Sunset Road: Silverbell Road to I-10 (Segment I)

Draft Design Concept Report

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EXECUTIVE SUMMARY

The Sunset Road project is divided into two segments: Silverbell Road to Interstate 10 (I-10) – Segment I project, and I-10 to River Road – Segment II. This document addresses Segment I. The Segment I limits include approximately 2,960 feet of mostly undeveloped land between the I-10 East Bound Frontage Road (EBFR) and Silverbell Road. Segment II will be addressed in future documentation. The project is located in northeastern Pima County (Township13 South, Range 13 East, Sections 17 and 18) in the Tucson metropolitan area. Project limits include a small segment within the City of Tucson, west of I-10 and just south of Sunset Road, the remainder of the project is within unincorporated County land. Town of Marana limits are about 1,500 feet to the northwest. The Town of Oro Valley limits are approximately 4 miles to the northeast. (See Figure 1 for Project location).

The project is included in the Regional Transportation Authority (RTA) Transportation Plan approved by Pima County voters in 2006. The project was identified as Pima County Sunset Road: Silverbell Road to River Road (RTA #8). Project funding comes from Pima Association of Governments (PAG) Regional Transportation Authority (RTA) Plan and local funds from Pima County and City of Tucson. The RTA plan identifies funding in the amount of $22,764,000 for both Segments I and II. The estimated cost for Segment I is approximately $19,000,000; to include design, environmental clearance, right-of-way, utilities, and construction. The RTA funding is expected to be available in Period 2 (2012 -2016), although the RTA Plan originally shows the funds to be available in Period 3 (2017-2021). The future Segment II will be a jointly funded effort by Arizona Department of Transportation (ADOT), RTA, Pima County and City of Tucson.

Sunset Road once extended from Silverbell Road to I-10 across the Santa Cruz River. In 1983 severe flooding throughout the greater Tucson area destroyed the bridge over the Santa Cruz River at Sunset Road, as well as a significant portion of the roadway adjacent to the river. No part of the old Sunset Road alignment or bridge remains. Due to growth in the northwest Tucson region, the connection of Silverbell Road to I-10 and ultimately River Road is needed to improve operations, increase mobility, improve safety, and reduce congestion.

The proposed project would construct a new Sunset Road from Silverbell Road to I-10 Eastbound Frontage Road (EBFR) as a two-lane roadway with a Two Way Left Turn Lane (TWLTL). A new six-span concrete girder bridge (approximately 724 feet in length) would be built over the Santa Cruz River, with earthen approach embankments on either side. The roadway and bridge would be constructed to allow for future inclusion of The Loop shared-use path on the east side of the river and the Juan Bautista de Anza Trial (Anza Trail) on the west side of the river. Bike and pedestrian facilities would be included on the bridge. The new intersection of Sunset Road and Silverbell Road would be constructed at current grade, be signalized, and include pedestrian facilities.

The design concept development process has resulted in the following recommendations:

- Sunset Road will be realigned south of the historic abandoned alignment and the new alignment will cross an abandoned gravel pit and cross the Santa Cruz River.
- The typical roadway section will be a three lane section (one through lane in each direction and a continuous Two Way Left Turn Lane (TWLTL), with six foot paved shoulders.

- A continuous asphaltic concrete sidewalk will be constructed on the north side of the roadway and an asphaltic concrete two way shared-use path will be constructed on the south side.
- The pavement section will be constructed to provide adequate design life.
- One new traffic signal location will be provided at Silverbell Road
- I-10 frontage road traffic will be stop controlled for Sunset Road through traffic
- All drainage ways and the bridge crossing at the Santa Cruz River will be designed for 100-year storm flows.
- Public art will be integrated in the design of the bridge.
- Extreme care will be exercised in protecting the environmental and culturally sensitive project site.

CHAPTER 1 – PROJECT OVERVIEW

Sunset Road – Silverbell to Interstate 10 (I-10) project is located in northwest Tucson in northeastern Pima County, within Sections 17 and 18 of Township 13 South, Range 13 East. The project lies within the jurisdictions of both unincorporated Pima County and the City of Tucson. Figures 1 and 2 show the project vicinity and location.

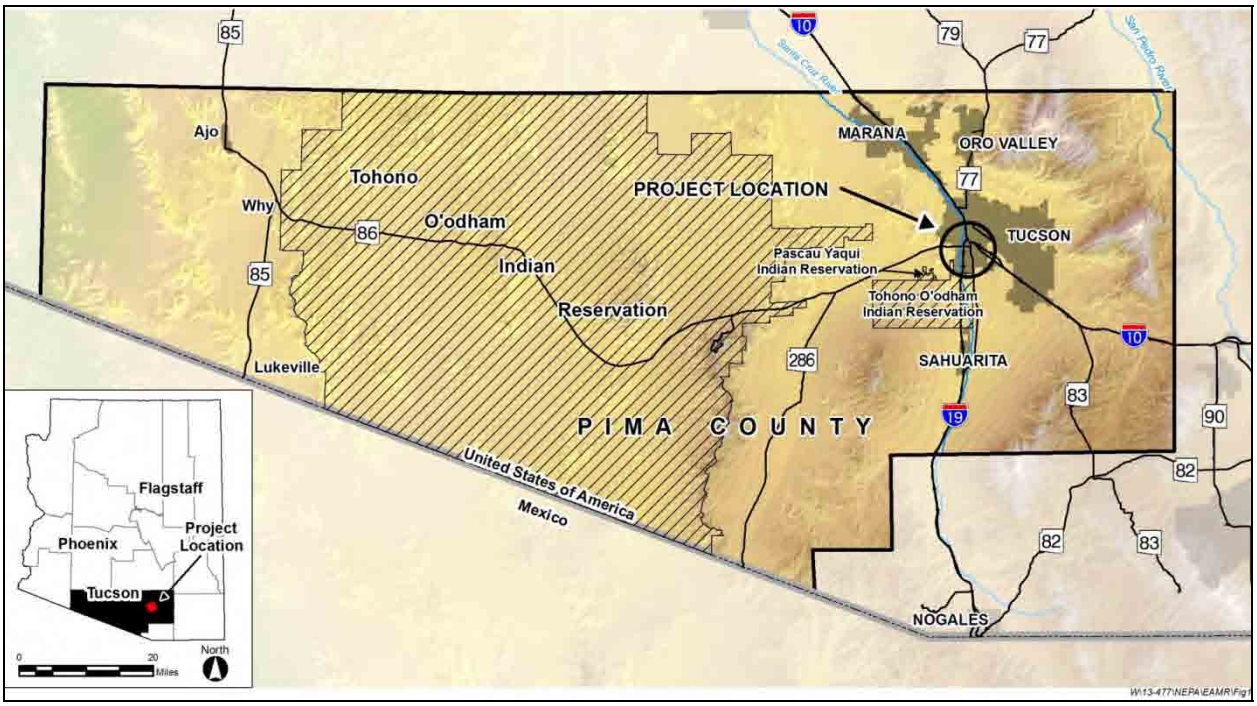


Figure 1 - Project Location

Figure 2 – Project Vicinity Map

The project consists of rebuilding Sunset Road along a new alignment from Silverbell Road to the west to the I-10 East-Bound Frontage Road (EBFR) to the east. The principal components of the project include a new "multi-modal" three-lane roadway with paved and unpaved shoulders, an 8' shared-use path on the south side of the roadway, a 5' pedestrian path on the north side and new bridge across the Santa Cruz River. At the west end of the project, the new Sunset Road will tie into Silverbell Road at a new intersection and will tie into the EBFR to the east at existing curb returns. 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 3rd period of the RTA Plan (FY 2017-2021) with funding now expected to be available in the 2nd Period (FY 2012-2016). The funding covers the entire length of a new Sunset Road from Silverbell Road to River Road. This project will only construct that portion of Sunset Road between Silverbell Road and I-10. The funding to support the construction of Sunset Road from Silverbell Road to I-10 is as follows:

- RTA Funds: Approximately $ 6.7 million
- Pima County Funds: Approximately $ 9.9 million
- City of Tucson Funds: Approximately $ 3.4 million
- **Total: Approximately $ 20 million**

The project is anticipated to begin construction in the fiscal year period 2016. The proposed project is needed to respond to growing traffic volume in the area and the resulting traffic congestion. There are also concerns over alternative routes when the Interstate 10 interchange improvements between Ina Road and Ruthrauff Road begin construction. 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 and could be exacerbated by construction related delays. Congested travel in the project area increases local and regional travel times and transportation costs. The project proposes to rebuild Sunset Road and reestablish an important linkage from Interstate 10 to Silverbell Road to help provide additional capacity for existing and future travel needs and short term congestion relief during other Interstate and east-west connector construction activity.

The project will also improve bicycle and pedestrian mobility through the provision of additional linkages to The Loop shared-use path and provide a key extension of the Loop to the Santa Cruz River to the west. These amenities will be located primarily on the south side of the new Sunset Road.

A new Silverbell Road and Sunset Road intersection will be developed as well as reestablishment of the intersection at Sunset Road and the I-10 EBFR to improve traffic operations and safety. The project will also provide for a new bridge crossing at the Santa Cruz River. This 724 foot long and 64 foot wide concrete girder bridge will span the perennially flowing channel and convey the 100 year flow of the Santa Cruz River while providing for vehicular and pedestrian linkage between the Interstate 10 frontage road and Silverbell Road. The bridge will have a an eight foot shared-use path along its southern edge and a five foot pedestrian sidewalk along its northern edge. These project parameters 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.

CHAPTER 2 – PROJECT DESCRIPTION

2.1 Project Type, Termini and Length

Project Name: Sunset Road: Silverbell Road to Interstate 10 Frontage Road

Pima County Project Number: 4RTSUN

Project Location and Limits: The project is located in eastern Pima County, in the northeastern portion of unincorporated Pima County, approximately six miles northwest of downtown Tucson, Pima County, Arizona (Figure 1). This project is between Silverbell Road and the Interstate 10 (I-10) East-Bound Frontage Road (EBFR) just south of the Sunset Road alignment. The project is in Sections 17 and 18 of Township 13 South, Range 13 East on the Jaynes (1992), Arizona, U.S. Geological Survey 7.5-minute quadrangle. The project limits include a segment in the city of Tucson west of I-10 just south of Sunset Road. The remainder of the project is in unincorporated county land. The Town of Marana limits are about 1,500 feet to the northwest, and the Town of Oro Valley limits are approximately 4 miles to the northeast. Adjacent lands are owned by Pima County and private parties.

In May 2006, the Regional Transportation Authority (RTA) plan and sales tax were approved by Pima County voters. One of the roadway projects included in the RTA plan is Pima County Sunset Road: Silverbell Road to River Road (RTA #8). Sunset Road once extended from Silverbell Road to I-10 across the Santa Cruz River. In 1983 severe flooding throughout the greater Tucson area destroyed the bridge over the Santa Cruz River at Sunset Road, as well as a significant portion of the roadway adjacent to the river. No part of the old Sunset Road alignment or bridge remains. Due to growth in the northwest Tucson region, the connection of Silverbell Road to I-10 and ultimately River Road is needed to improve operations, increase mobility, improve safety and reduce congestion.

The Pima County Department of Transportation (PCDOT), in cooperation with the RTA, proposes to extend existing Sunset Road from its current terminus at the I-10 EBFR westward to Silverbell Road, with a bridge over the Santa Cruz River. This is referred to as Segment I. The second phase of the project, Segment II will begin just west of I-10 and continue east over a future reconstructed I-10, the Union Pacific Railroad, and Rillito River to tie into River Road. The project location and the relationship of Segments I and II are shown on Figure 2.

The future Sunset Road / I-10 Traffic Interchange will be constructed by the Arizona Department of Transportation (ADOT) as part of continuing I-10 upgrades from Tangerine Road to Prince Road. This document addresses Segment I only.

2.2 Design and Posted Speeds

The design speed for Sunset Road is 40 miles per hour (mph) and the posted speed limit will be 35 mph. The design speed for Silverbell Road is 50 mph.

The existing posted speed limit on Silverbell Road is 45 mph. The existing posted speed limit on the I-10 frontage Roads is 45 mph. These posted speed limits will be maintained.

2.3 Nominal Right-of-Way Width

Sunset Road will be constructed within a 150 foot right-of-way. Water harvesting features east of the Santa Cruz River on the south side of Sunset Road will extend this right-of-way on south to 200 feet. Just east of the Santa Cruz River on the north side of the Sunset Road, the right-of-way will be extended by approximately 120 feet for a length of approximately 400 feet to accommodate an outlet pipe for the pavement and offsite drainage.

At the west end of the project, the right-of-way will be extended north and south of the 150 foot roadway right-of-way to accommodate needed channel construction and Santa Cruz River streambed grading.

2.4 Roadway Section

The proposed improvements involve constructing Sunset Road from Silverbell Road to I-10 as a new three-lane uncurbed roadway with 11-foot wide travel lanes, a 12-foot wide two-way left-turn lane (TWLTL) and 10-foot shoulders (six-foot wide paved and four-foot wide unpaved). The new roadway will include a new bridge over the Santa Cruz River. The proposed improvements will include:

- Widening Silverbell Road to the east of the existing edge of pavement to accommodate a 12-foot wide southbound left-turn lane and 12-foot wide northbound right-turn lane at the proposed Sunset Road/Silverbell Road intersection. The recommended storage lengths are indicated in Chapter 4 of this report.
- Reconstructing the curb returns on the northwest and southwest corner of the Sunset Road/EBFR intersection in accordance with Arizona Department of Transportation (ADOT) standard guidelines and practices.
- Constructing five-foot (north side) and eight-foot (south side) wide asphaltic concrete paths along Sunset Road to connect multi-modal users to "The Loop" system, an asphaltic concrete path that parallels the EBFR on the west side. An exception to the path width is described below.
- Installing a two stage crossing for bicycles about 270 feet west of the EBFR. The path width on the north side of Sunset Road will be eight feet wide between the proposed two stage crossing and the EBFR.

2.5 Drainage Improvements

Santa Cruz River Drainage

The proposed alignment of Sunset Road crosses the Santa Cruz River and a new six span bridge is recommended for the crossing. Several iterations of bridge configurations were evaluated to identify the preferred six span bridge configuration based on hydraulic capacity and roadway geometry. Additional design elements include a soil cement sloping abutment for abutment #1 and grading under the first two spans to increase conveyance through the bridge.

The new Sunset Road Bridge over the Santa Cruz River will alter the existing floodplain. The changes to the floodplain do not impact any existing structures. To mitigate increases in upstream water

surface elevation resulting from encroachment into the floodplain by the new roadway and bridge, grading is proposed beneath spans #1 and #2. In addition, to reduce the depth of scour at the western abutment, a sloping abutment is being considered at that location instead of a vertical abutment.

The Santa Cruz River is a Federal Emergency Management Agency (FEMA) regulated watercourse and, as a result, a Conditional Letter of Map Revision (CLOMR) and ultimately, a Letter of Map Revision (LOMR) are required to reestablish the floodplain and floodway within the project reach. A separate floodplain study is being conducted simultaneously for the design of this project to prepare the proper documentation for the FEMA requirements.

Silverbell Road in the vicinity of where Sunset Road will intersect is currently subject to flooding during large storm events. This will not change with the proposed construction of the new Sunset Road. The design of the Silverbell Road and Sunset Road intersection will continue to allow for this flow to occur and will promote drainage of the intersection as floodwaters subside.

Off-Site Drainage

The proposed offsite drainage facilities collect and/or direct storm water before reaching the Sunset Road alignment. All proposed facilities are designed to maintain the existing drainage patterns in the vicinity of the project. As shown on the conceptual plans, the proposed improvements include roadside channels, culverts and scour countermeasures.

Roadside channels are proposed upstream of the roadway alignment to collect and direct runoff to a logical outfall. There is a channel planned southeast of the Silverbell Road and Sunset Road intersection that will direct runoff crossing Silverbell Road from the west to the planned grading under the first two spans of the bridge.

Along the east side of Silverbell Road and the western portion of Sunset Road as it approached Silverbell Road proposed ford or cut-off walls will mitigate erosion and damage to the roadways. The roadside channel southwest of the Sunset Road and the EBFR collects sheet flow from the south and directs it to a proposed culvert that outlets to the Santa Cruz River.

Roadway Drainage

The onsite drainage facilities for this project include bridge scuppers and roadside ditches with catch basins to collect the storm water exiting the roadway. The bridge scuppers will be used to drain pavement drainage on the bridge over the Santa Cruz River. Roadside ditches set beyond the clear zone/recovery area will collect storm water runoff from the roadway and direct it to area inlets/catch basins that will capture and direct the surface runoff to a logical outfall.

2.6 Utility and Railroad Impact

The proposed roadway improvements directly impact the overhead power facilities and the existing overhead telecommunications line near Silverbell Road. The widening of Silverbell Road, although at-grade, impacts to the Tucson Electric Power (TEP) distribution lines east of Silverbell Road will occur. As a result, these lines will be relocated to the west and be added to the existing transmission poles. Pole upgrades may be necessary to accommodate the addition of the distribution lines. Also, due to the inclusion of the traffic signal at the Sunset/ Silverbell Road intersection the TEP lines west of Silverbell Road will need to be raised to mitigate clearance issues.

Century Link has aerial faculties on the east side of Siverbell Road attached to the TEP poles. They plan to place their facilities underground once right-of-way has been secured.

Tw Telcome has a fiber optic line on the TEP poles on the west side of Silverbell Road. They plan to rehang these lines on any new replacement poles installed.

The Western Area Power Administration (WAPA) and TEP overhead transmission lines east of Silverbell Road will lose clearance resulting from the proposed roadway profile. These lines will be raised to provide the appropriate clearances over the roadway.

The existing utilities at the EBFR are underground and since the project ties in at this location no impact is anticipated at this time to them.

Railroad Impact
There are no railroad facilities within the Segment 1 project limits and therefore no impact to the railroad facilities.

2.7 Access Control

There are no planned side streets or driveways within the Sunset Road corridor. Any future development will have to go through Pima County's development process to obtain a permit; which will identify proposed driveway locations. Any future roadway/driveway locations and configurations must comply with the most current Chapter 2.5 of the Roadway Design Manual (RDM) and Subdivision or Development Standards at the time of plan submission. ADOT requires full access control at the Sunset Road / EBFR intersection that will extend along the crossroad a minimum of 300 feet beyond the end of the frontage road radius return as specified in Section 506 of the ADOT Roadway Design Guide (RDG).

Residential driveways are located on Silverbell Road south of the existing Sunset Road/Silverbell Road intersection. The driveways are located approximately 700 feet apart. Existing side streets or driveways along Silverbell Road will be maintained within the project limits. No new access points are planned.

Access control along the eastbound and westbound frontage roads will be maintained in accordance with ADOT and Federal Highway Administration (FHWA) Access Control Policy requirements.

2.8 Signalization and Lighting

The anticipated opening year for Sunset Road from Silverbell Road to I-10 (Segment I) is 2018 and consists of the interim design of the new intersection of Sunset Road and Silverbell Road, and traffic control modifications to the existing I-10/Sunset Road traffic interchange (TI) in order to provide access to Silverbell Road. Based on the Design Concept Reports prepared for the segments of Silverbell Road and I-10 adjacent to Sunset Road as well as the anticipated construction start of the improvements to the I-10 Sunset Road interchange, it is assumed that the design year for the interim improvements is 2025. The roadway segment of Sunset Road between Silverbell Road and the 1-10/Sunset Road traffic interchange (TI) will be designed for the ultimate configuration. The design year for the ultimate configuration is 2040. The Sunset Road/Silverbell Road intersection is expected to meet traffic signal warrants in the opening year (2018) and the design year (2025); therefore, a

new traffic signal with intersection lighting will be installed as part of the proposed Sunset Road improvements.

The intersections of Sunset Road with the eastbound and westbound I-10 Frontage Roads do not meet the traffic signal warrants for the opening and design years; therefore, stop control will be installed on the frontage roads as part of the proposed Sunset Road improvements. However, it is recommended that traffic volumes be monitored and signal warrant analyses conducted in the future after Sunset Road is in place to evaluate the need for a traffic signal with count data. The existing street lighting at the intersections of Sunset Road with the eastbound and westbound frontage roads will be maintained.

Pursuant to PCDOT direction, no continuous street lighting is planned to be installed along Sunset Road.

2.9 Intersection Improvements

The proposed Sunset Road alignment will create a new T-intersection with Silverbell Road. The Sunset Road westbound approach to Silverbell Road will include an exclusive left- and right-turn lane. Silverbell Road will be widened to accommodate a southbound left-turn lane and northbound right-turn lane with the recommended storage lengths indicated in Section 4.2 of this report.

The intersection improvements at the EBFR include reconstructing the curb returns on the north- and southwest corners to match the new Sunset Road alignment. No improvements are needed at the westbound frontage road. Under I-10, Sunset Road will be restriped to include an exclusive left-turn lane and through lane in the westbound direction and one left-turn lane in the eastbound direction.

2.10 Landscaping

The Sunset Road landscape concept takes into account the unique mesoriparian plant community, the presence of delineated wetlands and several protected wildlife species (Yellow-Billed Cuckoo, and the Southwestern Willow Flycatcher), and the recreational nature of the area. Sunset Road offers an important link for trail users, providing a connection between the Urban Loop along the EBFR and the future Anza trail alignment planned for the west bank of the Santa Cruz River.

The plant palette will consist of species native to the Tucson basin that are appropriate within the project's vegetative communities. Native plant species identified on site during the plant inventory and releve process will be supplemented with additional species commonly occurring in the respective plant communities. Supplementation will provide a more diverse and ecologically appropriate plant palette – due to prior disturbance of the project area (including sand and gravel operations) the variety and number of existing plant species is low. The addition of a more diverse plant palette than currently exists will benefit wildlife by emphasizing plants that provide cover as well as food. Trees will be located to provide habitat as well as shade for trail users. Planting will consist of container-grown plants and seed mixes.

Plant layout and density will mimic natural vegetation patterns to help the project blend with surroundings. Planting density will be heaviest in areas adjacent to the Santa Cruz River, where existing plant density is the greatest. Density will lessen as planting moves away from the river into the desert scrub community.

Passive water harvesting techniques such as basins, berms, and check dams will be used where feasible throughout the project to enhance vegetation establishment and allow for infiltration of storm water. The sandy soils present in the project area should be conducive to infiltration. The main water harvesting opportunity is on the south side of Sunset Road, east of the Santa Cruz River. This undeveloped area currently sheet flows toward the northwest, eventually making its way into the River. The new Sunset Road alignment will act as a dam. Rather than use a strict conveyance channel to move the water away from and under the roadway, a series of check dams within the channel will slow the flow, allowing for infiltration and reducing the amount of water that must be conveyed under the roadway. Trees along the basin will benefit from the additional water, and will be located to shade the shared-use pathway running parallel to Sunset Road.

The irrigation system for the Sunset Road project is planned to be a fully automated drip irrigation system consistent with current Pima County Standards. At this point in time, there will be one water and electric point of connection for the project and they will be located at the intersection of Sunset and Silverbell Roads. Water will be supplied from an existing Tucson Water 12 inch PVC potable mainline located in Silverbell Road. It is estimated that the water meter will be a 1-1/2 inch maximum size. Estimated static pressure is 79 psi, which is adequate. Electric for the controller is also available at this intersection. A bridge crossing over the Santa Cruz River will be required for both the irrigation mainline and control wires. This may change based upon Tucson Water's potential interest in extending a water line across the bridge to serve future development.

The use of reclaimed water was investigated, but is not available for use on this project. All of the reclaimed water in the 24 inch reclaimed main that runs on the west side of Silverbell has been contracted. No new reclaimed service can be established from the existing main.

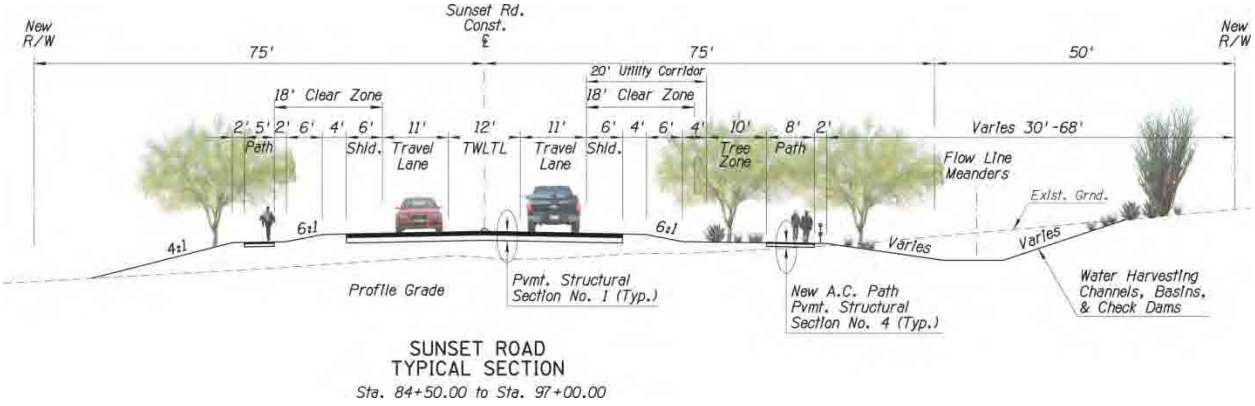


Figure 3 - Sunset Road typical section with water harvesting channel on south side

2.11 Safety Features

There are several best design practice improvements planned as part of the proposed project. At the Sunset Road/ EBFR a new stop controlled intersection will be implemented. At the intersection of Sunset Road/ Silverbell Road a new traffic signal will be installed. At the approaches to the Santa Cruz

River Bridge, new guardrail will be installed, and the bridge will include pedestrian facilities that are protected from traffic either by a raised curb on the north or by a concrete barrier on the south separating traffic and the shared-use path that crosses the bridge. Additionally, the following best design practice improvements are recommended:

- Construct Sunset Road from Silverbell Road to I-10 as a three-lane uncurbed roadway with 11-foot wide travel lanes, a 12-foot wide two-way left-turn lane and six-foot wide paved shoulders. The posted speed limit will be 35 mph.
- Construct five-foot and eight-foot wide asphaltic concrete paths along Sunset Road to connect multi-modal users to "The Loop".
- Install a two stage crossing for bicycles about 270 feet west of the Interstate 10 EBFR. The path section on the north side of Sunset Road between the proposed two stage crossing for bicyclists and the EBFR would be eight feet wide.
- Provide a westbound left-turn lane, southbound left-turn lane, and northbound right-turn lane at the proposed Sunset Road/Silverbell Road intersection.
- Modify the traffic control at the I-10 Traffic Interchange (TI) to have stop control on the eastbound and westbound frontage roads.
- Restripe Sunset Road underneath I-10 to designate a westbound left-turn bay for vehicles accessing the EBFR.
- Update pavement markings and signing for the EBFR approach to Sunset Road to designate a shared through/right-turn lane.
- Provide six foot wide roadway shoulders across the Santa Cruz River Bridge.
- Provide for continuation of the eight- foot wide shared-use path across the bridge on its south side and continuation of the five- foot walking path on the north side of the bridge via a six-foot wide sidewalk crossing the bridge.
- Provide vehicle and pedestrian barriers, roadway curbs and railings on the bridge to separate vehicles and pedestrians and multi-modal users and to protect bridge users at the deck edges of the bridge.
- Provide design considerations for future connectivity to future Santa Cruz River pathways.
- Provide stringent vertical elevation control in design consideration of all bridge elements to protect the overhead electrical power utilities at the west end of the bridge and prevent any incursion into their safety proximity envelopes.
- Provide drainage facilities that will in-turn provide "All-Weather" access for Sunset Road when combined with the future Silverbell Road improvements.

2.12 Public Art

Daniel Martin Diaz of Tucson has been selected to design the public art component of this project. The design team will coordinate with the artist team during the development of the project's design and construction documents to incorporate the public art elements in the project.

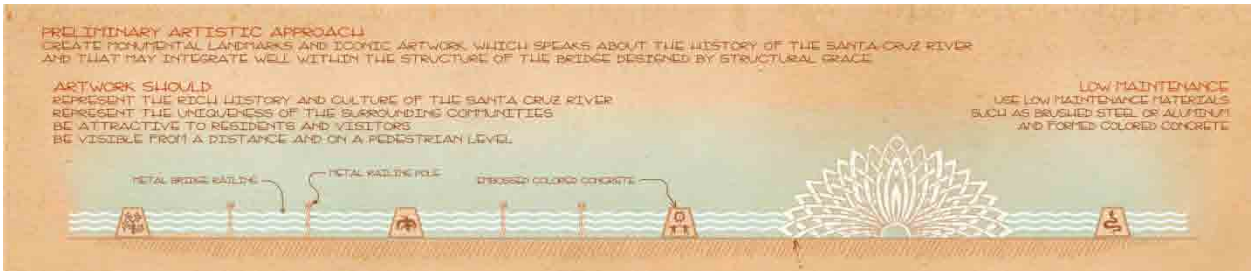


Figure 4 - Public art preliminary approach

CHAPTER 3 – PROJECT AREA CHARACTERISTICS

3.1 Surrounding Topography and Terrain

The Sunset Road: Silverbell Road to Interstate 10 (I-10) project is located in the northwest region of the Greater Tucson Basin. The Tucson Basin is surrounded by five main mountain ranges: Tortolita and Santa Catalina Mountains to the north, Rincon Mountains to the east, Tucson Mountains to the west and Santa Rita Mountains to the south.

Topography varies within the project area. Some of the variation is natural, transitioning from flat, even terrain near both ends of the project to rolling hills near the Santa Cruz River. There are four ephemeral washes that run through or adjacent to the site, which also contribute to the varied terrain. In addition to the natural variation in terrain, there are dramatic manmade topographic features. The most significant manmade features are extensive berms and deep pits that are a result of sand and gravel mining activity in and adjacent to the project area.

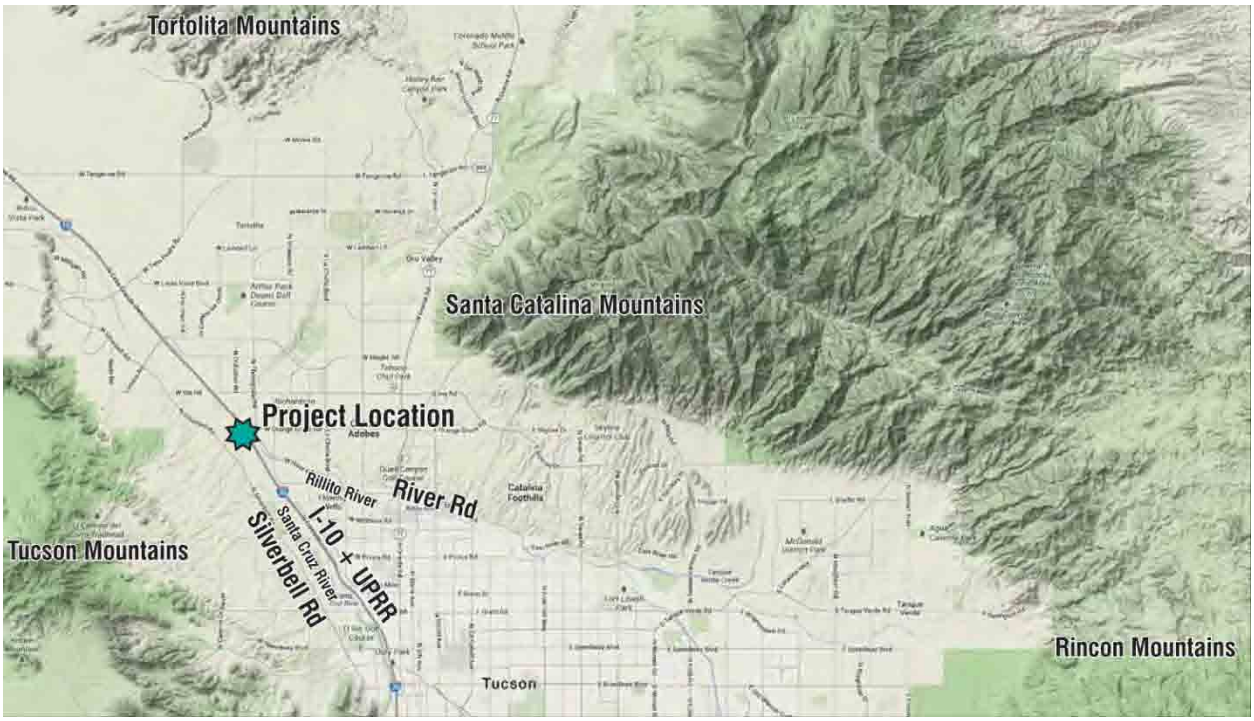


Figure 5 - Sunset Road Surrounding Topography

3.2 Existing Roadway

Sunset Road once extended from west of Silverbell Road to the EBFR, but the Sunset Road Bridge over the Santa Cruz River collapsed during the flood of 1983 and the connection between Silverbell Road and I-10 was lost. Sunset Road still exists west of Silverbell Road and consists of a two-lane asphaltic concrete paved roadway that is classified as an urban collector road. The Sunset Road/Silverbell Road intersection is a T-intersection with stop control on Sunset Road. The posted speed limit is 35 mph.

East of the Santa Cruz River, Sunset Road is a dirt road connecting to a paved section of Sunset Road that begins at the curb return of the EBFR and extends underneath the I-10 mainline, providing access to the westbound frontage road (WBFR). Sunset Road under the I-10 mainline is uncurbed with a single lane and paved shoulder with hatched striping in each direction. The pavement width varies between 44 feet and 48 feet. There are curb and gutter and curb access ramps at the intersections of Sunset Road with the frontage roads. Approaching I-10, from west to east, the horizontal alignment has a curve that ties into the EBFR and then is tangent between the EBFR and WBFR. The vertical alignment is generally flat. Sunset Road lies primarily within Pima County right-of-way, with the exception of the roadway segment near the I-10/Sunset Road Traffic Interchange (TI); which is located within ADOT right-of-way and Tucson city limits.

Silverbell Road, within the project limits, is a two-lane uncurbed roadway that is classified as an urban principal arterial. Its lane widths vary between 11 feet and 12 feet and shoulder widths vary between 4 feet and 6 feet. The horizontal alignment consists of two horizontal curves with radii of 3,500 feet and 1,400 feet from north to south. The vertical alignment generally follows the existing rolling terrain with at-grade drainage crossings. This section of Silverbell Road falls within Pima County's jurisdiction.

The EBFR and WBFR are curbed one-way roadways that provide access to ramps that connect to the I-10 mainline. The EBFR approach to Sunset Road includes an exclusive left-turn lane and two through lanes. The roadway width from face of curb to face of curb is approximately 49 feet. The WBFR approach to Sunset Road includes two lanes; one lane that is used as a shared left-turn/through lane and a through lane. The roadway width from face of curb to face of curb is approximately 40 feet. The lane widths are 12 feet and the shoulder widths are generally eight feet. Both roadways have curb/curb and gutter, horizontal alignments that are generally tangent and vertical alignments that are generally flat. Both roadways have concrete pavement sections and a posted speed limit of 45 mph. The intersections are under stop control, with traffic on Sunset Road having to stop while traffic on the frontage roads is free-flow.

"The Loop" shared-use path runs parallel to the frontage road and crosses Sunset Road just beyond the EBFR curb returns. This crossing is currently uncontrolled, with no signage requiring motorists from the dirt road or bicyclists/pedestrians from the shared-use path to yield to the other movement.

3.3 Roadway Geometric Deficiencies

Since Sunset Road is a new alignment, there are no geometric deficiencies. Silverbell Road is planned to be reconstructed to a four-lane divided roadway; therefore, it was not analyzed for geometric deficiencies as part of this project.

3.4 Existing Right-of-Way

Sunset Road between Silverbell Road and the East Bound Frontage Road will be constructed on new right-of-way acquired from two private parties and the Pima County Regional Flood Control District. Silverbell Road, north of the new Sunset Road alignment has an existing right-of-way width of 60 feet. Approximately 500 feet south of the intersection of the new Sunset Road alignment, the existing right-of-way widens to 150 feet.

3.5 Drainage Characteristics

The drainage characteristics in the vicinity of the proposed project can be separated into 3-areas of interest; west of the river, the river, and east of the river. In general both the areas east and west of the river drain overland to the river. Traversing west to east, each segment has different characteristics.

West of Silverbell Road consists of foothill characteristics with established natural drainages draining the eastern front of the Tucson Mountains. As each of these drainages reach Silverbell Road, the natural channels encounter the existing Silverbell Roadway where they flow at grade onto the left overbank of the Santa Cruz River Floodplain.

The east side of the river contains historic agricultural fields that are no longer active; but still have the retention properties typical of agricultural fields. In addition, there are active sand and gravel mining operations located on the east overbank of the Santa Cruz River. These active mining operations have the potential to intercept overland flow that would typically reach the river. Since these pits are active and there is evidence of berms around the top perimeter of these pits, the design team anticipates that berms are maintained by the mining operations.

3.6 Existing Structures

There are no existing roadway or drainage related structures along the proposed right-of-way.

3.7 Signalization and Lighting

There are no signalized intersections within the project limits and no continuous roadway lighting along Sunset Road or Silverbell Road. There is intersection lighting at the Sunset Road intersections with the EBFR and WBFR.

3.8 Existing Utilities

The existing utilities within the project limits include overhead power line, distribution and transmission, an overhead telecommunications line and underground potable and non-potable water mains, sanitary sewer and underground power, ADOT Freeway Management System and ADOT power.

At the Silverbell Road / Sunset Road intersection, there are overhead and underground utilities. Within the Silverbell Road right-of-way, there is overhead electric transmission on the west, overhead electric distribution lines, overhead telecommunications (with distribution) jointly on the east and underground water, potable and non-potable, under Silverbell Road and east of the road. Between Silverbell Road and I-10, there are no existing underground utilities between the existing right-of-way of Silverbell Road and I-10 along the proposed Sunset Road alignment.

Two overhead power lines, WAPA and TEP have transmission lines that parallel the Santa Cruz River and Silverbell Road and the proposed road alignment will cross both. At the east end of the project (I-10) there are a number of underground utilities within the ADOT right-of-way including; sanitary sewer, underground power, ADOT FMS, telecommunications line and storm drain. The Preliminary Right-of-Way Drawings show all existing utilities as identified by our research and is included in the Appendix.

3.9 Existing Vegetation and Landscaping

The project area is predominantly within the Arizona Upland subdivision of the Sonoran Desert Scrub plant community. Common indicator species for this plant community include mesquite, foothills palo verde, creosote, bursage, wolfberry, and brittlebush. The project area also contains Xeroriparian C and Mesoriparian H riparian plant communities. Common species for these riparian areas along the Santa Cruz River include white thorn acacia, Goodding's willow, canyon hackberry, desert hackberry, saltbush, and graythorn.

The project area and its surroundings are highly disturbed by prior agricultural activity and current mining activity, so plant density and variety is much lower than otherwise expected for these plant communities. In areas of Sonoran Desert Scrub, the design team noted that the predominant species are mesquite and creosote. Other indicator species listed above are present in very insignificant numbers or lacking altogether. In riparian areas, the design team noted the presence of Goodding's willow and saltbush, but other indicator species are lacking. In addition to these areas lacking expected variety of species, the design team observed the presence of several invasive species including giant reed, tamarisk, bermuda grass and Mexican palo verde.

Figure 6 - Representative mesoriparian (left) and xeroriparian (right) plant communities within the Sunset Road project area

3.10 Biological Resources

The project area lies between approximately 2,220 and 2,230 feet elevation (elevations referenced in this document are referenced to mean sea level) in the Santa Cruz River Valley that divides the

Tucson Mountains to the west from the Santa Catalina Mountains to the northeast. The project limits cross the Santa Cruz River, its floodplain, and adjacent upslope areas. In the project area, the Santa Cruz River is a perennially flowing waterway resulting from effluent that is discharged into the river approximately one mile upstream by the Agua Nueva Wastewater Reclamation Facility. The base flow in the river is augmented seasonally by precipitation. Several small ephemeral tributaries flow into the Santa Cruz River from the west side.

The project area is mapped within the Sonoran Desert Scrub biome with a riparian corridor along the Santa Cruz River. The project area is highly disturbed east of the river by past (agricultural) and on-going (sand and gravel mining) land uses. West of the river, habitat is degraded by off-road vehicle use, electric power transmission lines, and a residential property.

The Santa Cruz River mesoriparian habitat supports an extensive tree canopy of Goodding's black willow *(Salix gooddingii),* Athel tamarisk *(Tamarix aphylla)*, with an occasional velvet mesquite *(Prosopis velutina)*. Several wetland features have been mapped (Preliminary Jurisdictional Delineation and Wetland Delineation, May 5, 2014) within the project limits and are characterized by dock-leaf smartweed *(Persicaria lapathifolia)* and southern cat-tail *(Typha domingensis)*, with occasional areas of giant-reed *(Arundo donax)*.

The Santa Cruz River in the project vicinity is defined as an "Important Riparian Area" under the Maeveen Marie Behan Conservation Lands System. The Pima County Multi-species Conservation Plan identifies priority conservation areas for 44 species in Pima County. The project area includes Priority 1 Conservation Areas for 3 species; Abert's towhee *(Pipilo aberti),* cactus ferruginous pygmy-owl *(Glaucidium brasilianum cactorum),* and Western burrowing owl *(Athene cunicularia hypugaea)*. The following species were evaluated in a Biological Evaluation (BE):

Common Name	Scientific Name	Status
Southwestern willow flycatcher	*Empidonax traillii extimus*	Endangered with Critical Habitat
Yellow-billed cuckoo	*Coccyzus americanus*	Threatened
Tucson shovel-nosed snake*	*Chionactis occipitalis klauberi*	Candidate

*Subsequently the Tucson shovel-nosed snake was removed from the Candidate list by the USFWS (Federal Register Vol.79, No. 184, September 23, 2014)

3.11 Archaeological and Historic Resources

The general project vicinity contains multiple historic and prehistoric sites associated with occupation along the Santa Cruz River. Within the project limits there are three sites: AZ AA: 12:11(ASM), AZ AA:12:788 (ASM) which are known as the Rillito Fan Site, and the proposed Silverbell Archaeological District. The inclusion of the Silverbell Archaeological District on the National Register of Historic Places is pending action by the U.S. Army Corps of Engineers related to future Silverbell Road improvements.

3.12 Visual Resources

Topography and vegetation cover affect views of the surrounding mountain ranges. Areas of higher elevation and/or sparser vegetation result in unobstructed mountain views.

There are several cultural modifications that are visible from many viewpoints in the project area. These include overhead utilities and associated pole structures, low density residential structures, roadways and embankments, road signs, fences, a pecan grove, and large un-vegetated berms at the CalPortland quarry site. The visibility of these features depends on the elevation of a person's vantage point as well as surrounding vegetation density.

The Santa Cruz River supports a robust plant community. The band of lush green vegetation adds variety to the landscape and helps to screen many of the cultural modifications in the area.

Figure 7 - Representative project location shown in context with surrounding features

3.13 Existing Land Use

Silverbell Road abuts the west end of the project limits, and areas west of Silverbell Road support relatively low-density residential development on larger lots. I-10 abuts the east end of the project limits, and land use east of I-10 is characterized as urban and includes commercial, industrial, and relatively high-density residential development.

Current land use in the project area is primarily sand and gravel mining by CalPortland. This operation is under a 15 year lease from the Pima County Regional Flood Control District (PCRFCD) and will expire in 2027. West of the Santa Cruz River, a single residential property is present. West of Silverbell Road several single family homes on large lots are adjacent to the roadway.

There is an existing Pima County Loop Trail (The Loop) access along the eastern edge of the project footprint adjacent to the EBFR. This part of the Loop is paved and connects with the Rillito River Park to the north and the Santa Cruz River Park to the south.

Several overhead utilities occur between Silverbell Road and the Santa Cruz River. The Western Area Power Administration (WAPA) owns and maintains an 115kV transmission line running north-south between Silverbell Road and Santa Cruz River. Tucson Electric Power (TEP) has a 136 kV transmission line just east of the WAPA and two service lines (46 kV and 13.8 kV) which parallel

Silverbell Road on the west and east sides. Tucson Water has two potable water lines (12 and 42 inch) and one reclaimed water line (24 inch) in the Silverbell Road right-of-way.

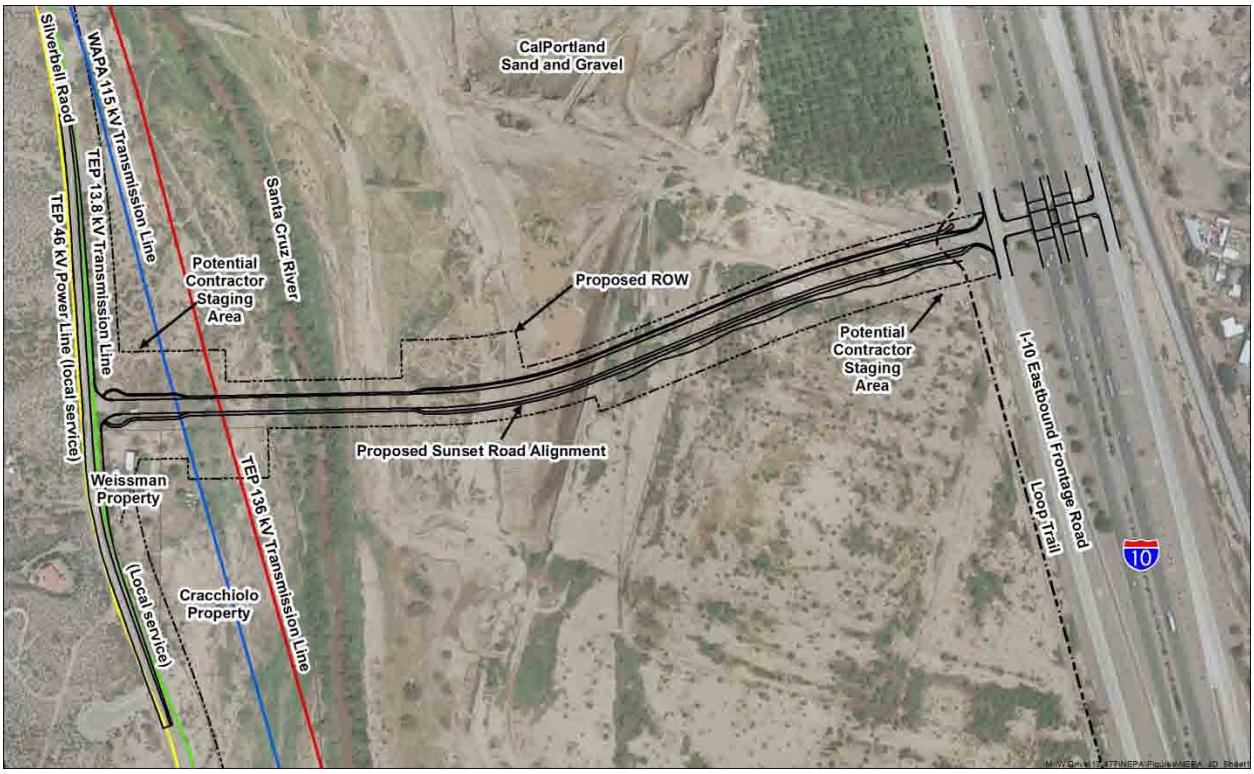


Figure 8 - Project immediate vicinity

3.14 Future Land Use

The project area is not subject to any pending development proposals. The acquisition of the CalPortland property by the PCRFCD provides future options for a wide range of development including; a regional park facility, Pima County services facilities, and commercial development. Two shared-use path facilities are planned for the Santa Cruz River corridor within the project limits. The Loop is planned to be relocated from the existing location along the I-10 eastbound frontage road to an alignment along the east bank of the river. The Anza Trail is planned for the west bank of the river.

In general, the adjacent land uses are expected to retain their current uses; residential west of Silverbell Road and mixed commercial/industrial east of I-10. Much of the immediate vicinity of the project falls within a 100-year floodplain, limiting future development. Generally, the floodplain extends from Silverbell Road on the west approximately 1,000 feet to the east. As noted in Section 2.5, a new floodplain will be mapped as a result of the influence of the bridge on the floodplain limits.

3.15 Current Zoning

Land uses in the project vicinity are limited to commercial mining, utility corridors, and dispersed residential adjacent to Silverbell Road. Zoning primarily falls under the City of Tucson with the areas east of the river zoned Industrial (I-1), west of the river Residential (RX-1) and the river corridor is zoned Open Space (O-3). Pima county zoning includes Rural Residential (GR-1), Suburban Homestead (SH), and a small area at I-10 designated General Business Zone (CB-2). No state or public lands occur adjacent to the project limits.

3.16 Proposed Developments

The project area is not currently subject to any pending development proposals. The adjacent land uses are expected to retain their current uses. As mentioned, much of immediate vicinity of the project falls within a 100-year floodplain, limiting future development.

3.17 Potentially Affected Community Facilities

There are no social services including, police, fire, or hospitals in the project vicinity. The nearest law enforcement facility is six miles to the south (Tucson Police Department, Miracle Mile station), a fire station is located 1 mile to the southwest (Northwest Fire District, El Camino del Cerro), and the closest hospital is 3 miles to the northeast (Northwest Medical Center, Orange Grove Road/La Cholla Boulevard). The nearest school is 0.5 mile east of I-10 (Green Fields Country Day School, Camino de la Tierra).

3.18 Public Lands within the Project Area

The project limits generally lie within Pima County Department of Transportation right-of-way for Silverbell Road and Pima County Regional Flood Control District property. The project connects to the Arizona Department of Transportation right-of-way for I-10.

3.19 Tribal Lands

There are no tribal lands within or adjacent to the project limits. The nearest Native American community is the Pascua Yaqui Tribe, almost 10 miles to the south.

3.20 Intergovernmental and Development Agreements

An intergovernmental agreement between Pima County and the Regional Transportation Authority will need to be established to address the funding of the project. Likewise, an intergovernmental agreement between Pima County and the City of Tucson will need to be established to address funding contributions from the City as well as the construction activities associated with the project that fall within Tucson's city limits.

CHAPTER 4 – TRAFFIC AND ACCIDENT DATA

4.1 Existing Conditions

Traffic Volumes and Factors

The *Sunset Road, Silverbell Road to I-10 (Segment I) Traffic Engineering Report* (TER) documented traffic and accident data for the proposed corridor. Provided below is an overview from the TER.

Pima Association of Governments (PAG) performed traffic counts on Silverbell Road in 2010. The PAG count within the study limits was taken on the segment of Silverbell Road between Ina Road and El Camino del Cerro. Based on the average of the two-day count, the 2010 average daily traffic (ADT) on Silverbell Road was 5,249 vehicles per day (vpd). From the volume data gathered from the PAG Database, traffic factors including K (the proportion of the daily traffic occurring in the peak hours), and D (directional split) were calculated. Table 1 in the Appendix illustrates the traffic volumes and factors on Silverbell Road.

PAG traffic counts taken in 2013 indicate that the traffic volume on the existing segment of Sunset Road, west of Silverbell Road, is approximately 1,400 vpd.

Traffic volumes for the frontage roads were gathered from the Traffic Engineering Study prepared for the ADOT I-10, Ina Road TI to Ruthrauff Road TI DCR. Table 2 in the Appendix shows the traffic volumes and factors on the frontage roads.

Crash Analysis

Crash data for the five-year period of October 1, 2008 to September 30, 2013 were obtained from PCDOT and ADOT. A total of seven crashes were recorded along the studies roadway segments and the intersections.

Intersections

The intersection crash data were analyzed and the results are summarized in Tables 3 and 4 in the Appendix. Table 3 classifies the recorded crashes by injury severity according to the following classification: fatal, incapacitating injury, bodily injury, non-serious injury, and property damage only (PDO) crashes. To analyze segment crashes, the ADT's were collected from PCDOT and ADOT and included in Table 4 in the Appendix.

Existing Sunset Road at Silverbell Road

In the five-year period studied, the existing Sunset Road/Silverbell Road intersection only had two total crashes that occurred on Silverbell Road between October 2008 and September 2013. Both crashes were rear-end collisions where a northbound left turning vehicle was struck by a vehicle traveling in the same direction. Both crashes resulted in PDO. The crash rate at this intersection is 0.16 crashes per million entering vehicles; which is lower than the Pima County average of 0.38 recorded for a three-year period between January 2009 and December 2011 for un-signalized

intersections. The severity index is 1.00; which results in a lower severity index than the Pima County average of 1.50 recorded in the same three-year period.

Sunset Road at EBFR
This un-signalized intersection had only one crash in the five-year period studied.

Sunset Road at WBFR
This un-signalized intersection had zero crashes in the five-year period studied.

Roadway Segments
The segment crash data for the roadways adjacent to Sunset Road were analyzed and the results are summarized in Tables 5 and 6 in the Appendix. The crash data evaluated for Silverbell Road correspond to the segment of Silverbell Road from approximately 900 feet north of the existing Sunset Road/Silverbell Road intersection to approximately 2,000 feet south of the same intersection.

Silverbell Road from 900 feet north of Sunset Road to 2,000 feet south of Sunset Road
In the five-year period studied, this segment of Silverbell Road had four recorded crashes. One of the four crashes recorded was a rear-end collision, one involved a single vehicle leaving its travel lane, one involved a motorist striking a deer, and one involved a bicyclist colliding with another bicyclist. Two of the crashes involved PDO and two had non-serious injuries. This resulted in a crash rate of 0.76 crashes per million vehicle-miles traveled; which is lower than Pima County's three-year average crash rate of 1.42 for low volume roadway segments. The severity index of 1.50 on Silverbell Road from 2009 to 2013 was slightly lower than the Pima County average of 1.55 for low volume roadway segments.

Sunset Road from Camino de Oeste to Silverbell Road
In addition to the crash data summarized in Tables 5 and 6, crash data was gathered for the existing segment of Sunset Road west of Silverbell Road and found that no crashes were reported for the five-year period evaluated.

Sunset Road between EBFR and WBFR
This roadway segment had zero crashes in the five-year period studied.

EBFR near Sunset Road
This roadway segment had zero crashes in the five-year period studied.

WBFR near Sunset Road
This roadway segment had zero crashes in the five-year period studied.

Since there was such a low frequency of crashes on Sunset Road, Silverbell Road, and the frontage roads, no pattern with respect to the type of crash or other factors was evident. Refer to Figure 8 to see all crashes and existing traffic information.

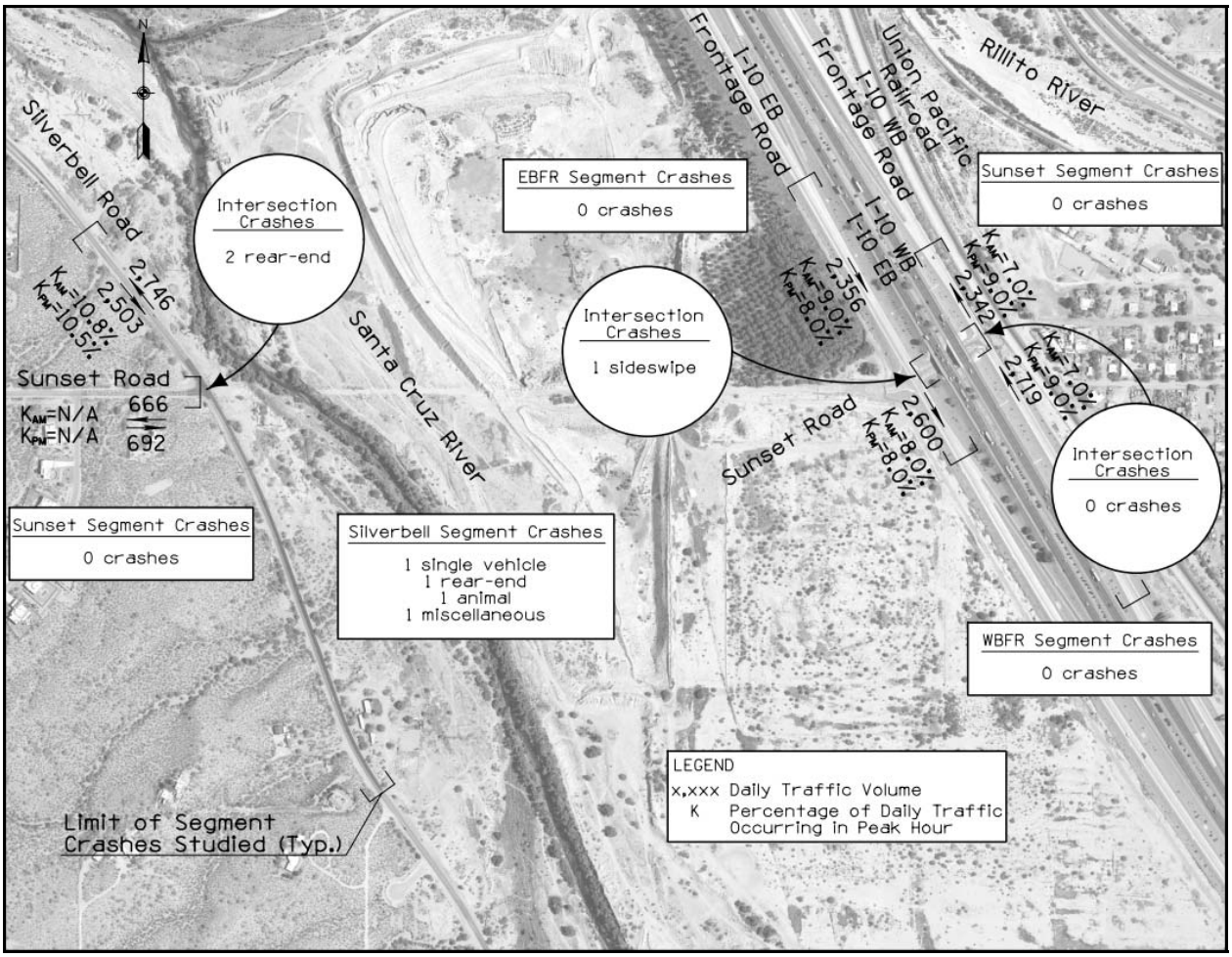


Figure 9 - Existing Traffic Volumes and Crashes

4.2 Future Conditions

Traffic Volume Projections

Traffic volume projections for the years 2018 and 2025 were developed utilizing PAG's regional traffic forecasting model to develop future volume projections based on projected socioeconomic, population, employment, origin-destination, and other regionally based data. The year 2018 is anticipated to be the opening for Segment I and the year 2025 the design year. The 2025 design year is based upon the anticipated construction start of Segment II of Sunset Road and the reconstruction of the I-10 / Sunset Road interchange by ADOT. Since Sunset Road is a new roadway and direct calibration could not be made to the future traffic volume projections, it was important to fine-tune the PAG traffic forecasting model to obtain accurate results.

The following minor adjustments were made to the PAG model structure:

- The model overestimated the volumes on the existing segment of Sunset Road. The model was modified to provide additional links from the Traffic Analysis Zones (TAZs) adjacent to Silverbell Road and Sunset Road to lower the traffic volume projection on Sunset Road. The

PAG model only had two connectors from the TAZ centroids to the roadway network and as a result, the traffic generated by the residential development in the area was split 50% onto Sunset Road and 50% onto Silverbell Road. Based on the existing access points on Sunset Road, Silverbell Road and El Camino del Cerro, the majority of the residents have direct access off of Silverbell Road and El Camino del Cerro.

- The model showed Camino de la Tierra intersecting with River Road instead of as one continuous link that goes underneath River Road. The model was modified to eliminate the intersection of Camino de la Tierra with River Road. By eliminating this intersection, the traffic projection on Camino de la Tierra did not increase north of River Road.
- The model assumed that Silverbell Road will be a four-lane divided roadway for the year 2018. The model was modified to reflect Silverbell Road as a two-lane roadway.
- The model assumed a 35 mph speed on Ina Road. Ina Road has a posted speed limit of 45 mph. The model was adjusted to reflect this posted speed limit.

Once the 2018 and 2025 daily traffic projections were acceptable, PAG performed an additional model run to provide peak hour turning volumes for the study intersections. Future K and D factors were calculated based on the PAG volumes to ensure projected traffic volumes accurately reflected the anticipated travel patterns in the project area.

Future Volumes on Sunset Road

Between the years 2018 and 2025, the PAG model anticipates an average annual growth rate (AAGR) of 3% on the new segment of Sunset Road between Silverbell Road and the EBFR. The PAG daily traffic volumes are presented in Table 7.

Future Daily and Hourly Traffic Volume Projections

Figures 9 and 10 presents the daily and hourly volumes projected for the years 2018 and 2025, respectively. Based on the PAG traffic volume projections shown in Figures 9 and 10, the traffic volumes are not expected to increase for all traffic movements between 2018 and 2025 since planned improvements on nearby roadways are anticipated to accommodate portions of the future traffic demand.

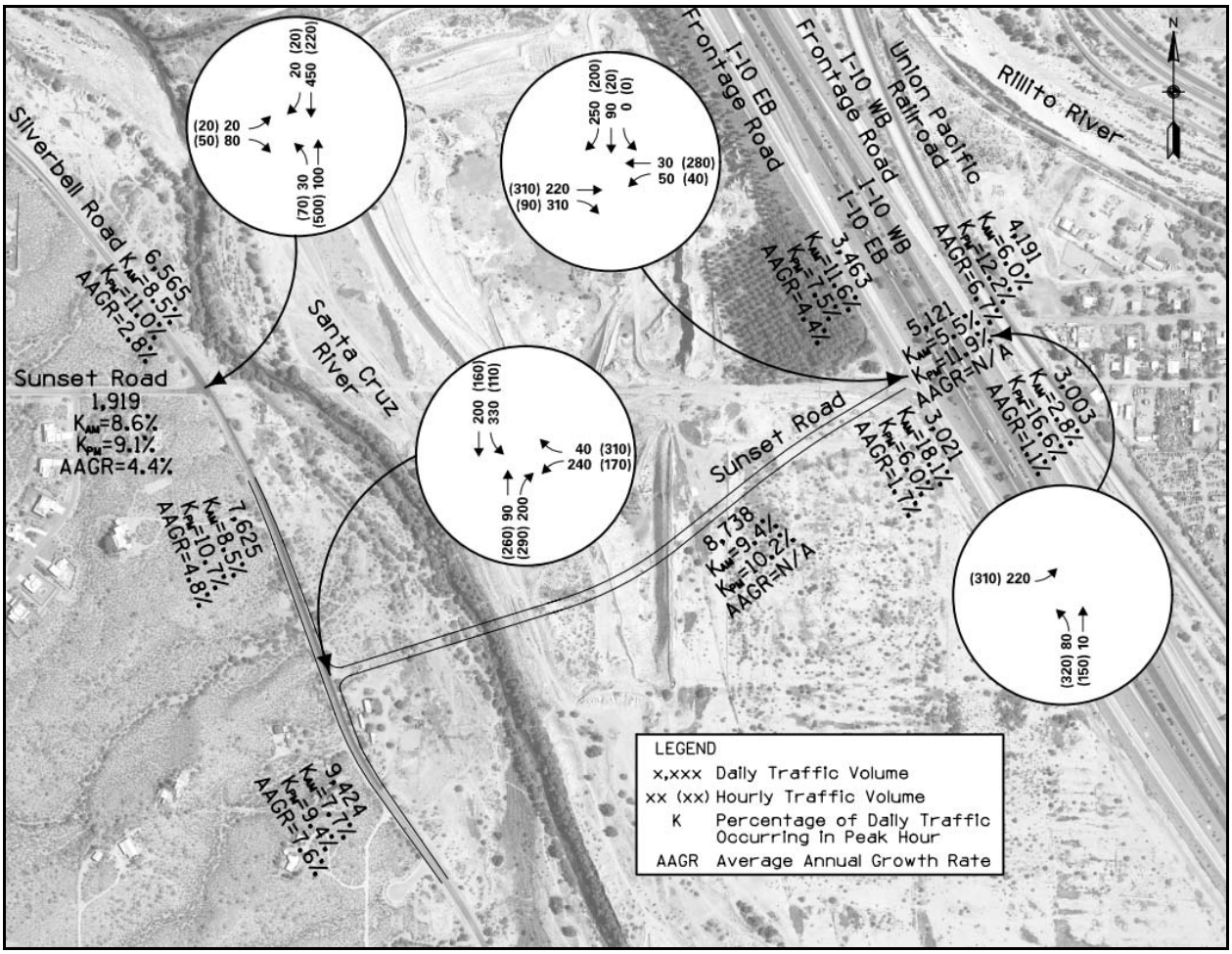


Figure 10 - 2018 Traffic Volume Projections

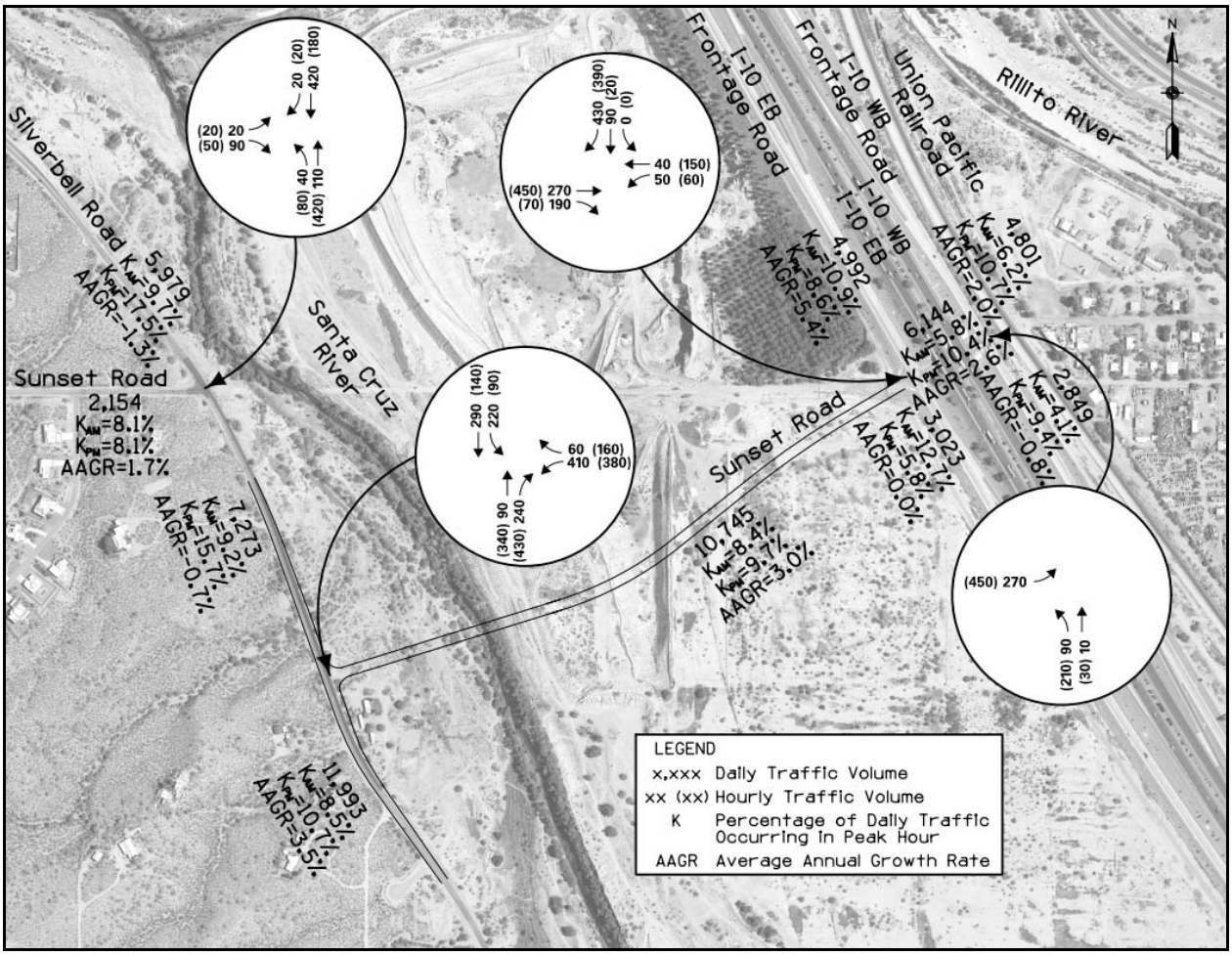


Figure 11 - 2025 Traffic Volume Projections

Capacity and Level of Service Analysis

This section of the report presents the results of the capacity analysis for Sunset Road between Silverbell Road and I-10 and the level of service (LOS) for the intersections of Sunset Road/Silverbell Road and Sunset Road with the frontage roads (I-10/Sunset Road TI).

