractor Semi-Trailer Trailer	11, 12	0.6%	0.6%

**Table 4-4**  
**Existing Vehicle Classification, Valencia Road East of I-10**

Class	Type	Vehicle Type	Class Percentage
1	Cars	Motorcycles	0.22%
2		Passenger cars, cars with 1- or 2-axle trailers	72.92%
3	LT (Light Truck)	Pick-ups, vans	22.03%
4	Bus	Buses	0.18%
5	MT (Medium Trucks)	2-axle Single Unit Truck	1.06%
6		3-axle Single Unit Truck	1.48%
7		4-axle Single Unit Truck	0.24%
8	TS (Tractor Semi-Trailer)	4 or fewer axle, single trailer	0.46%
9	TT (Tractor-Trailer)	5-axle single trailer	1.06%
10		6 or more axles, single trailer	0.09%
11	TST (Tractor Semi-Trailer Trailer)	5-axle multi-trailer	0.27%
12	TST (Tractor Semi-Trailer Trailer)	6-axle multi-trailer	0.00%
<b>TOTAL</b>			100.0%

**Future Conditions**

The future traffic volumes were calculated for the design year of 2035. The 2040 PAG projections indicated a 4.5% per year growth rate for the area, which appears to be excessively high given the significant portion of the land in the area that is already developed or cannot be developed because of institutional uses such as the DMAFB. Therefore, projections were based on a growth rate developed using historic traffic volumes from two Pima County permanent counter stations along Valencia Road. Based on the historic volumes, a 1.9% per year growth rate was used for the 2035 volume projections.

The 1.9% per year growth is expected to include traffic generated by new developments along the corridor. In addition, the proposed new gate for DMAFB on Wilmot Road is expected to generate a significant amount of traffic. Based on information in the *New South Gate Transportation Engineering Study*, submitted in June 2007, the new gate is not expected to change volumes on Valencia Road in the project area. However, the gate will likely add significant volumes on Wilmot Road north and south of Valencia Road, and the traffic patterns at the intersection of Valencia Road and Wilmot Road are expected to change significantly. In order to plan for the construction of the new gate (expected to occur in the next five years), the DMAFB Wilmot gate volumes (calculated using percentages from the original report) were added to the projected 2035 volumes. The derivation of the DMAFB volumes is detailed in the traffic report for this project. Figure 4-2 illustrates the projected 2035 traffic volumes (daily and peak hour) for Valencia Road.

**Traffic Operational Analysis**

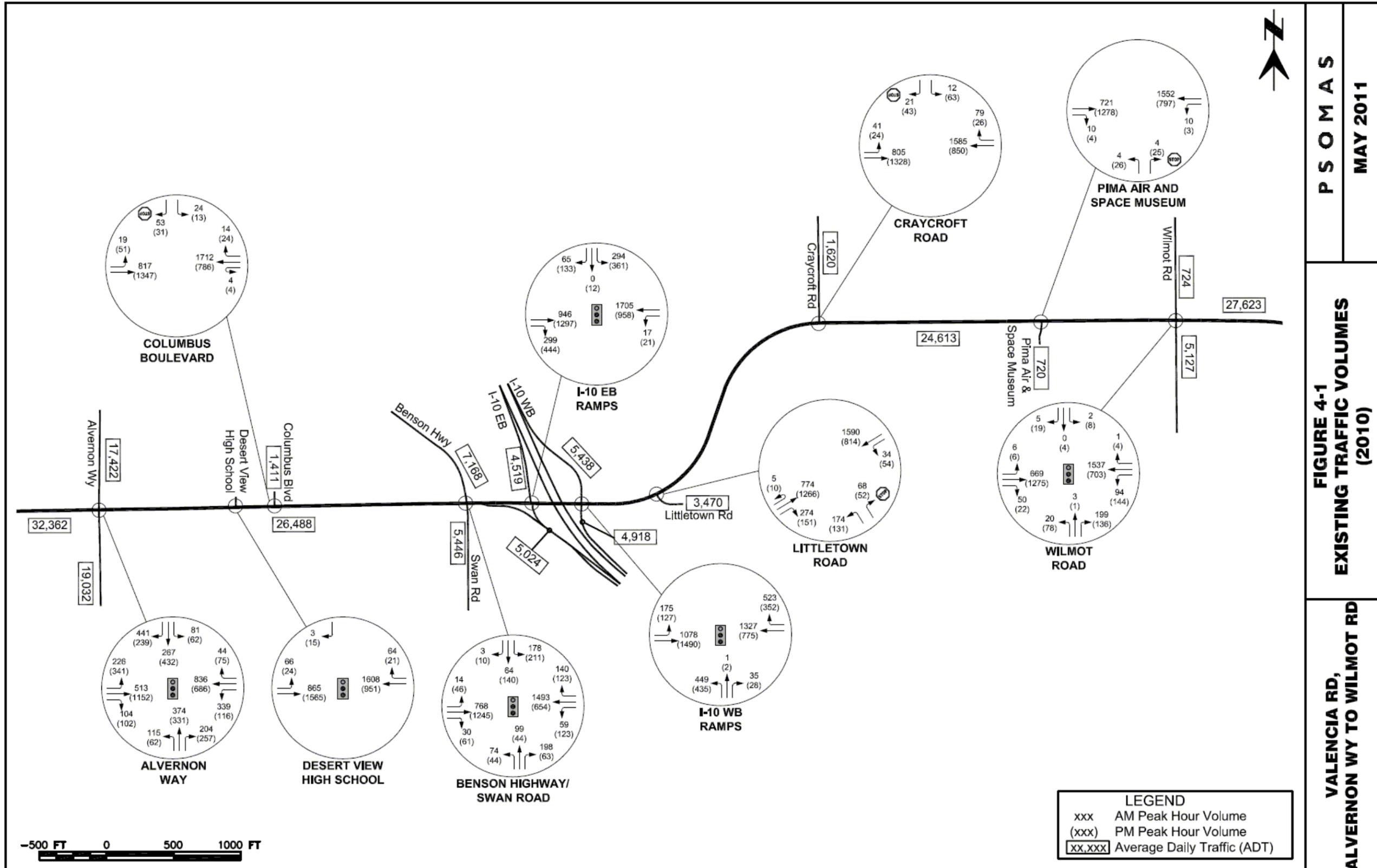
**Existing Conditions**

Level of Service (LOS) is a quality measure describing operational conditions within a traffic stream, generally in terms of travel speed (for arterials), density (for freeways), and delays (for intersections). LOS ranges from A to F, with A representing the best operating conditions and F representing the worst. The LOS at the existing major intersections in the project area was analyzed using *Synchro* for both the AM and PM peak hours. The LOS for unsignalized intersections is shown in Table 4-5, and the LOS for signalized intersections is shown in Table 4-6.

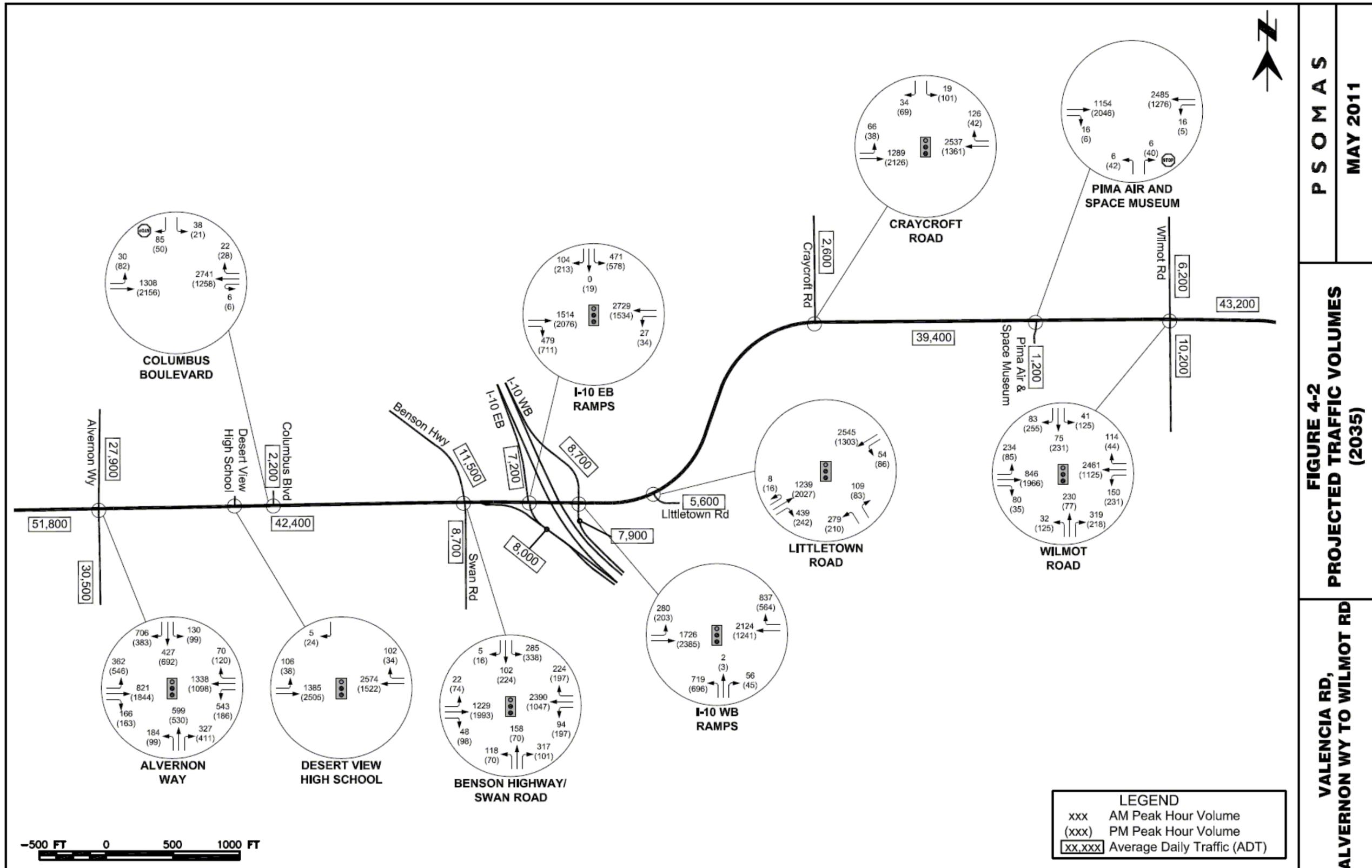
Intersection LOS is not defined for unsignalized intersections, but individual movements that experience delay (such as those that are stop controlled) do have a defined LOS. As seen in Table 4-5, the southbound left turns at Columbus Boulevard and northbound left turns at Littletown Road currently operate at LOS F in the AM peak hour. All other movements operate with acceptable levels of service in both peak hours.

As shown in Table 4-6, all of the signalized intersections currently operate at LOS C or better in both peak hours. The only movement that operates at LOS F is the eastbound left turns at the I-10 westbound ramps. All of the other movements operate at LOS E or better in both peak hours, with a vast majority operating at LOS D or better.

A preliminary traffic signal warrant evaluation was conducted for three of the major unsignalized intersections, as shown in Figure 4-3. Pima County conducted a signal warrant analysis for the intersection of Valencia Road and Littletown Road in December 2010, which found that a signal was warranted at the intersection and recommended that the signal be installed with the construction of this project. The analysis of warrant 3B for the other three intersections found that under current conditions, the intersection of Valencia Road and Craycroft Road meets the signal warrant, but the intersections at Columbus Boulevard and the Pima Air and Space Museum do not. It should be noted that meeting a warrant is a necessary but not in itself sufficient condition for installing a traffic signal. From Section 4C.01 in the *MUTCD*, "The satisfaction of a traffic signal warrant or warrants shall not in itself require the installation of a traffic control signal."



**PSOMAS**  
**MAY 2011**  
**FIGURE 4-1**  
**EXISTING TRAFFIC VOLUMES**  
**(2010)**  
**VALENCIA RD,**  
**ALVERNON WY TO WILMOT RD**



**Table 4-5  
Existing Unsignalized Intersection Level of Service**

<i>Columbus Boulevard and Valencia Road</i>													
Eastbound				Westbound			Northbound			Southbound			Total
	LT	TH	RT	U-Turn	TH	RT	LT	TH	RT	LT	TH	RT	Intersection
AM	LOS	C											C
	Delay	17.2											61.2
PM	LOS	B											C
	Delay	10.1											23.7

<i>Littletown Road and Valencia Road</i>													
Eastbound				Westbound			Northbound			Southbound			Total
	U-Turn	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT	Intersection
AM	LOS			B			F			A			A
	Delay			10.4			75.2			9.4			5.7
PM	LOS			B			E			B			A
	Delay			11.8			37.9			10.9			0.1

<i>Craycroft Road and Valencia Road</i>													
Eastbound				Westbound			Northbound			Southbound			Total
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT	Intersection
AM	LOS	C											D
	Delay	17.3											32.5
PM	LOS	B											D
	Delay	10.2											27.6

<i>Pima Air and Space Museum and Valencia Road</i>													
Eastbound				Westbound			Northbound			Southbound			Total
	U-Turn	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT	Intersection
AM	LOS			A			C			B			
	Delay			9.4			21.9			11.0			
PM	LOS			B			D			C			
	Delay			12.4			32.9			15.1			

**Table 4-6  
Existing Signalized Intersection Level of Service**

<i>Alvernon Way and Valencia Road</i>														
Eastbound				Westbound			Northbound			Southbound			Total	
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT	Intersection	
AM	LOS	C	C	A	B	C	C	D	D	A	D	D	B	C
	Delay	20.4	20.3	4.6	18.8	20.5	20.5	41.6	49.2	8.9	42.5	44.6	10.1	23.9
PM	LOS	C	C	A	C	B	B	D	D	A	D	D	A	C
	Delay	27.1	28.5	6.6	22.6	19.5	19.5	42.3	46.5	9.3	37.6	51.2	9.3	27.8

<i>Desert View High School and Valencia Road</i>														
Eastbound				Westbound			Northbound			Southbound			Total	
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT	Intersection	
AM	LOS	B					A	A					A	A
	Delay	19.4					9.9	1.6					5.7	6.8
PM	LOS	B					A	A					A	A
	Delay	15.2					9.2	3.6					0.1	3.9

<i>Benson Highway/Swan Road and Valencia Road</i>														
Eastbound				Westbound			Northbound			Southbound			Total	
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT	Intersection	
AM	LOS	A	B	A	A	B	A	D	D	A	E	C	B	B
	Delay	8.8	11.2	3.6	7.6	17.3	4.0	37.4	36.7	6.8	55.1	34.9	20.0	17.8
PM	LOS	A	B	A	C	B	A	D	D	A	E	D	B	B
	Delay	6.3	15.8	3.8	22.9	11.5	2.2	38.0	35.3	9.3	59.5	40.2	16.9	19.2

<i>I-10 EB Ramps and Valencia Road</i>														
Eastbound				Westbound			Northbound			Southbound			Total	
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT	Intersection	
AM	LOS		B		A	C				D	D	A	C	
	Delay		18.2		3.4	30.5				39.7	39.7	7.6	26.9	
PM	LOS		C		A	B				D	D	A	C	
	Delay		23.0		7.2	11.3				49.2	49.2	6.1	21.6	

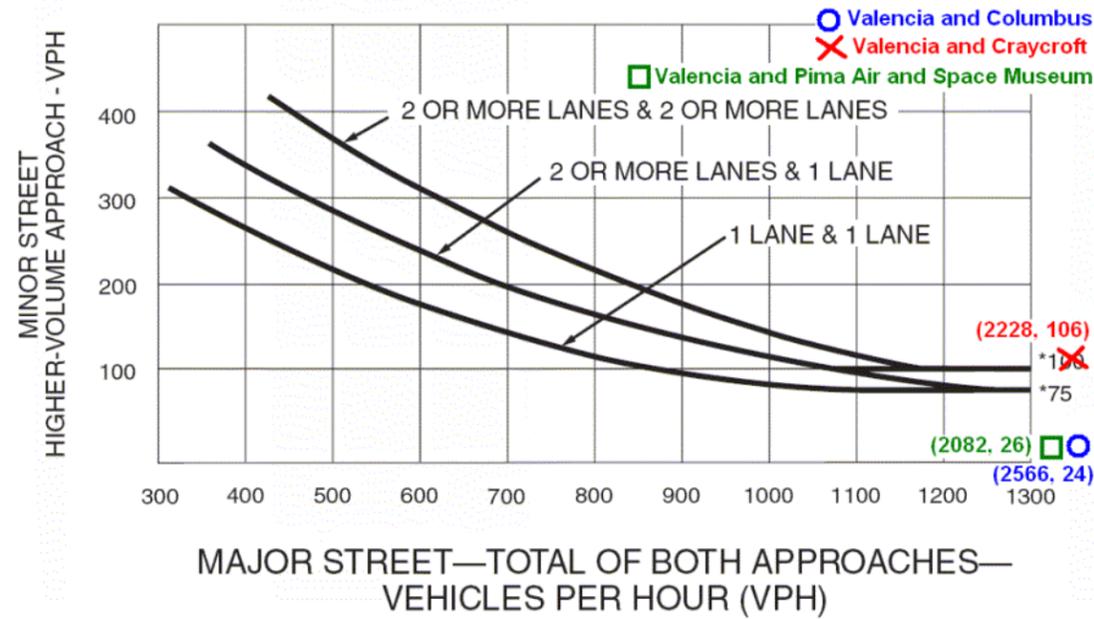
  

<i>I-10 WB Ramps and Valencia Road</i>														
Eastbound				Westbound			Northbound			Southbound			Total	
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT	Intersection	
AM	LOS	F	B				C	A	E	E	A			C
	Delay	149.7	10.1				24.3	8.9	72.2	72.2	9.4			29.8
PM	LOS	A	B				B	A	E	E	B			C
	Delay	5.7	14.0				16.5	2.5	67.6	67.6	10.2			20.3

<i>Wilmot Road and Valencia Road</i>														
Eastbound				Westbound			Northbound			Southbound			Total	
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT	Intersection	
AM	LOS	A	A	A	A	A	A	B	B	B	B	B	B	A
	Delay	5.3	5.4	5.4	6.4	9.9	9.9	10.1	10.1	10.1	18.3	18.3	18.3	8.6
PM	LOS	A	A	A	D	A	A	D	D	D	B	B	B	B
	Delay	5.7	8.8	8.8	54.6	6.3	6.3	35.1	35.1	35.1	16.5	16.5	16.5	13.2

**Figure 4-3**  
**Evaluation of MUTCD Signalization Warrant 3B under Existing Conditions**



In addition, an analysis was conducted for the I-10 ramp intersections on Valencia Road. ADOT is in the process of developing a corridor study which will evaluate the need for additional freeway lanes as well as potential interchange relocation/reconstruction/improvements. Because the study is in the early planning stages, it is not yet known which type of interchange will be proposed at Valencia Road. Therefore, an analysis was completed in the *Traffic Engineering Report* to determine what interim improvements might be needed at the interchange to maintain efficient operations. It was found that the interchange will operate with acceptable delays through 2025 assuming the six-lane Valencia Road has been constructed. After 2025, the addition of an exclusive left-turn lane on each ramp will alleviate delays to allow the interchange to continue to operate efficiently through 2035. It was assumed that each ramp will have an exclusive left-turn lane, a shared thru/left-turn lane, and an exclusive right-turn lane for the overall 2035 analysis.

Table 4-8 presents the projected 2035 LOS for the signalized intersections along Valencia Road. As shown in the table, all of the signalized intersections will operate at LOS D or better in both peak hours with the project. Further, no individual movements are expected to operate at LOS F.

**Future Conditions**

The 2035 LOS in the project area was evaluated assuming that the project will be in place, which will include new traffic signals at the intersections of Valencia Road/Littletown Road and Valencia Road/Craycroft Road as well as turn lanes at intersections throughout the project. All existing turn lanes will be maintained, and dual southbound left-turn lanes will be added at the intersection of Valencia Road/Benson Highway/Swan Road. Further, new turn lanes (as shown in Table 4-7) were assumed to be in place with this project. The future LOS for the no-build alternative is presented in the *Traffic Engineering Report*.

**Table 4-7**  
**Turn Lane Warrant Analysis**

Intersection	Movement	ADT	Turn Movement Volume	Required Volume	Warrant Met?
Valencia Road and Craycroft Road	WB RT	39,400	126	40	Yes
	SB LT	2,600	101	40	Yes
Valencia Road and Wilmot Road	EB RT	39,400	80	40	Yes
	WB RT	43,200	114	40	Yes
	NB LT	10,200	125	10	Yes
	NB RT	10,200	319	40	Yes
	SB LT	6,200	125	10	Yes
	SB RT	6,200	255	70	Yes

**Table 4-8**  
**2035 Signalized Intersection Level of Service**

		Alvernon Way and Valencia Road												Total Intersection
		Eastbound			Westbound			Northbound			Southbound			
		LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT	
AM	LOS	D	D	A	D	D	A	C	D	A	D	D	D	D
	Delay	46.6	35.5	6.0	53.8	43.5	6.7	34.5	53.8	7.9	35.3	49.6	54.7	42.4
PM	LOS	D	C	A	E	D	A	D	D	C	C	D	B	D
	Delay	50.7	34.4	9.5	57.3	37.9	6.1	52.7	48.4	25.5	33.7	51.6	18.6	37.8

		Desert View High School and Valencia Road												Total Intersection
		Eastbound			Westbound			Northbound			Southbound			
		LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT	
AM	LOS	B				B	A						B	B
	Delay	17.3				19.6	2.6						14.4	12.7
PM	LOS	B				B	A						A	A
	Delay	13.9				13.9	3.5						9.8	5.6

		Benson Highway/Swan Road and Valencia Road												Total Intersection
		Eastbound			Westbound			Northbound			Southbound			
		LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT	
AM	LOS	B	C	A	C	D	B	C	D	D	D	C	B	D
	Delay	16.3	24.1	6.5	23.6	49.3	11.3	27.1	46.0	50.7	54.3	33.8	17.4	39.8
PM	LOS	B	D	B	D	B	A	C	D	B	D	D	B	C
	Delay	12.3	40.2	10.9	35.9	16.7	2.9	32.6	54.3	17.9	54.6	54.1	16.1	33.0

		I-10 EB Ramps and Valencia Road												Total Intersection
		Eastbound			Westbound			Northbound			Southbound			
		LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT	
AM	LOS		C		A	A					D	D	C	C
	Delay		34.1		3.0	9.3					42.7	42.7	31.3	20.8
PM	LOS		D		A	A					D	D	C	C
	Delay		37.1		8.1	6.2					39.0	38.2	27.5	26.0

**Table 4-8 (cont'd)**  
2035 Signalized Intersection Level of Service

		I-10 WB Ramps and Valencia Road												Total Intersection
		Eastbound			Westbound			Northbound			Southbound			
		LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT	
AM	LOS	D	A			E	B	D	D	B				C
	Delay	53.9	3.3			60.3	12.2	53.8	53.9	20.0				34.6
PM	LOS	B	A			C	A	D	D	C				B
	Delay	15.3	5.6			26.3	5.1	42.8	43.2	22.2				16.2

		Littletown Road and Valencia Road												Total Intersection
		Eastbound			Westbound			Northbound			Southbound			
		U-Turn	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT	
AM	LOS	B	A	A	A	A		D		D				A
	Delay	15.0	8.9	1.7	3.3	3.2		48.7		48.7				8.4
PM	LOS	A	B	A	C	A		D		B				A
	Delay	7.8	10.6	1.4	28.2	1.5		54.3		13.6				9.9

		Craycroft Road and Valencia Road												Total Intersection
		Eastbound			Westbound			Northbound			Southbound			
		LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT	
AM	LOS	C	A			A	A				C		C	A
	Delay	29.5	2.0			9.7	1.0				26.4		24.6	7.5
PM	LOS	A	A			A	A				C		B	A
	Delay	4.2	3.8			6.7	2.6				27.7		10.7	5.6

		Wilmot Road and Valencia Road												Total Intersection
		Eastbound			Westbound			Northbound			Southbound			
		LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT	
AM	LOS	E	B	A	B	D	B	D	E	C	D	D	B	D
	Delay	62.7	10.7	3.8	10.3	49.4	11.2	36.7	75.3	24.8	41.8	45.8	11.0	38.8
PM	LOS	B	C	B	D	B	A	D	D	A	D	D	C	C
	Delay	14.1	34.8	12.6	43.3	19.2	6.6	49.4	40.6	8.0	35.7	55.0	27.6	30.4

Table 4-9 shows the delays for the unsignalized intersections along Valencia Road. As shown, the left turns from the minor streets (Columbus Boulevard and the Pima Air and Space Museum driveway) will operate with significant delays. However, drivers have the option of making a right-turn then making a u-turn at the nearest intersection. It should also be noted that simulations in *SimTraffic*, which better reflects available gaps as a result of nearby signals, show shorter delays for those movements (although they are still operating at LOS F). Because signal warrants are not expected to be met at either intersection, and because of the proximity of each intersection to a signalized intersection, it is not recommended that a signal be installed at either intersection.

**Table 4-9**  
2035 Unsignalized Intersection Level of Service

		Columbus Boulevard and Valencia Road											
		Eastbound			Westbound			Northbound			Southbound		
		LT	TH	RT	U-Turn	TH	RT	LT	TH	RT	LT	TH	RT
AM	LOS	E									F		D
	Delay	49.5									813.3		29.1
PM	LOS	B									E		B
	Delay	14.2									40.4		12.5

		Pima Air and Space Museum and Valencia Road											
		Eastbound			Westbound			Northbound			Southbound		
		U-Turn	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
AM	LOS				B			D		B			
	Delay				11.9			32.0		11.3			
PM	LOS				C			F		C			
	Delay				21.1			175.1		16.5			

#### 4.2 Accident Analysis

##### Source of Data

Psomas obtained crash data from Pima County for the latest available three-year period (April 2007 to March 2010) for the project area. Data near the interchange of I-10 and Valencia Road was taken from the ADOT database, and was missing some information (such as direction of travel), but included type of crash and crash severity. The location noted by the police officer was used to determine if a crash was intersection related.

##### Crash Data

The crash records for the intersections in the project area are summarized in the following tables. Additional crash information is provided in the *Traffic Engineering Report*.

Table 4-10 shows the crashes at the signalized intersections. Approximately 62% of the signalized intersection crashes were rear-end crashes. The next most common type of crash was left-turn crashes (14%), followed by angle crashes (13%). Note that the crashes at the intersection of Wilmot Road and Valencia Road were split into two periods; the first is the period from April 2007 until the month before a traffic signal was installed at the intersection (June 2007), and the second is from the time the signal was installed (July 2007) until March 2010.

During the three-year period of the data, the highest number of crashes occurred at the intersection of Valencia Road and Alvernon Way, where 40% of the crashes were left turn or angle collisions. Safety and capacity improvements at the Alvernon Way and Valencia Road intersection have been designed and is currently advertised for constructed. Those improvements include dual left-turn lanes with striped gores for improved visibility, protected-only left-turn phasing, and increased turn lane storage. At each of the signalized intersections, rear-end crashes were the most common type of crash.

**Table 4-10**  
**Summary by Crash Type – Signalized Intersections**

Intersection	Angle	Left Turn	Sideswipe	Rear End	Single Vehicle	Head-On	Bicycle/Pedestrian	Other	Total Crashes
Alvernon Way	5	9	2	16	2	0	1	0	35
Benson Highway/Swan Road	2	3	1	18	0	0	1	0	25
I-10 EB Ramps	2	0	1	13	0	0	0	0	16
I-10 WB Ramps	4	0	1	13	1	0	0	1	20
Wilmot Road (Jul 2007 - Mar 2010)	1	3	0	6	0	0	0	0	10
<b>TOTAL</b>	<b>14</b>	<b>15</b>	<b>5</b>	<b>66</b>	<b>3</b>	<b>0</b>	<b>2</b>	<b>1</b>	<b>106</b>

Table 4-11 shows the crashes at the major unsignalized intersections as well as at the Jack in the Box driveways (located just east of the interchange). Because of the limited data that was available, crashes attributed to both driveways were included in the same total. Crashes at other unsignalized locations were included in the roadway segment crash summary.

The most common type of crashes at the unsignalized intersections were left turns (32%), followed by rear-ends (29%) and angle crashes (24%). Left turn crashes at unsignalized intersections likely occur when drivers attempt to make a turn from or onto the minor street without a sufficient gap in cross traffic. Further, angle crashes may have involved vehicles making right or left turns at a driveway or cross street, but with the limited data available, it is impossible to be certain about the nature of the crash. The highest number of angle crashes was at the intersection of Valencia Road with the Jack in the Box driveway and the highest number of left turn crashes was at the intersection of Valencia Road and Littletown Road.

**Table 4-11**  
**Summary by Crash Type – Unsignalized Intersections**

Intersection	Angle	Left Turn	Sideswipe	Rear End	Single Vehicle	Head-On	Bicycle/Pedestrian	Other	Total Crashes
Columbus Boulevard	1	0	0	0	0	0	0	0	1
Jack in the Box Driveways	6	0	1	2	1	0	0	0	10
Littletown Road	1	6	1	3	0	0	0	1	12
Craycroft Road	0	4	0	3	1	0	0	0	8
Wilmot Road (Apr 2007 - Jun 2007)	0	1	0	2	0	0	0	0	3
<b>TOTAL</b>	<b>8</b>	<b>11</b>	<b>2</b>	<b>10</b>	<b>2</b>	<b>0</b>	<b>0</b>	<b>1</b>	<b>34</b>

Tables 4-12, 4-13, and 4-14 present the crash rates and crash severity for signalized intersections, unsignalized intersections, and road segments, respectively. The crash rates were calculated using the following equations:

$$Crash\ Rate_{(Road\ segment)} = \frac{Crashes \times 10^6}{365 \times Period \times ADT \times Length} = Crashes / MVM$$

$$Crash\ Rate_{(Inter\ section)} = \frac{Crashes \times 10^6}{365 \times Period \times ADT_{(Entering)}} = Crashes / MVE$$

Because the volumes in the project area have remained relatively stable over the past few years, the existing ADT was used in the crash rate equations above. The severity index is calculated based on the following equation, which weighs fatal and injury accidents more heavily than property damage only crashes.

$$Severity\ Index = \frac{5.8 \times (C_F + C_I) + 2 \times (C_{NI} + C_P) + C_N}{Total\ Crashes}$$

Where,

- C<sub>F</sub> = Crashes with fatality
- C<sub>I</sub> = Crashes with incapacitating injury
- C<sub>NI</sub> = Crashes with non-incapacitating injury
- C<sub>P</sub> = Crashes with possible injury
- C<sub>N</sub> = Crashes without injury

From Table 4-12, each of the signalized intersections has a severity index near or above the Pima County average of 1.41. The highest is 1.91 at the intersection of Valencia Road and the I-10 eastbound ramps, followed by the intersection of Benson Highway/Swan Road and Valencia Road (1.55). There were no fatalities at signalized intersections in the project area between April 2007 and March 2010. The crash rate at each of the intersections is lower than the Pima County average of 0.96 crashes per Million Vehicles Entering (MVE), with the exception of the Wilmot Road/Valencia Road intersection, which has a crash rate of 1.03 per MVE. Comparisons of crash rates with Pima County averages are provided for reference, but should be used with care, as the crash rate is highly dependent on how each jurisdiction and reporting officer determines which crashes are attributable to an intersection.

The Pima County Priority Index Rank is also shown in the tables, when available. The rank is calculated based on crash frequency, crash rate, severity index, and volume. The four statistics are treated equally in importance. The highest rank for a priority index is 1. Pima County currently provides a priority index rank for 99 signalized intersections. The intersections of Alvernon Way/Valencia Road and Benson Highway/Swan Road/Valencia Road are both ranked in the top third of signalized intersections in terms of priority index, but improvements were recently made at Benson Highway (signalization), and are currently advertised for construction at Alvernon Way. The intersections on Valencia Road at the I-10 eastbound and westbound ramps and at Wilmot Road are not under Pima County jurisdiction, and are therefore not ranked in the Pima County system.

**Table 4-12**  
**Summary by Severity – Signalized Intersections**

Intersecting Street	Fatality	Incapacitating Injury	Non-Incapacitating Injury	Possible Injury	No Injury	Total Crashes	Severity Index	Crash Rate (per MVE)	PCDOT Priority Index Rank
Alvernon Way	0	0	3	8	24	35	1.31	0.67	29
Benson Highway/Swan Road	0	1	5	4	15	25	1.55	0.72	21
I-10 EB Ramps	0	2	2	3	9	16	1.91	0.49	N/A
I-10 WB Ramps	0	0	1	4	15	20	1.25	0.60	N/A
Wilmot Road (Jul 2007 - Mar 2010)	0	0	1	3	6	10	1.40	1.03	N/A
<b>TOTAL</b>	<b>0</b>	<b>3</b>	<b>12</b>	<b>22</b>	<b>69</b>	<b>106</b>	<b>1.46</b>		

As shown in Table 4-13, three of the unsignalized intersections have a severity index higher than the Pima County average of 1.51 (for unsignalized intersections), and a fourth has an index just below the average (1.50). The intersection with the highest severity index, Wilmot Road and Valencia Road (with an index of 2.60), is no longer an unsignalized intersection, so the crash data shown for the intersection in Table 4-13 is no longer relevant.

**Table 4-13  
Summary by Severity – Unsignalized Intersections**

Intersecting Street	Fatality	Incapacitating Injury	Non-Incapacitating Injury	Possible Injury	No Injury	Total Crashes	Severity Index	Crash Rate (per MVE)	PCDOT Priority Index Rank
Columbus Boulevard	0	0	1	0	0	1	2.00	0.03	N/A
Jack in the Box Driveways	0	0	4	1	5	10	1.50	N/A	N/A
Littletown Road	0	0	1	1	10	12	1.17	0.38	53
Craycroft Road	0	1	1	1	5	8	1.85	0.28	8
Wilmot Road (Apr 2007 - Jun 2007)	0	1	0	0	2	3	2.60	3.40	N/A
<b>TOTAL</b>	<b>0</b>	<b>2</b>	<b>7</b>	<b>3</b>	<b>22</b>	<b>34</b>	<b>1.58</b>		

The crash rate is also shown in the table for each of the intersections with the exception of the Jack in the Box driveways, because volumes were not available for that intersection. The three intersections that are still unsignalized (Valencia Road at Columbus Boulevard, Littletown Road, and Craycroft Road) each have a crash rate lower than the Pima County average of 0.63 crashes per MVE. Before the Valencia Road/Wilmot Road intersection was signalized, the crash rate was significantly higher than the County average. However, the crash rate at that intersection has decreased significantly since the intersection has been signalized (as shown in Table 4-12).

As with the signalized intersections, the Pima County Priority Index Rank is shown in the table, when available. Pima County currently provides a priority index rank for 181 unsignalized intersections. Both intersections for which a priority index rank is available are ranked in the top third of unsignalized intersections in terms of priority index.

The severity index for two of the three roadway segments included in this analysis is below the County average of 1.58, as seen in Table 4-14. The section of Valencia Road from the I-10 westbound ramps to Mann Avenue (just east of Wilmot Road) has a severity index of 1.60, just above the average. The crash data that was provided by Pima County included the short segment between Wilmot Road and Mann Avenue, so those crashes are included in the table.

The crash rate is lower than the Pima County average of 1.90 for each of the roadway segments. Further, although the priority index ranks are shown in the table for reference, it should be noted that the segments used by Pima County for those calculations are slightly different than the segments used in this report.

**Table 4-14  
Summary by Severity – Road Segments**

Road Segment	Fatality	Incapacitating Injury	Non-Incapacitating Injury	Possible Injury	No Injury	Total Crashes	Severity Index	Segment Length (mi)	Crash Rate (per MVM)	PCDOT Priority Index Rank
Alvernon Wy to Benson Hwy/Swan Rd	1	1	1	6	27	36	1.46	1.04	1.19	18*
Benson Hwy/Swan Rd to I-10 WB Ramps	0	0	2	1	6	9	1.33	0.32	1.00	18*
I-10 WB Ramps to W of Mann Ave	0	2	11	7	26	46	1.60	2.04	0.84	5**
<b>TOTAL</b>	<b>1</b>	<b>3</b>	<b>14</b>	<b>14</b>	<b>59</b>	<b>91</b>	<b>1.52</b>			

\*The Pima County Segment is between Alvernon Way and Littletown Road

\*\*The Pima County Segment is Littletown Road to 0.2 miles east of Craycroft Road

## CHAPTER 5

### DESIGN STANDARDS AND CRITERIA

#### 5.1 Design References and Standards

##### **Geometric Standards**

Final design and construction documents for the proposed project will be in accordance with the *Roadway Design Manual*, PCDOT, 2010, and *A Policy on Geometric Design of Highways and Streets*, AASHTO, 2004. Within ADOT right-of-way and for all I-10 interchange ramps, the geometric standards will be in accordance with the *Roadway Design Guidelines*, ADOT, 2007 (including revisions and amendments).

##### **Design Standards**

Design standards utilized for the proposed project will primarily be in accordance with the *Standard Details for Public Improvements*, PC/COT, 2003. Within ADOT right-of-way at the I-10 interchange and for some structural and drainage details, the design standards will be in accordance with *Construction Standard Drawings*, ADOT, 2007.

##### **Slope Standards**

Standard slopes for the proposed project will be 4:1 for both cut and fill slopes. Fill slopes 3:1 and steeper will require guardrail or other appropriate traffic protection measures. Within ADOT right-of-way at the I-10 interchange, 6:1 will be used for both cut and fill slopes. Fill slopes steeper than 6:1 in ADOT right-of-way will require guardrail or other appropriate traffic protection. Slopes steeper than 3:1 will require the use of appropriate slope stabilization methods per the recommendations in the pending *Preliminary Geotechnical Report*.

##### **Pavement Structure**

The *Preliminary Geotechnical Report* and *Preliminary Pavement Design Summary* for this project have not yet been submitted and will be required to determine the appropriate pavement sections for the proposed project. Preliminary geotechnical testing has been completed, and due to poor quality soils in the project area, there will be areas where geogrid or overexcavation and recompaction are required along with the recommended pavement sections. These areas will be defined as the design is developed. A minimum 2% cross slope will be provided on all new construction.

##### **Design Speed**

Valencia Road within the project limits is classified as an Urban Principal Arterial under Federal Highway Administration classifications. AASHTO recommends a maximum design speed of 50 mph for curbed roadways, but as requested by Pima County, the design speed for Valencia Road will remain the same as existing at 55 mph, with a posted speed of 50 mph. This design speed was used for the review of the existing vertical alignments, horizontal alignments and cross slopes, and is in conformance with AASHTO recommendations for arterials (30 – 60 mph).

##### **Drainage Design**

Cross drainage is being designed such that during the 100-year storm event, flow will be maintained below the edge of pavement where possible. Where not possible, flow within the roadway will not exceed one foot in depth. Pavement drainage systems are designed to convey the combined offsite (if applicable) and onsite peak discharges during the ten-year storm event. Storm events greater than the ten-year design storm may result in the capacity of the stormdrain being exceeded, in which case, the excess runoff would flow along the roadway until reaching a location where it may be discharged.

##### **Access Control**

Access to Valencia Road will be provided by Pima County permit. There are several access points to existing subdivisions, schools, businesses, and other community facilities and parcels within the project limits. Several subdivisions have existing block walls set on or behind the right-of-way line. Additional parcels are expected to be developed in the future and will likely request access to Valencia Road.

There is currently ADOT access control along ADOT right-of-way at the I-10 interchange. No additional access or changes to this access control are anticipated as part of the proposed project.

#### 5.2 Cross Section Elements

The Valencia Road cross section will be designed in accordance with Section 2.3 of the *Roadway Design Manual*, PCDOT, 2010. The proposed cross section will include six travel lanes (three in each direction). The inner-most travel lane in each direction will be 12 feet wide while the outer two travel lanes will be 11 feet wide. The existing curbed median will remain through the majority of the proposed project; it is generally 20 feet wide and matches the minimum recommended median width. An exception to the median width occurs at the I-10 underpass, where the median will be reduced to 18 feet wide as a result of lateral constraints by the existing I-10 bridge piers. A six-foot wide paved shoulder, outside curb, and a six-foot sidewalk adjacent to back of curb will also be included in the proposed cross section. Left- and right-turn lanes will be 12 feet wide and will be included in locations consistent with the recommendations in the traffic report. Figure 2-1 and Appendix A-1 show the typical cross sections for the project.

#### 5.3 Roadway Geometrics

It is anticipated that throughout the project limits, the existing horizontal and vertical alignments of Valencia Road will match current conditions. The horizontal and vertical geometry will be compared against current standards to ensure compliance as outlined below.

##### **Horizontal Geometrics**

There are three horizontal curves located within the project limits along Valencia Road. Two curves do not meet the minimum design radius for the existing superelevation requirements for the design speed. The horizontal alignment within the project limits meets AASHTO standards for cross slope and stopping sight distance.

##### **Vertical Geometrics**

There are six sag vertical curves and five crest vertical curves located within the project limits along Valencia Road. All vertical curves meet AASHTO requirements for stopping sight distance. The maximum grade of Valencia Road within the project limits is 3.08% and the minimum grade is 0.32%. These grades are in conformance with AASHTO recommendations. The minimum vertical clearance for Valencia Road through the I-10 underpass is 17.33 feet under eastbound I-10 and 16.61 feet under westbound I-10, which meets the AASHTO recommended clearance for an arterial roadway of 16 feet minimum.

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

It is anticipated that no new right-of-way will be required for the proposed project and that the improvements will primarily remain inside the existing right-of-way. Figure 3-1 shows the existing right-of-way through the project corridor, and the existing nominal right-of-way widths vary from 150 feet to 250 feet. Limited drainage easements, slope easements, and temporary construction easements may be required and will be determined further into the design process.

**CHAPTER 6  
MAJOR DESIGN FEATURES**

**6.1 Introduction**

Various design alternatives were analyzed for the proposed project, including an alternative for widening the UPRR bridge, an alternate for slopes approaching the UPRR bridge, an alternative for pavement replacement versus pavement overlay, and an alternative for the alignment of Littletown Road. The analysis of the alternatives can be seen in Chapter 10. The preferred design alternatives for the project are included among the following design features:

- Widening Valencia Road along the existing alignment to six travel lanes, and adding continuous sidewalk and multi-use lanes in both directions through the entire project area.
- Retaining the majority of the existing median curb through the project limits and replacing the existing pavement.
- Widening the I-10 underpass to accommodate six lanes, adding concrete barrier to protect the bridge piers, and adding enhanced pedestrian facilities.
- Adding new turn lanes and increasing turn lane storage length on Benson Highway/Swan Road, Craycroft Road, and Wilmot Road.
- Realigning Littletown Road to form a new intersection, and adding a new traffic signal at the new Littletown Road intersection and conduit for a future traffic signal at the Craycroft Road intersection.
- Widening the UPRR Bridge on both sides to accommodate six travel lanes and pedestrian facilities.

**6.2 Horizontal and Vertical Alignments**

The horizontal and vertical alignments for the preferred alternatives are shown in the preliminary design plans contained in Appendix A-2. All horizontal and vertical curves comply with the proposed design speeds shown in Table 6-1.

**Valencia Road**

The proposed project on Valencia Road begins at Station 130+83.54 and continues to Station 301+68.31. There are three horizontal curves and six tangents within the project limits. Two of the horizontal curves form a reverse curve from Station 197+10.79 to Station 241+50.10, with a tangent section in between the two curves. These curves both have a radius of 1528.05 feet with an existing superelevation of 2%. The existing radii of the reverse curves meets the minimum radius requirement for the design controls shown in Table 6-1, but would require a 4% superelevation instead of the existing 2% using standard AASHTO superelevation criteria. However, when the reverse curves are analyzed under Method 2 as outlined in *A Policy on Geometric Design of Highways and Streets*, AASHTO, 2004, the reverse curves can accommodate a design speed of up to 59 mph with the existing 2% superelevation. Therefore, it is recommended that these curves be reconstructed at 2% superelevation to match existing conditions in order to minimize elevation differences, and because the existing UPRR bridge that is contained within one of the reverse curves is currently superelevated at 2%, and reconstruction or retrofit of the bridge is not possible under the proposed project budget and schedule constraints.

There are 11 existing vertical curves on Valencia Road within the project limits that all meet sight distance requirements. Through the majority of the project limits, the existing curbed median will remain and be utilized as the vertical control for the new pavement, resulting in the proposed vertical alignment being the same as the existing alignment in these areas. There are limited areas where the median curb will be need to be replaced as a result of tapering the roadway to fit under the I-10 underpass, or as a result of recommended changes to median

opening locations or turn bay storage lengths. In the areas where the median curb will be replaced, vertical control will be provided that matches the existing vertical alignment as closely as possible.

**Table 6-1  
Design Controls**

<b>Design Feature</b>	<b>Valencia Road</b>	<b>Major Side Streets</b>
Project Design Year	2035	2035
Design Speed	Valencia Road – 55 mph	Benson Highway – 50 mph Swan Road – 30 mph Littletown Road – 50 mph Craycroft Road – 50 mph Wilmot Road – 50 mph I-10 Ramps – 55 mph
Slope Standards	Within PC Right-of-Way - PCDOT Roadway Design Manual Table 2-2  Within ADOT Right-of-Way - ADOT Std Dwg C-02.20	All Side Streets and Driveways - PCDOT Roadway Design Manual Table 2-2  I-10 Ramps (ADOT) - ADOT Std Dwg C-02.20
Typical Section	11' Travel Lanes (12' Inside) 12' Turn Lanes 6' Shoulders	12' Travel Lanes 12' Turn Lanes 6' Shoulders  I-10 Ramps – ADOT Roadway Design Guidelines Section 504.5
Superelevation	Valencia Road – e(max) = 4%	Benson Hwy – e(max) = 9% (exst) I-10 Ramps – e(max) = 6% Other Major Side Streets - e(max) = 4%
Minimum Curve Radii	Valencia Road – 1190'	Dependant on Design Speed and e(max)
Maximum Grade	Valencia Road – 4%	Major Side Streets - 3%
Type of Access Control	Valencia Road – Pima County Permit Within ADOT R/W – ADOT Permit	I-10 Ramps (ADOT) – Full Access Control All Side Streets – Pima County Permit
Right-of-Way	Varies	Varies

**Major Side Streets**

Three of the side streets connecting to Valencia Road within the project limits will require significant improvements. The Benson Highway/Swan Road, Craycroft Road, and Wilmot Road intersections will all be

widened in order to add turn lanes at the approaches to the intersection. As these side streets are being widened and not reconstructed, the improvements will follow the existing horizontal and vertical alignments.

Littletown Road will be completely realigned as part of the proposed project in accordance with a development agreement with Diamond Ventures. The realigned roadway will intersect with Valencia Road approximately 500 feet east of the current intersection location, and will extend approximately 1000 feet southwest of the new intersection to connect with the existing Littletown Road alignment in the vicinity of Craycroft Elementary School. The new alignment will pass through land that is currently privately held, and Pima County will receive dedicated right-of-way as part of the development agreement. The vertical alignment for the realigned roadway will comply with all design controls in Table 6-1 and will remain as close to existing grade as possible to minimize disturbance.

Horizontal and vertical alignment information for these side streets is shown in the preliminary design plans in Appendix A-2.

### 6.3 Right-of-Way

Existing right-of-way within the proposed project limits can be seen in Figure 3-1. No right-of-way acquisition is anticipated as part of this project. Limited drainage easements and temporary construction easements may be required and will be identified further into the design process.

### 6.4 Drainage

Offsite stormwater runoff impacting this project is generated to the southeast and generally flows in a northwesterly direction at roughly a 1% slope towards the site via shallow sheet flow, natural washes, and constructed channels. Per Federal Emergency Management Agency Flood Insurance Rate Map (FIRM) Panels 04019C2245K and 04019C2265K there is a Zone A and Zone X Shaded floodplain crossing the roadway. Zone A is described on the Effective FIRM Panel legend as being an area where no base flood elevations have been determined. Zone X Shaded is described as area of 500-year flood, or area of 100-year flooding with average depths less than one foot or with drainage areas less than one square mile or areas protected by levees from the 100-year flood. The Zone A floodplain crosses Valencia Road immediately west of Swan Road and the Zone X shaded is located between I-10 and the UPRR crossing. With the Zone X shaded area is the Julian Wash, which is described as having the 100-year floodplain contained within the channel. The proposed improvements will not have a significant impact on the floodplains, and thus no Conditional Letter of Map Revision or Letter of Map Revision is anticipated. It is also anticipated that any disturbance to jurisdictional waters will be minimal and fall under the Nationwide Permit.

Runoff generated within the roadway is conveyed through multiple stormdrain systems and discharged generally along the south side of the roadway. All onsite and offsite runoff generated between I-10 and Alvernon Way is conveyed parallel to Valencia Road along the south side of the road in a constructed earthen channel towards the west where the flow enters a regional detention basin. Runoff generated between I-10 and Littletown Road is collected and conveyed to the north at a discharge point located adjacent to the northbound I-10 onramp. Runoff between Littletown Road and Kolb Road (located east of the project limits) is conveyed via stormdrain, constructed channels, and offsite natural washes to the Julian Wash, which flows under Valencia Road to the north.

Under existing conditions, roadway runoff is collected at 69 catch basins that discharge flow through numerous stormdrain systems comprised of RCP. The stormdrain systems located west of the UPRR crossing are generally short, and consist of RCP with diameters less than 24 inches. East of the railroad crossing is a single system of pipes conveying runoff from Valencia Road between the railroad crossing and intersection with Kolb Road as well as offsite runoff from the south that enters the stormdrain system via grate inlets. Within the project limits there are three grate inlets that collect offsite flow and contribute to this stormdrain system. Analysis of this stormdrain system, which has pipes ranging in size from 18 inches for laterals to 48 inches along the mainline at

the outlet at Craycroft Road, shows that it is currently undersized for the ten-year design storm event. Under existing conditions the stormdrain will convey a discharge between the two-year and five-year storm events.

Under proposed conditions, 65 catch basins will be relocated due to the roadway widening and modifications to the medians. Existing pipes will be extended to the new catch basin location. There are an additional four catch basin locations that are not anticipated to be relocated. Calculations to determine the spread and adequate size of each catch basin will be performed and presented in a formal drainage report. The proposed improvements will also require the relocation of three grate inlets, which will be located in the same manner as the catch basins, by extending the existing pipes. The existing stormdrain mainline will be upsized to convey the ten-year design storm event. The existing 48 inch pipe from the outlet to approximately 1000 feet east of Craycroft Road will be upsized to 60 inch diameter RCP and the next 900 feet east of that will be upsized to 54 inch diameter RCP. Though this project ends just east of Wilmot Road, the upsized stormdrain will accommodate the increased runoff due to an additional travel lane in each direction up to Kolb Road. Precast pipe should be used in order to minimize disturbance.

Three cross culverts are located within the project limits that convey flow under Valencia Road. Two of the crossings consist of corrugated metal pipe and the third is a RCBC at the Julian Wash. Under existing conditions, all culvert crossings are adequately sized to convey the 100-year design discharge with a resulting headwater elevation below the edge of pavement. Table 6-2 summarizes the three crossings.

**Table 6-2  
Culvert Crossings**

Station	Existing Culvert	Proposed Treatment
177+00	4-24" RCP	Reconstruct – Same size and material
196+12	3-30" RCP	Reconstruct – Same size and material
218+64	5-10'x9' CBC	Extend – Cast in place CBC

There are several roadside channels and ditches located within the project limits. Symmetrical widening and maintaining the existing profile along Valencia Road results in minimal impact to these channels. A roadside channel running parallel to Valencia Road west of I-10 will not be affected by the proposed design. Between Littletown Road and Julian Wash, fill limits may encroach into the channel. A proposed driveway at roughly Station 209+40 crossing this channel will require the addition of a culvert to convey flow beneath it. A similar situation is encountered between Julian Wash and Craycroft Road and along the roadside ditch east of Wilmot Road.

### 6.5 Earthwork

The preferred alternatives will result in unbalanced earthwork due to the volume of roadway excavation (approximately 65,000 cubic yards) compared to the volume of roadway embankment (approximately 30,000 cubic yards). After applying the appropriate shrinkage adjustments, the net embankment required is approximately 33,500 cubic yards. The resulting amount of excess material for the project is then approximately 31,500 cubic yards. Additional overexcavation may be required based on the preliminary results of the geotechnical analysis that have shown poor quality soils in parts of the project corridor.

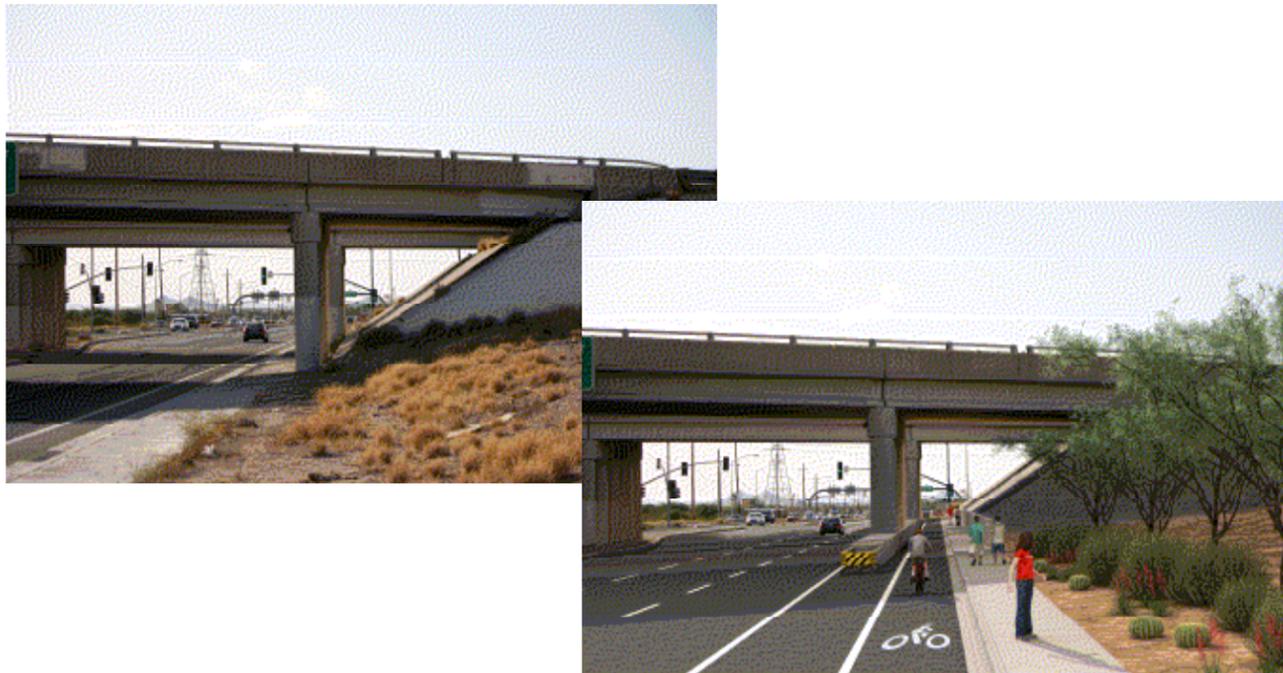
It should be noted that a significant component of the excavation material is due to the removal of the pavement on Valencia Road. If the existing pavement being removed were to be crushed and recycled as AB or used as backfill material for any required overexcavation, the amount of excess material could be reduced or eliminated, in addition to other possible cost savings.

## 6.6 Structures

### I-10 Underpass Widening

The existing I-10/Valencia Road Overpass consists of two 180-foot long, four-span bridges over Valencia Road. The I-10 westbound bridge is 47 feet wide and the eastbound bridge is 43 feet wide. The bridge superstructures are concrete deck slabs on AASHTO Type II girders. End spans are approximately 35 feet long, and interior spans are approximately 60 feet and 48 feet long. All Valencia Road travel lanes and sidewalks are presently under the two middle spans. Concrete paved fill slopes are under the two end spans that are supported by stub type abutment caps on steel H-pile foundations. Each concrete pier consists of a rectangular cap on five circular columns supported by spread footings. The I-10 roadway alignment is on a 1°30' degree of curvature, and substructure skews are approximately 30° right. The bridges are separated by an open median approximately 70 feet wide. The bridges were originally constructed in 1967.

It is desirable to widen Valencia Road beneath I-10 while minimizing disturbance to the existing four-span bridge structures. This can be accomplished by removing a portion of the abutment fill slopes in the end spans and moving the Valencia Road sidewalks from the interior spans to the end spans. The sidewalks will be expanded to 12-foot multi-use paths. The interior bridge spans are long enough to provide for three travel lanes in each direction on Valencia Road. For safety, traffic barriers will be provided at the piers. See Figure 2-1 and Appendix A-1 for the roadway typical section for Valencia Road at the I-10 Underpass. Removing a portion of the abutment fill slope will require retaining walls at the outside edge of the multi-use paths. In addition, soil nailing will be required to stabilize the cut slope remaining in front of the abutments. The soil nail system will be incorporated as part of the retaining walls. From as-built drawings of the existing bridges, the steel piles are spaced from nine to ten feet apart. Therefore the soil nails can be easily spaced to avoid interference with the existing piles.



Existing I-10 Underpass and Conceptual I-10 Underpass

### UPRR Bridge Widening

The existing Valencia Road Overpass consists of a 217-foot long, three-span bridge over the UPRR. The bridge is 79'-2" wide, and provides for two traffic lanes with two-foot shoulders in each direction and a 20-foot raised concrete median. There are no sidewalks. The bridge superstructure is a concrete deck slab on AASHTO Type VI girders. End spans are 50 feet long, and the center span over four UPRR tracks is 117 feet long. Concrete paved fill slopes are under the two end spans that are supported by stub type abutment caps on drilled shaft foundations. Each concrete pier consists of a rectangular cap on four circular columns supported by drilled shaft foundations. Each pier includes a concrete crash wall, monolithic with the pier columns. The Valencia Road alignment is on a horizontal curve to the right with a radius of 1528.05 feet, and substructure skews are approximately 22° left. The bridge deck cross slope is 2% with the high side at the north edge of the deck. The minimum vertical clearance over the UPRR tracks is 23'-3" at the south side exterior girder. The bridge was originally constructed in 1983. The recommended alternative for this bridge is a symmetrical widening on both sides of the existing bridge. A description of the proposed design is included in the alternatives discussion in Chapter 10.

### 6.7 Roadway Cross Section & Pavement Design

The roadway cross section for the proposed project are described in Chapter 5 and are in accordance with the requirements of the *Roadway Design Manual* and the design controls shown in Table 6-1. Typical sections for the proposed project can be seen in Figure 2-1 and Appendix A-1. Pavement design information is still pending and will be included upon the completion of the *Preliminary Pavement Design Summary*.

### 6.8 Traffic

All traffic related design features are included in Chapter 4.

### 6.9 Utilities

This portion of Valencia Road includes service, distribution, and transmission of gas, electric, communications, potable water, and wastewater. The majority of utility facilities run parallel to Valencia Road on both sides of the roadway and along all major cross streets.

Throughout the project limits, the utilities will be primarily impacted by the roadway widening, the relocation of catch basins, and installation of new storm drain. The proposed design will minimize the impact to all utilities.

The *Roadway Design Manual* and Pima County Ordinance 2008-72 shall be referenced when identifying the presence of utilities, determination and mitigation of utility conflicts, and preparation and review of utility relocation designs.

Two significant design process adjustments will affect utility design aspects of the project. PCDOT has advanced coordination with utility companies in the design process to facilitate an early partnership with utility companies in the design and construction of this project. This approach advances identification of utility facilities, design and construction conflicts, design mitigation alternatives, right-of-way and environmental impacts, relocation design, funding, and construction scheduling while maintaining an aggressive project schedule. Utility companies in turn are involved earlier in the coordination of utility impacts, mitigations, design, scheduling, and funding processes to address the use of company resources for the many regional projects they are currently involved in. This approach includes advancing other design elements such as right-of-way research, storm drain evaluation, prior rights research and determination, and utility easement and facility mapping.

The second process is the implementation of Pima County Ordinance 2008-72, "Regulations to the Use of the Public Right-of-Way," adopted December 2, 2008. Requirements of this ordinance related to design and location of facilities were implemented on this project. The ordinance requirements do not apply to privately owned facilities.

The following utility contact list (Table 6-3) represents the Utility Design Team which includes the utility company representatives, Pima County, and design consultant project managers and utility coordinators.

**Table 6-3  
Utility Design Team**

Utility Co.	Representative	Phone	Address
PCDOT	Damon Ballesteros (Project Mgr)	520-740-6477	201 N. Stone Avenue, 4 <sup>th</sup> Floor Tucson, AZ 85701
URS	Jody Rodriguez	520-407-2831	333. E Wetmore, Ste 400 Tucson, AZ 857
PCDOT	Ted Roberts Utility Coord.	520-740-6367	201 N. Stone Avenue, 4 <sup>th</sup> Floor Tucson, AZ 85705
AT&T	Walter Werstiuk	714-963-7964	22311 Brookhurst St., Ste 203 Huntington Beach, CA 92646
Cox Communications	Jeff Krause	520-867-7526	1440 E. 15 <sup>th</sup> Street Tucson, AZ 85719
DMAFB	Darren Horstmeier	520-228-5161	5285 E Mader Street Tucson, AZ 85707
El Paso Natural Gas	William Biggs	520-663-4259	5151 E. Broadway Blvd, Suite 1680 Tucson, AZ 85711
Kinder Morgan	Jack Constantino	714-920-5772	2051 E. Slover Bloomington, CA 92316
Level 3	Matthew Williams George Riffe	720-888-3813 520-425-4814	1025 El Dorado Blvd Broomfield, CO 80021
Pima County Regional Wastewater & Reclamation Department	Souren Naradikian	520-740-6322	201 N. Stone Avenue Engineering & Design Section Third Floor Tucson, AZ 85701
Qwest	Earl Winters	520-292-7927 928-533-4993 c	333 East Wetmore Rd., Third Floor Tucson, AZ 85705
Qwest National	Mike Mullins	520-572-4736 520-971-7526 c	6894 N. Camino Martin, Suite 120 Tucson, AZ 85741
Ray Water	Rhonda Rosenhaum	520-623-2366	414 N. Court Tucson, AZ 85701
Southwest Gas	Melanie Rice	520-794-6043	3401 E. Gas Road Tucson, AZ 85714
Tucson Electric Power	Cynthia Garcia Gary Gaulin	520-918-8246 520-360-0197 520-918-8364	4360 E. Irvington Rd Mailstop DB101 Tucson, AZ 85714
Tucson Water	Robin Allen	520-837-2129	310 W. Alameda Tucson, AZ 85726

Utility company base files were created using as-built and mapping records provided by the utility companies, and field survey of aboveground features and Blue Stake marking provided by utility companies, as part of the cultural survey activity.

The potential utility conflicts identified within the project limits are summarized below:

**AT&T**

AT&T has an underground facility that crosses Valencia Road in a northwest direction at approximate station 194+05. These facilities will not be impacted by the proposed roadway improvements. AT&T is located within an easement and will have prior rights associated with this project.

**Cox Communications**

Cox Communications has underground facilities located along the north side of Valencia Road from approximate station 158+50 to 162+60 that will not be affected by the proposed improvements. Cox has overhead facilities that cross Valencia Road from north to south at approximate station 162+60 and head east along the south side of Valencia Road to approximate station 176+25. These facilities are located on TEP 46 Kv poles and will need to be relocated as part of this project. Cox communications has claimed no prior rights on this project.

**El Paso Gas**

El Paso Gas has facilities that that cross Valencia Road in northwest direction at approximate station 280+60 that will not be impacted by this project. El Paso Gas has not claimed prior rights for this project.

**Kinder Morgan**

Kinder Morgan has 16, 12, 8 and 6 inch lines located along the south side of the UPRR right-of-way at the Valencia Road UPRR Bridge that will not impacted by the proposed bridge improvements. There is a six inch Kinder Morgan line located along the south side of Valencia Road from approximate station 251+44 to 293+66. This six inch line crosses Valencia Road at approximate station 293+66 and continues north along the west side of Wilmot Road. This six inch line will be impacted by the proposed catch basin relocations and roadway widening. Potholing of this six inch line will be required to determine exact depths and locations to minimize impacts to this facility. Prior rights have been claimed by Kinder Morgan for this project

**Level 3**

Level 3 has facilities the run north and south along the west side of Wilmot Road and cross Valencia Road at approximate station 293+48. As-built information states that these facilities may be shallow and potholing will verify the need for relocation. Level 3 also has facilities located along the south side of the UPRR right-of-way that should not be impacted by the proposed Valencia Road UPRR Bridge Improvements. Level 3 is claiming prior rights for this project.

**Pima County Wastewater**

Pima County Wastewater has several sewer facilities located along the project limits. There is a 12 inch sewer located along the south side of Valencia Road from approximate station 242+00 to 294+78 that will not be impacted by the proposed roadway improvements. This 12 inch sewer line continues east across Wilmot Road along the south side of Valencia Road and will need to be taken into consideration during the design of the storm drain and catch basin relocations. There is an eight inch sewer line along the south side of Valencia Road from approximate station 195+52 to station 217+40. There is a 12 inch sewer line that crosses Valencia Road at Swan Road at approximate station 176+03. Relocation of sewer facilities are not expected, with the exception of manhole adjustments. Pima County has claimed partial prior rights for this project and will provide documentation at a later date.

**Qwest**

There are Qwest underground facilities from station 131+00 to 199+00 that will be affected due to the roadway widening and storm drain extensions and catch basin relocations. There is a Qwest underground facility that crosses Valencia Road north to south at approximate station 162+82 that will require the relocation of the Qwest pull box located along the south side curb line. There are Qwest underground facilities located along the north side of Valencia Road from 158+86 to 171+35 that will be affected by the roadway widening and catch basin relocations. Qwest has underground crossings along Valencia Road at approximate stations 134+08, 162+35,

194+03, and 194+45 that will not be affected by the proposed roadway improvements. There are underground facilities located along the south side of Valencia Road from approximate station 242+00 to 293+80. At station 293+80 these facilities head north and south along Wilmot Road. These facilities will be affected by the roadway widening and catch basin relocations. There are Qwest underground facilities located along the north and south side of Valencia Road east of Wilmot Road that will need to be evaluated due to the storm drain and catch basin relocations. There are existing Qwest pull boxes along the south side of Valencia Road at approximate stations 177+58 and 196+73 that will need to be relocated due to the proposed roadway widening and storm drain extensions. Qwest also has facilities north of the UPRR right-of-way at the Valencia Road UPRR bridge that should not be affected by the proposed bridge improvements. Qwest is claiming partial prior rights for the project and will provide documentation at a later date.

#### ***Qwest National***

Qwest National is located within the UPRR right-of-way and should not be impacted by the proposed Valencia Road roadway widening or UPRR Bridge Improvements. Qwest National is located within an easement and will have prior rights for the project.

#### ***Ray Water Company***

Ray Water Company has facilities located north of the project area, west of Swan Road, that should not be impacted by the proposed project improvements.

#### ***Southwest Gas***

Southwest Gas has several facilities located within the project area. There is a four inch line located within Valencia Road from approximate station 140+18 to 175+92 and from 196+60 to 200+96 that that will not be impacted by the project. There is a two inch line that runs north and south within Wilmot Road and crosses the Valencia Road intersection at approximate station 294+18 that will not be impacted by the proposed widening. There is a four inch that originates north of Valencia Road at Wilmot Road at station 294+30 and then heads east to 302+00. This facility will also not be impacted by the proposed development. There is a house connection that runs north and south within Wilmot Road and across Valencia Road that will need to be potholed and located due to the intersection reconstruction.

SWG distribution feeder lines have a seasonal work restriction window of September to April. Relocation or installation and tie-in of new facilities may only occur from April to September. This restriction will require coordination with design schedule and construction phasing for work anticipated during construction.

#### ***Tucson Electric Power Company***

Tucson Electric Power has 46 Kv overhead facilities along the south side of Valencia Road from station 131+00 to 199+10 that will need to be relocated due to the proposed roadway widening. There is an underground crossing at 134+98 with a pull box along the existing southern curb line. These underground facilities will be impacted by the catch basin relocation. There is a underground facility crossing Valencia Road at approximate station 147+70 and a 46 Kv overhead crossing at station 162+60 that will be impacted by the roadway widening. There is a 138 Kv transmission tower located at the southwest corner of the Valencia Road and Swan Road intersection at approximate 175+00 that will not be impacted by the project. There is an overhead facility along the west side of Wilmot Road that crosses Valencia Road at approximate station 293+87 that should not be impacted by the project. TEP has underground facilities along the south side of Valencia Road east of Wilmot Road that will be impacted by the proposed roadway widening and relocation of catch basins.

TEP facilities will be affected by the following seasonal requirements. The relocation of TEP facilities such as feeder, sub-transmission, and transmission lines is limited to TEP's off-peak season, October through April. Relocation or installation and tie-in of new facilities may only occur from April to October. TEP poles will remain in place until all other joint-use participants have transferred facilities from TEP poles. These restrictions will also require coordination with the design schedule and construction phasing.

#### ***Tucson Water***

Tucson Water has facilities located along the project limits. There is a 12 inch water line located along the south side of Valencia Road from approximate station 247+21 to 267+93 that will be impacted by the proposed widening and catch basin relocations. Potholing will be required to determine the exact location and depths to minimize relocation. There is a 16 inch water line located along the north side of Valencia Road from approximate station 130+97 to 193+43 that will be impacted due to the roadway widening and catch basin relocation. These facilities cross Valencia Road to the south at approximate station 193+43 and head east along the south side of Valencia Road. There is a 16 inch water line crossing Valencia Road at approximate station 175+80 that will not be impacted by the proposed roadway improvements. Water Valve adjustments will be required for valves located along the roadway.

The project team, including the utility companies, will identify the need for utility potholing to confirm horizontal line location and verify vertical depth of facilities for assessment of conflicts and design mitigation solutions. All available and appropriate design options will be used to mitigate conflicts and relocation work to the extent possible. It is anticipated that relocation of underground and overhead utilities will be required for most companies. Pothole work may be provided by the utility or the design consultant. Survey of pothole elevations will be provided by the design consultant. Costs for utility pothole work, not performed by the utility, will be the responsibility of the utility unless prior rights have been established.

There are currently no planned utility system upgrades for any utility. Utility companies are responsible for submission of prior rights documentation for County verification to support any claim of prior rights. It is anticipated that there will be no need for acquisition of right-of-way for utility relocation.

#### **6.10 Constructability and Traffic Control**

Traffic control shall be specified by a traffic control plan or procedures and guidelines in the ADOT Traffic Control Manual for Highway Construction and Maintenance. Access to all adjacent properties shall be maintained during construction. Detours are not anticipated to be necessary as part of the proposed project.

#### **6.11 Design Exceptions**

One design exception has been identified for the proposed project, for the widening of Valencia Road at the I-10 underpass. Due to lateral constraints of the existing I-10 bridge piers, the maximum median width that can be accommodated with six travel lanes is 18 feet. The Pima County minimum recommended median width is 20 feet. However, as the travel lanes are all at the recommended minimum width, it is advisable to reduce the median width by two feet rather than reduce the travel lane widths any further. Narrowing the median width will not have any effect on the left-turn lane widths at the I-10 underpass, which will remain at the recommended 12 feet. The only other option to fit the full recommended median and travel lane widths would be to move one travel lane in each direction to the outside of the outer bridge piers. However, this approach would impact safety by introducing additional obstructions within the roadway limits, and would result in drastically increased costs due to the additional soil nailing that would be needed for the bridge abutment foreslopes. Therefore, it is recommended that a median width of 18 feet be approved as a design exception in this section of the proposed project.

## CHAPTER 7

### SOCIAL, ECONOMIC AND ENVIRONMENTAL CONSIDERATIONS

#### 7.1 Air Quality

The proposed project is located within an area that is in attainment for all criteria pollutants and within the Tucson Region Carbon Monoxide Limited Maintenance Area Plan boundary. The Valencia Road widening from Alvernon Way to Wilmot Road is in conformity and was analyzed for air quality impacts as part of the 2011-2015 Transportation Improvement Plan for Pima County.

The project will produce a temporary increase in particulate matter (i.e., dust) during construction. This impact will be short term in nature, and measures will be implemented to minimize this impact during construction. Prior to initiating any construction activities such as earthmoving, trenching, or road construction, the contractor will obtain an activity permit from the Pima County Department of Environmental Quality.

The overall impacts of the project on air quality will be positive because the project will decrease traffic congestion, thereby reducing emissions associated with idling vehicles.

#### 7.2 Biological Resources

No threatened, endangered, proposed, candidate or AGFD special status species are likely to occur in the project area; therefore, the proposed project would have no effect on these species. The project area is located in on the northern edge of the range for the endangered PPC. Surveys for were conducted in October 2010. No PPC or evidence of plants was observed within the project area. Other special status species including the western burrowing owl and cliff swallows, both listed under the MBTA were not found in the project area. Other non-federally listed bat species were not observed at project area bridges, underpasses, or drainage culverts. Though the CFPO is not listed with the USFWS, it remains on the AGFD special status species list and the County's Priority Vulnerable Species List. Protocol surveys for CFPO of the project area were completed in 2010. No CFPOs were detected during surveys. A biological evaluation will be completed for the project, and a Technical Assistance letter documenting effects on federally listed species from the project will be requested from the USFWS.

Large portions of the project area had been previously disturbed and are devoid of native vegetation. In some locations near residential and commercial development, the project area has been revegetated with native and non-native plants. Noxious weeds were present throughout the project area. Vegetation salvage and restoration will follow the Pima County Watercourse and Riparian Habitat Protection Ordinance, and the Environmentally Sensitive Roadway Design Guidelines (Pima County Roadway Design Manual, Chapter 4) to restore habitat quality. All equipment used for soil removal activities should be washed prior to entering the construction area to minimize the spread of noxious, non-native species. Disturbed areas should be stabilized immediately after grading is complete and restored with a native species seed mix to minimize erosion, maximize the establishment and recruitment of seedlings, and to restore native species to disturbed areas.

#### 7.3 Community Resource Impact

Desert View High School is located on the north side of Valencia Road, approximately 700 feet east of Alvernon Way. Temporary access to the school may be impacted by this project.

There are two additional schools in the vicinity of the project. Lauffer Middle School is on Littletown Road approximately one-quarter mile east of Valencia Road. Craycroft Elementary School is on Littletown Road just east of Lauffer Middle School. It is unlikely that either of these schools will be directly impacted by the project.

The nearest community facility is Thomas Jay/Littletown Regional Park, a recreational area that includes outdoor playing fields, basketball courts and a recreation center. The park is located one-half a mile east of Valencia Road on Littletown Road. It is unlikely that this park will be directly impacted by the project.

Rural/Metro Fire Department's Station 71 is in the vicinity of the project, as it is located on the north side of Benson Highway approximately one-half mile northwest of the intersection of Valencia Road and Benson Highway. It is unlikely that Station 71 will be directly impacted by this project.

Pima Air and Space Museum is located on the south side of Valencia Road approximately 1000 feet east of Craycroft Road. Temporary access to the museum may be impacted by this project.

#### 7.4 Hazardous Materials

A Preliminary Initial Site Assessment for hazardous materials was conducted for the project area and vicinity. During the site reconnaissance, no unusual odors, stressed vegetation, surface staining, wells, or dry wells were found in association with the right-of-way. Waste containers such as drums, buckets, unidentified substance containers, or other indications of environmental releases were not observed within the right-of-way. No observations were made during the site reconnaissance of adjoining properties that indicate adverse environmental impacts to the right-of-way. Review of the environmental record databases indicates that the right-of-way is not located on or within one mile of a Federal National Priority List site, or a Resource Conservation and Recovery Act (RCRA) Corrective Action Report (CORRACTS) Treatment Storage and/or Disposal (TSD) facility; on or within 0.5 mile of RCRA non-CORRACTS TSD, CORRACTS, or Federal or State Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) sites. The right-of-way is not located within one mile of a State Water Quality Assurance Revolving Fund site, active municipal solid waste landfills, rubbish landfills, private solid waste landfills, or closed solid waste landfills or waste dumps, or within 0.25 mile of CERCLA No Further Remedial Action Planned sites.

The project would require the demolition and removal of concrete structures, road striping, and other painted structures which may contain asbestos or lead-based paint (LBP). Sampling of suspect asbestos-containing or LBP materials should be conducted prior to demolition and removal. If suspected hazardous materials are encountered during construction, work should cease at that location and the engineer should be contacted to arrange for proper assessment, treatment, or disposal.

#### 7.5 Historic/Cultural Resources

A cultural resources survey of the project area was conducted to evaluate the project's potential to affect archeological properties listed in or eligible for listing in the NRHP. The survey of the project area resulted in the identification of three previously recorded historic-age sites/structures, one newly recorded archeological site, and ten isolated occurrences. The previously recorded historic-age sites/structures are (1) outside of the project area, (2) considered non-contributing components of the site's NRHP eligibility, or (3) an active pipeline currently exempt from NHPA Section 106. The newly recorded archeological site and isolated occurrences are recommended to be not eligible for listing. One of the isolated occurrences is a roadside memorial for which PCDOT has special procedures to follow in the event that such a feature will be disturbed by the project.

Because no properties listed in or eligible for the ARHP or NRHP will be affected, the Pima County Cultural Resources and Historic Preservation Office made a determination of no historic properties affected. The Pima County cultural resources consultation process has been completed and no treatment measures need to be implemented prior to construction of the proposed project.

#### 7.6 Neighborhood Impact

The project area consists of a variety of land uses including residential, commercial, institutional, industrial and vacant land. No additional right-of-way is anticipated to be needed to construct the project. Access to businesses, residences, schools, and emergency services will be maintained throughout the project corridor during construction; however, short-term and temporary delays to access may be experienced during construction. Sun Tran bus route 26 would continue to operate, but short-term and temporary delays could occur. Project

construction will temporarily produce dust, noise, and traffic delays within the project area. Standard measures to control dust and noise will be implemented during construction.

The proposed project will improve traffic service and circulation patterns. The proposed project would improve multi-modal transportation opportunities and access. The proposed project would improve neighborhood continuity by providing improved traffic efficiency, pedestrian circulation, ADA compliance, bicycle lanes and additional commuter bus options.

#### **7.7 Traffic Noise Analysis**

Existing noise levels were measured in January 2011 at 14 locations surrounding the project area. These measurements and the current peak hour traffic volumes were used to calculate current peak hour noise levels. The existing peak hour noise levels at the measurement locations ranged from 57 to 68 dBA. Existing peak hour noise levels met or exceeded 66 dBA at five locations based on peak hour traffic volumes.

Future peak hour noise levels at the 14 measurement locations were modeled using the predicted Year 2035 traffic volumes. Modeled Year 2035 peak hour traffic noise levels are between one dBA lower to three dBA higher than the existing noise levels. At four receiver locations noise levels of 66 dBA or above were modeled. PCDOT plans to use Rubberized Asphalt Concrete (RAC) as a component of their standard roadway pavement. RAC typically provides a minimum of three dBA reduction of traffic noise levels. A noise barrier is not recommended at three of these locations because the noise barrier does not meet PCDOT requirements of providing at least five dBA noise reduction. Noise barriers are recommended to be considered for noise mitigation at the following location:

- Desert Vista Terrace subdivision north side of Valencia Road between Columbus Boulevard and Ocotillo Desert Trail.