Roadway Segment

The capacity of a roadway segment depends on intersection traffic control types along the segment, as well as street environment factors including driveway density, speed limit, median types, intersection density, etc. The Florida Department of Transportation (FDOT) has established capacity tables at the planning level and determined that a two-lane arterial roadway can generally accommodate 15,600 vpd at LOS E. The 2018 traffic volume projection on Sunset Road is approximately 8,750 vpd, and the 2025 is 10,750 vpd. Considering FDOT's LOS criteria, a two-lane typical section on the new Sunset Road will accommodate the future traffic demand at an acceptable LOS.

Intersections

For the study intersections, the methodologies set forth in the 2010 Highway Capacity Manual (HCM) were utilized through Synchro (version 8) to assess future traffic operations. The peak hour traffic volumes for the analysis were based on the 2018 and 2025 PAG volume projections described in the previous section. Table 8 in the Appendix shows the control delays in seconds/vehicle (sec/veh) and corresponding LOS established in the HCM for signalized and un-signalized intersections.

Detailed analyses of the intersections, including type of traffic control, are discussed below. Signal warrants and turn lane warrants are discussed later in Chapter 4 of this document.

Sunset Road/Silverbell Road Intersection

The proposed T-intersection was modeled with a southbound left-turn lane, northbound right-turn lane, and westbound left-turn lane for the opening year (2018). According to the HCM, a three-leg intersection with stop control on the minor-street approach is classified as a two-way stop controlled (TWSC) intersection. Since Silverbell Road is classified as an urban arterial, the analysis was conducted assuming a TWSC on Sunset Road. In 2018, the westbound approach is anticipated to operate at an unacceptable LOS F, with an average delay of 195.4 seconds per vehicle. Likewise, in the design year (2025), the westbound approach will operate at unacceptable LOS in both the AM and PM peak hours. See Table 9 in the Appendix for 2010 HCM LOS and approach delay results for the opening and design years.

Based on the anticipated operations under a TWSC intersection, a signalized intersection analysis was performed. The analysis assumed a 60-second actuated cycle length with the same lane configuration utilized for the TWSC analysis. The signalized intersection is expected to operate at LOS B in both the AM and PM peak hours in 2018. The intersection is anticipated to continue to operate at an acceptable LOS through 2025 (LOS B in the AM and LOS C in the PM peak hours). Approach and intersection delays and corresponding LOS are illustrated in Table 10 in the Appendix.

Estimated queue lengths based on the signalized intersection analysis for the opening and design years are shown in Table 11 in the Appendix.

Frontage Roads and Sunset Road Intersections

Three traffic control alternatives were evaluated for the intersections of the I-10/Sunset Road TI. Currently, the traffic interchange operates with a free-flow movement for vehicles on the frontage roads. The traffic control alternatives include:

- Stop control on Sunset Road
- Stop control on the frontage roads
- All-Way Stop Control (AWSC)

The LOS analysis was performed assuming the existing lane configuration on the frontage roads and shared through/right-turn lane on Sunset Road. Tables 12 and 13 in the Appendix illustrate the results of the LOS analysis for the years 2018 and 2025, respectively.

In 2018, under the stop control on Sunset Road alternative, a significant delay is anticipated at the intersection for the eastbound movement on Sunset Road approaching the WBFR. This movement will operate at an unacceptable LOS F with an average delay of 182.9 seconds per vehicle in the afternoon peak hour. The other two traffic control alternatives are anticipated to operate at acceptable LOS where the stop control on the frontage roads outperformed the AWSC. The 2025 results are similar to results obtained for the opening year (2018) where unacceptable LOS is anticipated for the eastbound movement on Sunset Road approaching the WBFR. Additionally in the year 2025, the eastbound approach on Sunset Road under the AWSC is expected to operate at an unacceptable LOS. Overall, the stop control on the frontage roads will provide better traffic operations.

It is important to note that the capacity analysis was performed using procedures of the 2010 HCM for un-signalized intersections and that the intersections at the I-10/Sunset Road TI have characteristics that might be beyond the scope of the 2010 HCM (one-way street on two approaches and the major street terminates at the minor street). Consequently, a micro-simulation model was utilized to confirm the results. Due to the nature of macroscopic models (HCM) and microscopic models (simulation), delay obtained by the two methods should not be compared directly. The results of the simulation can be used to verify that stop control on the frontage roads is the traffic control alternative expected to outperform the other two traffic control alternatives evaluated. Table 14 in the Appendix illustrates the simulations delay estimated at the movement level for the I-10/Sunset Road TI.

The simulation results are the average of 30 runs performed for each of the peak hours and the magnitude of the average delay is similar to the average delay estimated using the 2010 HCM equations.

Estimated queue lengths for the stop control on the frontage roads alternative were estimated based on the 2010 HCM and the results of the simulation. The 95th percentile queue lengths for both methodologies are shown in Table 15 in the Appendix.

Even though the delay estimated using the simulation was lower than the delay estimated using the 2010 HCM, the 95th percentile queue lengths estimated using the simulation were greater than the queue lengths estimated using the 2010 HCM. The simulation queue lengths seem to be more appropriate for the expected traffic volumes. The simulation queue lengths were used as the basis for storage length recommendations.

In addition to using the simulation queues for storage length purposes, the simulation queues were utilized to evaluate the available distance for vehicles exiting I-10 and turning onto Sunset Road. The ramp/frontage road junctions are located approximately 700 feet (EBFR) and 1,100 feet (WBFR) away from the intersections. Based on the measured distance and estimated queue lengths, the available weaving distance is approximately 500 feet, which is consistent with weaving distances provided at other traffic interchanges.

Signalization and Turn Lane Warrant Analysis

Signalization Warrant Analysis

A preliminary signal warrant analysis was conducted for future conditions at the Sunset Road/Silverbell Road intersection and the I-10/Sunset Road TI. The preliminary signal warrant analysis was based on the eight-hour (Warrant No. 1) and four-hour (Warrant No. 2) analyses contained in the 2009 Manual on Uniform Traffic Control Devices (MUTCD).

In order to obtain eight-hour and four-hour volumes, ADOT Policies, Guidelines and Procedures (PGP) 611 (9) was utilized to obtain the hourly adjustment factors. The posted speed limit on Silverbell Road is 45 mph and consequently, Condition B was utilized to evaluate the Sunset Road/Silverbell Road intersection. The I-10/Sunset Road TI was analyzed under Condition A.

The Sunset Road/Silverbell Road intersection is expected to meet Warrant No. 1 in 2018 and 2025 as shown in Table 16 in the Appendix.

Likewise, the intersection is anticipated to meet Warrant No. 2 in the opening year and the design year. See Figure 11 for Warrant No. 2 results.

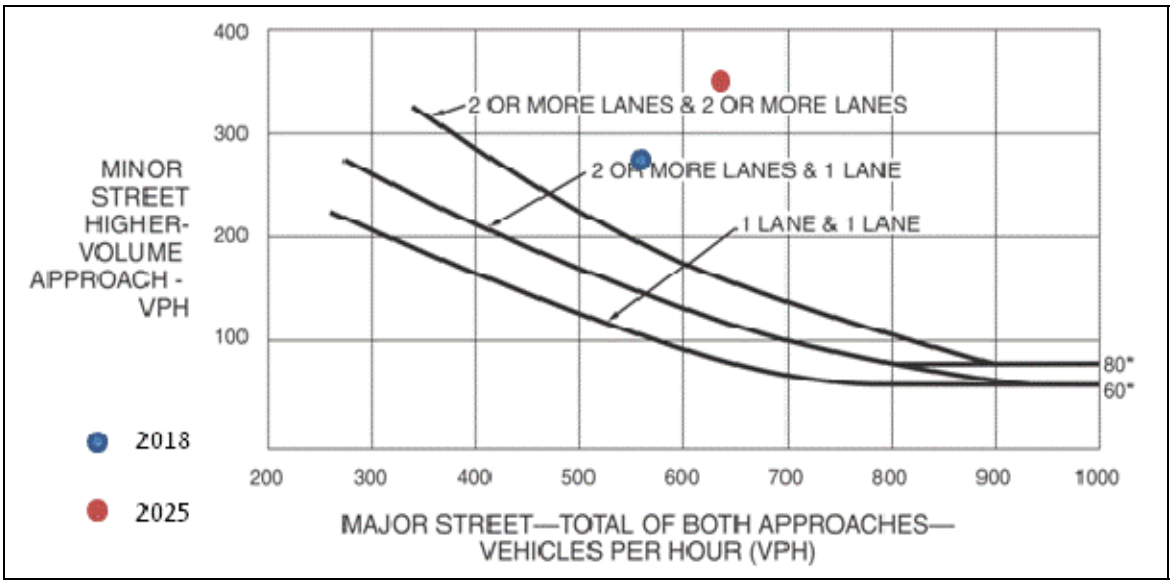


Figure 12 - Sunset Road/Silverbell Road Signal Warrant No. 2

Based on the eight-hour (Warrant No. 1) and four-hour (Warrant No. 2) analyses, the Sunset Road/Silverbell Road intersection meets the traffic signal warrants for the opening year. Therefore, it is recommended that a signal be installed at this new intersection as part of the Sunset Road improvements.

The I-10/Sunset Road TI intersections are not expected to meet the eight-hour (Warrant No. 1) or four-hour (Warrant No. 2) analysis for 2018 and 2025 as illustrated in Table 17 in the Appendix and

Figure 12, respectively. Therefore, it is recommended that traffic volumes are monitored and signal warrant analyses conducted in the future after Sunset Road is in place to evaluate the need for a traffic signal with count data.

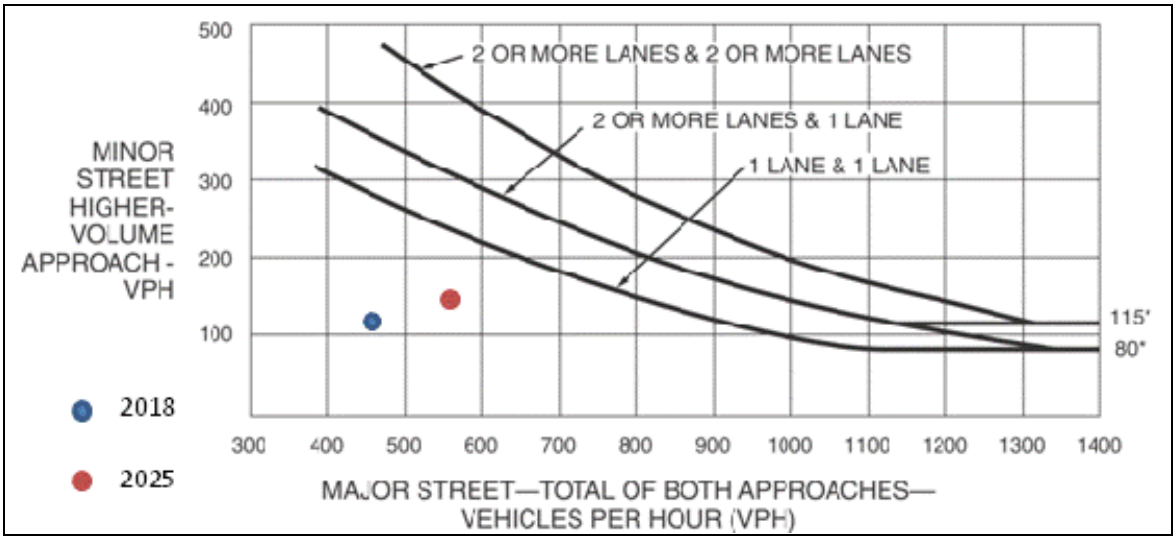


Figure 13 - Sunset Road/Frontage Road Signal Warrant No. 2

Turn Lane Warrant Analysis

Turn lane warrant studies for future conditions were conducted for the intersections of Sunset Road/Silverbell Road and the I-10/Sunset Road TI. *Pima County Subdivisions and Development Street Standards* criteria for turn lane warrants were utilized for the intersections within Pima County right-of-way. ADOT PGP 245 was utilized to evaluate the turn lane requirements at the I-10/Sunset Road TI. The results of the turn lane warrant analysis are summarized as follows:

- Sunset Road/Silverbell Road intersection- Turn lane warrants were met for the southbound left-turn, northbound right-turn, and westbound left-turn movements in 2018.
- Sunset Road/EBFR intersection - Turn lane warrants were met for the eastbound right-turn movement using both PCDOT and ADOT criteria.
- Sunset Road/WBFR intersection - No turn lane warrants was met.

The turn lane warrant analysis for the I-10/Sunset Road TI was performed assuming that stop control on the frontage roads will be implemented as part of the Sunset Road improvements.

Recommended Turn Bay Storage

Storage lengths were based on the 95th percentile queue lengths calculated in the Synchro analysis, as well as guidance on minimum lengths provided in the PCDOT/TDOT Pavement Marking Design Manual. Recommended storage lengths are provided in Table 18 in the Appendix.

CHAPTER 5 – DESIGN STANDARDS AND CRITERIA

5.1 Design References and Standards

Table 19 in the Appendix summarizes the design standard and criteria used to develop Sunset Road. The design elements will be in conformance with the following Pima County standards and guidelines:

- Roadway Design Manual (RDM), 2013
- Drainage and Channel Design Standards for Local Drainage, 1984
- Pima County/City of Tucson Pavement Marking Design Manual
- Street Lighting and ITS Conduit Design Manual
- Traffic Signal Design Manual
- Pima County/City of Tucson Signing Manual
- Environmentally Sensitive Roadway Guidelines
- Community Participation and Mitigation Ordinance
- Floodplain and Erosion Hazard Management Ordinance
- Pima County/City of Tucson Standard Details for Arizona Land Boundary Surveys
- Hydrology Manual for Engineering Design and Flood Plain Management, 1979
- Major Streets & Scenic Routes Plan (MSSRP), current edition
- Subdivision and Development Street Standards, 2005
- Guidelines for Establishing Scour and Freeboard for Bridges in Pima County

Other documents used to establish criteria include:

- PAG Standard Specifications and Details, current edition
- The American Association of State Highway Transportation Officials (AASHTO), A Policy on Geometric Design of Highways and Streets, 2011
- AASHTO, Roadside Design Guide, 2011
- AASHTO, Guide for the Development of Bicycle Facilities, 2012
- AASHTO, LRFD Bridge Design Specifications, 6th Edition
- Federal Highway Administration (FHWA), Manual on Uniform Traffic Control Devices (MUTCD), 2009
- FHWA, Hydraulic Design of Energy Dissipaters for Culverts and Channels, 1983
- FHWA, Urban Drainage Design Manual, HEC-22, 2001
- FHWA, Evaluating Scour at Bridges, HEC-18,
- Transportation Research Board Highway Capacity Manual (HCM)
- ADOT Materials Preliminary Engineering and Design Manual
- ADOT Roadway Design Guidelines (RDG), 2012
- ADOT Bridge Design Guidelines,
- ADOT Standard Drawings (current revisions and updates)
- ADOT Materials Preliminary Engineering and Design Manual
- ADOT Policies, Guidelines and Procedures, current edition
- Other supplemental ADOT design guidelines and policies

- Florida Department of Transportation (FDOT) capacity tables

Bridge Design Standards

The list below summarizes the design standards and criteria used to design the Sunset Road Santa Cruz River Bridge. The design elements of the bridge will be in conformance with the following standards and guidelines:

- ADOT Bridge Design Guidelines,
- AASHTO, LRFD Bridge Design Specifications, 6th Edition

Slope Standards

The side slopes between the roadway and asphaltic concrete paths vary from 2% to 6:1 within the clear zone. A maximum cut and fill slope of 4:1 is used outside the clear zone.

Pavement Structure

A Geotechnical Report will be prepared and pavement design performed as part of the project development. Table 20 in the Appendix outlines the initial pavement structural sections used in the development of the Segment I DCR Level Plans. It is assumed that the existing pavement on Sunset Road between the EBFR and WBFR will be milled two inches and replaced.

Design Speed

As noted in Table 19 in the Appendix, the design speed on Sunset Road is 40 mph. The design speed for Silverbell Road is 50 mph.

Drainage Design

The drainage design criteria are in accordance with the Pima County Roadway Design Manual, Section 2.10 Drainage (Revised 2013) and are as follows:

Offsite/Cross Drainage:
100-Year Design – No Overtopping of Roadway.
Mitigate for Scour

Bridge Hydraulic Design:
100-Year Design for bridge opening
500-Year Evaluated as extreme event
Minimize backwater, sedimentation, scour and bank erosion
Pier shape to minimize debris build up and scour depth
Freeboard requirements in accordance with PCRFCD's *Guidelines for Establishing Scour and Freeboard for Bridges in Pima County* –
100-Year Freeboard 3-feet
500-Year Freeboard 1-foot

Onsite/Pavement Drainage:
A check storm evaluation of the pavement drainage and storm drain system shall be provided using the 100-year design discharge

10-Year Design for Pavement Drainage
One-Lane equivalent to remain free of ponded or flowing storm water in each travel direction.

Storm Drains:
FHWA's *Urban Drainage Design Manual (HEC-22),* shall be referenced for both pressure and non-pressure design of storm drains. Pipe material shall be reinforced concrete with a minimum size of 24 inch diameter.

Culverts:
FHWA's Hydraulic Design Series No. 5 will be used to evaluate culvert hydraulics. Pipe material shall be reinforced concrete pipe or box culverts. Minimum size of pipe culverts shall be 24 inch diameters; whereas, the minimum size for reinforced box culverts shall have a 5-foot height and 6-foot width.

Scour Countermeasures:
Scour countermeasures shall be designed in accordance with FHWA's *Hydraulic Design of Energy Dissipaters for Culverts and Channels, Hydraulic Engineering Circular No. 14, 3rd Edition, July 2006*.

Access Control

There are no planned side streets or driveways within the Sunset Road corridor. Any future development will have to go through Pima County's development process to obtain a permit; which would identify proposed driveway locations. Any future roadway/driveway locations and configurations must comply with Chapter 2.5 of the RDM. ADOT requires full access control at the Sunset Road/EBFR intersection that will extend along the crossroad a minimum of 300 feet beyond the end of the frontage road radius return as specified in Section 506 of the ADOT RDG.

Residential driveways are located on Silverbell Road south of the existing Sunset Road/Silverbell Road intersection. The driveways are located approximately 700 feet apart. Existing side streets or driveways within the project limits along Silverbell Road will be maintained. No new access points are planned.

Access control along the frontage roads within the project limits will be maintained in accordance with ADOT and FHWA Access Control Policy requirements.

5.2 Cross Section Elements

The Sunset Road typical section generally follows the Rural Three-Lane Section as shown in Figure 2-6 of the RDM. It contains one 11-foot wide travel lane and 10-foot shoulder (six-foot wide paved and four-foot wide unpaved) in each direction, and a 12-foot wide TWLTL. The cross slope is a 2% normal crown. The typical roadway section is presented in Figure 14.

5.3 Roadway Geometrics

The horizontal and vertical design criteria are outlined in Table 19. The proposed Sunset Road alignment meet all of the geometric criteria; with the exception of the westbound approach to Silverbell Road. The vertical alignment approaching Silverbell Road has two crest vertical curves, 120 feet long (15 feet west of the Santa Cruz River bridge) and 650 feet long (on bridge), in the same direction separated by a short 15-foot tangent section to tie into the existing Silverbell Road alignment as an interim condition. When the Silverbell Road improvements are implemented, the Sunset Road alignment will rise to match the proposed Silverbell Road alignment eliminating the 120-foot long crest vertical curve.

CHAPTER 6 – MAJOR DESIGN FEATURES

6.1 Introduction

The major design features associated with Sunset Road are as follows:

- A new roadway with one vehicular travel lane with shoulders in each direction and a two way left turn along its entire length between Silverbell Road and the east bound Interstate 10 Frontage Road.
- An eight foot wide asphalt shared-use path along the south side of the roadway alignment.
- A five foot wide asphalt sidewalk on the north side of the alignment.
- A new traffic signal at Silverbell Road.
- A connection to the existing intersection with the east bound Interstate 10 Frontage Road, with the frontage road traffic stopping for free flowing Sunset Road traffic.
- A new 724 foot long bridge over the Santa Cruz River.
- A water harvesting channel on the south side of Sunset Road running from Interstate 10 westerly towards the Santa Cruz River

6.2 Horizontal and Vertical Alignments

The Sunset Road horizontal alignment (west to east) contains two horizontal curves with radii of 1,550 and 3,700 feet and three tangent sections ranging from about 465 feet to 1,105 feet. The first curve with a 1,550-foot radius starts about 1,100 feet east of the Sunset Road/Silverbell Road intersection and is 575 feet long. The second curve with a 3,700 feet radius starts about 870 feet west of the EBFR and is about 516 feet long. Sunset Road is designed to accommodate a 2% normal crown based on a 40 mph design speed.

The existing Silverbell Road horizontal alignment will be maintained. Within the project limits, this alignment (north to south) contains two horizontal curves with radii of 3,500 feet and 1,400 feet. The first curve with a 3,500-foot radius is about 310 feet long and starts at the beginning of the proposed improvements; which is about 950 feet north of the Sunset Road/Silverbell Road intersection. The second curve with a 1,400-foot radius is about 393 feet long and begins about 165 feet south of the Sunset Road/Silverbell Road intersection. The existing cross slope varies.

The Sunset Road vertical alignment contains three crest vertical curves of lengths 120 feet, 650 feet (on bridge) and 200 feet (tie-in into EBFR). There are two sag vertical curves of lengths 40 feet (tie–in into Sunset Road/Silverbell Road intersection) and 300 feet. The 40-foot vertical curve is needed as a temporary condition to match existing grades at the Sunset Road/Silverbell Road "T" intersection,

which is signalized, requiring vehicles to slow or stop when traveling through it. The longitudinal grades range from 0.5% to about 5% (temporary tie-in to the Sunset Road/Silverbell Road intersection). The proposed vertical alignment satisfies the sight distance requirements of the 40 mph design speed.

Silverbell Road will be widened to the east to accommodate a 12-foot wide southbound left-turn and northbound right-turn movement onto Sunset Road. The width of the new pavement section ranges from about 6 feet to 30 feet. The existing horizontal and vertical alignment on Silverbell Road will be maintained.

6.3 Right-of-Way

Sunset Road between Silverbell Road and the EBRF will be constructed on new right-of-way acquired from two private parties and the PCRFCD. The nominal right-of-way width will be 150′ Water harvesting features east of the Santa Cruz River on the south side of Sunset Road will extend this right-of-way on south an additional 50 feet. Just east of the Santa Cruz River on the north side of the Sunset Road, the right-of-way will be extended by approximately 120 feet for a length of approximately 400 feet to accommodate an outlet pipe for the pavement and offsite drainage.

At the west end of the project, the right-of-way will be extended north and south of the 150 foot Sunset Road right-of-way to accommodate needed channel construction and Santa Cruz River streambed grading.

Along Silverbell Road, right-of-way north of Sunset Road will be acquired from the PCRFCD to accommodate the future widening of Silverbell Road in accordance with the preliminary plans contained in the "Silverbell Road, Ina Road to Grant Road Design Concept Study – Final Report," June 2011. South of Sunset Road, property from one of the two private parties mention above will contribute to the needed right-of-way for Silverbell Road.

6.4 Drainage

The proposed drainage facilities that are recommended for this project include onsite, offsite, and river design features. The onsite features necessary for this project include ditches, catch basins and storm drain pipes to collect and convey onsite flows to logical out-falls; bridge deck scuppers will collect and shed pavement runoff from the roadway. Similarly, the offsite drainage features include roadside channels and a culvert with outlet scour protection to adequately capture and convey storm water to the logical outfall. The river design features mainly consist of a six-span bridge with cylindrical piers and sloping abutment along with channel grading under the first two spans to adequately convey the FEMA and Design discharges in the Santa Cruz River while minimizing the local scour associated with a bridge. All drainage improvements/features are provided in the conceptual plans included in the Appendix.

6.5 Earthwork

The proposed vertical alignment will result in primarily large fill sections from Silverbell Road to just east of the existing mine pit. From east of the mine pit to the tie-in at the EBFR, the vertical alignment is in a cut section. The typical sections generally include 4H:1V cut and fill slopes two feet

behind the asphaltic concrete paths on both sides of Sunset Road. Based on the proposed vertical alignment, the preliminary earthwork for the bridge, drainage and roadway construction is anticipated to be approximately 34,000 cubic yards (CY) of excavation and 55,400 CY of embankment. It is anticipated that the fill recently placed in the pit to the east of the bridge will require removal and recompaction. It is also anticipated that there will be the need for recompaction of subgrade along the alignment east of the bridge outside of the pit due to anticipated poor soil conditions. Final, earthwork factors and slope recommendations will be developed as part of the geotechnical investigations.

The site preparation for the roadway should be as outlined in the final Geotechnical Engineering Report being prepared as a part of this project.

6.6 Structures

Sunset Road will cross the Santa Cruz River on a 724' long six-span structure. The structure length was established through the hydraulic modeling effort associated with the project.

The western abutment location and the structure depth were established based upon two driving factors. The first was the desire to have a maximum longitudinal slope of approximately five percent between the beginning of the structure and the intersection with Silverbell Road. The second was the desire to maintain four feet of freeboard during the 100 year flood event in the Santa Cruz River, utilizing preliminarily modeled elevations.

The six-span configuration was based upon the maximum structural depth leading to a Type V (5) modified AASHTO girder and the need to span the Waters of the U.S. and the live river flow in the Santa Cruz River. A standard girder length was able to be achieved, with each girder measuring 119'-5". Both the east and west bridge abutments will be constructed to allow for future addition of "The Loop" shared-use path on the east side of the river and the Juan Bautista de Anza Trail (Anza Trail) on the west side of the river.

The bridge cross section was established to accommodate:

- Separate vehicular and pedestrian barriers on the south
- An eight foot shared-use path on the south
- Two six foot shoulders
- Two eleven foot travel lanes
- A twelve foot two way left turn lane
- A six foot sidewalk behind a six inch curb on the north with connection to the five foot asphaltic sidewalks
- A combined pedestrian vehicular barrier on the north.

The bridge will drain into scuppers placed at the quarter point along each span.

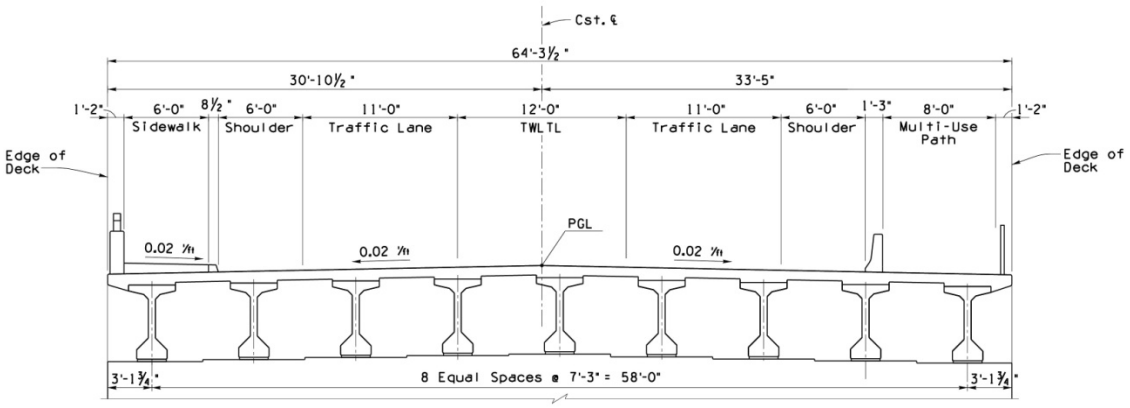


Figure 14 - Bridge typical section

6.7 Roadway Cross Section and Pavement Design

Sunset Road's typical section, presented in Figure 14, is a three-lane uncurbed section with one 11-foot wide travel lane and 10-foot shoulder (six-foot wide paved and four-foot wide unpaved) in each direction, and a 12-foot wide TWLTL. The clear zone width is 18 feet. The side slope between the roadway and asphaltic concrete paths vary from 2% to 6H:1V within the clear zone. A maximum cut and fill slope of 4H:1V is used outside the clear zone.

Five-foot and eight-foot wide asphaltic concrete paths will be constructed along the north side and south side of Sunset Road, respectively, to connect multi-modal users to "The Loop" system. The path section on the north side of Sunset Road will be widened to eight feet between the proposed two stage crossing for bicyclists and the EBFR.

Silverbell Road will be widened to the east to accommodate a 12-foot wide southbound left-turn lane and northbound right-turn lane. The width of the new pavement section ranges from about 6 feet to 30 feet. A 2-inch asphaltic concrete overlay will be applied to the existing pavement.

A Geotechnical Report will be prepared and pavement design performed as part of the project development. Table 20 in the Appendix outlines the initial pavement structural sections used in the development of the Segment I DCR Level Plans.

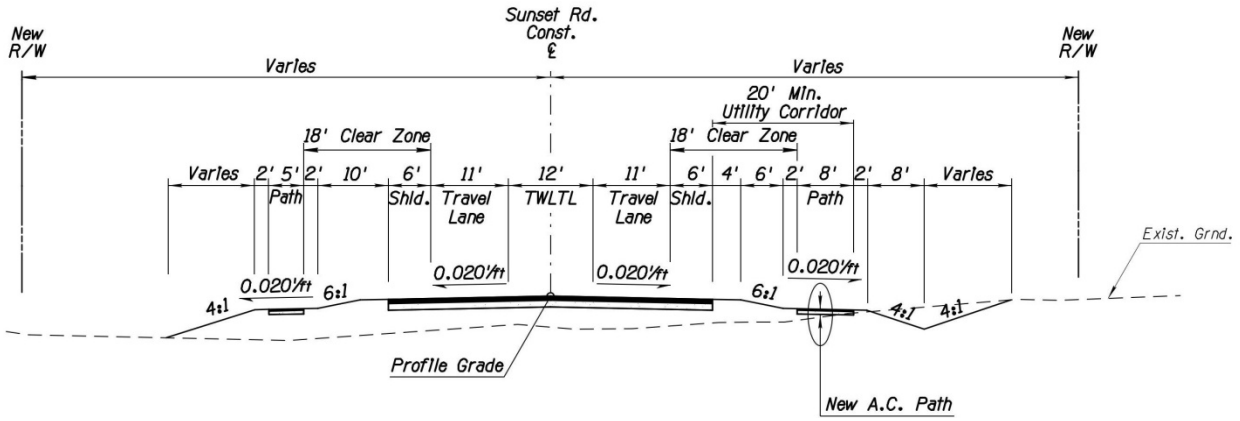


Figure 15 - Roadway typical section

6.8 Traffic

Signalization, Lighting and Intelligent Transportation System

Signalization

A new traffic signal will be installed at the Sunset Road/Silverbell Road intersection. The new traffic signal system will include new poles, mast arms, traffic signal faces, pedestrian signals (across Sunset Road and the north leg of Silverbell Road), video detection equipment and provisions for emergency vehicle pre-emption.

Lighting

Intersection lighting will be installed at the new Sunset Road/Silverbell Road intersection along with the installation of the new traffic signal system. No lighting improvements will be installed at the frontage road intersections as part of this project as no improvements will be implemented within ADOT right-of-way.

Additional intersection lighting at the frontage road intersections should be considered as traffic volumes and operations are monitored for future traffic signals.

Intelligent Transportation System

Conduits, pull boxes, vaults and tracer wire for future ITS will be installed along the section of Sunset Road from approximately 270 feet east of Silverbell Road near the Santa Cruz Bridge to approximately 1,200 feet west of the EBFR. ITS will not be installed in the section of Sunset Road that will be reconstructed as part of the future I-10/Sunset Road TI improvements. The design and installation shall conform to the requirements in the PCDOT *Street Lighting and ITS Conduit Design Manual*.

Pavement Marking and Signing

Pavement marking on Silverbell Road will be modified to include a southbound to eastbound left-turn lane and northbound to eastbound right-turn lane for the movement onto Sunset Road. Sunset Road will be striped to include one through lane in each direction and a TWLTL. At the intersection

of Silverbell Road, the TWLTL will transition into an exclusive left-turn lane and the through lane a right-turn lane.

At the Sunset Road intersections with the frontage roads, a stop bar and crosswalk will be striped across the approach leg of the EBFR and a stop bar across the approach leg of the WBFR. The lane lines on the frontage roads will be modified to solid white lane lines approaching Sunset Road.

Sunset Road underneath the I-10 mainline will be restriped to designate a westbound through and left-turn lane and an eastbound left-turn lane.

Flexible delineators and pavement markings will delineate the two stage bicycle crossing along with any applicable signing. A center stripe will be installed on the eight-foot wide asphaltic concrete path along Sunset Road.

Pavement marking and signing shall conform to Pima County, AASHTO, and other applicable standards on Silverbell Road and Sunset Road. Pavement marking and signing within ADOT right-of-way shall conform to ADOT standard practices and other applicable standards.

The posted speed limit on Sunset Road will be 35 mph, and 45 mph on Silverbell Road and the EBFR and WBFR.

6.9 Utilities

The existing utilities in the project vicinity include overhead power and telephone and underground water facilities.

The utility type, owner and potential impact to each utility are provided below:

Tucson Electric Power Company (TEP)
There are three (3) TEP power lines within the project limits. The overhead power lines are as follows:

- A 136 kV transmission line east of Silverbell Road between the Santa Cruz River and Silverbell Road on 4-legged steel towers.
- A 46 kV transmission line west of Silverbell Road; but within the roadway right-of-way.
- A 13.8 kV distribution power line located east of Silverbell Road within the roadway right-of-way.

All three overhead power lines are directly impacted by the proposed roadway improvements. The 136 kV transmission line will have to be raised to mitigate for loss of clearances which will require new steel poles. The roadway improvements planned for Silverbell Road do not directly impact the 46 kV line west of the road; however, they may be in conflict with the proposed traffic signal at the intersection. The distribution line east of Silverbell Road will be impacted by the interim widening to the east and will be required to relocate. The current plan is to relocate the distribution lines to the west and "piggy-back" on the 46 kV transmission line poles. The distribution relocation and the potential conflict with the traffic signal will require that poles are raised through the project limits.

TEP has expressed an interest that the bridge be fitted with provisions for TEP power line(s) to cross the river on the bridge. To date TEP has not provided information or requirements to accommodate their facilities on the bridge. Coordination is still on-going and the design team will be able to include the necessary details to provide TEP access to the bridge.

Western Area Power Administration (WAPA)
WAPA has one 115 kV overhead power line that crosses the proposed Sunset Road alignment. It is anticipated that this power line will need to be raised to mitigate the loss of clearance due to the height of the roadway. Current coordination with WAPA is on-going. The design team is currently waiting for a Sag Report from WAPA.

CenturyLink (CL)
Currently, CenturyLink telecommunications is overhead on joint use poles with the TEP distribution lines east of Silverbell Road. Since TEP plans to relocate to the west side of Silverbell Road, CenturyLink has identified that they will remain on the east side of Silverbell, however, they will relocate underground. The specific location has not been determined at this stage but continuing coordination will identify their proposed location.

CenturyLink has expressed interest and provided a formal request for provisions to allow them to cross the river hanging on the bridge. Appropriate facilities will be included for CenturyLink to cross the Santa Cruz River on the bridge.

Tucson Water
Tucson Water has three water mains within the Silverbell Road right-of-way. They include a 12 inch and 42 inch potable water main and a 24 inch reclaimed water main. Proposed improvements to Silverbell Road will widen the existing roadway to the east at its current grade. As a result, it is anticipated that the interim improvements will not adversely impact the water facilities.

Tucson Water is currently reviewing draft plans and future coordination will either confirm or disprove the assumption that there is no adverse impact. Tucson Water has scheduled an internal review of the project for their planning group to determine if they desire to cross the river on the bridge.

6.10 Constructability and Traffic Control

The majority of the construction associated with the Sunset Road improvements is on vacant land. As such, it is anticipated that during most of the construction phase, traffic will be maintained on existing roadways with minimal impacts since Sunset Road is a new facility. A detour plan may be needed for construction activities on Silverbell Road. Likewise, there may be some lane restrictions during the construction activities associated with connecting Sunset Road to the East Bound I-10 Frontage Road, as well as the restriping activities along the existing Sunset Road the under the I-10 traffic interchange

Traffic will be managed through detailed traffic control plans and by procedures and guidelines specified in the current addition of the Manual on Uniform Traffic Control Devices (MUTCD), Part

VI, Pima County guidelines and requirements, and any revisions or additions and/or associated provisions in the project plans. Traffic control within ADOT right-of-way must also comply with ADOT's latest Supplement of Part IV of the MUTCD.

There will be temporary impacts to the bicycle route and pedestrian access during construction. Traffic control plans must address these issues.

6.11 Design Exceptions

There only design excpetion relates to the 40 foot sag vertical curve at the Sunset Road / Silverbell Road intersection. As noted above, this 40 vertical curve is necessary to match the existing cross slope of Silverbell Road. As the curve is located at the "T" intersection along the Suinset alignment, vheicles will either be stopped or travelling well below the posted speed to accommodate the right or left turn onto Silverbell Road.

CHAPTER 7 – SOCIAL, ECONOMIC AND ENVIRONMENTAL CONSIDERATIONS

7.1 Air Quality

The project area is located within the Tucson Maintenance Area for Carbon Monoxide and is outside the limits of the Rillito Non-Attainment Area for Particulate Matter (dust). Metropolitan planning organizations are required by the Clean Air Act to ensure all transportation projects are in conformity with the approved air quality State Implementation Plan. This project is in PAG FY 2014-2018 Transportation Improvement Program (TIP), which was adopted by PAG Regional Council on May 22, 2014. The TIP conforms to the State Implementation Plan and, therefore the project is in conformity with air quality standards.

The proposed project will have temporary local impacts to particulate levels during construction. These impacts will be reduced by PCDOT standard specifications for dust suppression during construction. The project may improve long-term air quality by decreasing congestion at nearby I-10 interchanges on Ina Road and Ruthrauff Road.

7.2 Biological Resources

A Biological Evaluation (BE), Releve Survey and Protected Native Plant Survey were prepared for the project area. This included plant and animal species surveys, review of the Arizona Game and Fish Department (AGFD) On-line Environmental Review Tool, and review of the U.S. Fish and Wildlife Service (USFWS) list of endangered, threatened, and candidate species for Pima County. In addition, the BE addressed species included on the Pima County Priority Vulnerable Species list, as well as Section 10 Habitat Conservation Plan species. The documents *Biological Evaluation Sunset Road: Silverbell Road to I-10 Eastbound Frontage Road – Segment 1* ((EcoPlan 2014) and *Environmentally Sensitive Roadway Vegetation Inventory and Releve Analysis Report* (Wheat Design Group 2014) are available on the project website at: http://www.roadprojects.pima.gov/sunset/.

The project area is mapped within the Sonoran Desert Scrub biome with a riparian corridor along the Santa Cruz River. The project area is highly disturbed east of the river by past (agricultural) and on-going (sand and gravel mining) land uses. West of the river, habitat is degraded by off-road vehicle use, electric power transmission lines, and a residential property.

Previous studies related to long range improvement plans for Silverbell Road identified a wildlife linkage between the Tucson Mountains and Santa Cruz River (*Silverbell Road (North) Wildlife Linkage Initial Assessment: Ina Road to El Camino del Cerro, Pima County, Arizona,* SWCA 2010). An area east of Silverbell Road in the vicinity of the proposed new Sunset Road connection was noted as a Priority Crossing Zone - Habitat Protection Priority Area.

The Santa Cruz River in the project vicinity is defined as an "Important Riparian Area" under the Maeveen Marie Behan Conservation Lands System. The Biological Evaluation (EcoPlan 2014x) and a Technical Assistance Letter were prepared for the project and reviewed by the U.S. Fish and Wildlife Service (USFWS). The USFWS responded to the Technical Assistance Letter (USFWS, 2014), confirming the application of the proposed conservation and mitigation measures will likely reduce effects on listed species and migratory birds to insignificant or discountable levels.

The proposed Sunset Road does not alter any drainages crossing Silverbell Road nor preclude the future installation of culverts or other crossing facilities when Silverbell Road is widened in the future. Impacts to the riparian corridor are expected to total about 0.3 acres of permanent disturbance (bridge piers and abutments) and about 0.4 acres of temporary construction disturbance. Project impacts would result in about 0.3 acres of permanent impacts to potential nesting habitat for Abert's towhee along the Santa Cruz River.

7.3 Community Resource Impact

There are no social services including, police, fire, or hospitals in the project vicinity. The nearest law enforcement is six miles to the south (Tucson Police Department, Miracle Mile station), fire station is one mile to the southwest (Northwest Fire District, El Camino del Cerro), and closest hospital is three miles to the northeast (Northwest Medical Center, Orange Grove Road/ La Cholla Boulevard). The nearest school is 0.5 mile east of I-10 (Green Fields Country Day School, Camino de la Tierra).

No impacts to community resources or social services are expected. Construction will not impact any emergency vehicle access to facilities or any bus service to schools.

7.4 Hazardous Materials

A Preliminary Initial Site Assessment (PISA) was prepared for the project to determine if regulated or hazardous materials are present (EEC 2014). The PISA is available on the project website at: http://www.roadprojects.pima.gov/sunset/.

A records search of regulatory hazardous materials databases was conducted for the project area on September 13, 2014. The records search identified several potential hazardous waste sites within a 0.5 mile radius of the project limits. No sites were identified within the project limits.

No recognized environmental conditions such as leaking underground storage tanks, landfills, or uses associated with hazardous waste products were identified. One Water Quality Assurance Revolving Fund (WQARF) site was identified approximately 0.4 miles from the project limits. This is the El Camino del Cerro WQARF site which resulted from a former landfill and oil recycling business. The site has been under evaluation, remediation, and monitoring since the early 1990's. The contaminated groundwater plume has not migrated towards the Sunset Road project limits.

Based on the findings of the PISA the project excavation and earthmoving activities are not likely to encounter hazardous materials. No evidence of regulated hazardous materials is present in the project limits and the PISA concluded no issues of concern and no additional investigation recommended. The preliminary investigations did not examine the structures on the property to be acquired at 5380 N. Silverbell Road. It is unknown if the structures (mobile home and out buildings) contain any hazardous materials including asbestos or lead based paint.

7.5 Historic/Cultural Resources

Archaeological and historical resource assessments have been conducted through the Pima County Office of Sustainability and Conservation, Cultural resources and Historic Preservation Division. Two survey reports cover the overall Sunset Road Segment 1 project limits: *A Cultural Resources Survey for the Tres Rios del Norte El Corazon Project, Pima County, Arizona* (WSA, 2012) and *A Class III Cultural*

Resources Inventory for the El Corazon Project – West Bank of the Santa Cruz River: El Camino del Cerro to Sunset Road, Pima County, Arizona (SWCA, 2013).

The general project vicinity contains multiple historic and prehistoric sites associated with occupation along the Santa Cruz River. Within the project limits there are three sites: The proposed project will impact two sites. Pima County has consulted with the Arizona State Historic Preservation Office (SHPO), Arizona State Museum (ASM), and the Arizona tribes (see letter in Appendix, October 29, 2013) with a recommendation of "adverse effect." The consultation was based on an Intergovernmental Agreement between SHPO and Pima County for projects with no federal nexus. A Phase 1 data recovery research design and plan of work was approved by SHPO and field work was completed in July 2014. Pima County has committed to a Phase II data recovery for the Sunset Road project. Implementation of the data recovery will be based on final footprint or "area of potential effect"(APE) determined by the project design plans. Data recovery will occur prior to project construction activities.

7.6 Neighborhood Impact

There is no defined neighborhood in the project vicinity. The only residential areas are dispersed large lot single family homes west of Silverbell Road. No impacts to neighborhoods are expected, access will be maintained throughout construction.

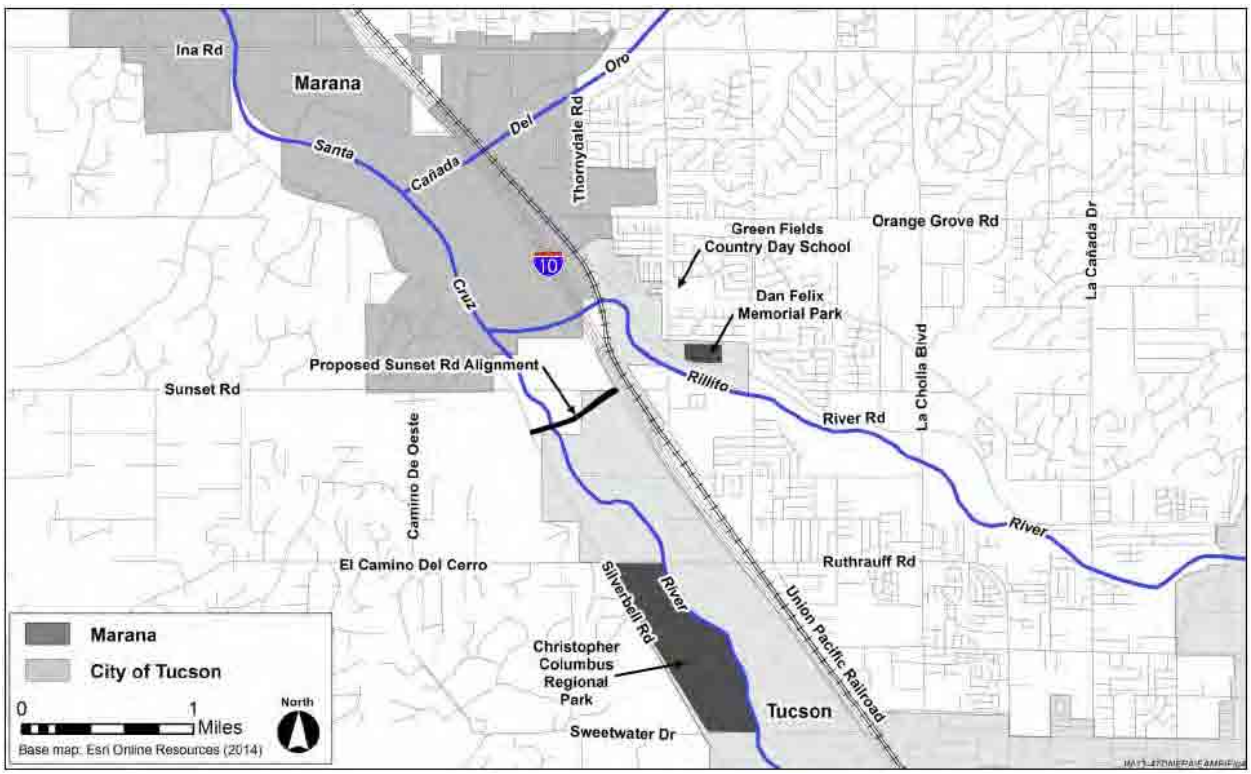


Figure 16 - Project adjacencies

7.7 Traffic Noise Analysis

There is one sensitive receiver (mobile home residence, 5380 N. Silverbell Road) within the project limits, located immediately east of Silverbell Road at the proposed connection of Sunset Road and Silverbell Road. There are seven single family homes west of Silverbell Road on large lots in the vicinity of the proposed Sunset Road/Silverbell Road intersection. They range from about 300 feet to 1,000 feet in distance from the proposed intersection. All are accessed off Silverbell Road.

Based on the limited potential for impacts to sensitive receivers a qualitative analysis was conducted for the project. The single residence (5380 N. Silverbell Road) within the project limits has been identified for full acquisition as the western bridge embankment encroaches on that residence. The seven homes within 1,000 feet of the project are expected to be minimally impacted by the Sunset Road extension due to distance from Sunset Road and elevation above Silverbell Road. Four of the seven homes are 10-20 feet higher in elevation than the Sunset/Silverbell Road proposed intersection. The 3 homes that are less than 10 feet above Silverbell Road are 1,000 feet to the south of proposed Sunset/Silverbell Road intersection.

This project will not increase capacity or speed on Silverbell Road and the speed on Sunset Road will be low due to the signalized intersection. Therefore, the sensitive receptors were not considered to be impacted due to; (1) acquisition of the 5380 N. Silverbell Road property, (2) no capacity or speed changes on Silverbell Road and (3) distance/elevation change from Sunset Road. No noise abatement measures are required.

7.8 Visual/Aesthetic Resources

The project will result in the modification, addition, and removal of elements from the view-shed. These have been listed and their impacts discussed in the Sunset Road Visual Assessment Report. Possible mitigation considerations have also been discussed in the report.

In general, the most significant additions to the view-shed will be the new roadway surface, bridge structure, drainage structures, and fill slopes. Vegetation will need to be cleared for project construction, which will open up views to existing cultural modifications as well as to the new project structures and elements. The design team will consider how re-vegetation, texture and color of materials and placement of public art can be used to enhance the quality of the view-shed.

7.9 Drainage and Clean Water Act

The Santa Cruz River is a perennially flowing waterway in the survey area resulting from effluent that is discharged into the river approximately two miles upstream of the survey area from the Agua Nueva Wastewater Reclamation Facility. The base flow is augmented seasonally by precipitation. The U.S. Army Corps of Engineers (Corps) has designated the reach of the Santa Cruz River between the Wastewater Reclamation Facility and the Pima County/Pinal County line, including the portion of the river in the survey area, as a Traditional Navigable Water under Section 404 of the Clean Water Act. As such, the Santa Cruz River in the survey area is jurisdictional. In addition to the river there are eleven tributary washes in the project limits.

A Preliminary Jurisdictional Delineation (USACE File No. SPL-2014-00196 KWG) for the project was approved April 25, 2014 (EcoPlan, 2014x). The extent of jurisdictional Waters in the survey area,

including wetlands, was mapped in anticipation of the potential need to obtain a Clean Water Act Section 404 permit to construct Segment I and to enable project designers to avoid impacts to Waters to the maximum extent practicable. A Pre-Construction Notification (PCN) will be submitted to the Corps to operate under a Nationwide 14 Permit. The PCN will include Section 401 Water Quality Certification.

The proposed project bridge will cross the Santa Cruz River and one wash. Improvements at the Silverbell Road intersection impact one wash and the drainage channel east of the west bridge abutment will impact 3 washes. All proposed construction will avoid the mapped wetlands and the bridge structure clear spans the waters of U.S. and the live flow in the river. To minimize contractor activities in the river channel the contractor will have the option of constructing a temporary access bridge over the river, or construct from the east and west banks of the river.

Because more than one acre of land will be disturbed during project construction, a Clean Water Act Section 402 Arizona Pollutant Discharge Elimination System (AZPDES) permit application and associated Stormwater Pollution Prevention Plan (SWPPP) will be prepared. A Notice of Intent and a Notice of Termination will be submitted to the ADEQ to work under the AZPDES Construction General Permit (AZG2013-001) at the appropriate times.

CHAPTER 8 – PUBLIC INVOLVEMENT

This section includes a summary of the public involvement activities held as a component of the project development.

8.1 Public Participation Plan

The public participation planning took advantage of multiple previous public presentations and meetings held in conjunction with ADOT planning for I-10 (Ina Road to Ruthrauff Road) improvements and the RTA Silverbell Road (Ina Road to Grant Road) improvements. Both of these projects included presentations on the concept of a Sunset Road extension between Silverbell Road and River Road. Additionally, this project included a public open house during the preliminary design stage.

8.2 Public Meetings

The Pima County Department of Transportation held a Public Open House on June 9, 2014 at the Pima County Natural Resources, Parks and Recreation Department facility on 3500 W. River Road. The meeting was announced through local media press release, project website, public notice in Arizona Daily Star and Arizona Territorial newspapers, and mailings to approximately 600 addresses in the project vicinity. The meeting was attended by about 75 citizens. Another meeting to present the Environmental Mitigation and Assessment Report, along with the Design Concept Report is scheduled for October 30, 2014. It will be held at the same location and announced in a similar fashion.

Due to the close relationship between the proposed project and the planned I-10 improvements between Ina Road and Ruthrauff Road, the Sunset Road extension has been presented and discussed at multiple I-10 meetings (Final Environmental Assessment - Interstate 10, Ina Road Traffic Interchange (TI) to Ruthrauff Road TI, ADOT 2012).

- I-10 Ina Road to Ruthrauff Road Scoping Meeting – November 18, 2009
- I-10 Ina Road to Ruthrauff Road Public Property Owner Briefings #1 – October 4, 2010 (two meeting held on this date, one in Marana and one in Tucson)
- I-10 Ina Road to Ruthrauff Road Public Property Owner Briefings #2 – November 8, 2010
- I-10 Ina Road to Ruthrauff Road Public Information Meeting – March 10, 2011
- I-10 Ina Road to Ruthrauff Road Public Hearing – June 21, 2012

Additionally, the Sunset Road extension was presented in conjunction with the planning for Silverbell Road (Design Concept Report, Silverbell Road, Ina Road to Grant Road (Kittleson, 2011).

- Silverbell Road, Ina Road to Grant Road Initial Public Open House – August 12th and19th, 2009
- Silverbell Road, Ina Road to Grant Road Interim Public Open House – June 7th and 9th, 2010
- Silverbell Road, Ina Road to Grant Road Final Public Open House – October 19th and 21st, 2010

8.3 Citizen Advisory Committee

The Pima County Board of Supervisors issued a waiver of Ordinance 10.56.110, Establishment of a Community Advisory Committee on January 3, 2013 at the recommendation of PCDOT (See the Appendix for a copy of this waiver). The waiver was justified due to the extensive previous public involvement noted above through the I-10 and Silverbell Road projects. The public strongly supported the Sunset Road extension and timing to have the improvements in place prior to the ADOT reconstruction of I-10. Additionally, the waiver notes the majority of project area is owned by PCRFCD and there are limited alignment options due to floodplain and CalPortland operations.

8.4 Community Comments

The public input was generally supportive at June 9, 2014 Open House. Comments were mostly about collateral issues or construction impacts.

- Keep Silverbell Road open during construction
- Keep the Loop Tail open during construction
- Advance the reconstruction of Silverbell Road to Ina Road
- Suggested Sunset Road could be 4 lanes instead of two lanes
- Noted the traffic relief the new Sunset Road would provide when ADOT reconstructs Ruthrauff TI
- Suggested a bridge across the Santa Cruz River at Orange Grove would have merits

CHAPTER 9 – AGENCY COORDINATION

This section describes the agency coordination that has occurred, and the continuing actions needed.

9.1 Federal Agency Coordination

- U.S. Army Corps of Engineers (USACE) - Pima County met with the USACE on January 23, 2014 to determine the approach for the Preliminary Jurisdictional Delineation (PJD) and subsequent Clean Water Act permit. The PJD was submitted on March 10, 2014 and approved on April 25, 2014.
- U. S. Fish and Wildlife Service (USFWS) – The USFWS attended the Environmental Coordination Meeting on December 12, 2013. Additionally Pima County sent a Technical Advisory Letter to the USFWS on July 24, 2014 to address potential impacts to endangered species. The USFWS replied on September 11, 2014.
- Western Area Power Administration (WAPA**)** – Pima County has communicated with WAPA staff on multiple occasions through the design development and provided preliminary plans for their review.
- Federal Emergency Management Agency (FEMA) – The project team has consulted with FEMA to assist in determining floodplain impacts and need for any floodplain map revisions.

9.2 State Agency Coordination

- Arizona Department of Transportation (ADOT) - Pima County has coordinated with ADOT on multiple occasions and met with Tucson District on April 17, 2014. The needs for the Sunset Road connection to the I-10 eastbound frontage were coordinated.
- Arizona Game and Fish Department (AZGFD) - The AZGFD was invited to the Environmental Coordination Meeting; however, they did not attend. Pima County has utilized the AZGFD on-line tool to access records for protected species and secure a response.
- Arizona State Historic Preservation Office (SHPO) – The initial coordination occurred with the SHPO on October 29, 2013 with submittal of the cultural Phase I testing and data recovery plan. Continued coordination has taken place to report results of Phase I and develop the planning for Phase II of the data recovery.

9.3 County Agency Coordination

- Pima County Regional Flood Control District (PCRFCD) -Throughout the project the PCDOT and PCRFCD have worked together to develop the project design and coordinate drainage/floodplain issues and solutions.
- Pima County Office of Sustainability and Conservation – The Cultural Resources and Historic Preservation Division (CRHPD) has provided the project support for cultural resources documentation, consultation, and data recovery. The design will continue to work closely with CRHPD to avoid sites and mitigate impacts as needed.
- Pima County Natural Resources and Parks and Recreation Department (PCNRPRD) – During the initial progress and coordination meetings for the project, PCDOT and PCNRPRD have

collaborated on those elements associated with the River Park system in the vicinity of Sunset Road for the Santa Cruz River and, when Sunset is extended to River Road, the Rillito River.

9.4 Local Governments Coordination

- Pima Association of Governments Regional Transportation Authority – Project funding needs and scheduling have been coordinated on multiple occasions.
- City of Tucson – The City participated in the Environmental Coordination Meeting on December 12, 2013.

9.5 Continuing Coordination

As the project development continues, additional coordination will occur with the agencies noted above and with additional agencies; U.S. Army Corps of Engineers (Section 404 Nationwide 14 permit and Section 401 Water Quality Certification, Arizona Department of Environmental Quality (Clean Water Act Section 402 permitting), Arizona Department of Agriculture (Native Plant Salvage), and Pima County Department of Environmental Quality (Fugitive Dust Activity permit).

CHAPTER 10 – ALTERNATIVES

Alternative alignments for Sunset Road were evaluated by Pima County Department of Transportation prior to the commencement of the planning and design process. The evaluation process is documented on the project website and in the Appendix.

Two configurations for the intersection of Sunset Road and Silverbell Road have been identified. One is an interim design option to tie the new Sunset Road into Silverbell Road at its existing vertical and horizontal alignment and adding left-and right-turn lane improvements on Silverbell Road. The other is an ultimate configuration tying the new Sunset Road to Silverbell Road that is widened to a four lane divided roadway with left and right-turn lanes (As defined by "Silverbell Road, Ina Road to Grant Road Design Concept Study – Final Report," June 2011) and then transitioning to its existing conditions north and south.

The "Technical Memorandum: Sunset Road and Silverbell Road Intersection Conceptual Design Option Comparison Interim versus Ultimate Configurations" (See the Memorandum in the Appendix) documents the comparison of these two alternatives and recommends the connection of Sunset Road to Silverbell Road at its existing vertical and horizontal alignment with the addition of the left and right turn lane improvements.

CHAPTER 11 – COST ESTIMATE

The project Costs shown in the table below are based on the preliminary design performed to date and will be refined as more detailed plans are prepared.

Task	Cost
Construction Cost	$11,744,570
Artwork	$135,000
Right-of-Way	$750,000
Design and Planning	$3,248,409
Construction administration	2,348,914
Utility Relocation (due to prior rights)	$750,000
Cultural Resource Clearance / Env. In-Lieu Fee	$1,000,000
Total	**$19,976,893**

For a breakdown of the construction cost see the Appendix A-5.

CHAPTER 12 – BUDGET CONSIDERATIONS

The full project (both Segments I and II) is included in the Regional Transportation Authority's Transportation Plan approved by Pima County voters in 2006. The project is identified as Pima County Sunset Road: Silverbell Road to River Road (RTA#8). Project funding comes from the Regional Transportation Authority Plan, ($12,764,000), Pima County ($5,000,000) and the City of Tucson ($5,000,000). The Regional Transportation Authority Plan indicates that its funds will be available in the third period of the 20 year plan (June 2016 through 2021).

Specific to Segment I from Silverbell to I-10, The following target amounts have been identified:

RTA: Approximately $6.7M
City of Tucson: Approximately $3.4
Pima County (local and regional funds): Approximately $9.9M

Upon approval of the EAMR by the Board of Supervisors, the Intergovernmental Agreements (IGA's) will be developed to secure the final funding amounts.

CHAPTER 13 – DELIVERY METHOD

The project delivery method for the construction of the project at this point in time is the Design – Bid – Build method, where plans, specification and an estimate are prepared and construction services are procured through a bidding process, with the responsive and responsible low bidder being considered for the award of the contract.

Since this project is primarily a roadway widening and bridge construction project on new right of way there are few opportunities to take advantage of an alternative delivery method such as Construction Manager at Risk (CMAR) or Design/Build.

CMAR is typically useful in taking advantage of the Contactor's perspective in reviewing and commenting on the design. CMAR is used when an agency would like to award the contact 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 a 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

The Pima County Department of Transportation is moving forward with plans to reconstruct Sunset Road from Silverbell Road to Interstate 10 along a new alignment, crossing the Santa Cruz River as part of the RTA plan approved by voters to meet future traffic needs. The alignment of the roadway has been established and the following recommendations should be implemented for this project:

- Construct Sunset Road with two through lanes and shoulders in each direction with a two way left turn lane.
- Construct a new 724 foot long six span bridge over the Santa Cruz River.
- Integrate public art in the bridge design.
- Incorporate water harvesting techniques along the channel capturing overland flow south of Sunset Road between Interstate 10 and the Santa Cruz River.
- Keep the existing grade and alignment of Silverbell Road at the Sunset Road intersection.
- Construct a new traffic signal at the intersection of Silverbell Road and Sunset Road.
- Establish a stop controlled condition for Interstate 10 frontage road traffic for free flowing Sunset Road.
- Work with Tucson Electric Power and the Western Area Power Administration to raise their transmission lines as they pass over the future roadway/ bridge alignment.
- Work closely with appropriate agencies in the vicinity of the Santa Cruz River to address 404 permitting requirements.

Table 1 – Silverbell Road Traffic Factors

Street-Segment	ADT	KAM	KPM	DAM	DPM
Silverbell Road - Ina Road to El Camino del Cerro	5,249	0.11	0.11	0.76	0.73

Table 2 – Frontage Roads Traffic Factors

Street-Segment	ADT	KAM	KPM	DAM	DPM
EBFR - North of Sunset Road	2,356	0.09	0.08	1.00	1.00
EBFR - South of Sunset Road	2,600	0.08	0.08	1.00	1.00
WBFR - North of Sunset Road	2,719	0.07	0.09	1.00	1.00
WBFR - South of Sunset Road	2,342	0.07	0.09	1.00	1.00

EBFR – Eastbound frontage road
WBFR - Westbound frontage road

Table 3 – Intersection Crashes by Injury Severity

Injury Severity	Sunset Road at Silverbell Road		Sunset Road at EBFR		Sunset Road at WBFR	
	Number	% of Total	Number	% of Total	Number	% of Total
Fatal	0	0%	0	0%	0	0%
Class 4 Injury	0	0%	0	0%	0	0%
Bodily Injury	0	0%	1	100%	0	0%
PDO	2	100%	0	0%	0	0%
Total Crashes	2	100%	1	100%	0	0%
Severity Index*	1.00	N/A	2.00	N/A	N/A	N/A

*Severity index was calculated based on crash severity parameters developed by the National Safety Council. The Severity Index was calculated using the formula provided by Pima County.
Index = [5.8 (Fatality & Class 4 Injury) + 2 (Class 2 & 3 Bodily Injury) + Property Damage]/(Total No. of Crashes)

Table 4 – Intersection Crashes by Type

Crash Type	Sunset Road at Silverbell Road		Sunset Road at EBFR		Sunset Road at WBFR	
	Number	% of Total	Number	% of Total	Number	% of Total
Single Vehicle	0	0%	0	0%	0	0%
Rear End	2	100%	0	0%	0	0%
Turning	0	0%	0	0%	0	0%
Angle	0	0%	0	0%	0	0%
Sideswipe	0	0%	1	100%	0	0%
Miscellaneous	0	0%	0	0%	0	0%
Fixed Object	0	0%	0	0%	0	0%
Backing	0	0%	0	0%	0	0%

Head On	0	0%	0	0%	0	0%
Animal	0	0%	0	0%	0	0%
Total Crashes	2	100%	1	100%	0	0%
ADT	6,700	N/A	4,950	N/A	5,050	N/A
Crash Rate*	0.16	N/A	0.11	N/A	N/A	N/A

*Intersection crash rates refer to the number of crashes per million vehicles entering the intersection.
Rate = (number of 5-year crashes x 106)/(5 years x weekday entering volume x 365 days).

Table 5 – Segment Crashes by Injury Severity

Injury Severity	Silverbell Road		EBFR near Sunset Road TI		WBFR near Sunset Road TI	
	Number	% of Total	Number	% of Total	Number	% of Total
Fatal	0	0%	0	0%	0	0%
Class 4 Injury	0	0%	0	0%	0	0%
Bodily Injury	2	50%	0	0%	0	0%
PDO	2	50%	0	0%	0	0%
Total Crashes	4	100%	0	0%	0	0%
Severity Index*	1.50	N/A	N/A	N/A	N/A	N/A

*Severity index was calculated based on crash severity parameters developed by the National Safety Council. The Severity Index was calculated using the formula provided by Pima County.
Index = [5.8 (Fatality & Class 4 Injury) + 2 (Class 2 & 3 Bodily Injury) + Property Damage]/(Total No. of Crashes)

Table 6 – Segment Crashes by Type

Crash Type	Silverbell Road		EBFR near Sunset Road TI		WBFR near Sunset Road TI	
	Number	% of Total	Number	% of Total	Number	% of Total
Single Vehicle	1	25%	0	0%	0	0%
Rear End	1	25%	0	0%	0	0%
Turning	0	0%	0	0%	0	0%
Angle	0	0%	0	0%	0	0%
Sideswipe	0	0%	0	0%	0	0%
Misc.	1	25%	0	0%	0	0%
Fixed Object	0	0%	0	0%	0	0%
Backing	0	0%	0	0%	0	0%
Head On	0	0%	0	0%	0	0%
Animal	1	25%	0	0%	0	0%
Total Crashes	4	100%	0	0%	0	0%
ADT	5,250	N/A	2,400	N/A	2,500	N/A
Crash Rate*	0.76	N/A	0.00	N/A	0.00	N/A

*Segment crash rates refer to the number of crashes per million vehicle-miles of travel.
Rate = (number of 5-year crashes x 106)/(5 years x weekday volume x segment length x 365 days).

Table 7 – Traffic Volume Projections

Street - Segment	2018 Traffic Projections (vpd)	2025 Traffic Projections (vpd)
Sunset Road – EBFR to Silverbell Road	8,738	10,745

Table 8 – Intersection Delay and Corresponding LOS

Level of Service	Signalized Intersection Control Delay (sec/veh)	Stop Controlled Intersection Control Delay (sec/veh)	All-Way Stop Controlled Intersection Control Delay (sec/veh)
A	0-10.0	0-10.0	0-10.0
B	>10.0-20.0	>10.0-15.0	>10.0-15.0
C	>20.0-35.0	>15.0-25.0	>15.0-25.0
D	>35.0-55.0	>25.0-35.0	>25.0-35.0
E	>55.0-80.0	>35.0-50.0	>35.0-50.0
F	>80.0	>50.0	>50.0

Source: 2010 HCM, pgs. 18-2, 19-2 and 20-3

Table 9 – 2018 and 2025 Sunset Road/Silverbell Road TWSC LOS

2018 Opening Year									
Time Period	EB Approach		WB Approach		NB Approach		SB Approach		Intersection Delay (sec/veh)
	LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay	
AM	N/A	N/A	F	195.4	A	0.0	A	5.1	52.2
PM	N/A	N/A	C	17.3	A	0.0	A	3.3	7.1
2025 Design Year									
Time Period	EB Approach		WB Approach		NB Approach		SB Approach		Intersection Delay (sec/veh)
	LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay	
AM	N/A	N/A	F	316.6	A	0.0	A	3.4	114.9
PM	N/A	N/A	F	90.7	A	0.0	A	3.2	32.3

Table 10 – 2018 and 2025 Sunset Road/Silverbell Road Signalized LOS

2018 Opening Year									
Time Period	EB Approach		WB Approach		NB Approach		SB Approach		Intersection Delay (sec/veh)
	LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay	
AM	N/A	N/A	C	22.1	C	21.2	B	18.4	20.1

PM	N/A	N/A	C	28.1	B	19.9	B	13.8	21.7
2025 Design Year									
Time Period	**EB Approach**		**WB Approach**		**NB Approach**		**SB Approach**		**Intersection Delay (sec/veh)**
	LOS	**Delay**	**LOS**	**Delay**	**LOS**	**Delay**	**LOS**	**Delay**	
AM	N/A	N/A	C	21.6	C	23.8	B	19.7	21.4
PM	N/A	N/A	C	22.9	D	43.3	B	17.3	32.2

Table 11 – 2018 and 2025 Sunset Road/Silverbell Road Signalized Queue Lengths

2018 Opening Year Queue Lengths (feet)				
Time Period	**EB Approach**	**WB Approach**	**NB Approach**	**SB Approach**
AM	N/A	144	60	118
PM	N/A	103	139	59
2025 Design Year Queue Lengths (feet)				
Time Period	**EB Approach**	**WB Approach**	**NB Approach**	**SB Approach**
AM	N/A	235	60	128
PM	N/A	247	197	59

Table 12 – 2018 Sunset Road/I-10 Frontage Roads Traffic Control Alternatives

Traffic Control Alternative	**Approach**	**Period**	**2010 HCM Approach Delay (sec/veh)**	**2010 HCM LOS**	**Traffic Interchange Delay* (sec/veh)**
Stop Control on Sunset Road	Sunset Road at EBFR	AM	23.7	C	12.5
	EBFR (free-flow)		N/A	N/A	
	Sunset Road at WBFR		11.9	B	
	WBFR (free-flow)		N/A	N/A	
	Sunset Road at EBFR	PM	15.0	C	44.1
	EBFR (free-flow)		N/A	N/A	
	Sunset Road at WBFR		182.9	F	
	WBFR (free-flow)		N/A	N/A	
Stop Control	Sunset Road at	AM	N/A	N/A	5.3

Traffic Control Alternative	Approach	Period	2010 HCM Approach Delay (sec/veh)	2010 HCM LOS	Traffic Interchange Delay* (sec/veh)
on Frontage Roads	EBFR				
	EBFR (stop)		13.3	B	
	Sunset Road at WBFR		N/A	N/A	
	WBFR (stop)		9.8	A	
	Sunset Road at EBFR	PM	N/A	N/A	3.3
	EBFR (stop)		13.0	B	
	Sunset Road at WBFR		N/A	N/A	
	WBFR (stop)		22.0	C	
All-Way Stop Control	Sunset Road at EBFR (stop)	AM	31.6	D	16.3
	EBFR (stop)		13.2	B	
	Sunset Road at WBFR (stop)		9.2	A	
	WBFR (stop)		9.1	A	
	Sunset Road at EBFR (stop)	PM	19.1	C	16.2
	EBFR (stop)		12.1	B	
	Sunset Road at WBFR (stop)		14.1	B	
	WBFR (stop)		17.3	C	

*Average delay for the two un-signalized intersections.

Table 13 – 2025 Sunset Road/I-10 Frontage Roads Traffic Control Alternatives

Traffic Control Alternative	Approach	Period	2010 HCM Approach Delay (sec/veh)	2010 HCM LOS	Traffic Interchange Delay* (sec/veh)
Stop Control on Sunset Road	Sunset Road at EBFR	AM	28.7	D	12.7
	EBFR (free-flow)		N/A	N/A	

Traffic Control Alternative	Approach	Period	2010 HCM Approach Delay (sec/veh)	2010 HCM LOS	Traffic Interchange Delay* (sec/veh)
	Sunset Road at WBFR		13.2	B	
	WBFR (free-flow)		N/A	N/A	
	Sunset Road at EBFR	PM	31.0	D	40.5
	EBFR (free-flow)		N/A	N/A	
	Sunset Road at WBFR		91.5	F	
	WBFR (free-flow)		N/A	N/A	
Stop Control on Frontage Roads	Sunset Road at EBFR	AM	N/A	N/A	6.7
	EBFR (stop)		14.9	B	
	Sunset Road at WBFR		N/A	N/A	
	WBFR (stop)		10.1	B	
	Sunset Road at EBFR	PM	N/A	N/A	5.4
	EBFR (stop)		14.0	B	
	Sunset Road at WBFR		N/A	N/A	
	WBFR (stop)		14.2	B	
All-Way Stop Control	Sunset Road at EBFR (stop)	AM	33.4	D	18.8
	EBFR (stop)		25.4	D	
	Sunset Road at WBFR (stop)		10.0	A	
	WBFR (stop)		9.4	A	
	Sunset Road at EBFR (stop)	PM	61.9	F	28.3
	EBFR (stop)		26.1	D	
	Sunset Road at WBFR (stop)		17.5	C	

Traffic Control Alternative	Approach	Period	2010 HCM Approach Delay (sec/veh)	2010 HCM LOS	Traffic Interchange Delay* (sec/veh)
	WBFR (stop)		13.1	B	

*Average delay for the two un-signalized intersections.

Table 14 – 2025 Simulation Results for Stop Control on the Frontage Roads

Intersection	Time Period	Movement	Simulation Delay/Vehicle (sec)	Simulation Intersection Delay (sec)
EBFR/Sunset Road	AM	Sunset Road NB Thru	2.9	5.0
		Sunset Road NB Right	1.8	
		Sunset Road SB Left	4.2	
		Sunset Road SB Thru	1.6	
		EBFR Thru	8.8	
		EBFR Right	7.4	
	PM	Sunset Road NB Thru	2.0	3.9
		Sunset Road NB Right	1.4	
		Sunset Road SB Left	4.7	
		Sunset Road SB Thru	1.9	
		EBFR Thru	9.0	
		EBFR Right	6.9	
WBFR/Sunset Road	AM	Sunset Road NB Left	1.1	2.5
		WBFR Left	6.3	
		WBFR Thru	7.4	
	PM	Sunset Road NB Left	1.3	4.4
		WBFR Left	10.4	
		WBFR Thru	9.9	

Table 15 – 2025 I-10/Sunset Road TI Queue Lengths

Intersection	Time Period	Movement	HCM 95th Percentile Queue Length (feet)	Simulation 95th Percentile Queue Length (feet)
EBFR/Sunset Road	AM	Sunset Road SB Left	5	40
		EBFR Thru	13	57
		EBFR Right	98	149
	PM	Sunset Road SB Left	5	54
		EBFR Thru	3	43
		EBFR Right	78	114
WBFR/Sunset Road	AM	WBFR Left	10	59
		WBFR Thru	N/A	14
	PM	WBFR Left	45	106

		WBFR Thru	N/A	37

Table 16 – Sunset Road/Silverbell Road Signal Warrant No. 1

2018 Opening Year							
Sunset Road Number of Lanes	**Silverbell Road Number of Lanes**	**Major Street Approach Volumes (vph)**	**Minor Street Approach Volume (vph)**	**Cond A 100%**	**Cond A 70%**	**Cond B 100%**	**Cond B 70%**
2 or more	2 or more	490	250	No	Yes	No	No
2025 Design Year							
Sunset Road Number of Lanes	**Silverbell Road Number of Lanes**	**Major Street Approach Volumes (vph)**	**Minor Street Approach Volume (vph)**	**Cond A 100%**	**Cond A 70%**	**Cond B 100%**	**Cond B 70%**
2 or more	2 or more	550	310	No	Yes	No	No

vph = vehicles per hour

Table 17 – Sunset Road/Frontage Road Signal Warrant No. 1

2018 Opening Year							
Sunset Road Number of Lanes	**Silverbell Road Number of Lanes**	**Major Street Approach Volumes (vph)**	**Minor Street Approach Volume (vph)**	**Cond A 100%**	**Cond A 70%**	**Cond B 100%**	**Cond B 70%**
1	1	400	100	No	N/A	No	N/A
2025 Design Year							
Sunset Road Number of Lanes	**Silverbell Road Number of Lanes**	**Major Street Approach Volumes (vph)**	**Minor Street Approach Volume (vph)**	**Cond A 100%**	**Cond A 70%**	**Cond B 100%**	**Cond B 70%**
1	1	480	140	No	N/A	No	N/A

Table 18 – Recommended Storage Lengths

Intersection	Turn Bay	Recommended Storage Length (feet)	Comment

Sunset Road/ Silverbell Road	WB LT	250	Based on the estimated queue length
	SB LT	150	Minimum turn bay length = 150′
	NB RT	150	Minimum turn bay length = 150′
Sunset Road/EBFR	WB LT	110	Based on estimated queue length and physical constraints

Table 19 – Design Criteria

Description of Criteria	Desirable Design Criteria	Criteria Source	Comments
Roadway Classification	Urban Major Arterial	MSSRP	
Design Speed	40 mph	See Note 1	Posted Speed – 35 mph
Horizontal Alignment			
Control Location	Roadway Centerline	RDM Appendix 2-B	Figure 2-6 – Rural 3-Lane Section
Stopping Sight Distance	305′	RDM Section 2.4	Table 2-3
Radius			
Min. Radius	533′ (e_{max} = 4%)	AASHTO Table 3-7	See Note 2
Min. Horizontal Curve Length	500'	RDM Section 2.2	Increase 100' for each one degree decrease below 5 degrees
Max. Angle Point w/o Curve	1 Degree 8 Minutes	RDM Section 2.2	
Superelevation	4%	RDM Section 2.2	Urban/Suburban Roadway
Superelevation Runoff/Tangent Runoff	125′	RDM Section 2.2; AASHTO Pgs. 3-59 – 3-68	See Note 2
Vertical Alignment			
Control Location	Roadway Centerline	RDM Appendix 2-B	Figure 2-6 – Rural 3-Lane Section
Max. Gradient	3% Max. –flat; 7% Max. -foothills	RDM Section 2.4	
Min. Gradient	0.50%	RDM Section 2.4	
Min. Vertical Curve Length	3 x Design Speed (Min.)	RDM Section 2.4	
Vertical Grade Break	4% Max.	RDM Section 2.4	
Vertical Clearance			

Over/Under Roadway	16′ (New structure)	AASHTO Pg. 7-38	See Note 2
Cross Sectional Elements			
Lane Widths			
Thru Lanes	11′	RDM Section 2.3	Table 2-1
Turn Lanes	12′	RDM Section 2.3	Table 2-1
Shoulder Width (3-lane rural)	10′ (6' paved, 4′ unpaved)	RDM Section 2.3	Table 2-1
Cross Slope (Lanes & shoulders)	2%	RDM Section 2.3	Table 2-2
Side Slopes			
Within Clear Zone	6H:1V Desirable; 4H:1V Min.		
Outside Clear Zone	4H:1V (Cut & fill) Desirable 3:1 Min.	RDM Section 2.3	Table 2-2
Clear Zone Width	18′	AASHTO RDG Table 3-1	See Note 3
Sidewalk Width	5′ Min.	RDM Section 2.6	Width determined by Pima County
Bridge Sidewalk Width	6′	RDM Section 2.6	Width determined by Pima County
Shared-use Paths Widths	5′ (North of roadway) 8′ (South of roadway)	RDM Section 2.6	Widths determined by Pima County
Intersections			
Design Vehicle	WB-62	RDM Section 2.5	
Intersection Sight Distance	Driver Eye Ht.=3.5′; Object Ht.=2.0′	RDM Section 2.5	See Note 5
Max. Skew Angle	20 Degrees (Max.)	RDM Section 2.5	
Storage Lane Lengths	Left-turn Lane (Min.) 110′; ≤ 40 mph 150′; ≥ 45 mph Right-turn Lane (Min.) 110′; ≤ 40 mph 150′; ≥ 45 mph	See Note 7 - Sht. Nos. 4-6 & 4-7	See Note 6
Turn Bay Taper Rate or Length	Left-turn Lane $WS^2/60$; ≤ 40 mph WS; ≥ 45 mph Right-turn Lane – 15:1	See Note 7 – Sht. Nos. 4-1 & 4-7	
Turn Bay Opening	Left-turn Lane 60′; 25 mph – 35 mph 90′; 40 mph – 45 mph	See Note 7 – Sht. No. 4-6	

Design Criteria Notes:
Note 1: Design speed determined by Pima County
Note 2: A Policy on Geometric Design of Highways and Streets, 2011 (Green Book)
Note 3: Roadside Design Guide (RDG); ADT > 6,000, Design Speed=40 mph, flat slope
Note 5: RDM Section 2.5; AASHTO Green Book (2011) Section 3.2.6; RDM Table 2-3 (SSD)
Note 6: See Table 17 of this report for recommended storage lane lengths

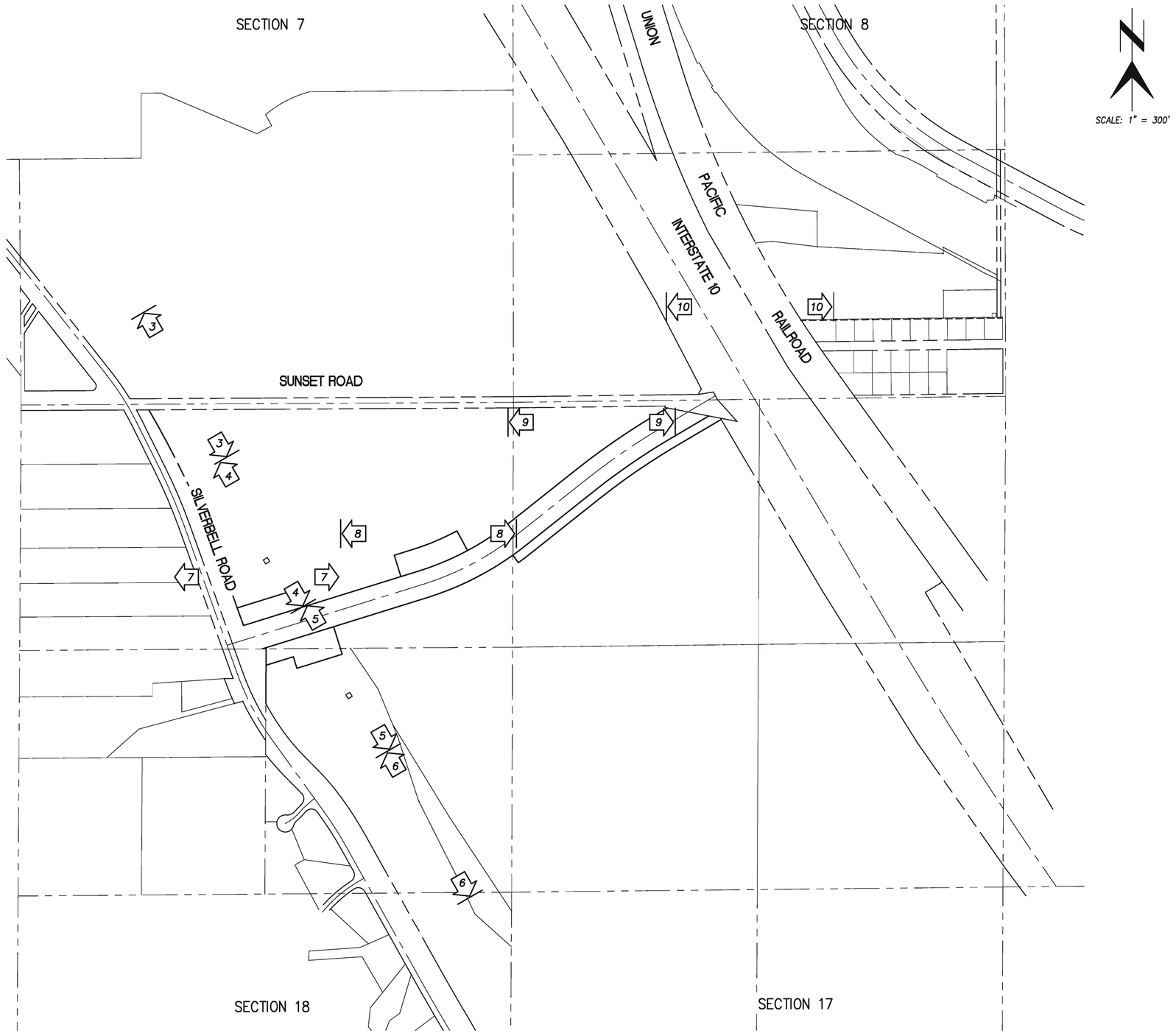
Note 7: Pima County/City of Tucson Pavement Marking Design Manual

Table 20 – Pavement Structural Sections

Pavement Structural Section No.	Location	Asphaltic Concrete Mix No. 1	Asphaltic Concrete Mix No. 2	Aggregate Base Course
1	Sunset Rd. – Silverbell Rd. to I-10	2.5″	2.5″	4″
2	Silverbell Rd. Widening		3″	6″
3	Silverbell Rd. – Overlay Existing Pavement		2.5″	
4	Asphaltic Concrete Path		2″	4″
5	Sunset Rd. – Under I-10 Mainline (Mill & Replace)		2.5″	

APPENDIX

A-1 Preliminary Right-of-Way



No.	Revision Description	Engineer	Date

		Date
Designed	PG	03/14
Drawn	BDB	03/14
Checked	PG	03/14

SEQ

Priscilla S. Cornelio, P.E., Director

Pima County Department of Transportation

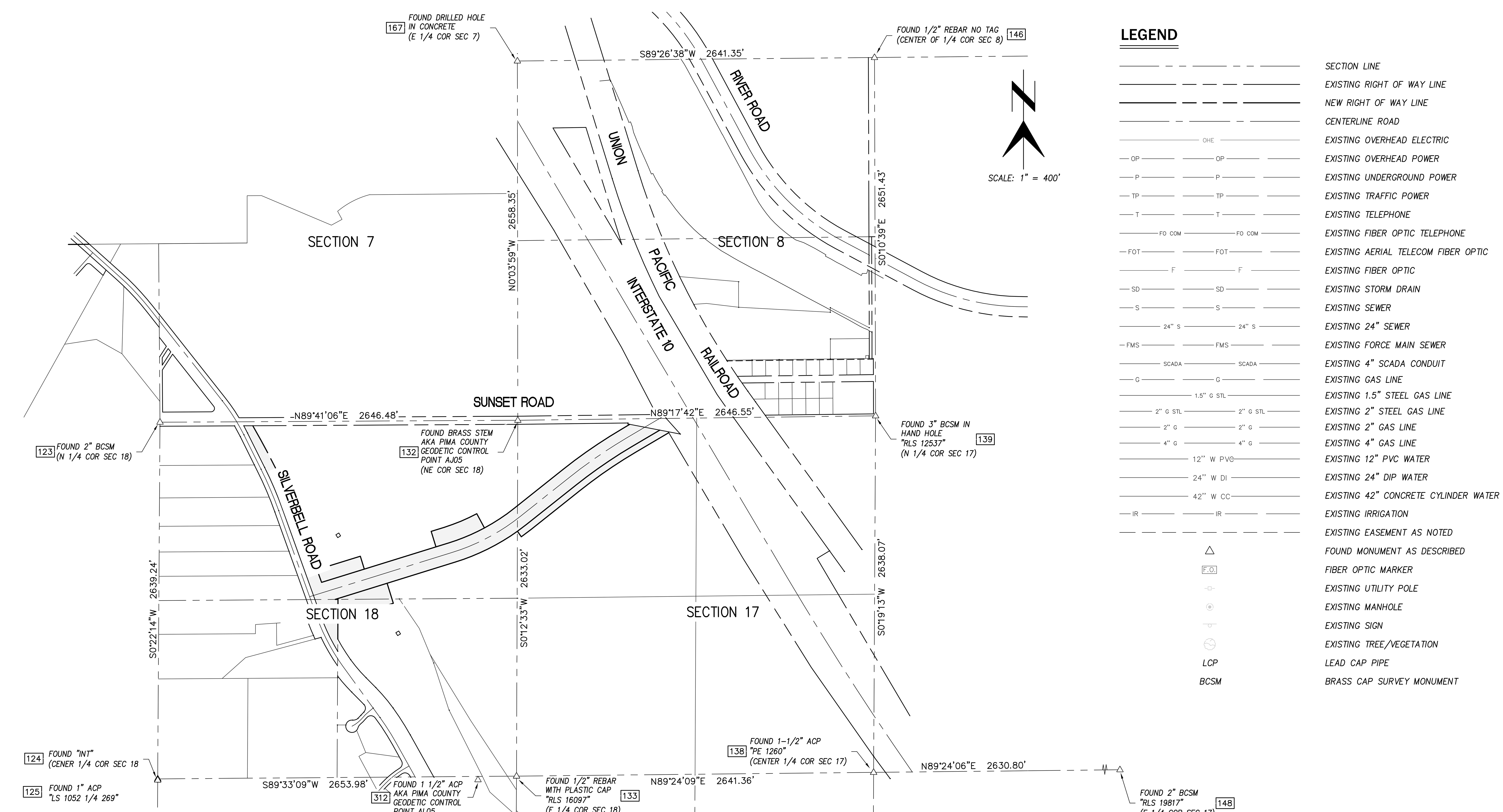
RIGHT OF WAY PLANS
SUNSET ROAD
SILVERBELL ROAD TO INTERSTATE-10
PROJECT NO.

REGISTERED LAND SURVEYOR
CERTIFICATE NO.
46276
PATRICIA
GANDA
Not signed
ARIZONA U.S.A.
Expires 6/30/15

Engineering and Environmental Consultants, Inc.
4625 E. PT. LOWELL RD.
TUCSON, ARIZONA 85712
520-321-4625

SCALES	Horiz.	Sheet RW01 of RW10
	Vert. N/A	

SEQ



HORIZONTAL CONTROL

THE HORIZONTAL CONTROL FOR THIS PROJECT IS BASED ON EXISTING SURVEY CONTROL POINTS AS PROVIDED BY PIMA COUNTY/CITY OF TUCSON GEODETIC CONTROL POINTS. THE PUBLISHED COMBINED FACTOR FOR "AJ05" = 0.9998762050 WAS USED TO CONVERT GRID COORDINATES TO SURFACE.

TO CONVERT PROJECT COORDINATES TO STATE PLANE COORDINATES, ADD 400,000 TO THE NORTHINGS AND ADD 900,000 TO THE EASTINGS, THEN MULTIPLY BY 0.9998762050.

VERTICAL CONTROL

VERTICAL CONTROL FOR THIS PROJECT IS BASED ON PIMA COUNTY BENCHMARK DESIGNATION Q291 AKA NGS Q291 CS0554. BASED ON NAVD 88 DATUM HAVING AN ELEVATION OF 2,232.24 FEET. STATION MARK IS A BENCHMARK DISK SET IN CONCRETE STANDARD Q291 1951. STAMPED Q291 1951.

BASIS OF BEARINGS

THE BASIS OF BEARINGS FOR THIS PROJECT IS A GRID BEARING OF N 55°56'26" E BETWEEN PIMA COUNTY DOT/CITY OF TUCSON DOT GEODETIC, CONTROL POINT AL03 AND PIMA COUNTY DOT/CITY OF TUCSON DOT GEODETIC, CONTROL POINT AG09, AS ESTABLISHED FROM THE ARIZONA COORDINATE SYSTEM, 1983 (HARN 92), CENTRAL ZONE 0202.

COORDINATE TABLE

PT NO	NORTHING	EASTING
123	77173.1870	66458.3730
124	74534.0030	66441.3080
125	74534.0560	66441.2020
126	74528.8720	66441.4000
127	74525.1590	66441.4970
132	77187.7400	69104.8170
133	74554.7340	69095.2040
138	74582.2820	71736.4210
139	77220.3030	71751.0990
146	79871.7560	71742.9100
148	74609.7510	74367.0840
167	79846.0840	69101.7340
312	74527.8920	68810.1700

SCALES	Horiz.	Sheet RW02 of RW10
	Vert. N/A	

Pima County Department of Transportation

Priscilla S. Cornelio, P.E., Director

No.	Revision Description	Engineer	Date

		Date
Designed	PG	03/14
Drawn	BDB	03/14
Checked	PG	03/14

REGISTERED LAND SURVEYOR CERTIFICATE NO. 46270 PATRICIA GAUDA ARIZONA U.S.A. Expires 6/30/16

eec Engineering and Environmental Consultants, Inc. 4625 E. FT. LOWELL RD. TUCSON, ARIZONA 85712 520-321-4625

RIGHT OF WAY PLANS
SUNSET ROAD
SILVERBELL ROAD TO INTERSTATE-10
PROJECT NO.

SEQ

SEQ

SECTION 7

SECTION 18

SCALE: 1" = 40'

SUNSET ROAD

SILVERBELL ROAD

EXIST R/W

SECTION LINE

PIMA COUNTY
FLOOD CONTOL DISTRICT
101-06-009F

PIMA COUNTY
FLOOD CONTOL DISTRICT
101-21-0010

200.0' TUCSON GAS AND ELECTRIC COMPANY EASEMENT BK 2288, PG 548

100.0' USA EASEMENT FOR ELECTRIC TRANSMISSION LINE BK 211, PG 250

NEW R/W

WAPA POWER POLE

OHE

42" W CC

24" W DI

12" W PVC

PN 234-1957

PN 082-1995

PN 121-2006

FO COM

2" G STL

101-21-0020

101-21-003A

SEE SHEET 4

123 FOUND 2" BCSM
N 1/4 COR SEC 18

SCALES	Horiz.	Sheet RW03 of RW10
	Vert. N/A	

Pima County Department of Transportation

Priscilla S. Cornelio, P.E., Director

	Designed	PG	03/14
	Drawn	BDB	03/14
	Checked	PG	03/14

No.	Revision Description	Engineer	Date

REGISTERED LAND SURVEYOR
CERTIFICATE NO.
46270
PATRICIA
GARCIA
Not Signed
ARIZONA U.S.A.
Expires 6/30/15

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Engineering and Environmental Consultants, Inc.
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RIGHT OF WAY PLANS
SUNSET ROAD
SILVERBELL ROAD TO INTERSTATE-10
PROJECT NO.

SEQ

SEQ

SECTION 18

SCALE: 1" = 40'

TEP TOWER

TUCSON GAS AND ELECTRIC COMPANY EASEMENT
BK. 2288, PG 548
100'

USA EASEMENT FOR
ELECTRIC TRANSMISSION LINE
BK. 211, PG 250
100'

PIMA COUNTY
FLOOD CONTOL DISTRICT
101-21-0010

WAPA POWER POLE

NEW R/W

SUNSET ROAD

100.0'

75.0'

SEE SHEET 3

SEE SHEET 5

SILVERBELL ROAD

EXIST R/W

PN 234-1987
PN 082-1995
PN 121-2006

42" W CC
24" W DI
12" W PVC
OHE
FO COM

101-21-003D
101-21-003C
101-21-003B
101-21-003E

SCALES Horiz. N/A Vert.

Sheet RW04 of RW10

Pima County Department of Transportation

Priscilla S. Cornelio, P.E., Director

No.	Revision Description	Engineer	Date

		Date
Designed	PG	03/14
Drawn	BDB	03/14
Checked	PG	03/14

REGISTERED LAND SURVEYOR
CERTIFICATE NO.
46270
PATRICIA
GAMBA
Not Signed
ARIZONA U.S.A.
Expires 6/30/15

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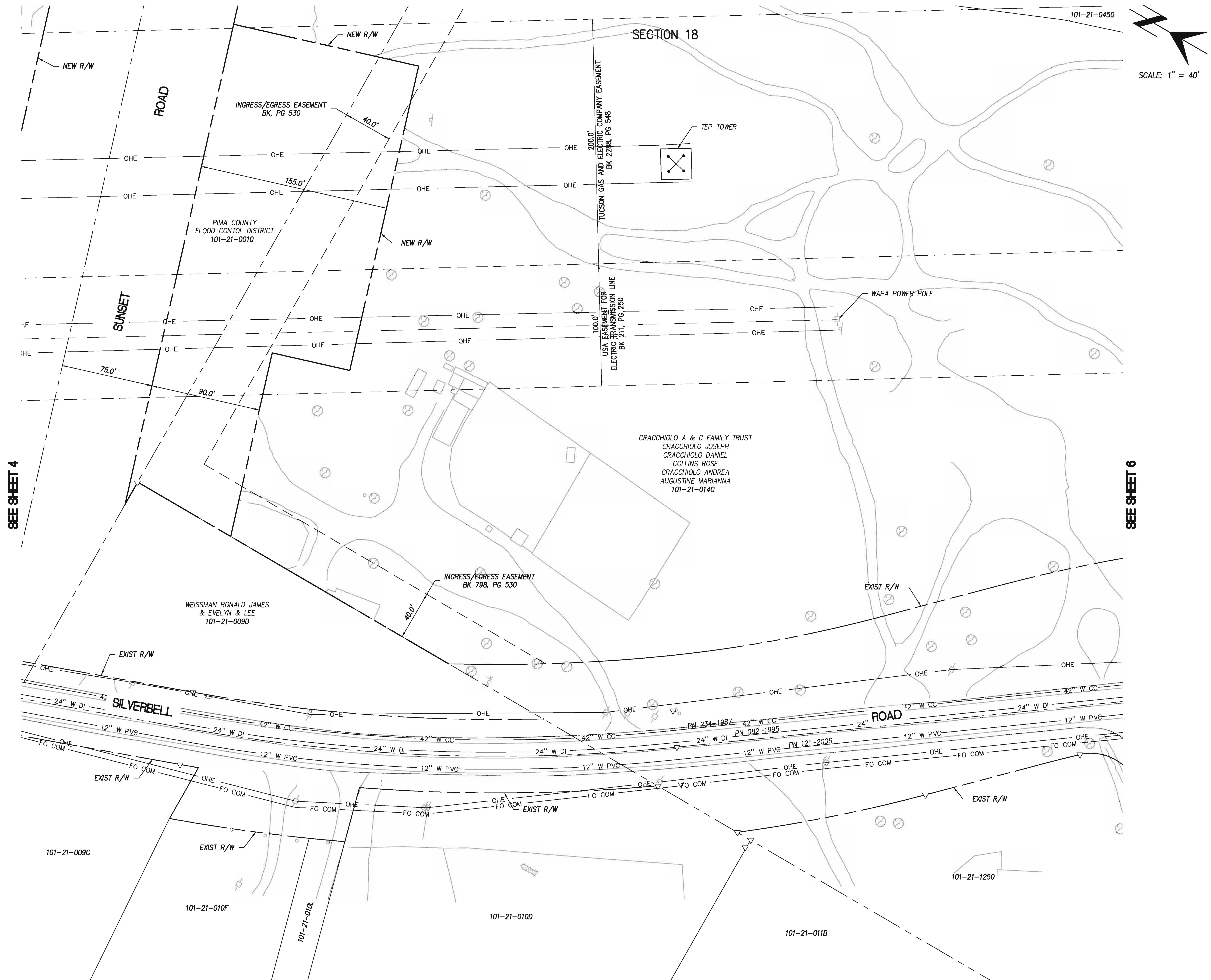
Engineering and Environmental Consultants, Inc.
4625 E. FT. LOWELL RD. TUCSON, ARIZONA 85712 520-321-4625

RIGHT OF WAY PLANS
SUNSET ROAD
SILVERBELL ROAD TO INTERSTATE-10
PROJECT NO.

SEQ



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	Vert.	N/A

Sheet RW05 of RW10

No.	Revision Description	Engineer	Date

		Date
Designed	PG	03/14
Drawn	BDB	03/14
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Priscilla S. Cornelio, P.E., Director

Pima County Department of Transportation

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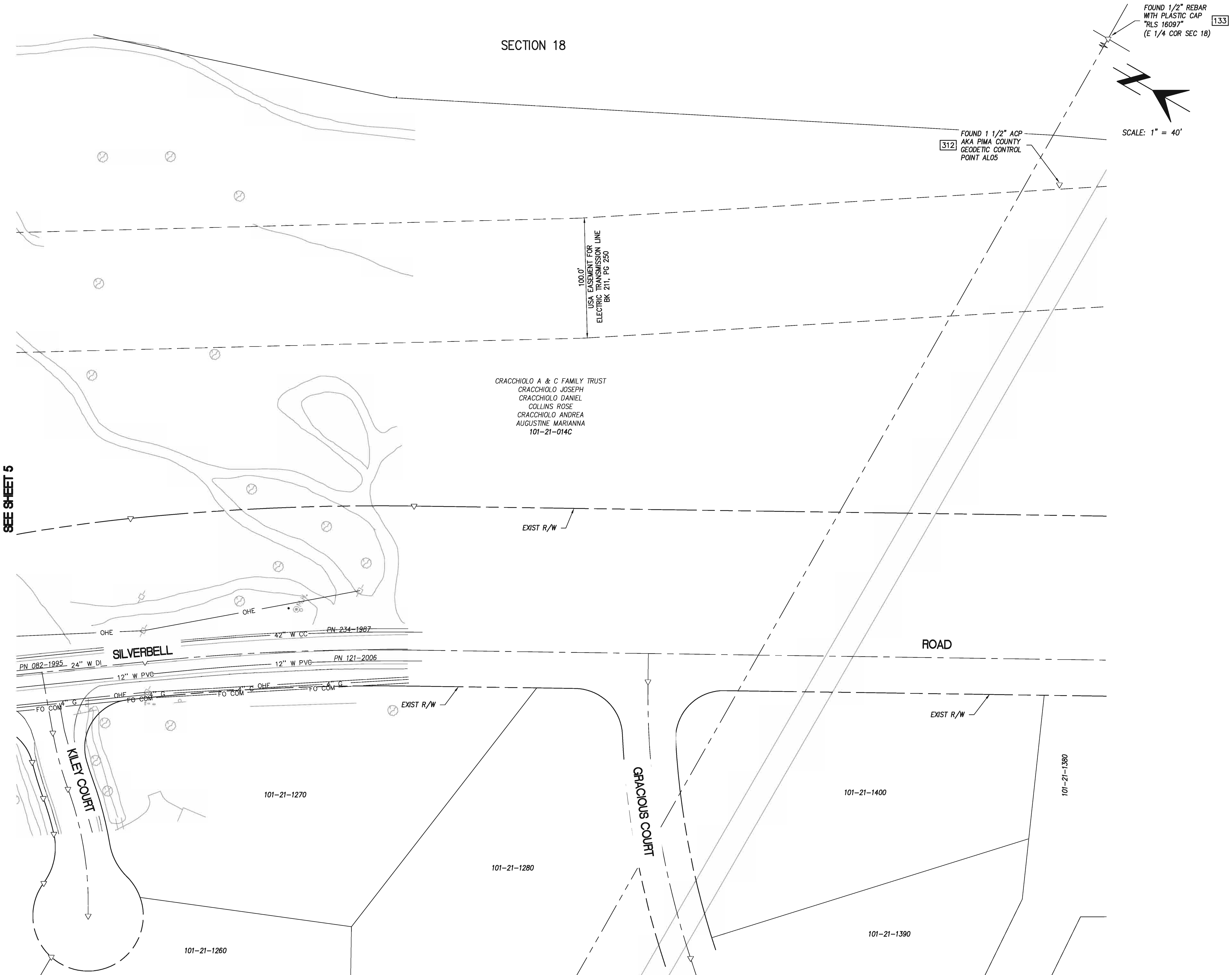
CERTIFICATE No. 46274
PATRICK GAJDA
ARIZONA U.S.A.
Expires 6/30/16

Engineering and Environmental Consultants, Inc.
4625 E. FT. LOWELL RD.
TUCSON, ARIZONA 85712 520-321-4625

RIGHT OF WAY PLANS
SUNSET ROAD
SILVERBELL ROAD TO INTERSTATE-10
PROJECT NO.

SEQ



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No.	Revision Description	Engineer	Date

REGISTERED LAND SURVEYOR CERTIFICATE No. 46274 PATRICIA GAIDA ARIZONA U.S.A. Expires 6/30/16

Pima County Department of Transportation

Priscilla S. Cornelio, P.E., Director

eec Engineering and Environmental Consultants, Inc. 4625 E. FT. LOWELL RD. TUCSON, ARIZONA 85712 520-321-4625

RIGHT OF WAY PLANS
SUNSET ROAD
SILVERBELL ROAD TO INTERSTATE-10
PROJECT NO.

SCALES	Horiz.		Sheet RW06 of RW10
	Vert.	N/A	

SEQ

SECTION 18

SCALE: 1" = 40'

SEE SHEET 8

SILVERBELL ROAD

SUNSET ROAD

42nd ROAD

NEW R/W

EXIST R/W

100.0' USA EASEMENT FOR ELECTRIC TRANSMISSION LINE BK 1211, PG 250

200.0' TUCSON GAS AND ELECTRIC COMPANY EASEMENT BK 2288, PG 548

PIMA COUNTY FLOOD CONTOL DISTRICT 101-21-0010

INGRESS/EGRESS EASEMENT BK 798, PG 530 — 40.0'

75.0' — 100.0' — 150.0' — 75.0' — 155.0' — 90.0'

101-21-003C

101-21-003B

101-21-003E

101-21-009C

101-21-010F

WEISSMAN RONALD JAMES & EVELYN & LEE 101-21-009D

CRACCHIOLO A & C FAMILY TRUST
CRACCHIOLO JOSEPH
CRACCHIOLO DANIEL
COLLINS ROSE
CRACCHIOLO ANDREA
AUGESTINE MARIANNA
101-21-014C

24" W DI — 12" W PVC — 42" W CC — FO COM — OHE — PN 334-1987 — PN 082-1995 — PN 121-2006

Designed	PG	03/14
Drawn	BDB	03/14
Checked	PG	03/14

No.	Revision Description	Engineer	Date

Priscilla S. Cornelio, P.E., Director

Pima County Department of Transportation

RIGHT OF WAY PLANS
SUNSET ROAD
SILVERBELL ROAD TO INTERSTATE-10
PROJECT NO.

eac
Engineering and Environmental Consultants, Inc.
4625 E. FT. LOWELL RD. TUCSON, ARIZONA 85712 520-321-4625

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SCALES	Horiz.	
	Vert.	N/A

Sheet RW07 of RW10

SEQ

SECTION 18

SCALE: 1" = 40'

SEE SHEET 9

SEE SHEET 7

NEW R/W

NEW R/W

NEW R/W

NEW R/W

NEW R/W

120.0'

50.0'

75.0'

150.0'

75.0'

16.0'

TUCSON GAS AND ELECTRIC COMPANY
BK 5198, PG 106

PIMA COUNTY
FLOOD CONTOL DISTRICT
101-21-0010

101-21-014C

101-21-0130

Designed	PG	03/14
Drawn	BDB	03/14
Checked	PG	03/14

No.	Revision Description	Engineer	Date

Priscilla S. Cornelio, P.E., Director

Pima County Department of Transportation

RIGHT OF WAY PLANS
SUNSET ROAD
SILVERBELL ROAD TO INTERSTATE-10
PROJECT NO.

REGISTERED LAND SURVEYOR
CERTIFICATE NO.
46276
PATRICIA
GARCIA
ARIZONA U.S.A.
Expires 6/30/15

Engineering and Environmental Consultants, Inc.
4625 E. FT. LOWELL RD.
TUCSON, ARIZONA 85712 520-321-4625

SCALES Horiz.
Vert. N/A

Sheet RW08 of RW10

SEQ

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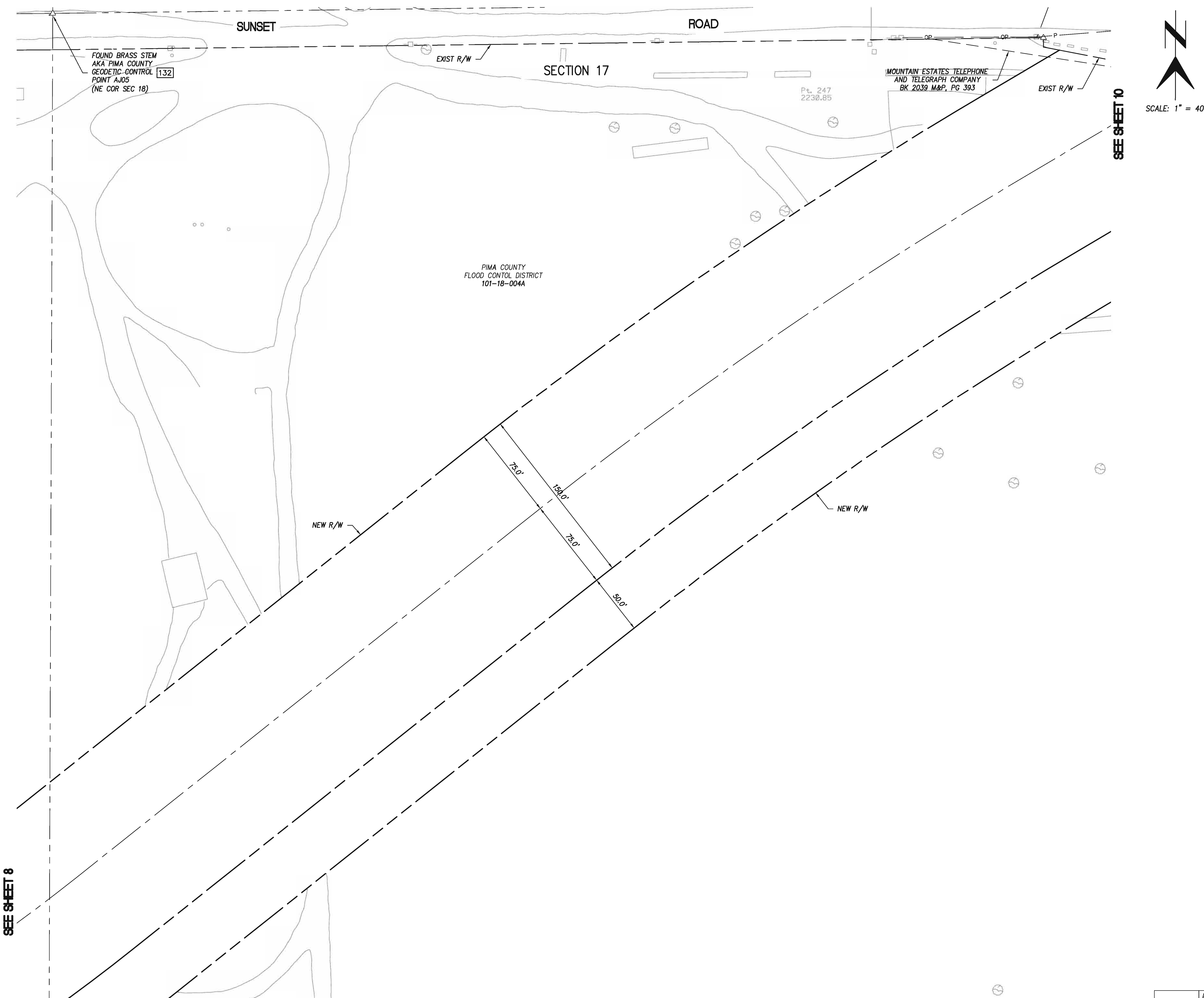

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Drawn	BDB	03/14
Checked	PG	03/14

No.	Revision Description	Engineer	Date

Priscilla S. Cornelio, P.E., Director

Pima County Department of Transportation

REGISTERED LAND SURVEYOR
CERTIFICATE No. 46274
PATRICK GAJDA
ARIZONA U.S.A.
Expires 6/30/16

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4625 E. FT. LOWELL RD.
TUCSON, ARIZONA 85712 520-321-4625

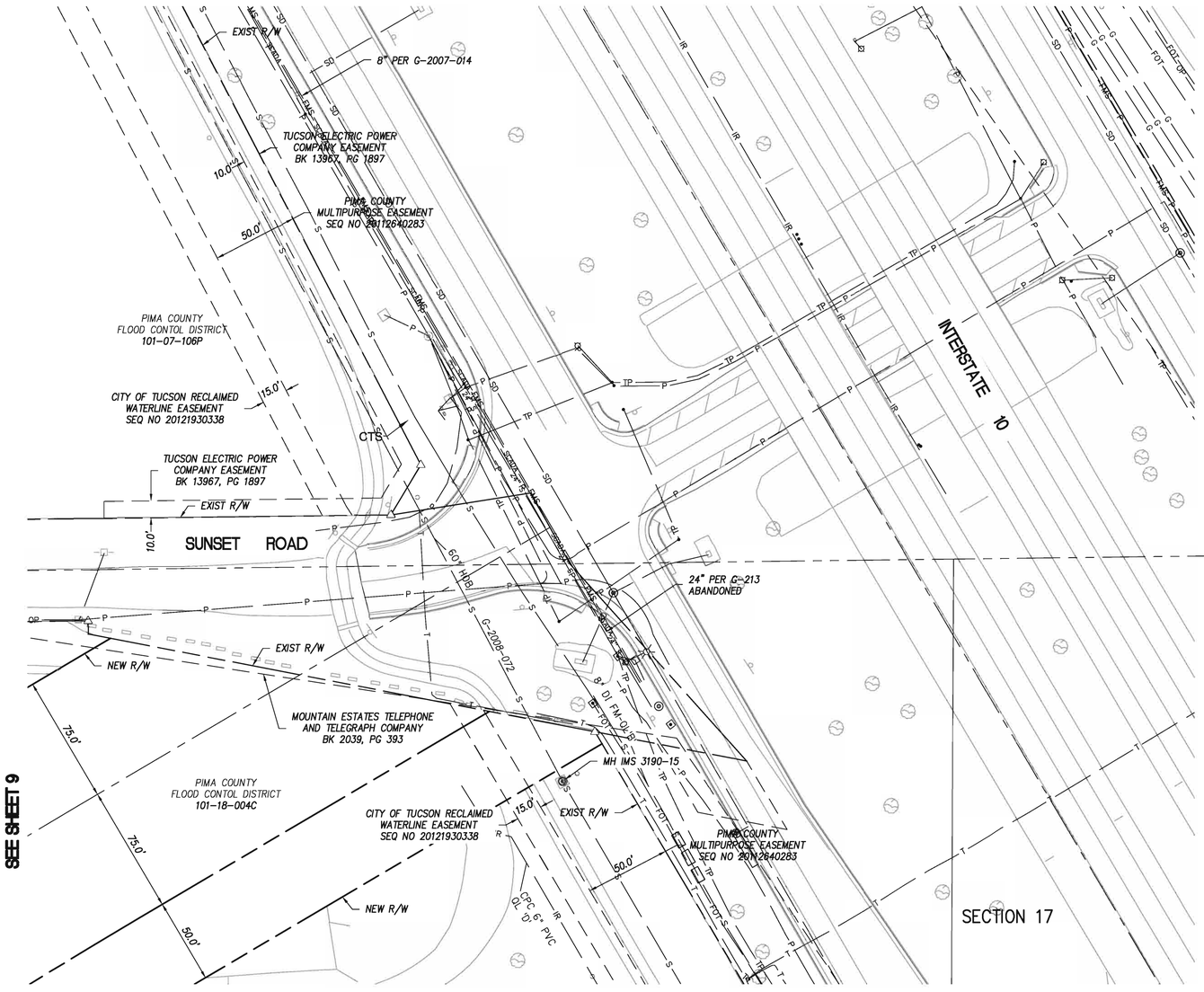
RIGHT OF WAY PLANS
SUNSET ROAD
SILVERBELL ROAD TO INTERSTATE-10
PROJECT NO.

SCALES	Horiz.	
	Vert.	N/A

Sheet RW09 of RW10

SEQ

SEQ



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Drawn	BDB	03/14
Checked	PG	03/14

No.	Revision Description	Engineer	Date

Priscilla S. Cornelio, P.E., Director

Pima County Department of Transportation

REGISTERED LAND SURVEYOR
CERTIFICATE NO.
46276
PATRICIA G. DA
ARIZONA U.S.A.
Expires 6/30/15

eec
Engineering and Environmental Consultants, Inc.
4625 E. PT. LOWELL RD.
TUCSON, ARIZONA 85712
520-321-4625

RIGHT OF WAY PLANS
SUNSET ROAD
SIL VERBELL ROAD TO INTERSTATE-10
PROJECT NO.

SCALES	Horiz.	Sheet RW10 of RW10
	Vert. N/A	

SEQ

SEQ

A-2 CAC Waiver

MEMORANDUM

Department of Transportation

DATE: January 3, 2013

TO: C.H. Huckelberry, County Administrator

FROM: Priscilla S. Cornelio, P.E., Director

SUBJECT: **Request for Waiver from Pima County Ordinance 10.56.110**

As the Department of Transportation is preparing to move forward with the Sunset Road project from Silverbell Road to River Road, we are asking for your concurrence to request the Board of Supervisors (BOS) to exempt this project from Ordinance 10.56.110, Establishment of Community Advisory Committee.

Although this project has not yet officially been started, the basic location, configuration and approximate timing for implementation has been shared at the various public meetings and community outreach affronts associated with the I-10 project from Ina Road to Ruthrauff, as well as the Silverbell project from Grant Road to Ina Road. In the majority of these meetings, the inquiries and comments regarding the future Sunset Road project were favorable and the majority of the residents and citizens expressed a desire to see the project move forward as quickly as possible.

In addition, the constraints surrounding this project, most notably the location of the I-10 interchange, floodway limits, water surface elevation, gravel pit operations between Silverbell and I-10, plus overall project costs; severely restrict the number of alternatives and configuration possibilities that can be explored. As a result, the opportunity to adjust the design based on public comments and input is greatly limited.

Based on these two factors, we are recommending that the BOS exempt the project from the requirements of forming a Community Advisory Committee (CAC). We still plan to incorporate community outreach and input via open house forums, newsletters, project website, etc., as appropriate, and neighborhood meetings as requested. In addition, we will also develop an Environmental Assessment and Mitigation Report (EAMR) that will be presented to the BOS for final approval. We believe that this approach will still provide ample opportunity to share project information with the public as well as solicit any comments and feedback.

We appreciate your consideration of this request and if you need any further information, please let me know.

PSC:RE:sap

Concur:

John M. Bernal, Deputy County Administrator – Public Works — 1/3/13 Date

Approved / Not Approved

C.H. Huckelberry, County Administrator — 1/3/13 Date

A-3 Sunset Alignment Evaluation

Sunset Road, Silverbell Road to River Road

Summary of Process to Develop Preferred Alignment

Traffic Analysis

Traffic forecasts associated with the Sunset Road extension were estimated using the Dynamic Traffic Assignment Model (DTA) developed for the I-10, Ina Road to Ruthrauff Road DCR project. Three alternatives were evaluated, 1) Extend Sunset Road from Silverbell Road to I-10, 2) Extend Sunset Road from Silverbell Road to River Road, 3) Extend Sunset Road from Silverbell Road to Camino de la Tierra. Based on the analysis results, it was recommended that a direct extension with Camino de la Tierra was undesirable due to the adverse impacts associated with the increased traffic demand on this collector roadway.

Alignment Assessment

Silverbell Road to I-10

Several alignments for the connection between Silverbell Road and I-10 were evaluated. Santa Cruz River floodway/floodplain mapping prepared by the Pima County RFCD in 2010 was utilized to develop and evaluate each alternative.

RTA Plan Alignment – The alignment provided in the approved RTA plan maintains the extension of Silverbell Road on the existing roadway alignment. Based on the floodway limits and the water surface elevation, it was determined that a bridge some 1000 ft in length would be required to span the floodway and that the intersection at Silverbell Road would need to be raised some 14 feet. Raising Silverbell Road to this degree would have substantial impacts on adjacent residential properties. It was also determined that east of the Santa Cruz River, the roadway alignment would need to swing south out of the existing right-of-way in order to properly align with the Sunset Road TI.

RTA Plan Alignment with River Channelization – Channelizing the Santa Cruz River at this location to narrow and shift the channel was identified as a possible alternative, however RFCD recommended against this alternative since it would require substantial bank protection upstream and downstream and would likely generate significant 404 permitting challenges.

North Alignment – No suitable opportunity to move the connection to the north were identified based on the large gravel mining pit and inability to tie into the Sunset Road TI.

South Alignment - Approximately ¼ mile south of the existing Sunset Road alignment, the floodway narrowed to approximately 600 feet and then shifted to the east, allowing for a reduced bridge length and resulting in substantially less impact to Silverbell Road and adjacent properties. A crossing at this location also results in a much straighter alignment and tie-in with the Sunset Road TI than would be possible on the existing alignment.

Environmental Impacts – Potential impacts to cultural resources were discussed with Pima County Environmental staff. Since mapping of archeological sites within the Santa Cruz River in the Sunset Road area was unavailable, specific assessment of each alternative was not possible. However, it was generally agreed that given the history of the area and experience with other projects within the Santa Cruz River corridor, it is likely that sites would be present and that avoidance was unlikely. Therefore, neither alternative was considered to have any advantage relative to archeological site impacts and costs. Other environmental impacts, including biological and hazardous materials were not assessed.

Utility Impacts - Impacts to existing utilities , primarily the existing TEP and WAPA lines running parallel to and east of Silverbell Road, were considered to essentially be the same for both alternatives.

Right-of-Way Impacts – Right-of-way impacts were not specifically assessed, however were considered. The proposed Sunset Road connection alignment to the south was included in the area that RFCD was negotiating for purchase from Cal Portland Cement.

I-10 to River Road

The proposed alignment for this connection essentially followed the alignment included in the RTA Plan, however with some minor adjustments to provide appropriate tie-in to the TI, minimize right-of-way impacts, and provide a connection to River Road that could allow for future connection to Camino de la Tierra.

A-4 Final Technical Memorandum

Sunset Road: Silverbell Road to River Road
PCDOT Project Number 4RTSUN

Technical Memorandum
Final

Sunset Road and Silverbell Road Intersection
Conceptual Design Option Comparison
Interim versus Ultimate Configurations

May 8, 2014
Amended September 8, 2014

Prepared by:

1430 E. Ft. Lowell Road, Suite 200
Tucson, AZ 85719

In Coordination with:

AECOM PARSONS BRINCKERHOFF EcoPlan Associates, Inc. Environmental Science & Resource Economics
WHEAT DESIGN GROUP LANDSCAPE ARCHITECTS ncs eec

1430 E. Ft. Lowell Road, Suite 200
Tucson, AZ 85719
(520) 320-0156
Fax (520) 320-0157
www.structuralgrace.com

Unique Approach – Unique Solution

TABLE OF CONTENTS

Appendix

INTRODUCTION

In May 2006, the Regional Transportation Authority (RTA) plan and sales tax were approved by the voters of Pima County. One of the 35 roadway projects included in the RTA plan is Pima County's Sunset Road: Silverbell Road to River Road (RTA #8). Sunset Road once extended from Silverbell Road to Interstate 10 (I-10), but the Sunset Road Bridge over the Santa Cruz River was washed away during the flood of 1983. Due to the growth in the northwest Tucson region, the connection of Silverbell Road to Interstate 10 and ultimately River Road is needed to improve operations, increase mobility, improve safety and reduce congestion.

The RTA plan calls for this new reach of Sunset Road as a three-lane roadway (one lane in each direction with a two-way left-turn lane in the center) with appropriate additional turn lanes at the intersections with Silverbell Road, the east-and westbound I-10 frontage roads, and River Road. The ultimate configuration of Sunset Road will pass over a lowered and expanded I-10; which is planned to be reconstructed by the Arizona Department of Transportation (ADOT) in the future. The reconstructed frontage roads and on/off ramps will rise to intersect with the elevated Sunset Road. Sunset Road will continue northeasterly from this elevated interchange with I-10 and drop down to meet River Road at its current alignment north of the Rillito River. This new Sunset Road will include bridges over the Santa Cruz River, I-10, the Union Pacific Railroad (UPRR), and the Rillito River. The Sunset Road traffic interchange bridge structure over I-10 will be constructed and funded by ADOT.

Pima County plans to develop this reach of Sunset Road in two phases. The first phase, referred to as Segment I, will construct Sunset Road from Silverbell Road easterly over a new bridge across the Santa Cruz River to connect with the eastbound I-10 frontage road at the existing grade. The second phase of the project, referred to as Segment II, will begin along Sunset Road west of I-10 (approximately 1,200 feet west of the eastbound frontage road) at the "touch down point" where the road will rise to meet the new elevated I-10 interchange (as described above), cross over the UPRR and then drop to connect at River Road with an at-grade "T" intersection.

SUNSET ROAD / SILVERBELL INTERSECTION

Two configurations for the intersection of Sunset Road and Silverbell Road have been identified. One is an interim design option to tie the new Sunset Road into Silverbell Road at its existing vertical and horizontal alignment and adding left-and right-turn lane improvements on Silverbell Road. The other is an ultimate configuration tying the new Sunset Road to Silverbell Road that is widened to a four lane divided roadway with left and right-turn lanes[1] and then transitioning to its existing conditions north and south.

[1] As defined by "Silverbell Road, Ina Road to Grant Road Design Concept Study – Final Report," June 2011.

This Technical Memorandum describes, evaluates and compares these two options and offers a recommendation for Pima County Department of Transportation's (PCDOT) consideration.

For both configurations, the cross section on Sunset Road will include two 11-foot wide travel lanes (one in each direction) and a 12-foot wide two-way left-turn lane. The proposed horizontal alignment of Sunset Road would tie into the Silverbell Road alignment at a 2.5 degree skew. There are no horizontal curves within the Sunset Road alignment between the bridge and Silverbell Road. The cross slope would be a normal crown.

Interim Alternative

Silverbell Road

For the Interim Alternative, the proposed improvements on Silverbell Road would involve widening the existing roadway to include a southbound left-turn lane and northbound right-turn lane. The widening would generally occur to the east of the existing roadway edge of pavement (see plans in Appendix A).

Cross Section

Silverbell Road would contain one 11-foot wide travel lane and six-foot wide paved shoulder in each direction. The roadway would be widened at Sunset Road to include a 12-foot wide southbound left-turn lane and a 12-foot wide northbound right-turn lane. The bike lane between the travel and right-turn lane would be five feet wide.

Horizontal Alignment

The existing Silverbell Road centerline alignment would be maintained. It consists of two horizontal curves with radii of 3,500 feet and 1,400 feet (see plans in Appendix A). The horizontal curves allow for the roadway cross slope to be at a normal crown based on a 50 mph design speed. The roadway widening would occur to the east of the existing roadway pavement edge.

Vertical Alignment

There would be no change to the existing vertical profile on Silverbell Road.

Drainage

There would be no change to the existing cross drainage patterns. Where ford walls exist on the east side of the roadway, new ones would be established at the new edge of pavement.

Sunset Road

For the Interim Alternative, the proposed improvements assume that a portion of Sunset Road is reconstructed at a future date to match the horizontal and vertical alignment of Silverbell Road when it is ultimately improved.

Vertical Alignment

The proximity of the west abutment for the bridge along Sunset Road over the Santa Cruz River to Silverbell Road is a critical controlling element for the Interim Alternative's vertical profile. Preliminary hydraulic modelling indicated that the abutment would need to be located very close to Silverbell Road. The necessary freeboard over the regulatory flood event in addition to the structural depth of the bridge made it impossible to connect the new Sunset Road alignment into the existing Silverbell Road.

Subsequently, consultation with PCDOT and Regional Flood Control District staff has led to the conclusion that the floodplain in this area needs to be remapped and an increase to the upstream base flood elevation of one foot would be acceptable. This will allow for a shorter structure overall, and, perhaps fewer spans.

Given this leeway in the hydraulic modelling process, the design team established a vertical profile for Sunset Road rising at a 5.4% grade that provides sufficient clearance above the current regulatory flood elevation to accommodate four feet of freeboard, and six and a half feet of structure depth. This allows for the west abutment to be placed at Station 71+25, or approximately 300 feet east of the centerline of Silverbell Road. As an Environmentally Sensitive Roadway, maximum grades can reach 10% in mountainous areas and 5% in rolling terrain, with steeper grades allowed to reduce cuts and fills. It is anticipated that the final hydraulic modelling will allow for the west abutment to be moved to the east, a shorter structure, and/or a lower elevation.

For the purposes of this technical memorandum, the vertical profile for Sunset Road between the intersection and the bridge over the Santa Cruz River contains a 40-foot long sag vertical curve at the intersection, a 113-foot long tangent section, then two crest vertical curves of 120-foot and 650-foot long. A short, 15-foot tangent section is placed between the two crest vertical curves and is anticipated to be the location of the west approach slab for the bridge. The longitudinal grade between the intersection and the 120-foot long curve is about 5.4%. The vertical alignment is based on a 40 mph design speed.

Ultimate Alternative

Silverbell Road

Under the Ultimate Alternative scenario, Silverbell Road is reconstructed to meet the criteria as set forth in the "Silverbell Road, Ina Road to Grant Road Design Concept Study – Final Report" in the vicinity of Sunset Road where turn lanes are required. This new section will then transition, north and south, to meet existing Silverbell Road.

Cross Section

The ultimate configuration on Silverbell Road is a four-lane divided roadway that would consist of two travel lanes (12-foot wide inside and 11-foot wide outside lanes) and a six-foot wide paved shoulder in each direction with curb and gutter and a 20-foot wide raised median . At the intersection with Sunset Road, Silverbell Road would be built out to the ultimate four-lane divided roadway including 12-foot wide northbound and southbound left-turn lanes and a 12-foot wide northbound right-turn lane. Silverbell Road would be striped to accommodate one travel lane in each direction.

Horizontal Alignment

The "Silverbell Road, Ina Road to Grant Road Design Concept Study – Final Report" has the new centerline alignment shifted approximately 30 to 40 feet east of the existing centerline and the proposed improvements occurring to the east of the existing roadway (see plans in Appendix A). This offset would be achieved through horizontal curves north and south of the Silverbell Road/Sunset Road intersection that would tie the new alignment into the existing Silverbell Road alignment at the project limits.

The horizontal alignment has two curves with radii of 5,150 feet and 1,638 feet. The first curve of 5,150 feet begins about 1,380 feet north of the intersection and ends about 380 feet north of the intersection. The second curve begins about 115 feet south of the intersection and terminates about 475 feet further south. The horizontal curves allow for the roadway cross slope to be at a normal crown based on a 50 mph design speed.

The transition from the two-lane to the four-lane roadway begins approximately 885 feet north and terminates approximately 1,160 feet south of the Silverbell Road/Sunset Road intersection.

Vertical Alignment

The vertical profile for Silverbell Road contains two vertical reverse curves, all at 300 feet in length, near the beginning and end of the alignment and a 112-foot crest vertical curve to tie into the existing roadway at the south end. The longitudinal grades range from about .18%

to about .90%. This vertical alignment satisfies the sight distance requirements of the 50 mph design speed.

Sunset Road

Under the Ultimate Alternative, Sunset Road is constructed to connect into the ultimate alignment of Silverbell Roadway. This would avoid reconstructing Sunset Road when improvements to Silverbell Road occur in the future.

Vertical Alignment

The vertical profile for Sunset Road contains a 700-foot crest vertical curve coming off of the bridge and a 40-foot sag vertical curve at the intersection. The longitudinal grade is about 2%. The vertical alignment is based on a 40 mph design speed.

Interim and Ultimate Alternatives – Comparisons

Access Control

The Interim Configuration allows for the majority of the existing access points along Silverbell Road to be maintained. With both configurations, access off of Sunset Road to properties north and south of Sunset Road on the east side of Silverbell Road will be somewhat problematic due to the elevation of Sunset Road as it rises to meet the future bridge grade. The property to the north is owned by Pima County Regional Flood Control District. The property to the south is privately held and appears to be impacted by the right-of-way and slope easements needed for Sunset Road.

Right-of-Way

It is assumed the future 150-foot Sunset Road right-of-way will be acquired for both alternatives.

The existing right-of-way on Silverbell Road is generally 60 feet within the project limits. Both Alternatives require right-of-way on the east side of Silverbell Road. For the purposes of comparison, it will be assumed that the future right-of-way on the east as identified in the "Silverbell Road, Ina Road to Grant Road Design Concept Study – Final report" will be acquired for either Alternative.

For the Interim Alternative, no right-of-way is anticipated to be acquired on the west side of Silverbell Road, as the necessary widening is occurring to the east with the exception of some minor additions to the shoulder on the west to establish a six-foot width within the project limits.