#### **7.8 Visual/Aesthetic Resources**

The greatest change in visual character in this project will occur in the foreground and middle ground by converting a four-lane roadway to a six-lane roadway. In locations adjacent to undeveloped lands, foreground and middle ground views will have a moderate increase in structured hardscape rather than the currently undeveloped right-of-way. The road is currently raised at the UPRR bridge crossing. Widening of the bridge will not require additional piers and will not change the visual profile of the bridge section. Landscape plantings and artistic elements are recommended to soften the hardscape and improve the aesthetic appeal.

#### **7.9 Drainage and Clean Water Act**

The existing storm drain system along Valencia Road consists of storm drainage pipes under Valencia Road which outlet to storm drain channels that parallel Valencia Road west of I-10. Existing stormwater from Valencia Road west of I-10 discharges into an existing off-site detention basin located on an Arizona State Land Department parcel southeast of the Valencia Road/Alvernon Way intersection. West of I-10, stormwater from Valencia Road outlets into two storm drain channels that discharge into the Julian Wash. The project will improve the capacity of the storm drain system, but the basic configuration of the storm drainage system, including outlets and storm drain channels, will remain largely unchanged.

Two named washes (the Earp Wash and Julian Wash) and three storm drain channels cross Valencia Road in the project area. Preliminary site reconnaissance indicates that these drainages are Waters of the United States (Waters). A jurisdictional delineation will be completed to ascertain the location and extent of Waters within the project area. Work within Waters is anticipated to affect less than 0.5 acre at each crossing and, therefore, would be covered by a Clean Water Act (CWA) Section 404 Nationwide Permit (NWP) #14. Should impacts to Waters exceed 0.5 acre at a crossing, a CWA Section 404 Individual Permit would be required.

CWA Section 401 water quality permit would be included under a NWP #14. If a CWA Section 404 Individual Permit is required, an individual Section 401 water quality permit would be required from the Arizona Department of Environmental Quality (ADEQ). Because the project will disturb more than one acre of land, the project will require a CWA Section 402 authorization. Compliance can be obtained by filing a Notice of Intent (NOI) with ADEQ to use the statewide Construction General Permit, along with the preparation and implementation of a Stormwater Pollution Prevention Plan (SWPPP).

## CHAPTER 8 PUBLIC INVOLVEMENT

The project team recognizes that conveying and collecting accurate and easy-to-understand information is vital to the public involvement effort and the success of the project. Members of the public are provided with a basic understanding of the project to help them provide input and express their concerns. Public outreach efforts focus on information exchange with the public that affords an opportunity for understanding what is important to the public at an early stage and for seeking ways to respond to citizen issues as an integral part of the design concept process. The following specific strategies have been used in order to involve residents, businesses and other project stakeholders:

- Public open houses
- Citizen's Advisory Committee (CAC)
- Project website (<http://www.roadprojects.pima.gov/valenciawilmot/>)

### ***Public Open Houses***

A total of four Public Open Houses are planned during the development of the project. To date, there have not been any Open Houses scheduled.

### ***CAC***

To date, public involvement activities have included the establishment of a CAC and two CAC meetings. The CAC was formed to provide PCDOT with feedback and input during the Environmental Assessment and Mitigation Report (EAMR) process and through the design of the project. CAC meetings were held February 22, 2011 and April 12, 2011. A total of six CAC meetings are scheduled during the development of the project.

The first CAC meeting included a description of the project scope and limits and an introduction to the project approach. A brief overview of current activities of the design team was also included.

The second CAC meeting included a discussion of the preliminary traffic results, geotechnical results and the result of preliminary meetings with the UPRR. A general environmental update and introduction to noise was also included.

The main concerns of the CAC through the first two meetings include the request for a traffic signal at the Valencia Road and Littleton Road intersection, traffic impacts due to the proposed DMAFB Wilmot Gate, and traffic noise.

### ***Project Website***

Project information is also available online at <http://www.roadprojects.pima.gov/valenciawilmot/>. Some of the information available includes the project location map and the project scope of work. As project documents are finalized, they will be added to the website. Contact information for the design team is also available on the website.

## CHAPTER 9

### AGENCY COORDINATION

Coordination between Pima County and the design team has been ongoing since the beginning of the project. Progress meetings are held monthly in order to ensure that no design issues are overlooked. The Pima County Natural Resources, Parks and Recreation Department will be coordinated with regarding the proposed Julian Wash Master Plan. Coordination will be required with Pima County Regional Flood Control District regarding the proposed extension of the existing Julian Wash box culverts.

The project is a part of the RTA 20-year regional transportation plan. The RTA is the fiscal manager of the plan and will release funding for the project. An IGA is already in place between the County and the RTA for the development of this project. Pima County will be the lead agency for the development of this project. A portion of the project limits lies within the jurisdiction of the City of Tucson. The City will review the Design Concept Report (DCR), EAMR and construction documents during the development of the project.

The roadway will be widened within ADOT right-of-way at the I-10 overpass of Valencia Road. Preliminary meetings have been held with ADOT and the widening concept has been accepted. The project plans will be submitted to ADOT for review and coordination will continue throughout planning and design of the project.

The existing bridge over the UPRR will require widening. The project team has met with the UPRR and submitted conceptual widening plans for review. The preliminary concepts have been accepted by the UPRR. Further coordination will be required throughout project development.

DMAFB has proposed a new gate at the Wilmot Entrance. Traffic impacts due to the proposed gate have been included in the Traffic Report. The project runs adjacent to DMAFB property and a representative from DMAFB has been included on the CAC to ensure that any concerns are addressed during design.

The United States Army Corps of Engineers will be consulted regarding activities impacting jurisdictional waters of the United States. A Section 404 NWP #14 is anticipated.

AGFD and USFWS will be consulted regarding threatened and endangered species.

The notice of intent for stormwater discharges will be submitted to ADEQ and ADEQ will issue the authorization number. Construction will not commence until the authorization number is received from ADEQ and the SWPPP has been implemented.

Utilities have been contacted to obtain as-built utility information and to determine utilities' plans within the project area. Coordination will continue through the planning and design process.

**CHAPTER 10  
ALTERNATIVES**

**10.1 Introduction**

Four design concept alternatives were developed and evaluated with the project limits as follows:

- UPRR bridge widening
- Pavement replacement versus overlay selection
- Littleton Road alignment
- UPRR bridge approach slopes

Input to the development of alternatives included Pima County, ADOT, and the Citizen Advisory Committee.

**10.2 Description and Evaluation of Alternatives**

***UPRR Bridge Widening***

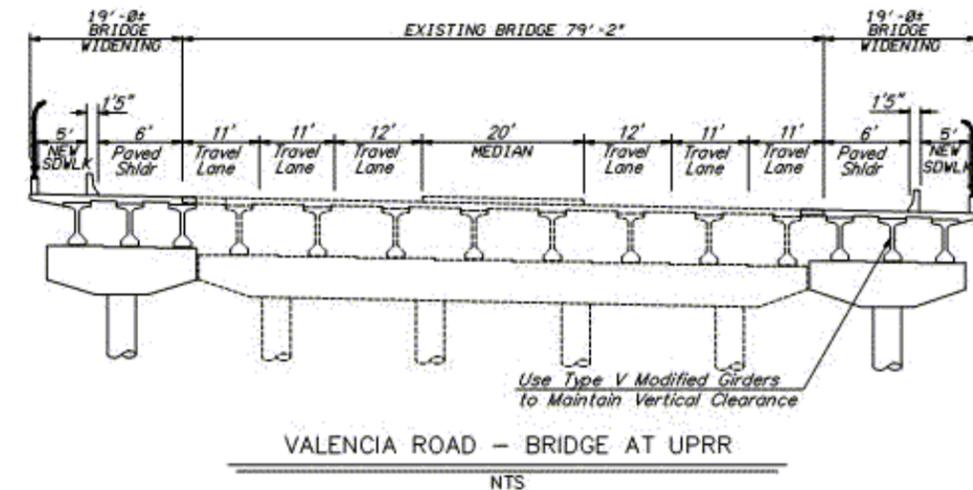
The bridge at the crossing with UPRR is currently a four lane bridge with a 20-foot wide raised concrete median and two-foot shoulders. The bridge will need to be widened as part of the proposed project to include six lanes of traffic, multi-use lanes, and pedestrian facilities. The two alternatives for the bridge widening are discussed below.

**Alternative 1 – One Side Widening**

The bridge is widened only on the high side. This option is the least expensive option for bridge costs provided that lanes can be shifted at the approaches. Type VI girders can be used since vertical clearance to the UPRR is not an issue at the high side of the bridge. To reduce right-of-way requirements for this project, it is desirable to maintain the horizontal and vertical geometry of Valencia Road. Therefore this option is not feasible, and will not be discussed further.

**Alternative 2 – Symmetrical Two Side Widening**

The bridge is widened approximately 19 feet on both sides. This is a typical widening option when it is desirable to avoid lane shifts at the approaches. To maintain the existing minimum railroad vertical clearance at the low side of the bridge, the widening will use AASHTO Modified Type V girders that are nine inches less in depth than the existing AASHTO Type VI girders. Although the existing bridge vertical clearance will remain at 23'-3", the clearance of the new widened portions of the bridge will be 23'-6", meeting UPRR requirements. To compensate for smaller girder section properties for the span, the girder spacing between the new girders will be reduced from the existing spacing. The bridge typical section is shown in Figure 10-1. The new piers will be designed similar to the existing piers with a rectangular pier cap on two columns supported by drilled shaft foundations. The crash walls at the piers will be extended to the outside columns of the new piers. The abutments will also be designed similar to the existing abutments supported by drilled shaft foundations. On April 11, 2011, UPRR approved the design concept for the widening of both sides of the Valencia Road bridge (Alternative 2), and a formal agreement with UPRR will follow.



**Figure 10-1 – UPRR Bridge Widening**

***Pavement Section***

Preliminary geotechnical testing results have indicated that there are poor quality soils in areas of the proposed project. As a result, an analysis was performed on the results to determine the required pavement sections and any necessary subgrade stabilization. The two options that were considered for the pavement sections are discussed below:

**Alternative 1 – Overlay Existing Pavement**

The original intent for the proposed project was to attempt to mill and overlay the existing pavement in order to reduce costs. However, upon receiving the results of the geotechnical testing, it was determined that due to poor quality soils the new overlay section would need to have four to six inches of AC more than the existing pavement section, resulting in a finish grade that is up to 0.5 feet higher than the existing finish grade. As a result, the median curb would have to be replaced to accommodate the increased pavement finish grade, minimum clearances would possibly be impacted at the I-10 underpass, additional work would be needed to taper down to the existing bridge deck elevation at the UPRR bridge, and raising the pavement grade would impact driveway and side street tie-ins by potentially extending tie-in points. Additionally, visual inspection of the existing pavement surface revealed that large stretches of the existing pavement were in poor condition and not recommended for a mill and overlay approach. For these reasons and the increased costs and construction issues associated with them, the mill and overlay approach was abandoned in favor of Alternative 2.

### Alternative 2 – Reconstruct Pavement

Due to the variety of issues associated with attempting to use an overlay section for Valencia Road, the preferred alternative for the proposed project is to reconstruct the pavement section. The recommended pavement section will be provided in the *Preliminary Pavement Design Summary*. This approach has numerous advantages, primarily that the existing median curb can remain, and the finish grade will remain the same as existing which maintains existing vertical clearances and facilitates side street and driveway tie-ins. Due to the poor soils in areas of the project, it is anticipated that a combination of overexcavation and recompaction and subsurface stabilization such as geogrid will be utilized to help minimize the required pavement section and ensure subsurface stability. Geogrid is preferable in areas with heavy utility and storm drain presence in order to avoid conflicts that may arise from overexcavation. The pavement and subsurface treatment alternatives are shown in Figure 10-2.

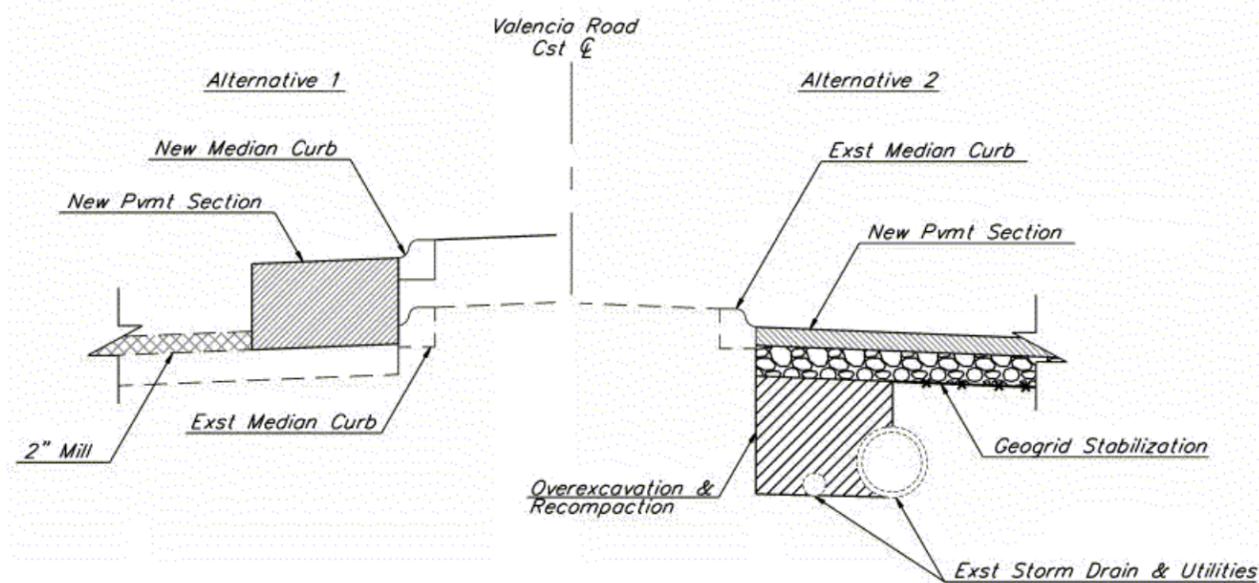


Figure 10-2 – Valencia Road Pavement Alternatives

### Littletown Road Alignment

#### Alternative 1 – Existing Alignment

The current alignment of Littletown Road intersects with Valencia Road at approximately Station 204+00, and comes into the intersection on a curve with a radius of approximately 210 feet, with no tangent section between the curve and the intersection, which should generally be avoided. Additionally, a curve with a radius of 210 feet is acceptable for a low speed local road with a design speed of 25 mph, while Littletown Road currently has a posted speed of 45 mph leading into the curve. Due to the geometric deficiencies associated with the existing Littletown Road alignment and due to the benefits of Alternative 2 that will be discussed below, it is not recommended that this alternative be pursued.

#### Alternative 2 – Realignment

The preliminary realignment for Littletown Road moves the intersection approximately 500 feet east of the exiting intersection, to approximately Station 209+00 on Valencia Road. The new alignment will be superior to the existing one in that it will accommodate a design speed of 50 mph and that it will have over 200 feet of tangent section leading into the intersection, enhancing sight distance and safety. Median work will be required as a part

of this alternative, as a new median opening with turn lanes will need to be created for the new alignment, and the median opening for the existing alignment will need to be closed. Pima County is currently working on a development agreement with Diamond Ventures to route the new Littletown Road alignment through a parcel that is currently privately owned. Right-of-way for the new alignment would be dedicated as part of the development agreement. Additionally, the costs of design and construction would be borne by the developer, making this the most cost effective alternative despite requiring more extensive improvements than Alternative 1. The proposed Littletown Road realignment is shown in Figure 10-3 and is included in the preliminary design plans in Appendix A-2.



Figure 10-3 – Littletown Road Realignment

### UPRR Bridge Approach Slopes

Both approaches to the UPRR bridge rise to a height of approximately 35' above the adjacent natural grade. The roadway currently has unprotected side slopes at a slope of 2:1 coming off of the roadway and catching inside of the right-of-way. As a result of the roadway widening, the roadway section will extend out further and will require new slopes. The three options that were considered for the approach slopes are discussed below:

#### Alternative 1 – Retaining Walls

This approach would utilize cast in place retaining walls placed at the bottom of the slope approximately 5' inside of the right-of-way line, with 3:1 hydroseeded slopes up to the roadway section. A temporary construction easement (TCE) would be required to construct the walls, and a drainage swale would be provided along the top of the wall to catch the slope drainage. An example of this configuration can be seen in Figure 10-4. The advantages to this approach are that no permanent right-of-way or easements would need to be acquired, and it allows the use of flatter slopes than the other alternatives. The primary disadvantage of this alternative is the cost. An estimated 36,000 square feet of retaining wall would be required with this approach, equating to a cost of approximately \$1.5M.

#### Alternative 2 – Match Existing Slope

This approach would utilize 2:1 slopes off of the new roadway section, which matches the existing slope. The slopes would be hydroseeded, but would not include any other stabilization measures, matching the existing

conditions. The new slopes would extend up to 20 feet outside the right-of-way in some locations, and would require slope easements from surrounding property owners, which include Valencia/I-10 Properties, Unisource Energy, and Pima County. An example of this configuration can be seen in Figure 10-4. The primary disadvantages of this approach are that the slopes catch outside of the existing right-of-way limits and would require the acquisition of slope easements, and that the slope will only be stabilized by hydroseeding, which could result in mild erosion as seen on the existing slopes. The primary advantage is that it has the potential to be the most cost effective alternative, with an approximate slope easement cost of \$100,000. Due to the cost effectiveness, this is the preferred alternative for the UPRR approach slopes. However, if unforeseen complications arise during the easement acquisition process, the project team will investigate using a hybrid approach of the other alternatives to ensure the most cost effective solution.

**Alternative 3 – Match Existing Toe of Slope**

This approach would utilize steeper slopes of approximately 1.7:1 in order to match the catch point of the new slope to the toe of the existing slope. The new slopes would require stabilization, but would stay within the existing right-of-way limits. An example of this configuration can be seen in Figure 10-4. Two methods of stabilization will be evaluated upon the completion of the geotechnical analysis, slope paving and riprap. If slope paving is required, approximately 20,000 square yards of slope paving would be needed, resulting in a cost of approximately \$1M. If riprap is able to be used, approximately 7,000 cubic yards would be required, resulting in a cost of approximately \$500,000. The primary advantage of this approach is that the slopes will catch within the right-of-way, and will be well protected from erosion. The primary disadvantages to this approach are visual impacts and the relatively high costs compared to Alternative 2.

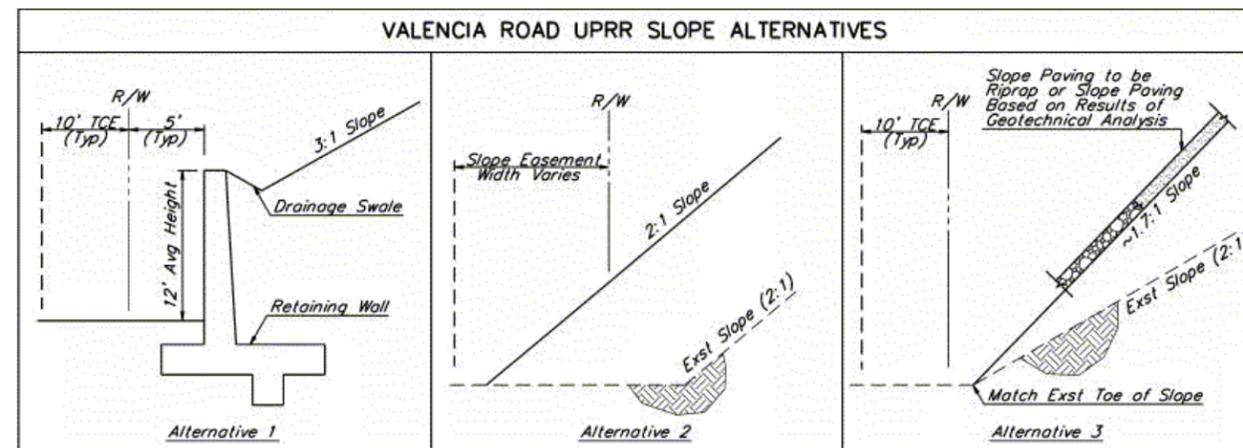


Figure 10-4 – Valencia Road UPRR Bridge Approach Slopes

CHAPTER 11

COST ESTIMATE

ITEM NO.	ITEM DESCRIPTION	UNIT	QUANTITY	UNIT PRICE	AMOUNT
2010001	CLEARING AND GRUBBING	L.S.	1	\$50,000.00	\$50,000.00
2020001	REMOVAL OF STRUCTURES AND OBSTRUCTIONS	L.S.	1	\$220,000.00	\$220,000.00
2020020	REMOVAL OF CURB	L.F.	41,070	\$1.00	\$41,070.00
2020029	REMOVAL OF BITUMINOUS PAVEMENT	S.Y.	101,500	\$2.00	\$203,000.00
2030300	ROADWAY EXCAVATION	C.Y.	38,006	\$10.00	\$380,060.00
3030003	AGGREGATE BASE	C.Y.	47,880	\$35.00	\$1,675,800.00
3060002	GEOGRID BASE REINFORCEMENT	S.Y.	53,695	\$3.00	\$161,085.00
4040111	TACK COAT	TON	178	\$400.00	\$71,200.00
4060001	ASPHALTIC CONCRETE (NO. 1)	TON	52,337	\$60.00	\$3,140,220.00
4130040	ASPHALTIC CONCRETE (ASPHALT-RUBBER)	TON	19,522	\$35.00	\$683,270.00
4130042	ASPHALT RUBBER MATERIAL (FOR AR-AC)	TON	3,594	\$550.00	\$1,976,700.00
4130044	MINERAL ADMIXTURE (FOR AR-AC)	TON	720	\$100.00	\$72,000.00
5011022	PIPE, REINFORCED CONCRETE, CLASS II, 24"	L.F.	1,400	\$70.00	\$98,000.00
5011032	PIPE, REINFORCED CONCRETE, CLASS II, 30"	L.F.	507	\$85.00	\$43,095.00
5011042	PIPE, REINFORCED CONCRETE, CLASS II, 36"	L.F.	432	\$100.00	\$43,200.00
5011057	PIPE, REINFORCED CONCRETE, CLASS II, 54"	L.F.	805	\$200.00	\$161,000.00
5011062	PIPE, REINFORCED CONCRETE, CLASS II, 60"	L.F.	1,050	\$250.00	\$262,500.00
5030017	CATCH BASIN, PC/COT STD. DTL. 308, TYPE 3 (L = 12')	EACH	30	\$5,500.00	\$165,000.00
5030025	CATCH BASIN, PC/COT STD. DTL. 308, TYPE 3 (L = 16')	EACH	30	\$6,500.00	\$195,000.00
5030201	DRAINAGE STRUCTURES	L.SUM	1	\$150,000.00	\$150,000.00
5050006	MANHOLE (STORM DRAIN) PC/COT STD. DTL. 300	EACH	5	\$1,000.00	\$5,000.00
5150001	MISCELLANEOUS UTILITY RELOCATION	F.A.	1,450,000	\$1.00	\$1,450,000.00
6012010	UPRR BRIDGE WIDENING	SF	9,136	\$140.00	\$1,279,040.00
6012020	I-10 UNDERPASS MODIFICATIONS	L.SUM	1	\$400,000.00	\$400,000.00

ITEM NO.	ITEM DESCRIPTION	UNIT	QUANTITY	UNIT PRICE	AMOUNT
6070000	SIGNING	L.SUM	1	\$125,000.00	\$125,000.00
7010001	MAINTENANCE AND PROTECTION OF TRAFFIC	L.S.	1	\$1,450,000.00	\$1,450,000.00
7010006	CONSTRUCTION AREA ELEMENTS (PREDETERMINED REIMBURSEMENT RATES)	F.A.	590,000	\$1.00	\$590,000.00
7010008	FLAGGING SERVICES	F.A.	295,000	\$1.00	\$295,000.00
7040000	STRIPING	L.SUM	1	\$150,000.00	\$150,000.00
7330005	TRAFFIC SIGNALS	EACH	1	\$950,000.00	\$950,000.00
8060000	LANDSCAPING	L.SUM	1	\$1,000,000.00	\$1,000,000.00
8100001	AZPDES/NPDES (ORIGINAL)	L.S.	1	\$195,000.00	\$195,000.00
8100011	AZPDES/NPDES (MODIFIED)	F.A.	100,000	\$1.00	\$100,000.00
9010001	MOBILIZATION	L.S.	1	\$1,750,000.00	\$1,750,000.00
9080005	CONCRETE VERTICAL CURB, (PC/COT STD. DTL. 209) (TYPE 2)	L.F.	41,070	\$15.00	\$616,050.00
9080201	CONCRETE SIDEWALK	S.F.	192,800	\$5.00	\$964,000.00
9080280	CONCRETE SIDEWALK RAMP PC/COT STD DTL 207 (TYPE I)	EACH	58	\$1,500.00	\$87,000.00
9100006	CONCRETE HALF BARRIER	L.F.	1,927	\$90.00	\$173,430.00
9250101	CONSTRUCTION SURVEYING AND LAYOUT	L.S.	1	\$440,000.00	\$440,000.00
9260001	ENGINEER'S FIELD OFFICE	L.S.	1	\$50,000.00	\$50,000.00

<b>SUBTOTAL VALENCIA ROAD CONSTRUCTION COST</b>	<b>\$21,861,720.00</b>
<b>CONTINGENCIES (35%)</b>	<b>\$7,651,602.00</b>
<b>TOTAL VALENCIA ROAD CONSTRUCTION COST</b>	<b>\$29,513,322.00</b>
<b>RIGHT-OF-WAY ACQUISITION COST</b>	<b>\$100,000.00</b>
<b>DESIGN COST</b>	<b>\$4,000,000.00</b>
<b>CONSTRUCTION ADMINISTRATION COST (15%)</b>	<b>\$4,426,998.30</b>
<b>PROJECT TOTAL</b>	<b>\$38,040,320.30</b>



## CHAPTER 12 BUDGET CONSIDERATIONS

Financing for the Valencia Road corridor will come from the RTA and City of Tucson funds. The RTA plan identified a total of \$46,317,000 in funds available for Valencia Road between Alvernon Way and Kolb Road (four miles). Of that amount, \$43.3 million will come from the half-cent tax approved by voters in 2006. The RTA funding is expected to be available in Period 2 (FY 2012-FY 2016) of the plan. The remaining \$3.0 million will come from the City of Tucson.

Valencia Road is also identified in the *2040 Regional Transportation Plan (RTP)* published by PAG. The segment from Alvernon Way to Kolb Road (Plan ID#152.08) is proposed for the early period with a budget of \$44,994,000.

Overall, it is anticipated that the funds allocated by the RTA to Valencia Road (\$46.3 M) will be sufficient to complete the project, as this segment, which represents 75-80% of the corridor length, is expected to cost \$38 million, or approximately 82% of the funds available for the project. However, given that the funds are allocated for the entire corridor, this assessment will depend on the estimated costs for the segment to the east of this project.



## CHAPTER 13 DELIVERY METHOD

Historically, Pima County has delivered their projects through the Design-Bid-Build process. Valencia Road will use this method to deliver the project. Since this project is predominately a roadway widening project, there are few opportunities to take advantage of an alternate delivery method such as Construction Manager at Risk (CMAR) or Design/Build. The method in which the widening occurs at I-10 and UPRR could be design features that a CMAR or Design/Build delivery method could take advantage of. There have been preliminary discussions with ADOT and UPRR to determine a solution for widening at these facilities. In the current construction climate, the Design-Bid-Build delivery method would most likely result in a lower construction cost.

CMAR is typically useful in taking advantage of the contractor's perspective to review and comment on the design. CMAR is used when an agency would like to award the contract based on qualifications and is not as concerned with costs, although a guaranteed maximum price is negotiated. Partnering is a key to this delivery method.

The Design/Build delivery method can be used to award the contract based on qualifications or based on costs. This method provides some advantages such as awarding the design and construction contract to one firm, provide cost saving potential, time savings and an early knowledge of costs. The design contract for this project has been awarded, so it would be unlikely this delivery method would be used.

## CHAPTER 14

### RECOMMENDATIONS AND CONCLUSIONS

This DCR describes the recommended design for widening Valencia Road from Alvernon Way to Wilmot Road. The project fulfills the purpose and need of meeting 2035 travel demands, increasing safety, improving multi-modal connectivity and relieving congestion in eastern Pima County.

The design concept development process and alternatives analysis resulted in the following recommendations:

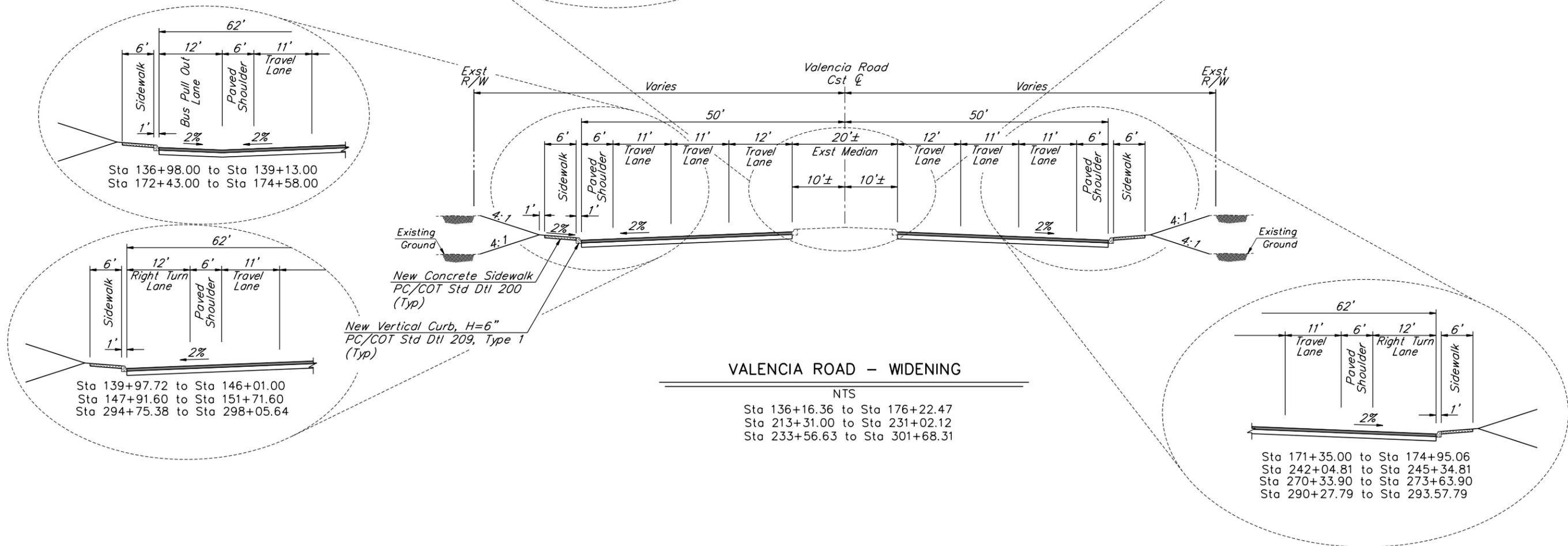
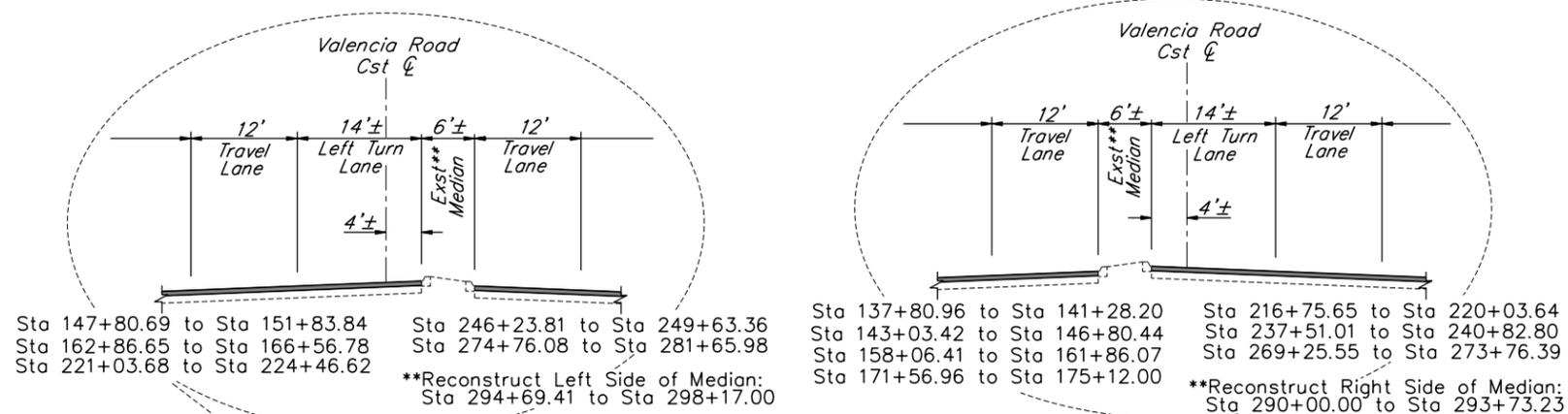
- Valencia Road will be widened along the existing horizontal and vertical alignment to six travel lanes.
- Continuous sidewalk and multi-use lanes in both directions will be added through the entire project area.
- The pavement section will be reconstructed to provide adequate design life.
- Rubberized asphalt will be used throughout the project to reduce roadway noise.
- The I-10 underpass will be widened to accommodate six lanes, adding concrete barrier to protect the bridge piers and adding enhanced pedestrian and bicycle facilities.
- The UPRR bridge will be symmetrically widened in accordance with the approved concept submitted to UPRR.
- Slope easements will be acquired for the embankment slopes approaching the UPRR bridge.
- Littletown Road will be realigned to provide an adequate radius for the design speed, a longer tangent section before the intersection and better signal spacing.
- One new traffic signal location at Littletown Road and conduit for a future signal at Craycroft Road will be installed with this project. Existing traffic signals at Desert View High School, Benson Highway/Swan Road, the I-10 ramps and Wilmot Road will be upgraded to accommodate the proposed roadway improvements.
- Turn lanes will be improved at Benson Highway/Swan Road, Craycroft Road and Wilmot Road.
- All cross drainages will be designed for 100-year storm flows.
- The roadway storm drain system will be designed for the ten-year storm with one “dry” travel lane open in each direction. For the 100-year storm, the maximum depth will be one foot, in accordance with Section 2.10 of the *Pima County Roadway Design Manual*.



PSOMAS

**APPENDIX A-1**  
**TYPICAL SECTIONS**

NOTE: PAVEMENT SECTIONS TO BE INCLUDED UPON COMPLETION OF PAVEMENT DESIGN REPORT



VALENCIA ROAD - WIDENING

NTS

Sta 136+16.36 to Sta 176+22.47  
Sta 213+31.00 to Sta 231+02.12  
Sta 233+56.63 to Sta 301+68.31

DESIGNED:	SS	DATE	05/11
DRAWN:	PRE	DATE	05/11
CHECKED:	PS	DATE	05/11
PROJ. ENG.:	KIT	DATE	05/11

NO.	REVISION DESCRIPTION	DIV. ENGINEER	DATE

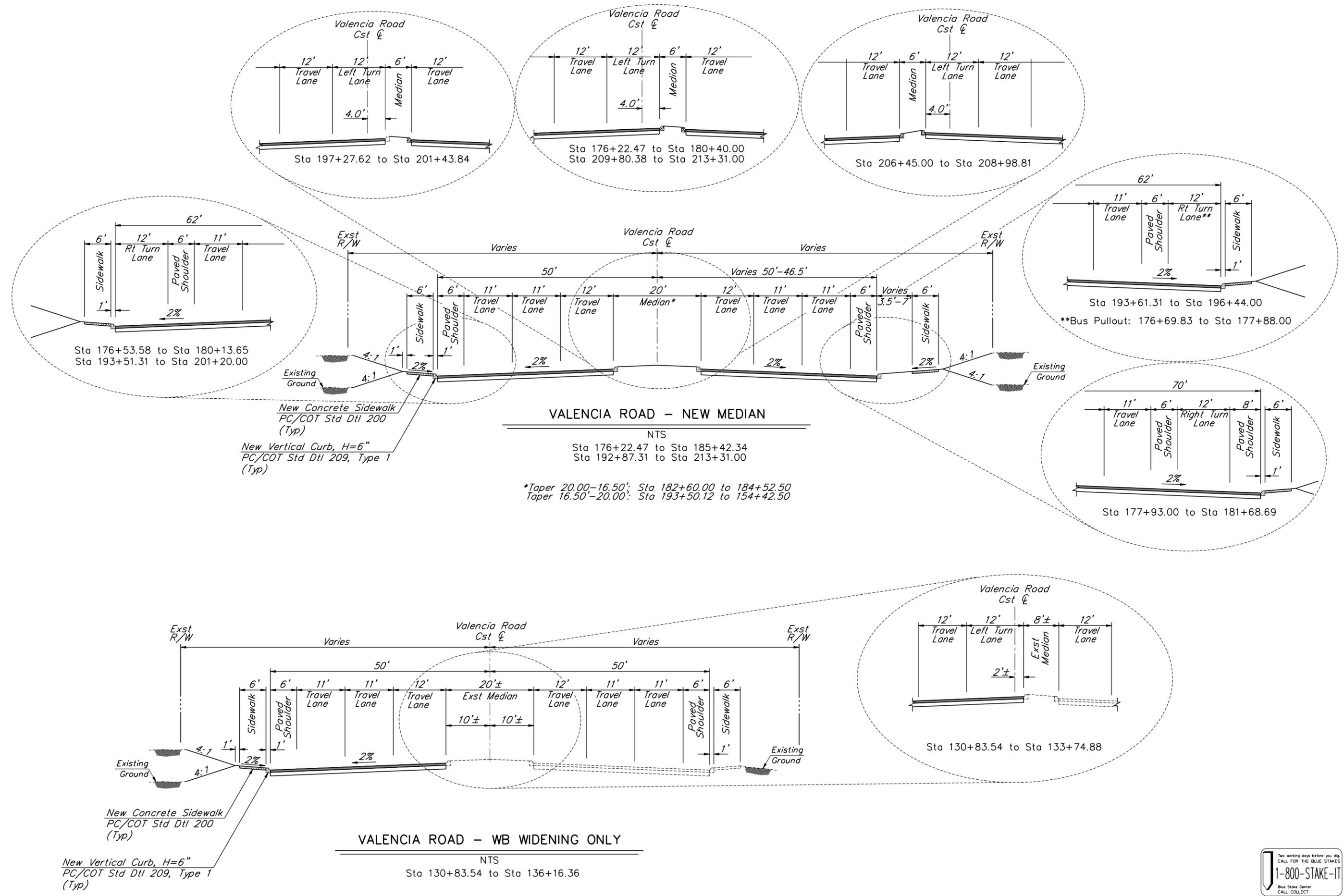
**PSOMAS**  
800 E. Wilshire Road, Suite 110  
Tucson, Arizona 85719  
(520) 292-2300 (520) 292-1290 (FAX)

PIMA COUNTY DEPARTMENT OF TRANSPORTATION  
TYPICAL SECTIONS FOR  
VALENCIA ROAD  
ALVERNON WAY TO WILMOT ROAD  
VALENCIA ROAD



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*New Concrete Sidewalk*  
PC/COT Std Dtl 200  
(Typ)  
*New Vertical Curb, H=6"*  
PC/COT Std Dtl 209, Type 1  
(Typ)

\*Taper 20.00'-16.50': Sta 182+60.00 to 184+52.50  
Taper 16.50'-20.00': Sta 193+50.12 to 154+42.50

*New Concrete Sidewalk*  
PC/COT Std Dtl 200  
(Typ)  
*New Vertical Curb, H=6"*  
PC/COT Std Dtl 209, Type 1  
(Typ)



PIMA COUNTY DEPARTMENT OF TRANSPORTATION

TYPICAL SECTIONS FOR

VALENCIA ROAD

ALVERNON WAY TO WILMOT ROAD

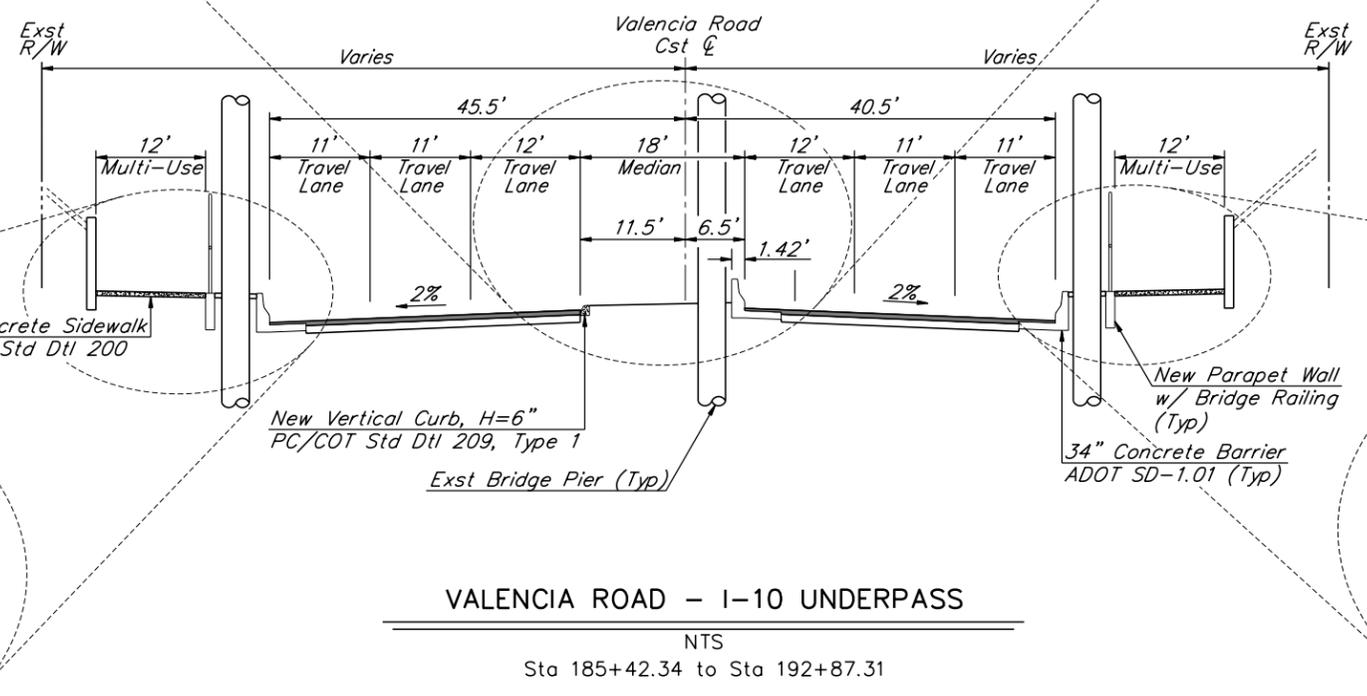
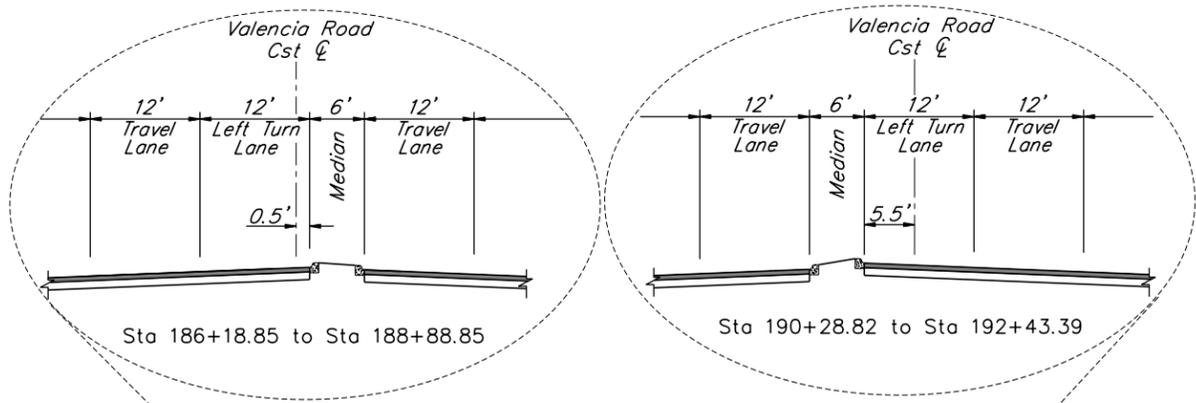
VALENCIA ROAD

PRISCILLA S. CORNELIO, P.E., DIRECTOR

DESIGNED:	SS	DATE	05/11
DRAWN:	PRE	DATE	05/11
CHECKED:	PS	DATE	05/11
PROJ. ENG.:	KTT	DATE	05/11

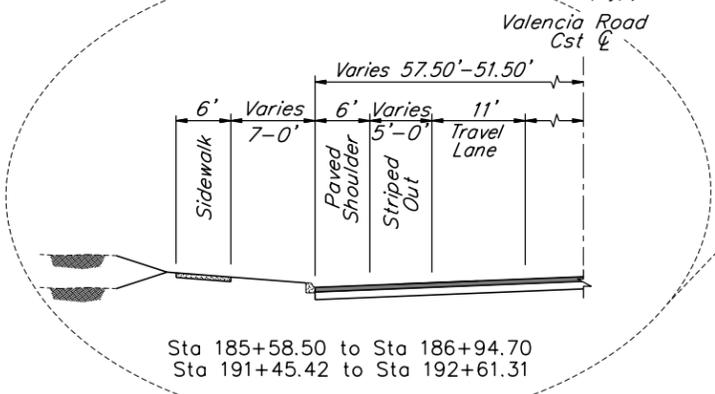
NO.	REVISION DESCRIPTION	DATE

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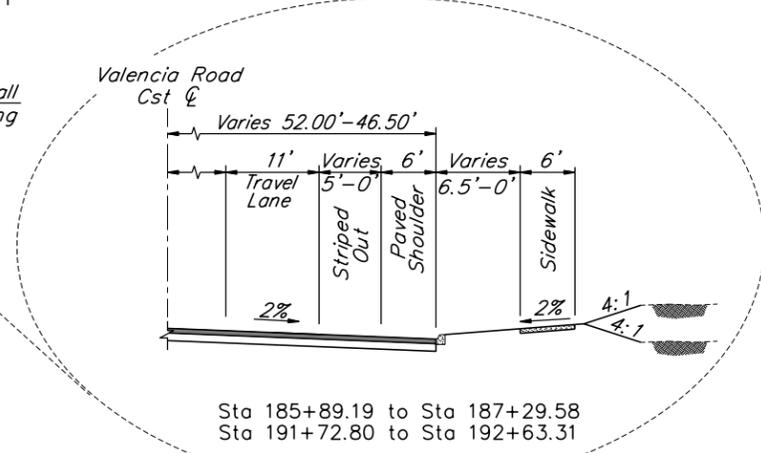


**VALENCIA ROAD - I-10 UNDERPASS**

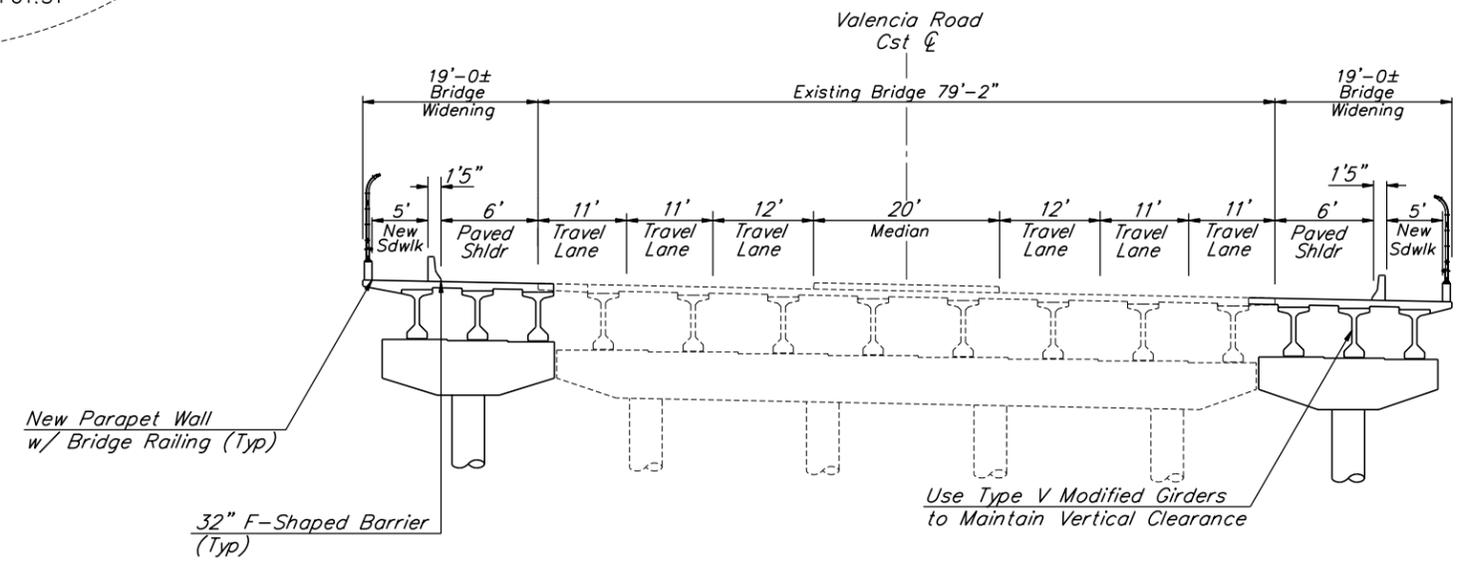
NTS  
Sta 185+42.34 to Sta 192+87.31



Sta 185+58.50 to Sta 186+94.70  
Sta 191+45.42 to Sta 192+61.31



Sta 185+89.19 to Sta 187+29.58  
Sta 191+72.80 to Sta 192+63.31



**VALENCIA ROAD - BRIDGE AT UPRR**

NTS  
Sta 231+02.12 to Sta 233+56.63



DESIGNED:	SS	DATE	05/11
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PIMA COUNTY DEPARTMENT OF TRANSPORTATION  
TYPICAL SECTIONS FOR  
**VALENCIA ROAD**  
ALVERNON WAY TO WILMOT ROAD  
VALENCIA ROAD

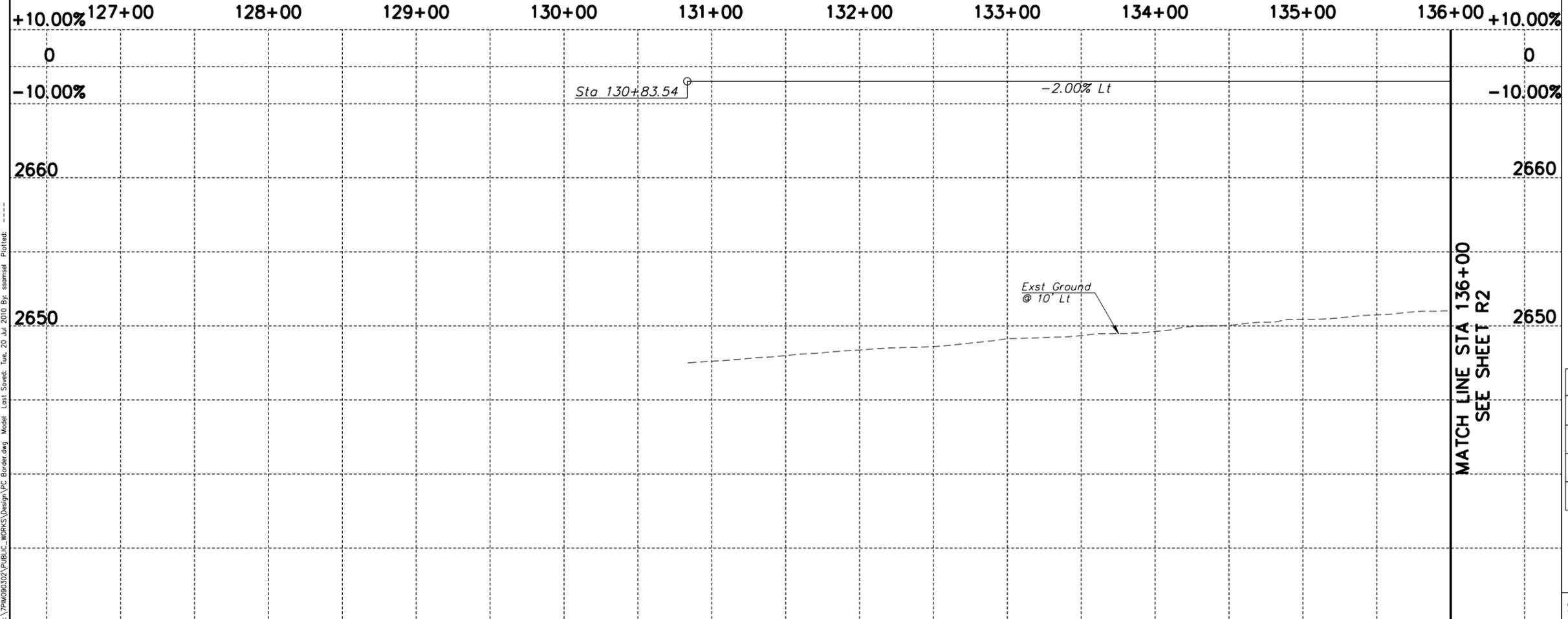
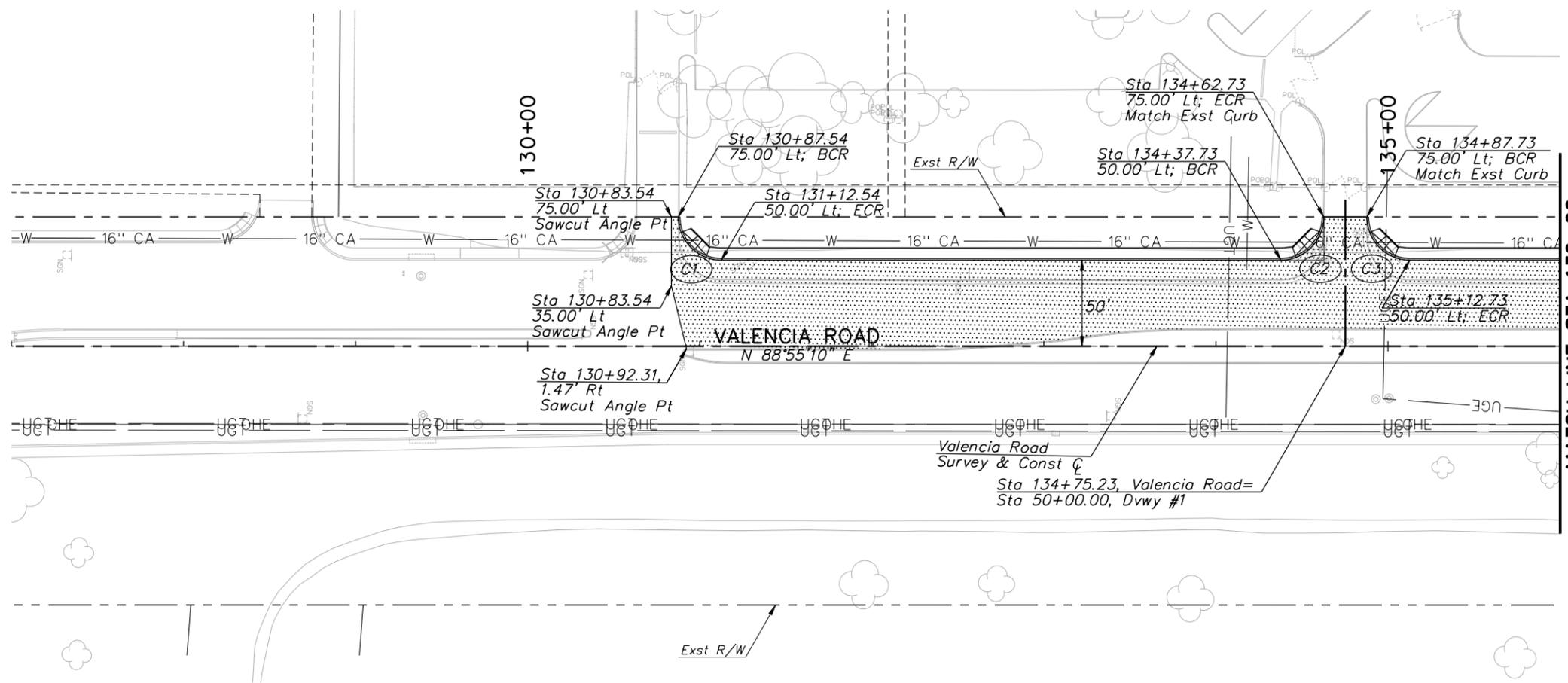
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PSOMAS

**APPENDIX A-2**

**PLAN AND PROFILE SHEETS**



Curve No	Radius	Length	Delta	Tangent
C1	25.00'	39.27'	90°00'00"	25.00'
C2	25.00'	39.27'	90°00'00"	25.00'
C3	25.00'	39.27'	90°00'00"	25.00'



SCALES: HORIZ. 1"=40'  
VERT. 1"=4'

DESIGNED:	SS	DATE	05/11
DRAWN:	PRE	CHECKED:	PS
PROJ. ENG.:	KIT		05/11

NO.	REVISION DESCRIPTION	DIV. ENGINEER	DATE

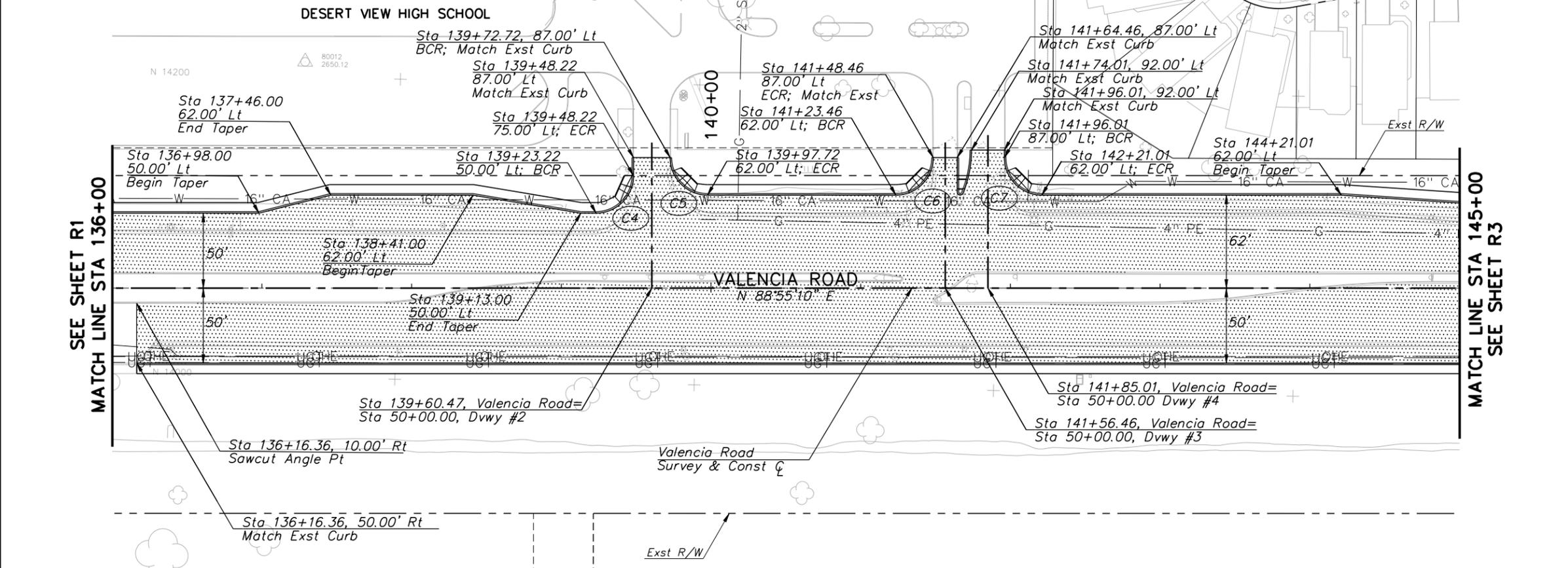
PRISCILLA S. CORNELIO, P.E., DIRECTOR

PIMA COUNTY DEPARTMENT OF TRANSPORTATION

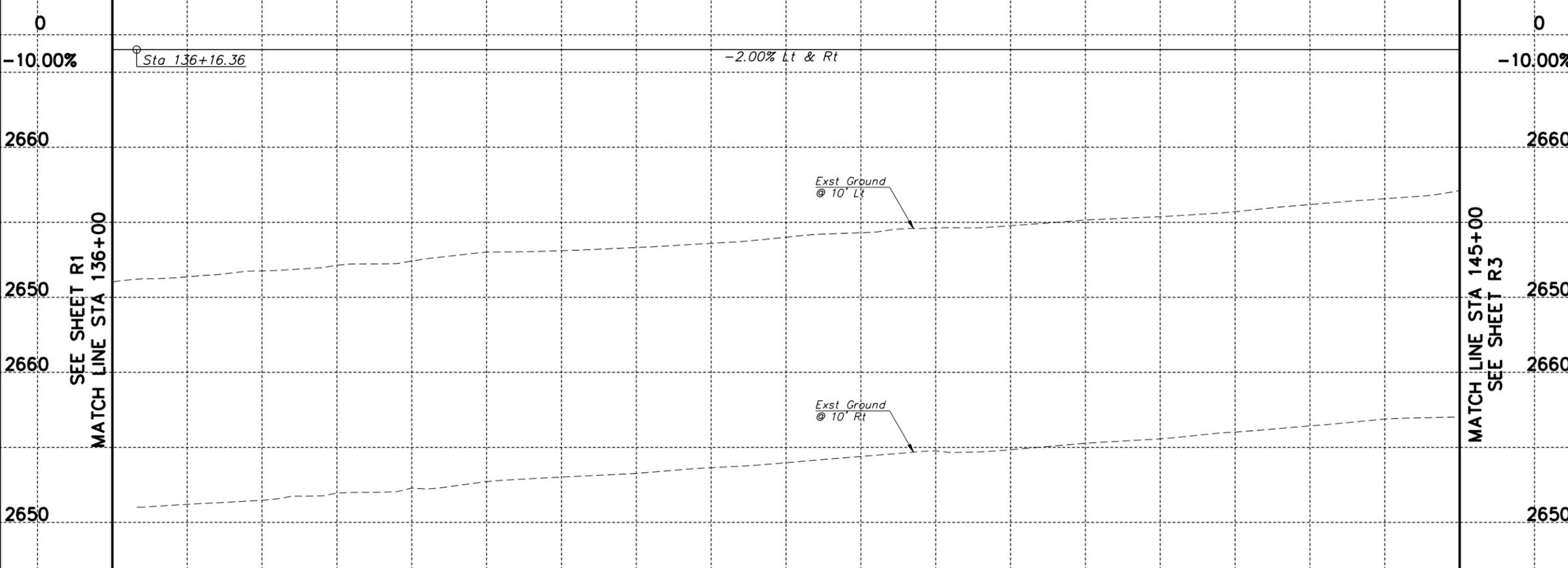
ROADWAY PLAN AND PROFILE  
FOR  
**VALENCIA ROAD**  
ALVERNON WAY TO WILMOT ROAD  
STA 127+00 TO STA 136+00

**PSOMAS**  
800 E. Wilcox Road, Suite 110  
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+10.00% 136+00    137+00    138+00    139+00    140+00    141+00    142+00    143+00    144+00    145+00 +10.00%



Curve No	Radius	Length	Delta	Tangent
C4	25.00'	39.27'	90°00'00"	25.00'
C5	25.00'	39.27'	90°00'00"	25.00'
C6	25.00'	39.27'	90°00'00"	25.00'
C7	25.00'	39.27'	90°00'00"	25.00'



SCALES: HORIZ. 1"=40'  
VERT. 1"=4'

DESIGNED:	SS	DATE	05/11
DRAWN:	PRE	CHECKED:	05/11
PROJ. ENG.:	PS	KIT	05/11

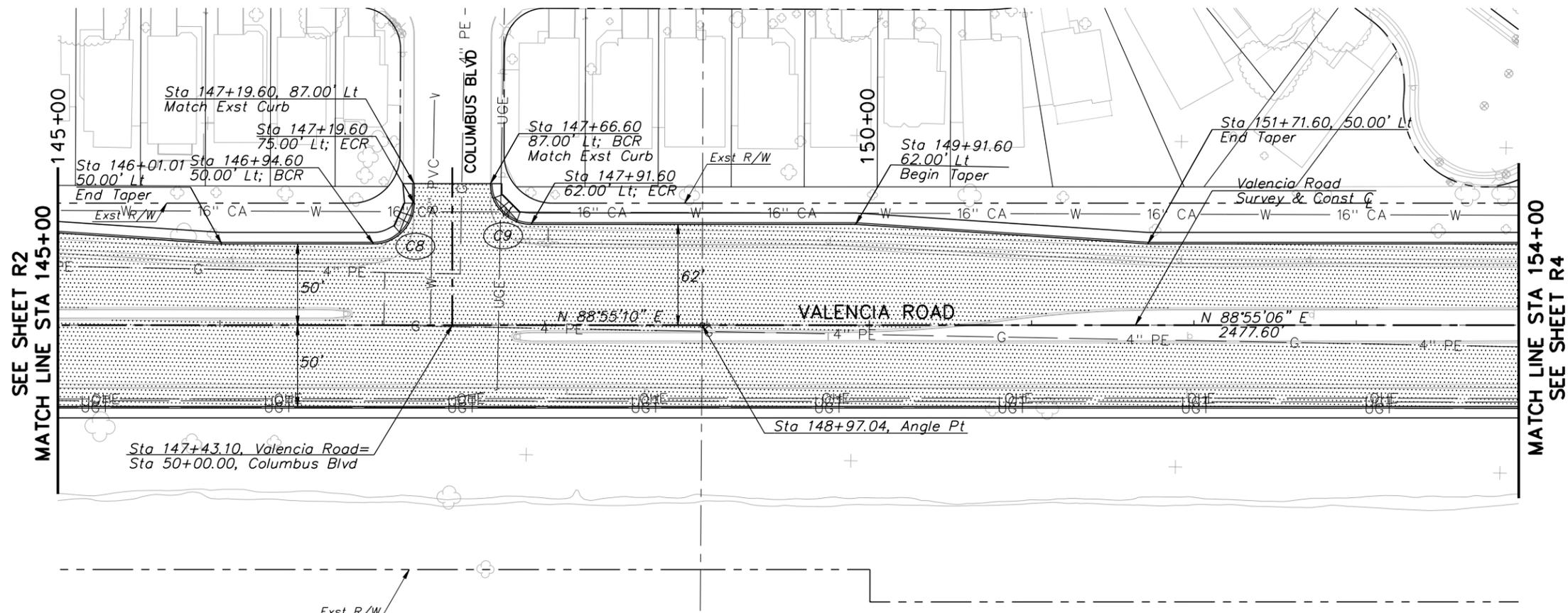
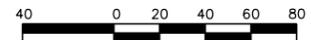
NO.	REVISION DESCRIPTION	DIV. ENGINEER	DATE

**PSOMAS**  
800 E. Wilmore Road, Suite 110  
Tucson, Arizona 85719  
(520) 292-2300 (520) 292-1290 (FAX)

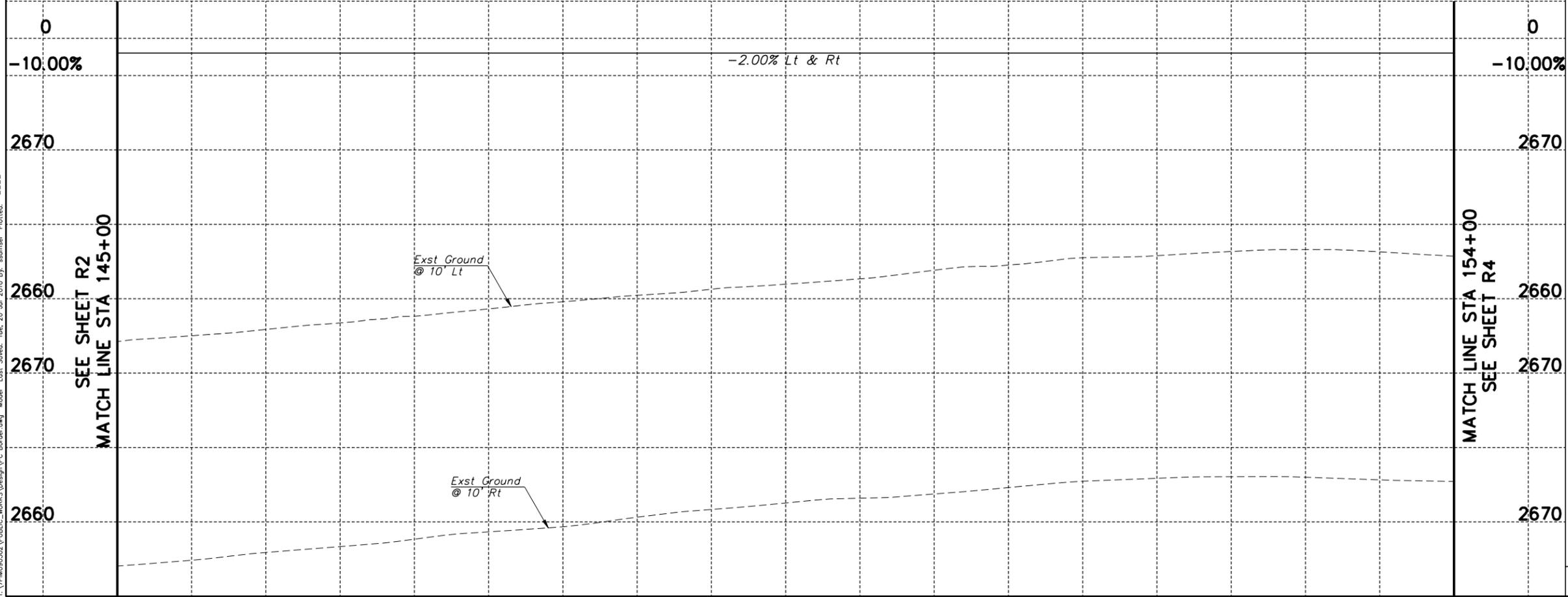
PIMA COUNTY DEPARTMENT OF TRANSPORTATION  
ROADWAY PLAN AND PROFILE  
FOR  
**VALENCIA ROAD**  
ALVERNON WAY TO WILMOT ROAD  
STA 136+00 TO STA 145+00

SHEET R2 OF R28    PAGE XXX OF XXX

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+10.00% 145+00    146+00    147+00    148+00    149+00    150+00    151+00    152+00    153+00    154+00 +10.00%



Curve Table				
Curve No	Radius	Length	Delta	Tangent
C8	25.00'	39.27'	90°00'00"	25.00'
C9	25.00'	39.27'	90°00'00"	25.00'



SCALES: HORIZ. 1"=40'  
VERT. 1"=4'

DESIGNED:	SS	DATE	05/11
DRAWN:	PRE	DATE	05/11
CHECKED:	PS	DATE	05/11
PROJ. ENG.:	KIT	DATE	05/11

NO.	REVISION DESCRIPTION	DIV. ENGINEER	DATE

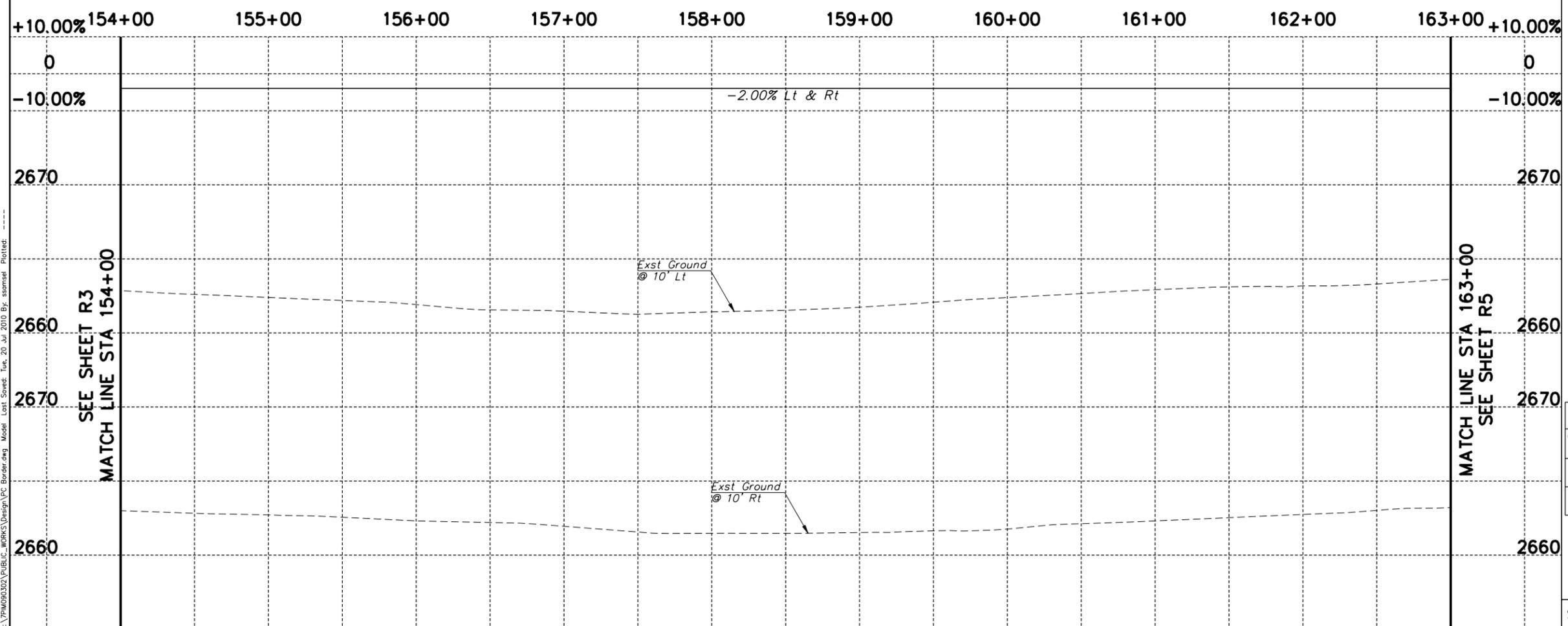
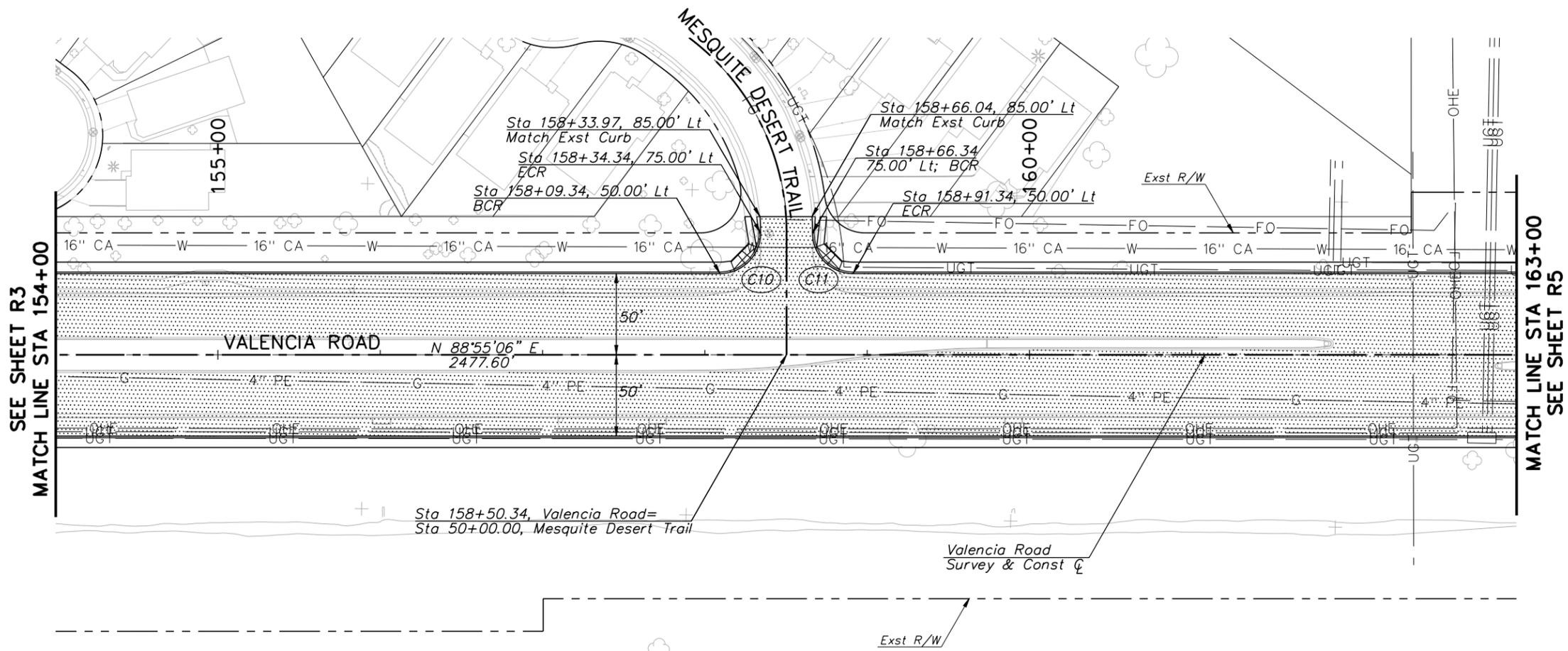
PRISCILLA S. CORNELIO, P.E., DIRECTOR

PIMA COUNTY DEPARTMENT OF TRANSPORTATION

ROADWAY PLAN AND PROFILE  
FOR  
**VALENCIA ROAD**  
ALVERNON WAY TO WILMOT ROAD  
STA 145+00 TO STA 154+00

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Curve No	Radius	Length	Delta	Tangent
C10	25.00'	39.27'	90°00'00"	25.00'
C11	25.00'	39.27'	90°00'00"	25.00'



SCALES: HORIZ. 1"=40'  
VERT. 1"=4'