For the Ultimate Alternative, it is assumed a combination of new right-of-way and easements will be required on the west side of Silverbell Road from various property owners. See Table 1.

TABLE 1

SILVERBELL ULTIMATE ALTERNATIVE						
Parcel No.	**Total R/W Acquisition**		**Drainage Easement**		**Slope Easement**	
	S.F.	**Acres**	**S.F.**	**Acres**	**S.F.**	**Acres**
101-21-003C	3,482	0.08	1,087	0.02	-	-
101-21-003B	3,057	0.07	944	0.02	-	-
101-21-003E	3,027	0.07	-	-	-	-
101-21-009C	2,688	0.06	1,994	0.05	-	-
101-21-010F	-	-	509	0.01	-	-
101-21-010D	-	-	-	-	4,177	0.10
101-21-1250	-	-	927	0.02	-	-
Total	**12,254**	**0.28**	**5,460**	**0.13**	**4,177**	**0.10**

Drainage

For Sunset Road in both alternatives, the pavement is drained to adjacent swales that slope to the west and would then connect to the existing drainage patterns crossing Silverbell Road.

For Silverbell Road, the Interim Alternative keeps the existing cross drainage patterns that convey the flow over the pavement. New ford walls along the edge of the widened pavement would be required on the east side of the roadway.

For the Ultimate Alternative, the raised vertical alignment of Silverbell Road calls for the need to install culverts both north (2-10'x5'x135' R.C.B.C) and south (4-36"x194' R.C.P. and a 5-24"x163' R.C.P) of Sunset Road[2]. These culverts require drainage easements on the west side to accommodate the inlet structures. It is anticipated that the outlet structures and channels are accommodated within the proposed right-of-way to be acquired on the east side of Silverbell Road, with the exception of the 2-10'x5'x135' R.C.B.C. on existing Pima County Regional Flood Control District controlled property also needing a drainage easement.

The current regulatory FEMA floodplain encompasses portions of Silverbell Road within the vicinity of the intersection with the future Sunset Road. With the construction of the Sunset Road bridge over the Santa Cruz River, this floodplain and floodway will be remapped and the floodplain limits will change. A Conditional Letter of Map Revision and Letter of Map Revision will document the revised floodplain in this vicinity. With the Interim Alternative,

[2] As defined by "Silverbell Road, Ina Road to Grant Road Design Concept Study – Final Report," June 2011.

the construction of the bridge will likely increase the flooding in and around the intersection location. With the Ultimate Alternative, the intersection itself would be out of the floodplain, but Silverbell Road leading to but outside of the project limits will continue to experience flooding.

Constructability / Traffic Control / Construction Phasing

Both Alternatives can accommodate the construction of Sunset Road without significant issues associated with constructability or traffic control. For both alternatives, the construction of the bridge over the Santa Cruz River will drive the construction project schedule and duration.

For the Interim Alternative, it is conceivable that the additional pavement width on Silverbell Road can be added along with an overlay of the existing pavement section without a major detour.

For the Ultimate Alternative, a detour route would be required for Silverbell Road to allow for the additional fill to be placed and the cross drainage structures constructed. It is anticipated that the detour would be placed to the east of the existing Silverbell Road pavement section.

Earthwork

The vertical alignment for the Interim Alternative would result in fill sections along both sides of Sunset Road as it heads to the east approaching the abutment for the bridge over the Santa Cruz River. The vertical alignment for the Ultimate Alternative would result in fill sections along both Silverbell Road and Sunset Road. The maximum fill slopes on both sides of Silverbell Road and Sunset Road would be 3H:1V outside of the clear zone to match existing ground. The 3H:1V fill slopes would be benched and hydroseeded. The Interim Alternative would require about 11,000 cubic yards (cy) of borrow. The Ultimate Alternative would require about 50,000 cy of borrow.

Utilities

For the purposes of comparing the two alternatives, only the utilities along Silverbell Road are potentially impacted.

Tucson Electric Power

Tucson Electric Power (TEP) has overhead power lines on both sides of Silverbell Road. There is a 46kv transmission line on the west side of the road and a 13.8kv line on the east and includes CenturyLink and, possibly, Cox cable lines.

With the Interim Alternative, the poles on the west side should be able to remain in place, as the location of the southbound travel lane remains the same (although additional pavement to establish a six-foot shoulder is proposed). The widening on the east will impact the 13.8kv line.

With the Ultimate Alternative, the poles on both sides of Silverbell Road within the project limits will be impacted. TEP has indicated that the 46kv line would need to be relocated between October 14 and April 15

Tucson Water

Tucson Water has a 12-inch and a 42-inch potable water line along with a 24 inch reclaimed water line within the existing Silverbell Road right-of-way. These lines should not be impacted by either alternative as the Interim Alternative would be built along existing grade and the Ultimate Alternative would be constructed on fill.

Pavement Design

For the purposes of comparing the two alternatives, the pavement sections are roughly estimated since the geotechnical work for the pavement design has not been completed. The sections described below reflect the differences of the life spans of the two alternatives, with the Interim Alternative section reflecting a shorter one.

For Silverbell Road, the additional pavement width assumed for the Interim Alternative is 2″ of Mix No. 1, over 6″ of Aggregate Base (AB), with a 2″ Mix No. 2 overlay within the project limits. For Sunset Road, under the Interim Alternative, the pavement is assumed to be 2″ of Mix No. 2, over 2″ of Mix No. 1, over 6″ of AB.

Under the Ultimate Alternative for both Silverbell Road and Sunset Road, the pavement section is assumed to be 2″ of mix No. 2, over 3″ of mix No.1, over 8″ of AB.

Signalization

A new traffic signal and intersection lighting system would be installed for both alternatives. For the Interim Alternative, the traffic signal and intersection lighting would be temporary. The recommended system would be a span wire type system with steel poles. Under the Ultimate Alternative, the traffic signal and intersection lighting system would be a permanent installation with steel poles and mast arms. Electrical service would be coordinated with TEP to determine a permanent location for both alternatives.

Pavement Marking and Signing

Both alternatives would require interim pavement marking and signing conforming to Pima County requirements on Silverbell Road. Although the pavement marking and signing on

Sunset Road would be consistent under both scenarios, if the Interim Alternative is constructed, about 300 feet of Sunset Road (to the approach slab of the west abutment) would need to be reconstructed in the future to match the new vertical alignment on Silverbell Road. The posted speed limit on Silverbell Road would be 45 mph and 35 mph on Sunset Road. For the Ultimate Alternative, the interim striping on Silverbell Road would need to be obliterated and restriped to accommodate four travel lanes.

Landscaping

For the purposes of comparison between the Interim and Ultimate Alternatives, no landscaping is assumed. Appropriate sleeving for irrigation would be included for the median islands called for with the Ultimate Alternative, but its cost is assumed to be incidental.

Social, Economic and Environmental Considerations

A comparison of the two alternatives from a social, economic and environmental consideration; which included noise, historic/cultural resources, Section 401 and 404 of the Clean Water Act, hazardous materials, visual impacts and wildlife linkages was conducted. In general, environmental considerations are not substantive issues which would guide the selection of the Interim or Ultimate connection options. Those resources or issue of note are provided below.

From a noise perspective, neither alternative will trigger noise mitigation measures. The Ultimate Alternative will raise the elevation of Silverbell Road and increase the noise level to some degree, but it is not anticipated that it will impact sensitive receptors where mitigation measures are warranted.

From Section 401 and 404 of the Clean Water Act perspectives, the new portion of Sunset Road called for in both alternatives will have similar permitting implications. Silverbell Road widening needed for the intersection would encroach on Waters of the US and be subject to Section 401/404 Nationwide Permit #14 (Linear Transportation Projects) permitting. The Interim Alternative footprint is likely less than 1/10th of an acre and would be a non-notifying action. The Ultimate Alternative impacts may exceed 1/10th of an acre and require a Pre-Construction Notice (PCN). In neither case are the Clean Water Act implications of significant concern.

For historic/cultural resources, efforts to-date does not indicate any potential issues. No known cultural resource sites are located at the intersection location. The future Historic District proposed as part of the overall Silverbell Road: Ina Road to Grant Road planning effort will not be in place prior to construction of the Sunset Road / Silverbell Road intersection and should not complicate the construction effort for either alternative.

The impacts to biological resources would be similar with either alternative. No riparian or protected plant or animal species are expected at the Silverbell Road connection. The Ultimate Alternative would remove a greater number of native plants; however, the difference is not significant.

For both alternatives, the visual impact associated with the new Sunset Road would be similar. For the Ultimate Alternative, raising Silverbell Road by up to eight to nine feet would alter the visual aesthetic resources. For the purposes of this comparison; however, no significant mitigation measures are anticipated.

The "Silverbell Road, Ina Road to Grant Road Design Concept Study – Final Report" identified a wildlife corridor in the area immediately adjacent and to the north of the planned Sunset Road and Silverbell Road intersection. The area was originally defined under the Pima County 2004 Conservation Lands System Bond Program as "Highest Priority Private" land, due to generally open space connectivity between the Tucson Mountains and Santa Cruz River at this location. The future widening of Silverbell Roadway to a 4-lane divided roadway is the primary issue associated with consideration of increased hazards to motorist and wildlife. The Ultimate Alternative would substantially widen Silverbell Road and would also include a box culvert just north of the intersection that could conceivably facilitate wildlife crossings if appropriate fencing and other measures were installed to encourage its use. The additional fencing would fall well outside of the project limits in order to make the new culvert an effective wildlife linkage across Silverbell Road. The Interim Alternative condition does not substantially widen Silverbell Road, therefore it is not substantively changing the current wildlife movement conditions. Also, the forecast Silverbell traffic volumes change minimally with the new Sunset Road connection to I-10. 2018 and 2025 volumes with or without Sunset Road are within 10% of each other. Since the interim condition is not substantially changing Silverbell Road, the current wildlife movements would not be expected to be impacted.

Probable Costs for Construction

The probable costs for construction (see Appendix B) include 10% design, 25% construction and 1% post design services contingencies for both alternatives. For right-of-way, a $1.50 per square foot value is assumed and a $0.75 per square foot value is assumed for easements. Needed right-of-way and easement costs are only applied to what is needed to construct the Ultimate Alternative and does not include the overlap of right-of-way / easements with the Interim Alternative.

For the purposes of comparing the two alternatives, the portion of the respective Alternatives improvement that will be removed when rest of Silverbell Road is widened is characterized as the "throwaway." The following assumptions were used in determining the costs provided in the table:

- Interim Alternative – the "throwaway" includes the span wire signal and lighting system (minus salvage value), aggregate base and paving on Silverbell Road (widening) and about 300 feet along Sunset Road, along with the ford walls.
- Ultimate Alternative – the "throwaway" includes the transition paving and aggregate base.

Alternative	**Total Estimated Construction Costs**	**Total Estimated Cost of Throwaway**
Interim	$1.25 M	$371K
Ultimate	$3.70 M	$300K

Summary

The Sunset Road: Silverbell Road to River Road project has significant regional implications. Constructing the Silverbell Road to I-10 portion (Segment I) as soon as possible will allow for a key traffic relief route for the upcoming Ina Road/I-10 and Ruthrauff Road/I-10 Traffic Interchange reconstruction projects.

The Sunset Road / Silverbell Road intersection has implications on the ability to have the Segment I project move forward with alacrity and cost effectiveness. The design features reviewed in this technical memorandum offer insight on how to best meet these overarching goals and address key concerns with respect to scope, schedule and budget.

The significant design features considered in the comparison of the two alternatives demonstrate benefits and challenges associated with their respective implementation. In the three and a half months since the design's kick-off meeting, other project related issues have emerged that offer some insight on how to weight the differences between the two. Most notably, the hydraulics of the Santa Cruz River and its impact on the bridge location and length has caused considerable concerns.

As noted earlier in this memorandum, the preliminary hydraulic modelling placed the western Santa Cruz Bridge abutment so close to Silverbell Road that it precluded the consideration of the Interim Alternative due to the differences in grade. With the new approach to the hydraulic modelling, the abutment has been set at a location where the vertical geometry is manageable and the Interim Alternative is still a viable option.

Early indications of the hydraulic modelling effort under the new approach reflect flow conditions that will increase the length of the Santa Cruz River Bridge over the one used in establishing the budget and scope as included in the original Solicitation for Qualifications. As such, the cost of the overall project could become a key concern and cost saving measures are, likewise, carrying greater weight.

Reviewing the alternatives with respect to the design features described above, the Ultimate Alternative has three key advantages:

- Drainage across a portion of Silverbell Road will be improved
- The traffic signal will not need to be rebuilt
- The cost of the improvements that must be rebuilt (the "throw away" portion is less.

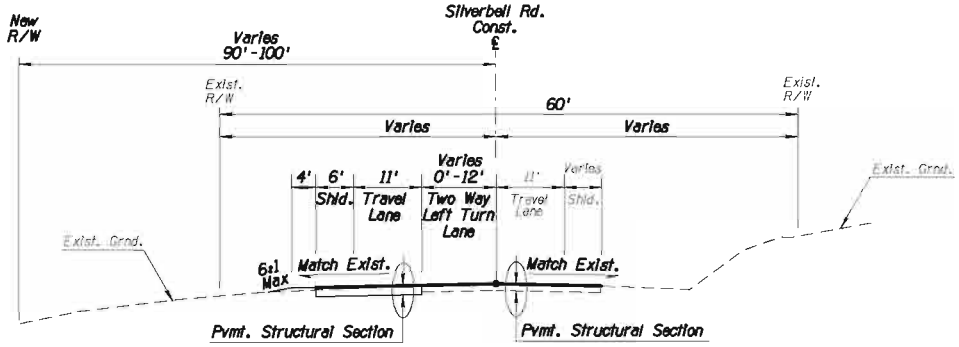
Focusing on the design feature where there are notable differences, the Interim Alternative offers advantages over the Ultimate in terms of the following:

- Access to adjacent properties along Silverbell is not as severely impacted
- Right-of-way requirements are less
- Earthwork is reduced
- Constructability / Traffic Control/ Construction Phasing is easier to accommodate
- Utilities, most notably Tucson Electric Power are less impacted
- Noise impacts are lower
- Visual impacts are less
- The construction cost is lower

Recommendation

Recognizing the fiscal constraints that are beginning to emerge with respect to the project's cost as well as the advantages associated with some of the key design features, the Interim Alternative is the approach recommended at this time. Should assumptions change, other design factors emerge, or other issues surface, this recommendation is subject to change.

Appendix A – Preliminary Plans



SILVERBELL ROAD
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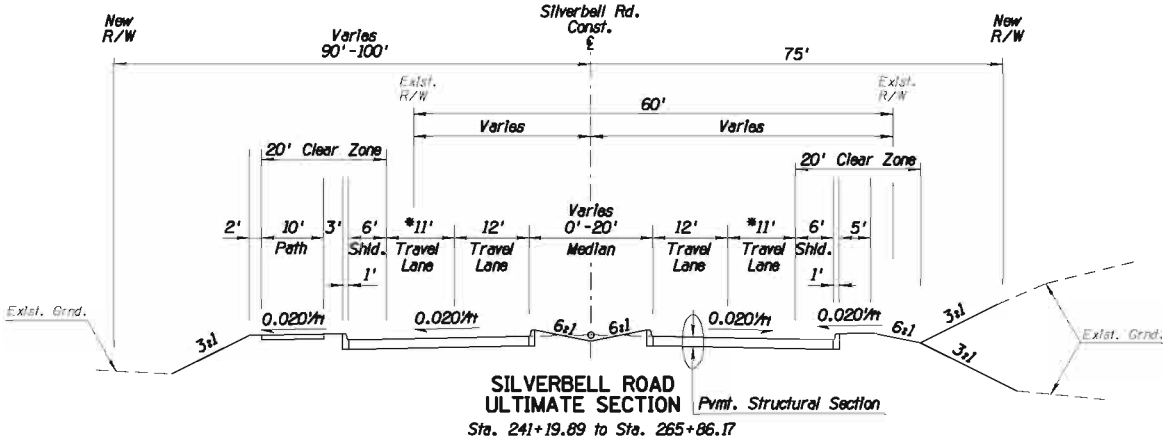
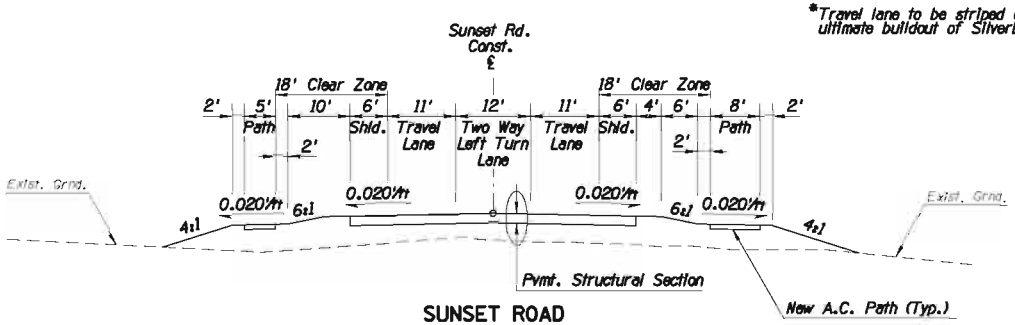


SILVERBELL ROAD
ULTIMATE SECTION

Sta. 241+19.89 to Sta. 265+86.17

*Travel lane to be striped out until ultimate buildout of Silverbell Road.



SUNSET ROAD
INTERIM AND ULTIMATE

SCALE: 1"=40'

Scales: 1"=40' Horiz. | Sheet TYP01 of TYP01 | Page 1 of 9

Pima County Department of Transportation
Priscilla S. Cornelio, P.E., Director

No.	Revision Description	Engineer	Date

Designed	MPK	05/14
Drawn	CSR	05/14
Checked	MPK	05/14

PRELIMINARY NOT FOR CONSTRUCTION STAGE I

AECOM

Arizona Blue Stake, Inc. 1-800-STAKE-IT (1-800-782-5348)

SUNSET ROAD - SEGMENT I
SILVERBELL RD. TO I-10
PROJECT NO. 4RTSUN

SUNSET ROAD – SILVERBELL ROAD TO I-10 – PROJECT NO. 4RTSUN

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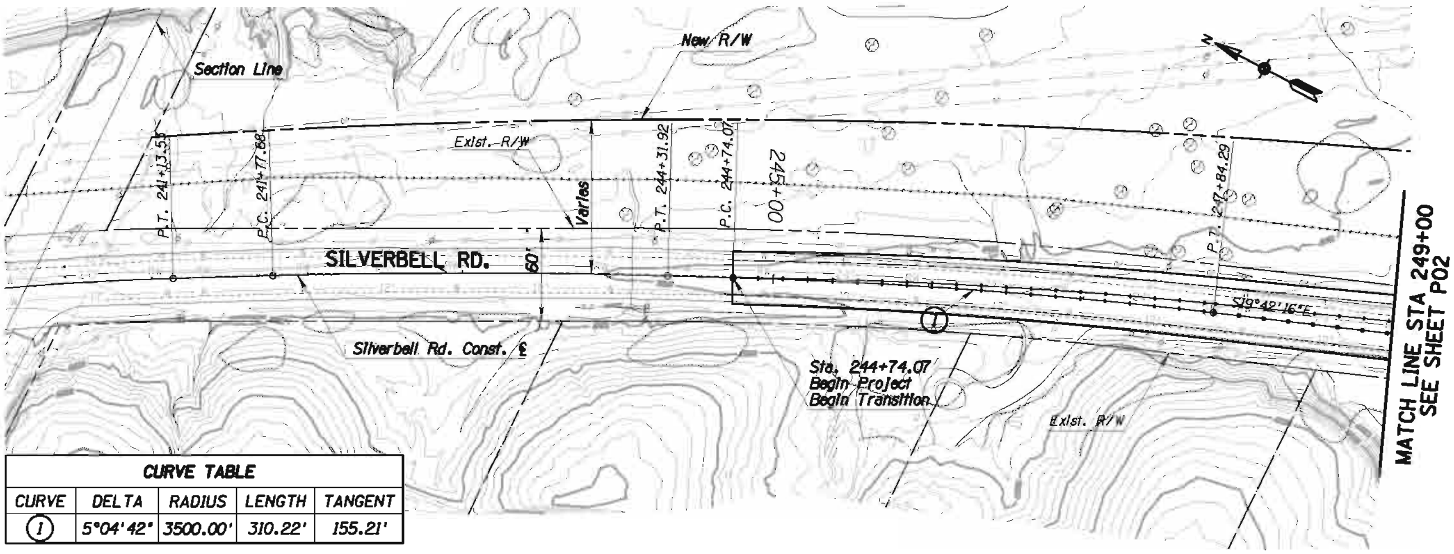

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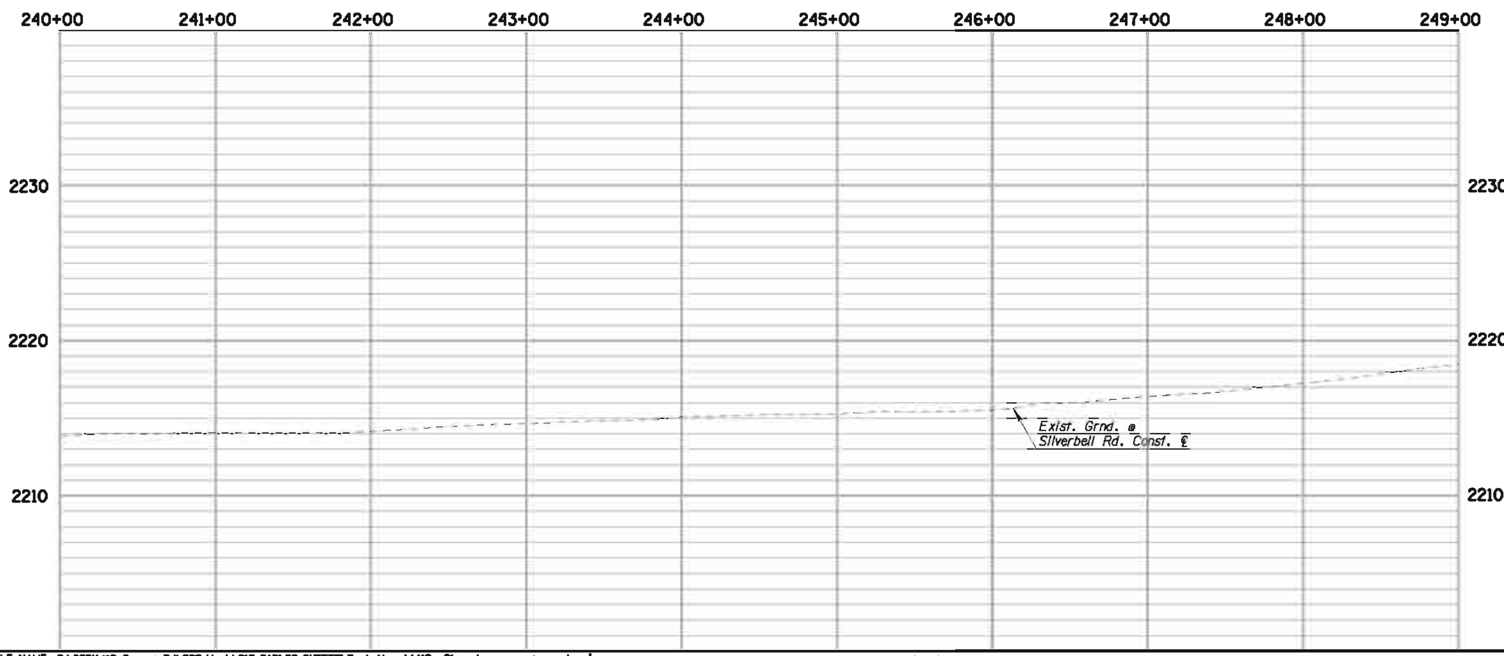

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TECHNICAL MEMO
INTERIM SILVERBELL OPTION

Scale: 1"=40' | Sheet P01 of P04

Pima County Department of Transportation

Priscilla S. Cornelio, P.E., Director

Designed	JLC
Drawn	JLC
Checked	MPK
Proj. Engr.	CJR

No.	Revision Description	Engineer	Date

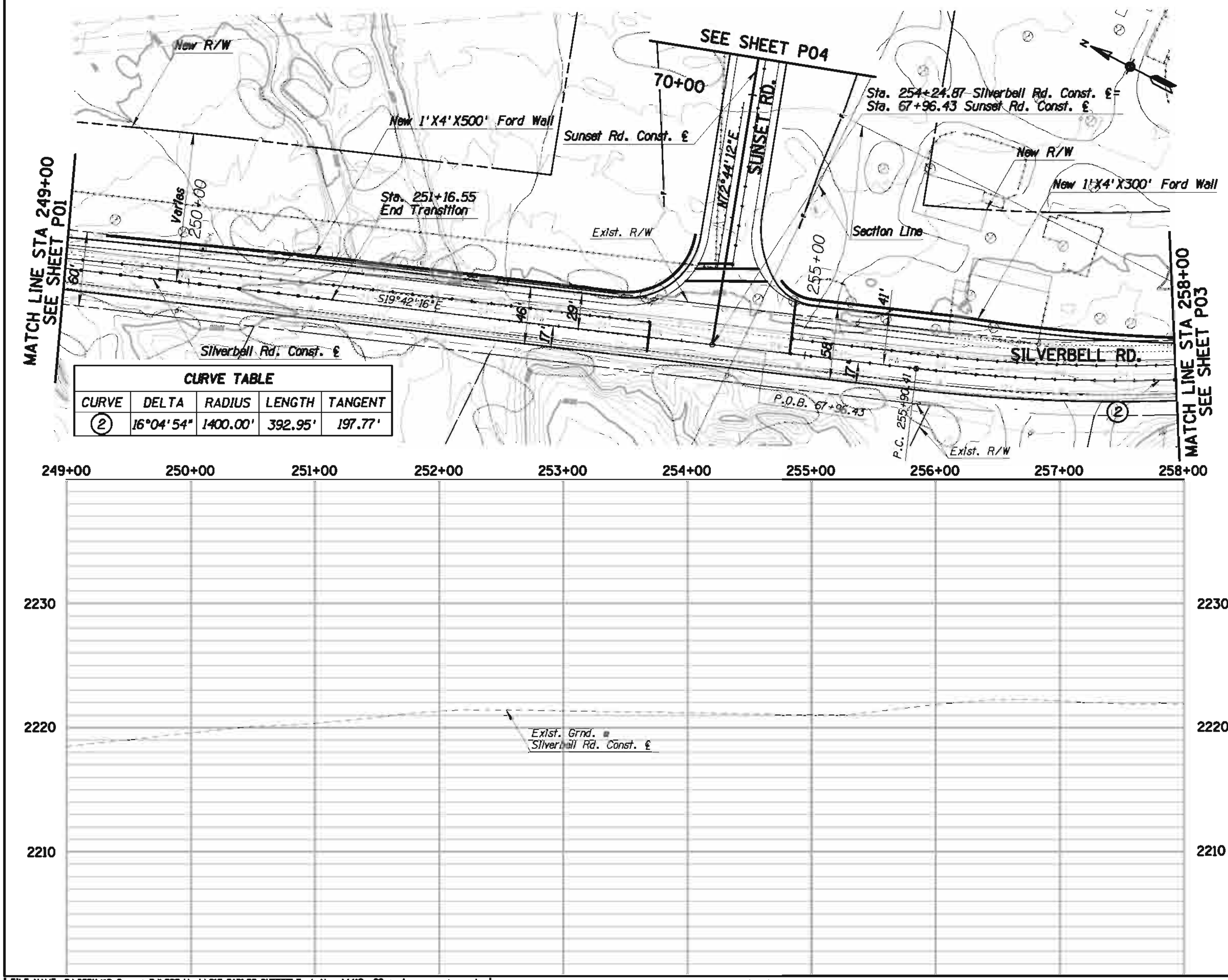
Silverbell Rd./ Sunset Rd. Technical Memo

AECOM

Arizona Blue Stake 1-800-STAKE-IT 1-800-782-5348

ROADWAY PLAN & PROFILE SHEET
SUNSET ROAD
PROJECT NO. 4RTSUN

SUNSET ROAD - SILVERBELL ROAD TO I-10 - PROJECT NO. 4RTSUN



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TECHNICAL MEMO
INTERIM SILVERBELL OPTION

Pima County Department of Transportation — Priscilla S. Cornelio, P.E., Director

Designed	JLC	03/14
Drawn	JLC	03/14
Checked	MPK	03/14
Proj. Engr.	CJR	03/14

No.	Revision Description	Engineer	Date

Silverbell Rd./ Sunset Rd. Technical Memo

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Arizona Blue Stake 1-800-STAKE-IT

ROADWAY PLAN & PROFILE SHEET
SUNSET ROAD
PROJECT NO. 4RTSUN

Scale: 1"=40' | Sheet P02 of P04 | Page 3 of 9

SUNSET ROAD - SILVERBELL ROAD TO I-10 - PROJECT NO. 4RTSUN

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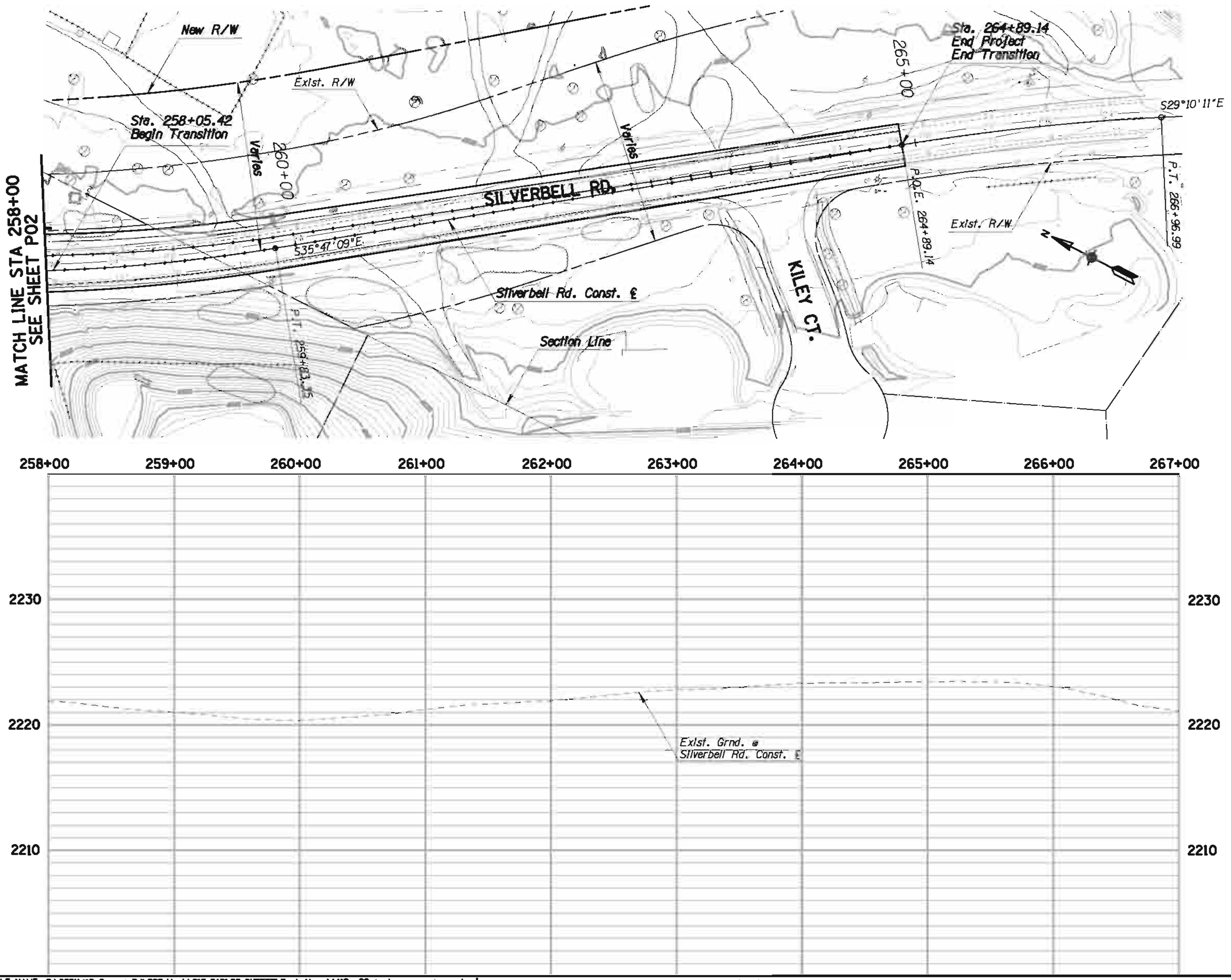

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TECHNICAL MEMO
INTERIM SILVERBELL OPTION

Pima County Department of Transportation

Priscilla S. Cornelio, P.E., Director

ROADWAY PLAN & PROFILE SHEET
SUNSET ROAD
PROJECT NO. 4RTSUN

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1-800-782-5348

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Silverbell Rd./ Sunset Rd. Technical Memo

No.	Revision Description	Engineer	Date

		Date
Designed	JLC	03/14
Drawn	JLC	03/14
Checked	MPK	03/14
Proj. Engr.	CJR	03/14

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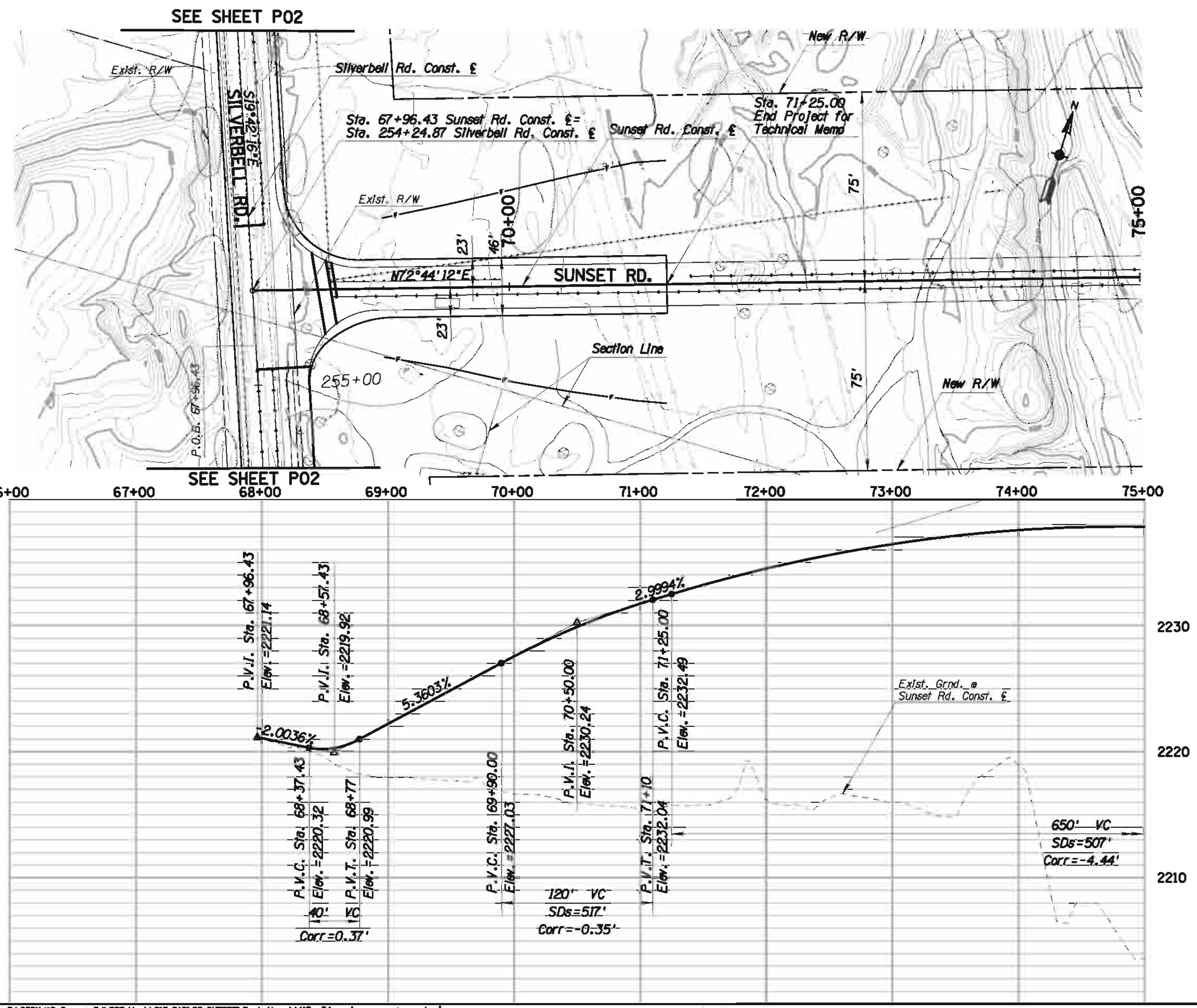
SUNSET ROAD - SILVERBELL ROAD TO I-10 - PROJECT NO. 4RTSUN



TECHNICAL MEMO
INTERIM SILVERBELL OPTION

Pima County Department of Transportation

Priscilla S. Cornelio, P.E., Director

No.	Revision Description	Engineer	Date

Designed	JLC	03/14
Drawn	JLC	03/14
Checked	MPK	03/14
Proj. Engr.	CJR	03/14

Silverbell Rd./ Sunset Rd. Technical Memo

AECOM

Arizona Blue Stake 1-800-STAKE-IT 1-800-782-5348

ROADWAY PLAN & PROFILE SHEET
SUNSET ROAD
PROJECT NO. 4RTSUN

Scale: 1"=40' | Sheet P04 of P04 |

SUNSET ROAD - SILVERBELL ROAD TO I-10 - PROJECT NO. 4RTSUN

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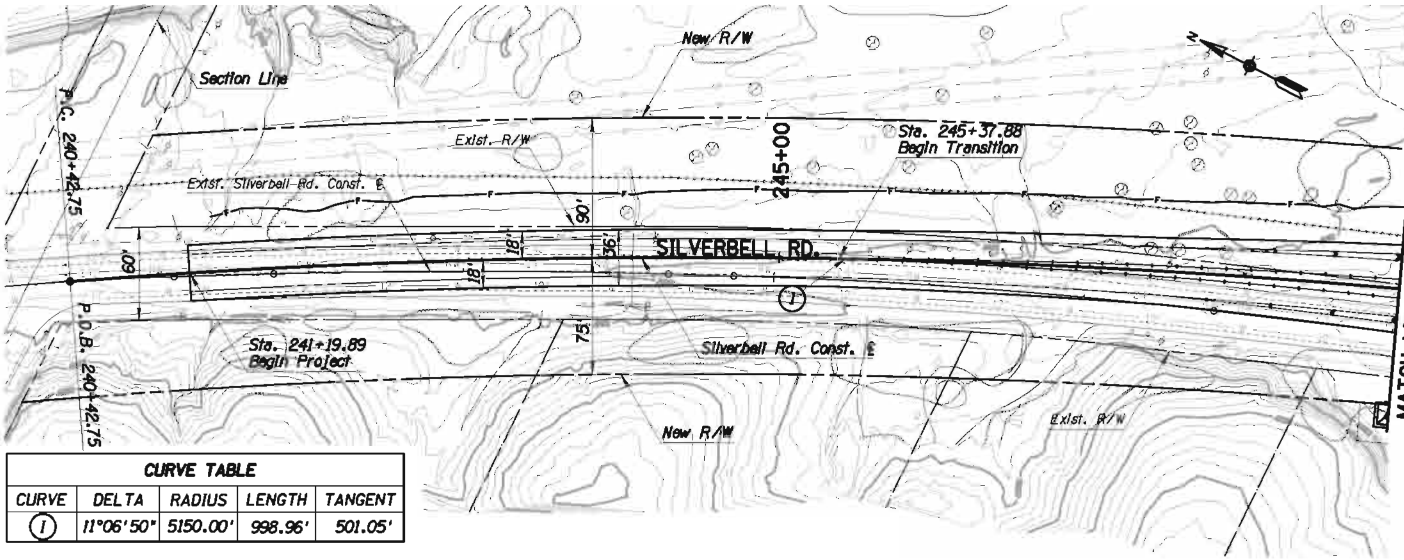

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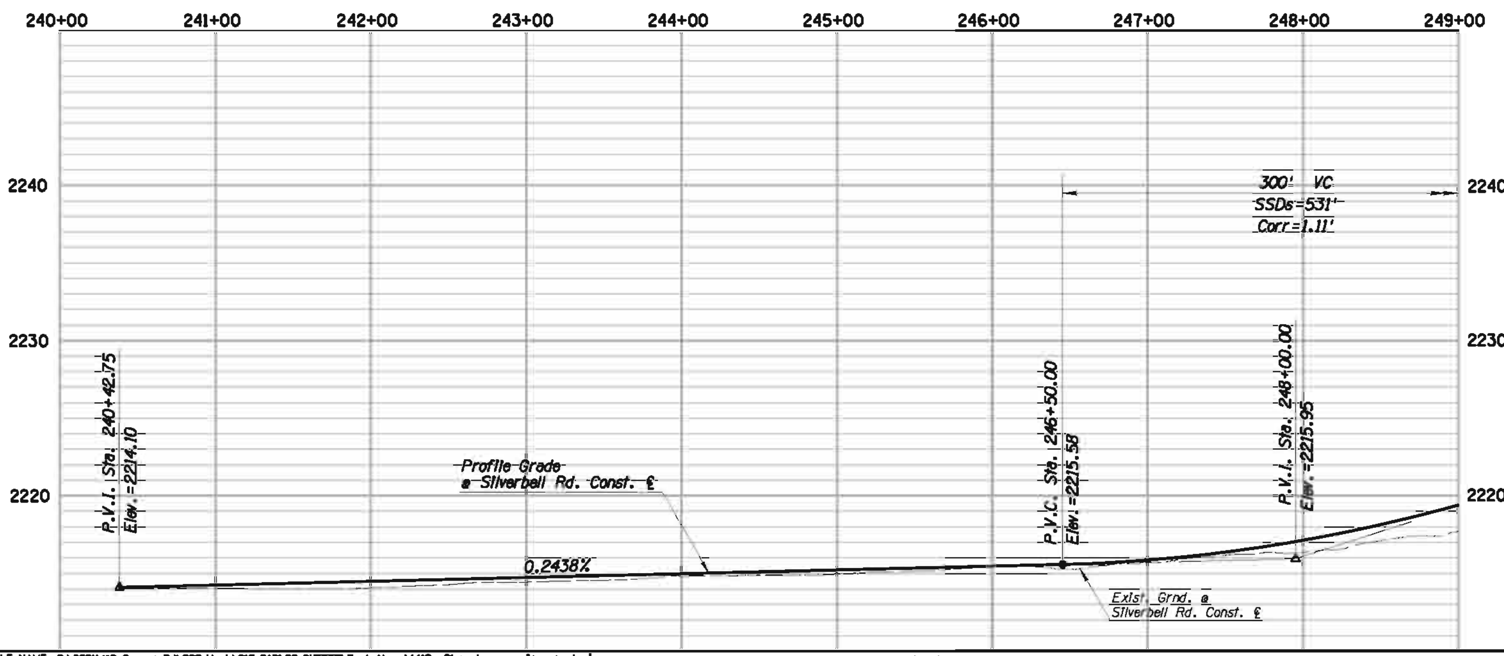


TECHNICAL MEMO
ULTIMATE SILVERBELL OPTION

Pima County Department of Transportation

Priscilla S. Cornelio, P.E., Director

Designed	JLC	03/14
Drawn	JLC	03/14
Checked	MPK	03/14
Proj. Engr.	CJR	03/14

No.	Revision Description	Engineer	Date

Silverbell Rd./ Sunset Rd. Technical Memo

AECOM

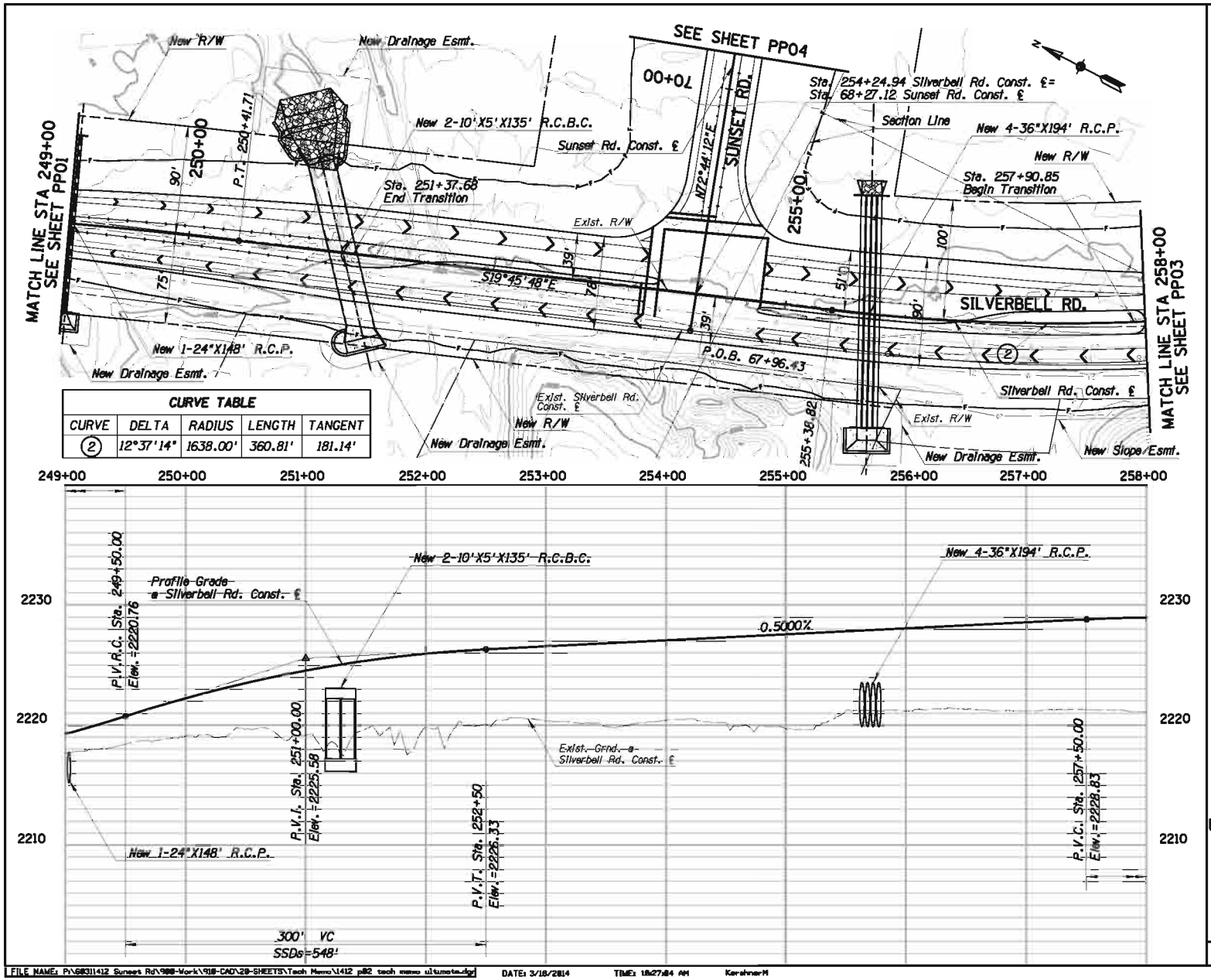
Arizona Blue Stake 1-800-STAKE-IT 1-800-782-5348

ROADWAY PLAN & PROFILE SHEET
SUNSET ROAD
PROJECT NO. 4RTSUN

Scale: 1"=40' | Sheet PP01 of PP04 | Page 6 of 9

SUNSET ROAD - SILVERBELL ROAD TO I-10 - PROJECT NO. 4RTSUN

FILE NAME: P:\60311412 Sunset Rd\900-Work\910-CAD\20-SHEETS\Tech Memo\1412 p01 tech memo ultimate.dgn DATE: 3/18/2014 TIME: 10:25:52 AM KershnerM



CURVE TABLE				
CURVE	DELTA	RADIUS	LENGTH	TANGENT
(2)	12°37'14"	1638.00'	360.81'	181.14'

TECHNICAL MEMO
ULTIMATE SILVERBELL OPTION

Pima County Department of Transportation

Priscilla S. Cornelio, P.E., Director

No.	Revision Description	Engineer	Date

			Date
Designed	J.C.		03/14
Drawn	J.C.		03/14
Checked	M.M.		03/14
Proj. Engr.	C.B.		03/14

Silverbell Rd./ Sunset Rd. Roadway Plans

AECOM

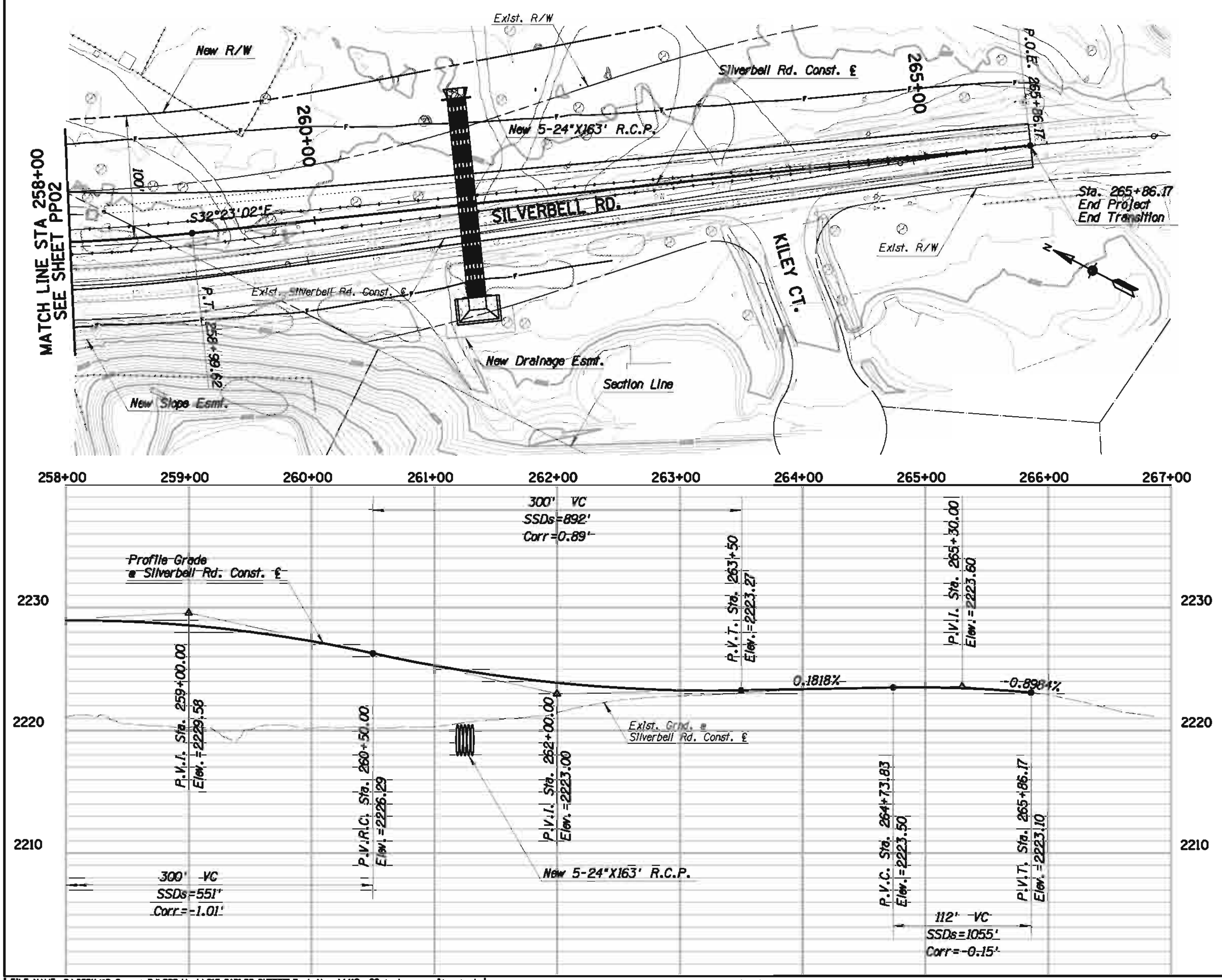
Arizona Blue Stake 1-800-STAKE-IT (1-800-782-5348)

ROADWAY PLAN & PROFILE SHEET
SUNSET ROAD
PROJECT NO. 4RTSUN

SUNSET ROAD - SILVERBELL ROAD TO I-10 - PROJECT NO. 4RTSUN

Scale:	1"=40'	Sheet PP02 of PP04	Page 7 of 9

FILE NAME: P:\58311412 Sunset Rd\900-Work\918-CAD\28-SHEETS\Tech Memo\1412 p02 tech memo ultimate.dgn DATE: 3/18/2014 TIME: 10:27:24 AM Kershner M



TECHNICAL MEMO
ULTIMATE SILVERBELL OPTION

Pima County Department of Transportation

Priscilla S. Cornelio, P.E., Director

Designed	JLC	03/14
Drawn	JLC	03/14
Checked	MPK	03/14
Proj. Engr.	CJR	03/14

ROADWAY PLAN & PROFILE SHEET
SUNSET ROAD
PROJECT NO. 4RTSUN

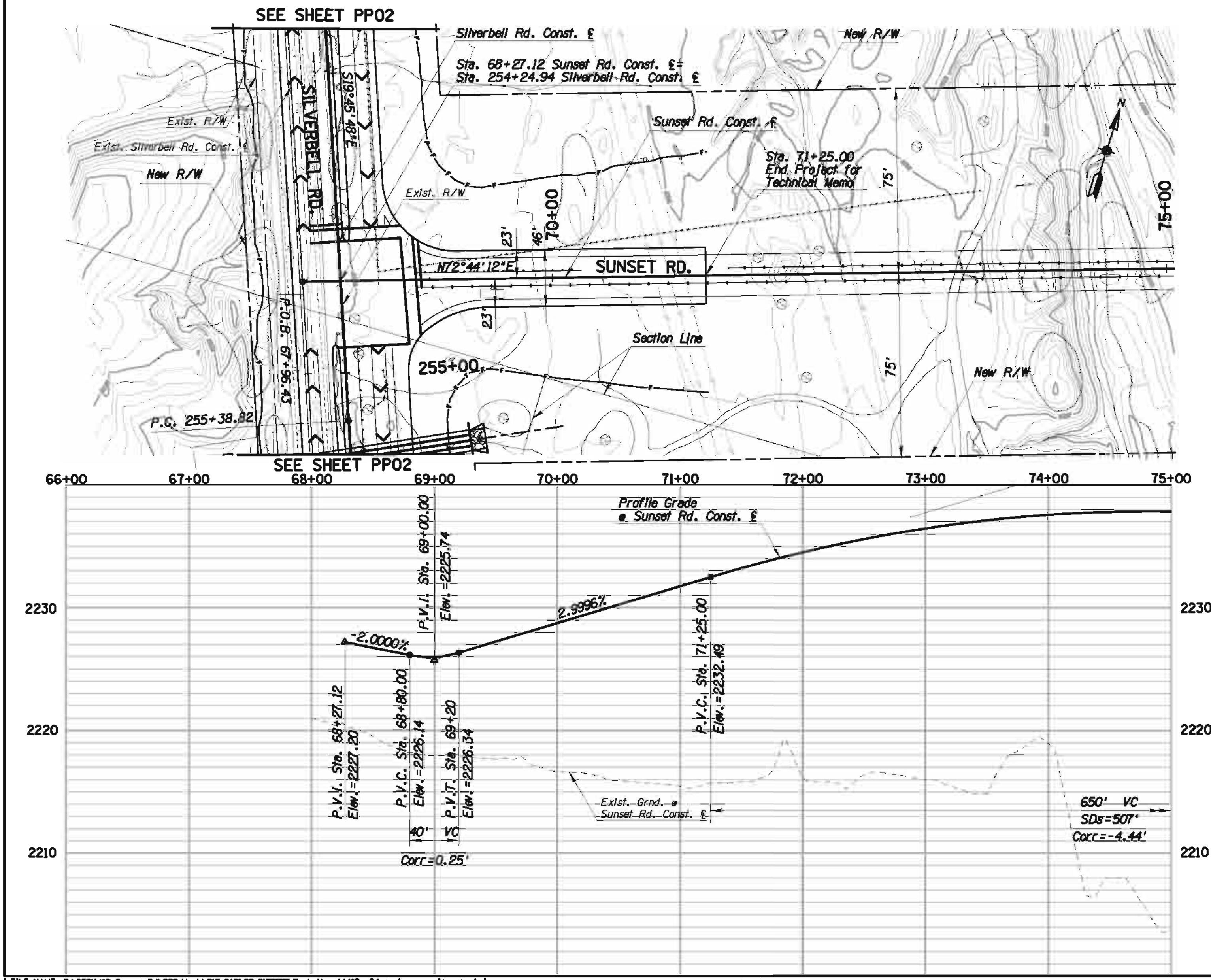
AECOM

Silverbell Rd./ Sunset Rd. Technical Memo

Scale: 1"=40' | Sheet PP03 of PP04 | Page 8 of 9

SUNSET ROAD - SILVERBELL ROAD TO I-10 - PROJECT NO. 4RTSUN

FILE NAME: P:\60311412 Sunset Rd\900-Work\910-CAD\20-SHEETS\Tech Memo\1412 p03 tech memo ultimate.dgn DATE: 3/18/2014 TIME: 10:29:24 AM KershnerM



TECHNICAL MEMO
ULTIMATE SILVERBELL OPTION

Pima County Department of Transportation

Priscilla S. Cornelio, P.E., Director

Designed	JLC	03/14
Drawn	JLC	03/14
Checked	MPK	03/14
Proj. Engr.	CJR	03/14

No.	Revision Description	Engineer	Date

Silverbell Rd./ Sunset Rd. Technical Memo

AECOM

Arizona Blue Stake 1-800-STAKE-IT 1-800-782-5348

ROADWAY PLAN & PROFILE SHEET
SUNSET ROAD
PROJECT NO. 4RTSUN

Scale: 1"=40' | Sheet PP04 of PP04 | Page 9 of 9

SUNSET ROAD - SILVERBELL ROAD TO I-10 - PROJECT NO. 4RTSUN

FILE NAME: P:\60311412 Sunset Rd\900-Work\910-CAD\20-SHEETS\Tech Memo\1412 p04 tech memo ultimate.dgn DATE: 3/18/2014 TIME: 10:29:36 AM KershnerM

Appendix B – Preliminary Cost Estimates

Interim Alternative Probable Cost

	ITEM NO.	ITEM DESCRIPTION	UNIT	QUANTITY	UNIT PRICE	AMOUNT
1	2010001	CLEARING AND GRUBBING	L.S.	1	$10,000.00	$10,000.00
2	2010010	CLEARING AND GRUBBING (NOXIOUS AND INVASIVE SPECIES CONTROL ALLOWANCE)	USD	5,000	$1.00	$5,000.00
3	2020001	REMOVAL OF STRUCTURES & OBSTRUCTIONS	L.S.	1	$10,000.00	$10,000.00
4	2020030	REMOVAL OF BITUMINOUS PAVEMENT BY MILLING	S.Y.	6,700	$2.00	$13,400.00
5	2030901	BORROW	C.Y.	11,000	$12.00	$132,000.00
6	3030003	AGGREGATE BASE	C.Y.	834	$40.00	$33,360.00
7	4060001	ASPHALTIC CONCRETE (NO. 1)	TON	544	$85.00	$46,240.00
8	4060002	ASPHALTIC CONCRETE (NO. 2)	TON	1,275	$85.00	$108,375.00
9	7010001	MAINTENANCE AND PROTECTION OF TRAFFIC	L.S.	1	$50,000.00	$50,000.00
10	7010007	CONSTRUCTION AREA ELEMENTS (PREDETERMINED REIMBURSEMENT RATE ALLOWANCE)	USD	25,000	$1.00	$25,000.00
11	9010001	MOBILIZATION	L.S.	1	$100,000.00	$100,000.00
12	9080504	CONCRETE FORD WALL (1'x4')	L.F.	800	$75.00	$60,000.00
13	9250001	CONSTRUCTION SURVEYING AND LAYOUT	L.S.	1	$15,000.00	$15,000.00
14	9300100	INCIDENTAL ITEMS ALLOWANCE	USD	20,000	$1.00	$20,000.00
15		TRAFFIC SIGNAL	EACH	1	$150,000.00	$150,000.00
16		PAVEMENT MARKINGS	L.S.	1	$10,000.00	$10,000.00
17		SIGNING	L.S.	1	$25,000.00	$25,000.00
18		LANDSCAPE & IRRIGATION	L.S.	1	$0.00	$0.00
19		EROSION CONTROL	L.S.	1	$15,000.00	$15,000.00
		ROADWAY TOTAL				**$828,375.00**
		ENGINEERING DESIGN (10%)				$82,838.00
		CONTINGENCIES (25%)				$207,094.00
		RIGHT OF WAY				$0.00
		POST DESIGN SERVICES (1%)				$8,284.00
		CONSTRUCTION ADMINSITRATION (15%)				$124,256.00
		INTERIM ALTERNATIVE TOTAL PROJECT COST				**$1,250,847.00**

Interim Alternative Probable Cost of Throwaway

	ITEM NO.	ITEM DESCRIPTION	UNIT	QUANTITY	UNIT PRICE	AMOUNT
1	3030003	AGGREGATE BASE	C.Y.	834	$40.00	$33,360.00
2	4060001	ASPHALTIC CONCRETE (NO. 1)	TON	544	$85.00	$46,240.00
3	4060002	ASPHALTIC CONCRETE (NO. 2)	TON	1,275	$85.00	$108,375.00
4	9080504	CONCRETE FORD WALL (1'X4")	L.F.	800	$75.00	$60,000.00
5		TRAFFIC SIGNAL	EACH	1	$100,000.00	$100,000.00
6		PAVEMENT MARKINGS	L.S.	1	$6,500.00	$6,500.00
7		SIGNING	L.S.	1	$16,250.00	$16,250.00
		INTERIM ALTERNATIVE ROADWAY THROWAWAY TOTAL				**$370,725.00**

Ultimate Alternative Probable Cost

	ITEM NO.	ITEM DESCRIPTION	UNIT	QUANTITY	UNIT PRICE	AMOUNT
1	2010001	CLEARING AND GRUBBING	L.S.	1	$25,000.00	$25,000.00
2	2010010	CLEARING AND GRUBBING (NOXIOUS AND INVASIVE SPECIES CONTROL ALLOWANCE)	USD	10,000	$1.00	$10,000.00
3	2020001	REMOVAL OF STRUCTURES & OBSTRUCTIONS	L.S.	1	$25,000.00	$25,000.00
4	2020029	REMOVAL OF BITUMINOUS PAVEMENT	S.Y.	9,000	$3.00	$27,000.00
5	2030901	BORROW	C.Y.	50,000	$12.00	$600,000.00
6	3030003	AGGREGATE BASE	C.Y.	3,181	$40.00	$127,256.00
7	4060001	ASPHALTIC CONCRETE (NO. 1)	TON	2,183	$85.00	$185,555.00
8	4060002	ASPHALTIC CONCRETE (NO. 2)	TON	1,862	$85.00	$158,270.00
9	5011024	PIPE, REINFORCED CONCRETE, CLASS IV, 24"	L.F.	963	$95.00	$91,485.00
10	5011044	PIPE, REINFORCED CONCRETE, CLASS IV, 36"	L.F.	776	$145.00	$112,520.00
11	6010101	BOX CULVERT 1 (2-10'X5' RCBC)	L.F.	135	$1,675.00	$226,125.00
12	7010001	MAINTENANCE AND PROTECTION OF TRAFFIC	L.S.	1	$120,000.00	$120,000.00
13	7010007	CONSTRUCTION AREA ELEMENTS (PREDETERMINED REIMBURSEMENT RATE ALLOWANCE)	USD	50,000	$1.00	$50,000.00
14	9010001	MOBILIZATION	L.S.	1	$250,000.00	$250,000.00
15	9080001	CONCRETE CURB (STD. DTL. 209) (TYPE 1)	L.F.	2,240	$18.00	$40,320.00
16	9080286	MEDIAN REFUGE AREA (TYPE 2)	EACH	1	$1,200.00	$1,200.00
17	9250001	CONSTRUCTION SURVEYING AND LAYOUT	L.S.	1	$35,000.00	$35,000.00
18	9300100	INCIDENTAL ITEMS ALLOWANCE	USD	35,000	$1.00	$35,000.00
19		STORM DRAIN	L.S.	1	$50,000.00	$50,000.00
20		TRAFFIC SIGNAL	L.S.	1	$200,000.00	$200,000.00
21		PAVEMENT MARKINGS	L.S.	1	$25,000.00	$25,000.00
22		SIGNING	L.S.	1	$50,000.00	$50,000.00
23		LANDSCAPE & IRRIGATION	L.S.	1	$0.00	$0.00
24		EROSION CONTROL	L.S.	1	$35,000.00	$35,000.00
		ROADWAY TOTAL				**$2,479,731.00**
		ENGINEERING DESIGN (10%)				$247,973.00
		CONTINGENCIES (25%)				$619,933.00
		RIGHT OF WAY	S.F.	12,235	$1.50	$18,353.00
		EASEMENTS	S.F.	9,638	$0.75	$7,228.00
		POST DESIGN SERVICES (1%)				$24,797.00
		CONSTRUCTION ADMINSITRATION (15%)				$371,960.00
		ULTIMATE ALTERNATIVE TOTAL CONSTRUCTION COST:				**$3,769,975.00**

Ultimate Alternative Probable Cost of Throwaway

	ITEM NO.	ITEM DESCRIPTION	UNIT	QUANTITY	UNIT PRICE	AMOUNT
1	3030003	AGGREGATE BASE	C.Y.	1,873	$40.00	$74,927.00
2	4060001	ASPHALTIC CONCRETE (NO. 1)	TON	1,222	$85.00	$103,891.00
3	4060002	ASPHALTIC CONCRETE (NO. 2)	TON	1,222	$85.00	$103,891.00
4		PAVEMENT MARKINGS	L.S.	1	$5,000.00	$5,000.00
5		SIGNING	L.S.	1	$12,500.00	$12,500.00
		ULTIMATE ALTERNATIVE ROADWAY THROWAWAY TOTAL				**$300,209.00**

A-5 Cost Estimate

SUNSET ROAD - SILVERBELL ROAD TO INTERSTATE 10 EASTBOUND FRONTAGE ROAD
30% COST ESTIMATE

Date: 11/18/2014

ITEM NO.	ITEM DESCRIPTION	UNIT	UNIT PRICE	QUANTITY	AMOUNT
1090010	FUEL ADJUSTMENT ALLOWANCE	USD	$1.00	7,500	$7,500.00
2010001	CLEARING AND GRUBBING	L.S.	$15,000.00	1	$15,000.00
2010004	PRESERVATION FENCING	L.F.	$1.25	1,000	$1,250.00
2010010	CLEARING AND GRUBBING (NOXIOUS AND INVASIVE SPECIES CONTROL ALLOWANCE)	USD	$1.00	2,500	$2,500.00
2020001	REMOVAL OF STRUCTURES & OBSTRUCTIONS	L.S.	$25,000.00	1	$25,000.00
2020029	REMOVAL OF BITUMINOUS PAVEMENT	S.Y.	$2.75	1,446	$3,977.00
2020030	REMOVAL OF BITUMINOUS PAVEMENT BY MILLING	S.Y.	$3.00	1,598	$4,794.00
2030300	ROADWAY EXCAVATION	C.Y.	$8.00	34,000	$272,000.00
2030401	DRAINAGE EXCAVATION	C.Y.	$15.00	9,160	$137,400.00
2030502	EXCAVATION (OVEREXCAVATION AND RECOMPACTION)	C.Y.	$4.00	43,389	$173,556.00
2030901	BORROW	C.Y.	$10.00	69,137	$691,370.00
3030003	AGGREGATE BASE	C.Y.	$32.00	2,885	$92,320.00
4040111	TACK COAT	TON	$750.00	5	$3,750.00
4060001	ASPHALTIC CONCRETE (NO. 1)	TON	$70.00	1,253	$87,710.00
4060002	ASPHALTIC CONCRETE (NO. 2)	TON	$110.00	2,754	$302,940.00
4060510	BITUMINOUS MATERIAL PRICE ADJUSTMENT ALLOWANCE	USD	$1.00	10,000	$10,000.00
5011022	PIPE, REINFORCED CONCRETE, CLASS II, 24"	L.F.	$80.00	227	$18,160.00
5011025	PIPE, REINFORCED CONCRETE, CLASS V, 24"	L.F.	$160.00	591	$94,560.00
5011042	PIPE, REIFORCED CONCRETE, CLASS II, 36"	L.F.	$110.00	880	$96,800.00
5030063	JUNCTION STRUCTURE (STORM DRAIN), MISCELLANEOUS	EACH	$2,500.00	1	$2,500.00
5030734	CATCH BASIN, TYPE 4, OFF ROAD, 1-GRATE (D=<8')	EACH	$3,500.00	5	$17,500.00
5030790	CATCH BASIN SCUPPER	EACH	$2,000.00	36	$72,000.00
5150005	UTILITY POTHOLING, DEPTH <12'	EACH	$250.00	30	$7,500.00
5150007	UTILITY POTHOLING, DEPTH ≥12'	EACH	$400.00	10	$4,000.00
5150101	UTILITY IMPACT ALLOWANCE	USD	$1.00	15,000	$15,000.00
6016087	PIPE CULVERT HEADWALL	EACH	$12,000.00	2	$24,000.00
6070010	SIGN POST (PERFORATED) (SINGLE)	L.F.	$5.00	440	$2,200.00
6070110	FOUNDATION FOR SIGN POST (PERFORATED)	EACH	$150.00	44	$6,600.00
6070210	REMOVE AND SALVAGE SIGNS	L.S.	$1,000.00	1	$1,000.00
6080016	SIGN PANEL (TRAFFIC CONTROL) (PERMANENT) (TYPE IV)	S.F.	$10.00	200	$2,000.00
6080020	SIGN PANEL (TRAFFIC CONTROL) (PERMANENT) (DIAMOND GRADE)	S.F.	$12.00	180	$2,160.00
7010007	CONSTRUCTION AREA ELEMENTS (PREDETERMINED REIMBURSEMENT RATE ALLOWANCE)	USD	$1.00	15,000	$15,000.00
7040010	PAVEMENT MARKING (WHITE HOT-SPRAYED THERMOPLASTIC) (0.060")	L.F.	$0.40	18,000	$7,200.00
7040020	PAVEMENT MARKING (YELLOW HOT-SPRAYED THERMOPLASTIC) (0.060")	L.F.	$0.40	14,300	$5,720.00
7040030	PAVEMENT MARKING (WHITE HOT-SPRAYED THERMOPLASTIC) SGL. ARROW (0.090")	EACH	$115.00	10	$1,150.00
7040040	PAVEMENT MARKING (WHITE HOT-SPRAYED THERMOPLASTIC) DBL. ARROW (0.090")	EACH	$150.00	1	$150.00
7040060	PAVEMENT LEGEND (WHITE HOT-SPRAYED THERMOPLASTIC) (ONLY) (0.090")	EACH	$130.00	6	$780.00
7040110	PAVEMENT MARKING (WHITE HOT-SPRAYED THERMOPLASTIC) (TRANSVERSE)(0.90")	L.F.	$0.50	2,300	$1,150.00
7040120	PAVEMENT MARKING (YELLOW HOT-SPRAYED THERMOPLASTIC) (TRANSVERSE)) (0.09")	L.F.	$0.50	1,600	$800.00
7050080	PAVEMENT LEGEND, PREFORMED, TYPE I, BIKE LANE LEGEND AND SYMBOL	EACH	$150.00	8	$1,200.00
7060020	PAVEMENT MARKER, REFLECTIVE, (TYPE C, CLEAR, RED)	EACH	$3.50	26	$91.00
7060025	PAVEMENT MARKER, REFLECTIVE, (TYPE D, YELLOW, TWO-WAY)	EACH	$3.50	471	$1,649.00
7080001	PAVEMENT MARKING (PAINTED)	L.F.	$0.15	35,800	$5,370.00
7080010	PAINTED PAVEMENT SYMBOL OR LEGEND	EACH	$65.00	25	$1,625.00
7310030	POLE (TYPE G)	EACH	$4,500.00	1	$4,500.00

SUNSET ROAD - SILVERBELL ROAD TO INTERSTATE 10 EASTBOUND FRONTAGE ROAD
30% COST ESTIMATE

Date: 11/18/2014

ITEM NO.	ITEM DESCRIPTION	UNIT	UNIT PRICE	QUANTITY	AMOUNT
7310035	POLE (TYPE J)	EACH	$3,500.00	2	$7,000.00
7310045	POLE (TYPE Q)	EACH	$4,500.00	1	$4,500.00
7310060	POLE (TYPE 2B STREET LIGHT)	EACH	$2,300.00	4	$9,200.00
7310215	POLE FOUNDATION (TYPE G)	EACH	$850.00	1	$850.00
7310220	POLE FOUNDATION (TYPE J)	EACH	$1,500.00	2	$3,000.00
7310230	POLE FOUNDATION (TYPE Q)	EACH	$1,600.00	4	$6,400.00
7310240	POLE FOUNDATION (TYPE 2A, 2B, AND 2C STREET LIGHT)	EACH	$750.00	4	$3,000.00
7310405	MAST ARM (25 FT.)(TAPERED)	EACH	$1,400.00	2	$2,800.00
7310410	MAST ARM (30 FT.)(TAPERED)	EACH	$1,400.00	1	$1,400.00
7310535	MAST ARM (20 FT.)(LUMINAIRE TAPERED)	EACH	$800.00	2	$1,600.00
7320010	ELECTRICAL CONDUIT (1")(PVC)(TRENCHED)	LF	$8.00	947	$7,576.00
7320020	ELECTRICAL CONDUIT (2")(PVC)(TRENCHED)	LF	$9.00	65	$585.00
7320080	ELECTRICAL CONDUIT (3")(PVC)(TRENCHED)	LF	$10.00	130	$1,300.00
7320090	ELECTRICAL CONDUIT (4")(PVC)(TRENCHED)	LF	$11.00	210	$2,310.00
7320092	ELECTRICAL CONDUIT (4")(PVC)(SECOND IN TRENCH)	LF	$6.00	270	$1,620.00
7320400	PULL BOX (NO. 3 1/2)	EACH	$400.00	6	$2,400.00
7320420	PULL BOX (NO. 7)	EACH	$500.00	3	$1,500.00
7320421	PULL BOX (NO. 7) (WITH EXTENSION)	EACH	$650.00	1	$650.00
7320600	CONDUCTORS (TRAFFIC SIGNAL AND INTEGRAL STREET LIGHTING)	LS	$20,000.00	1	$20,000.00
7320690	GROUND ROD (3/4"X10')	EACH	$80.00	1	$80.00
7320825	BATTERY BACK UP POWER SYSTEM (DEPT. SUPPLIED)	EACH	$700.00	1	$700.00
7320890	ELECTRIC SERVICE INSTALLATION	LS	$1,500.00	1	$1,500.00
7320891	METER SERVICE PEDESTAL CABINET	EACH	$2,200.00	1	$2,200.00
7320892	METERED PEDESTAL FOUNDATION	EACH	$700.00	1	$700.00
7320888	ELECTRIC SERVICE INSTALLATION FEE ALLOWANCE	USD	$1,500.00	1	$1,500.00
7330045	TRAFFIC SIGNAL FACE (TYPE F)	EACH	$560.00	9	$5,040.00
7330050	TRAFFIC SIGNAL FACE (TYPE Q)	EACH	$800.00	4	$3,200.00
7330200	TRAFFIC SIGNAL FACE (PEDESTRIAN MAN/HAND COUNTDOWN)	EACH	$410.00	4	$1,640.00
7330305	TRAFFIC SIGNAL MOUNTING ASSEMBLY (TYPE II)	EACH	$150.00	7	$1,050.00
7330320	TRAFFIC SIGNAL MOUNTING ASSEMBLY (TYPE V)	EACH	$450.00	4	$1,800.00
7330325	TRAFFIC SIGNAL MOUNTING ASSEMBLY (TYPE VI)	EACH	$500.00	1	$500.00
7330350	TRAFFIC SIGNAL MOUNTING ASSEMBLY (TYPE XI)	EACH	$275.00	4	$1,100.00
7330501	PRE-EMPT BEACON (DEPARTMENT FURNISHED)	EACH	$200.00	3	$600.00
7330512	PRE-EMPT SENSOR (DEPARTMENT FURNSHED)	EACH	$200.00	3	$600.00
7340100	CONTROL CABINET (AGENCY SUPPLIED/CONTRACTOR INSTALLED)	EACH	$760.00	1	$760.00
7340350	CONTROLLER FOUNDATION	EACH	$900.00	1	$900.00
7340125	SIGNAL METER PEDESTAL (W/ FOUNDATION)(TRAFFIC SIGNAL)	EACH	$2,000.00	1	$2,000.00
7350001	VIDEO DETECTION SYSTEM (AGENCY SUPPLIED / CONTRACTOR INSTALLED)	EACH	$2,000.00	1	$2,000.00
7350400	PEDESTRIAN PUSH BUTTON (2" ADA BUTTON W/ SIGN)	EACH	$460.00	4	$1,840.00
7360050	LUMINAIRE (HORIZONTAL MOUNT)(LED)	EACH	$800.00	6	$4,800.00
7360190	PHOTO ELECTRIC CONTROL	EACH	$100.00	1	$100.00
7360200	METRO STREET NAME SIGNS WITH FLAG MOUNT	EACH	$2,500.00	3	$7,500.00
7370220	INCIDENTAL ELECTRICAL WORK	LS	$5,000.00	1	$5,000.00
732XXXX	ITS INSTALLATION	L.S.	$45,000.00	1	$45,000.00
810XXXX	Landscpaping / Irrigation (4% of URS 2005 estimate)	L.S.	$413,960.00	1	$413,960.00

SUNSET ROAD - SILVERBELL ROAD TO INTERSTATE 10 EASTBOUND FRONTAGE ROAD
30% COST ESTIMATE

Date: 11/18/2014

ITEM NO.	ITEM DESCRIPTION	UNIT	UNIT PRICE	QUANTITY	AMOUNT
9050001	GUARD RAIL, W-BEAM, SINGLE FACE	L.F.	$20.00	19	$380.00
9050020	GUARD RAIL TERMINAL (SKT 350)	EACH	$2,750.00	2	$5,500.00
9050036	GUARD RAIL, ANCHOR ASSEMBLY	EACH	$600.00	1	$600.00
9050402	GUARD RAIL TRANSITION, THRIE BEAM TO CONCRETE BARRIER	EACH	$1,500.00	1	$1,500.00
9050403	GUARD RAIL TRANSITION, W-BEAM TO THRIE BEAM	EACH	$1,250.00	1	$1,250.00
9080063	CONCRETE CURB AND GUTTER (C-05.10) (TYPE D)	L.F.	$25.00	221	$5,525.00
9080090	CONCRETE CURB TERMINAL SECTION (STD. DTL. 212)	EACH	$50.00	2	$100.00
9080092	CONCRETE CURB TERMINAL SECTION (C-05.10)	EACH	$75.00	2	$150.00
9080292	CONCRETE LANDING WITH DETECTABLE WARNING STRIP	EACH	$1,000.00	4	$4,000.00
9080294	CONCRETE SIDEWALK RAMP, TYPE A (C-05.30)	EACH	$1,400.00	2	$2,800.00
9080502	CONCRETE FORD WALL (1'x2')	L.F.	$30.00	1,867	$56,010.00
9080504	CONCRETE FORD WALL (1'x4')	L.F.	$55.00	321	$17,655.00
9080505	CONCRETE FORD WALL (1'x6')	L.F.	$80.00	135	$10,800.00
9090021	SURVEY MONUMENT, FRAME AND COVER	EACH	$350.00	11	$3,850.00
9100008	CONCRETE HALF BARRIER TRANSITION	EACH	$3,000.00	1	$3,000.00
9130001	RIPRAP (DUMPED)	C.Y.	$100.00	20	$2,000.00
9130004	RIPRAP (SLOPED MATTRESS)	C.Y.	$200.00	65	$13,000.00
9130005	RIPRAP (GABIONS)	C.Y.	$200.00	48	$9,600.00
9130009	RIPRAP (HAND PLACED) (GROUTED)	S.Y.	$50.00	6,044	$302,222.00
9200401	SOIL CEMENT BANK PROTECTION	C.Y.	$80.00	6,015	$481,200.00
9250111	SURVEY, ADDITIONAL STAKING AND LAYOUT ALLOWANCE	USD	$1.00	7,500	$7,500.00
9300100	INCIDENTAL ITEMS ALLOWANCE	USD	$1.00	300,000	$300,000.00
9330001	BARRICADE RAILING (PC/COT STD. DTL. 105)	L.F.	$30.00	2,900	$87,000.00
9999901	LUMP SUM STRUCTURE	L.S.	$4,654,596.00	1	$4,654,596.00
	INTERMEDIATE ROADWAY & STRUCTURES SUBTOTAL				$8,797,431.00
	CONTINGENCIES and OTHER COSTS			15%	$1,319,614.65
	EROSION CONTROL AND POLLUTION PREVENTION (NPDES)			2%	$131,961.47
	MAINTENANCE AND PROTECTION OF TRAFFIC			2%	$175,948.62
	MOBILIZATION (USING 15% DUE TO NEED TO AVOID WETLANDS)			15%	$1,319,614.65
	CONSTRUCTION COST SUBTOTAL				**$11,744,570.39**
	CONSTRUCTION ENGINEERING / ADMIN / SURVEY			20%	$2,348,914.08
	PUBLIC ART				$135,000.00
	ENGINEERING DESIGN (Consultant, current not to exceed limit)				$3,073,409.00
	ENGINEERING DESIGN (Internal labor)				$175,000.00
	UTILITY RELOCATION WORK (TEP/WAPA)				$750,000.00
	RIGHT-OF-WAY				$750,000.00
	ARCHAEOLOGICAL CLEARANCE / ENVIRONMENTAL IN-LIEU				$1,000,000.00
	TOTAL PROJECT COST				**$19,976,893.46**

A-6 Plans & Cross Sections

SUNSET ROAD
SILVERBELL ROAD TO INTERSTATE 10

GENERAL DESCRIPTION OF PROJECT

CONSTRUCTION OF 0.53 MILES OF NEW ROADWAY INCLUDING BRIDGE OVER SANTA CRUZ RIVER

PIMA COUNTY
TRANSPORTATION

PROJECT NUMBER
4RTSUN

PIMA COUNTY BOARD OF SUPERVISORS

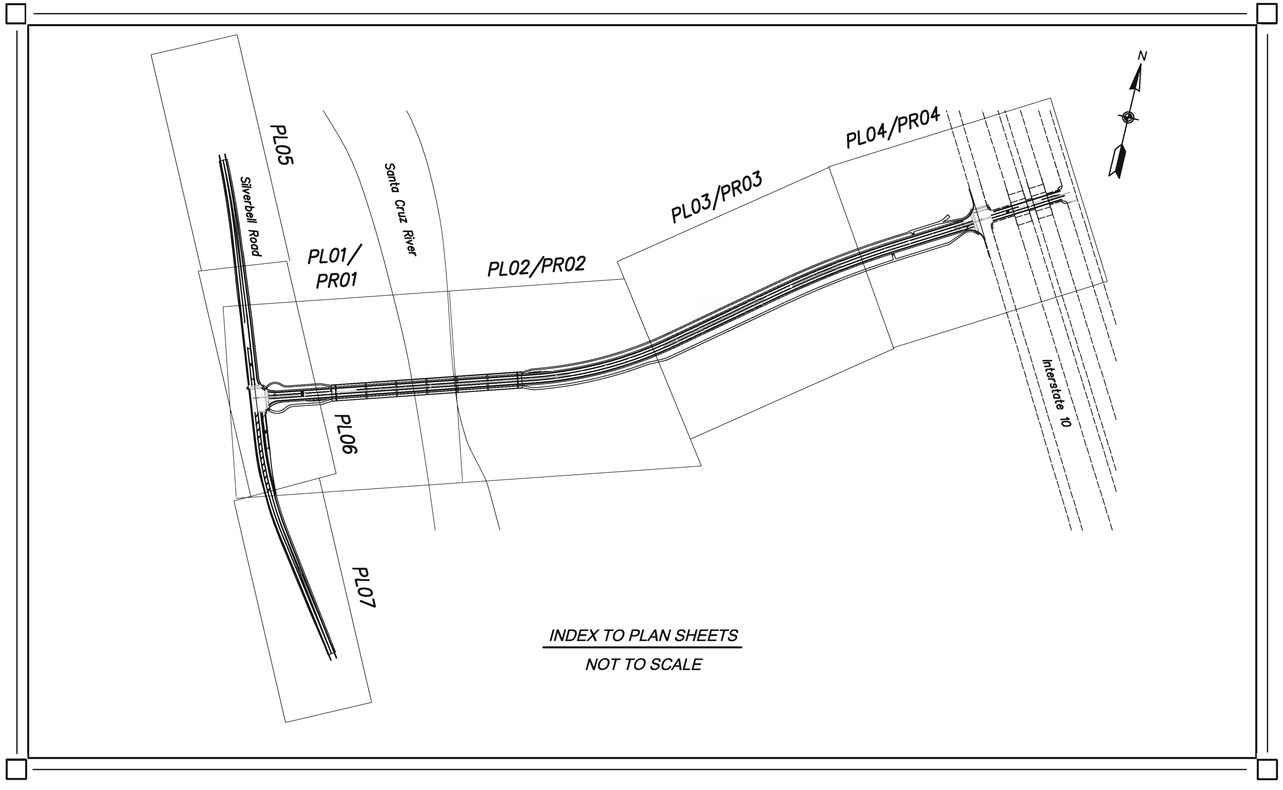
SHARON BRONSON, CHAIR, DISTRICT 3

ALLY MILLER, DISTRICT 1 RICHARD ELIAS, DISTRICT 5

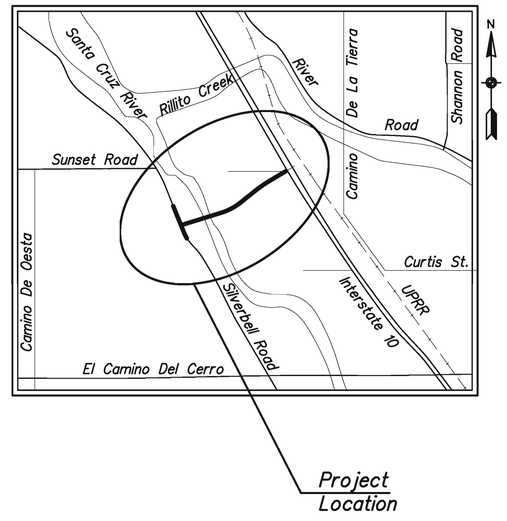
RAMON VALADEZ, DISTRICT 2 RAY CARROLL, DISTRICT 4

THIS PROJECT IS LOCATED WITHIN SUPERVISOR DISTRICT 1

SHEET INDEX



INDEX TO PLAN SHEETS
NOT TO SCALE



Location Map
NOT TO SCALE

Section 8, 17 18
T-13-S, R-13-E
G & S R B & M
Pima County, Arizona

Pima County Department of Transportation
201 N. Stone Ave. 4th floor Tucson, Arizona 85701
Phone Number: 724-6410
Priscilla S. Cornelio, P.E. Director

Call at least two full working days before you begin excavation.
ARIZONA 811 Arizona Blue Stake, Inc.
Dial 8-1-1 or 1-800-STAKE-IT (782-5348)
In Maricopa County: (602) 263-1100

Structural Grace, Inc
1430 E. Fort Lowell Rd., Ste. 200, Tucson, AZ 85719 (520) 320-0156

No.	Revisions	Engineer	Date
No.	As Built	Engineer	Date

30% PRELIMINARY NOT FOR CONSTRUCTION

Reviewed by	Engineer	Date
Mgr. Trans Engr.		
Mgr. Traffic Engr.		
Mgr. Field Engr.		
Mgr. WWM		
Mgr. Tucson Water		

Approved: _____ 20__
Director

Project No. 4RTSUN
Sheet No. CS01 of CS01
Page No. 1 of 36

10/6/2014 2:57:24 PM
W:\Jobs\2013\326...Sunset\326...Working\326...Sunset...00_FC01.dgn
Sunset Road - Silverbell Road to I-10 - Project No. 4RTSUN

GENERAL NOTES

1. Construction shall conform to the Pima County Association of Governments (PAG) Standard Specifications and Details for Construction, 2012 Edition, except as modified by the Special Provisions or where noted on the plans. In addition, the construction shall conform to the Arizona Department of Transportation (ADOT) May 2012 Construction Drawings (C-series) and the ADOT June 2012 Bridge Group, Structure Detail Drawings (SD-series) plus current revisions to either series.
2. Average daily traffic volume data varies per location. Refer to the Final Traffic Engineering Report, Sunset Road, Silverbell Road to I-10 (Segment I) dated August 2014.
3. Construction zone traffic control shall conform to the requirements of the "Manual on Uniform Traffic Control Devices" 2009 Edition, the project plans and the Special Provisions. Most elements of work will be included in a lump sum pay item. However, see Traffic Control Plans, bid schedule and Special Provisions for specific information.
4. Utility locations shown on plans were compiled based on the best information available to the department. Utility locations are not intended to be exact or complete. Prior to commencing construction, the contractor shall verify the location of all utilities with the appropriate organizations. Contact "Blue Stake" at 1-800-782-5348 two full working days prior to beginning construction (Saturdays and Sundays are not considered working days).
5. Right-of-way encroachments shall be removed only by order of Pima County, unless otherwise noted.
6. Removal of all cacti and native plants shall be in accordance with the provisions of the "Arizona Native Plant Law" A.R.S., Chapter 7.
7. Contractor shall comply with all applicable Occupational Safety and Health Administration regulations, in particular, shoring of trenches and excavations.
8. Contractor shall adjust all water meters, valve boxes, storm drain manholes, and sewer manholes and cleanouts to finish grade. This work shall be considered incidental to the other items of work, except when the bidding schedule contains specific items on a unit basis.
9. The design speed for Sunset Road is 40 mph. The posted speed limit is 35 mph. The design speed on Silverbell Road from Orange Grove Road to El Camino del Cerro is 50 mph. The posted speed limit is 45 mph.
10. Design vehicle is WB-62 for the project with the exception of U-turns; which were calculated using a standard passenger vehicle.
11. The basis of bearings for this project is a grid bearing of N55°56'26"E between Pima County DOT/City of Tucson DOT geodetic control point AI03 and Pima County DOT/City of Tucson DOT geodetic control point AG09, as established from the Arizona Coordinate System, 1983 (Harn 92), central zone 0202.
12. Basis of Elevation: Vertical control for this project is based on Pima County benchmark designation 0291 AKA NGS 0291 CS055R. Based on NAVD 88 datum having an elevation of 2,232.24 feet. Station mark is a benchmark disk set in concrete standard 0291 1951. Stamped 0291 1951.
13. Basis of Coordinates: The horizontal control for this project is based on existing survey control points as provided by Pima County/City of Tucson geodetic control points. The published combined factor for "AJ05" = 0.9998762050 was used to convert grid coordinates to surface. To convert project coordinates to state plane coordinates, add 400,000 to the northings and add 900,000 to the eastings, then multiply by 0.9998762050.
14. Basis of stationing: Stations for Sunset Road increase from south to north. Stations for Silverbell Road increase from north to south.
15. All stationing shown on the plans and profiles is along the construction centerline, unless otherwise noted.
16. The contractor shall install all permanent pavement markings and all permanent traffic control devices.
17. Soils information will be made available to prospective bidders in the project Special Provisions. Soils information so provided shall be for information purposes only, and is not to be considered a part of the contract documents. This information was developed as accurately as possible by the methods used. Pima County accepts no responsibility for any conditions encountered which vary from the information provided.
18. The pavement structural sections are from the pavement design summary report dated _______, 2014.
19. Existing conditions shown on the plan sheets reflect conditions as of December 30, 2013.
20. The contractor shall maintain access to all driveways, alleys, and mailboxes during construction. The contractor will not restrict emergency vehicles, U.S. postal delivery, solid waste collections, and/or access to the adjacent properties, except as approved by the Engineer.
21. It shall be the contractor's responsibility to furnish, haul, and apply all water required for compaction, and for the control of dust from construction activity. The cost of water is to be incidental to those items of work using or requiring water.
22. The contractor shall be responsible for the care, maintenance, repair or replacement of existing improvements in the work area; which have been removed or damaged during the course of construction. All repair, replacement, or cleanup shall be done to the satisfaction of the owner.
23. Omissions or conflicts between various elements of the drawings, notes and details shall be brought to the attention of the Engineer and resolved before proceeding with the work.
24. Any revisions made to these plans must be approved by Pima County DOT prior to construction.
25. A copy of these plans shall be kept in an easily accessible location on the site at all times during construction.
26. Any excess excavated material shall become the property of the contractor, and shall be removed from the project site by the contractor at no additional cost to the Pima County DOT.

LENGTH OF PROJECT

Sunset Rd. Sta. 67+96.43 to Sta. 101+64.02
Gross Length = 3,367.59' (0.64 Mile)

Silverbell Rd. Sta. 244+74.07 to Sta. 264+89.14
Gross Length = 2,015.07' (0.38 Mile)

ABBREVIATIONS NOT INCLUDED IN PAG STD. DTL.

Asphalt Rubber Asphaltic Concrete	A.R.A.C.
Correction	Corr.
Edge of Pavement	E.P.
Point of Compound Curve	P.C.C.
Shoulder	Shld.
Stopping Sight Distance	SSDs
Vertical Curve	V.C.

PRELIMINARY EARTHWORK QUANTITIES

Item No.	Item Description	Total Volume (CY)
2030300	Roadway Excavation	34,000
2030401	Drainage Excavation	
	Box Culvert Str. Excavation	
	Pipe Excavation	
	Total Excavation	34,000
	Total Shrinkage (X%)	3,500
	NET EXCAVATION	30,500
	Roadway Embankment	85,050
	Ground Compaction (0.XX Ft.)	850
	Box Culvert Str. Backfill	
	Pipe Backfill	
	NET EMBANKMENT	85,900
2030901	Borrow	55,400

DESIGN DATA

DESIGN TRAFFIC	SUNSET RD.	SILVERBELL RD.
2010 ADT	NA	5,249 veh/day
2025 ADT	10,750 veh/day	9,633 veh/day*

* ADT represents average at Sunset/Silverbell Intersection

DESIGN SPEED

ROADWAY	DESIGN	POSTED
Sunset Rd.	40 mph	35 mph
Silverbell Rd.	50 mph	45 mph

Priscilla S. Cornelio, P.E., Director

	Designed	Drawn	Checked	Proj. Engr.
	WPK	RW	CJR	WPK
Date	09/14	09/14	09/14	09/14

No.	Revision Description	Engineer	Date

PRELIMINARY NOT FOR CONSTRUCTION STAGE I

TRANSPORTATION
AECOM USA, Inc.
1640 E. RIVER RD, SUITE 123
Tucson, Arizona 85718
T 520.299.6700 F 520.299.6777
AECOM
www.aecom.com

Arizona Blue Stake
1-800-STAKE-IT
1-800-782-5348
Call Two Working Days Before You Dig

Pima County Department of Transportation

GENERAL NOTES SHEET
SUNSET ROAD - SEGMENT I
SILVERBELL RD. TO I-10
PROJECT NO. 4RTSUN

SUNSET ROAD - SILVERBELL ROAD TO I-10 - PROJECT NO. 4RTSUN

Scale: N.T.S. | Sheet GN01 of GN01 |

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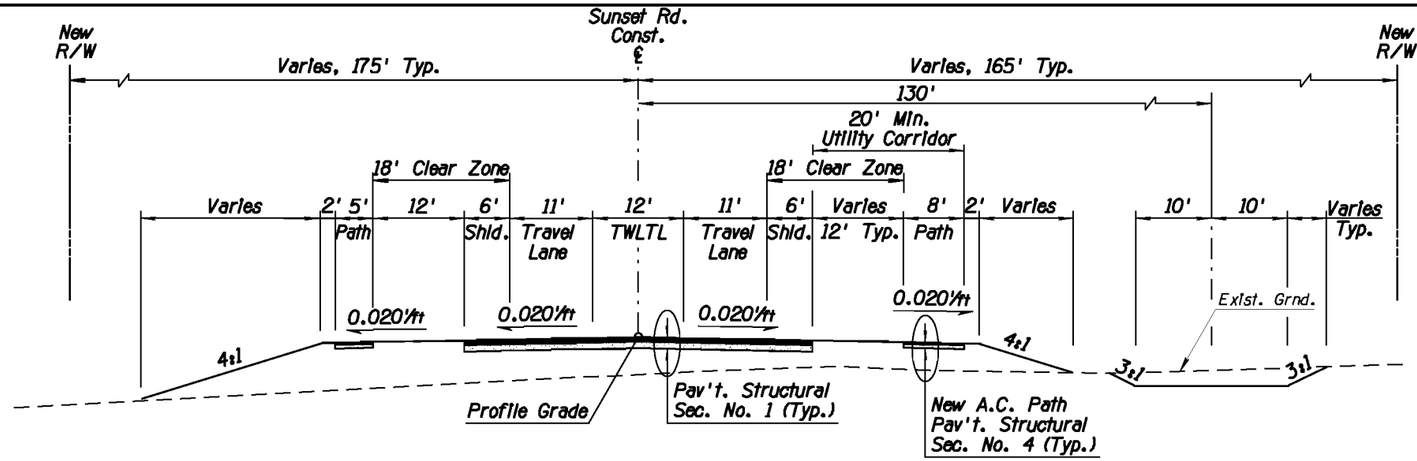
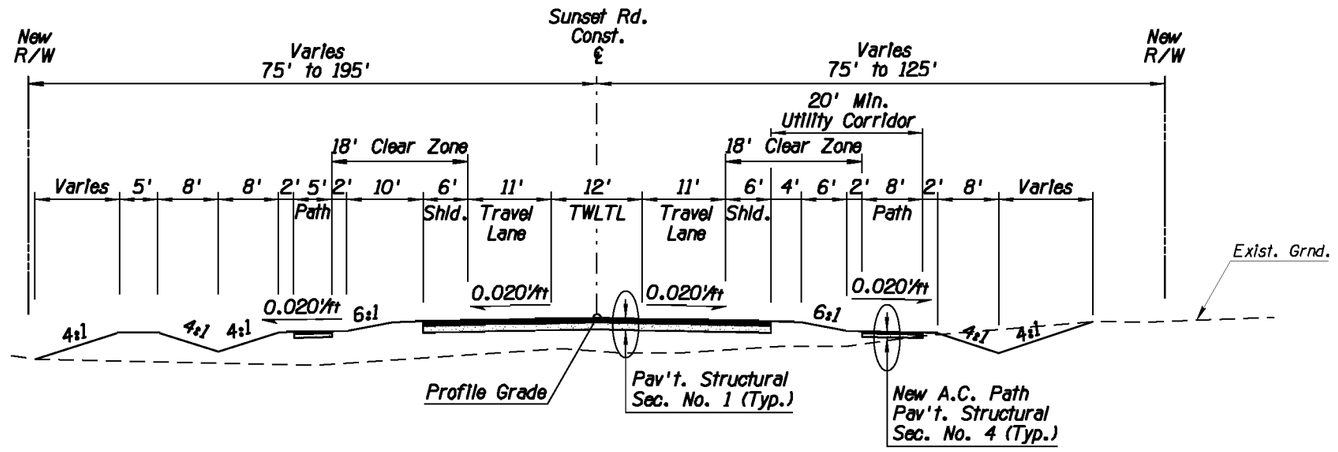
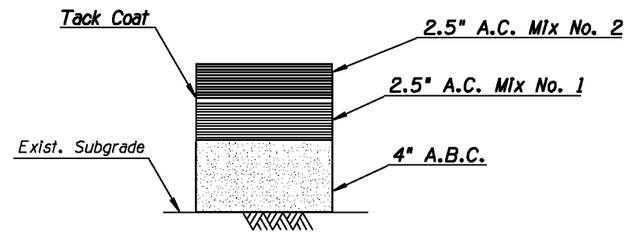


SUNSET ROAD
TYPICAL SECTION
Sta. 67+98.00 to Sta. 71+22.75

Sta. 71+22.75 to Sta. 78+47.25
Santa Cruz River Bridge Exception
See Bridge Sheets for Typical Section

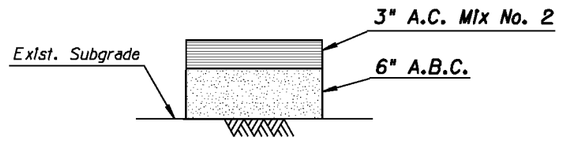


SUNSET ROAD
TYPICAL SECTION
Sta. 78+47.25 to Sta. 84+30.00



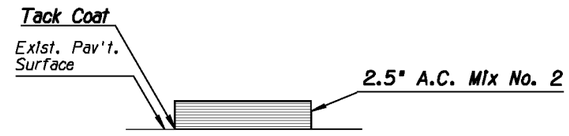
Total Thickness = 9"

PAVEMENT STRUCTURAL SECTION NO. 1
Sunset Road from Silverbell Road to I-10



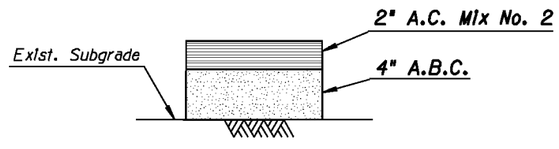
Total Thickness = 9"

PAVEMENT STRUCTURAL SECTION NO. 2
Silverbell Road Widened Areas



Total Thickness = 2.5"

PAVEMENT STRUCTURAL SECTION NO. 3
Silverbell Road
Overlay Exist. Pav't.



Total Thickness = 6"

PAVEMENT STRUCTURAL SECTION NO. 4
A.C. Path

Priscilla S. Cornelio, P.E., Director
Pima County Department of Transportation

No.	Revision Description	Engineer	Date

	Designed	Drawn	Checked	Proj. Engr.
Date	09/14	09/14	09/14	09/14
	MPK	RM	CJR	MPK

PRELIMINARY NOT FOR CONSTRUCTION STAGE I

AECOM
TRANSPORTATION
AECOM USA, Inc.
7720 N. 16th Street, Suite 100
Phoenix, Arizona 85020
T 602.371.1100 F 602.371.1077
www.aecom.com

Arizona Blue Stake 1-800-STAKE-IT 1-800-782-5348
Call two working days before you dig

TYPICAL SECTIONS
SUNSET ROAD - SEGMENT I
SILVERBELL RD. TO I-10
PROJECT NO. 4RTSUN

SUNSET ROAD – SILVERBELL ROAD TO I-10 – PROJECT NO. 4RTSUN

Scale:	N.T.S.	Sheet TYP01 of TYP02	Page 03 of 36

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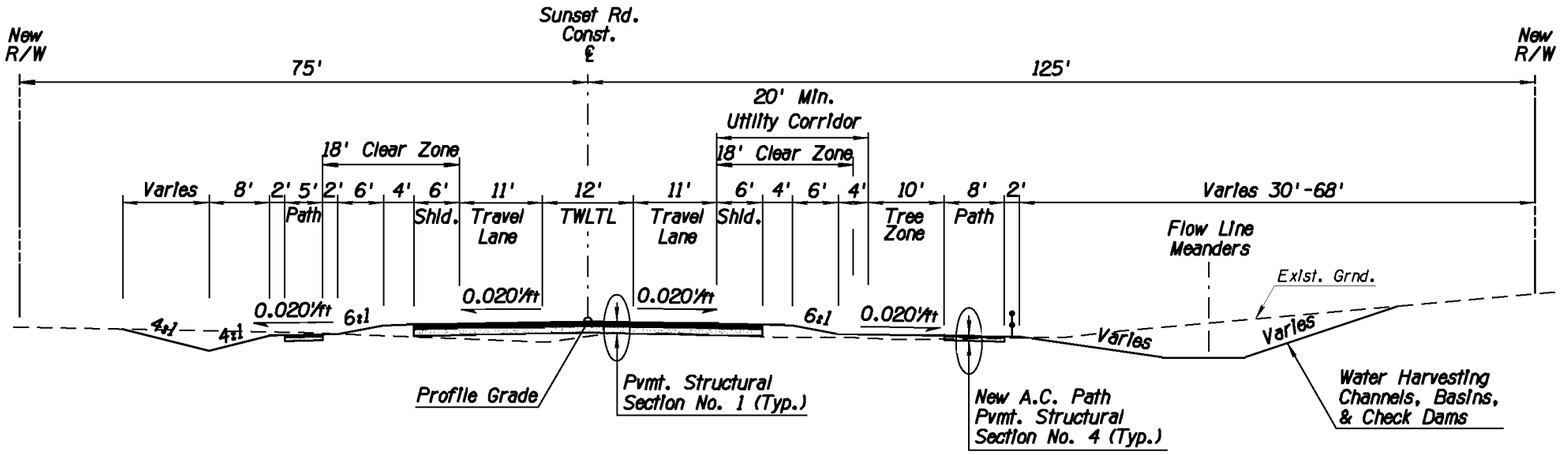
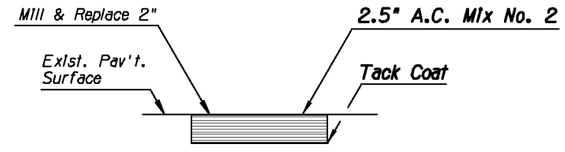


SUNSET ROAD TYPICAL SECTION

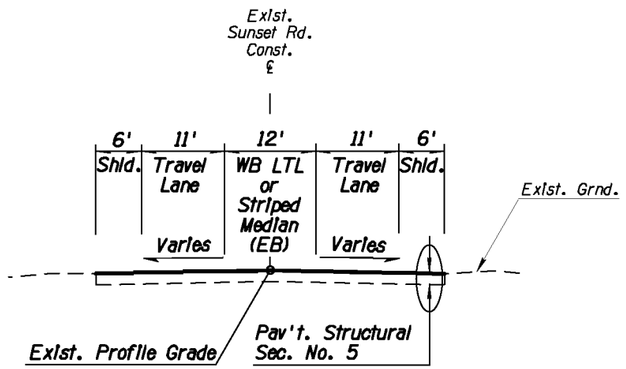
Sta. 84+30.00 to Sta. 97+90.45



Total Thickness = 2.5"

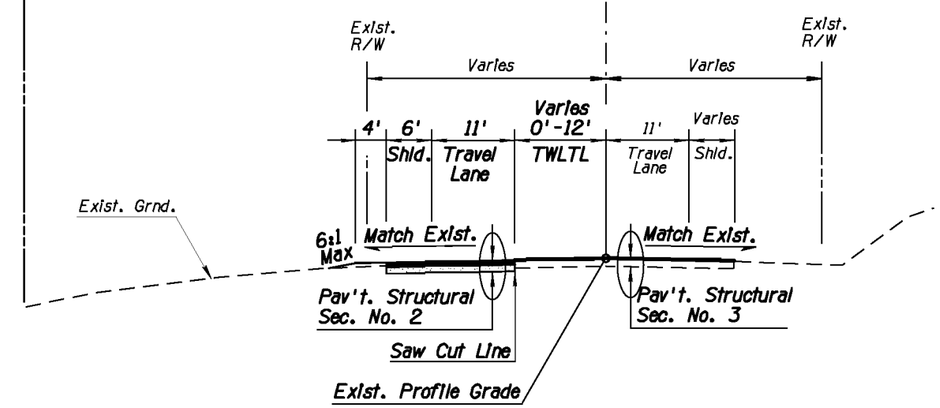
PAVEMENT STRUCTURAL SECTION NO. 5

Sunset Road
Mill & Replace Exist. Pav't.



SUNSET ROAD TYPICAL SECTION (UNDER I-10)

Sta. 98+31.48 to Sta. 101+43.72



SILVERBELL ROAD TYPICAL SECTION

Sta. 244+74.07 to Sta. 264+89.14

Priscilla S. Cornelio, P.E., Director
Pima County Department of Transportation

No.	Revision Description	Engineer	Date

Designed	MPK		09/14
Drawn	TM		09/14
Checked	CJR		09/14
Proj. Engr.	MPK		09/14

PRELIMINARY NOT FOR CONSTRUCTION STAGE I

AECOM
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T 602.371.1100 F 602.371.1615
www.aecom.com

Arizona Blue Stake
1-800-STAKE-IT
1-800-782-5348
Or Two Working Days, Excluding Holidays

TYPICAL SECTIONS
SUNSET ROAD - SEGMENT I
SILVERBELL RD. TO I-10
PROJECT NO. 4RTSUN

SUNSET ROAD - SILVERBELL ROAD TO I-10 - PROJECT NO. 4RTSUN

Scale:	N.T.S.	Sheet TYP02 of TYP02	Page 04 of 36

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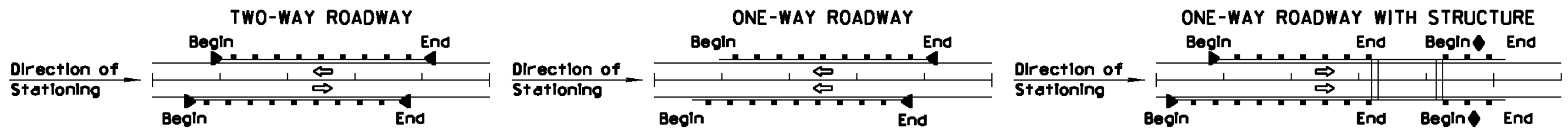

BARRIER

LOCATION: Beginning Sta. (Approximate) (0)	Plan Reference Number □	□: Type "A" C-10.01, Type "B" C-10.02	C-10.03 (Timber)	C-10.04 (Steel)	Dtl.	NEW GUARDRAIL: Length (Linear Feet) (0.0)	C-10.06 Nested W-Beam ▲ Length (Linear Feet) (0.0)	C-10.07 Bolted Anchor (Each)	Shop Curved Guardrail Length (Linear Feet) (0.0)	Reconstruct-Exist. Post, Block	Reconstruct-New Post, Block	Remove and Salvage	Construct from Salvage	Remove	EXISTING GR: Length (Linear Feet) (0.0)	Remove Exist. Length (Linear Feet) (0.0)	CONCRETE BARRIER: C-10.40 (32" Median)	C-10.41 (42" Median)	C-10.50 (32" Half)	C-10.51 (32" Half w/ Sidewalk)	C-10.52 (32" Half w/ Gutter) △	C-10.53 (42" Half w/ Gutter) △	C-10.54 (32" Half at Piers)	C-10.55 (42" Half at Piers)	Bridge Barrier ◓	Dtl. RD17	Length (Linear Feet) (0.0)	CABLE: High-Tension Cable Barrier ● Length (Linear Feet) (0)	C-12.30 Chain-Link Cable Length (Linear Feet) (0.0)
70+30 Rt.	1																												
78+62 Rt.	2																												
78+65 Lt.	3	A	X			18.8																							
Sheet Total						18.8																							

TRANSITION / END TREATMENT

LOCATION: Beginning Sta. (Approximate) (0)	Begin = Treatment at Beginning, End = Treatment at End	RAIL (Each): C-10.30 Thrie Beam	Bridge Thrie Beam ◓ SD 1.03	Reconstruct Rub Rail	CONCRETE BARRIER (Each): C-10.70 32" or C-10.72 42"	C-10.71 32" or C-10.73 42" △	C-10.74 42" to 32"	C-10.75 32" (Mod) ◆	C-10.76 32" on Radius	Bridge Barrier ◓	Dtl. RD17 - 20 ft Transition	END TREATMENT Action: New	Reconstruct (See Special Prv)	Remove and Salvage	Construct from Salvage	Remove	Each ◪: Tangent ET Plus or SKT-350 ◧○	Flared SRT-350 or FLEAT-350◧	End Anchor C-10.08 or Dtl.	High-Tension Cable Terminal	Sand Barrels C-1 or Dtl. ■	Attenuator Dtl.	BCT (L=12.5')	REMARKS
70+30 Rt.	Begin											X					1							
	End	X								X		X												
78+62 Rt.	Begin									X														Type 1
	End							X				X												
78+65 Lt.	Begin											X							1					
	End											X					1							
Sheet Total								1									2		1					

THE ZEROS IN PARENTHESES (0.0) INDICATE THE DIMENSIONAL PRECISION FOR THAT COLUMN

▲ THE LENGTH OF NESTED W-BEAM IS FOR TYPES 2 OR 3 (37.5'). DETERMINATION OF TYPE (1, 2 or 3) TO USE IS MADE IN THE FIELD. THE PAY QUANTITY IS THE ACTUAL LENGTH INSTALLED (25.0' or 37.5').

△ SPECIFY GUTTER WIDTH UNDER "REMARKS"

◆ BEGIN STATION AFTER BRIDGE TRANSITION

◓ SEE BRIDGE SHEETS FOR DETAILS AND QUANTITIES

● LENGTH IS FROM LENGTH OF NEED (LON) POINT TO LON POINT. ACTUAL SEGMENT LENGTH VARIES DEPENDING ON TERMINAL TYPE. SEE SPECIAL PROVISIONS.

○ TYPE SPECIFIED UNDER REMARKS

SEE ADOT STANDARD DRAWINGS FOR C STANDARDS

◆ SPECIFY TYPE 1 OR 2 UNDER 'REMARKS'

◪ ALLOWABLE END TREATMENT OPTIONS ARE INDICATED WITH THE NUMBER '1' IN THE SPACE. BLANK SPACES ARE NOT VIABLE ALTERNATIVES.

■ ARRAY TYPE AND ANGLE IS NOTED UNDER 'REMARKS'

◧ NOTE: FOR AS-BUILT PREPARATION - CIRCLE END TREATMENT INSTALLED

STATIONS ARE REFERENCED FROM SUNSET RD. CONST. ℄ UNLESS NOTED OTHERWISE

40' 0 40' 80'
SCALE: 1" = 40'

Priscilla S. Cornelio, P.E., Director

Designed	MPK	09/14
Drawn	RM	09/14
Checked	JLC	09/14
Proj. Engr.	MPK	09/14

No.	Revision Description	Engineer	Date

PRELIMINARY NOT FOR CONSTRUCTION STAGE I

AECOM
www.aecom.com
TRANSPORTATION
AECOM USA, Inc.
1840 E. RIVER RD, SUITE 123
Tucson, Arizona 85718
T 520.299.8700 F 520.299.8777

Arizona Blue Stake
1-800-STAKE-IT
1-800-782-5348
Call Two Working Days Before You Dig

Pima County Department of Transportation

BARRIER SUMMARY SHEET
SUNSET ROAD - SEGMENT I
SILVERBELL RD. TO I-10
PROJECT NO. 4RTSUN

SUNSET ROAD - SILVERBELL ROAD TO I-10 - PROJECT NO. 4RTSUN

Scale: N.T.S. | Sheet SB01 of SB01 |

REV. DATE: 01/16/2009

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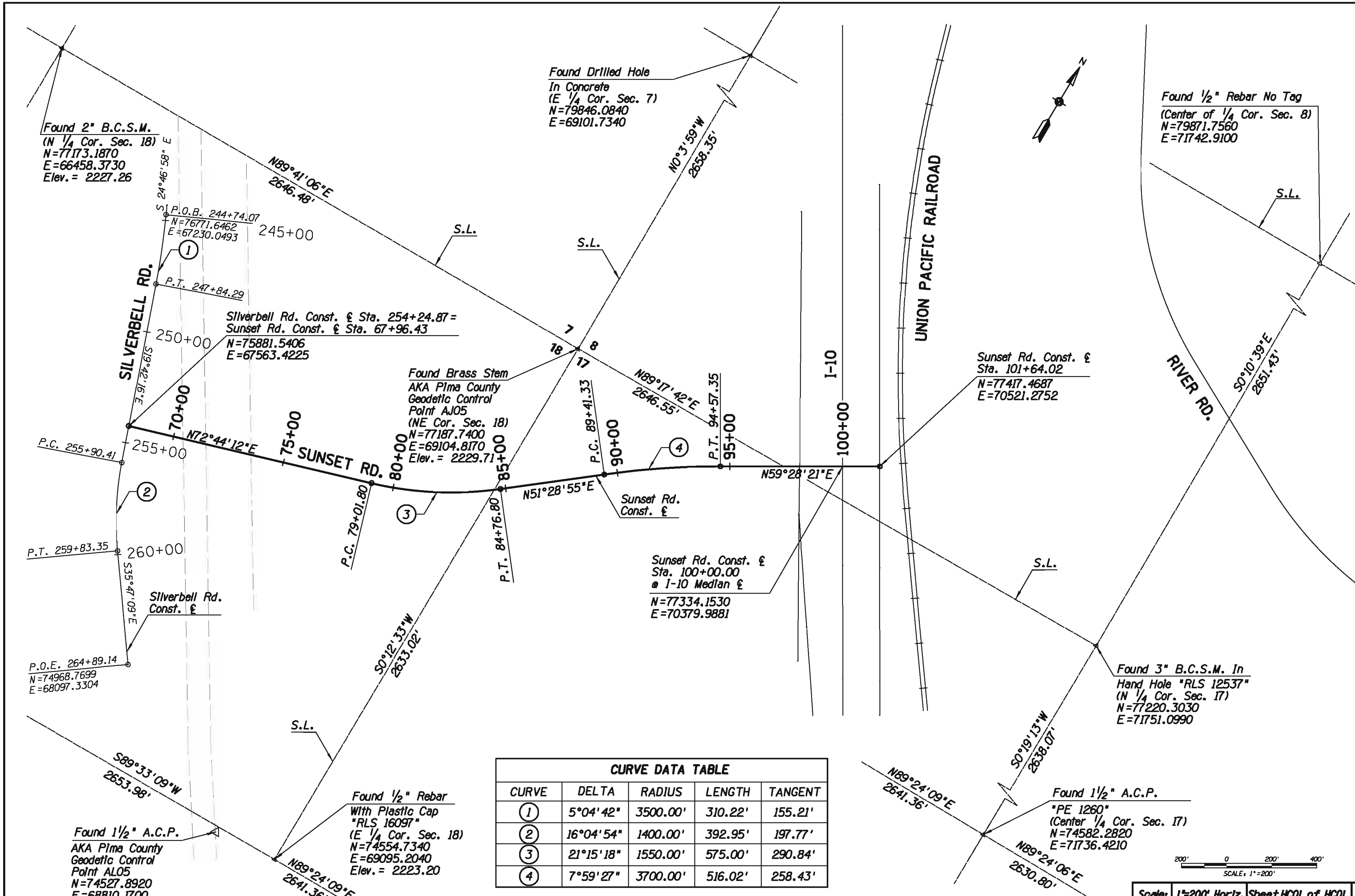

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E=66458.3730
Elev.= 2227.26
S 24°46'58" E
N89°41'06"E
2646.48'
S.L.
P.O.B. 244+74.07
N=76771.6462
E=67230.0493
245+00
1
SILVERBELL RD.
P.T. 247+84.29
250+00
S19°42'16"E
Silverbell Rd. Const. ℄ Sta. 254+24.87 =
Sunset Rd. Const. ℄ Sta. 67+96.43
N=75881.5406
E=67563.4225
70+00
N72°44'12"E
75+00
SUNSET RD.
80+00
P.C. 255+90.41
255+00
2
P.C. 79+01.80
3
P.T. 259+83.35
260+00
S35°47'09"E
Silverbell Rd. Const. ℄
P.O.E. 264+89.14
N=74968.7699
E=68097.3304
Found Drilled Hole
In Concrete
(E 1/4 Cor. Sec. 7)
N=79846.0840
E=69101.7340
N0°3'59"W
2658.35'
S.L.
7
8
18
17
Found Brass Stem
AKA Pima County
Geodetic Control
Point AJ05
(NE Cor. Sec. 18)
N=77187.7400
E=69104.8170
Elev.= 2229.71
85+00
P.T. 84+76.80
N51°28'55"E
P.C. 89+41.33
90+00
N89°17'42"E
2646.55'
P.T. 94+57.35
95+00
4
Sunset Rd. Const. ℄
N59°28'21"E
100+00
I-10
UNION PACIFIC RAILROAD
Sunset Rd. Const. ℄
Sta. 101+64.02
N=77417.4687
E=70521.2752
Sunset Rd. Const. ℄
Sta. 100+00.00
@ I-10 Median ℄
N=77334.1530
E=70379.9881
S0°12'33"W
2633.02'
S.L.
S89°33'09"W
2653.98'
Found 1 1/2" A.C.P.
AKA Pima County
Geodetic Control
Point AL05
N=74527.8920
E=68810.1700
Found 1/2" Rebar
With Plastic Cap
"RLS 16097"
(E 1/4 Cor. Sec. 18)
N=74554.7340
E=69095.2040
Elev.= 2223.20
N89°24'09"E
2641.36'
N
Found 1/2" Rebar No Tag
(Center of 1/4 Cor. Sec. 8)
N=79871.7560
E=71742.9100
S.L.
RIVER RD.
S0°10'39"E
2651.43'
S.L.
Found 3" B.C.S.M. In
Hand Hole "RLS 12537"
(N 1/4 Cor. Sec. 17)
N=77220.3030
E=71751.0990
S0°19'13"W
2638.07'
N89°24'09"E
2641.36'
Found 1 1/2" A.C.P.
"PE 1260"
(Center 1/4 Cor. Sec. 17)
N=74582.2820
E=71736.4210
N89°24'06"E
2630.80'
200' 0 200' 400'
SCALE: 1"=200'

CURVE DATA TABLE

CURVE	DELTA	RADIUS	LENGTH	TANGENT
1	5°04'42"	3500.00'	310.22'	155.21'
2	16°04'54"	1400.00'	392.95'	197.77'
3	21°15'18"	1550.00'	575.00'	290.84'
4	7°59'27"	3700.00'	516.02'	258.43'

Priscilla S. Cornelio, P.E., Director

Designed	MPR	09/14
Drawn	RU	09/14
Checked	CJR	09/14
Proj. Engr.	MPR	09/14

No.	Revision Description	Engineer	Date

PRELIMINARY NOT FOR CONSTRUCTION STAGE I

AECOM

Pima County Department of Transportation

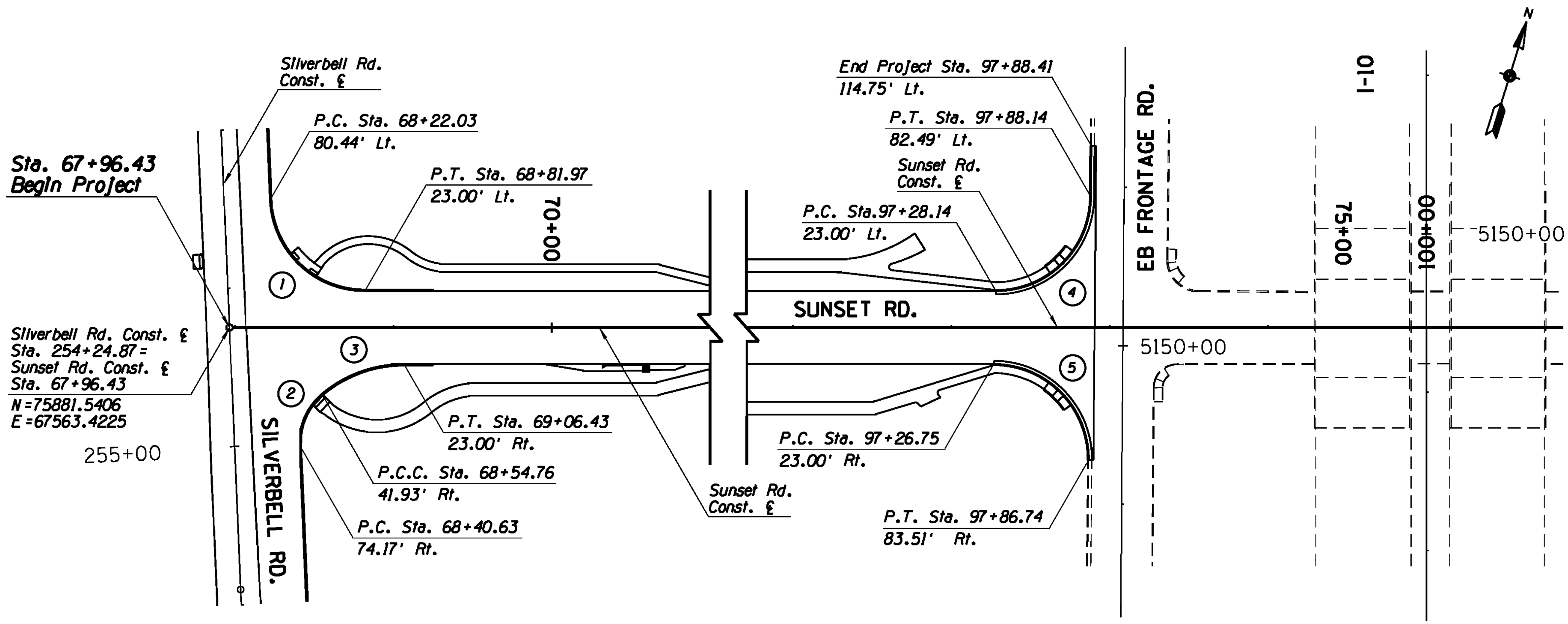
HORIZONTAL CONTROL SHEET
SUNSET ROAD - SEGMENT I
SILVERBELL RD. TO I-10

PROJECT NO. 4RTSUN

SUNSET ROAD – SILVERBELL ROAD TO I-10 – PROJECT NO. 4RTSUN

Scale: 1"=200' Horiz. | Sheet HC01 of HC01 | Page 06 of 36

FILE NAME: P:\60311412 Sunset Rd\900-Work\910-CAD\20-SHEETS\4RTSUN_hc01_seg1.dgn   DATE: 10/6/2014   TIME: 11:17:25 AM   RobinsonC



Notes:

1. For Horizontal Alignment Control See Sheet HC01
2. For Roadway Plan See Sheets PL01 To PL07
3. For Roadway Profiles See Sheets PR01 To PR04
4. For Storm Drain Plan & Profile See Sheet SD01
5. For Pavement Marking Plans See Sheets PM01 To PM05
6. Stations & Offsets Are From Sunset Rd. Construction Centerline To Face Of Curb Or Concrete Ford Wall

CURVE DATA

NO.	DELTA	RADIUS	LENGTH	TANGENT
1	87°33'32" Lt	60.00'	91.69'	57.50'
2	52°12'33" Rt	40.00'	36.45'	19.60'
3	40°13'55" Rt	80.00'	56.17'	29.30'
4	89°31'03" Lt	60.00'	93.74'	59.50'
5	90°28'57" Rt	60.00'	94.75'	60.51'

40' 0 40' 80'
SCALE: 1"=40'

Priscilla S. Cornelio, P.E., Director

Pima County Department of Transportation

Designed	MPK	09/14
Drawn	RM	09/14
Checked	CJR	09/14
Proj. Engr.	MPK	09/14

No.	Revision Description	Engineer	Date

PRELIMINARY NOT FOR CONSTRUCTION STAGE I

TRANSPORTATION
AECOM
AECOM USA, Inc.
1840 E. RIVER RD, SUITE 123
Tucson, Arizona 85718
T 520.299.8700 F 520.299.8777
www.aecom.com

Arizona Blue Stake
1-800-STAKE-IT
1-800-782-5348
Call Two Working Days Before You Dig

GEOMETRIC DATA SHEET
SUNSET ROAD - SEGMENT I
SILVERBELL RD. TO I-10

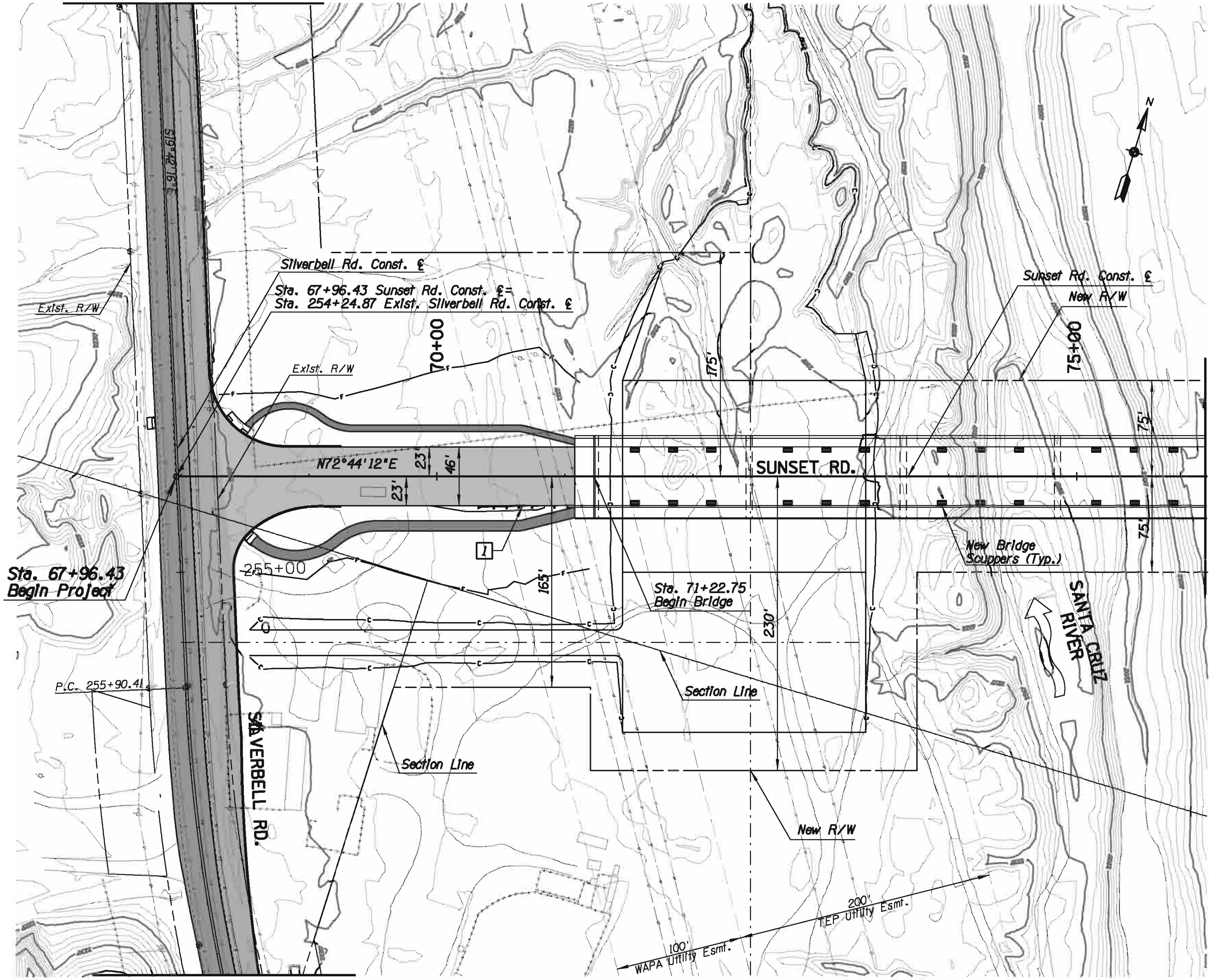
PROJECT NO. 4RTSUN

SUNSET ROAD - SILVERBELL ROAD TO I-10 - PROJECT NO. 4RTSUN

Scale: 1"=40' Horiz. Sheet GC01 of GC01

FILE NAME: P:\60311412 Sunset Rd\900-Work\910-CAD\20-SHEETS\4RTSUN.cdg01.segl.dgn DATE: 10/6/2014 TIME: 8:56:04 AM RobinsonC

MATCH LINE SEE SHEET PL06



MATCH LINE SEE SHEET PL06

Notes:

1. For Horizontal Alignment Control See Sheet HC01
2. For Geometric Curb Data See Sheet GD01
3. For Roadway Profiles See Sheets PR01 To PR04
4. For Storm Drain Plan & Profile See Sheet SD01
5. For Pavement Marking Plans See Sheets PM01 To PM05
6. Removals To Be Determined During Final Design

LEGEND

- Pav't Structural Sec. No. 1
- Pav't Structural Sec. No. 2
- Pav't Structural Sec. No. 3
- Pav't Structural Sec. No. 4

40' 0 40' 80'
SCALE: 1"=40'

Pima County Department of Transportation

Priscilla S. Cornelio, P.E., Director

Designed	MPK	09/14
Drawn	RW	09/14
Checked	CJR	09/14
Proj. Engr.	MPK	09/14

No.	Revision Description	Engineer	Date

PRELIMINARY NOT FOR CONSTRUCTION STAGE I

AECOM

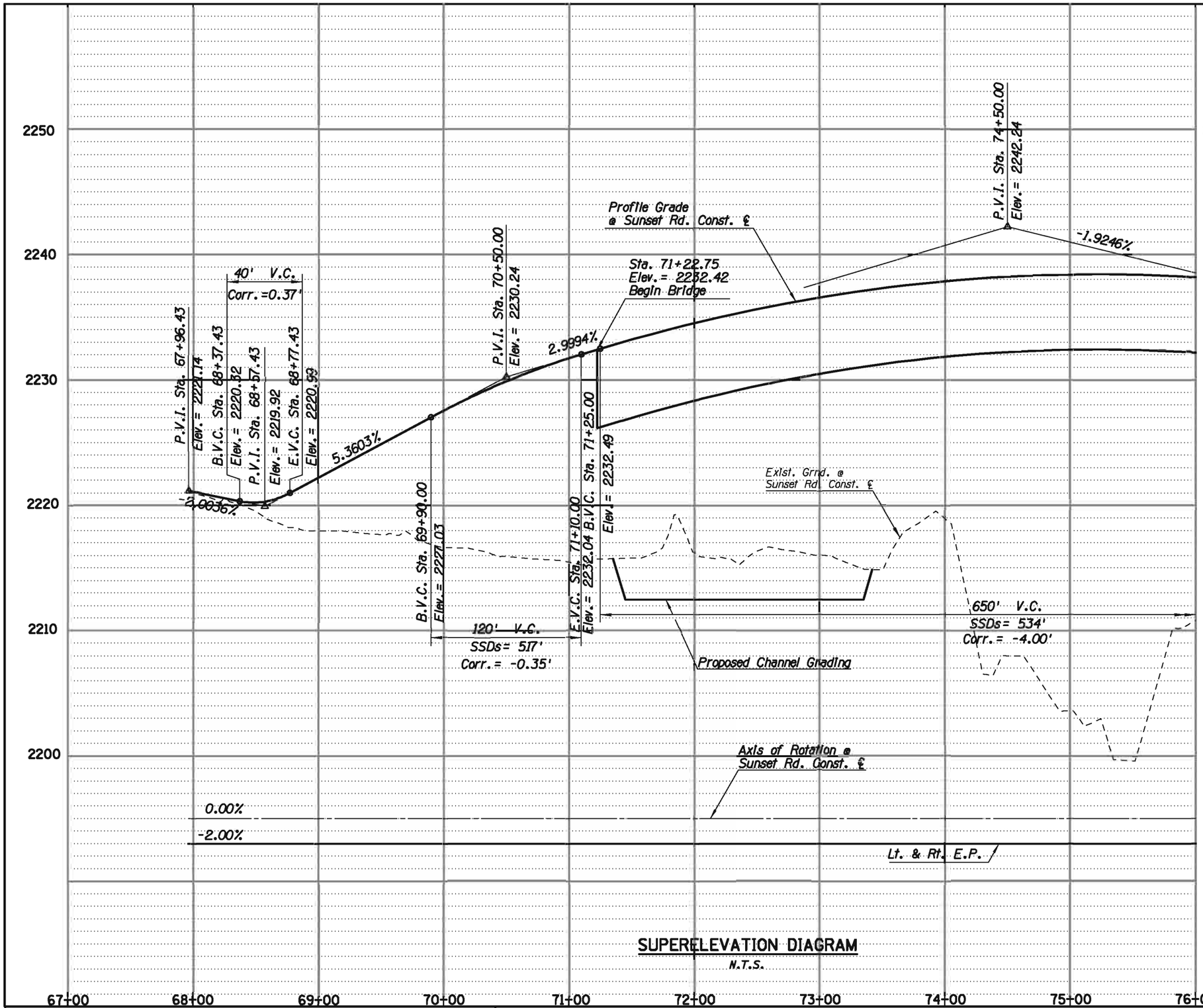
Arizona Blue Stake 1-800-STAKE-IT 1-800-782-5348

ROADWAY PLAN SHEET
SUNSET ROAD - SEGMENT I
SILVERBELL RD. TO I-10
STA. 67+96 TO STA. 76+00
PROJECT NO. 4RTSUN

SUNSET ROAD - SILVERBELL ROAD TO I-10 - PROJECT NO. 4RTSUN

Scale: 1"=40' Horiz. | Sheet PL01 of PL07 | Page 08 of 36

FILE NAME: P:\60311412 Sunset Rd\900-Work\910-CAD\20-SHEETS\4RTSUN_pl01_seg1.dgn DATE: 10/6/2014 TIME: 10:59:29 AM KershnerM



SUPERELEVATION DIAGRAM

N.T.S.