DESIGNED:	SS	DATE	05/11
DRAWN:	PRE	CHECKED:	PS
PROJ. ENG.:	KIT		05/11

NO.	REVISION DESCRIPTION	DIV. ENGINEER	DATE

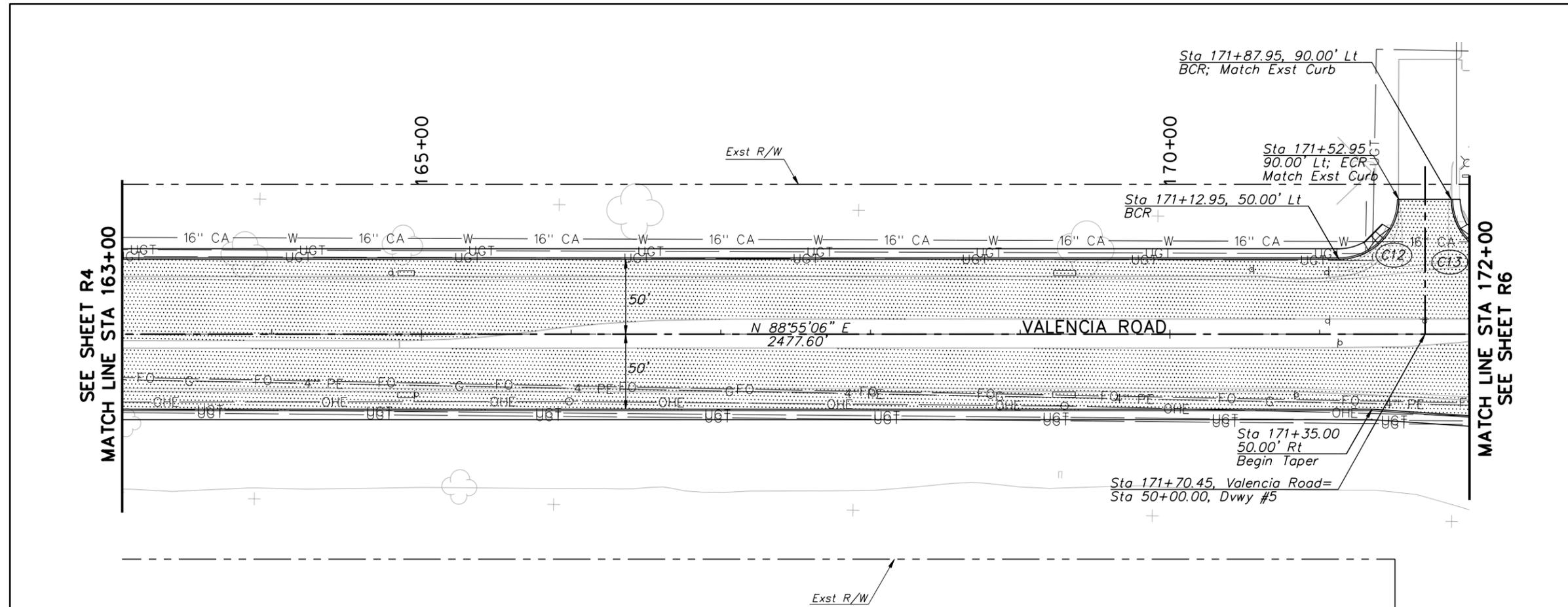
PRISCILLA S. CORNELIO, P.E., DIRECTOR

PIMA COUNTY DEPARTMENT OF TRANSPORTATION

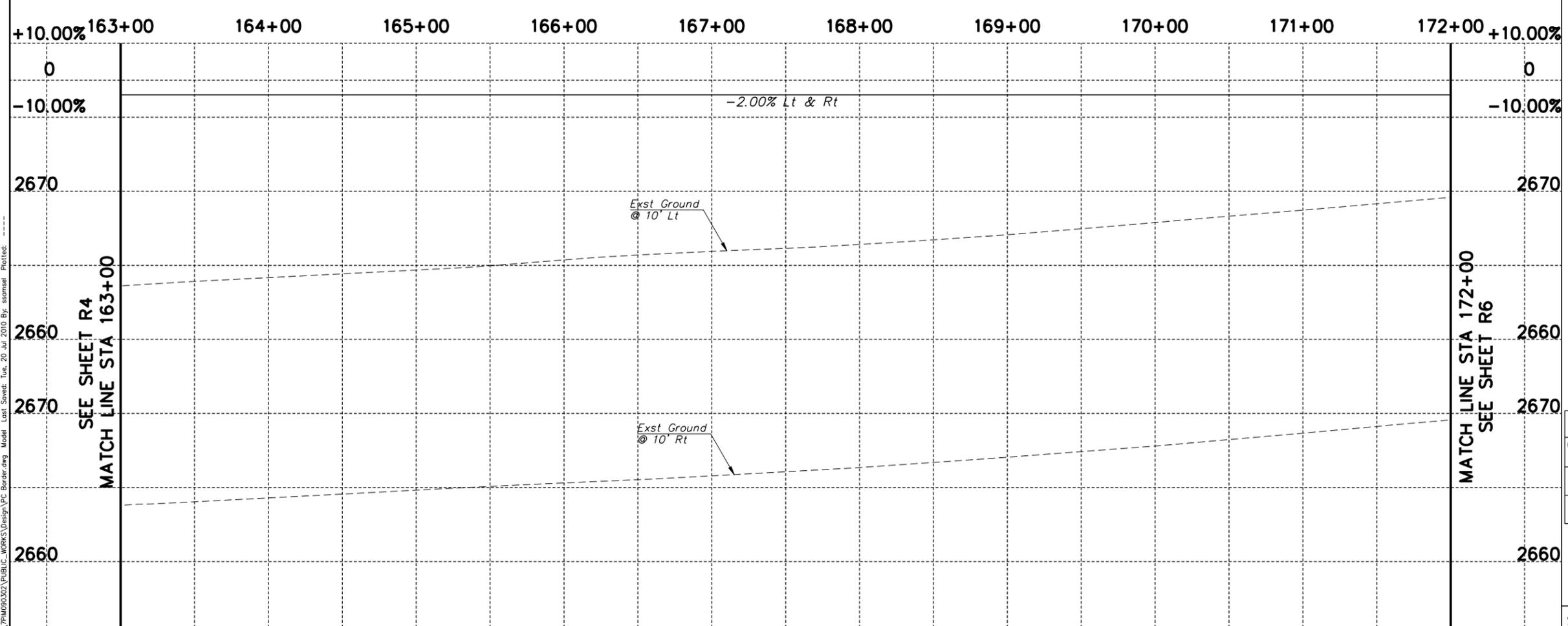
ROADWAY PLAN AND PROFILE  
FOR  
**VALENCIA ROAD**  
ALVERNON WAY TO WILMOT ROAD  
STA 154+00 TO STA 163+00

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800 E. Wilma Road, Suite 110  
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CURVE DATA



Curve Table				
Curve No	Radius	Length	Delta	Tangent
C12	40.00'	62.83'	90°00'00"	40.00'
C13	40.00'	62.83'	90°00'00"	40.00'



SCALES: HORIZ. 1"=40'  
VERT. 1"=4'

DESIGNED:	SS	DATE	05/11
DRAWN:	PRE	DATE	05/11
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PROJ. ENG.:	KIT	DATE	05/11

NO.	REVISION DESCRIPTION	DATE

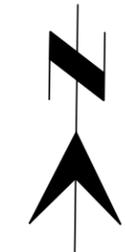
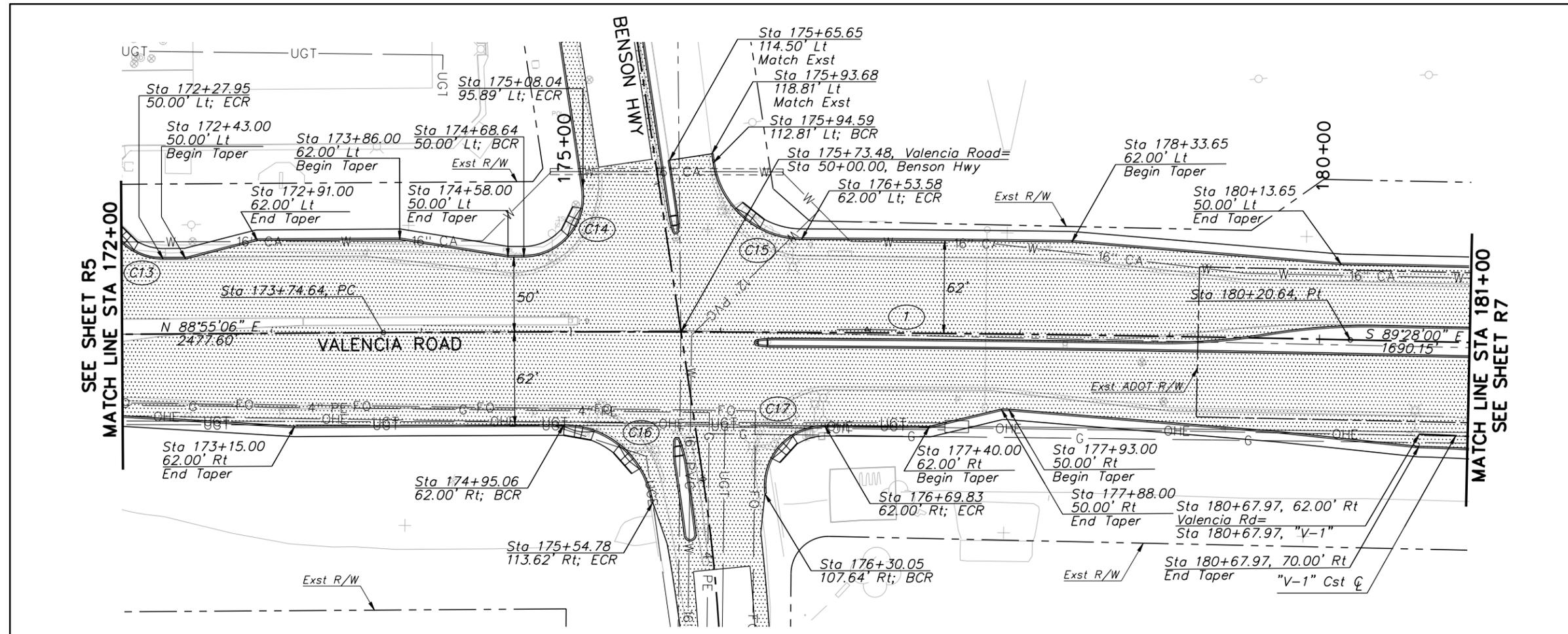
PRISCILLA S. CORNELIO, P.E., DIRECTOR

PIMA COUNTY DEPARTMENT OF TRANSPORTATION

ROADWAY PLAN AND PROFILE  
FOR  
**VALENCIA ROAD**  
ALVERNON WAY TO WILMOT ROAD  
STA 163+00 TO STA 172+00

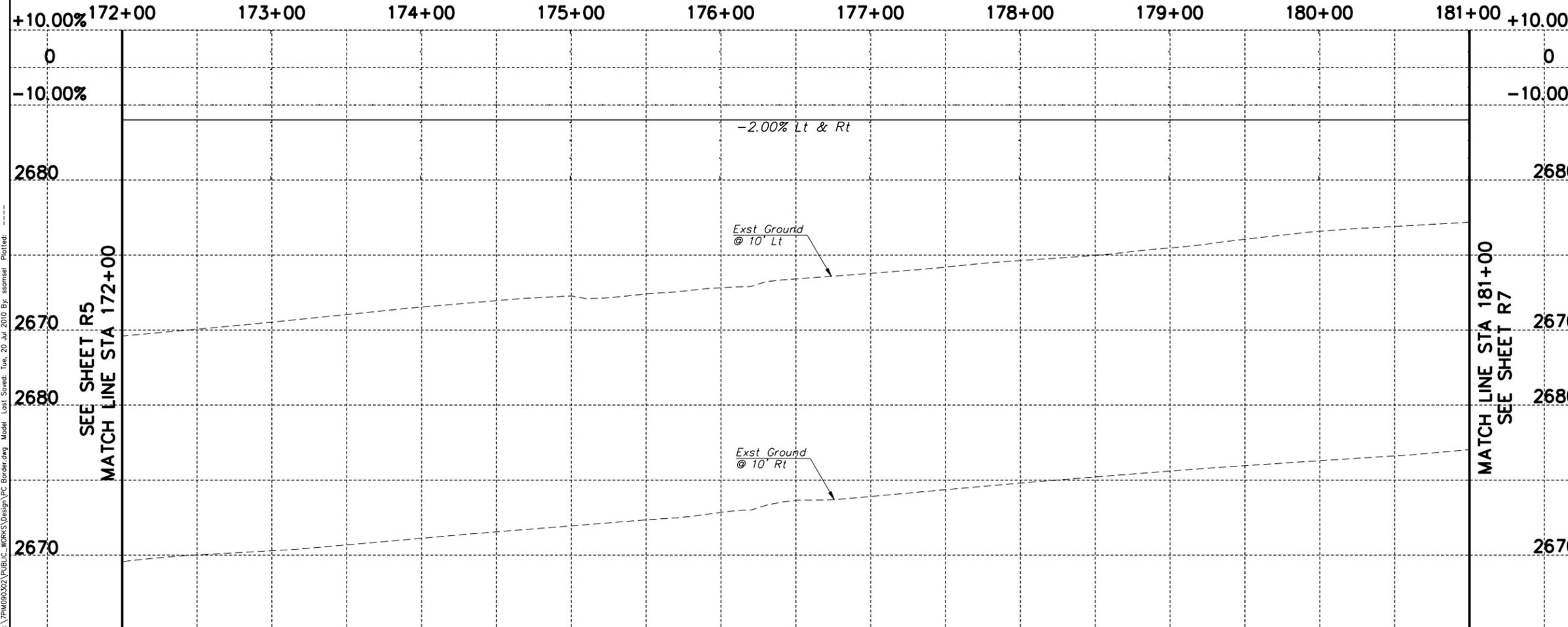
**PSOMAS**  
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Tucson, Arizona 85719  
(520) 292-2300 (520) 292-1290 (FAX)

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**CURVE DATA**

1  
 R= 22918.32'  
 L= 646.00'  
 $\Delta$  = 01°36'54"  
 T= 323.02'  
 D= 00°15'00"



Curve Table				
Curve No	Radius	Length	Delta	Tangent
C13	40.00'	62.83'	90°00'00"	40.00'
C14	40.00'	68.71'	98°25'08"	46.36'
C15	60.00'	84.95'	81°07'07"	51.35'
C16	60.00'	85.92'	82°02'39"	52.20'
C17	40.00'	68.53'	98°09'44"	46.15'



SCALES: HORIZ. 1"=40'  
 VERT. 1"=4'

PRISCILLA S. CORNELIO, P.E., DIRECTOR

DESIGNED:	SS	DATE	05/11
DRAWN:	PRE	DATE	05/11
CHECKED:	PS	DATE	05/11
PROJ. ENG.:	KIT	DATE	05/11

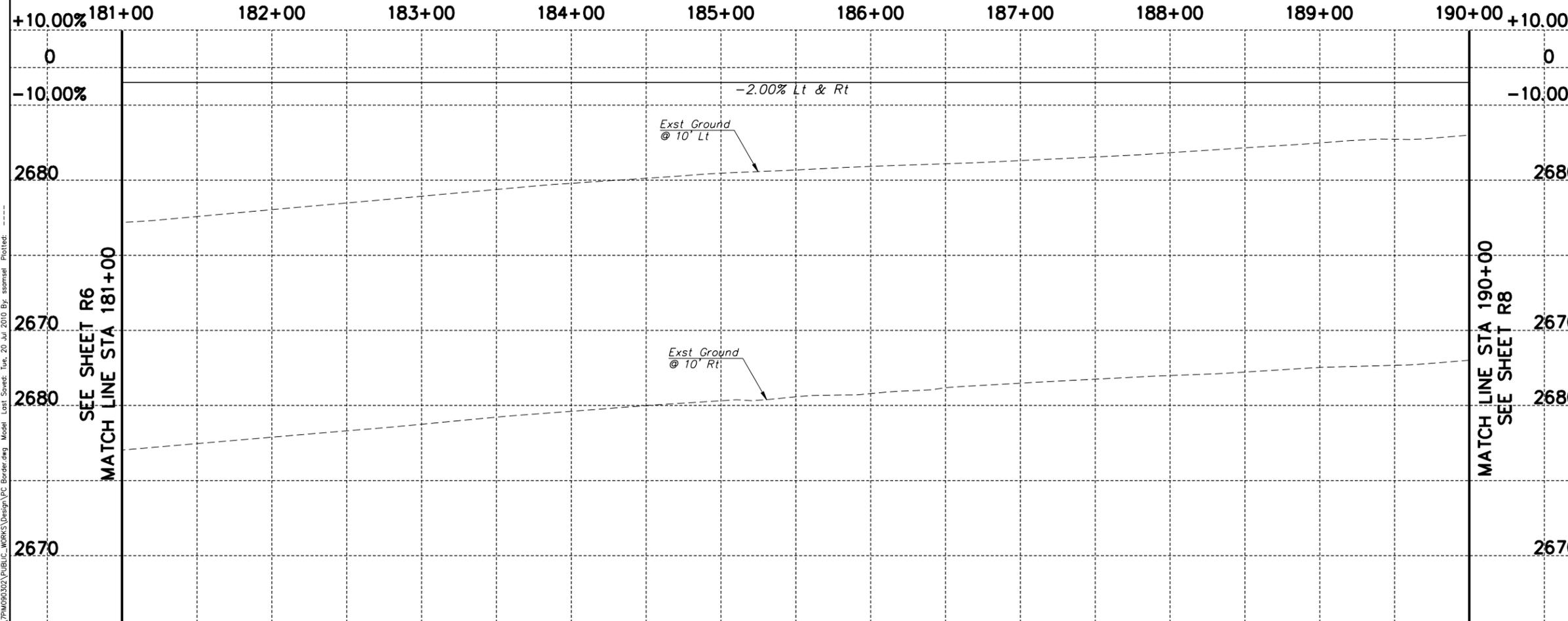
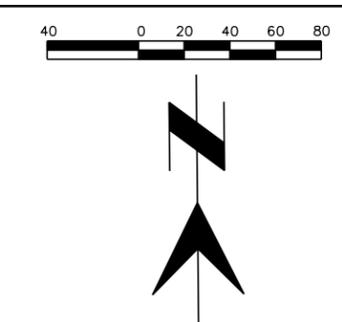
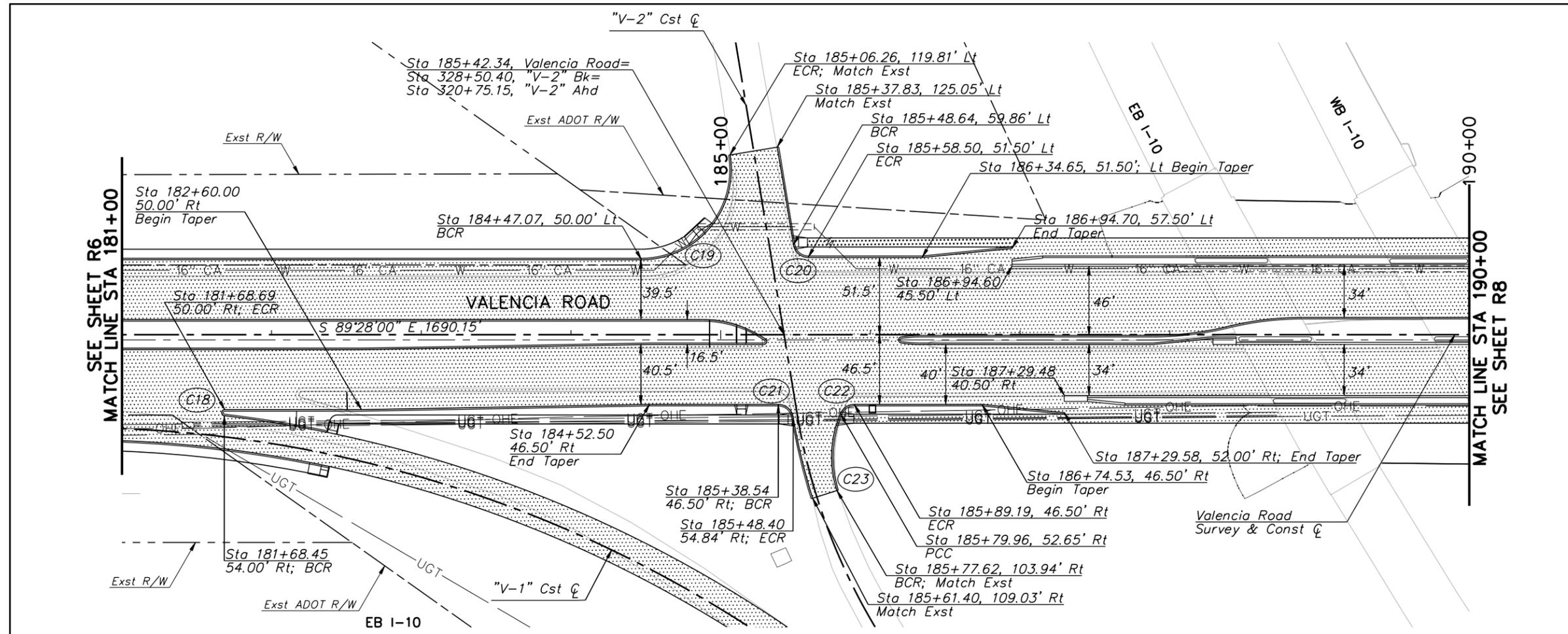
NO.	REVISION DESCRIPTION	DATE

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 (520) 292-2300 (520) 292-1290 (FAX)

PIMA COUNTY DEPARTMENT OF TRANSPORTATION  
 ROADWAY PLAN AND PROFILE  
 FOR  
**VALENCIA ROAD**  
 ALVERNON WAY TO WILMOT ROAD  
 STA 172+00 TO STA 181+00

PAGE XXX OF XXX

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Curve Table				
Curve No	Radius	Length	Delta	Tangent
C18	2.00'	6.05'	173°10'54"	33.57'
C19	60.00'	104.11'	99°24'54"	70.77'
C20	10.00'	14.06'	80°35'06"	8.48'
C21	10.00'	14.04'	80°25'30"	8.45'
C22	10.00'	11.76'	67°22'48"	6.67'
C23	75.00'	52.40'	40°02'00"	27.32'



SCALES: HORIZ. 1"=40'  
VERT. 1"=4'

PRISCILLA S. CORNELIO, P.E., DIRECTOR

DESIGNED:	SS	DATE	05/11
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PROJECT:	PS	PROJ. ENG.:	KIT

NO.	REVISION DESCRIPTION	DIV. ENGINEER	DATE

PIMA COUNTY DEPARTMENT OF TRANSPORTATION  
ROADWAY PLAN AND PROFILE  
FOR  
**VALENCIA ROAD**  
ALVERNON WAY TO WILMOT ROAD  
STA 181+00 TO STA 190+00

**PSOMAS**  
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PAGE XXX OF XXX

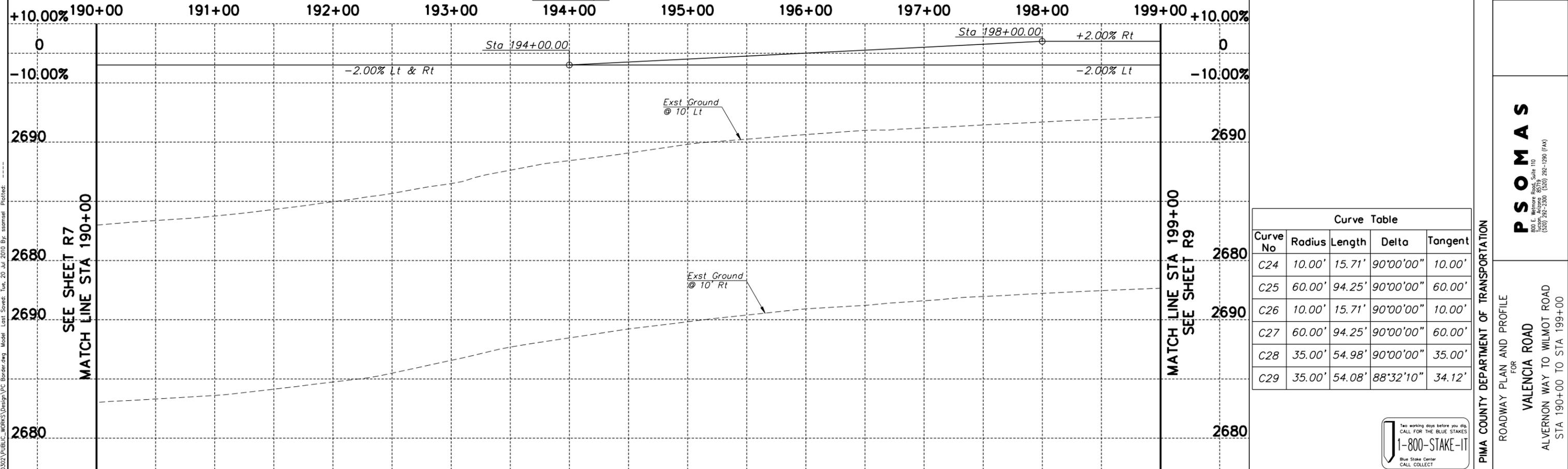
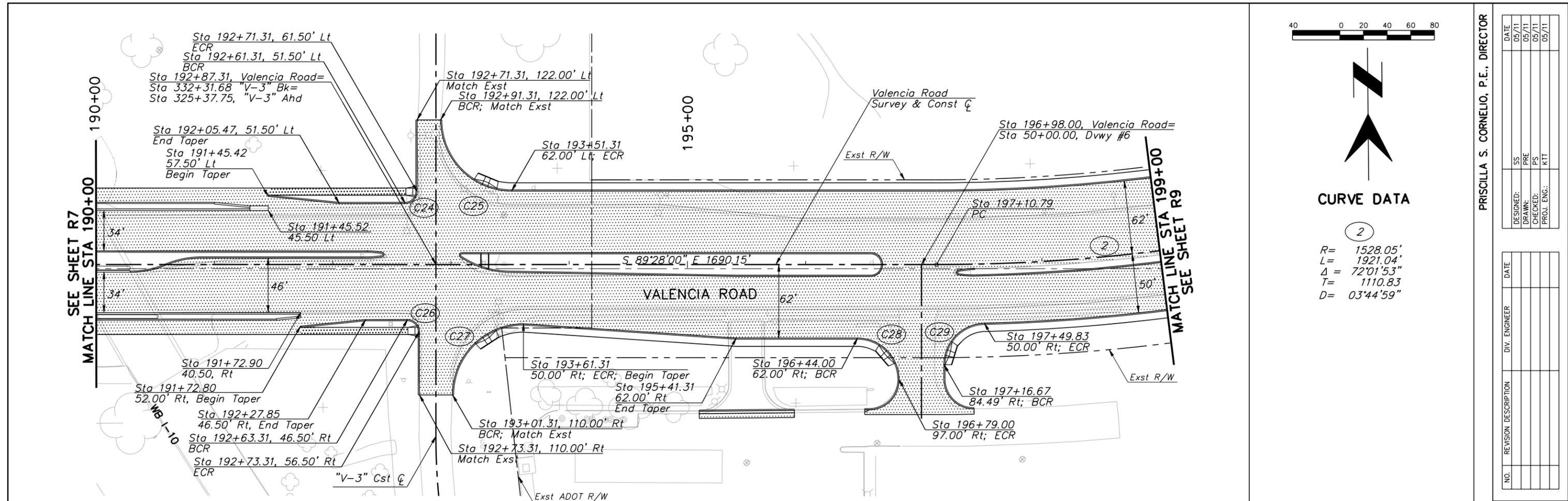
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**CURVE DATA**

(2)

R= 1528.05'  
 L= 1921.04'  
 Δ = 72°01'53"  
 T= 1110.83  
 D= 03°44'59"



Curve Table				
Curve No	Radius	Length	Delta	Tangent
C24	10.00'	15.71'	90°00'00"	10.00'
C25	60.00'	94.25'	90°00'00"	60.00'
C26	10.00'	15.71'	90°00'00"	10.00'
C27	60.00'	94.25'	90°00'00"	60.00'
C28	35.00'	54.98'	90°00'00"	35.00'
C29	35.00'	54.08'	88°32'10"	34.12'



SCALES: HORIZ. 1"=40' VERT. 1"=4' SHEET R8 OF R28 PAGE XXX OF XXX

PRISCILLA S. CORNELIO, P.E., DIRECTOR

DESIGNED:	SS	DATE	05/11
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PROJ. ENG.:	KIT	DATE	05/11

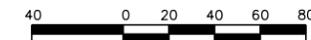
NO.	REVISION DESCRIPTION	DIV. ENGINEER	DATE

**PSOMAS**  
 800 E. Wilmore Road, Suite 110  
 Tucson, Arizona 85719  
 (520) 292-2300 (520) 292-1290 (FAX)

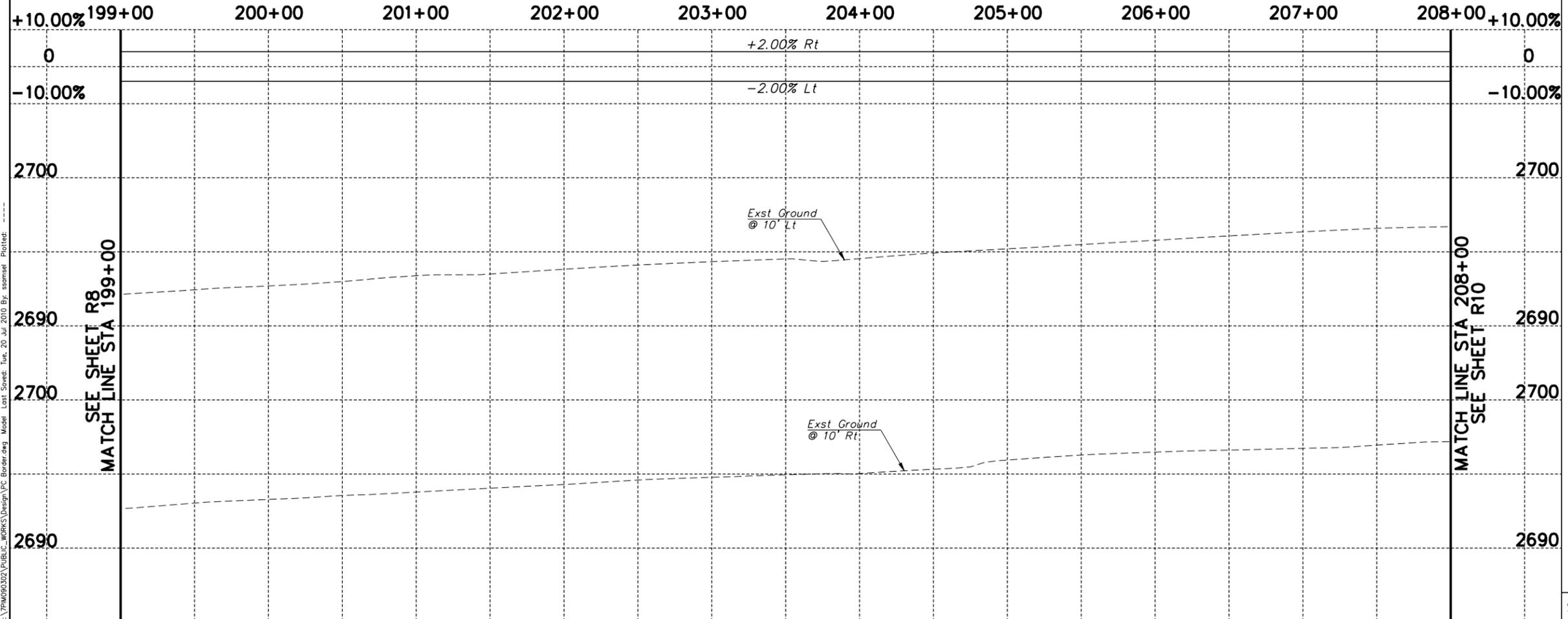
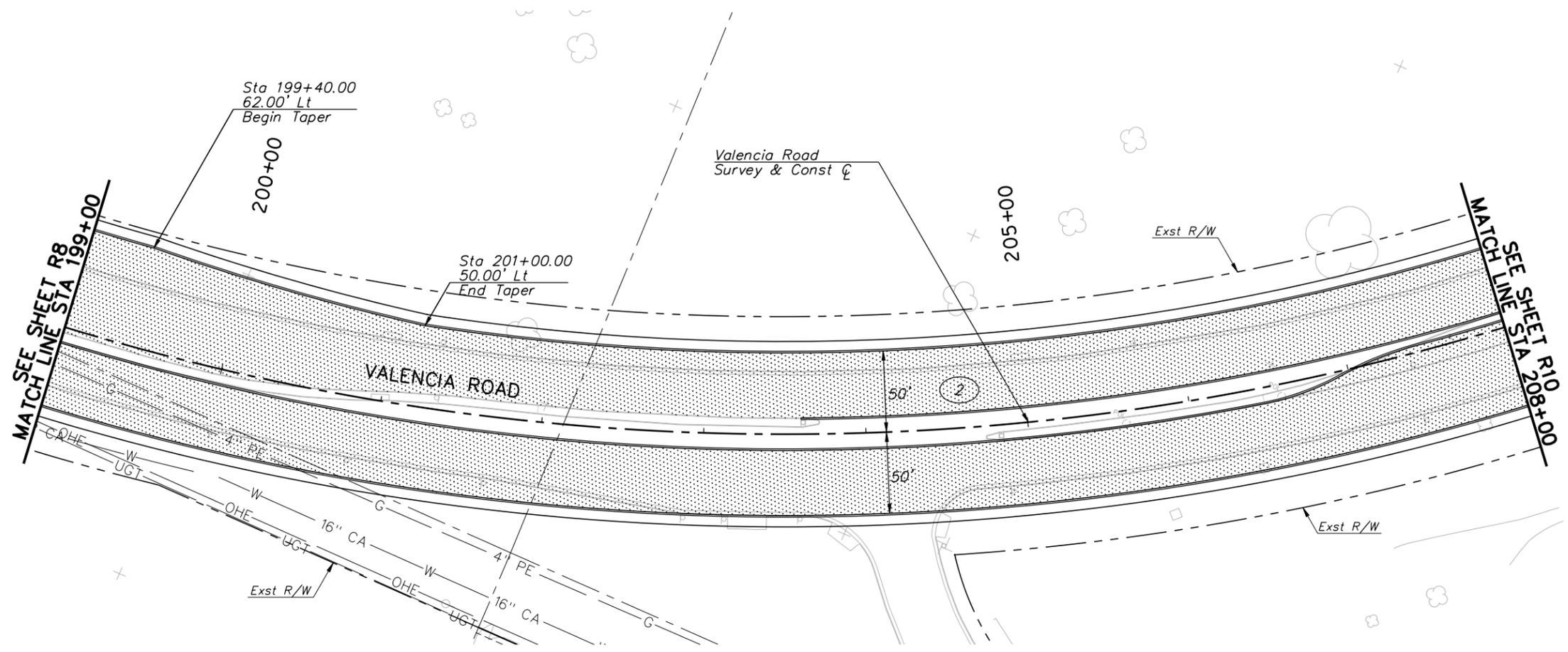
PIMA COUNTY DEPARTMENT OF TRANSPORTATION  
 ROADWAY PLAN AND PROFILE  
 FOR  
**VALENCIA ROAD**  
 ALVERNON WAY TO WILMOT ROAD  
 STA 190+00 TO STA 199+00

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**CURVE DATA**

②  
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 L = 1921.04'  
 Δ = 72°01'53"  
 T = 1110.83'  
 D = 03°44'59"



DESIGNED:	SS	DATE	05/11
DRAWN:	PRE	DATE	05/11
CHECKED:	PS	DATE	05/11
PROJ. ENG.:	KTT	DATE	05/11

NO.	REVISION DESCRIPTION	DIV. ENGINEER	DATE

PRISCILLA S. CORNELIO, P.E., DIRECTOR

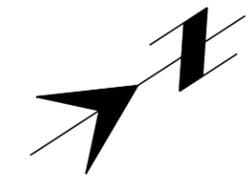
PIMA COUNTY DEPARTMENT OF TRANSPORTATION

**PSOMAS**  
 800 E. Wilmore Road, Suite 110  
 Tucson, Arizona 85719  
 (520) 292-2300 (520) 292-1290 (FAX)

ROADWAY PLAN AND PROFILE  
 FOR  
**VALENCIA ROAD**  
 ALVERNON WAY TO WILMOT ROAD  
 STA 199+00 TO STA 208+00

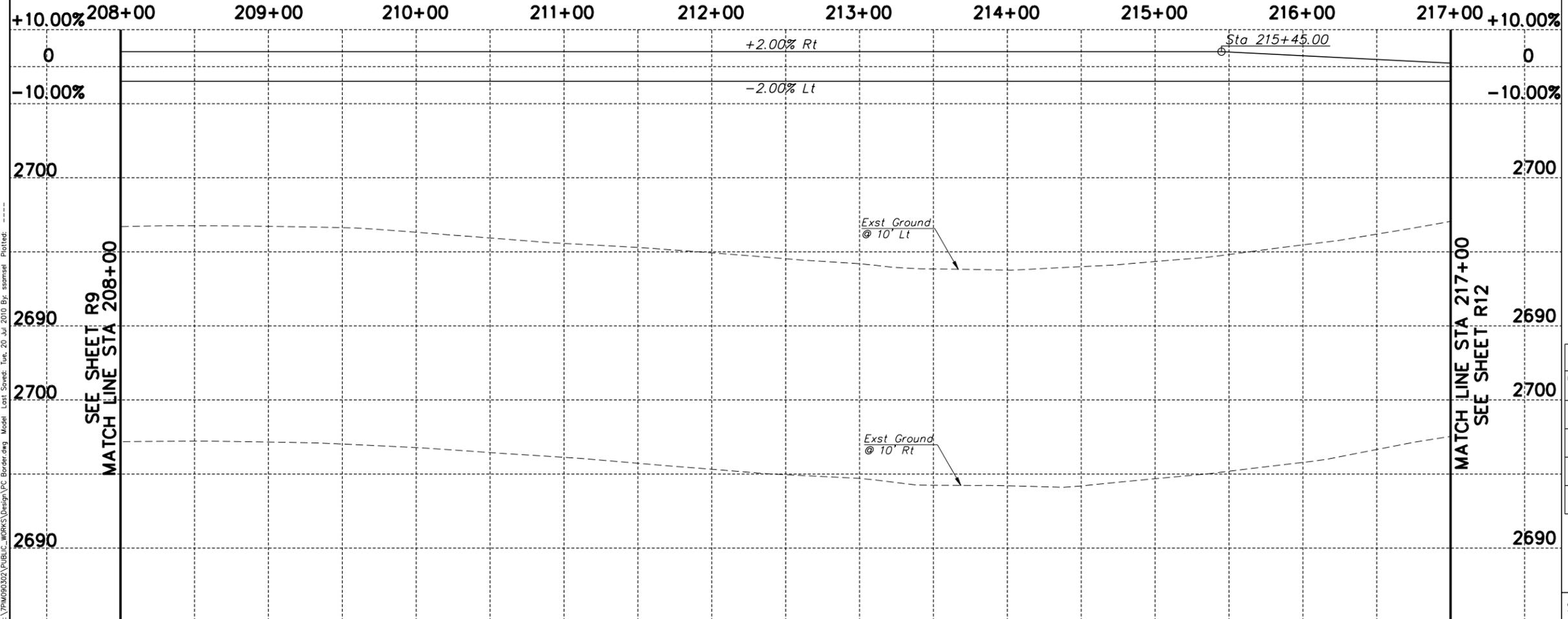
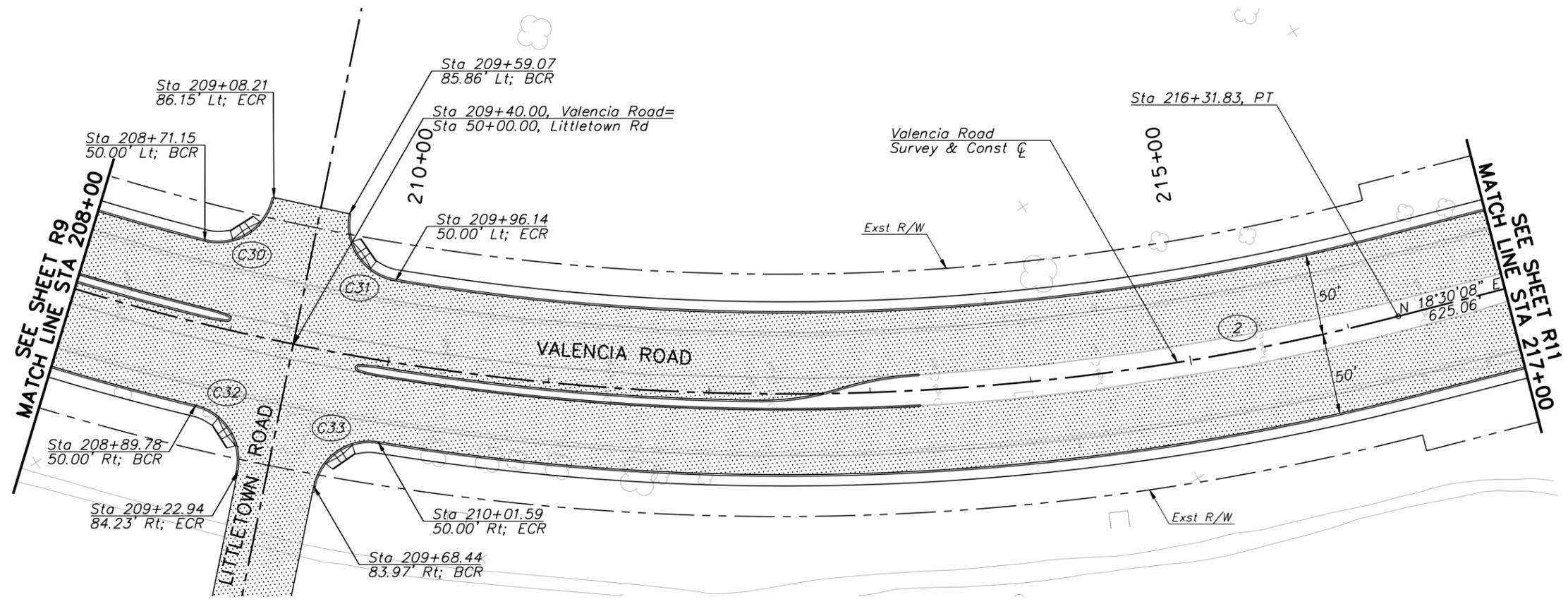