Notes:

1. For Horizontal Alignment Control See Sheet HC01
2. For Geometric Curb Data See Sheet GD01
3. For Roadway Plans See Sheets PL01 To PL07
4. For Storm Drain Plan & Profile See Sheet SD01
5. For Pavement Marking Plans See Sheets PM01 To PM05

No.	Revision Description	Engineer	Date

		Date
Designed	MPK	09/14
Drawn	RM	09/14
Checked	C.R.	09/14
Proj. Engr.	C.R.	09/14

Priscilla S. Cornelio, P.E., Director

Pima County Department of Transportation

PRELIMINARY NOT FOR CONSTRUCTION STAGE I

AECOM
TRANSPORTATION
7720 N. 16th Street, Suite 100
Phoenix, Arizona 85020
T 602.371.1100 F 602.371.1615
www.aecom.com

Arizona Blue Stake
1-800-STAKE-IT
1-800-782-5348
Dial 811 Before You Dig

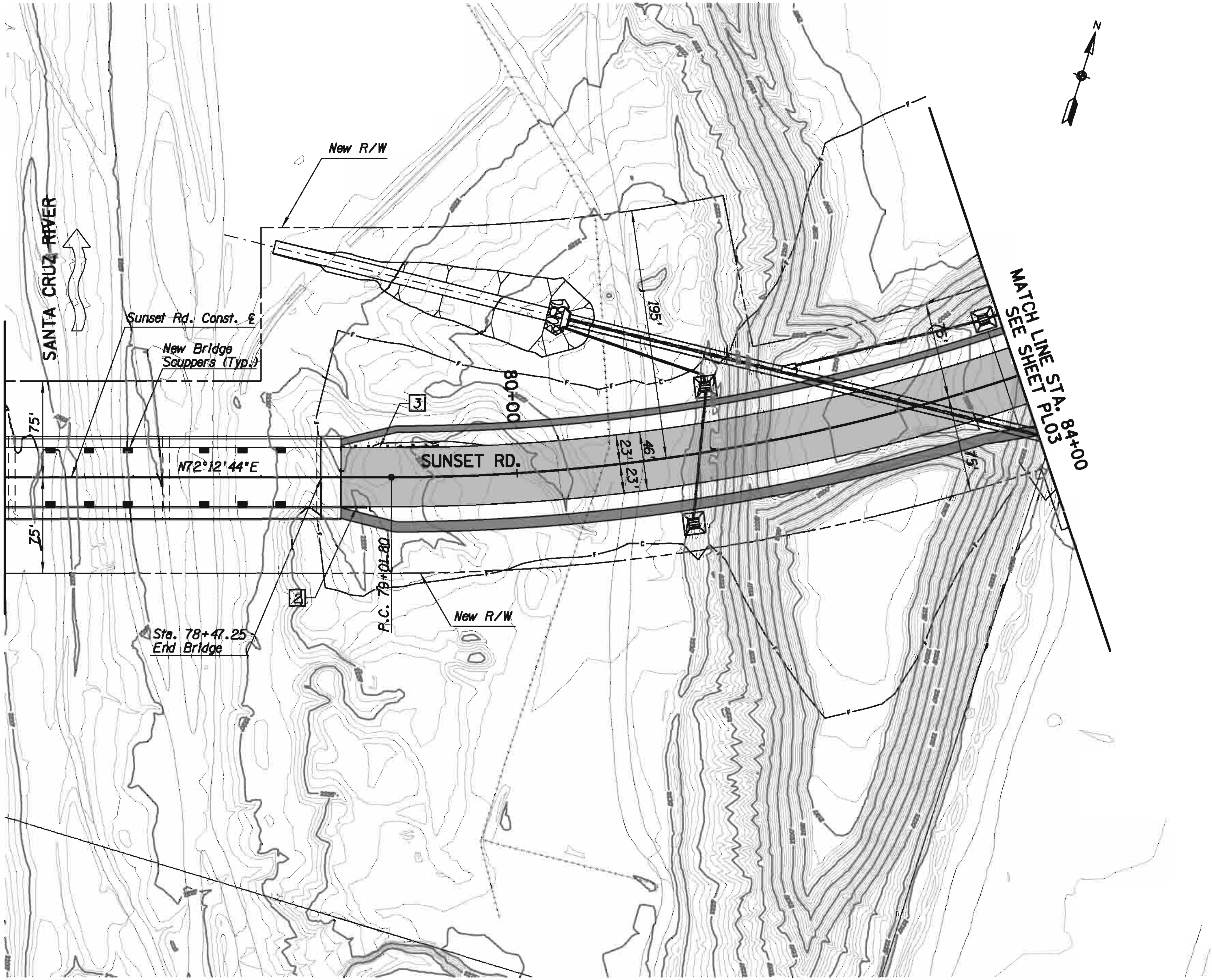
ROADWAY PROFILE SHEET
SUNSET ROAD - SEGMENT I
SILVERBELL RD. TO I-10
STA. 67+96 TO STA. 76+00
PROJECT NO. 4RTSUN

SUNSET ROAD - SILVERBELL ROAD TO I-10 - PROJECT NO. 4RTSUN

40' 0 40' 80'
SCALE: 1" = 40'

Scale:	1"= 40' Horiz. 1"= 4' Vert.	Sheet PR01 of PR04	Page 09 of 36

FILE NAME: P:\60311412 Sunset Rd\900-Work\910-CAD\20-SHEETS\4RTSUN_pr01_seg1.dgn
DATE: 10/28/2014 TIME: 2:02:45 PM KershnerM



Notes:

1. For Horizontal Alignment Control See Sheet HC01
2. For Geometric Curb Data See Sheet GD01
3. For Roadway Profiles See Sheets PR01 To PR04
4. For Storm Drain Plan & Profile See Sheet SD01
5. For Pavement Marking Plans See Sheets PM01 To PM05
6. Removals To Be Determined During Final Design

LEGEND

- Pav't Structural Sec. No. 1
- Pav't Structural Sec. No. 4

40' 0 40' 80'
SCALE: 1" = 40'

Pima County Department of Transportation
Priscilla S. Cornelio, P.E., Director

Designed	MPK	09/14
Drawn	RW	09/14
Checked	CJR	09/14
Proj. Engr.	MPK	09/14

No.	Revision Description	Engineer	Date

PRELIMINARY NOT FOR CONSTRUCTION STAGE I

AECOM

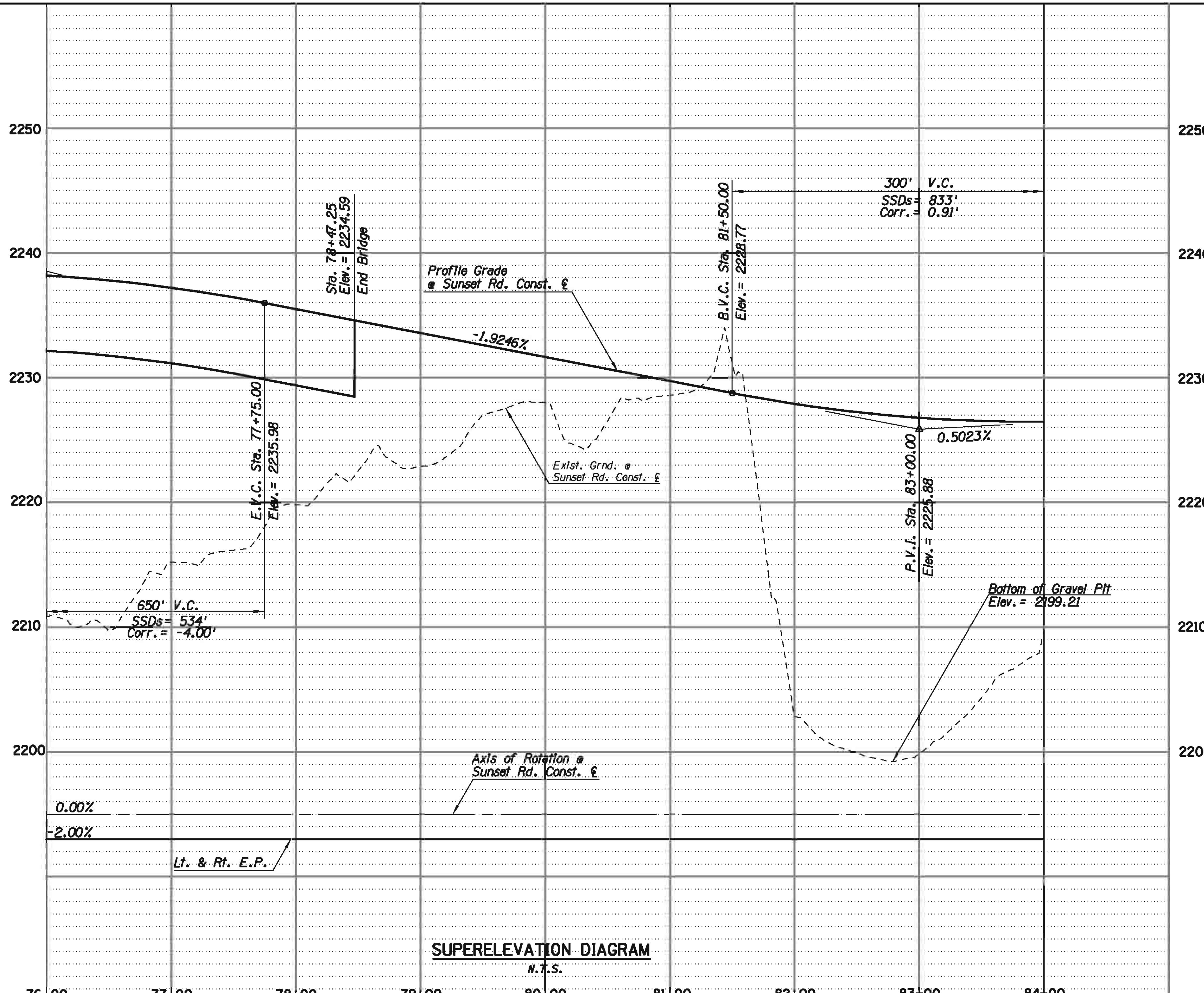
Arizona Blue Stake 1-800-STAKE-IT 1-800-782-5348

ROADWAY PLAN SHEET
SUNSET ROAD - SEGMENT I
SILVERBELL RD. TO I-10
STA. 76+00 TO STA. 84+00
PROJECT NO. 4RTSUN

SUNSET ROAD - SILVERBELL ROAD TO I-10 - PROJECT NO. 4RTSUN

Scale: 1"=40' Horiz. | Sheet PL02 of PL07 | Page 10 of 36

FILE NAME: P:\60311412 Sunset Rd\900-Work\910-CAD\20-SHEETS\4RTSUN_pl02_seg1.dgn DATE: 10/6/2014 TIME: 11:01:55 AM KerehnerM



Notes:

1. For Horizontal Alignment Control See Sheet HC01
2. For Geometric Curb Data See Sheet GD01
3. For Roadway Plans See Sheets PL01 To PL07
4. For Storm Drain Plan & Profile See Sheet SD01
5. For Pavement Marking Plans See Sheets PM01 To PM05

40' 0 40' 80'
SCALE: 1"=40'

Scale: 1"= 40' Horiz. 1"= 4' Vert. | Sheet PR02 of PR04 | Page 11 of 36

Pima County Department of Transportation

Priscilla S. Cornelio, P.E., Director

Designed	MPK	09/14
Drawn	RM	09/14
Checked	CJR	09/14
Proj. Engr.	CJR	09/14

No.	Revision Description	Engineer	Date

PRELIMINARY NOT FOR CONSTRUCTION STAGE I

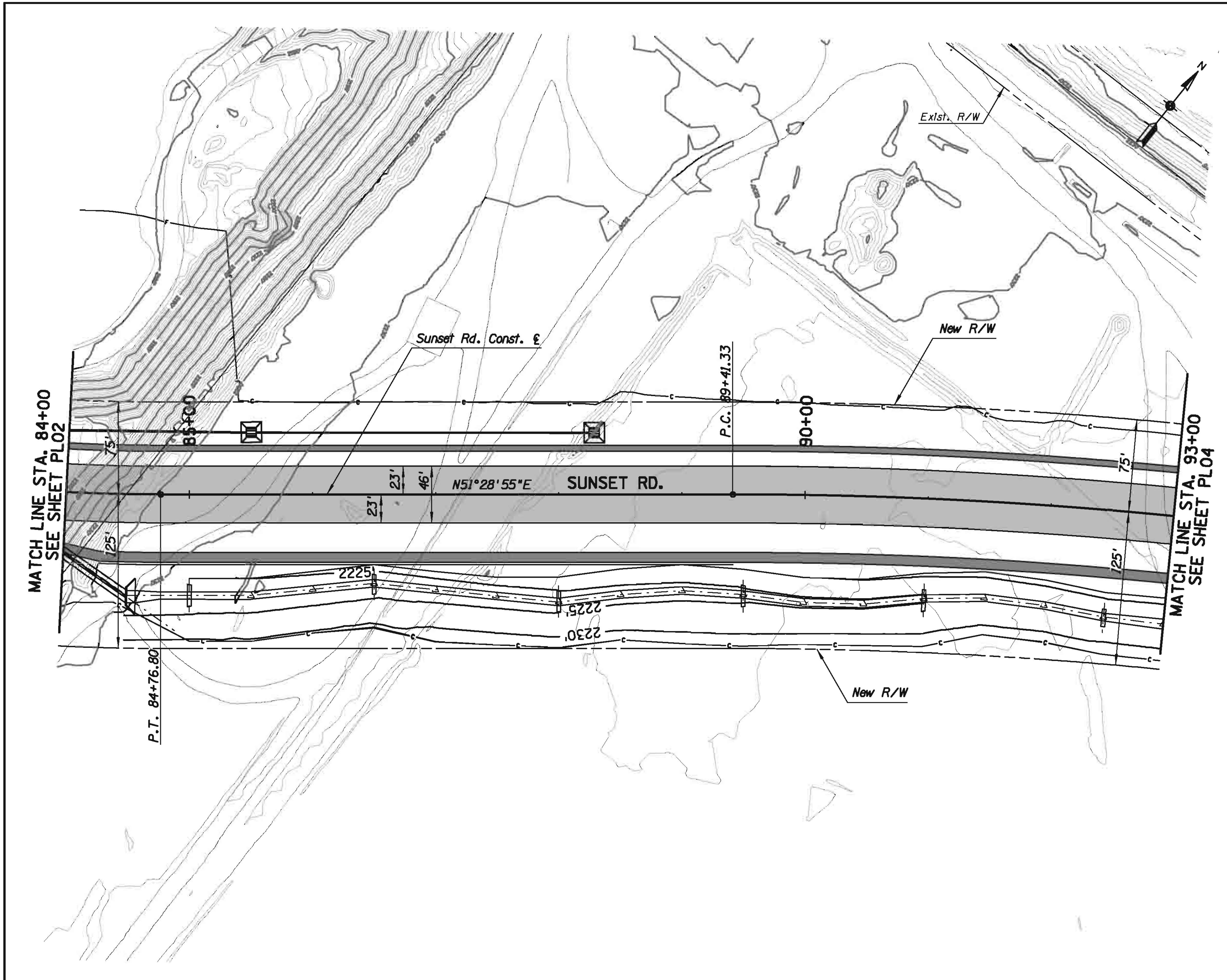
TRANSPORTATION
AECOM USA, Inc.
AECOM
www.aecom.com

Arizona Blue Stake
1-800-STAKE-IT
1-800-782-5348

ROADWAY PROFILE SHEET
SUNSET ROAD - SEGMENT I
SILVERBELL RD. TO I-10
STA. 76+00 TO STA. 84+00
PROJECT NO. 4RTSUN

SUNSET ROAD - SILVERBELL ROAD TO I-10 - PROJECT NO. 4RTSUN

FILE NAME: P:\60311412 Sunset Rd\900-Work\910-CAD\20-SHEETS\4RTSUN_pr02_seg1.dgn DATE: 10/28/2014 TIME: 2:03:12 PM KershnerM



Notes:

1. For Horizontal Alignment Control See Sheet HC01
2. For Geometric Curb Data See Sheet GD01
3. For Roadway Profiles See Sheets PR01 to PR04
4. For Storm Drain Plan & Profile See Sheet SD01
5. For Pavement Marking Plans See Sheets PM01 To PM05
6. Removals To Be Determined During Final Design

LEGEND

- Pav't Structural Sec. No. 1
- Pav't Structural Sec. No. 4

SCALE: 1" = 40'

Priscilla S. Cornelio, P.E., Director

	Designed	Drawn	Checked	Proj. Engr.
	MPK	RW	CJR	MPK
Date	09/14	09/14	09/14	09/14

No.	Revision Description	Engineer	Date

PRELIMINARY NOT FOR CONSTRUCTION STAGE I

AECOM

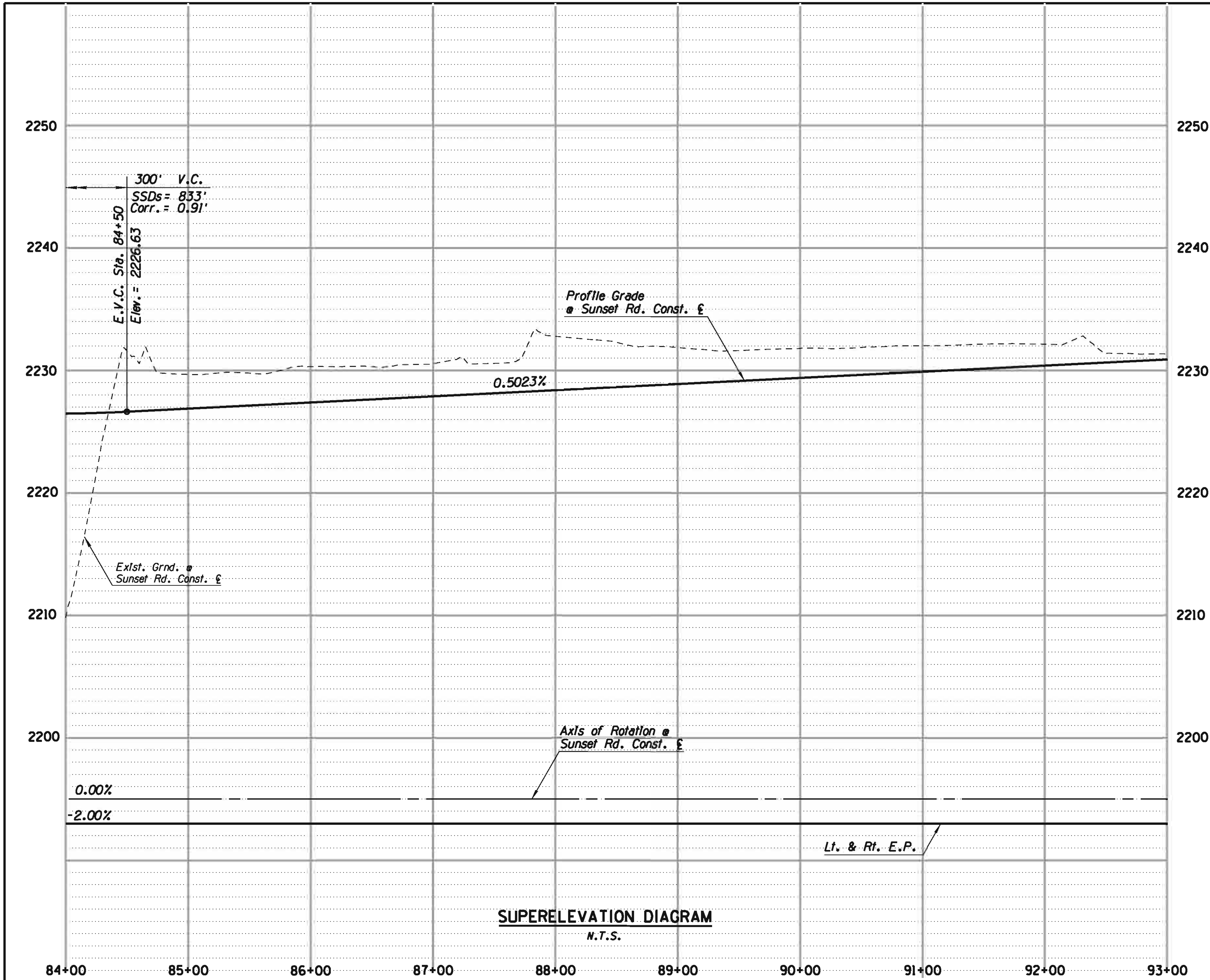
Pima County Department of Transportation

ROADWAY PLAN SHEET
SUNSET ROAD - SEGMENT I
SILVERBELL RD. TO I-10
STA. 84+00 TO STA. 93+00
PROJECT NO. 4RTSUN

SUNSET ROAD – SILVERBELL ROAD TO I-10 – PROJECT NO. 4RTSUN

Scale: 1"=40' Horiz. | Sheet PL03 of PL07 | Page 12 of 36

FILE NAME: P:\60311412 Sunset Rd\900-Work\910-CAD\20-SHEETS\4RTSUN_pl03_seg1.dgn DATE: 10/6/2014 TIME: 11:03:01 AM KershnerM



Notes:

1. For Horizontal Alignment Control See Sheet HC01
2. For Geometric Curb Data See Sheet GD01
3. For Roadway Plans See Sheets PL01 To PL07
4. For Storm Drain Plan & Profile See Sheet SD01
5. For Pavement Marking Plans See Sheets PM01 To PM05

Priscilla S. Cornelio, P.E., Director

Designed	MPK	09/14
Drawn	RW	09/14
Checked	CJR	09/14
Proj. Engr.	CJR	09/14

No.	Revision Description	Engineer	Date

PRELIMINARY NOT FOR CONSTRUCTION STAGE I

AECOM

Arizona Blue Stake 1-800-STAKE-IT

Pima County Department of Transportation

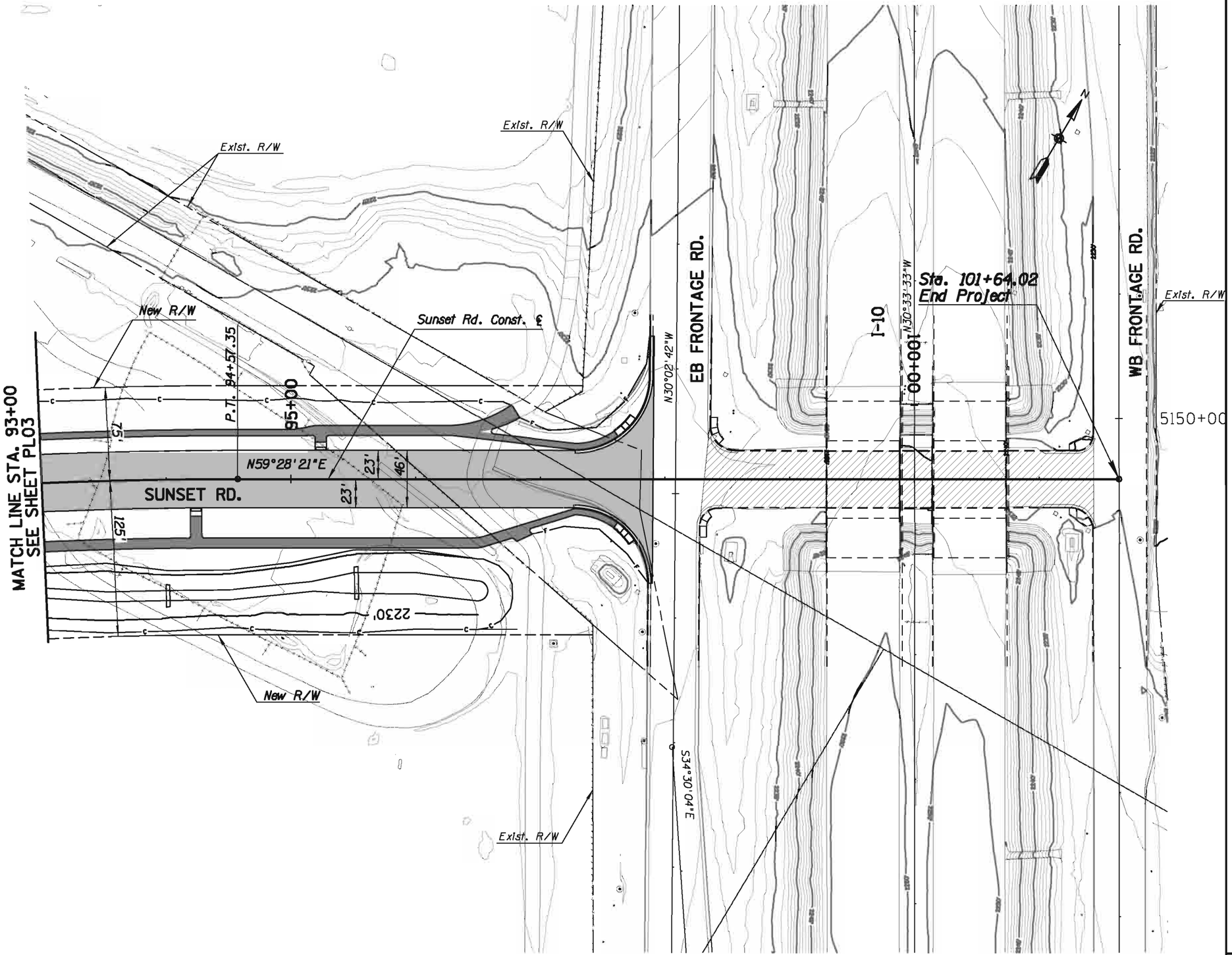
ROADWAY PROFILE SHEET
SUNSET ROAD - SEGMENT I
SILVERBELL RD. TO I-10
STA. 84+00 TO STA. 93+00
PROJECT NO. 4RTSUN

SUNSET ROAD - SILVERBELL ROAD TO I-10 - PROJECT NO. 4RTSUN

SCALE: 1"=40'

Scale: 1"= 40' Horiz. 1"= 4' Vert. | Sheet PR03 of PR04 | Page 13 of 36

FILE NAME: P:\60311412 Sunset Rd\900-Work\910-CAD\20-SHEETS\4RTSUN.pr03.seg1.dgn DATE: 10/6/2014 TIME: 9:08:30 AM RobinsonC



Notes:

1. For Horizontal Alignment Control See Sheet HC01
2. For Geometric Curb Data See Sheet GD01
3. For Roadway Profiles See Sheets PR01 To PR04
4. For Storm Drain Plan & Profile See Sheet SD01
5. For Pavement Marking Plans See Sheets PM01 To PM05
6. Removals To Be Determined During Final Design

LEGEND

- Pav't Structural Sec. No. 1
- Pav't Structural Sec. No. 4
- Pav't Structural Sec. No. 5

40' 0 40' 80'
SCALE: 1" = 40'

Priscilla S. Cornelio, P.E., Director
Pima County Department of Transportation

Designed	MPK	09/14
Drawn	RM	09/14
Checked	CJR	09/14
Proj. Engr.	MPK	09/14

No.	Revision Description	Engineer	Date

PRELIMINARY NOT FOR CONSTRUCTION STAGE I

AECOM
TRANSPORTATION
ADDRESS LINE 1
ADDRESS LINE 2
PHONE AND FAX NUMBERS

Arizona Blue Stake 1-800-STAKE-IT 1-800-782-5348

ROADWAY PLAN SHEET
SUNSET ROAD - SEGMENT I
SILVERBELL RD. TO I-10
STA. 93+00 TO 101+64
PROJECT NO. 4RTSUN

SUNSET ROAD - SILVERBELL ROAD TO I-10 - PROJECT NO. 4RTSUN

Scale: 1"=40' Horiz. | Sheet PL04 of PL07 | Page 14 of 36

FILE NAME: P:\60311412 Sunset Rd\900-Work\910-CAD\20-SHEETS\4RTSUN_pl04_seg1.dgn
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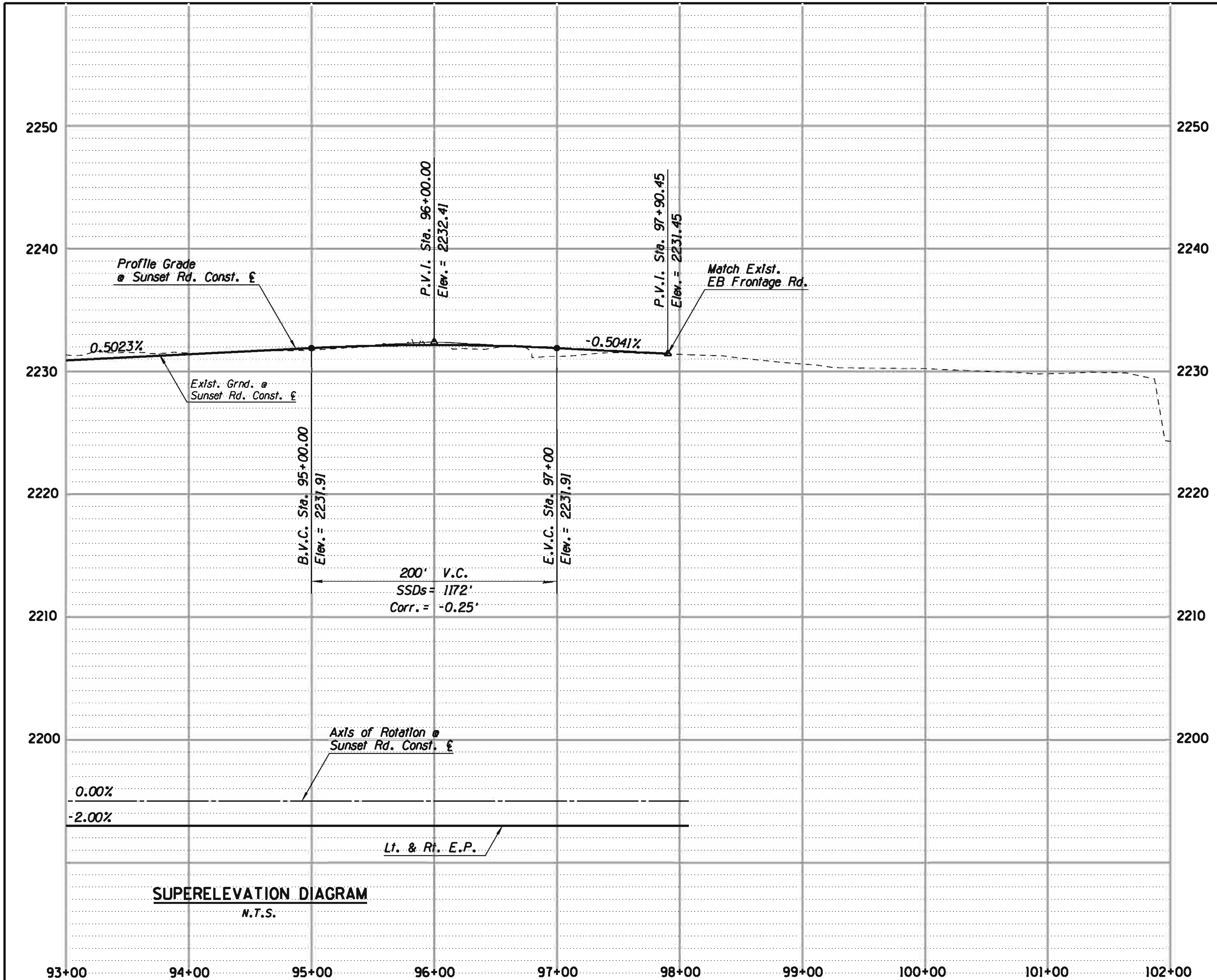

Notes:

1. For Horizontal Alignment Control See Sheet HC01
2. For Geometric Curb Data See Sheet GD01
3. For Roadway Plans See Sheets PL01 To PL07
4. For Storm Drain Plan & Profile See Sheet SD01
5. For Pavement Marking Plans See Sheets PM01 To PM05

SCALE: 1" = 40'

Scale: 1" = 40' Horiz. 1" = 4' Vert. | Sheet PR04 of PR04 | Page 15 of 36

Priscilla S. Cornelio, P.E., Director

Pima County Department of Transportation

Designed	MPK	09/14
Drawn	RM	09/14
Checked	CJR	09/14
Proj. Engr.	CJR	09/14

No.	Revision Description	Engineer	Date

PRELIMINARY NOT FOR CONSTRUCTION STAGE I

AECOM

Arizona Blue Stake 1-800-STAKE-IT

ROADWAY PROFILE SHEET
SUNSET ROAD - SEGMENT I
SILVERBELL RD. TO I-10
STA. 93+00 TO 102+00
PROJECT NO. 4RTSUN

SUNSET ROAD - SILVERBELL ROAD TO I-10 - PROJECT NO. 4RTSUN

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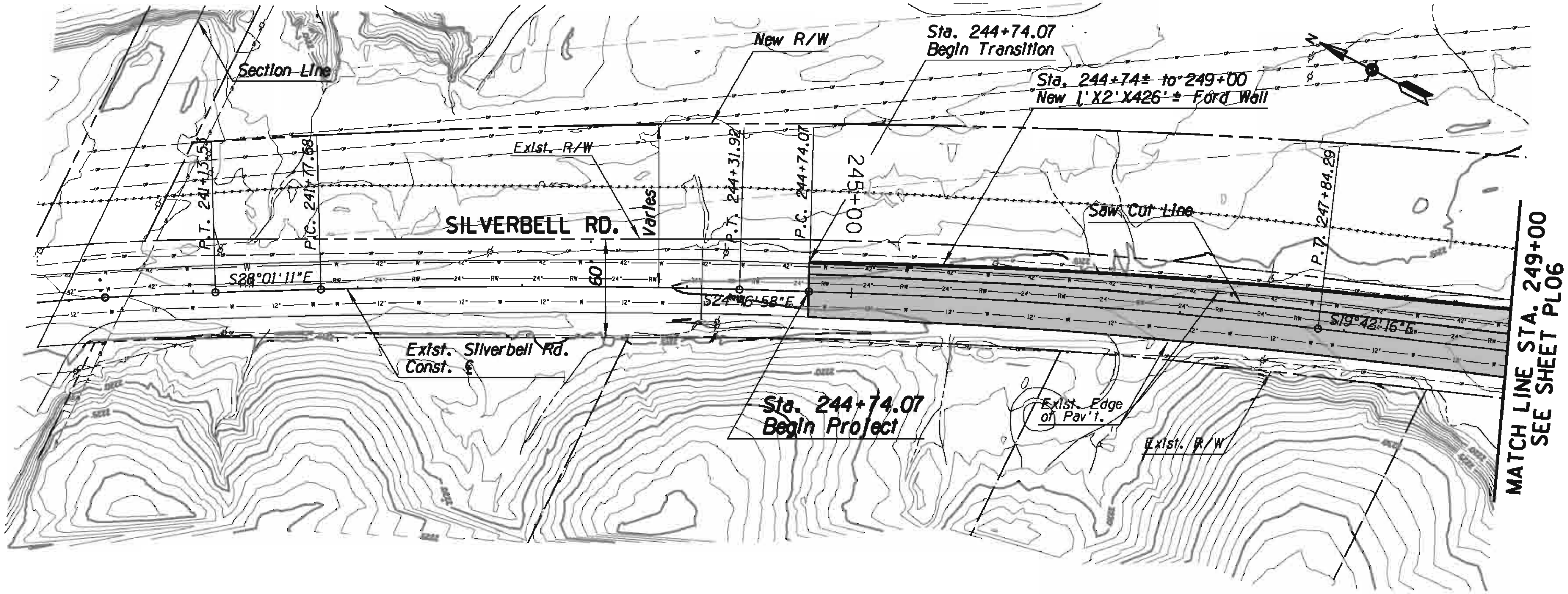
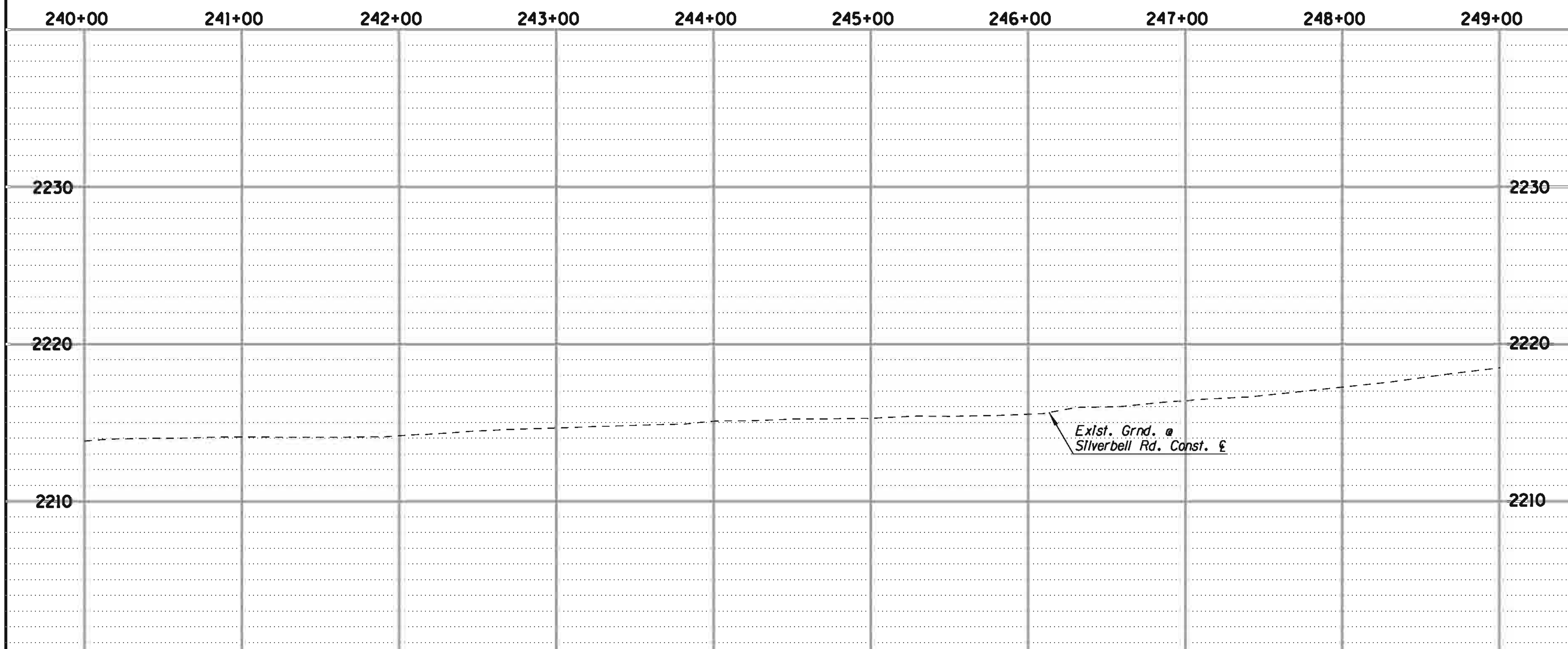




Notes:

1. For Horizontal Alignment Control See Sheet HC01
2. For Geometric Curb Data See Sheet GD01
3. For Storm Drain Plan & Profile See Sheet SD01
4. For Pavement Marking Plans See Sheets PM01 To PM05
5. Removals To Be Determined During Final Design

LEGEND

- Pav't Structural Sec. No. 2
- Pav't Structural Sec. No. 3

SCALE: 1" = 40'

Priscilla S. Cornelio, P.E., Director

	Date
Designed MPR	09/14
Drawn RW	09/14
Checked CJR	09/14
Proj. Engr. CJR	09/14

No.	Revision Description	Engineer	Date

PRELIMINARY NOT FOR CONSTRUCTION STAGE I

AECOM

Arizona Blue Stake 1-800-STAKE-IT

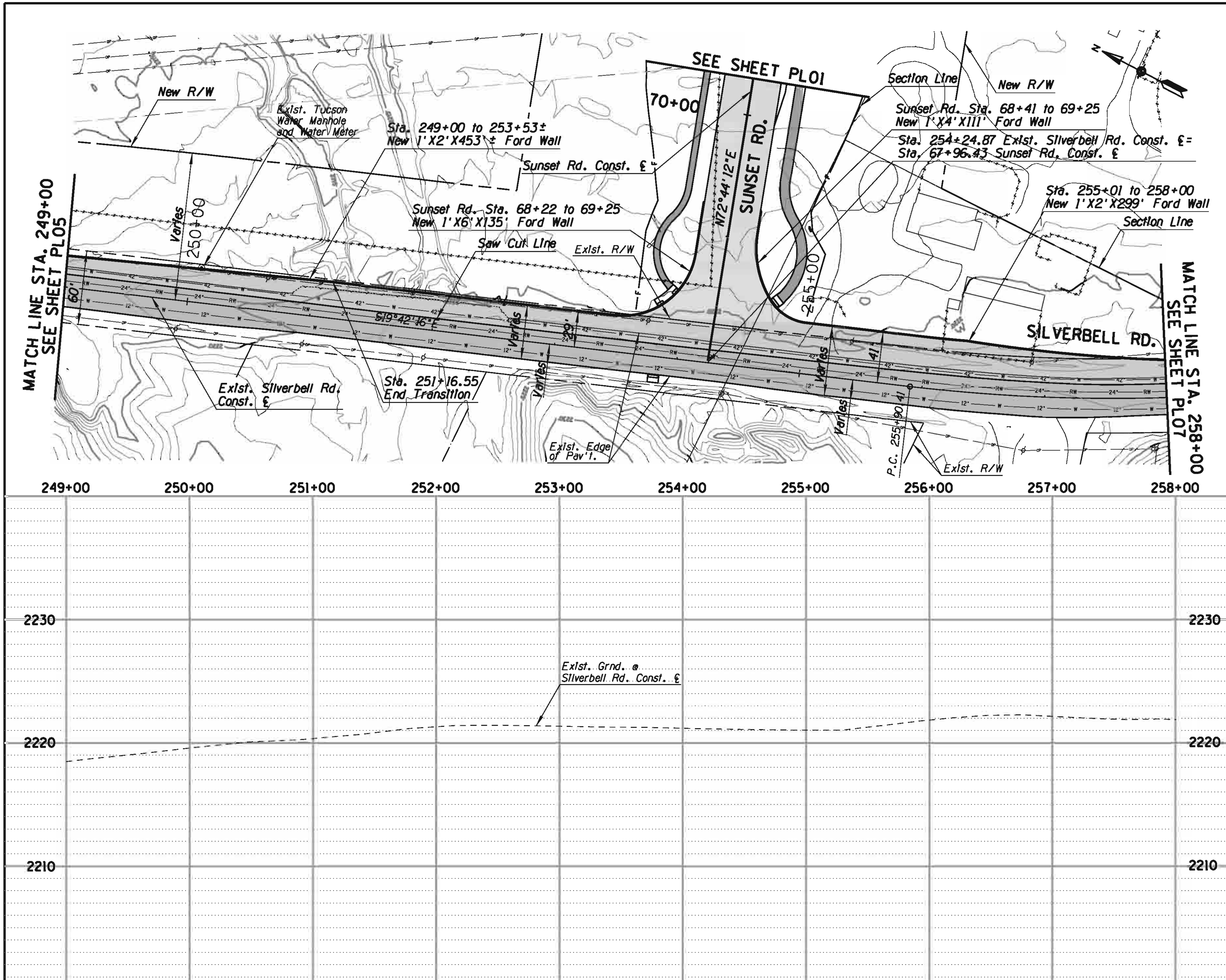
Pima County Department of Transportation

ROADWAY PLAN & PROFILE SHEET
SUNSET ROAD - SEGMENT I
SILVERBELL RD. TO I-10
STA. 240+00 TO STA. 249+00
PROJECT NO. 4RTSUN

SUNSET ROAD - SILVERBELL ROAD TO I-10 - PROJECT NO. 4RTSUN

Scale: 1" = 40' Horiz. 1" = 4' Vert. | Sheet PL05 of PL07 | Page 16 of 36

FILE NAME: P:\60311412 Sunset Rd\900-Work\910-CAD\20-SHEETS\4RTSUN_pl05_seg1.dgn DATE: 10/6/2014 TIME: 9:00:59 AM RobinsonC



Notes:

1. For Horizontal Alignment Control See Sheet HC01
2. For Geometric Curb Data See Sheet GD01
3. For Storm Drain Plan & Profile See Sheet SD01
4. For Pavement Marking Plans See Sheets PM01 To PM05
5. Removals To Be Determined During Final Design

LEGEND

- Pav't Structural Sec. No. 1
- Pav't Structural Sec. No. 2
- Pav't Structural Sec. No. 3
- Pav't Structural Sec. No. 4

40' 0 40' 80'
SCALE: 1"=40'

Priscilla S. Cornelio, P.E., Director

Pima County Department of Transportation

Designed	MPK	09/14
Drawn	RW	09/14
Checked	CJR	09/14
Proj. Engr.	CJR	09/14

No.	Revision Description	Engineer	Date

PRELIMINARY NOT FOR CONSTRUCTION STAGE I

AECOM

Arizona Blue Stake 1-800-STAKE-IT 1-800-782-5348

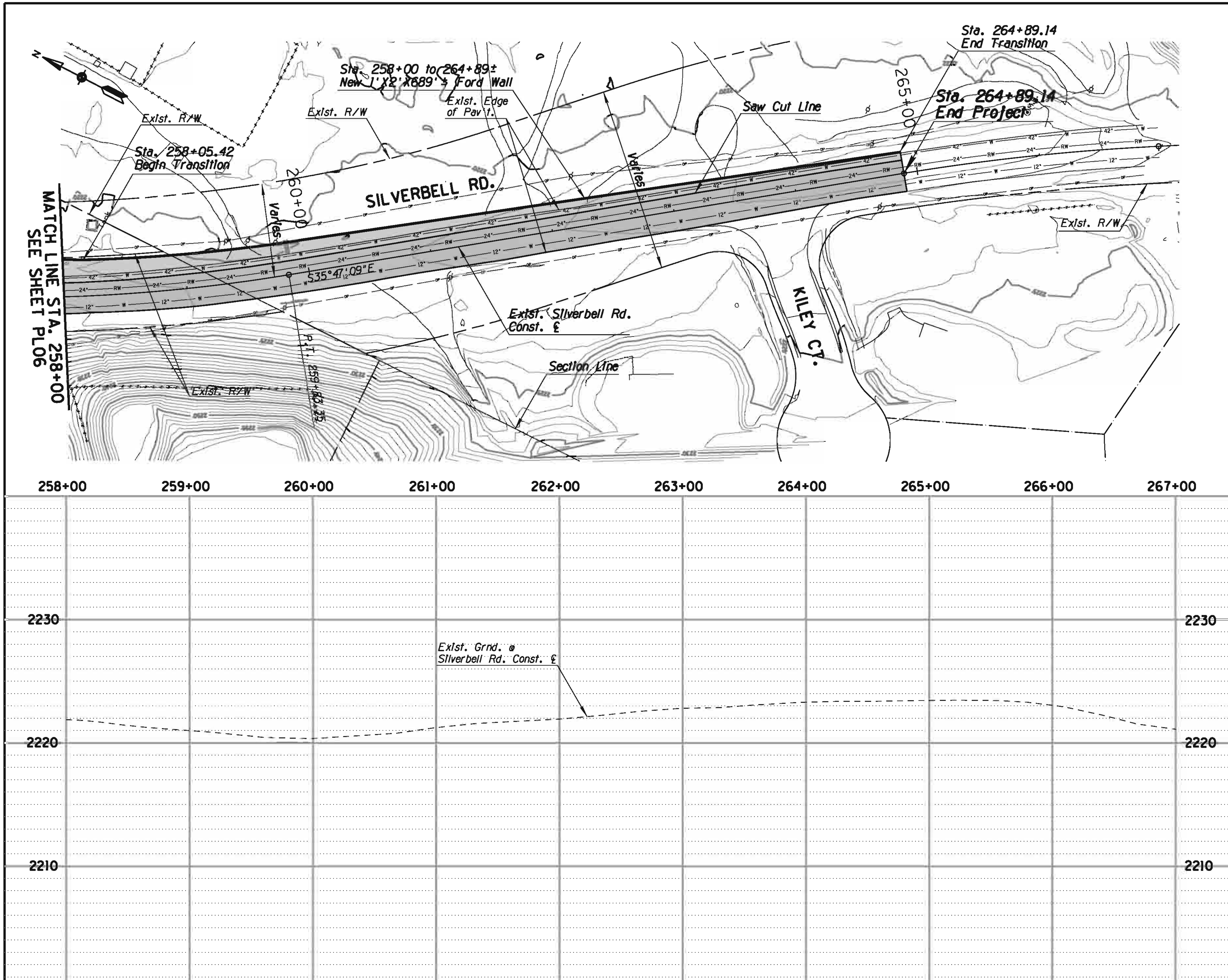
ROADWAY PLAN & PROFILE SHEET
SUNSET ROAD - SEGMENT I
SILVERBELL RD. TO I-10
STA. 249+00 TO 258+00
PROJECT NO. 4RTSUN

SUNSET ROAD - SILVERBELL ROAD TO I-10 - PROJECT NO. 4RTSUN

Scale: 1"= 40' Horiz. 1"= 4' Vert.

Sheet PL06 of PL07

FILE NAME: P:\60311412 Sunset Rd\900-Work\910-CAD\20-SHEETS\4RTSUN_pl06.segl.dgn DATE: 10/6/2014 TIME: 9:01:46 AM RobinsonC



Notes:

1. For Horizontal Alignment Control See Sheet HC01
2. For Geometric Curb Data See Sheet GD01
3. For Storm Drain Plan & Profile See Sheet SD01
4. For Pavement Marking Plans See Sheets PM01 To PM05
5. Removals To Be Determined During Final Design

LEGEND

- Pav't Structural Sec. No. 2
- Pav't Structural Sec. No. 3

40' 0 40' 80'
SCALE: 1"=40'

Priscilla S. Cornelio, P.E., Director

Designed	MPK	09/14
Drawn	RW	09/14
Checked	CJR	09/14
Proj. Engr.	CJR	09/14

No.	Revision Description	Engineer	Date

PRELIMINARY NOT FOR CONSTRUCTION STAGE I

AECOM

Arizona Blue Stake 1-800-STAKE-IT 1-800-782-5348

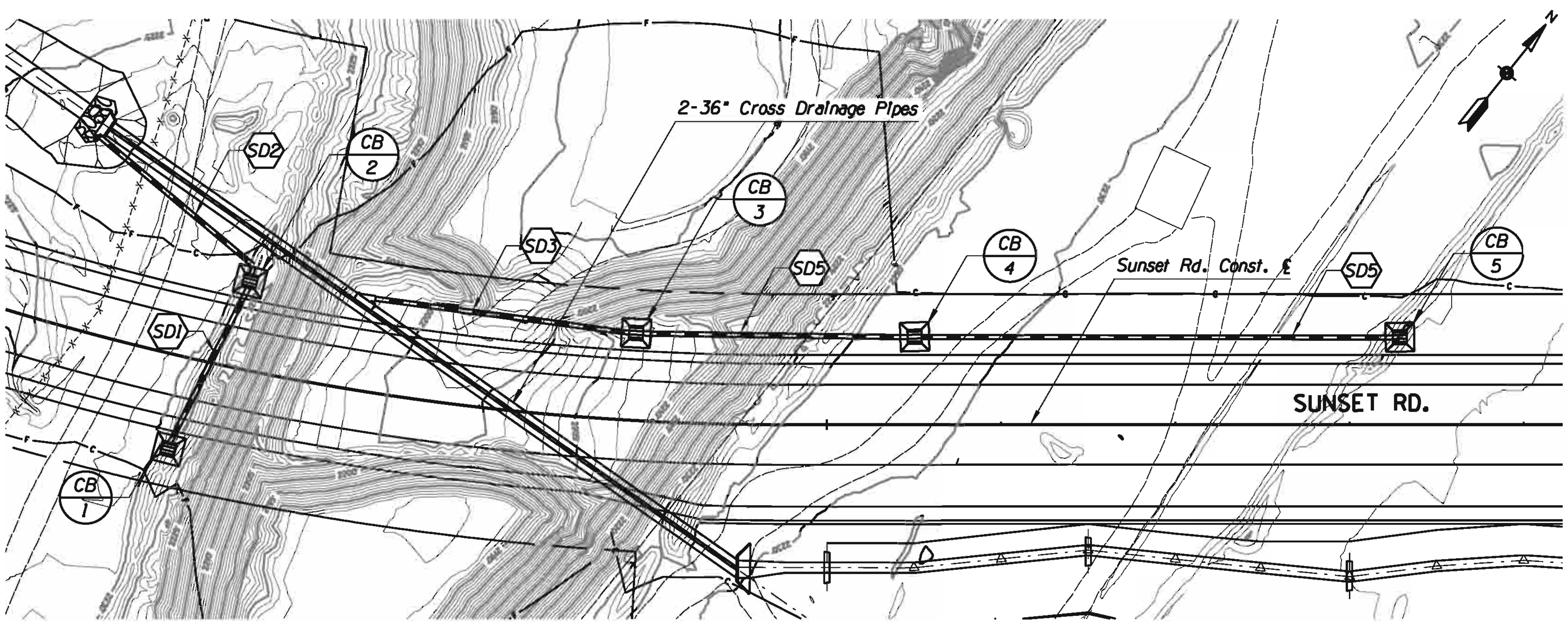
Pima County Department of Transportation

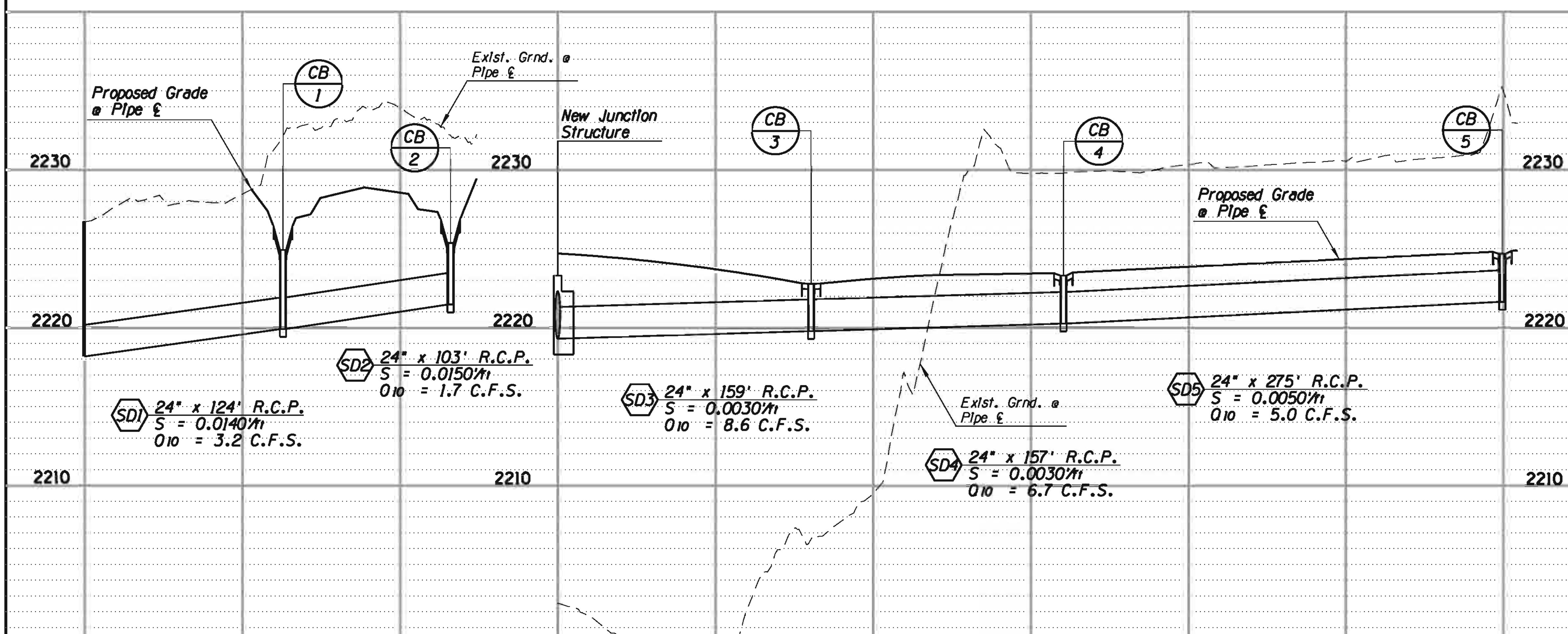
ROADWAY PLAN & PROFILE SHEET
SUNSET ROAD - SEGMENT I
SILVERBELL RD. TO I-10
STA. 258+00 TO STA. 267+00
PROJECT NO. 4RTSUN

SUNSET ROAD - SILVERBELL ROAD TO I-10 - PROJECT NO. 4RTSUN

Scale: 1"= 40' Horiz. 1"= 4' Vert. | Sheet PL07 of PL07 | Page 18 of 36

FILE NAME: P:\60311412 Sunset Rd\900-Work\910-CAD\20-SHEETS\4RTSUN_pl07_seg1.dgn DATE: 10/6/2014 TIME: 9:02:27 AM RobinsonC





Notes:

1. For Horizontal Alignment Control See Sheet HC01
2. For Geometric Curb Data See Sheet GD01
3. For Roadway Plan See Sheets PL01 To PL07
4. For Roadway Profiles See Sheets PR01 To PR04
5. For Pavement Marking Plans See Sheets PM01 To PM05

40' 0 40' 80'
SCALE: 1" = 40'

Priscilla S. Cornelio, P.E., Director

Designed	MPK	09/14
Drawn	RM	09/14
Checked	CJR	09/14
Proj. Engr.	CJR	09/14

No.	Revision Description	Engineer	Date

PRELIMINARY NOT FOR CONSTRUCTION STAGE I

AECOM
TRANSPORTATION
AECOM USA, Inc.

Arizona Blue Stake 1-800-STAKE-IT 1-800-782-5348

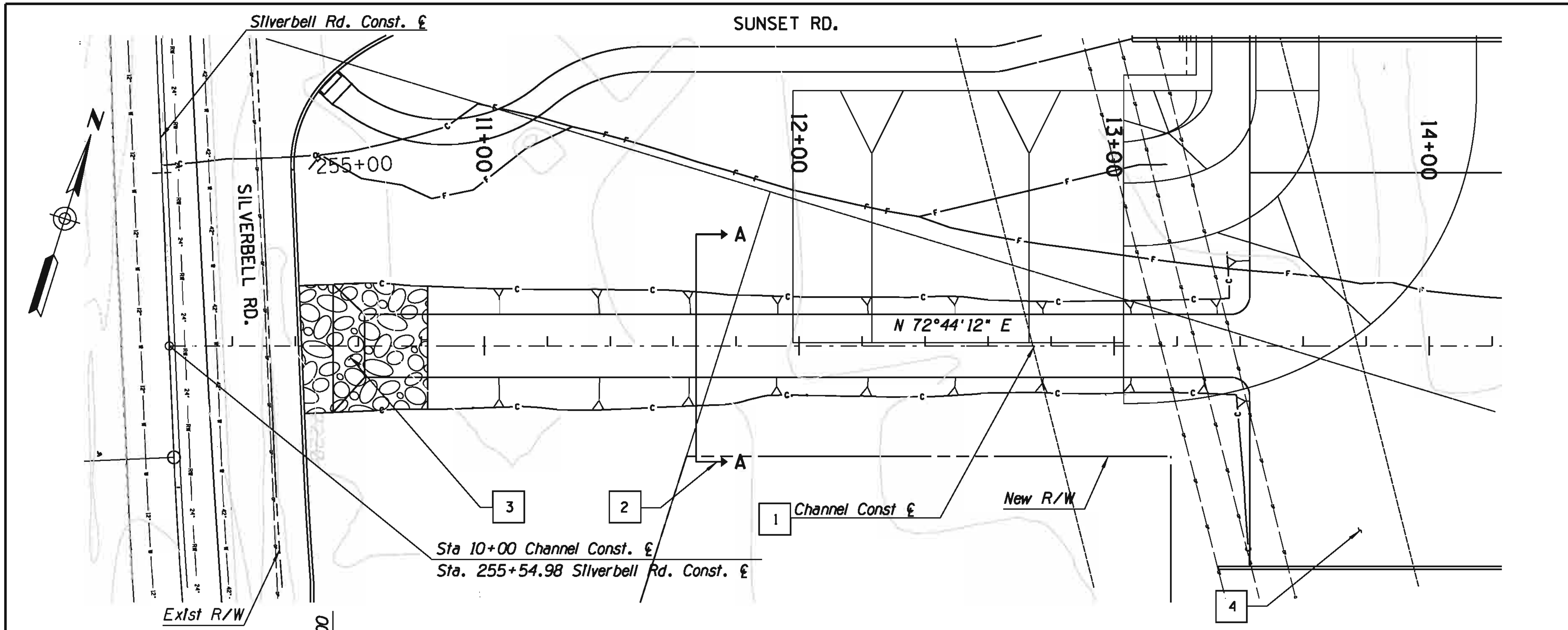
Pima County Department of Transportation

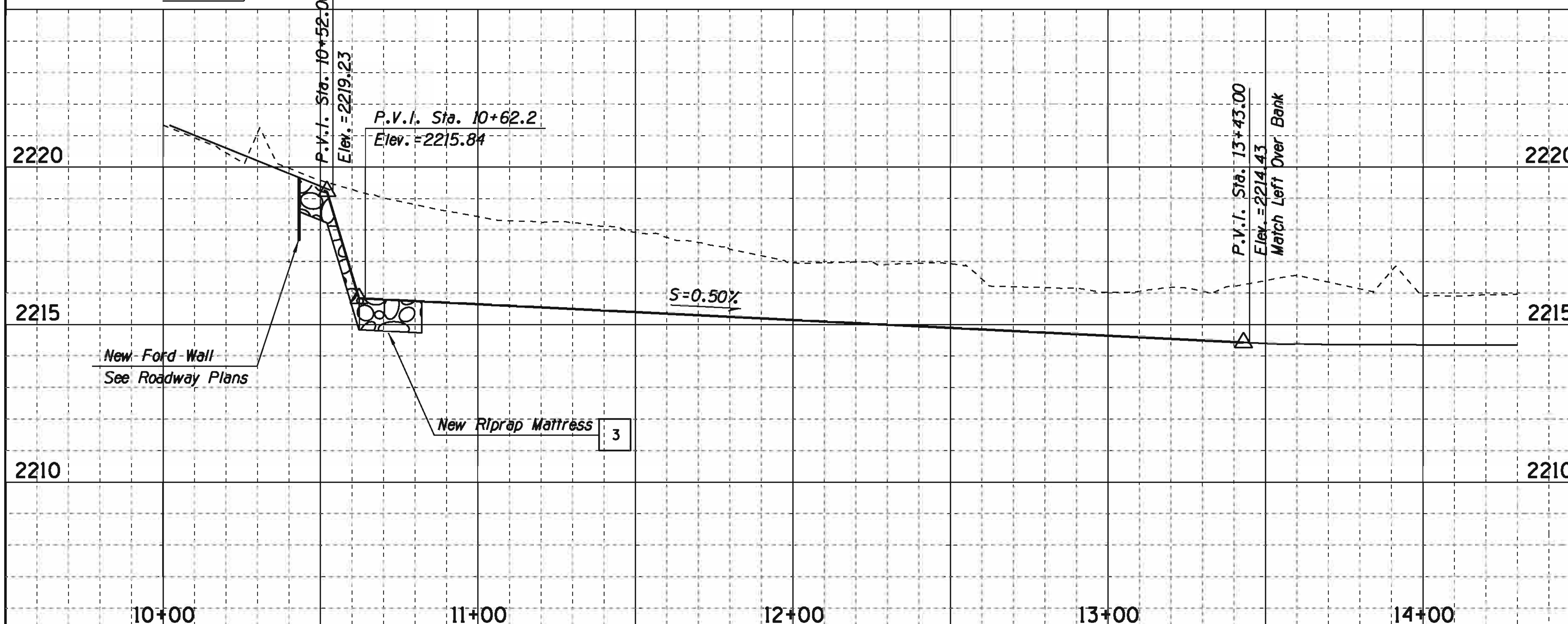
STORM DRAIN PLAN & PROFILE SHEET
SUNSET ROAD - SEGMENT I
SILVERBELL RD. TO I-10
STA. 76+00 TO STA. 84+00
PROJECT NO. 4RTSUN

SUNSET ROAD - SILVERBELL ROAD TO I-10 - PROJECT NO. 4RTSUN

Scale: 1" = 40' Horiz. 1" = 4' Vert. | Sheet SD01 of SD01 | Page 19 of 36

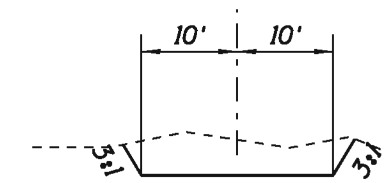
FILE NAME: P:\60311412 Sunset Rd\900-Work\910-CAD\20-SHEETS\4RTSUN.sd01.segl.dgn DATE: 10/6/2014 TIME: 9:06:31 AM RobinsonC





Notes:

1. Channel Const. ℄
505 C.Y. Drainage Excavation
2. Channel Typical Section
See Section A-A
3. 65 CY New Riprap Mattress
See Detail D
4. Left Overbank Grading
See Sheets CD02 & CD03



SECTION A-A

20' 0 20' 40'
SCALE: 1"=20'

Priscilla S. Cornelio, P.E., Director

Pima County Department of Transportation

PRELIMINARY NOT FOR CONSTRUCTION STAGE 1

PARSONS BRINCKERHOFF
177 N. CHURCH AVE., STE. 610
TUCSON, AZ. 85701
(520) 882-6424

Arizona Blue Stake
1-800-STAKE-IT
1-800-782-5348

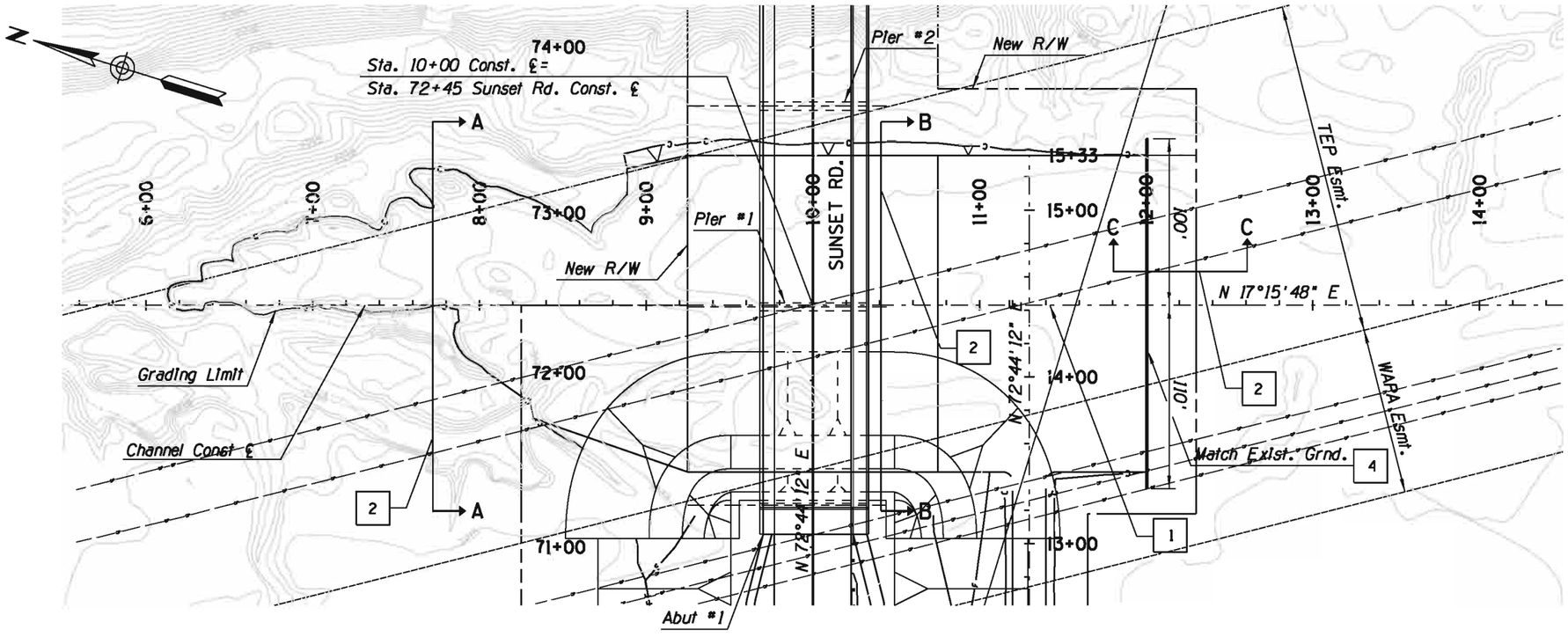
WEST ROADSIDE CHANNEL
SUNSET ROAD - SEGMENT 1
SILVERBELL RD. TO I-10
PROJECT NO. 4RTSUN

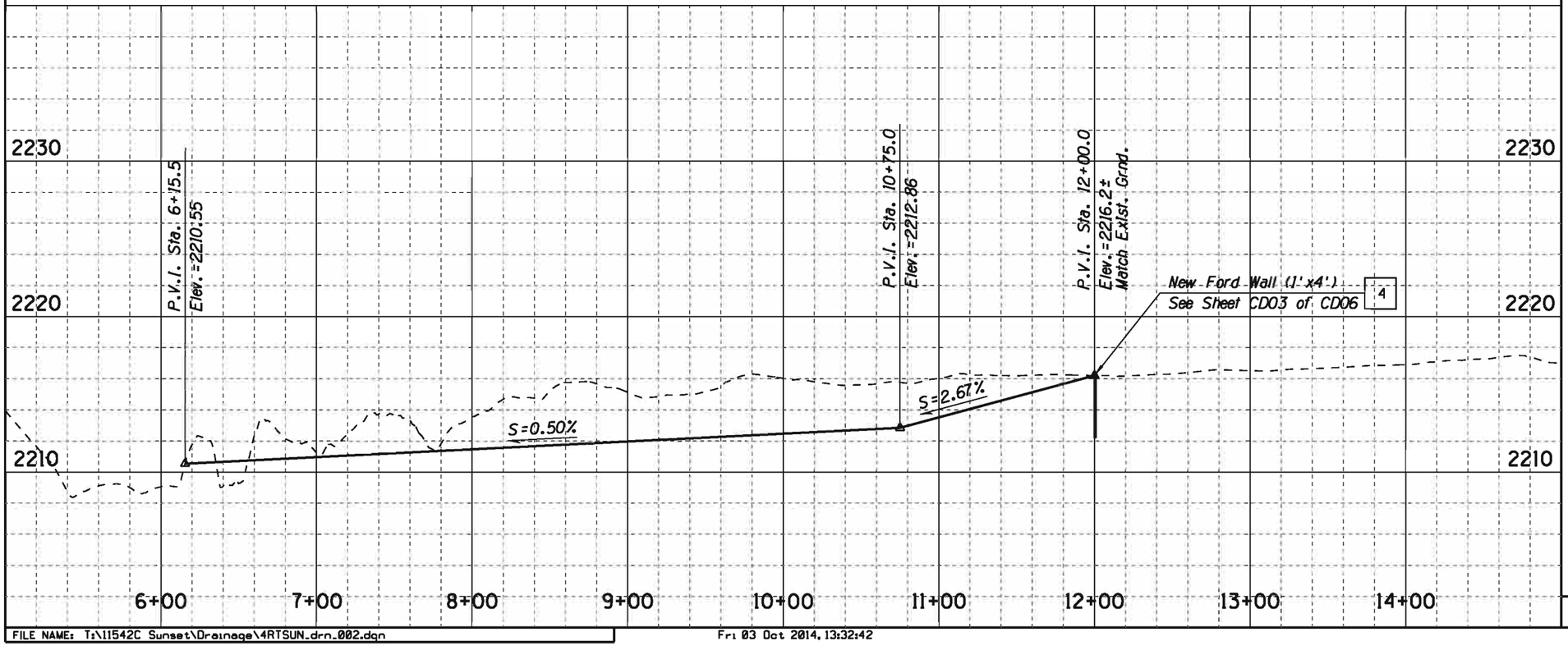
SUNSET ROAD - SILVERBELL ROAD TO I-10 - PROJECT NO. 4RTSUN

Scale: 1"=20' Horiz. | Sheet CD01 of CD06 | Page 20 of 36

FILE NAME: T:\11542C Sunset\Drainage\4RTSUN_drn_001.dgn

Fri 03 Oct 2014, 13:32:34





Notes:

1. Channel Const ℄
   7645 C.Y. Drainage Excavation
2. Channel Typical Sections See
   Left Overbank Grading
   Sheet CD03
3. Not Used
4. 210 L.F. New Conc. Ford Wall
   ADOT Std. Dwg. C-19.10

40' 0 40' 80'
SCALE: 1"=40'

Scale: 1"=40' Horiz. | Sheet CD02 of CD06 | Page 21 of 36

FILE NAME: T:\11542C Sunset\Drainage\4RTSUN_drn_002.dgn

Fri 03 Oct 2014, 13:32:42

Priscilla S. Cornelio, P.E., Director

No.	Revision Description	Engineer	Date

Designed	GB		09/14
Drawn	CPC		09/14
Checked	JJK		09/14
Proj. Engr.	GB		09/14

PRELIMINARY NOT FOR CONSTRUCTION STAGE 1

PARSONS BRINCKERHOFF
177 N. CHURCH AVE., STE. 610
TUCSON, AZ. 85701
(520) 882-4424

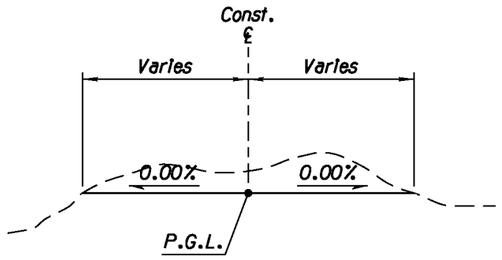
Arizona Blue Stake 1-800-STAKE-IT (1-800-782-5348) Call two working days before you dig

Pima County Department of Transportation

LEFT OVERBANK GRADING
SUNSET ROAD - SEGMENT I
SILVERBELL RD. TO I-10

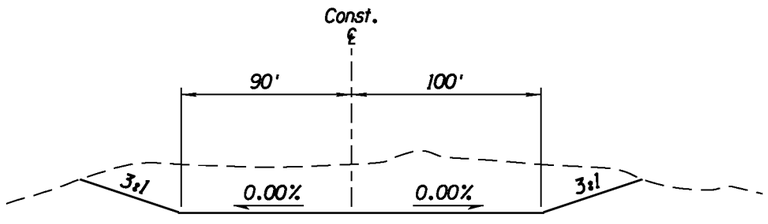
PROJECT NO. 4RTSUN

SUNSET ROAD - SILVERBELL ROAD TO I-10 - PROJECT NO. 4RTSUN



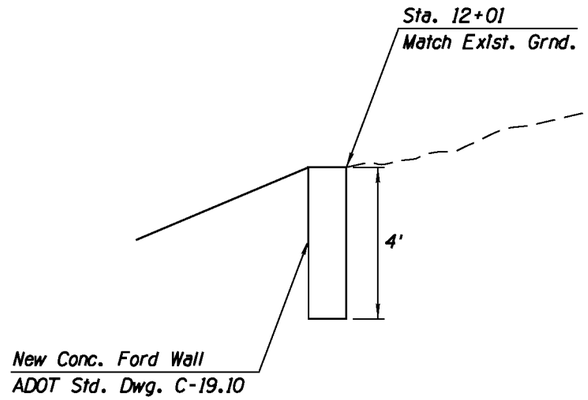
SECTION A-A

Sta. 7+00 to Sta. 8+30



SECTION B-B

Sta. 8+90 to Sta. 12+00



SECTION C-C

Ford Wall

Pima County Department of Transportation

Priscilla S. Cornelio, P.E., Director

No.	Revision Description	Engineer	Date

		Date
Designed	GB	09/14
Drawn	CPG	09/14
Checked	JJK	09/14
Proj. Engr.	GB	09/14

PRELIMINARY NOT FOR CONSTRUCTION STAGE I

PARSONS BRINCKERHOFF
177 N. CHURCH AVE., STE. 610
TUCSON, AZ. 85701
(520) 882-9424

Arizona Blue Stake
1-800-STAKE-IT
1-800-782-5348
(Ariz. Blue Stake, Inc.)

LEFT OVERBANK GRADING
SUNSET ROAD - SEGMENT I
SILVERBELL RD. TO I-10

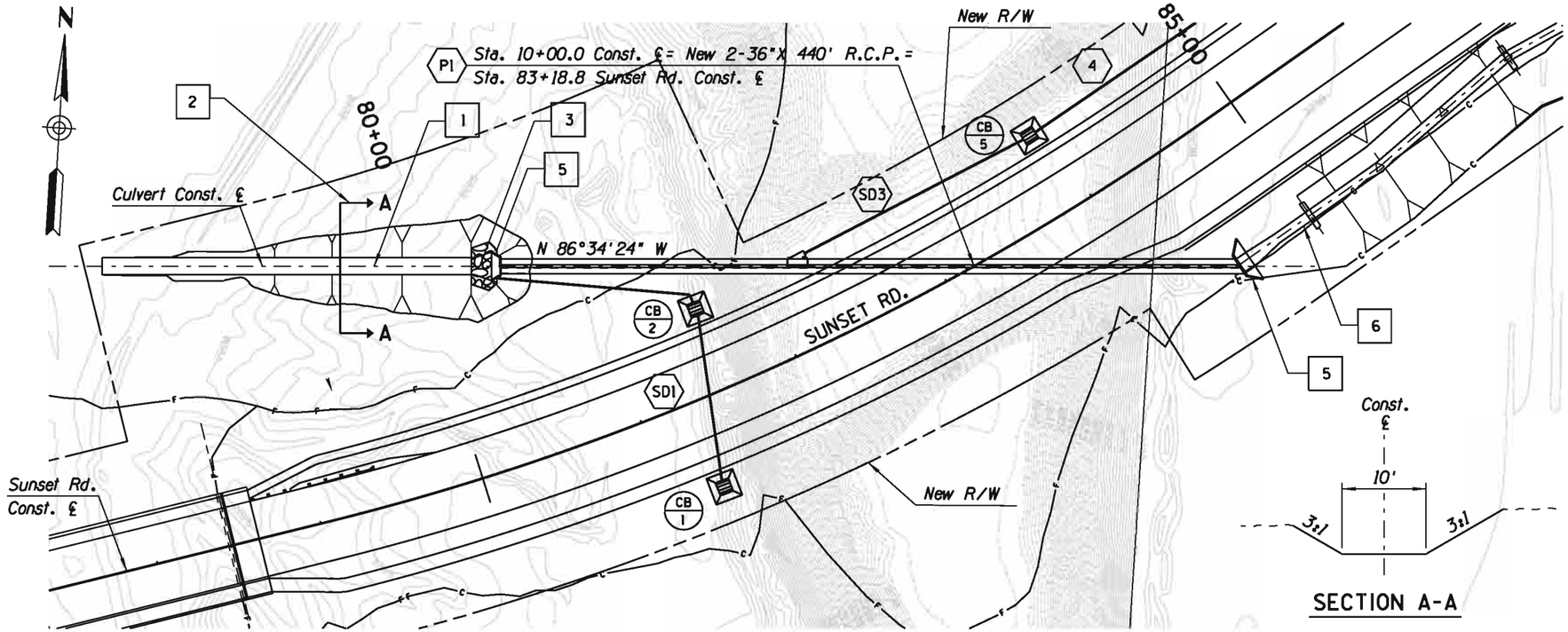
PROJECT NO. 4RTSUN

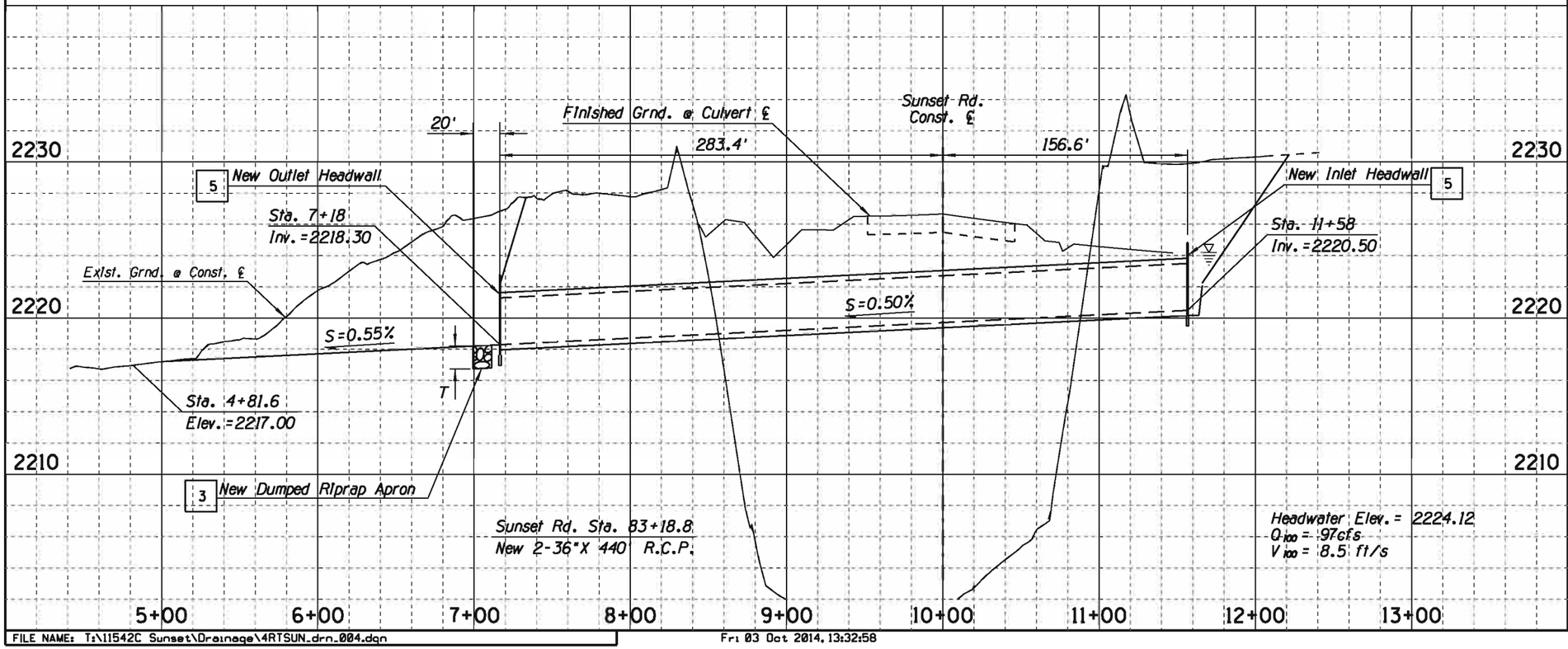
SUNSET ROAD - SILVERBELL ROAD TO I-10 - PROJECT NO. 4RTSUN

Scale:	N.T.S	Sheet CD03 of CD06	Page 22 of 36

FILE NAME: T:\11542C Sunset\Drainage\4RTSUN_drn_003.dgn

Fri 03 Oct 2014, 13:27:00





Notes:

1. Culvert and Channel const. ℄ 1010 C.Y. Drainage Excavation
2. Channel Typical Section See Section A-A
3. 20 C.Y. Dumped Riprap Apron, w/ Filter Fabric T=18", D_{50}=6" Gradation:

% Passing	Size

4. Not Used
5. New Headwall, ADOT Std. Dwg. B-11.12, Mod See Detail D_
6. New Roadside Channel w/ Check Dams, See Sheets CD05 & CD06

P1 New Pipe Culvert I.D.

SD New Storm Drain Pipe I.D. See Storm Drain Plans

CB New Storm Drain Catch Basin I.D. See Storm Drain Plans

40' 0 40' 80'
SCALE: 1"=40'

Scale: 1"=40' Horiz. | Sheet CD04 of CD06 | Page 23 of 36

FILE NAME: T:\11542C Sunset\Drainage\4RTSUN_drn_004.dgn

Fri 03 Oct 2014, 13:32:58

Pima County Department of Transportation

Priscilla S. Cornelio, P.E., Director

No.	Revision Description	Date	Engineer

	Designed	Drawn	Checked	Proj. Engr.
Date	09/14	09/14	09/14	09/14
	GB	CPC	JJK	GB

PRELIMINARY NOT FOR CONSTRUCTION STAGE 1

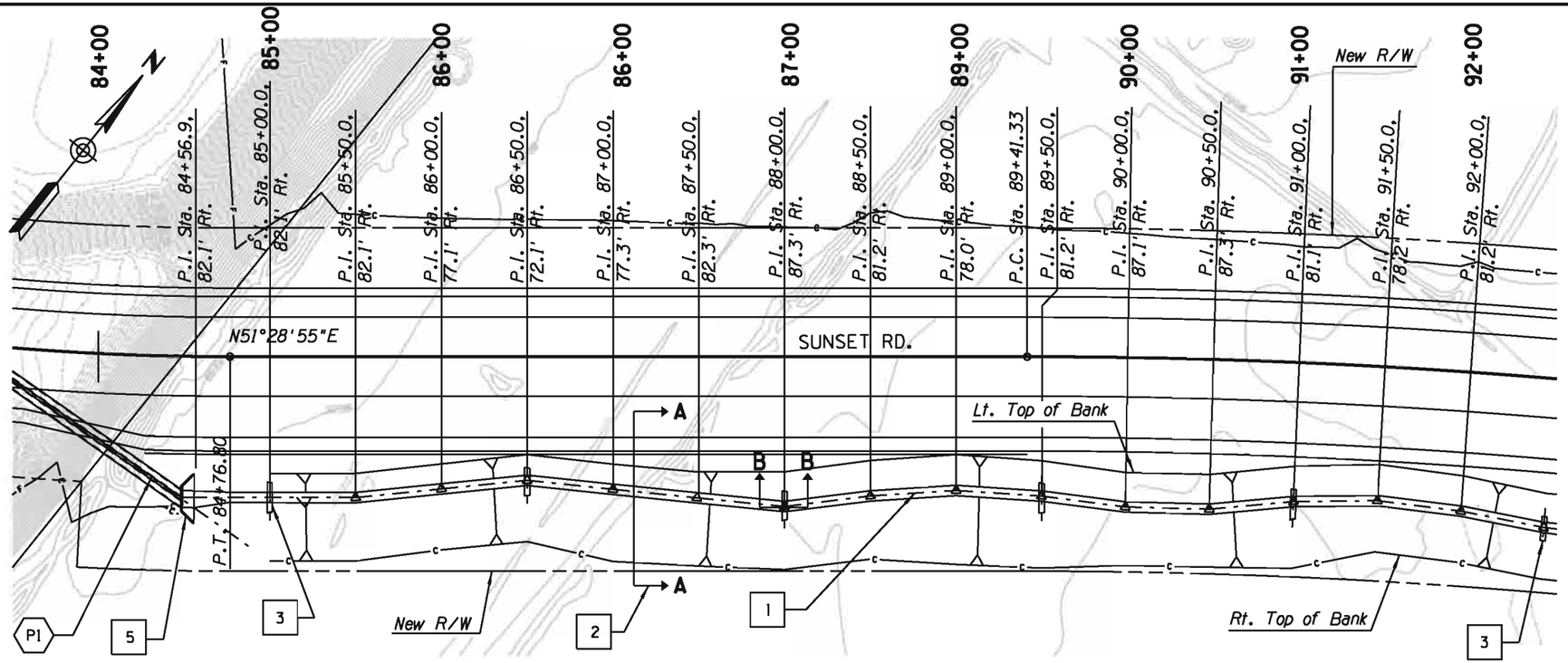
PARSONS BRINCKERHOFF
177 N. CHURCH AVE, STE. 610
TUCSON, AZ. 85701
(520) 882-4424

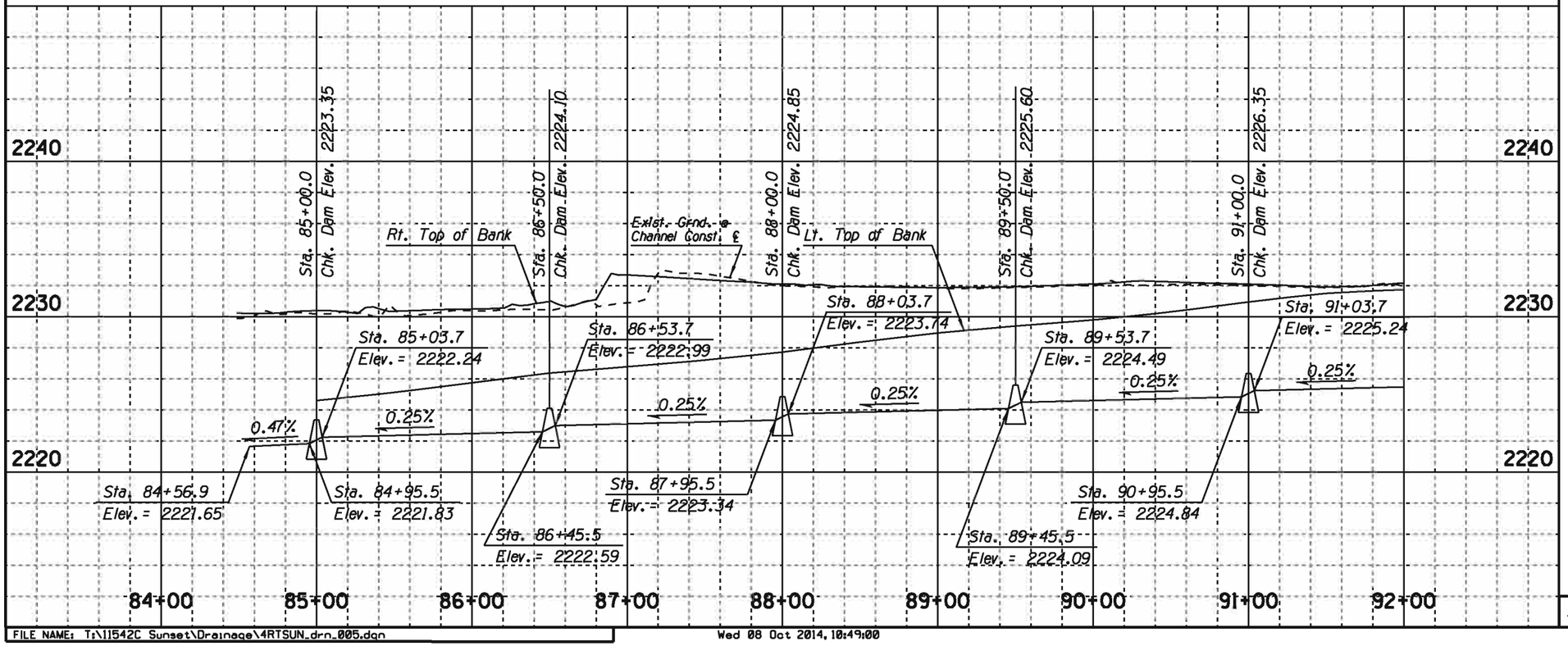
Arizona Blue Stake 1-800-STAKE-IT (1-800-782-5348) Call two working days before you dig

CULVERT PLAN & PROFILE
SUNSET ROAD - SEGMENT I
SILVERBELL RD. TO I-10

PROJECT NO. 4RTSUN

SUNSET ROAD - SILVERBELL ROAD TO I-10 - PROJECT NO. 4RTSUN





Notes:

1. Channel Const. ℄ Excavation Included w/ Roadway Excavation
2. Channel Typical Section See Section A-A, Sheet CD06
3. Dumped Riprap or Gabion Check Dam (TBD) 9Typ) See Section B-B, Sheet CD06
4. Not Used
5. New Headwall, See Sheet CD04
6. Not Used

P1 New Culvert I.D.

40' 0 40' 80'
SCALE: 1"=40'

Priscilla S. Cornelio, P.E., Director
Pima County Department of Transportation

No.	Revision Description	Engineer	Date

		Date
Designed	GB	09/14
Drawn	CPC	09/14
Checked	LJK	09/14
Proj. Engr.	GB	09/14

PRELIMINARY NOT FOR CONSTRUCTION STAGE I

PARSONS BRINCKERHOFF
177 N. CHURCH AVE., STE. 610
TUCSON, AZ. 85701
(520) 882-6424

Arizona Blue Stake 1-800-STAKE-IT 1-800-782-5348

ROADSIDE CHANNEL
Sta 84+50 to Sta 92+00
SUNSET ROAD - SEGMENT I
SILVERBELL RD. TO I-10

PROJECT NO. 4RTSUN

SUNSET ROAD - SILVERBELL ROAD TO I-10 - PROJECT NO. 4RTSUN

Scale: 1"=40' Horiz. | Sheet CD05 of CD06 | Page 24 of 36

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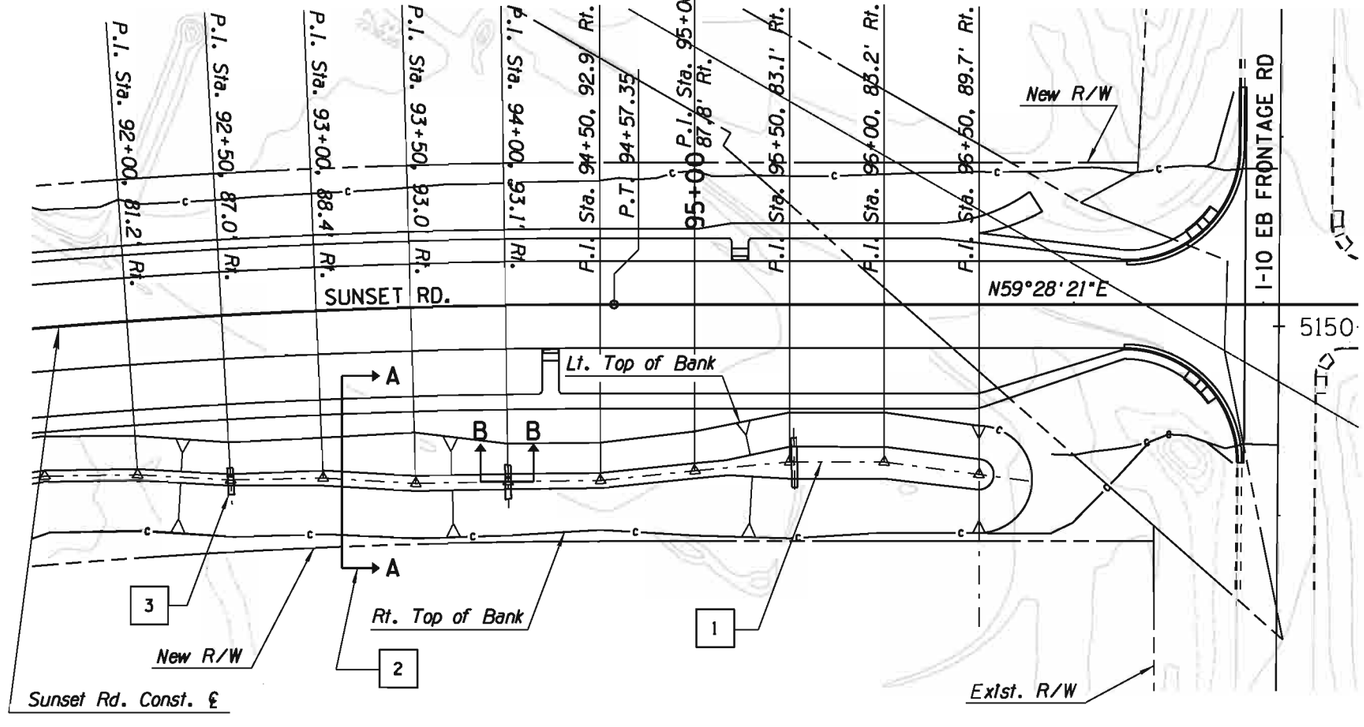
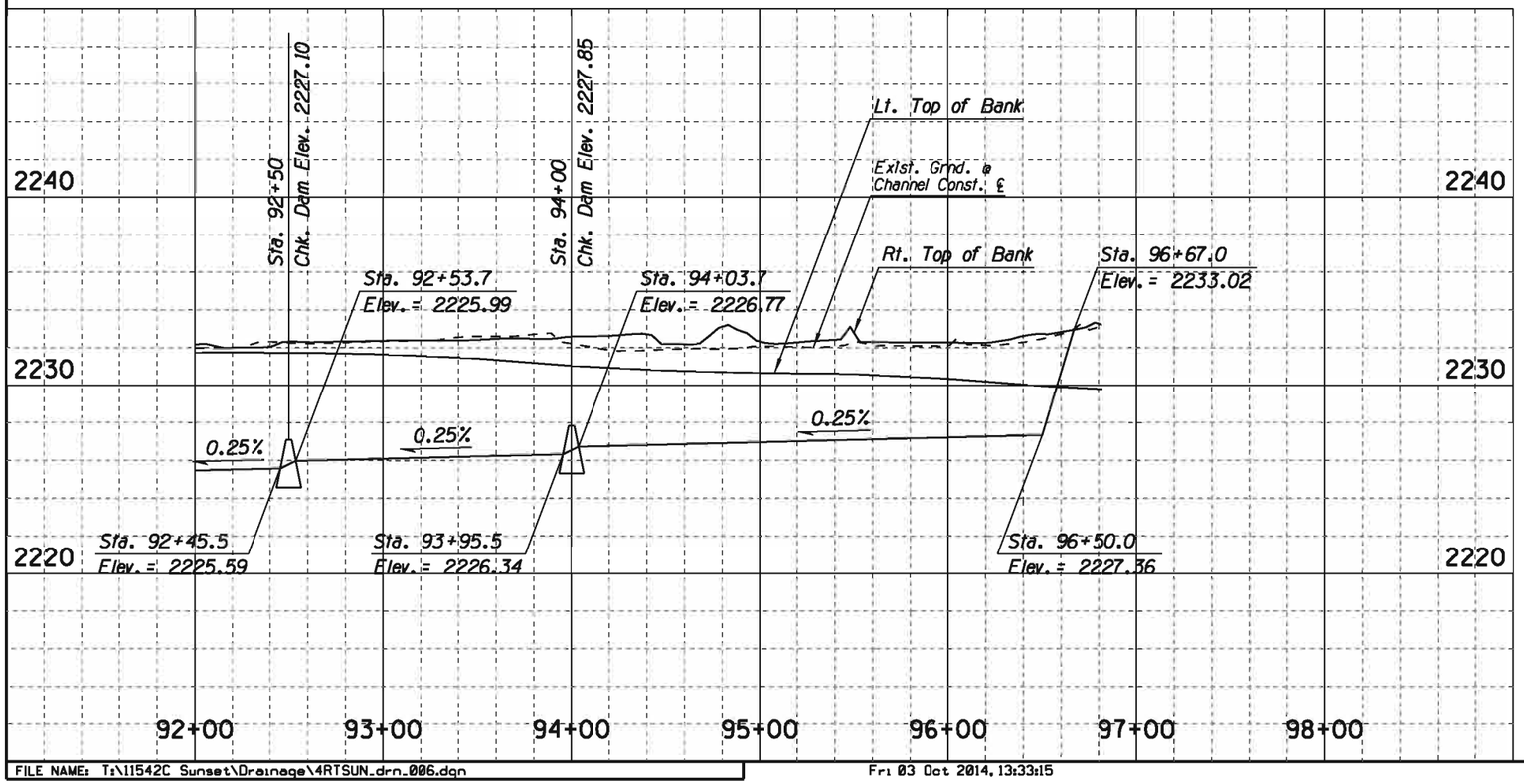
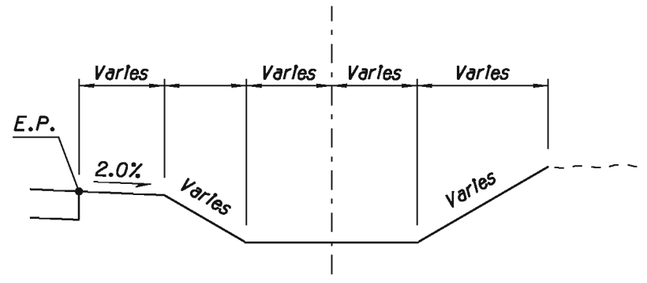
Wed 08 Oct 2014, 10:49:00





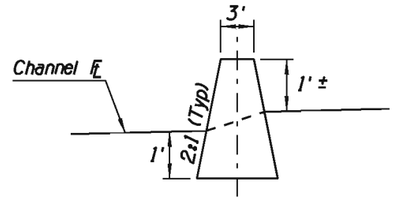
Notes:

1. Channel const. ℄ Excavation Included w/ Roadway Excavation
2. Channel Typical Section See Section A-A, Sheet CD06
3. Dumped Riprap or Gabion Check Dam (TBD) 9Typ) See Section B-B, Sheet CD06
4. Not Used
5. New Headwall, See Sheet CD04
6. Not Used



SECTION A-A

* See Staking Plan, Detail _



SECTION B-B

Riprap Check Dam
or
Gabion Check Dam

40' 0 40' 80'
SCALE: 1"=40'

Pima County Department of Transportation

Priscilla S. Cornelio, P.E., Director

No.	Revision Description	Engineer	Date

		Date
Designed	GB	09/14
Drawn	CPC	09/14
Checked	JJK	09/14
Proj. Engr.	GB	09/14

PRELIMINARY NOT FOR CONSTRUCTION STAGE 1

PARSONS BRINCKERHOFF
177 N. CHURCH AVE, STE. 610
TUCSON, AZ. 85701
(520) 882-4424

Arizona Blue Stake 1-800-STAKE-IT (1-800-782-5348) Call two working days before you dig

ROADSIDE CHANNEL
Sta 92+00 to Sta 100+00
SUNSET ROAD - SEGMENT I
SILVERBELL RD. TO I-10

PROJECT NO. 4RTSUN

SUNSET ROAD - SILVERBELL ROAD TO I-10 - PROJECT NO. 4RTSUN

Scale: 1"=40' Horiz. | Sheet CD06 of CD06 | Page 25 of 36

FILE NAME: T:\11542C Sunset\Drainage\4RTSUN_drn_006.dgn

Fri 03 Oct 2014, 13:33:15

PAVEMENT MARKING GENERAL NOTES

1. All pavement markings shall conform to the August 2008 Pima County/City of Tucson Pavement Marking Design Manual and the Pima Association of Governments (PAG) Standard Specifications.

2. The permanent pavement markings may be modified as directed by the Traffic Engineer.

3. The design speed for Sunset Road 40 miles per hour (mph). The posted speed limit is 35 mph. The design speed on Silverbell Road from Orange Grove Road to El Camino del Cerro is 50 mph. The posted speed limit is 45 mph. The Design Vehicle is WB-62.

4. All lane dimensions are from center of lane line, center of double lane line, or edge of pavement, unless otherwise noted.

5. The pavement marking drawings are schematic only. The contractor shall follow all dimensions, details and standards when installing pavement striping, markings and markers.

6. The final longitudinal striping shall be 60 mil (0.060") thick hot-sprayed thermoplastic reflectorized striping placed over the temporary striping within 14 to 30 calendar days after completion of the final pavement surface, or as directed by the Traffic Engineer. All other markings shall be applied at the same time. Temporary striping shall be paint.

7. All final transverse markings shall be hot-sprayed 90 mil (0.090") thermoplastic striping. All pavement arrows and legends shall be hot-sprayed 90 mil (0.090") thermoplastic pavement marking. Extruded thermoplastic or preformed applications may be used if approved by the Traffic Engineer.

8. The contractor shall be responsible for the layout and installation of pavement markings on final surface course following control points that have been set no more than 50 feet apart along the lines to be striped. In tangent sections of a road where the pavement marking pattern does not change, control points can be set at 200 feet apart. The layout and inspection of all pavement markings shall be approved by the Traffic Engineer prior to the application of materials.

9. It is the contractor's responsibility to ensure that the final surface course is placed so that the striping is offset no more than one foot clear of the construction joint, unless otherwise directed by the Engineer.

10. The contractor shall clean the roadway surface to the satisfaction of the Traffic Engineer by sweeping and air-jet blowing immediately prior to the placement of all pavement markings. The temperature shall not be less than 50 degrees fahrenheit for the placement of hot-sprayed thermoplastic striping, and 40 degrees fahrenheit for the placement of raised pavement markers (RPMs).

11. All RPMs shall be installed so that the reflective face of each marker is facing the direction of traffic and is perpendicular to the direction of traffic flow. Type C pavement markers shall be installed so that the clear reflective face of each marker is facing approaching traffic and is perpendicular to the direction of traffic flow.

12. The offset between the edge of the RPMs and the edge of a solid stripe shall be 2 inches.

13. All removal of existing pavement markings shall be accomplished in accordance with Section 701 of the PAG Standard Specifications. Painting over existing striping does not constitute approved striping obliteration.

14. The Engineer of record shall be required to produce as-built striping plans within 90 days of striping completion.

15. Final inspection/acceptance of pavement markings shall be performed by the Traffic Engineer.

40' 0 40' 80'
SCALE: 1"=40'

Pima County Department of Transportation
Priscilla S. Cornelio, P.E., Director

PRELIMINARY NOT FOR CONSTRUCTION STAGE I

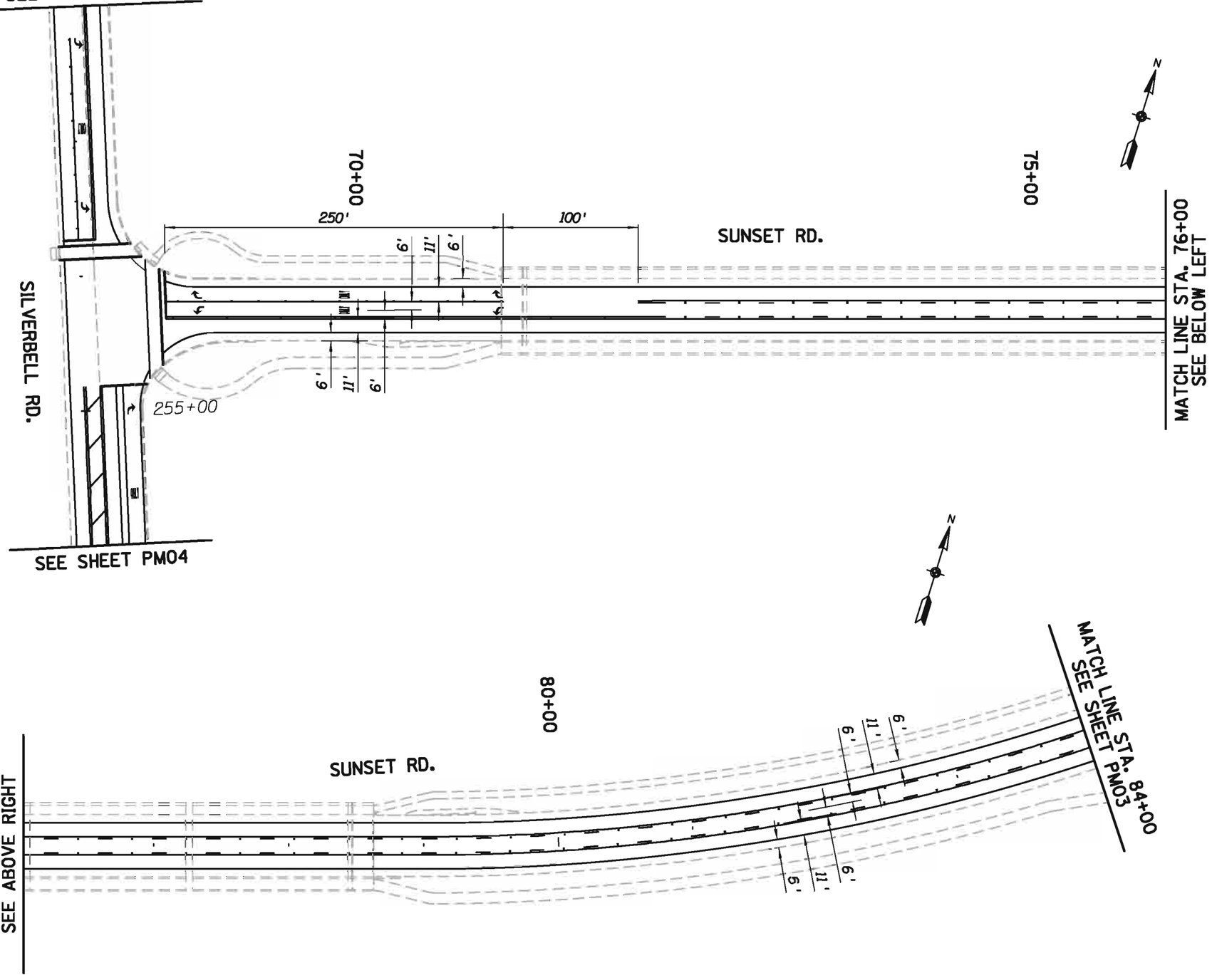
AECOM

PAVEMENT MARKING GENERAL NOTES
SUNSET ROAD - SEGMENT I
SILVERBELL RD. TO I-10
PROJECT NO. 4RTSUN

SUNSET ROAD - SILVERBELL ROAD TO I-10 - PROJECT NO. 4RTSUN

FILE NAME: P:\60311412 Sunset Rd\900-Work\910-CAD\20-SHEETS\4RTSUN.pmGN.seg1.dgn DATE: 10/6/2014 TIME: 9:11:57 AM RobinsonC

MATCH LINE STA. 252+00
SEE SHEET PM04



SEE SHEET PM04

Note:

1 Pavement Marking Notes & Other Information To Be Included In Future Plans.

Pinal County Department of Transportation
Priscilla S. Cornelio, P.E., Director

No.	Revision Description	Engineer	Date

		Date
Designed	WPK	09/14
Drawn	RM	09/14
Checked	CJR	09/14
Proj. Engr.	WPK	09/14

PRELIMINARY NOT FOR CONSTRUCTION STAGE I

AECOM
TRANSPORTATION
AECOM USA, Inc.
7720 N. 16th St., Suite 120
Phoenix, AZ 85020-4277
T 602.371.1100 F 602.371.1077
www.aecom.com

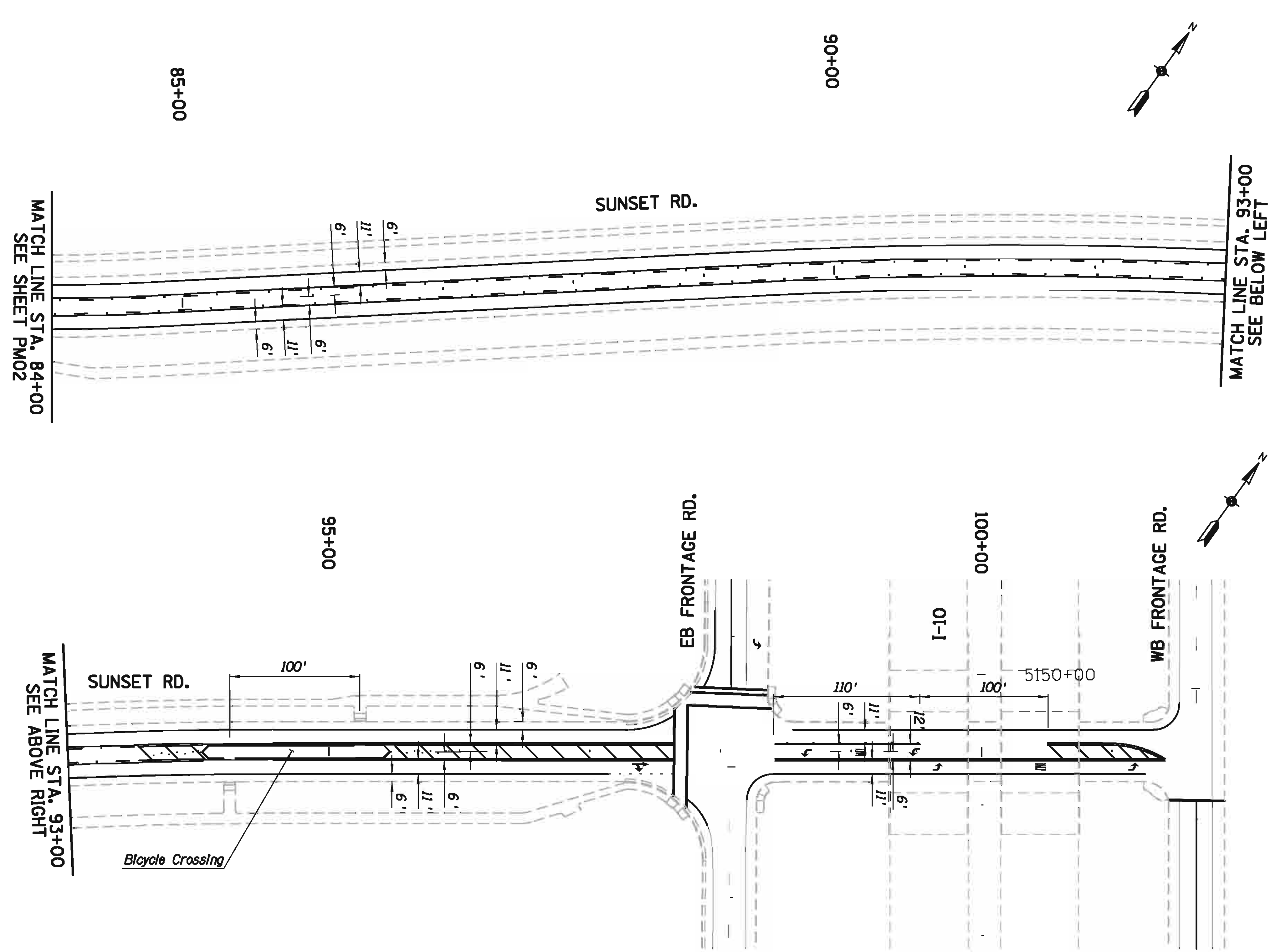
Arizona Blue Stake
1-800-STAKE-IT
1-800-782-5348
Call two working days before you dig

PAVEMENT MARKING SHEET
SUNSET ROAD - SEGMENT I
SILVERBELL RD. TO I-10
STA. 68+00 TO STA. 83+00
PROJECT NO. 4RTSUN

SUNSET ROAD - SILVERBELL ROAD TO I-10 - PROJECT NO. 4RTSUN

Scale:	1"=40' Horiz.	Sheet PM02 of PM05	Page 27 of 36

FILE NAME: P:\60311412 Sunset Rd\900-Work\910-CAD\20-SHEETS\4RTSUN_pm01_seg1.dgn DATE: 10/28/2014 TIME: 2:03:43 PM Kershner-M



Note:

1 Pavement Marking Notes & Other Information To Be Included In Future Plans.

40' 0 40' 80'
SCALE: 1" = 40'

Priscilla S. Cornelio, P.E., Director

Designed	MPK	09/14
Drawn	RM	09/14
Checked	CJR	09/14
Proj. Engr.	MPK	09/14

No.	Revision Description	Engineer	Date

PRELIMINARY NOT FOR CONSTRUCTION STAGE I

AECOM

Arizona Blue Stake 1-800-STAKE-IT 1-800-782-5348

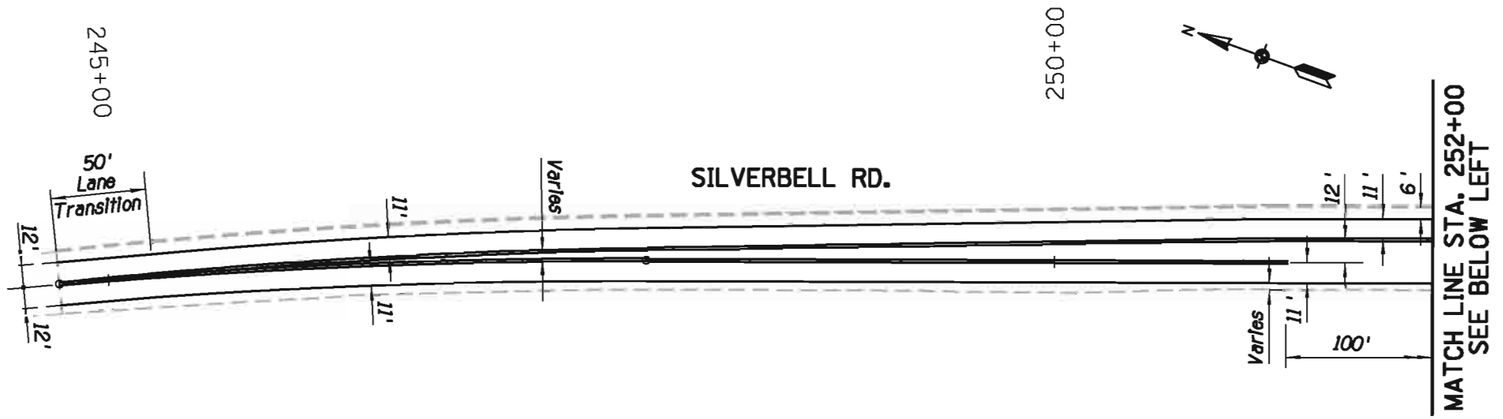
Pima County Department of Transportation

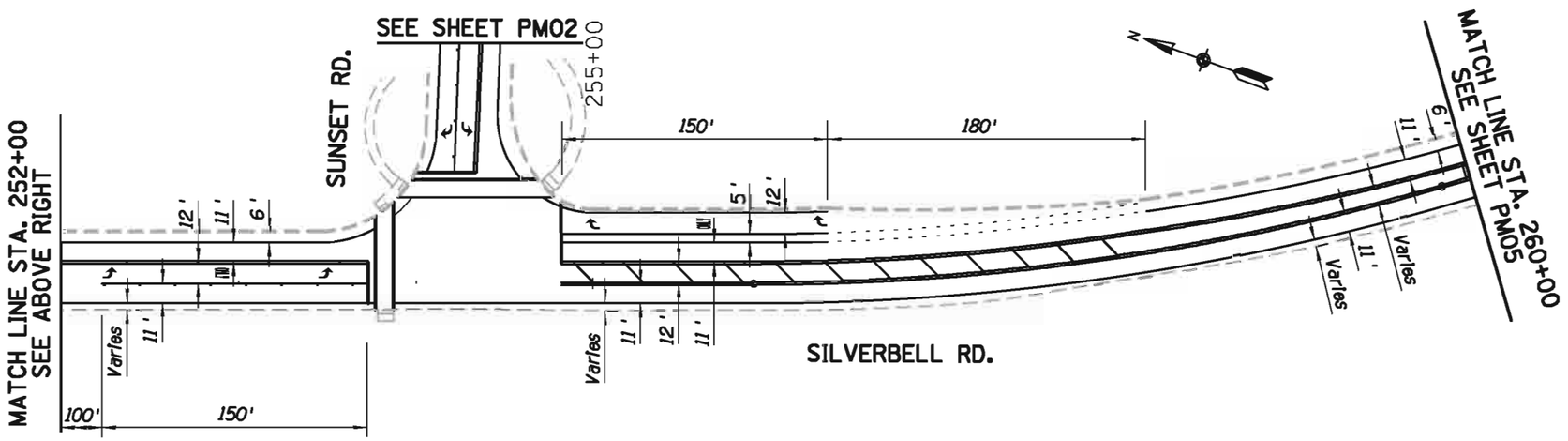
PAVEMENT MARKING SHEET
SUNSET ROAD - SEGMENT I
SILVERBELL RD. TO I-10
STA. 84+00 TO STA. 102+00
PROJECT NO. 4RTSUN

SUNSET ROAD - SILVERBELL ROAD TO I-10 - PROJECT NO. 4RTSUN

Scale:	1"=40' Horiz.	Sheet PM03 of PM05	Page 28 of 36

FILE NAME: P:\60311412 Sunset Rd\900-Work\910-CAD\20-SHEETS\4RTSUN_pm02_seg1.dgn DATE: 10/28/2014 TIME: 2:04:08 PM KershnerM





Note:

1 *Pavement Marking Notes & Other Information To Be Included In Future Plans.*

40' 0 40' 80'
SCALE: 1"=40'

Priscilla S. Cornelio, P.E., Director

Pima County Department of Transportation

No.	Revision Description	Engineer	Date

		Date
Designed	MPK	09/14
Drawn	RM	09/14
Checked	CJR	09/14
Proj. Engr.	MPK	09/14

PRELIMINARY NOT FOR CONSTRUCTION STAGE I

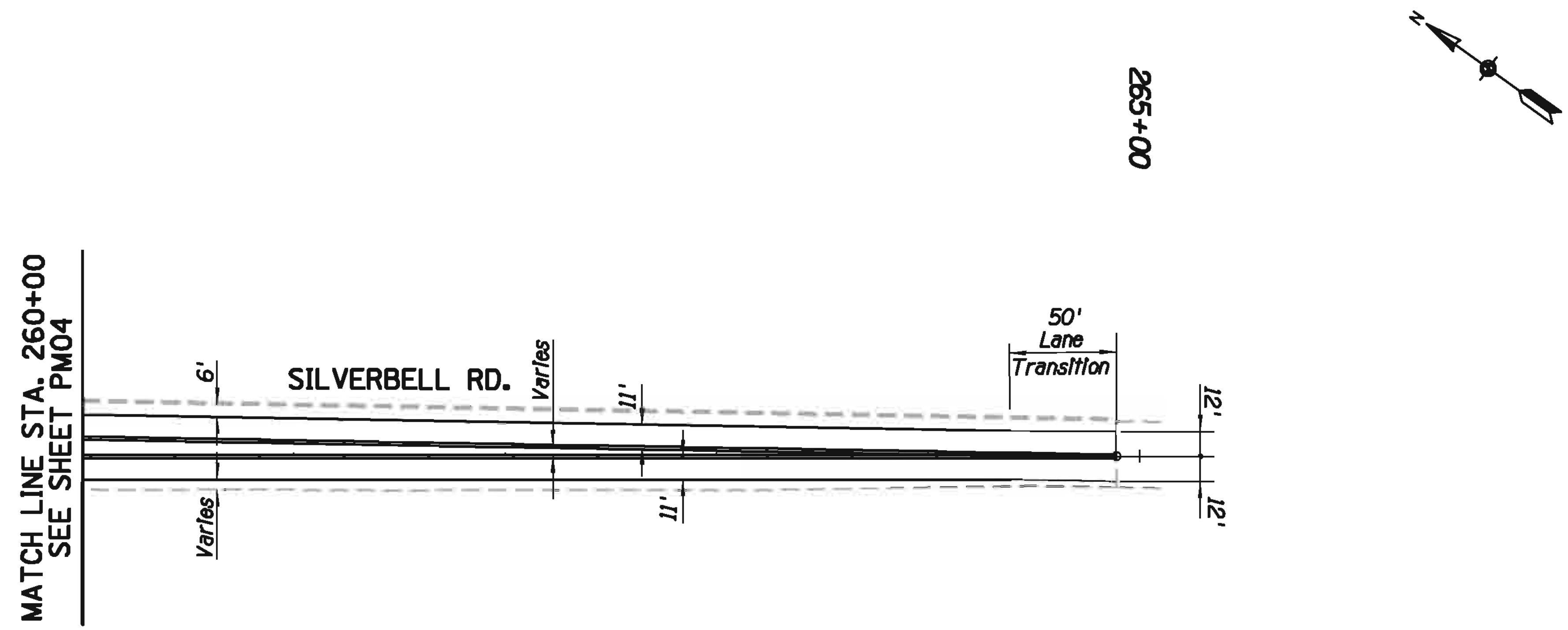
AECOM
TRANSPORTATION
AECOM USA, Inc.
7720 N. 16th Street, Suite 125
Phoenix, AZ 85020
T 602.371.1100 F 602.371.1177
www.aecom.com

Arizona Blue Stake
1-800-STAKE-IT
1-800-782-5348
Call two working days before you dig

PAVEMENT MARKING SHEET
SUNSET ROAD - SEGMENT I
SILVERBELL RD. TO I-10
STA. 245+00 TO STA. 260+00
PROJECT NO. 4RTSUN

SUNSET ROAD - SILVERBELL ROAD TO I-10 - PROJECT NO. 4RTSUN

Scale:	1"=40' Horiz.	Sheet PM04 of PM05	Page 29 of 36



Notes:

1 Pavement Marking Notes & Other Information To Be Included In Future Plans.

SCALE: 1" =40'

Pima County Department of Transportation

Priscilla S. Cornelio, P.E., Director

Designed	MPK	09/14
Drawn	RW	09/14
Checked	CJR	09/14
Proj. Engr.	MPK	09/14

No.	Revision Description	Engineer	Date

PRELIMINARY
NOT FOR
CONSTRUCTION
STAGE I

AECOM

Arizona Blue Stake
1-800-STAKE-IT
1-800-782-5348

PAVEMENT MARKING SHEET
SUNSET ROAD - SEGMENT I
SILVERBELL RD. TO I-10
STA. 260+00 TO STA. 265+00
PROJECT NO. 4RTSUN

SUNSET ROAD - SILVERBELL ROAD TO I-10 - PROJECT NO. 4RTSUN

Scale:	1"=40' Horiz.	Sheet PM05 of PM05	Page 30 of 36

FILE NAME: P:\60311412 Sunset Rd\900-Work\910-CAD\20-SHEETS\4RTSUN_pm04_seg1.dgn DATE: 10/28/2014 TIME: 2:04:53 PM KershnerM

TRAFFIC SIGNAL GENERAL NOTES:

1. All equipment / materials and construction shall meet or exceed the requirements contained in the current Pima County / City of Tucson "Standard Specifications for Public Improvements" and "Standard Details for Public Improvements", the Special Provisions, and the plans.

2. All pedestrian push button assemblies shall meet ADA requirements. The signs that shall be used are identified in the 2003 MUTCD as R10-3b on page 2B-40.

3. Metro street name signs shall be installed such that the bottom of the sign is no less than 17 feet above the roadway pavement or no less than 16 feet above the finished grade beyond the shoulder, bike lane or multi-use lane.

4. The exact location of each new pole foundation, pull box, controller cabinet foundation, UPS cabinet foundation and electric service pedestal foundation shall be approved by the Engineer prior to installation.

5. The top of the pole foundation shall be level with the finished grade. If the slope or shoulder drops off from finished grade, the contractor shall grade around pole foundation. The top of the foundation shall extend no more than 4 inches above surrounding grade.

6. Only new conduit and cable shall be installed.

7. All conduits shall be cleaned by compressed air and a properly sized conduit piston or mandrel shall be pulled through the conduit prior to cable installation.

8. Conduit installed under existing paved driveways, which are not scheduled to be reconstructed as part of this project, shall be installed by means of boring.

9. ITS / roadway lighting sleeves shall be installed under all intersecting side streets and driveways on all major roadway reconstruction projects, unless directed otherwise by the Engineer. Each end of the sleeve shall be sealed with a Carlon MAEPOX, or approved equal.

10. Pull boxes shall not be installed within concrete curb access ramps. In addition, any pull boxes installed behind curbs shall be installed between the curb and the proposed / future sidewalk or beyond the proposed / future sidewalk. An exception to this note would be pull boxes installed in a median. Any pull boxes installed along an uncurbed roadway shall be installed adjacent to, but not within, the shoulder.

11. A ¾ in. x 10 ft. ground rod shall be installed in the No. 7 pull box (with the extension) adjacent to the controller cabinet. Two ground rod clamps shall be furnished for grounding the ground wire.

12. The high voltage cables should be separated from the low voltage cables as much as possible.

13. A #14 AWG IMSA 19-1-1984 7-conductor solid wire cable shall be installed from each traffic signal terminal strip to the concrete pull box adjacent to the pole foundation leaving three feet of slack for each cable (measured from the top of the pull box) in the pull box.

14. Two #10 AWG-XHHW conductors shall be installed from each luminaire to the concrete pull box adjacent to the pole foundation, leaving three feet of slack for each conductor (measured from the top of the pull box) in the pull box. Route four conductors to the luminaire with the photoelectric cell. An in-line fuse shall be installed for each luminaire in the associated pull box.

15. Poles with pedestrian signals and push button stations shall use one 7-conductor cable for both the push button station and the pedestrian signal. The outer cable jacket shall be removed at the hand hole height. Two conductors shall be routed to the push button station and the remaining conductors shall be routed to the pedestrian signal.

16. All vehicle roadway detection loop cables shall be #14 AWG IMSA 51-5-1985 cable. Lead-in cables shall be #16 AWG IMSA 50-2-1984 cable. No splices shall be allowed in the roadway detection loop cable except at the pull box adjacent to loop.

17. The telephone interconnect cable and detector lead-in cable shall not be spliced.

18. The emergency vehicle pre-emption sensor cable shall be Opticom Detector Cable Model No. 138. The cable shall not be spliced.

19. The Econolite cable (part No. 1175-00X) shall be installed for the video camera, un spliced, from the traffic signal pole hand hole, to the traffic signal controller cabinet. The Auto Scope camera cable shall extend from the mounted camera to the hand hole. The camera cable and home run cable shall be spliced in the pole hand hole with Scotchlok UAL connectors with a 3M E9Y crimping tool.