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**CURVE DATA**

②  
 R= 1528.05'  
 L= 1921.04'  
 Δ = 72°01'53"  
 T= 1110.83  
 D= 03°44'59"



Curve Table				
Curve No	Radius	Length	Delta	Tangent
C30	35.00'	56.55'	92°34'54"	36.61'
C31	35.00'	56.26'	92°06'17"	36.31'
C32	35.00'	53.83'	88°07'02"	33.87'
C33	35.00'	53.57'	87°41'26"	33.62'



SCALES: HORIZ. 1"=40'  
 VERT. 1"=4'

PRISCILLA S. CORNELIO, P.E., DIRECTOR

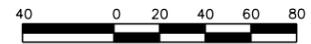
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PROJ. ENG.:	KTT	DATE	05/11

NO.	REVISION DESCRIPTION	DIV. ENGINEER	DATE

**PSOMAS**  
 800 E. Wilmore Road, Suite 110  
 Tucson, Arizona 85719  
 (520) 292-2300 (520) 292-1290 (FAX)

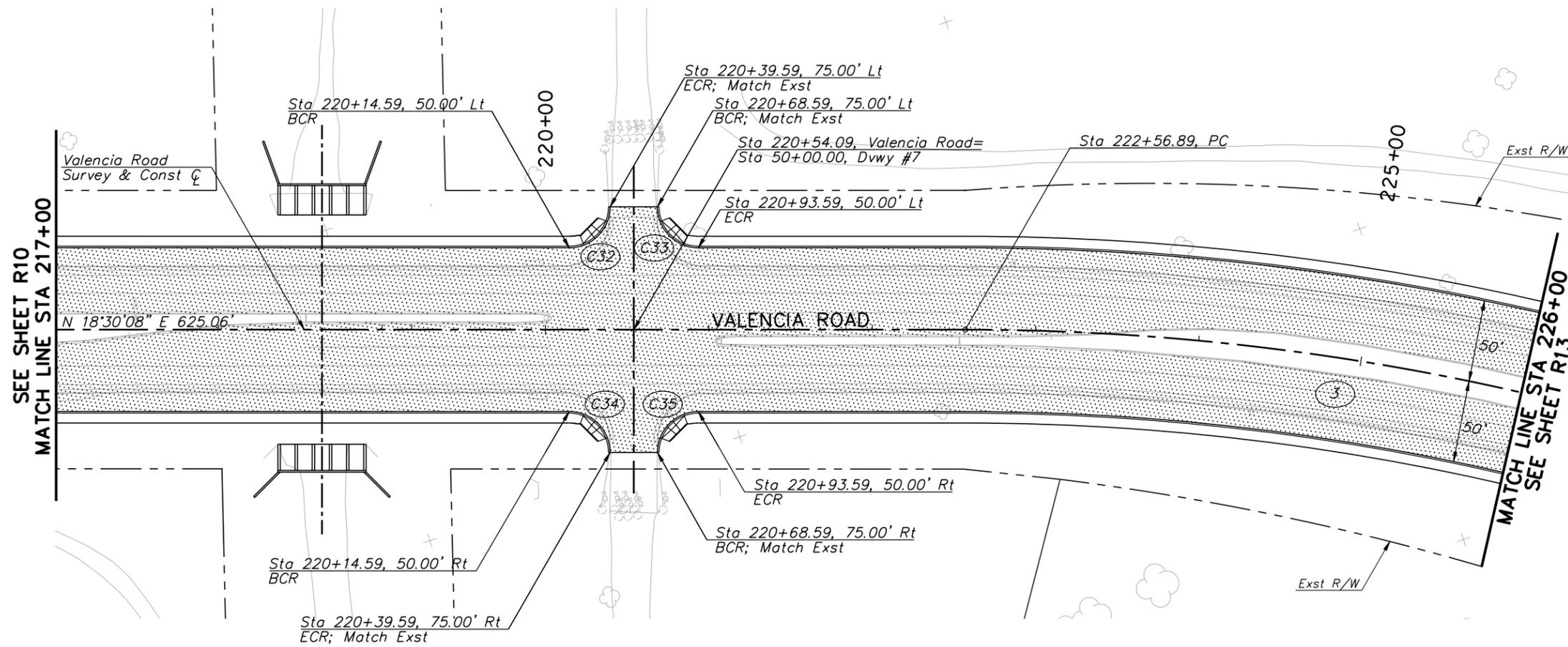
PIMA COUNTY DEPARTMENT OF TRANSPORTATION  
 ROADWAY PLAN AND PROFILE  
 FOR  
**VALENCIA ROAD**  
 ALVERNON WAY TO WILMOT ROAD  
 STA 208+00 TO STA 217+00

I:\7PM090302\PUBLIC\_WORKS\Design\PC Border.dwg Model Last Saved: Tue, 20 Jun 2010 10:00:00 AM By: ssmsmal Plotted: 5/17/2011 2:32:12 PM



**CURVE DATA**

3  
 R= 1528.05'  
 L= 1893.21'  
 Δ = 70°59'17"  
 T= 1089.71'  
 D= 03'44"59"



**Curve Table**

Curve No	Radius	Length	Delta	Tangent
C32	25.00'	39.27'	90°00'00"	25.00'
C33	25.00'	39.27'	90°00'00"	25.00'
C34	25.00'	39.27'	90°00'00"	25.00'
C35	25.00'	39.27'	90°00'00"	25.00'



SCALES: HORIZ. 1"=40'  
 VERT. 1"=4'

SHEET R11 OF R28

**PRISCILLA S. CORNELIO, P.E., DIRECTOR**

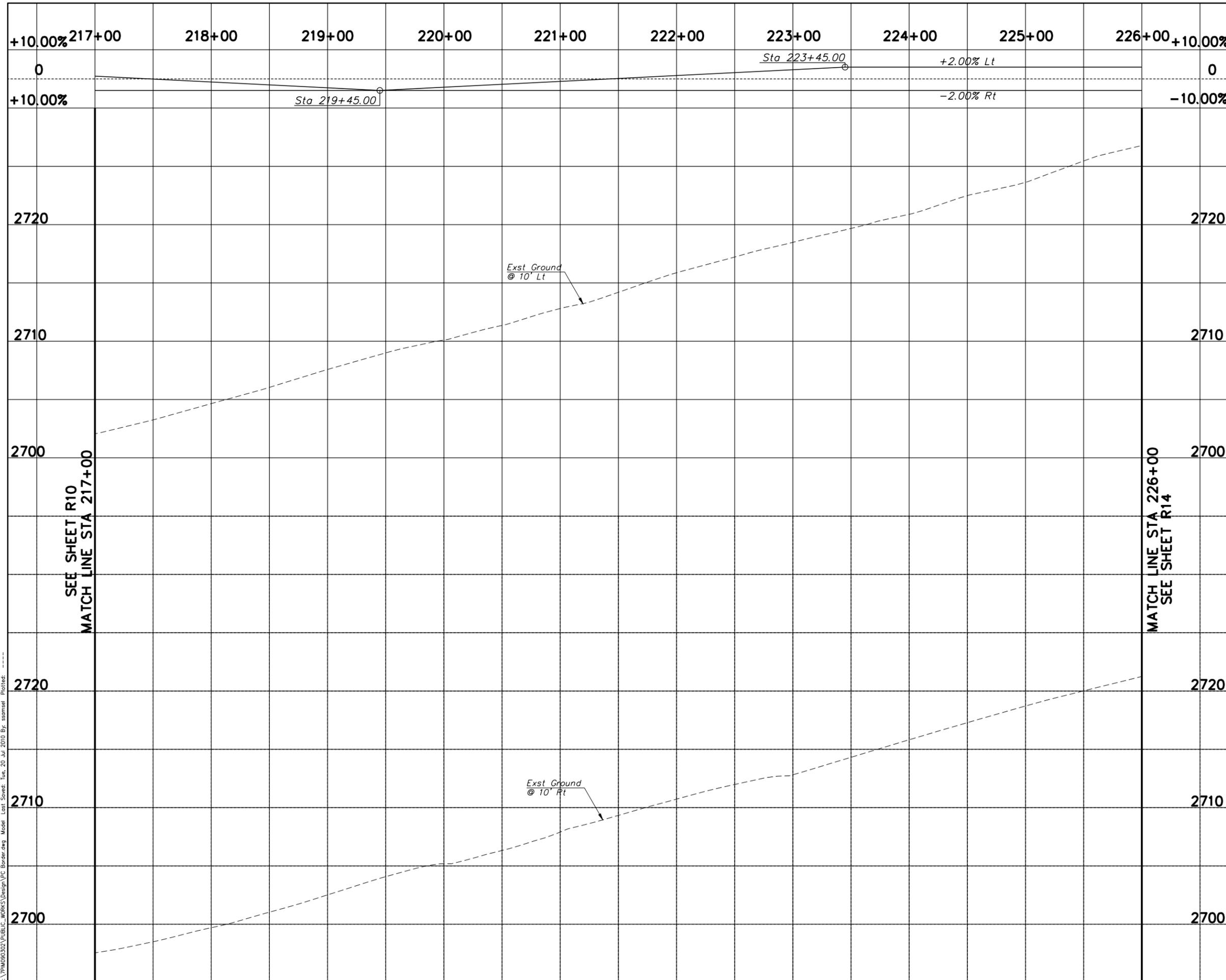
DESIGNED:	SS	DATE
DRAWN:	PRE	05/11
CHECKED:	PS	05/11
PROJ. ENG.:	KTT	05/11

NO.	REVISION DESCRIPTION	DIV. ENGINEER	DATE

**PSOMAS**  
 800 E. Wilmore Road, Suite 110  
 Tucson, Arizona 85719  
 (520) 292-2300 (520) 292-1290 (FAX)

**PIMA COUNTY DEPARTMENT OF TRANSPORTATION**  
 ROADWAY PLAN  
 FOR  
**VALENCIA ROAD**  
 ALVERNON WAY TO WILMOT ROAD  
 STA 217+00 TO STA 226+00

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PRISCILLA S. CORNELIO, P.E., DIRECTOR

DATE	05/11
DESIGNED:	SS
DRAWN:	PRE
CHECKED:	PS
PROJ. ENG.:	KTT

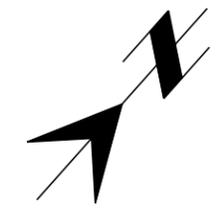
NO.	REVISION DESCRIPTION	DIV. ENGINEER	DATE

**PSOMAS**  
 800 E. Valencia Road, Suite 110  
 Tucson, Arizona 85719  
 (520) 292-2300 (520) 292-1290 (FAX)

PIMA COUNTY DEPARTMENT OF TRANSPORTATION  
 ROADWAY PROFILE  
 FOR  
**VALENCIA ROAD**  
 ALVERNON WAY TO WILMOT ROAD  
 STA 217+00 TO STA 226+00

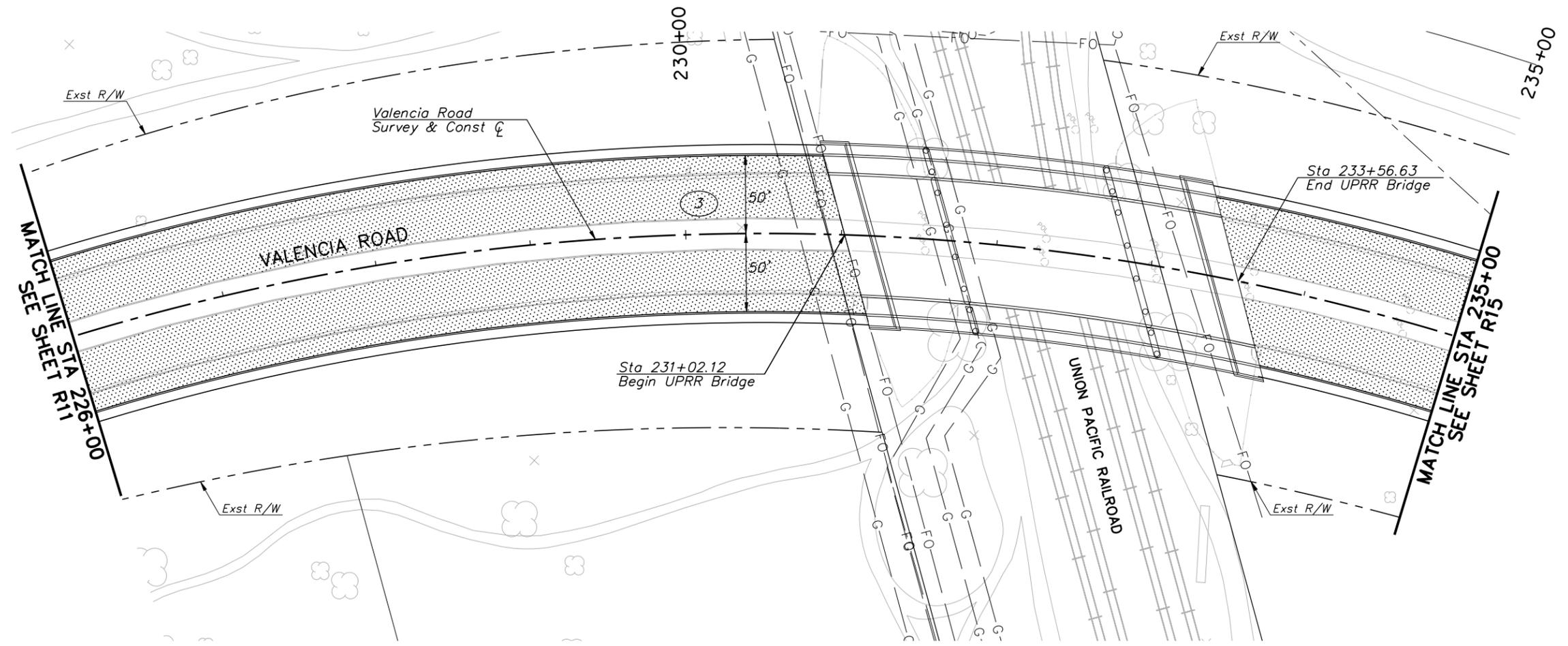


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**CURVE DATA**

③  
 $R = 1528.05'$   
 $L = 1893.21'$   
 $\Delta = 70^{\circ}59'17''$   
 $T = 1089.71'$   
 $D = 03^{\circ}44'59''$



DESIGNED:	SS	DATE	05/11
DRAWN:	PRE	CHECKED:	PS
PROJ. ENG.:	KTT		05/11

NO.	REVISION DESCRIPTION	DIV. ENGINEER	DATE

PRISCILLA S. CORNELIO, P.E., DIRECTOR

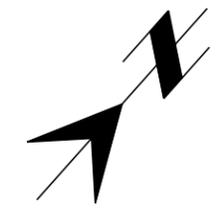
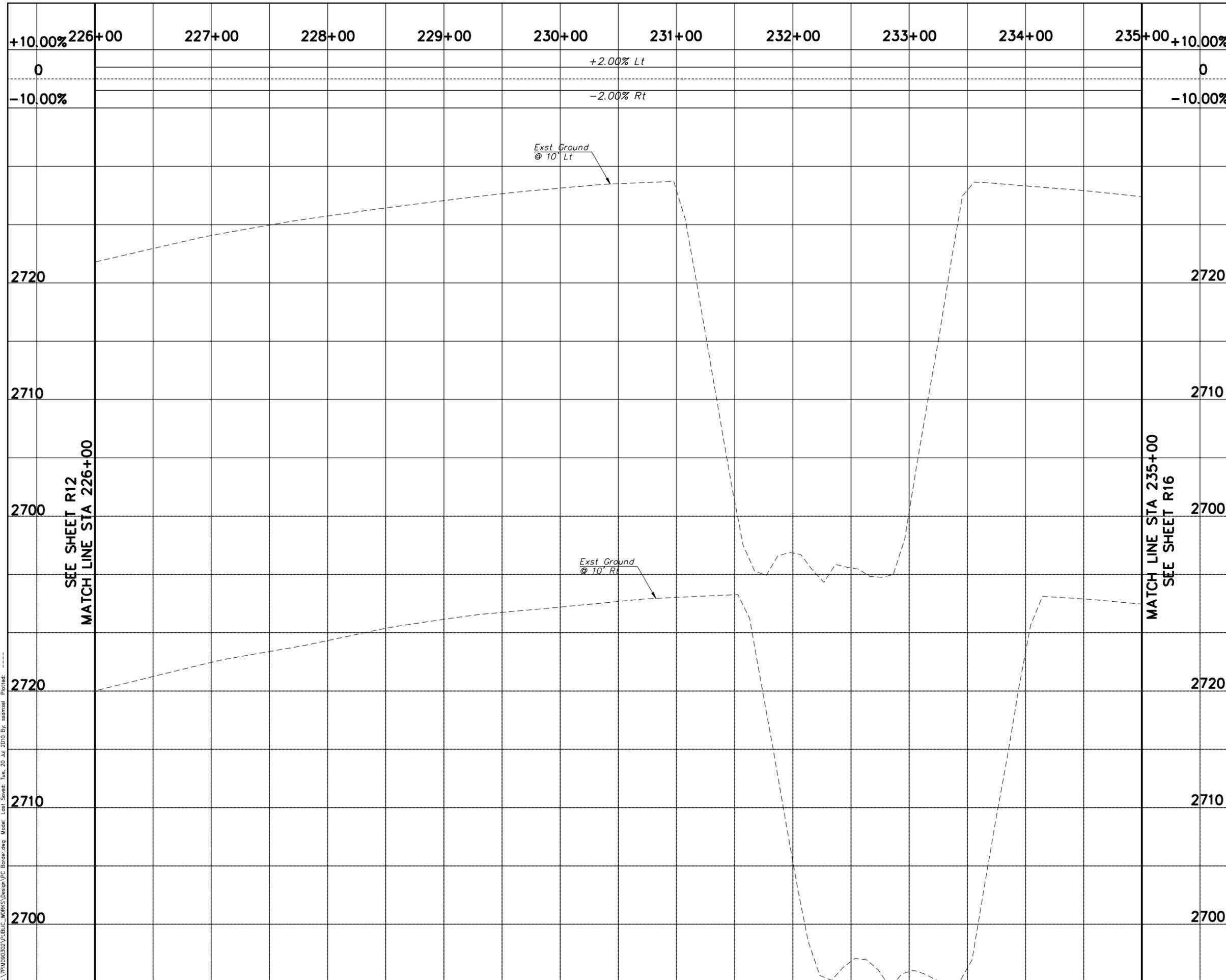
**PSOMAS**  
 800 E. Wilmore Road, Suite 110  
 Tucson, Arizona 85719  
 (520) 292-2300 (520) 292-1290 (FAX)

PIMA COUNTY DEPARTMENT OF TRANSPORTATION

ROADWAY PLAN  
 FOR  
**VALENCIA ROAD**  
 ALVERNON WAY TO WILMOT ROAD  
 STA 226+00 TO STA 235+00



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PRISCILLA S. CORNELIO, P.E., DIRECTOR

DESIGNED:	SS	DATE	05/11
DRAWN:	PRE	DATE	05/11
CHECKED:	PS	DATE	05/11
PROJ. ENG.:	KIT	DATE	05/11

NO.	REVISION DESCRIPTION	DIV. ENGINEER	DATE

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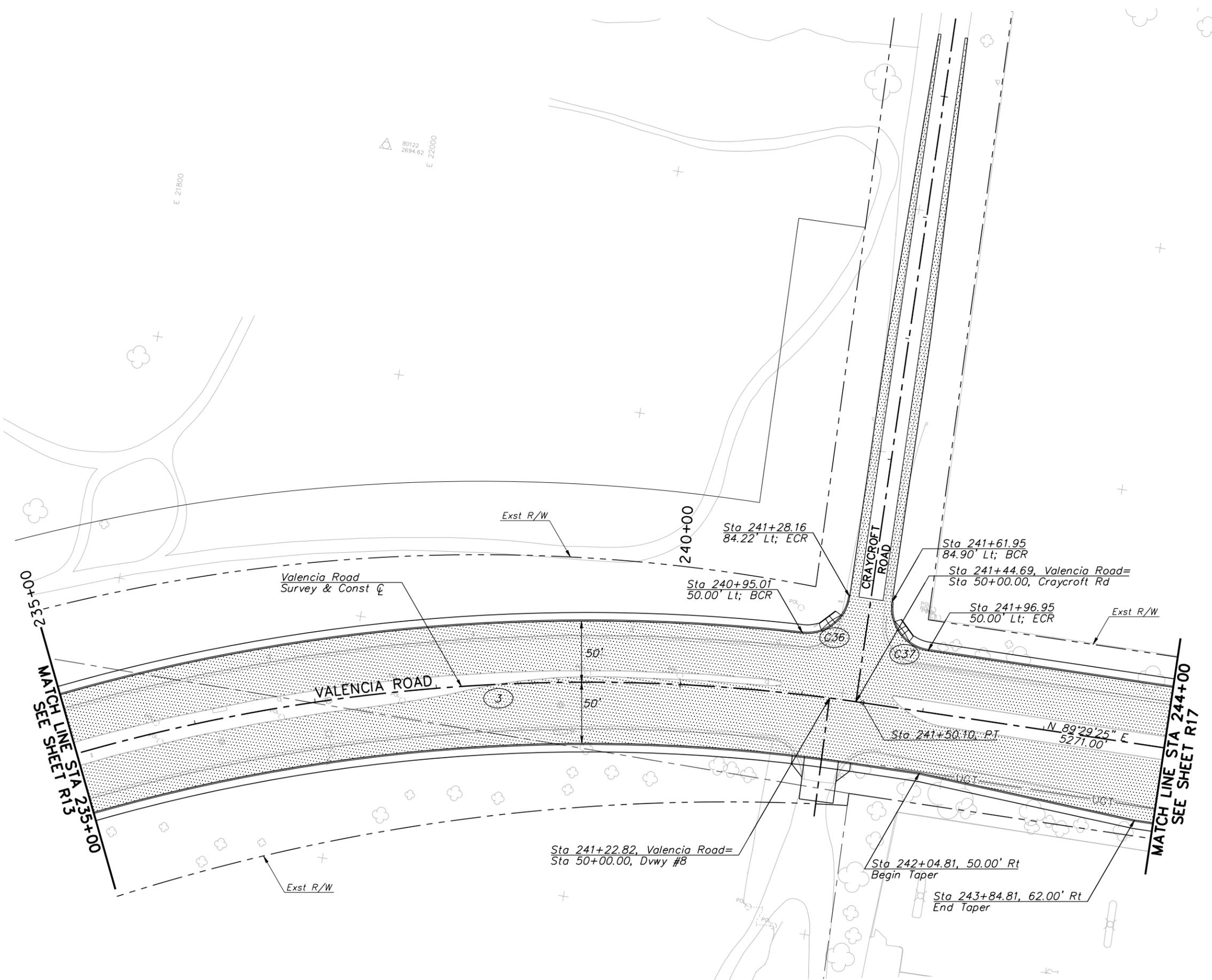
**PSOMAS**  
 800 E. Valencia Road, Suite 110  
 Tucson, Arizona 85719  
 (520) 292-2300 (520) 292-1290 (FAX)

PIMA COUNTY DEPARTMENT OF TRANSPORTATION

ROADWAY PROFILE  
 FOR  
**VALENCIA ROAD**  
 ALVERNON WAY TO WILMOT ROAD  
 STA 226+00 TO STA 235+00



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**CURVE DATA**

3

R= 1528.05'  
 L= 1893.21'  
 Δ = 70°59'17"  
 T= 1089.71'  
 D= 03°44'59"

Curve Table				
Curve No	Radius	Length	Delta	Tangent
C36	35.00'	53.81'	88°05'46"	33.86'
C37	35.00'	54.88'	89°50'16"	34.90'



SCALES: HORIZ. 1"=40'  
 VERT. 1"=4'

PIMA COUNTY DEPARTMENT OF TRANSPORTATION  
 ROADWAY PLAN FOR  
**VALENCIA ROAD**  
 ALVERNON WAY TO WILMOT ROAD  
 STA 235+00 TO STA 244+00

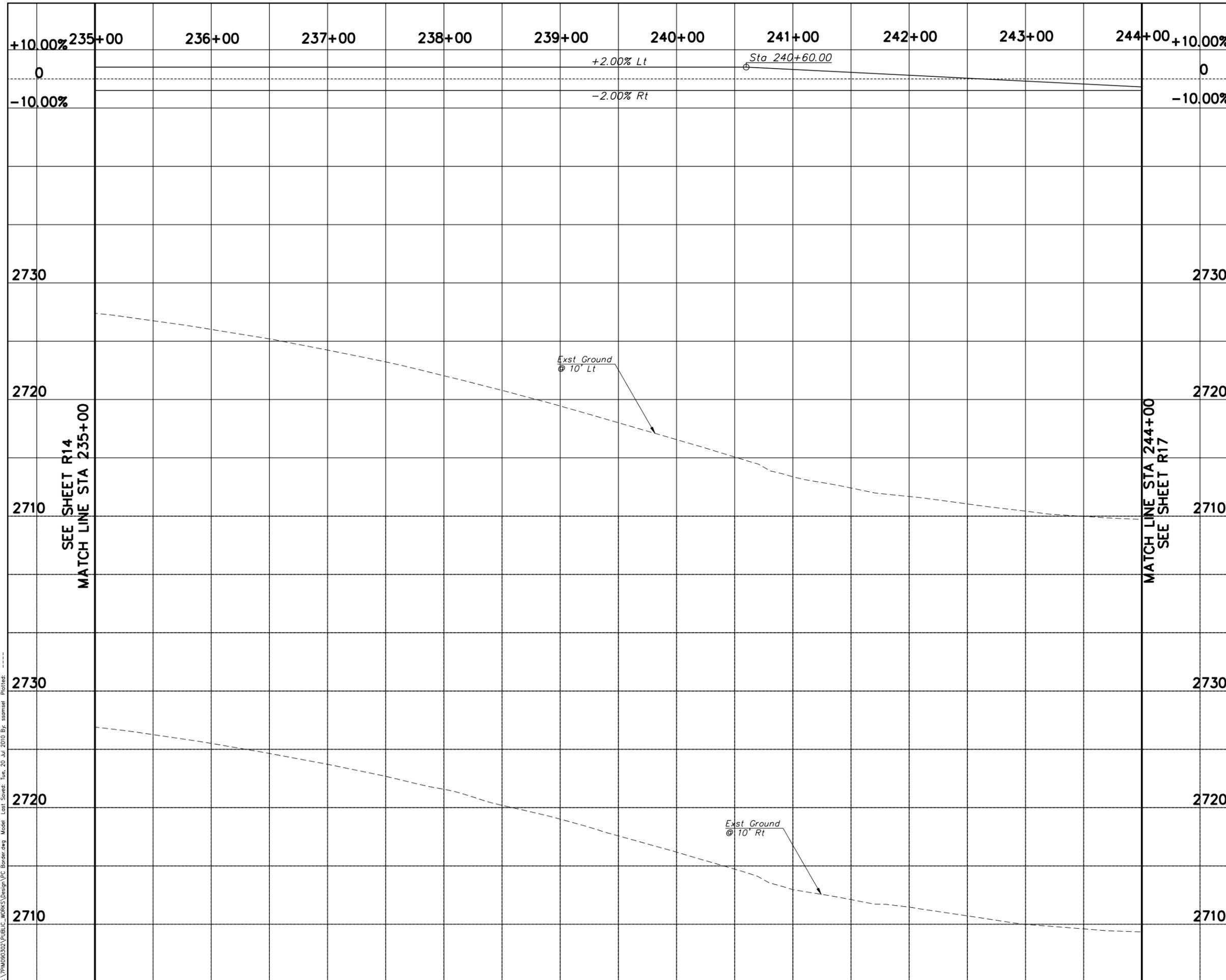
**PSOMAS**

800 E. Wilmore Road, Suite 110  
 Tucson, Arizona 85719  
 (520) 292-2300 (520) 292-1290 (FAX)

PRISCILLA S. CORNELIO, P.E., DIRECTOR

NO.	REVISION DESCRIPTION	DIV. ENGINEER	DATE

DESIGNED:	SS	DATE
DRAWN:	PRE <td>05/11</td>	05/11
CHECKED:	PS <td>05/11</td>	05/11
PROJ. ENG.:	KTT <td>05/11</td>	05/11



PRISCILLA S. CORNELIO, P.E., DIRECTOR

DESIGNED:	SS	DATE	05/11
DRAWN:	PRE	DATE	05/11
CHECKED:	PS	DATE	05/11
PROJ. ENG.:	KTT	DATE	05/11

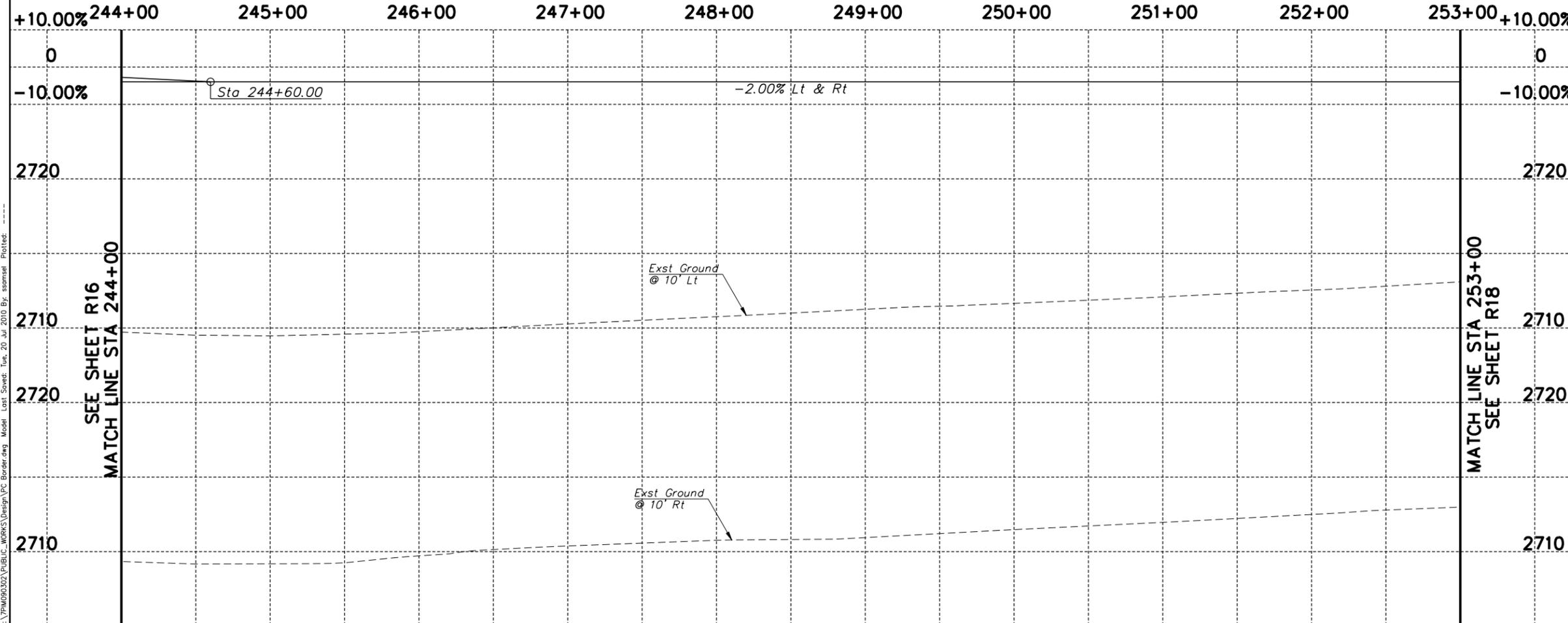
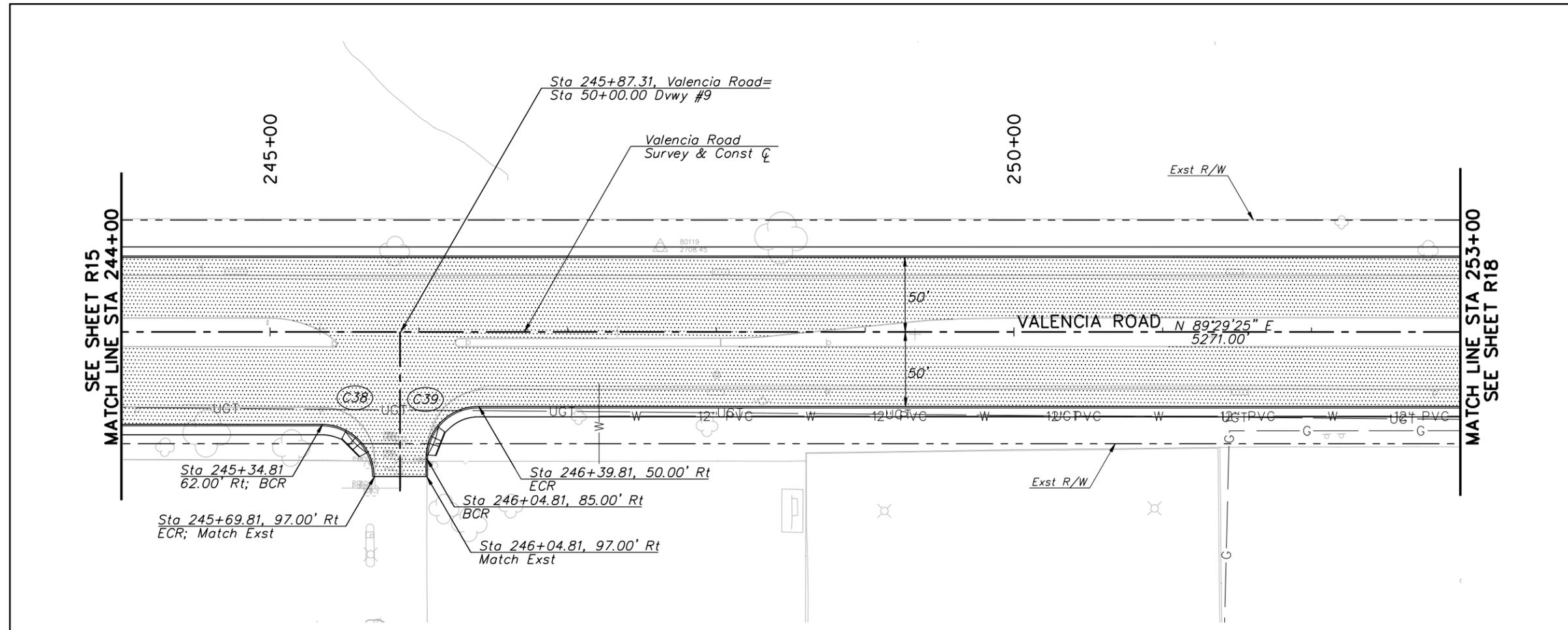
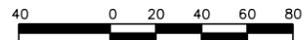
NO.	REVISION DESCRIPTION	DIV. ENGINEER	DATE

**PSOMAS**  
 800 E. Valencia Road, Suite 110  
 Tucson, Arizona 85719  
 (520) 292-2300 (520) 292-1290 (FAX)

PIMA COUNTY DEPARTMENT OF TRANSPORTATION  
 ROADWAY PROFILE  
 FOR  
**VALENCIA ROAD**  
 ALVERNON WAY TO WILMOT ROAD  
 STA 235+00 TO STA 244+00



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Curve Table				
Curve No	Radius	Length	Delta	Tangent
C38	35.00'	54.98'	90°00'00"	35.00'
C39	35.00'	54.98'	90°00'00"	35.00'



SCALES: HORIZ. 1"=40'  
VERT. 1"=4'

NO.	REVISION DESCRIPTION	DIV. ENGINEER	DATE

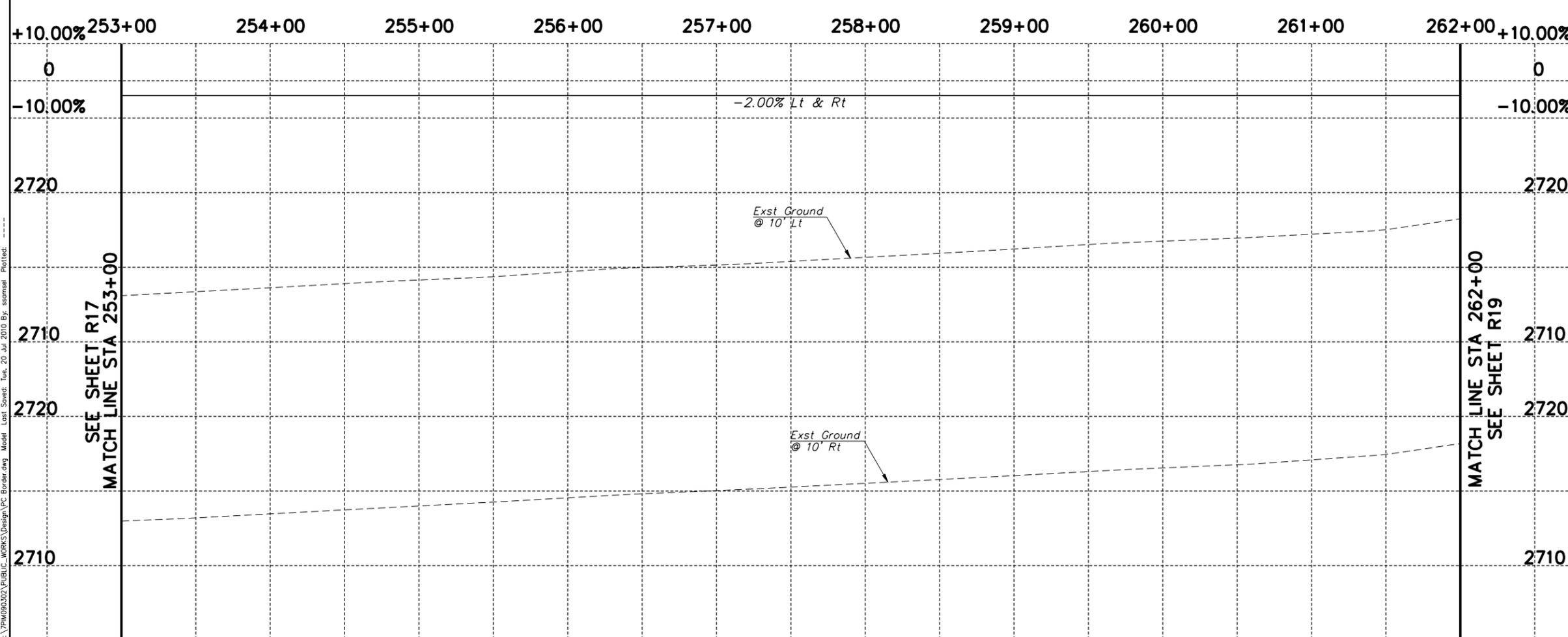
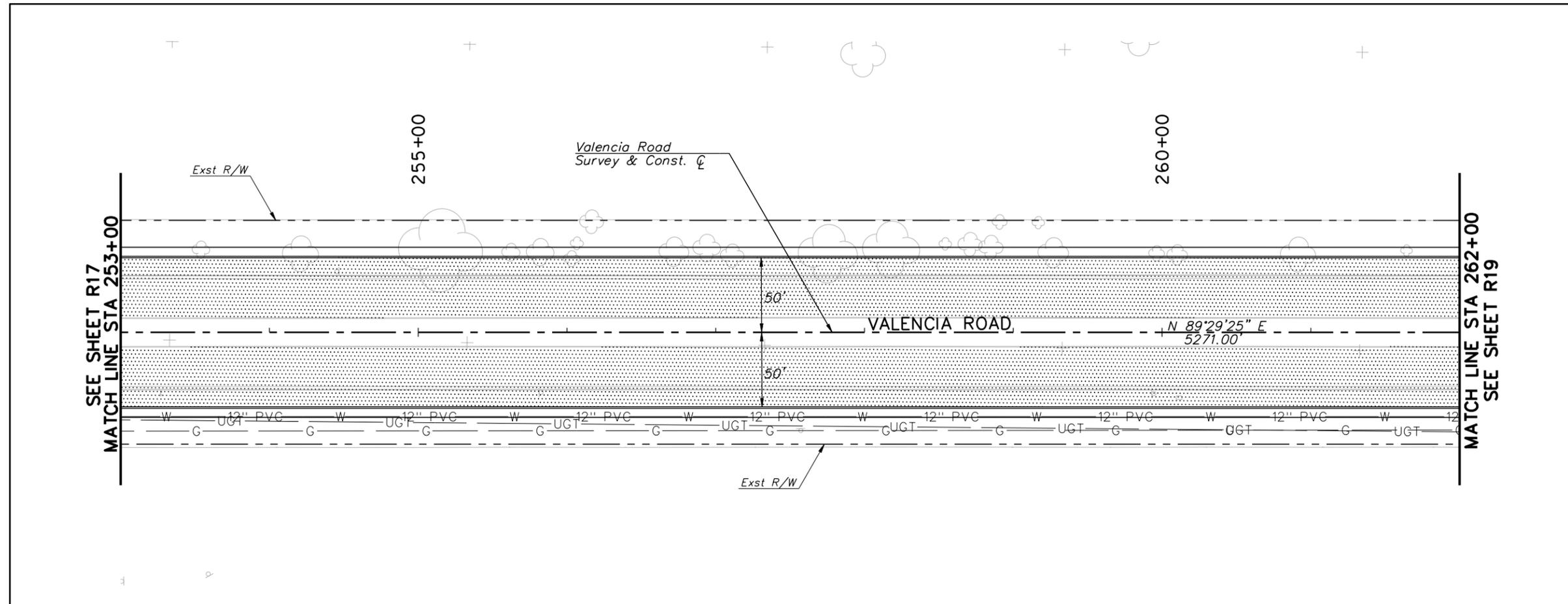
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CHECKED:	PS <td>05/11</td>	05/11
PROJ. ENG.:	KIT <td>05/11</td>	05/11

PIMA COUNTY DEPARTMENT OF TRANSPORTATION  
ROADWAY PLAN AND PROFILE  
FOR  
**VALENCIA ROAD**  
ALVERNON WAY TO WILMOT ROAD  
STA 244+00 TO STA 253+00

**PSOMAS**  
800 E. Wilma Road, Suite 110  
Tucson, Arizona 85719  
(520) 292-2300 (520) 292-1290 (FAX)

PRISCILLA S. CORNELIO, P.E., DIRECTOR

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PRISCILLA S. CORNELIO, P.E., DIRECTOR

DESIGNED:	SS	DATE	05/11
DRAWN:	PRE	DATE	05/11
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PROJ. ENG.:	KTT	DATE	05/11

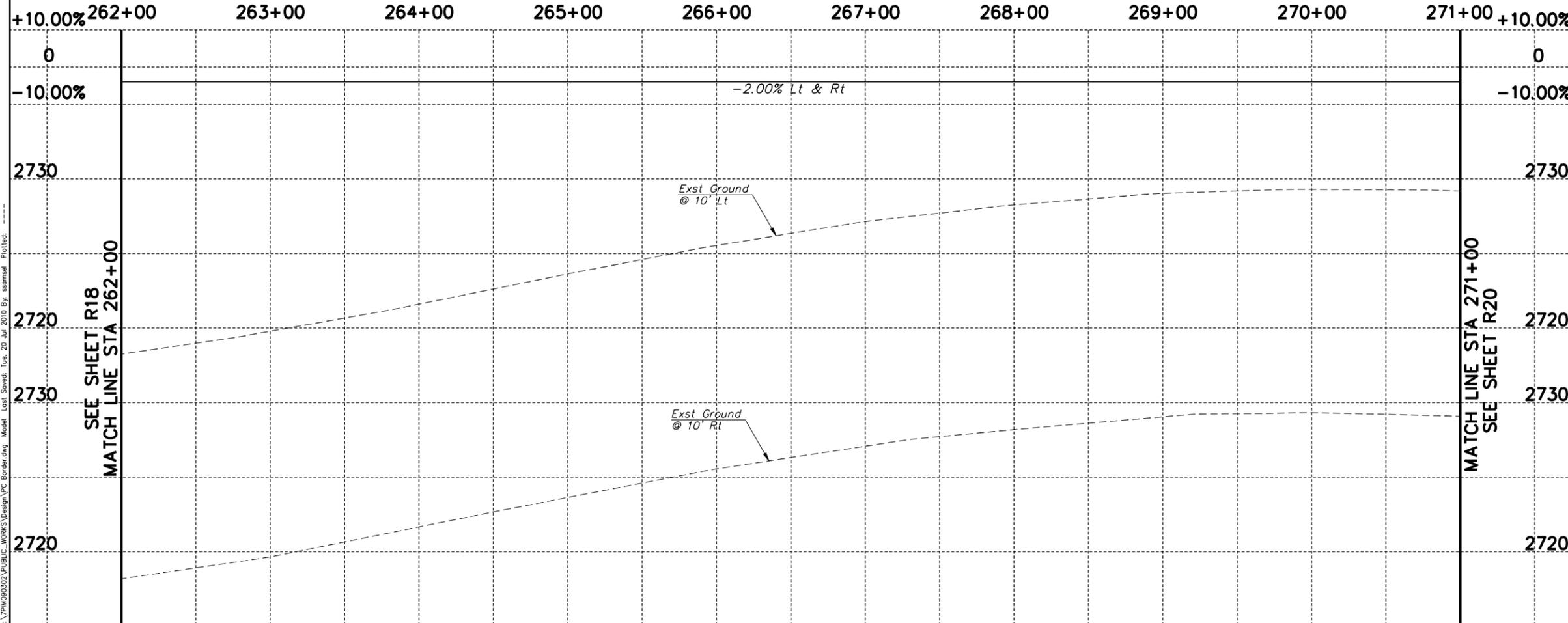
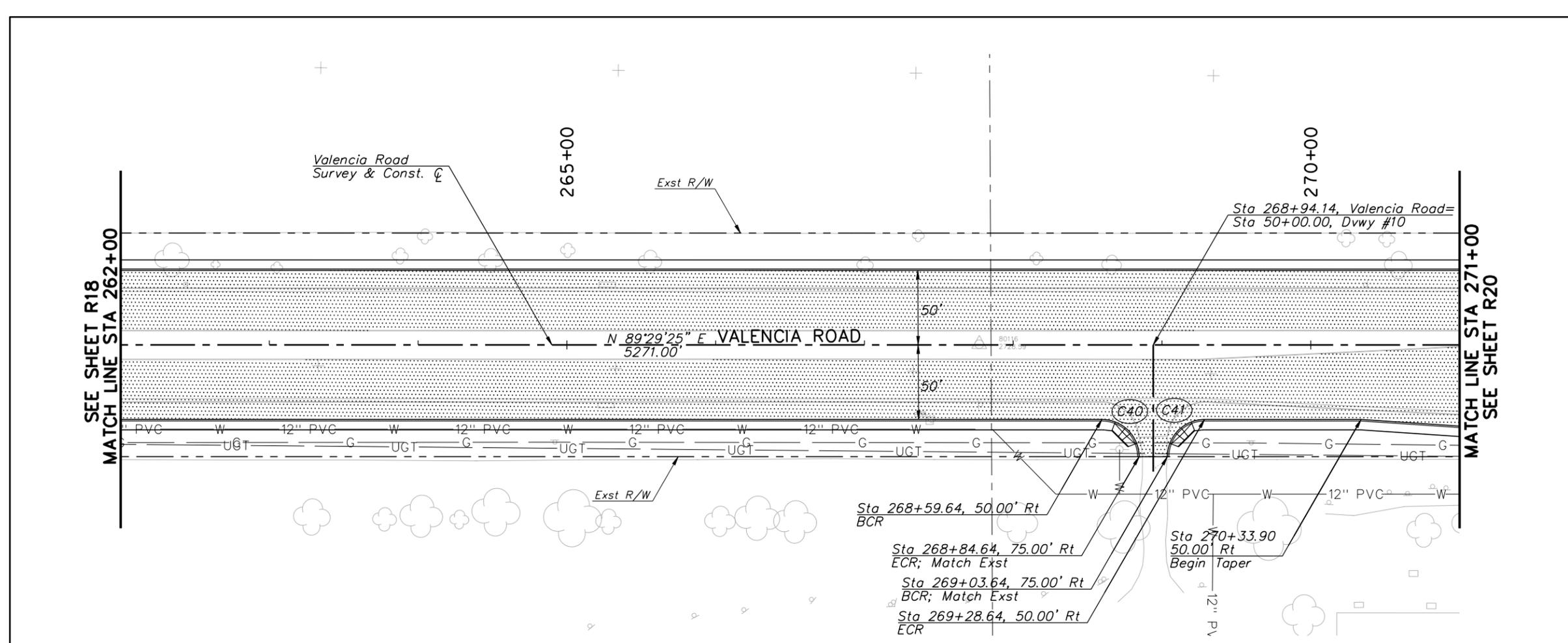
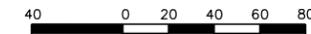
NO.	REVISION DESCRIPTION	DIV. ENGINEER	DATE

PIMA COUNTY DEPARTMENT OF TRANSPORTATION  
ROADWAY PLAN AND PROFILE  
FOR  
**VALENCIA ROAD**  
ALVERNON WAY TO WILMOT ROAD  
STA 253+00 TO STA 262+00

**PSOMAS**  
800 E. Wilmore Road, Suite 110  
Tucson, Arizona 85719  
(520) 292-2300 (520) 292-1290 (FAX)



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Curve No	Radius	Length	Delta	Tangent
C40	25.00'	39.27'	90°00'00"	25.00'
C41	25.00'	39.27'	90°00'00"	25.00'



SCALES: HORIZ. 1"=40'  
VERT. 1"=4'

DESIGNED:	SS	DATE	05/11
DRAWN:	PRE	DATE	05/11
CHECKED:	PS	DATE	05/11
PROJ. ENG.:	KTT	DATE	05/11

NO.	REVISION DESCRIPTION	DIV. ENGINEER	DATE

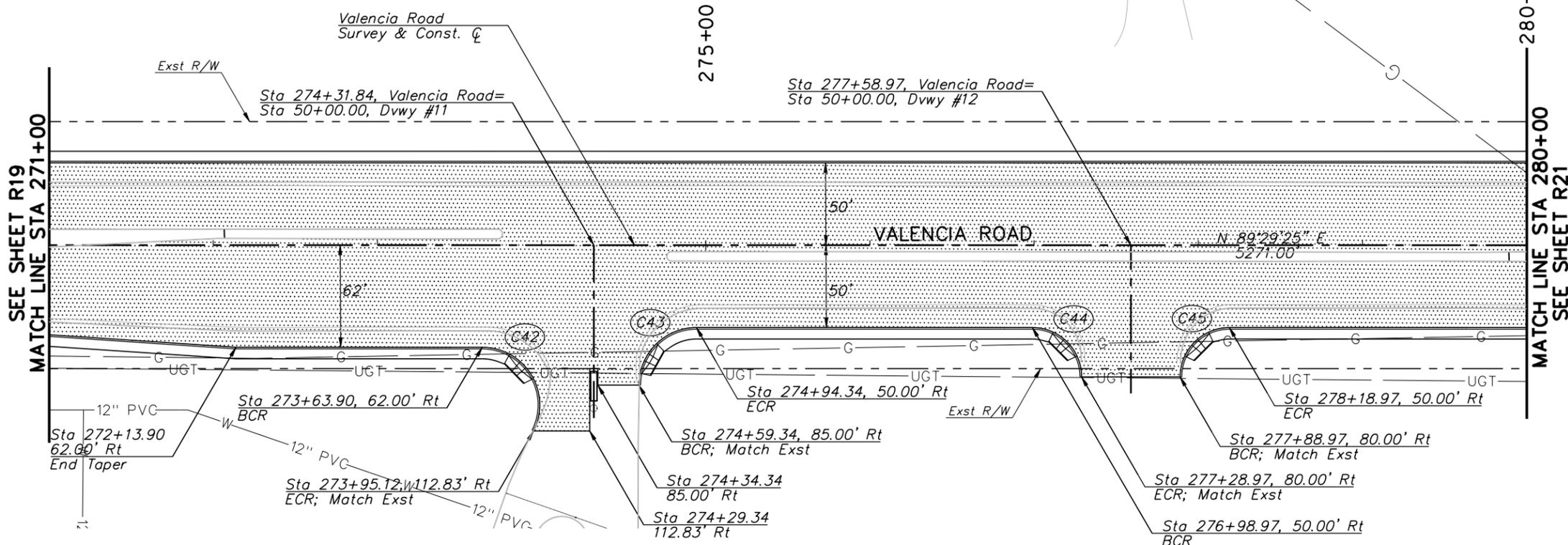
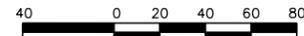
PRISCILLA S. CORNELIO, P.E., DIRECTOR

PIMA COUNTY DEPARTMENT OF TRANSPORTATION  
ROADWAY PLAN AND PROFILE

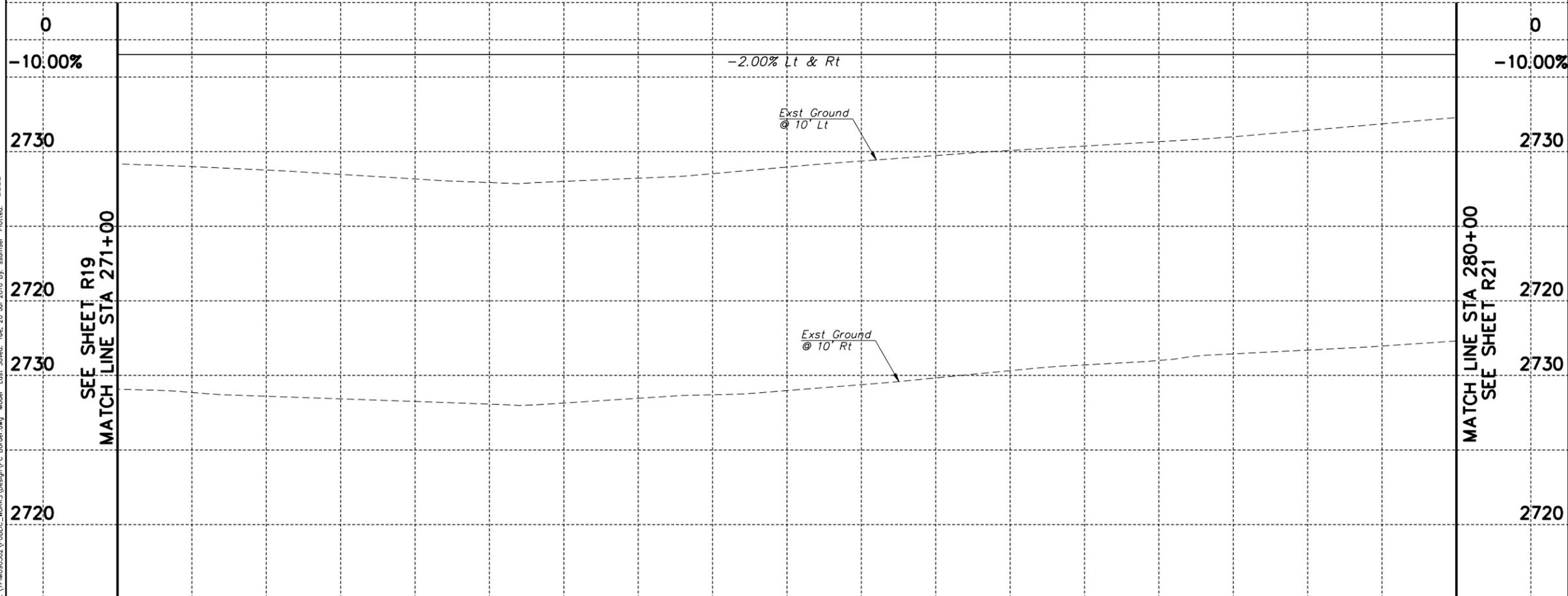
**PSOMAS**  
800 E. Wilcox Road, Suite 110  
Tucson, Arizona 85719  
(520) 292-2300 (520) 292-1290 (FAX)

FOR  
**VALENCIA ROAD**  
ALVERNON WAY TO WILMOT ROAD  
STA 262+00 TO STA 271+00

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+10.00% 271+00    272+00    273+00    274+00    275+00    276+00    277+00    278+00    279+00    280+00 +10.00%



Curve Table				
Curve No	Radius	Length	Delta	Tangent
C42	35.00'	71.40'	116°53'03"	56.99'
C43	35.00'	54.98'	90°00'00"	35.00'
C44	30.00'	47.12'	90°00'00"	35.00'
C45	30.00'	47.12'	90°00'00"	35.00'



SCALES: HORIZ. 1"=40' VERT. 1"=4' SHEET R20 OF R28

PRISCILLA S. CORNELIO, P.E., DIRECTOR

DESIGNED:	SS	DATE	05/11
DRAWN:	PRE	DATE	05/11
CHECKED:	PS	DATE	05/11
PROJ. ENG.:	KIT	DATE	05/11

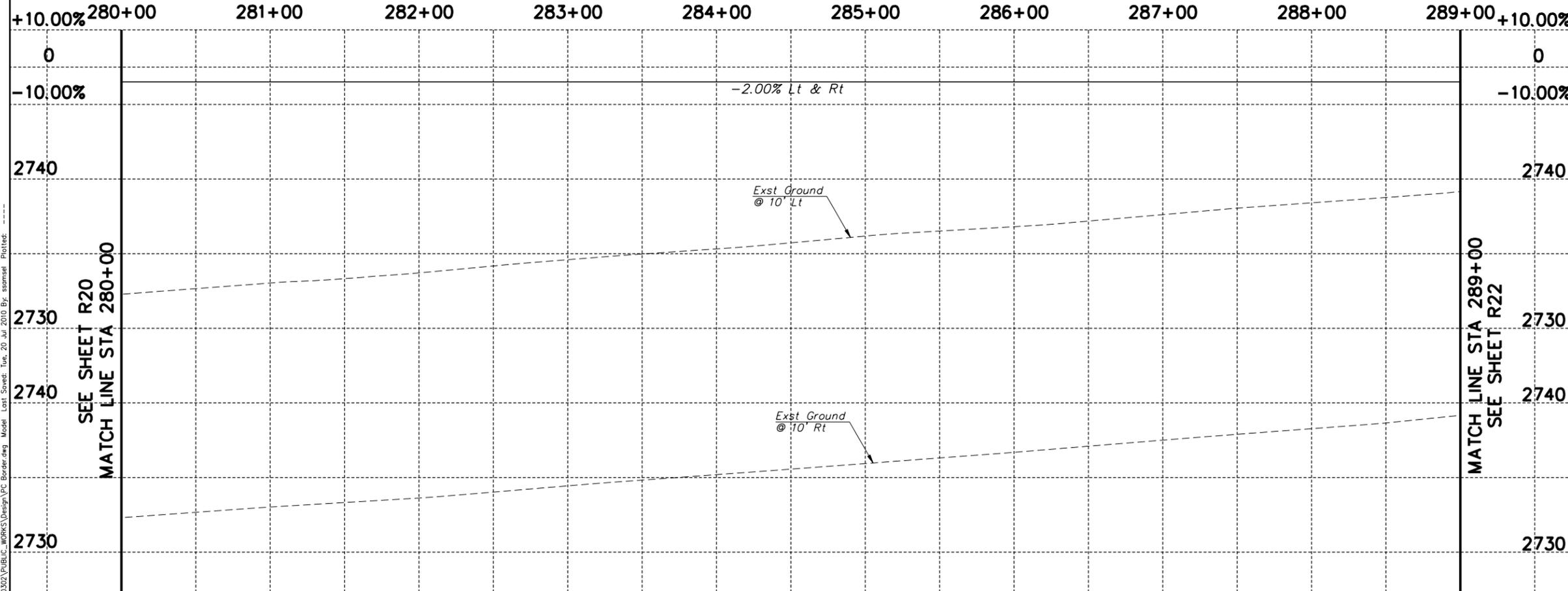
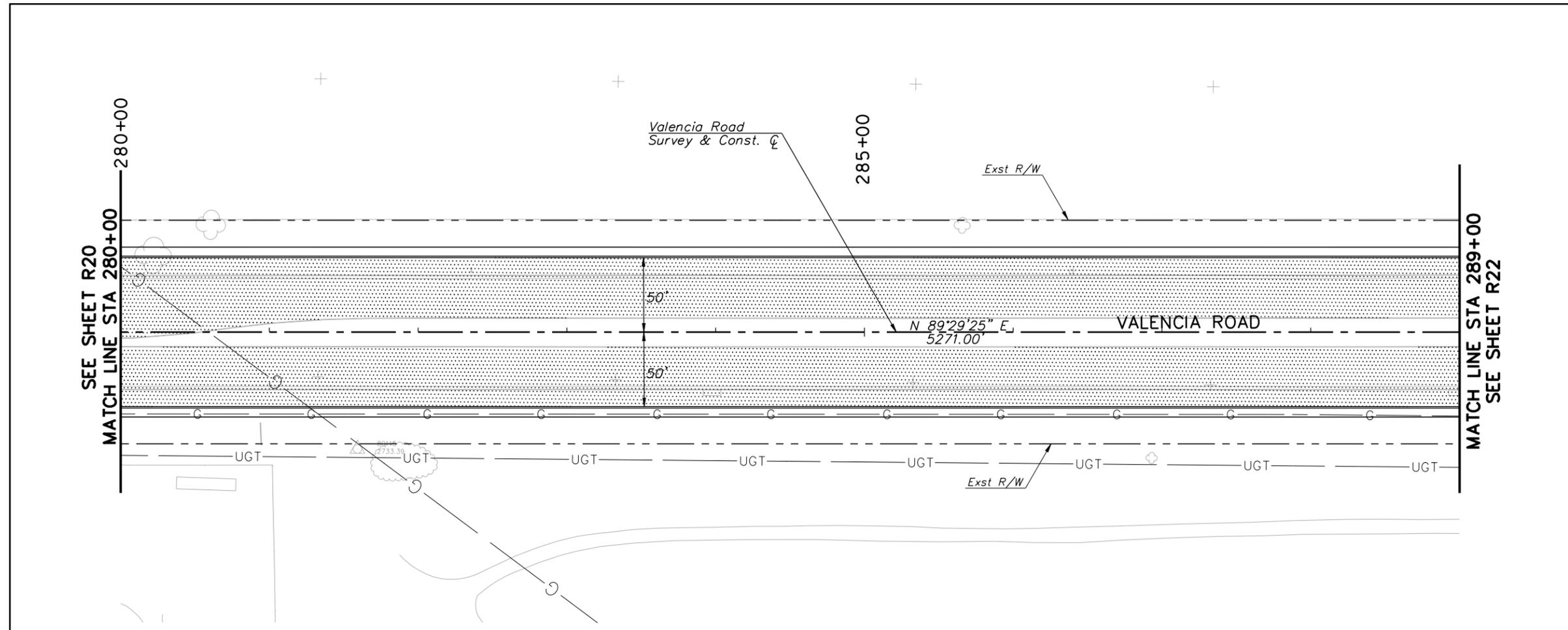
NO.	REVISION DESCRIPTION	DIV. ENGINEER	DATE

PIMA COUNTY DEPARTMENT OF TRANSPORTATION  
ROADWAY PLAN AND PROFILE  
FOR  
**VALENCIA ROAD**  
ALVERNON WAY TO WILMOT ROAD  
STA 271+00 TO STA 280+00

**PSOMAS**  
800 E. Wilmore Road, Suite 110  
Tucson, Arizona 85719  
(520) 292-2300 (520) 292-1290 (FAX)

PAGE XXX OF XXX

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PRISCILLA S. CORNELIO, P.E., DIRECTOR

DESIGNED:	SS	DATE	05/11
DRAWN:	PRE	CHECKED:	PS
PROJ. ENG.:	KTT		05/11

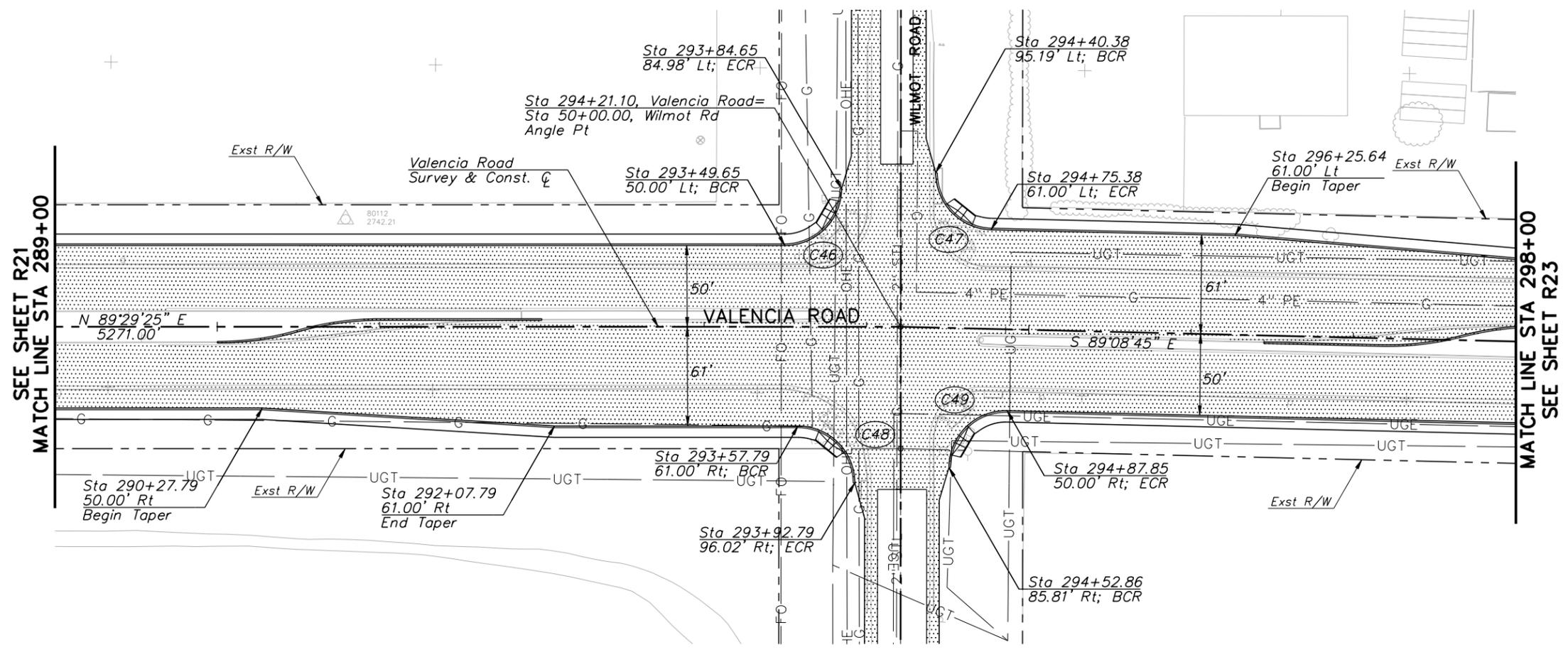
NO.	REVISION DESCRIPTION	DIV. ENGINEER	DATE

PIMA COUNTY DEPARTMENT OF TRANSPORTATION  
ROADWAY PLAN AND PROFILE  
FOR  
**VALENCIA ROAD**  
ALVERNON WAY TO WILMOT ROAD  
STA 280+00 TO STA 289+00

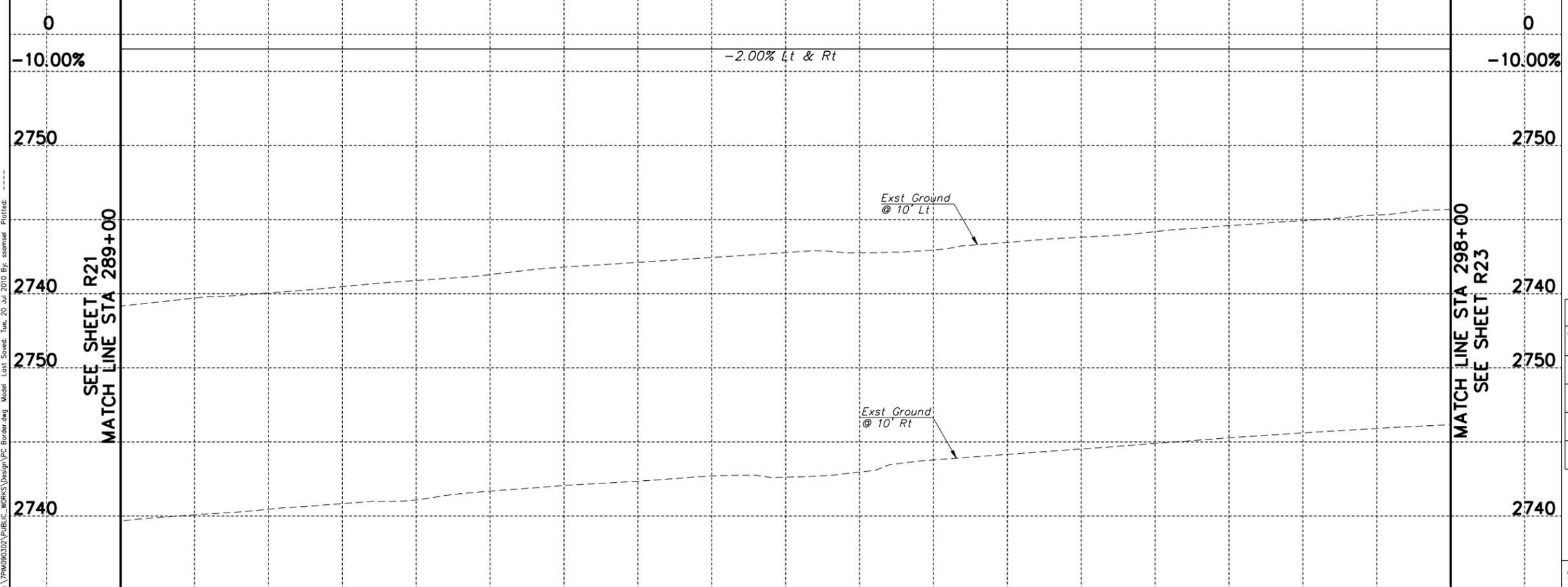
**PSOMAS**  
800 E. Wilmore Road, Suite 110  
Tucson, Arizona 85719  
(520) 292-2300 (520) 292-1290 (FAX)



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+10.00% 289+00    290+00    291+00    292+00    293+00    294+00    295+00    296+00    297+00    298+00 +10.00%



Curve Table				
Curve No	Radius	Length	Delta	Tangent
C46	35.00'	54.96'	89°58'09"	34.98'
C47	35.00'	54.16'	88°40'02"	34.20'
C48	35.00'	55.00'	90°01'52"	35.02'
C49	35.00'	55.79'	91°19'56"	35.82'



SCALES: HORIZ. 1"=40'  
VERT. 1"=4'

DESIGNED:	SS	DATE	05/11
DRAWN:	PRE	CHECKED:	05/11
PROJ. ENG.:	PS	KIT	05/11

NO.	REVISION DESCRIPTION	DIV. ENGINEER	DATE

PRISCILLA S. CORNELIO, P.E., DIRECTOR

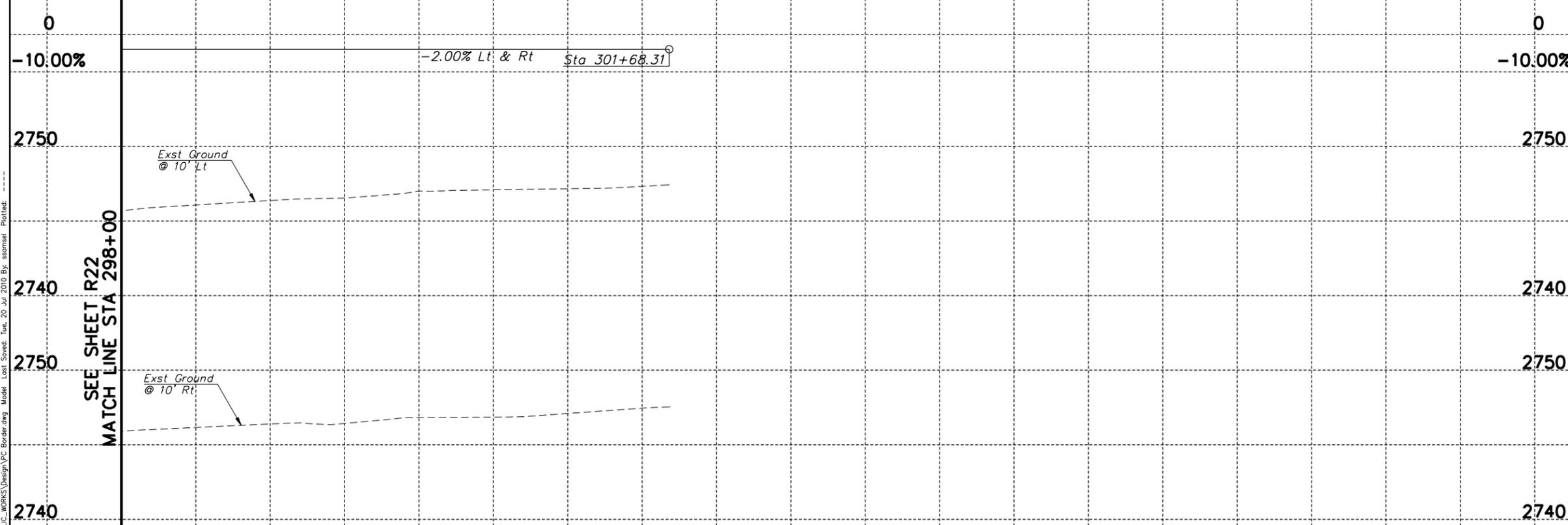
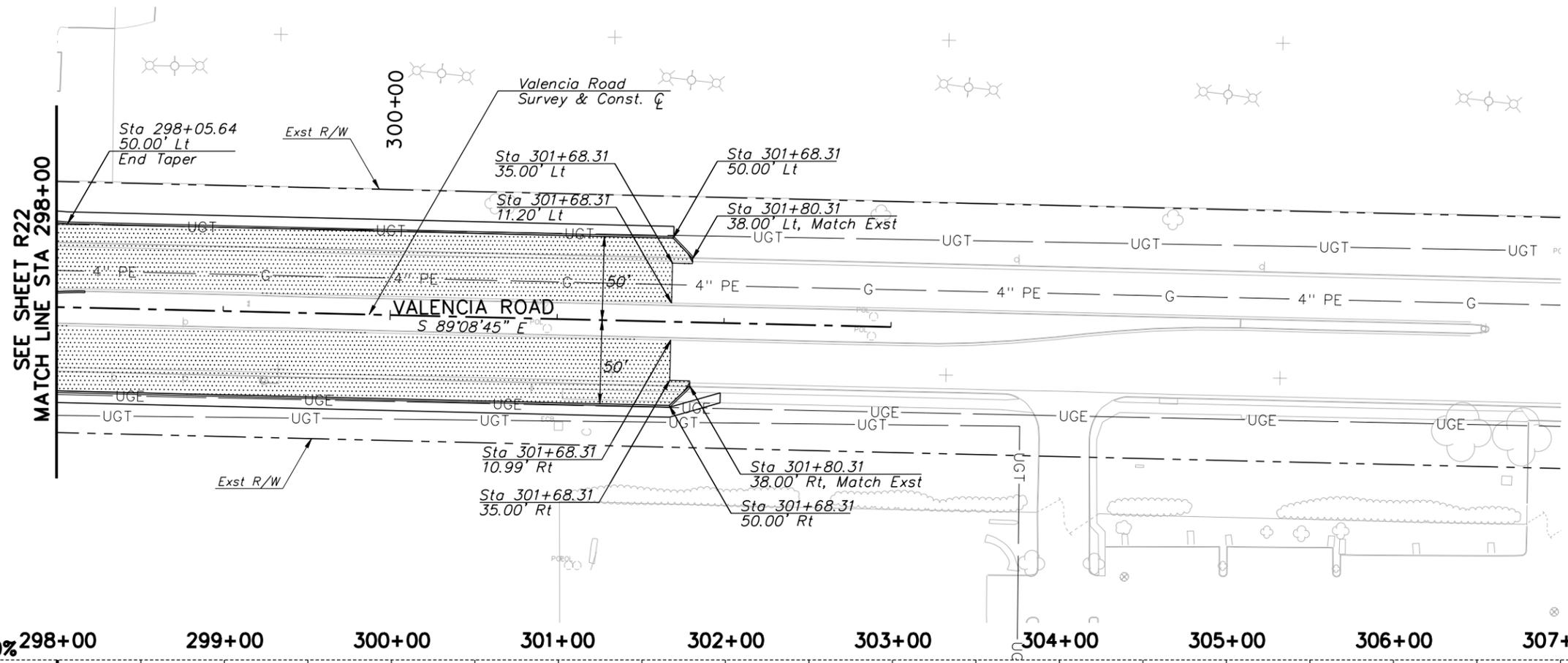
PIMA COUNTY DEPARTMENT OF TRANSPORTATION  
ROADWAY PLAN AND PROFILE

**PSOMAS**  
800 E. Wilcox Road, Suite 110  
Tucson, Arizona 85719  
(520) 292-2300 (520) 292-1290 (FAX)

FOR  
**VALENCIA ROAD**  
ALVERNON WAY TO WILMOT ROAD  
STA 289+00 TO STA 298+00

SHEET R22 OF R28    PAGE XXX OF XXX

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PRISCILLA S. CORNELIO, P.E., DIRECTOR

DESIGNED:	SS	DATE	05/11
DRAWN:	PRE	DATE	05/11
CHECKED:	PS	DATE	05/11
PROJ. ENG.:	KIT	DATE	05/11

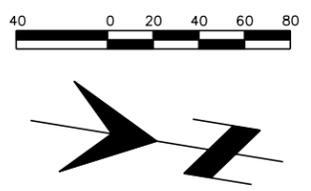
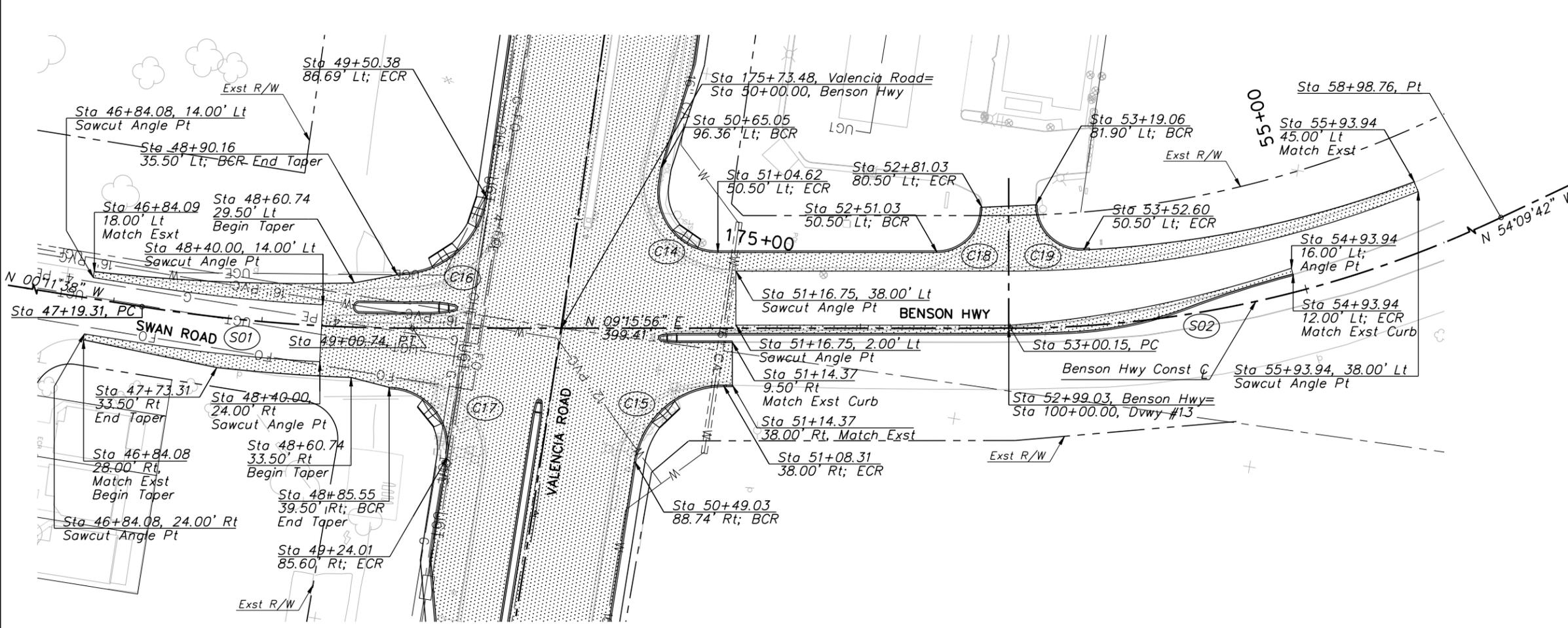
NO.	REVISION DESCRIPTION	DIV. ENGINEER	DATE

PIMA COUNTY DEPARTMENT OF TRANSPORTATION

ROADWAY PLAN AND PROFILE  
FOR  
**VALENCIA ROAD**  
ALVERNON WAY TO WILMOT ROAD  
STA 298+00 TO STA 302+00

**PSOMAS**  
800 E. Wilcox Road, Suite 110  
Tucson, Arizona 85719  
(520) 292-2300 (520) 292-1290 (FAX)





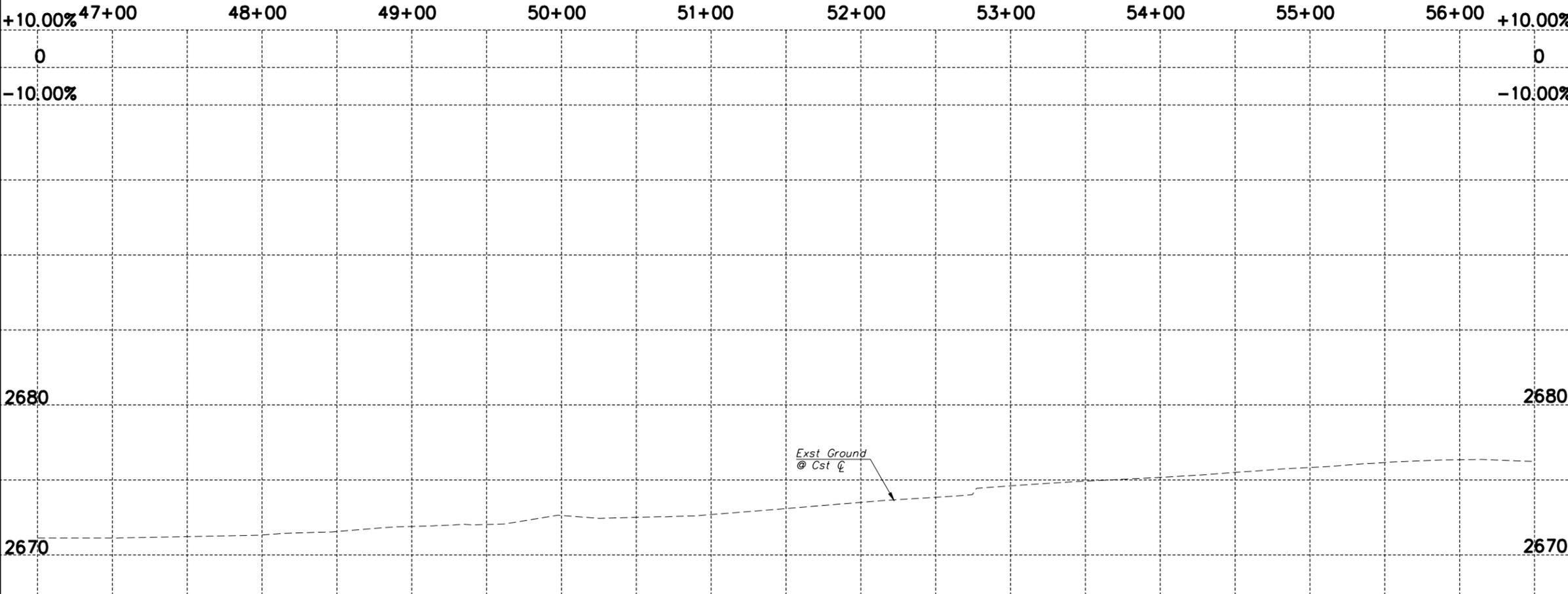
**CURVE DATA**

**(S01)**

R= 1145.92'  
 L= 181.43'  
 Δ = 09°04'18"  
 T= 90.91'  
 D= 05'00'00"

**(S02)**

R= 763.94'  
 L= 598.61'  
 Δ = 44°53'46"  
 T= 315.62'  
 D= 07'30'00"



**Curve Table**

Curve No	Radius	Length	Delta	Tangent
C14	40.00'	68.71'	98°25'08"	46.35'
C15	60.00'	84.95'	81°07'07"	51.35'
C16	60.00'	85.92'	82°02'39"	52.20'
C17	40.00'	68.53'	98°09'44"	46.15'
C18	30.00'	47.12'	90°00'00"	30.00'
C19	30.00'	49.18'	93°56'00"	32.13'



**P S O M A S**  
 800 E. Wilmore Road, Suite 110  
 Tucson, Arizona 85719  
 (520) 292-2300 (520) 292-1290 (FAX)

**PIMA COUNTY DEPARTMENT OF TRANSPORTATION**  
 ROADWAY PLAN AND PROFILE  
 FOR  
**VALENCIA ROAD**  
 ALVERNON WAY TO WILMOT ROAD  
 BENSON HIGHWAY / SWAN ROAD

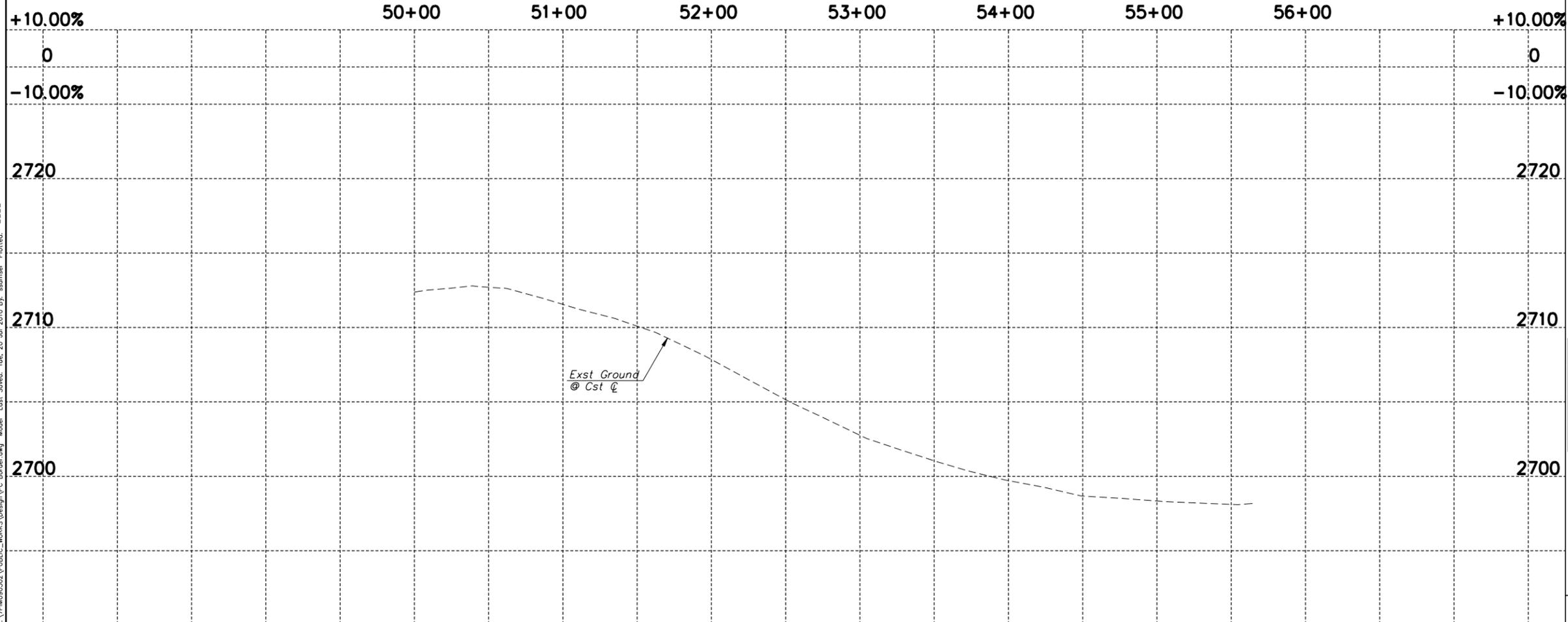
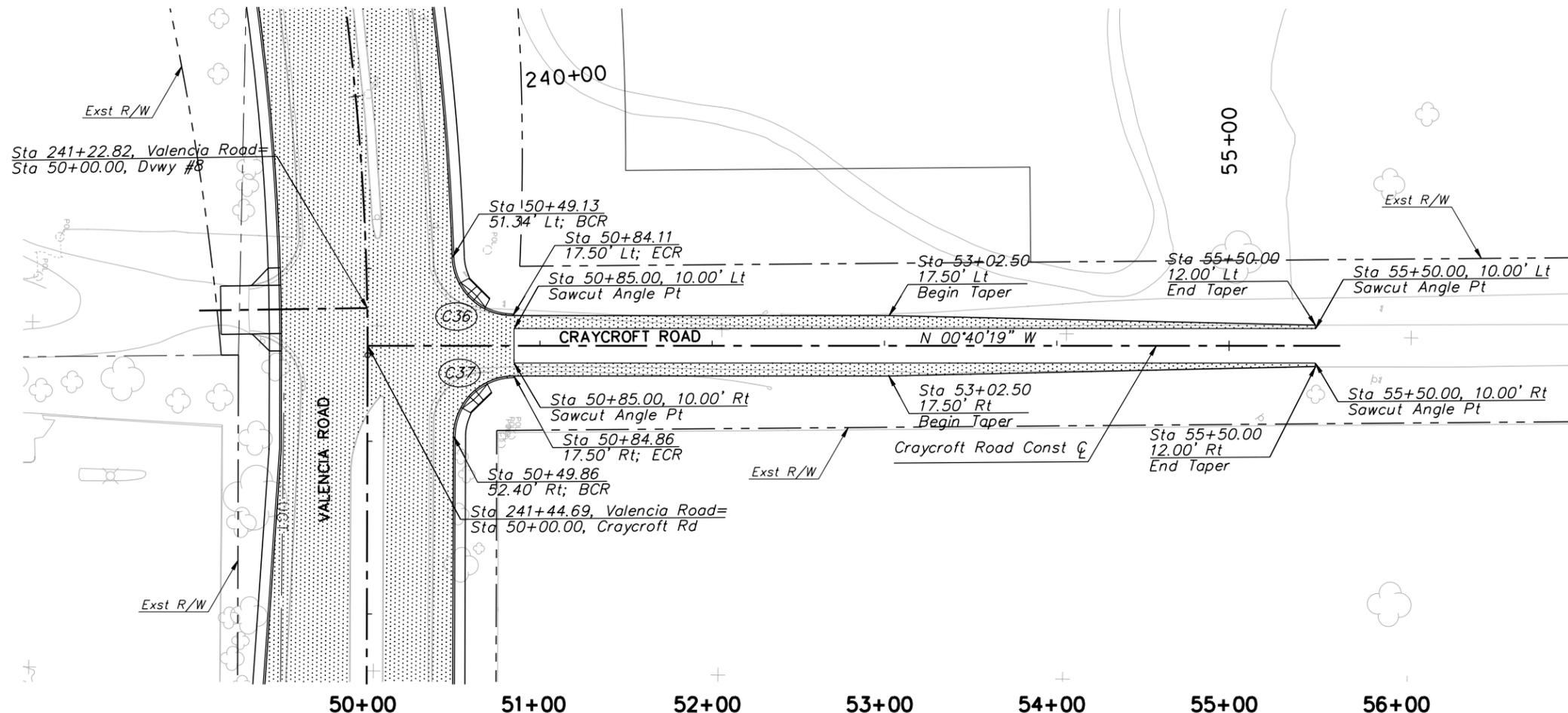
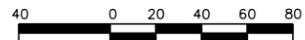
PRISCILLA S. CORNELIO, P.E., DIRECTOR

DESIGNED:	SS	DATE	05/11
DRAWN:	PRE	DATE	05/11
CHECKED:	PS	DATE	05/11
PROJ. ENG.:	KTT	DATE	05/11

NO.	REVISION DESCRIPTION	DIV. ENGINEER	DATE

SCALES: HORIZ. 1"=40'  
 VERT. 1"=4'  
 SHEET R24 OF R28  
 PAGE XXX OF XXX

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Curve No	Radius	Length	Delta	Tangent
C36	35.00'	53.81'	88°05'46"	33.86'
C37	35.00'	54.88'	89°50'16"	34.90'

Two working days before you dig,  
CALL FOR THE BLUE STAKES  
**1-800-STAKE-IT**  
Blue Stake Center  
CALL COLLECT

DESIGNED:	SS	DATE	05/11
DRAWN:	PRE	DATE	05/11
CHECKED:	PS	DATE	05/11
PROJ. ENG.:	KIT	DATE	05/11

NO.	REVISION DESCRIPTION	DIV. ENGINEER	DATE

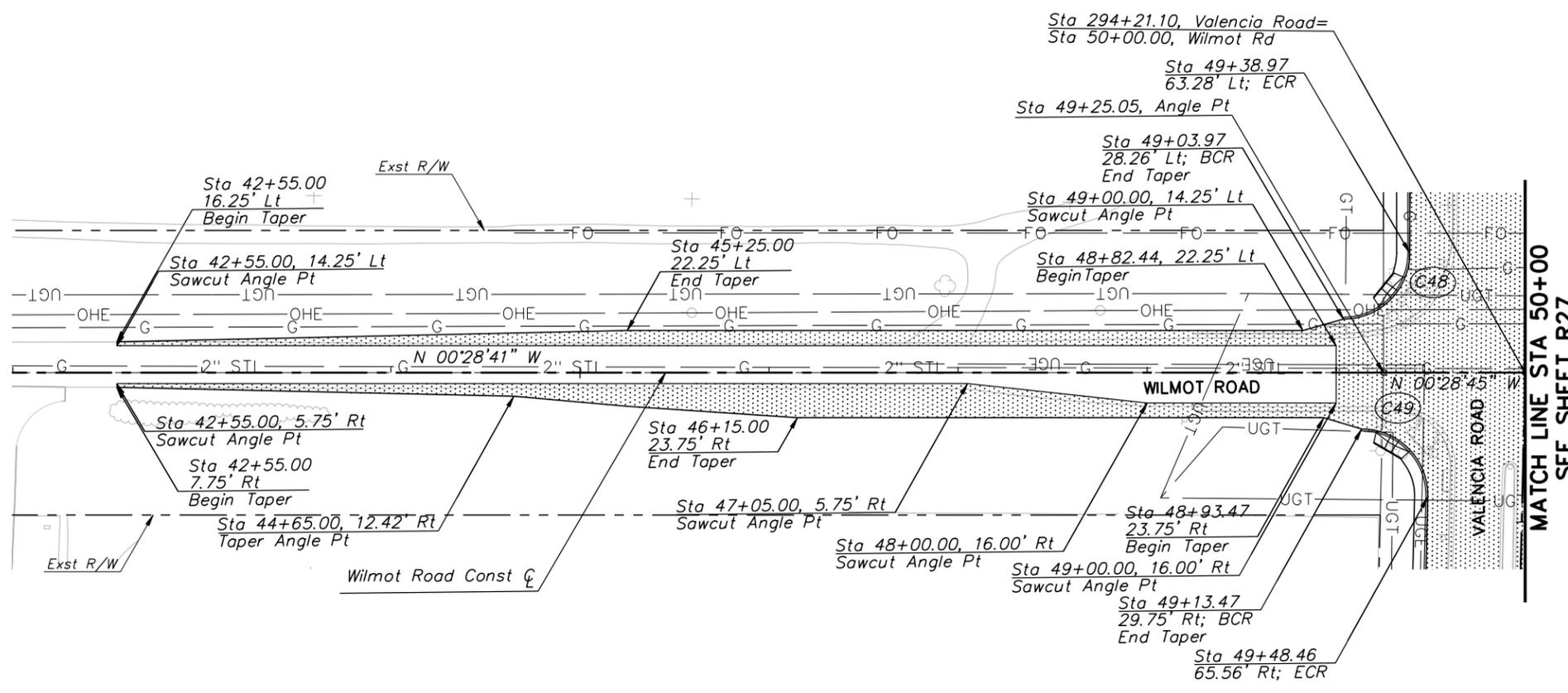
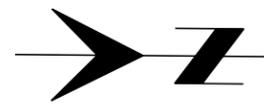
PRISCILLA S. CORNELIO, P.E., DIRECTOR

PIMA COUNTY DEPARTMENT OF TRANSPORTATION

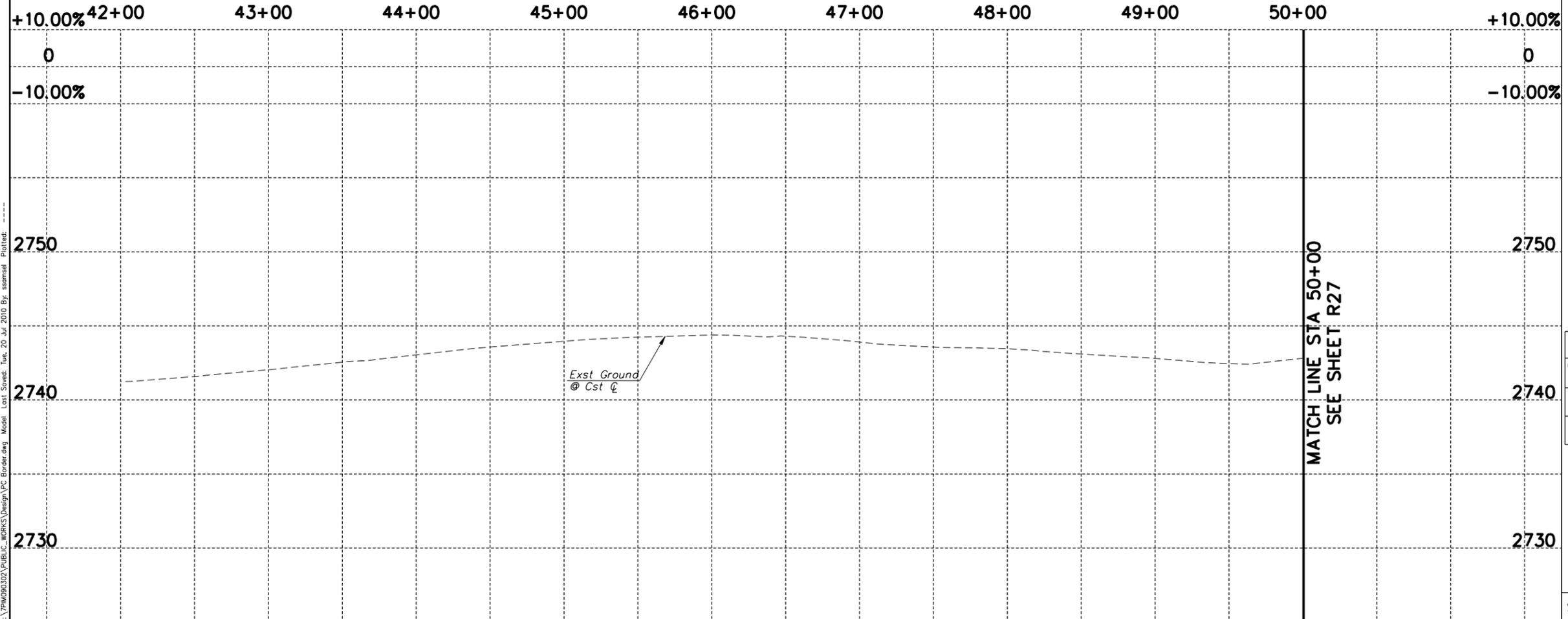
ROADWAY PLAN AND PROFILE  
FOR  
**VALENCIA ROAD**  
ALVERNON WAY TO WILMOT ROAD  
CRAYCROFT ROAD

**PSOMAS**  
800 E. Wilcox Road, Suite 110  
Tucson, Arizona 85719  
(520) 292-2300 (520) 292-1290 (FAX)

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MATCH LINE STA 50+00  
SEE SHEET R27



Curve Table				
Curve No	Radius	Length	Delta	Tangent
C48	35.00'	55.00'	90°01'52"	35.02'
C49	35.00'	55.79'	91°19'56"	35.82'



SCALES: HORIZ. 1"=40'  
VERT. 1"=4'

PRISCILLA S. CORNELIO, P.E., DIRECTOR

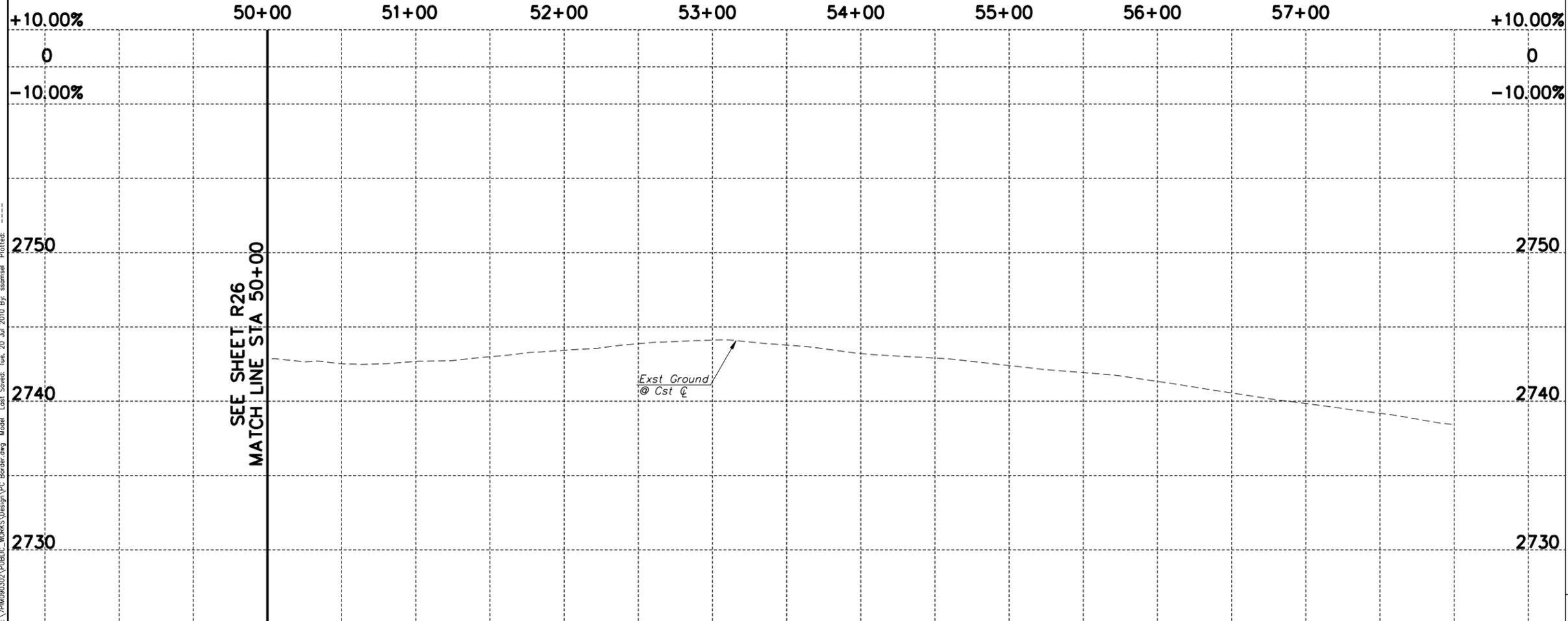
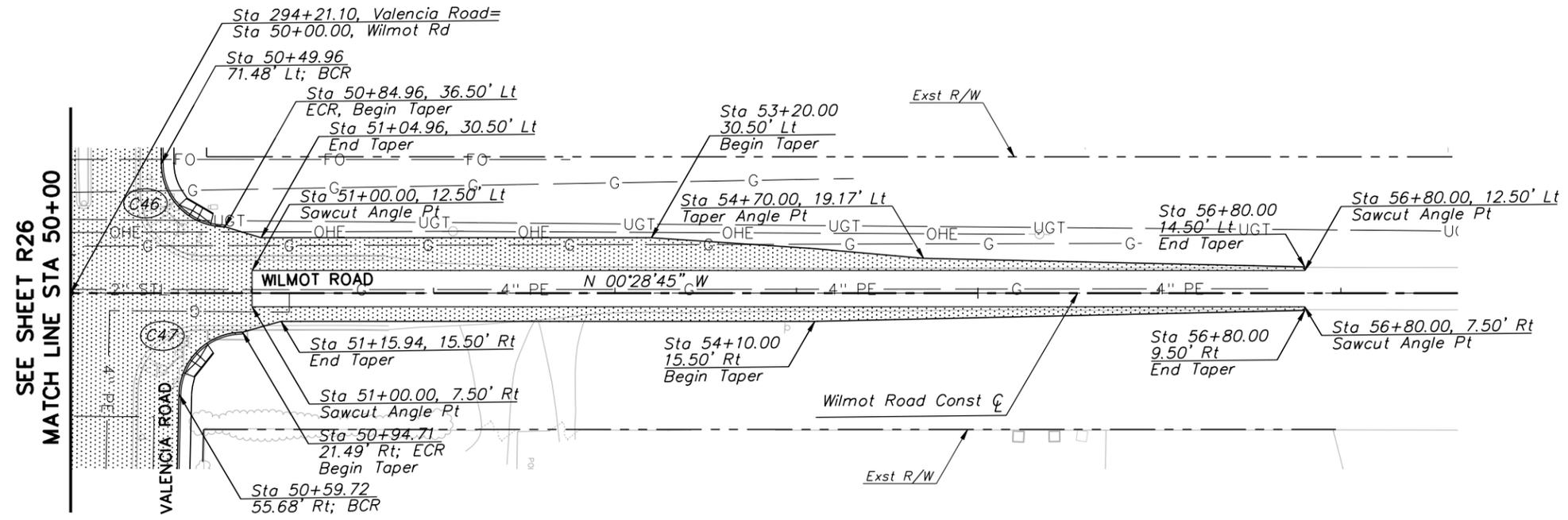
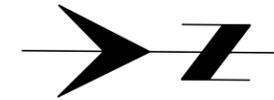
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CHECKED:	PS	DATE	05/11
PROJ. ENG.:	KIT	DATE	05/11

NO.	REVISION DESCRIPTION	DIV. ENGINEER	DATE

**PSOMAS**  
800 E. Wilmore Road, Suite 110  
Tucson, Arizona 85719  
(520) 292-2300 (520) 292-1290 (FAX)

PIMA COUNTY DEPARTMENT OF TRANSPORTATION  
ROADWAY PLAN AND PROFILE  
FOR  
**VALENCIA ROAD**  
ALVERNON WAY TO WILMOT ROAD  
WILMOT ROAD

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Curve Table				
Curve No	Radius	Length	Delta	Tangent
C46	35.00'	54.96'	89°58'09"	34.98'
C47	35.00'	54.16'	89°40'02"	34.80'



SCALES: HORIZ. 1"=40' VERT. 1"=4' SHEET R27 OF R28 PAGE XXX OF XXX

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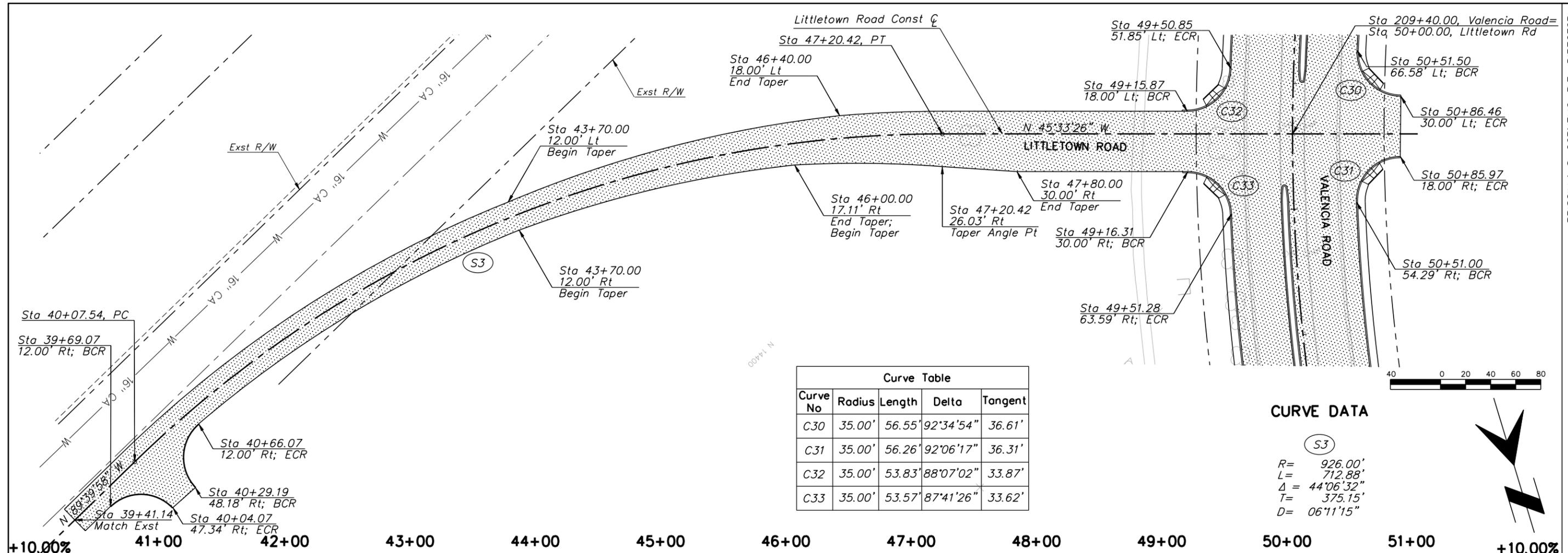
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DRAWN:	PRE	DATE	05/11
CHECKED:	PS	DATE	05/11
PROJ. ENG.:	KIT	DATE	05/11

NO.	REVISION DESCRIPTION	DATE

PIMA COUNTY DEPARTMENT OF TRANSPORTATION  
 ROADWAY PLAN AND PROFILE  
 FOR  
**VALENCIA ROAD**  
 ALVERNON WAY TO WILMOT ROAD  
 WILMOT ROAD

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 Tucson, Arizona 85719  
 (520) 292-2300 (520) 292-1290 (FAX)

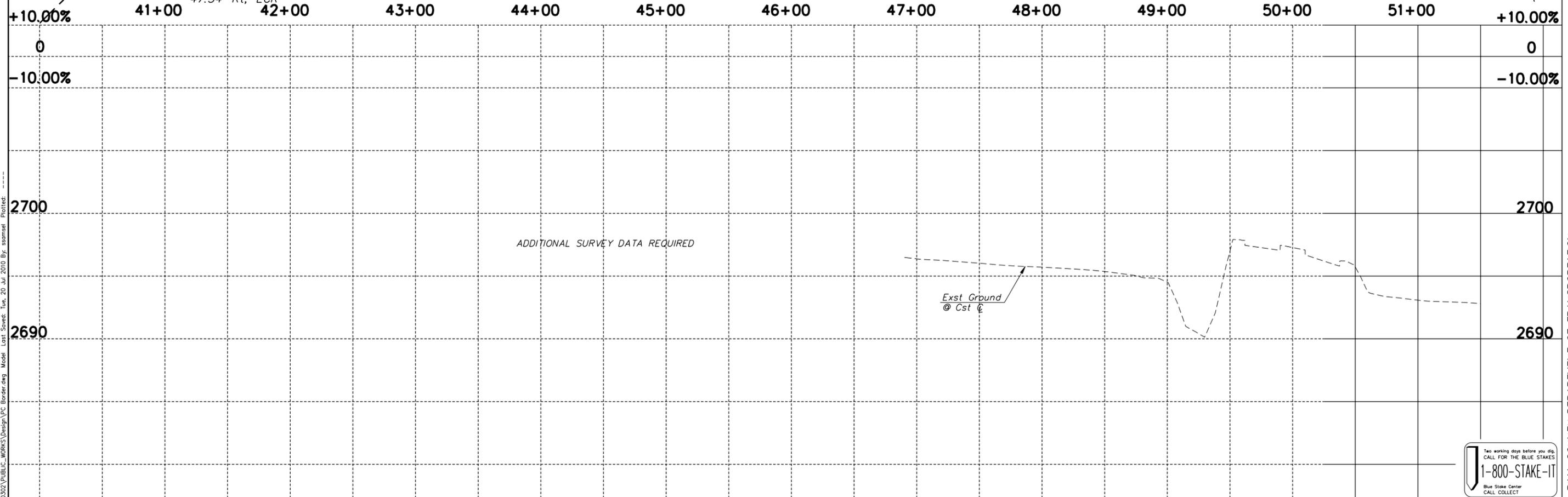
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Curve Table				
Curve No	Radius	Length	Delta	Tangent
C30	35.00'	56.55'	92°34'54"	36.61'
C31	35.00'	56.26'	92°06'17"	36.31'
C32	35.00'	53.83'	88°07'02"	33.87'
C33	35.00'	53.57'	87°41'26"	33.62'

**CURVE DATA**

(S3)  
 R= 926.00'  
 L= 712.88'  
 Δ = 44°06'32"  
 T= 375.15'  
 D= 06°11'15"



SCALES: HORIZ. 1"=40'  
 VERT. 1"=4'



PRISCILLA S. CORNELIO, P.E., DIRECTOR

DESIGNED:	SS	DATE	05/11
DRAWN:	PRE	DATE	05/11
CHECKED:	PS	DATE	05/11
PROJ. ENG.:	KTT	DATE	05/11

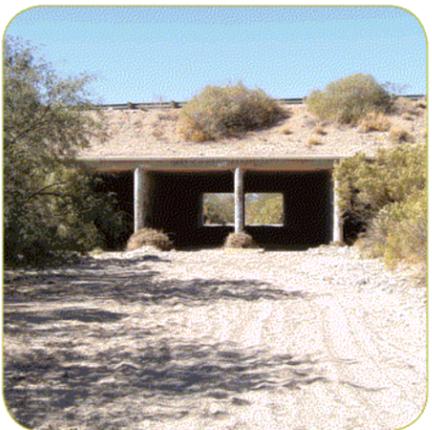
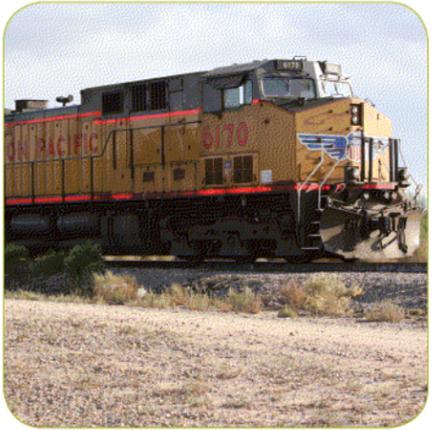
NO.	REVISION DESCRIPTION	DIV. ENGINEER	DATE

PIMA COUNTY DEPARTMENT OF TRANSPORTATION  
 ROADWAY PLAN AND PROFILE  
 FOR  
**VALENCIA ROAD**  
 ALVERNON WAY TO WILMOT ROAD  
 LITTLETOWN ROAD

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 800 E. Wilma Road, Suite 110  
 Tucson, Arizona 85719  
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