20. Detection loop saw cuts shall be flushed with water under pressure and then dried with air under pressure.

21. The Tucson Electric Cooperative Public Improvement Coordinator (918-8359) shall be contacted by the Contractor to verify the location of the electric service connection at each intersection. The Contractor shall be responsible for excavating and back filling the trench and installing any necessary sleeves under sidewalks or driveways in which the electric service cable in conduit (CIC) is to be installed by Trico.

22. The CenturyLink Public Improvement Coordinator (292-8255) shall be contacted by the Contractor to verify the location of the telephone connection at each intersection.

23. All signal indications shall be LED, except yellow ball indications, which shall be incandescent. Signal lens shall be tinted to the color of the indication.

24. The Contractor shall contact Blue Stake at 1-800-782-5348, a minimum of 2 working days prior to any excavation.

25. The Contractor shall maintain and allow access to all Pima County Waste Water manholes located within the ROW. Access must be maintained 24 hours per day, seven days per week. No utilities may be placed within six feet of a force main.

26. Any equipment and/or utilities within the project limits that are damaged or destroyed by the Contractor shall be repaired or replaced at the sole expense of the Contractor.

27. All equipment shall be placed within Right-of-Way, including all conduit runs.

28. Pole foundations close to existing water mains, shall maintain a minimum of (5') feet horizontal distance from the outside of foundation wall to the outside of the pipe wall.

RESPONSIBILITIES:

1. The Contractor shall supply and install the following equipment and materials as specified in the plans: Steel pole anchor bolts (with nuts and washers), concrete pole foundations with reinforcement (where specified), traffic signal controller cabinet(s) with controller(s) and all auxiliary equipment, controller cabinet concrete foundation(s), concrete pull boxes, electrical conduit, ground rods and connectors, bare bond wire and all other conductors, poles, mast arms, traffic signals and mounting assemblies, pedestrian signals and mounting assemblies, pedestrian push button stations with signs, luminaries, photocells, electric service pedestal(s) and concrete foundation(s), video detection system equipment, vehicle detection loops, and all other appurtenances necessary for the operation of the traffic signal installation(s), except as modified in the plans.

2. The Contractor shall deliver the controller cabinet(s) with the controller(s) and auxiliary equipment specified in the plans to the PCDOT Maintenance Yard, 1313 S. Mission Road, Bldg. #28 for testing. This shall occur a minimum of two weeks prior to the installation(s) at the intersection(s). Contact Don Pittenger (740-2632) at least 48 hours prior to the delivery of the controller cabinet(s) to PCDOT. The contractor shall pick up and transport the controller cabinet(s) from the PCDOT Maintenance Yard to the intersection(s) after the PCDOT staff has tested the equipment and approved it for installation.

3. The Contractor shall install each traffic controller cabinet on its foundation and route all of the conductors into the controller cabinet. The PCDOT staff shall terminate the conductors in the controller cabinet.

4. The Contractor shall salvage and replant any landscaping vegetation that may be damaged by construction activities. The Contractor shall obtain prior approval from Connie Hutchins (740-5969) before any plants are moved.

5. The Contractor shall repair/restore any landscape irrigation components damaged by construction activity to their original condition.

6. PCDOT shall fabricate metro street name signs for this intersection. PCDOT shall provide all mounting hardware and PCDOT shall install metro street name signs.

7. The Contractor shall provide all materials and install all traffic control signs and pavement markings required to complete the project.

Priscilla S. Cornelio, P.E., Director

No.	Revision Description	Engineer	Date

		Date
Designed	GB	09/14
Drawn	CPC	09/14
Checked	JJK	09/14
Proj. Engr.	GB	09/14

PRELIMINARY NOT FOR CONSTRUCTION STAGE I

PARSONS BRINCKERHOFF
177 N. CHURCH AVE., STE. 610
TUCSON, AZ. 85701
(520) 882-6424

Arizona Blue Stake 1-800-STAKE-IT (1-800-782-5348) Call before you dig. It's the law.

Pima County Department of Transportation

TRAFFIC SIGNAL PLAN
SUNSET ROAD - SEGMENT I
SILVERBELL RD. TO I-10
PROJECT NO. 4RTSUN

SUNSET ROAD - SILVERBELL ROAD TO I-10 - PROJECT NO. 4RTSUN

Scale:	N/A	Sheet TS01 of TS03	Page 31 of 36

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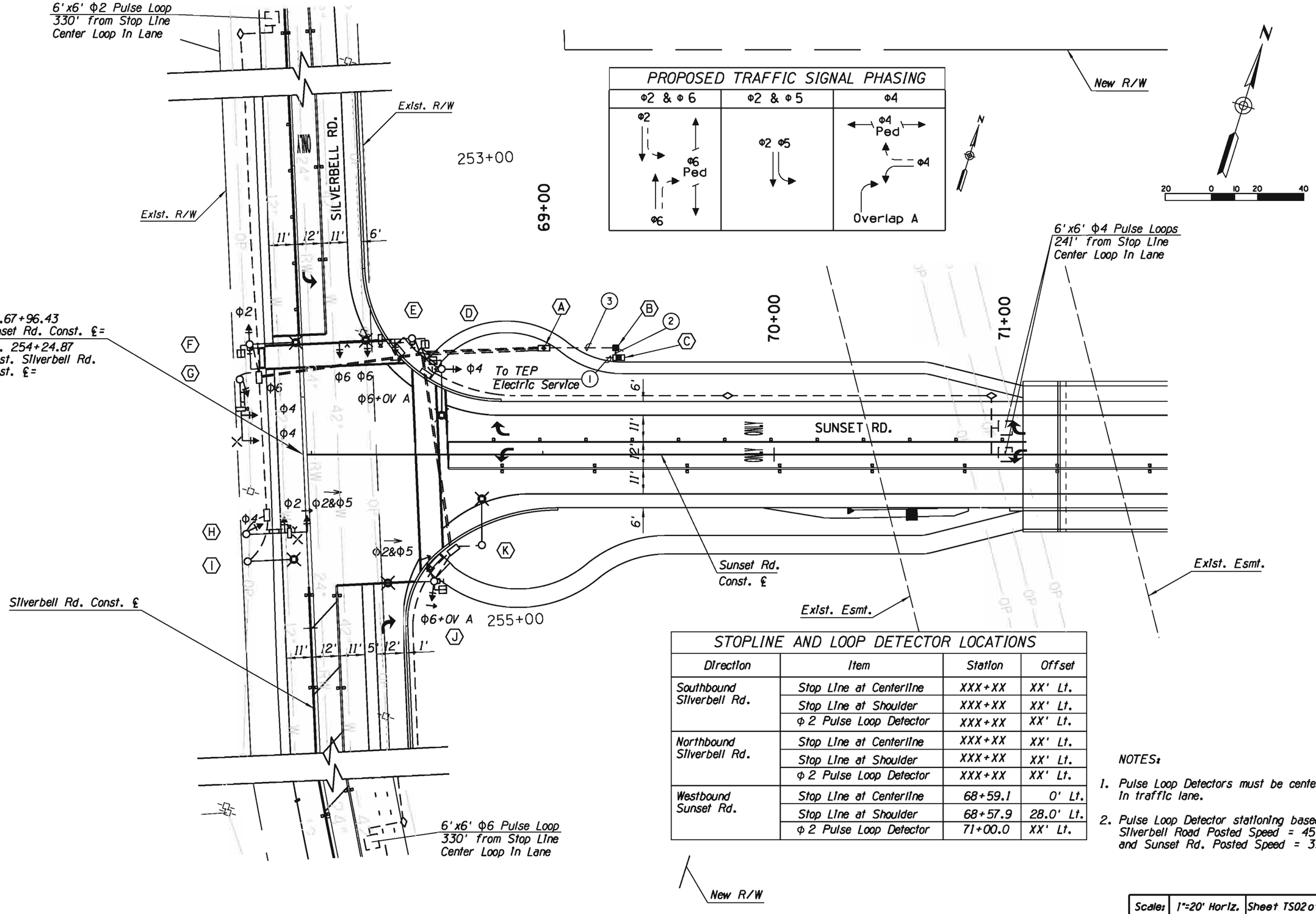

STOPLINE AND LOOP DETECTOR LOCATIONS

Direction	Item	Station	Offset
Southbound Silverbell Rd.	Stop Line at Centerline	XXX+XX	XX' Lt.
	Stop Line at Shoulder	XXX+XX	XX' Lt.
	Φ 2 Pulse Loop Detector	XXX+XX	XX' Lt.
Northbound Silverbell Rd.	Stop Line at Centerline	XXX+XX	XX' Lt.
	Stop Line at Shoulder	XXX+XX	XX' Lt.
	Φ 2 Pulse Loop Detector	XXX+XX	XX' Lt.
Westbound Sunset Rd.	Stop Line at Centerline	68+59.1	0' Lt.
	Stop Line at Shoulder	68+57.9	28.0' Lt.
	Φ 2 Pulse Loop Detector	71+00.0	XX' Lt.

NOTES:

1. Pulse Loop Detectors must be centered In traffic lane.
2. Pulse Loop Detector stationing based on Silverbell Road Posted Speed = 45 MPH and Sunset Rd. Posted Speed = 35 MPH.

Priscilla S. Cornelio, P.E., Director
Pima County Department of Transportation

No.	Revision Description	Date	Engineer

		Date
Designed	GB	09/14
Drawn	CPC	09/14
Checked	JJK	09/14
Proj. Engr.	GB	09/14

PRELIMINARY NOT FOR CONSTRUCTION STAGE 1

PARSONS BRINCKERHOFF
177 N. CHURCH AVE., STE. 610
TUCSON, AZ. 85701
(520) 882-4424

Arizona Blue Stake 1-800-STAKE-IT 1-602-263-1100 Dial 811 Before You Dig

TRAFFIC SIGNAL PLAN
SUNSET ROAD - SEGMENT I
SILVERBELL RD. TO I-10
PROJECT NO. 4RTSUN

SUNSET ROAD - SILVERBELL ROAD TO I-10 - PROJECT NO. 4RTSUN

Scale: 1"=20' Horiz. | Sheet TS02 of TS03 | Page 32 of 36

CABINET AND POLE SCHEDULE

TRAFFIC SIGNAL CONTROLLER				REMARKS	LOCATION	STANDARDS
CABINET	TYPE	CONTROLLER	AUX. CONTROLLER			
(A)	MYERS 125 AMP 120/240 V, MEUG 16-125WTB	METERED SERVICE PEDESTAL WITH TWO SINGLE POLE 50 AMP CIRCUIT BREAKERS	(1) 30 AMP SINGLE POLE BREAKER FOR SIGNALS (1) 50 AMP SINGLE POLE BREAKER FOR LIGHTING	SHARE FOUNDATION W/UPS, FOUNDATION SIZE IS 66"L X 36"W X 24"D	LOCATE BY ENGINEER IN THE FIELD MIN. 12 FEET BEHIND EDGE OF CURB TO THE STREET SIDE OF FOUNDATION AND MIN. 21 FEET FROM NEAR EDGE OF THROUGH LANE.	T1801
(B)	AIRPAX DIMENSIONS 392614 ENCLOSE W/2 REMOVABLE SHELVES, OR EQUAL	AIRPAX DIMENSIONS INC. 24M11 W/2-105ah, GROUP 31 AGM BATTERIES		SHARE FOUNDATION W/PEDESTIAL FOUNDATION SIZE IS 66"L X 36"W X 24"D		
(C)	NEMA TS2, 1998 TYPE 1 TS2, SIZE 6 DETECTOR RACK CONFIGURATION 1	NEMA TS2 TYPE 2, ECONOLITE MODEL ASC/2-2100 OR EQUAL	16 CHANNEL MMU, RACK MOUNTED LOOP DETECTORS, NEMA SOLID STATE LOAD SWITCHES, VIDEO DETECTION, A THREE POLE STREET LIGHTING CONTACTOR, AND THREE 20 AMP CIRCUIT BREAKERS.		LOCATE ADJACENT TO ELECTRIC SERVICE PEDESTAL ON A SHARED OR COMMON FOUNDATION WITH SAME MINIMUM CLEARANCES TO CURB OR NEAR EDGE OF THOUGH LANE.	T203 T313

POLE		MAST ARM		SIGNALS		LUMINAIRE	PED PB TYPE/SIGN	REMARKS	STATION (Road)	OFFSET	TOP OF FND. ELEV.	STANDARDS
NUMBER	TYPE	SIGNAL	LUMIN	MTG	FACE							
(D) (F)	Type 2B	-	20'	(1) V (1) XI	(1) F (1) MH		TYPE 1 2" ADA PPB & PPB SIGN R10-3b					
(E) 12'	'0'	30'	20'	(3) II (1) XI	(2) F (1) O (1) MH		TYPE 1 2" ADA PPB & PPB SIGN R10-3b					
(G) 11'	'J'	25'	-	(2) II (1) V	(3) F		-					
(H) 10'	'J'	25'	-	(2) II (1) V	(2) F (1) O		-					
(I) (K)	Type 2B	-	20'	-	-		-					
(J)	'G'	-	20'	(1) VI (1) XI	(2) O (1) MH		TYPE 1 2" ADA PPB & PPB SIGN R10-3b					

HIGH VOLTAGE CIRCUIT

(X) Y" C	= Number and Size of Conduit
(X)	= Number of Cables
*CC	= *14 IMSA Cable
BB	= Bare Bond, *8, Solid
BG	= Bare Ground, *4, Solid
PB	= Pre-Empt Beacon, *14 THW
SP	= Signal Power
SL	= Street Lighting, *10 AWG XHHW
PC	= Photo Cell, *10 AWG XHHW

* NOTE:
Signal Power shall consist of:
2-*6 AWG TWH (WHITE)
1-*6 AWG TWH (BLACK)
1-*6 AWG TWH (RED)
1-*6 AWG TWH (GREEN)
1-*4 AWG BARE COPPER

LOW VOLTAGE CIRCUIT

(X) y" C	= Number and Size of Conduit
(X)	= Number of Cables
VDC	= Video Detection Cable Econolite Part * 1175-00X
PS	= Pre-empt Sensor, Opticom *20 3 CC-Shielded Cable (Model 138)
TI	= Telephone Interconnect, 4CC *20
DLC	= Detector Lead-In Cable, 16 AWG IMSA 50-2-1984
RLW	= Roadway Loop Wire, 14 AWG IMSA 51-5-1985.

NOTES

1. Astro-Brac mounting assemblies shall be Pelco Astro-Brac part number AB-0116, or equivalent.
2. All luminaires shall have photocell receptacles. All photocell receptacles shall have shorting cap, except for the luminaire with photocell.
3. Pedestrian push button to be at 42 Inches above finish grade to center of push button.
4. Furnish and Install pedestrian push button sign R10-3b(L) per the latest edition of MUTCD as adopted by PCDOT.
5. Furnish and Install pedestrian push button sign R10-3b(R) per the latest edition of MUTCD as adopted by PCDOT.
6. Furnish and Install pedestrian push button sign R10-3b. The bi-directional (←→) arrow used shall be the R10-3b sign per the latest edition of MUTCD as adopted by PCDOT.
7. The Wesled tenon at end of mast arm for Astro-Brac shall be located 6 Inches from the tip of mast arm center hole of tenon.
8. PCDOT will contract with Smartwave Technologies, Inc. under a separate Purchase Order to provide and Install PTZ camera and wireless communications device.
9. Refer to Sheet TSXX for the Metro Street Name sign details.

Priscilla S. Cornelio, P.E., Director
Pima County Department of Transportation

No.	Revision Description	Engineer	Date

		Date
Designed	GB	09/14
Drawn	CPC	09/14
Checked	JJK	09/14
Proj. Engr.	GB	09/14

PRELIMINARY NOT FOR CONSTRUCTION STAGE I

PARSONS BRINCKERHOFF
177 N. CHURCH AVE., STE. 610
TUCSON, AZ 85701
(520) 882-6424

Arizona Blue Stake 1-800-STAKE-IT 1-800-782-5348

POLE AND CONDUCTOR SCHEDULE
SUNSET ROAD - SEGMENT I
SILVERBELL RD. TO I-10
PROJECT NO. 4RTSUN

SUNSET ROAD - SILVERBELL ROAD TO I-10 - PROJECT NO. 4RTSUN

Scale: N/A | Sheet TS03 of TS03 |

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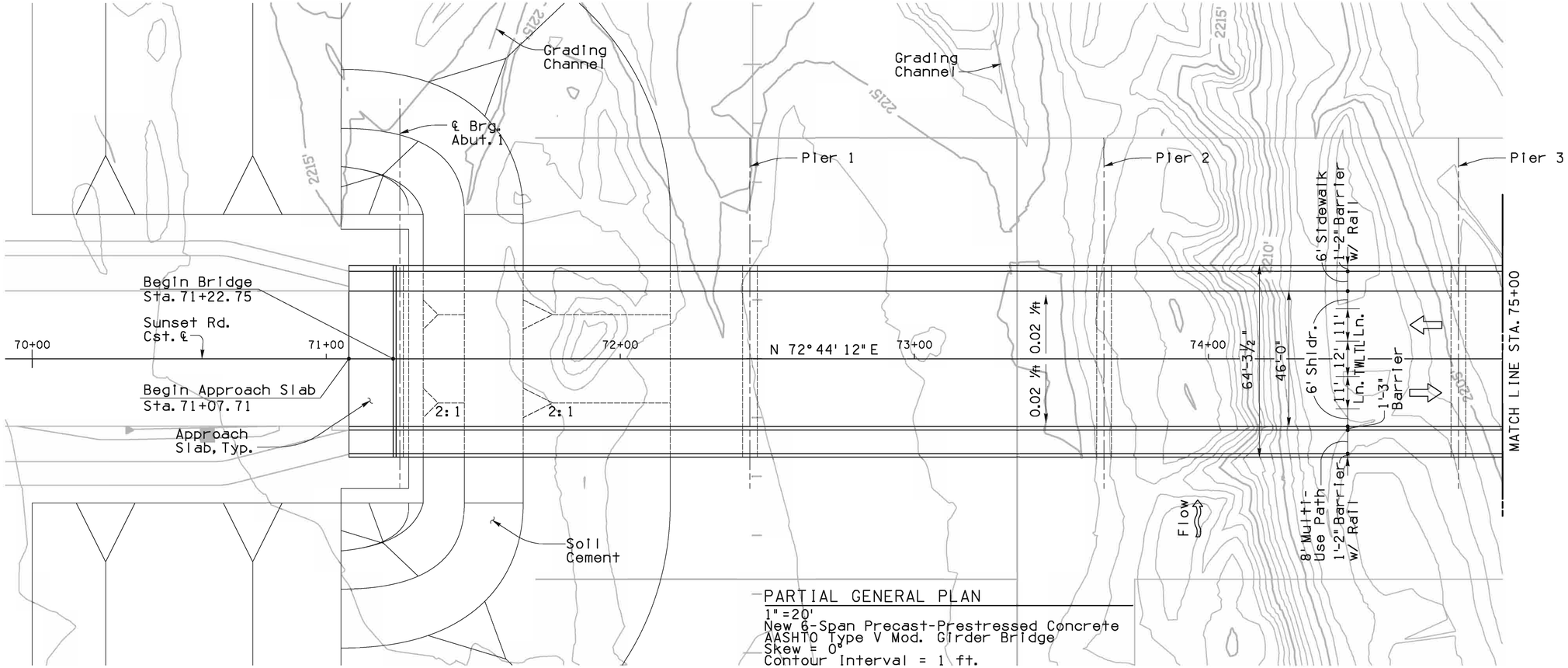
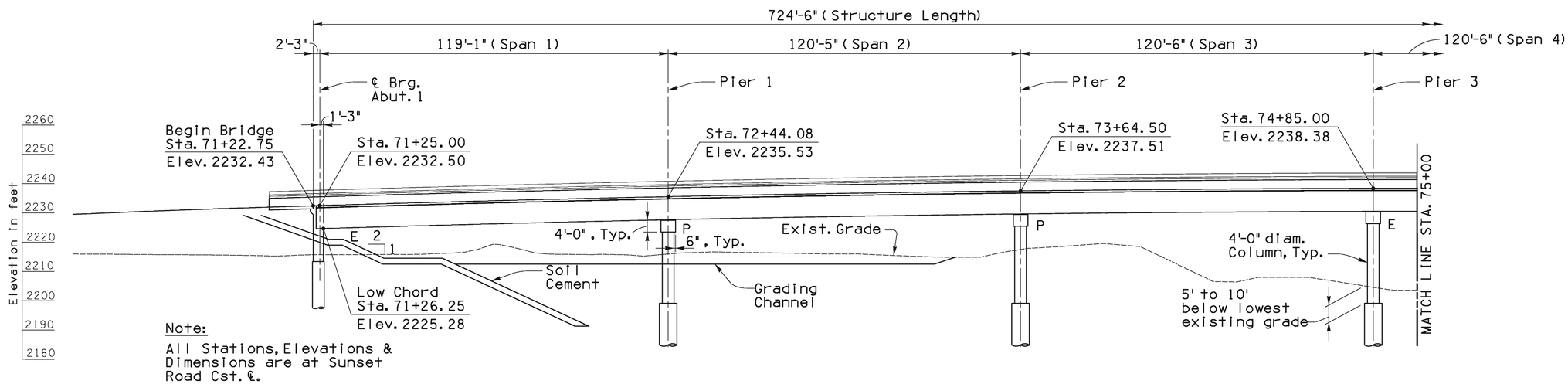


PARTIAL GENERAL PLAN
1" = 20'
New 6-Span Precast-Prestressed Concrete
AASHTO Type V Mod. Girder Bridge
Skew = 0°
Contour Interval = 1 ft.



Note:
All Stations, Elevations & Dimensions are at Sunset Road Cst. ℄.

PARTIAL ELEVATION
1" = 20'

Priscilla S. Cornelio, P.E., Director
Pima County Department of Transportation

Designed	JAM	08/14
Drawn	JHS, MJL	08/14
Checked	CSP	08/14
Proj. Engr.	JAM	08/14

No.	Revision Description	Engineer	Date

PRELIMINARY NOT FOR CONSTRUCTION STAGE I

Structural Grace, Inc
1430 E. Fort Lowell Rd., Ste. 200, Tucson, AZ 85719 (520) 320-0156

CALL TWO WORKING DAYS BEFORE YOU DIG
602-263-1100
1-800-STAKE-IT
(OUTSIDE MARICOPA COUNTY)

GENERAL PLAN & ELEVATION - 1 OF 2
SUNSET ROAD - SEGMENT 1
SILVERBELL RD. TO I-10
PROJECT NO. 4RTSUN

SUNSET ROAD - SILVERBELL ROAD TO I-10 - PROJECT NO. 4RTSUN

Scale: As Noted | Sheet GP01 of GP02 | Page 34 of 36

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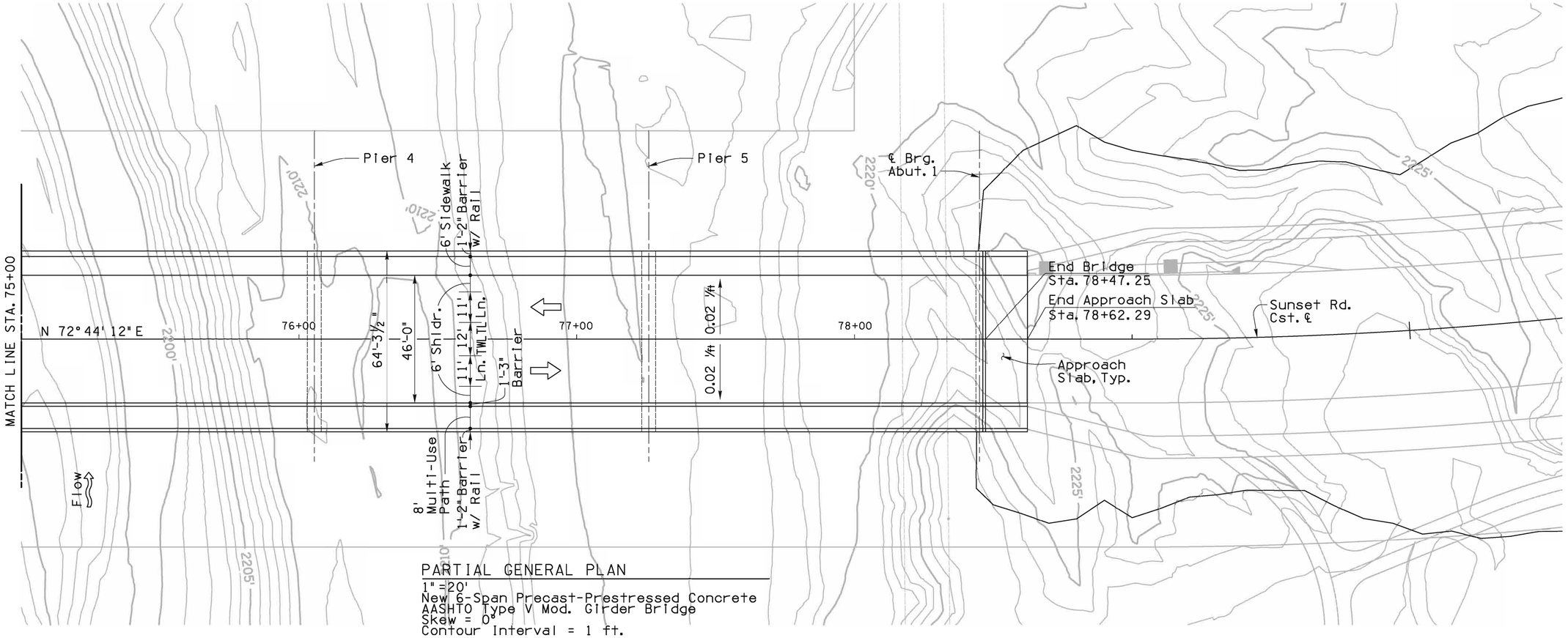
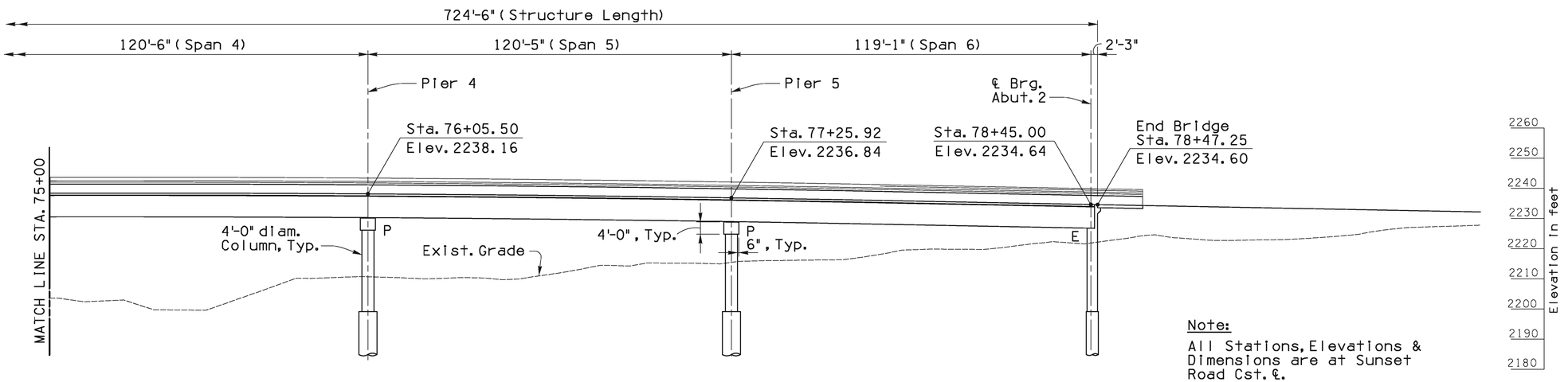


PARTIAL GENERAL PLAN

1" = 20'
New 6-Span Precast-Prestressed Concrete
AASHTO Type V Mod. Girder Bridge
Skew = 0°
Contour Interval = 1 ft.



Note:

All Stations, Elevations & Dimensions are at Sunset Road Cst. ℄.

PARTIAL ELEVATION

1" = 20'

Priscilla S. Cornelio, P.E., Director

Pima County Department of Transportation

Designed	JAM	08/14
Drawn	JHS, MJL	08/14
Checked	CSP	08/14
Proj. Engr.	JAM	08/14

No.	Revision Description	Engineer	Date

PRELIMINARY NOT FOR CONSTRUCTION STAGE I

Structural Grace, Inc
1430 E. Fort Lowell Rd., Ste. 200, Tucson, AZ 85719 (520) 320-0156

CALL TWO WORKING DAYS BEFORE YOU DIG
602-263-1100
1-800-STAKE-IT
(OUTSIDE MARICOPA COUNTY)

GENERAL PLAN & ELEVATION - 2 OF 2
SUNSET ROAD - SEGMENT 1
SILVERBELL RD. TO I-10
PROJECT NO. 4RTSUN

SUNSET ROAD - SILVERBELL ROAD TO I-10 - PROJECT NO. 4RTSUN

Scale:	As Noted	Sheet GP02 of GP02	Page 35 of 36

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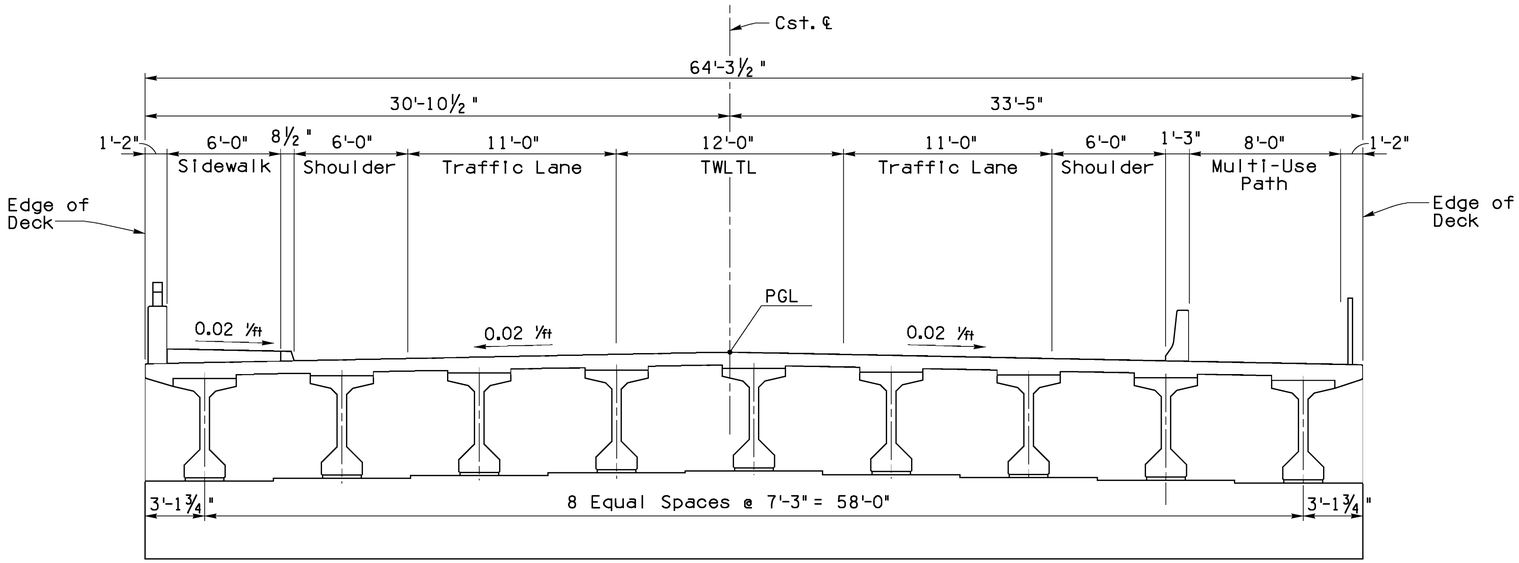

SECTION
¼" = 1'-0"

Priscilla S. Cornelio, P.E., Director

Designed	JAM	08/14
Drawn	JHS, MJL	08/14
Checked	CBP	08/14
Proj. Engr.	JAM	08/14

No.	Revision Description	Engineer	Date

PRELIMINARY NOT FOR CONSTRUCTION STAGE I

Structural Grace, Inc
1430 E. Fort Lowell Rd., Ste. 200, Tucson, AZ 85719 (520) 320-0156

CALL TWO WORKING DAYS BEFORE YOU DIG
602-263-1100
1-800-STAKE-IT
(OUTSIDE MARICOPA COUNTY)

Pima County Department of Transportation

TYPICAL CROSS SECTION
SUNSET ROAD - SEGMENT 1
SILVERBELL RD. TO I-10
PROJECT NO. 4RTSUN

SUNSET ROAD - SILVERBELL ROAD TO I-10 - PROJECT NO. 4RTSUN

Scale:	As Noted	Sheet XS01 of XS01	Page 36 of 36

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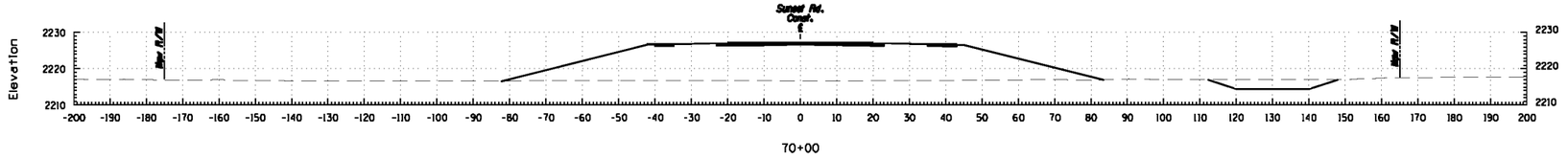

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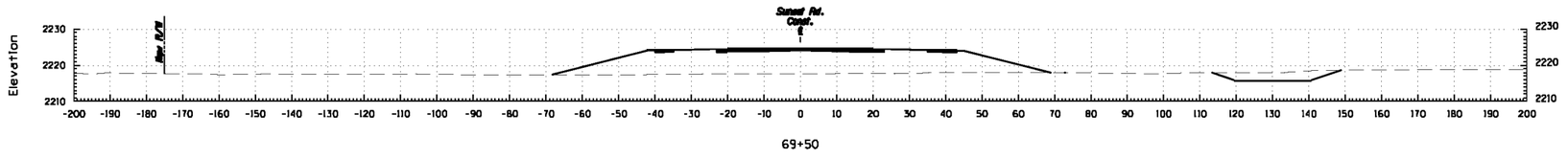

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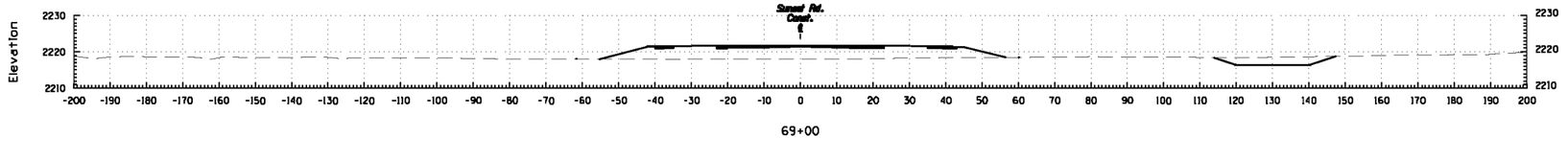

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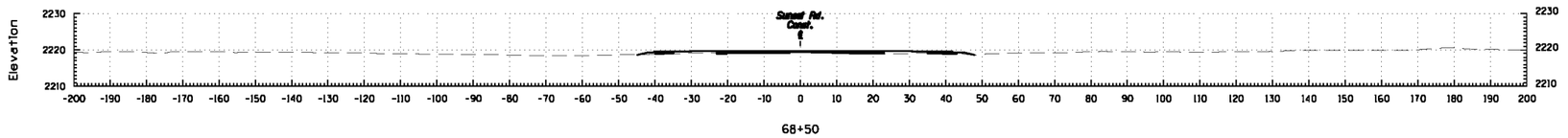

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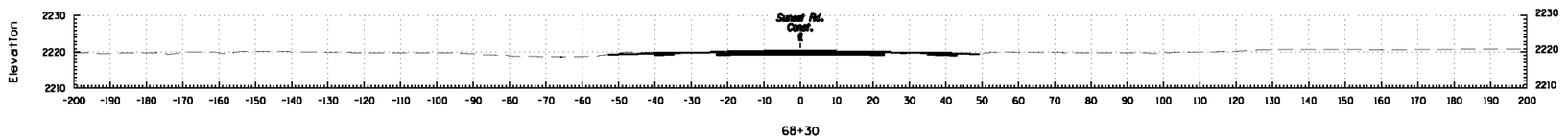

68+30

SUNSET ROAD – SILVERBELL ROAD TO I-10 – PROJECT NO. 4RTSUN

Scale: 1"=20' | AECOM | SUNSET ROAD | Sta. 68+30 to Sta. 70+00 | Sheet 1 of 20

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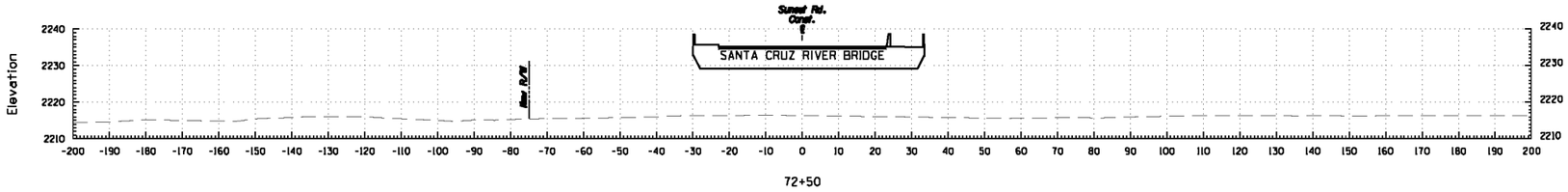

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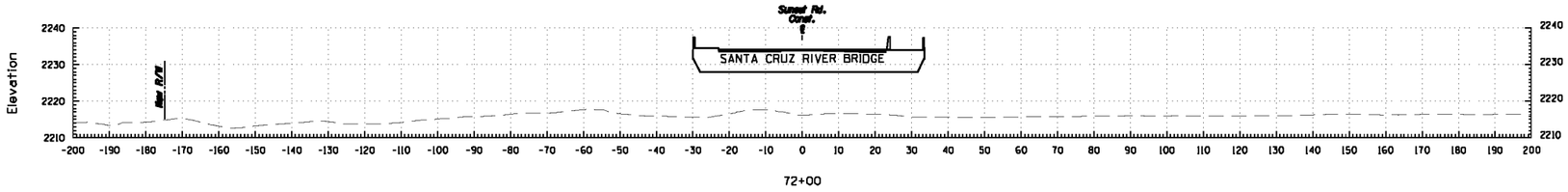

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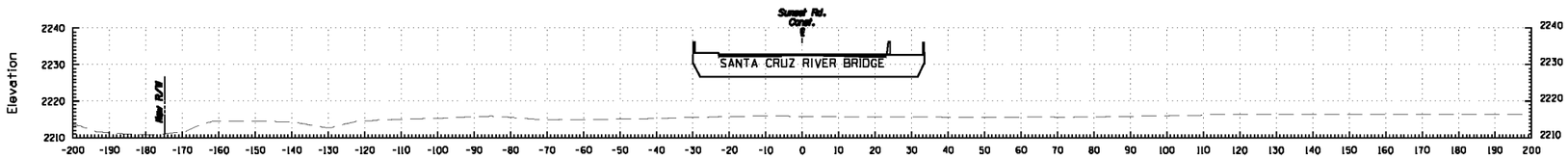

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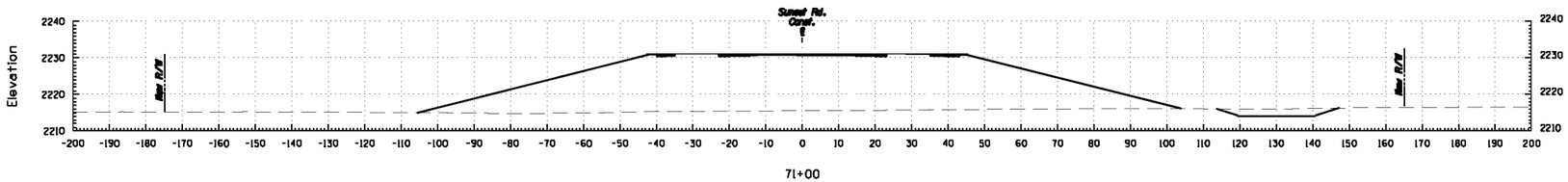

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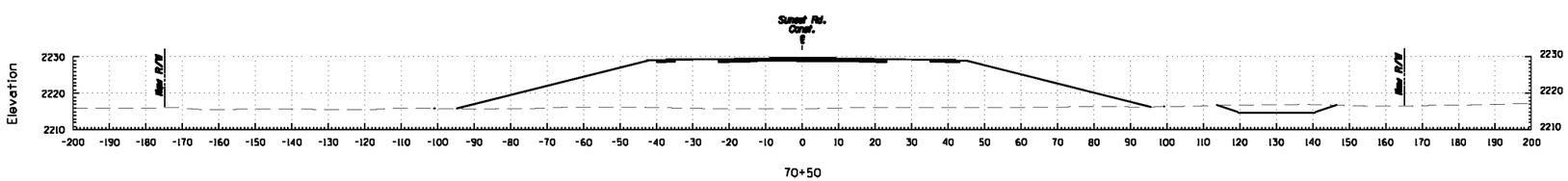
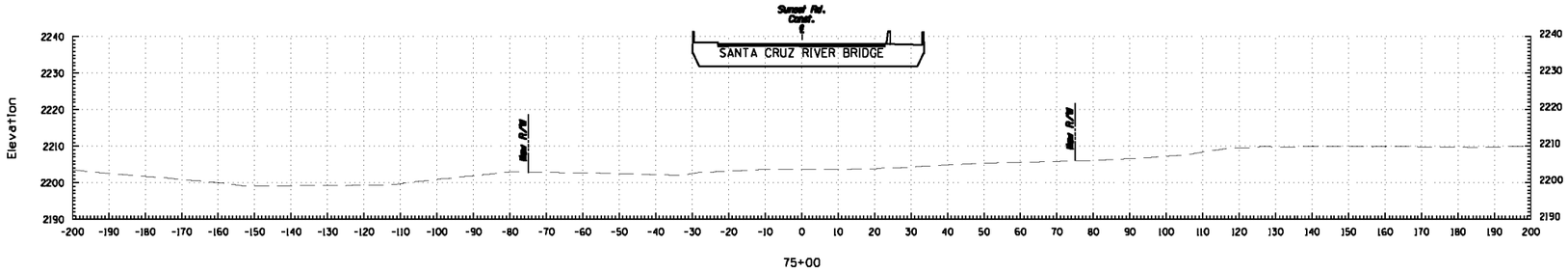


70+50

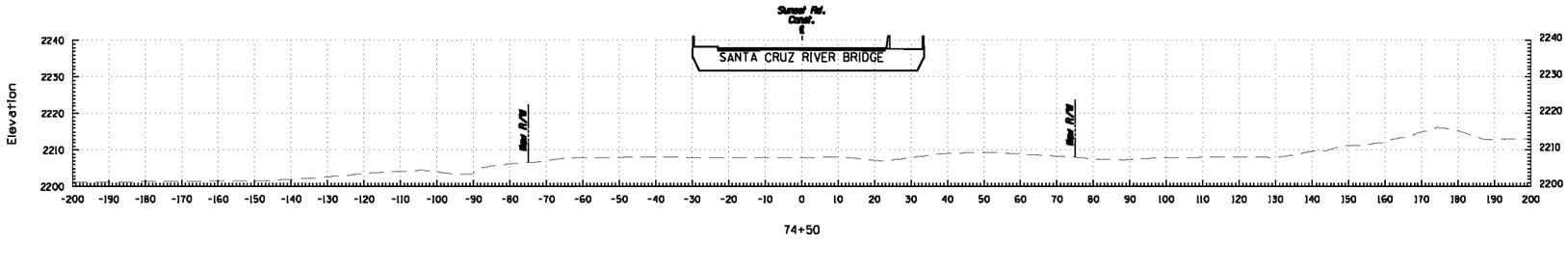
SUNSET ROAD – SILVERBELL ROAD TO I-10 – PROJECT NO. 4RTSUN

Scale: 1"=20' | AECOM | SUNSET ROAD | Sta. 70+50 to Sta. 72+50 | Sheet 2 of 20

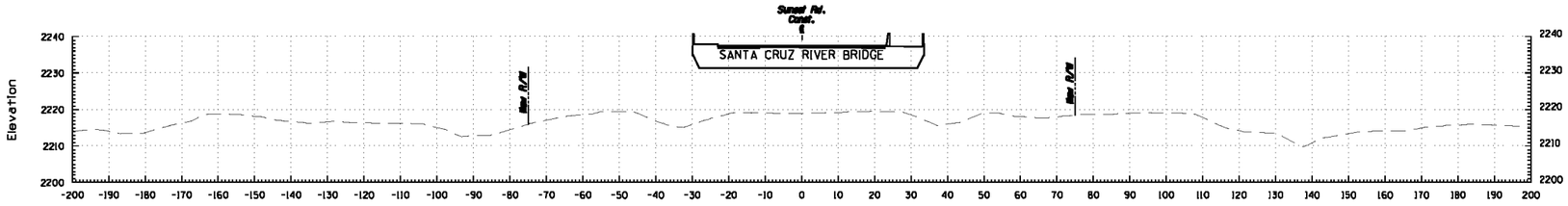
FILE NAME: P:\60311412 Sunset Rd\900-Work\910-CAD\20-SHEETS\4RTSUN_xsec_SS2.dgn DATE: 10/6/2014 TIME: 11:27:48 AM PRINTED BY: KershnerM



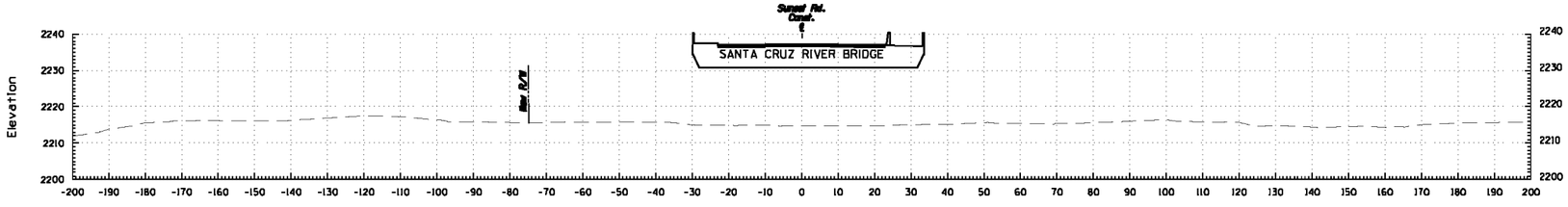
75+00



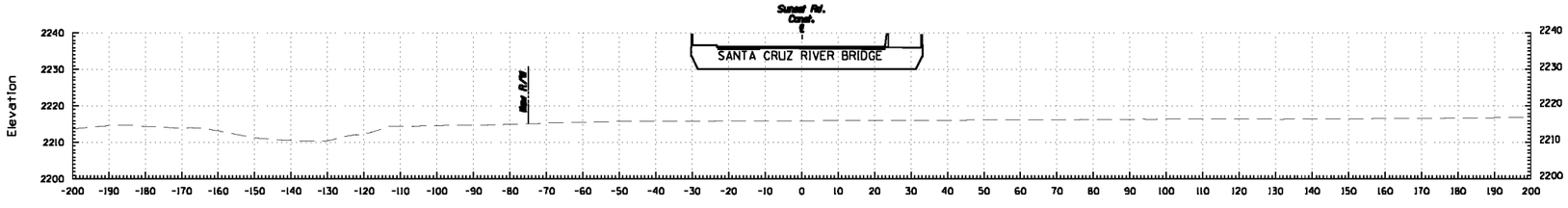
74+50



74+00



73+50

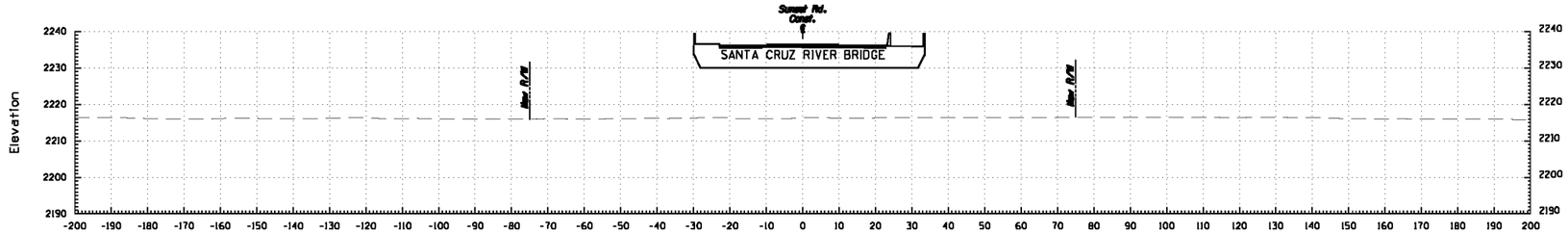


73+00

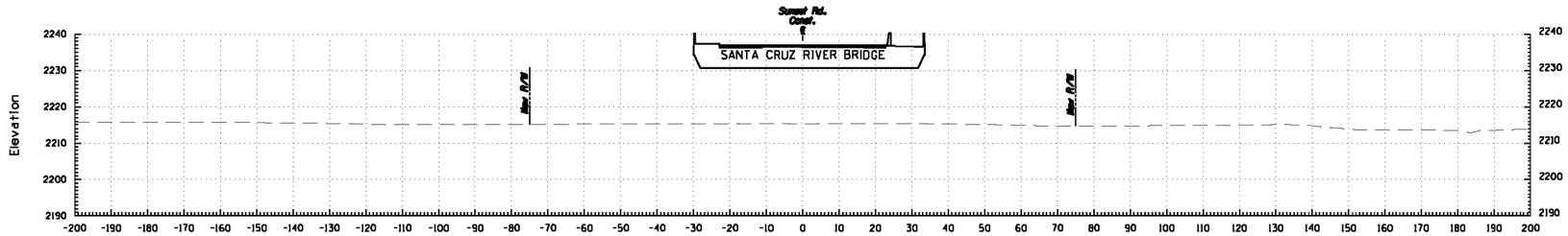
SUNSET ROAD – SILVERBELL ROAD TO I-10 – PROJECT NO. 4RTSUN

Scale: 1"=20' | AECOM | SUNSET ROAD | Sta. 73+00 to Sta. 75+00 | Sheet 3 of 20

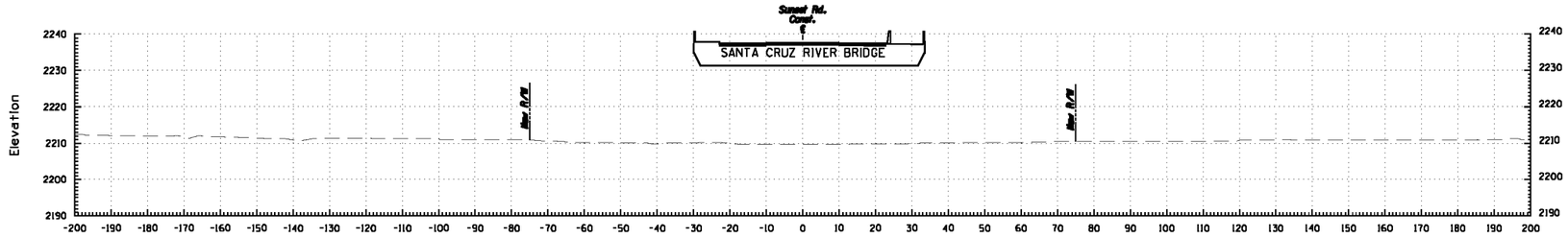
FILE NAME: P:\60311412 Sunset Rd\900-Work\910-CAD\20-SHEETS\4RTSUN_xsec_SS3.dgn DATE: 10/6/2014 TIME: 11:28:19 AM PRINTED BY: KershnerM



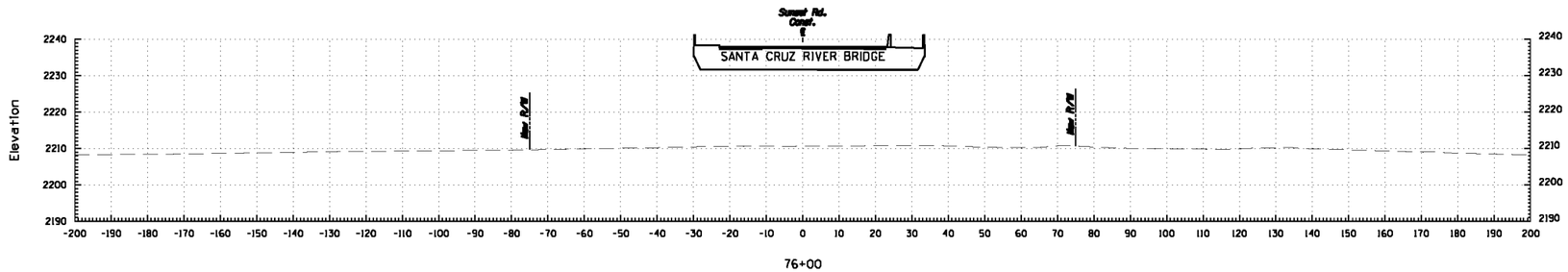
77+50



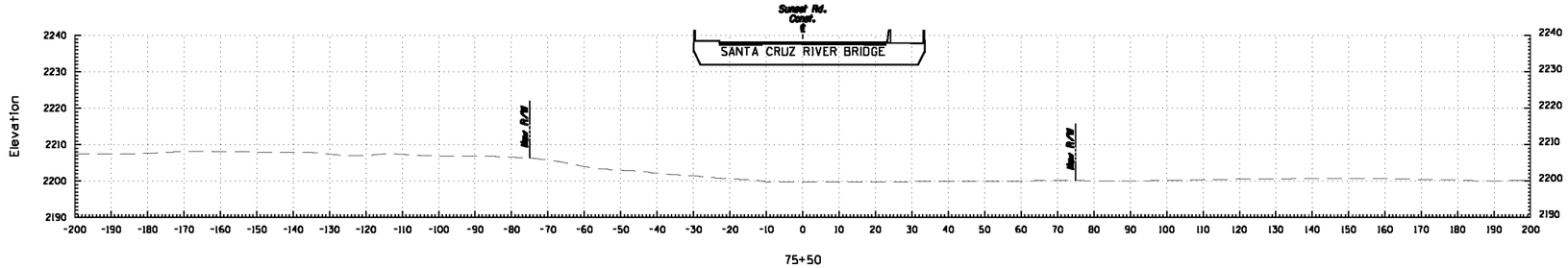
77+00



76+50



76+00

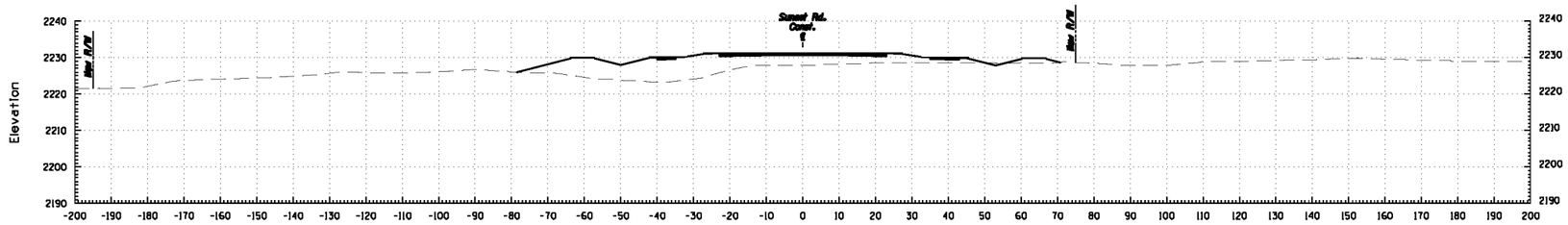


75+50

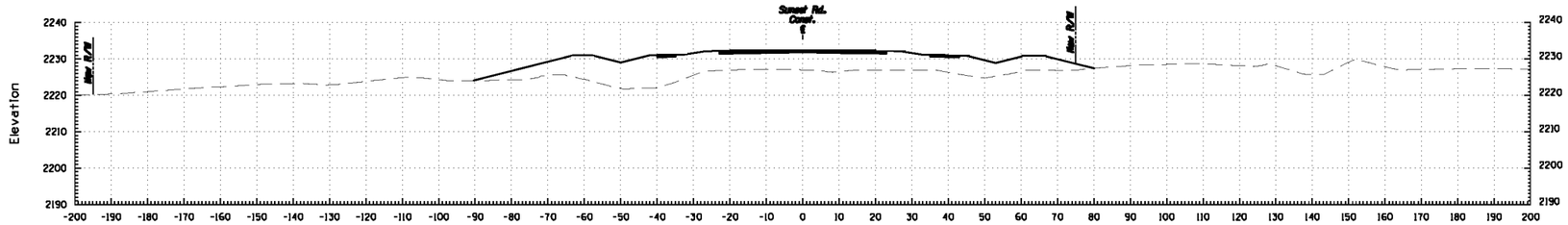
SUNSET ROAD – SILVERBELL ROAD TO I-10 – PROJECT NO. 4RTSUN

Scale: 1"=20' | AECOM | SUNSET ROAD | Sta. 75+50 to Sta. 77+50 | Sheet 4 of 20

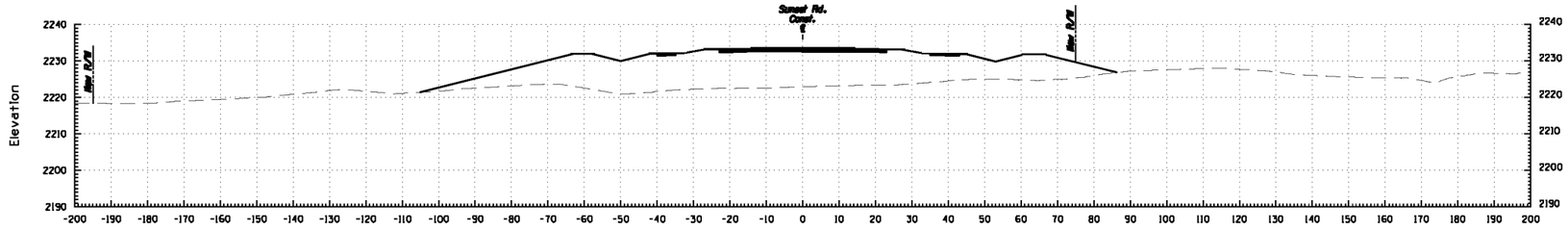
FILE NAME: P:\60311412 Sunset Rd\900-Work\910-CAD\20-SHEETS\4RTSUN_xsec_SS4.dgn DATE: 10/6/2014 TIME: 11:28:49 AM PRINTED BY: Kershner-M



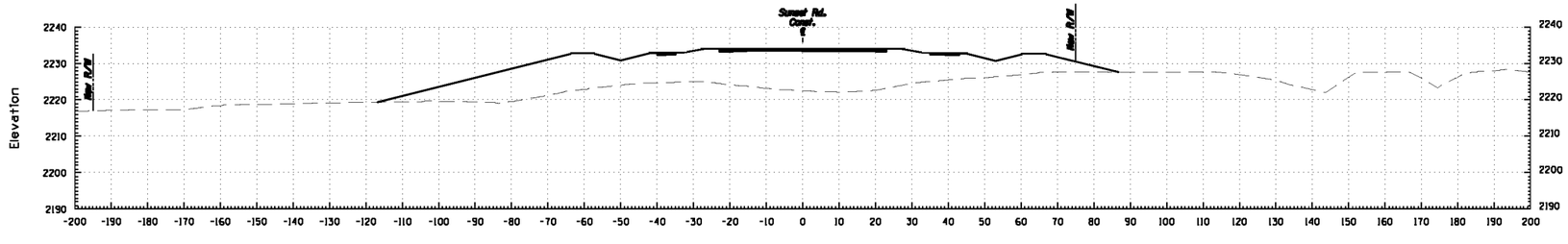
80+00



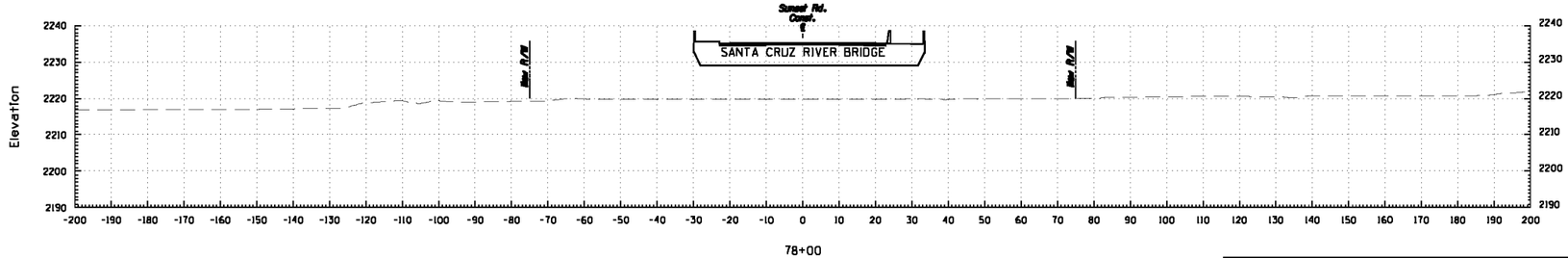
79+50



79+00



78+50

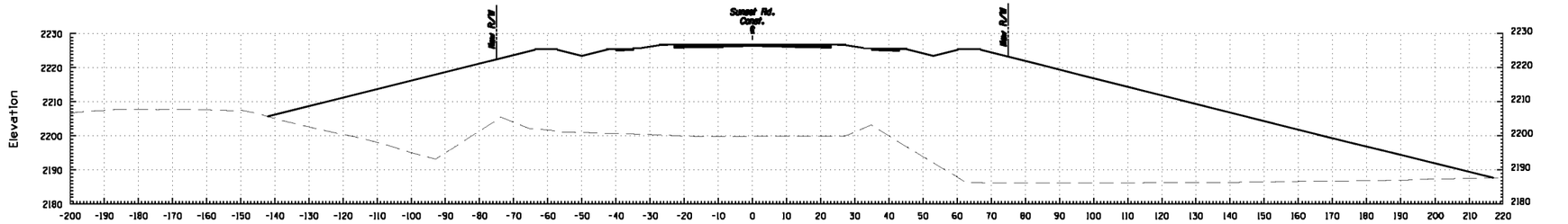


78+00

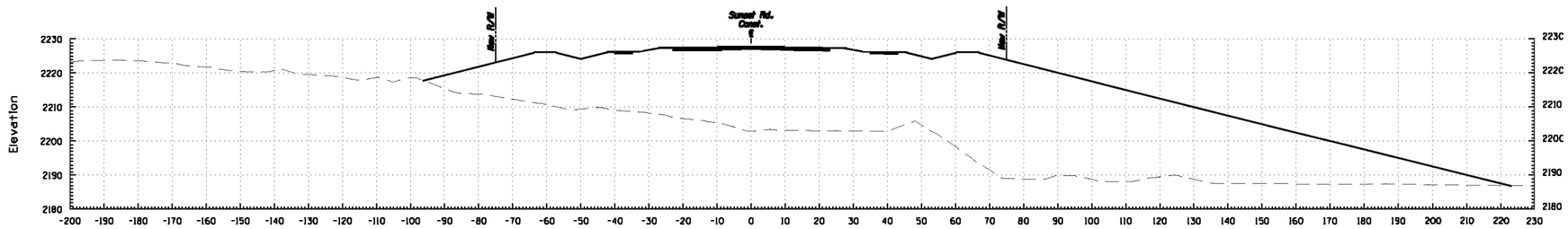
SUNSET ROAD – SILVERBELL ROAD TO I-10 – PROJECT NO. 4RTSUN

Scale: 1"=20' | AECOM | SUNSET ROAD | Sta. 78+00 to Sta. 80+00 | Sheet 5 of 20

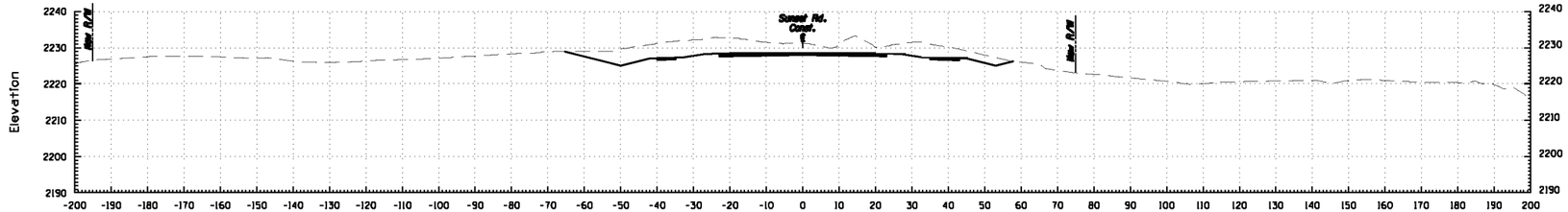
FILE NAME: P:\60311412 Sunset Rd\900-Work\910-CAD\20-SHEETS\4RTSUN_xsec_SS5.dgn DATE: 10/6/2014 TIME: 11:29:21 AM PRINTED BY: KershnerM



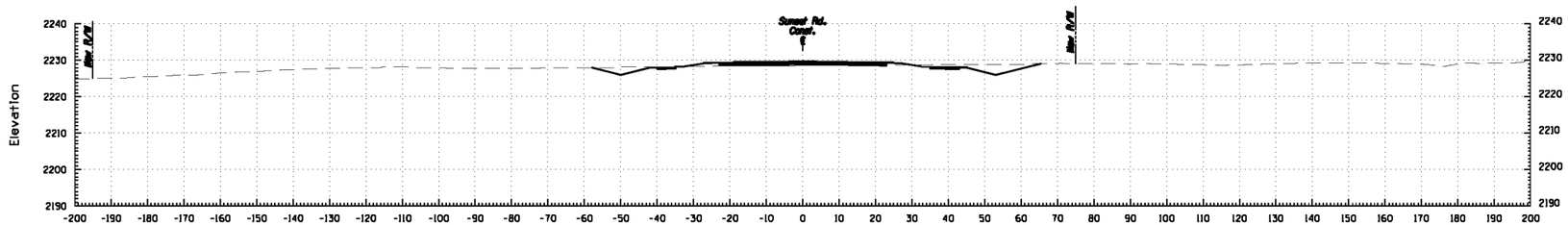
82+50



82+00



81+50



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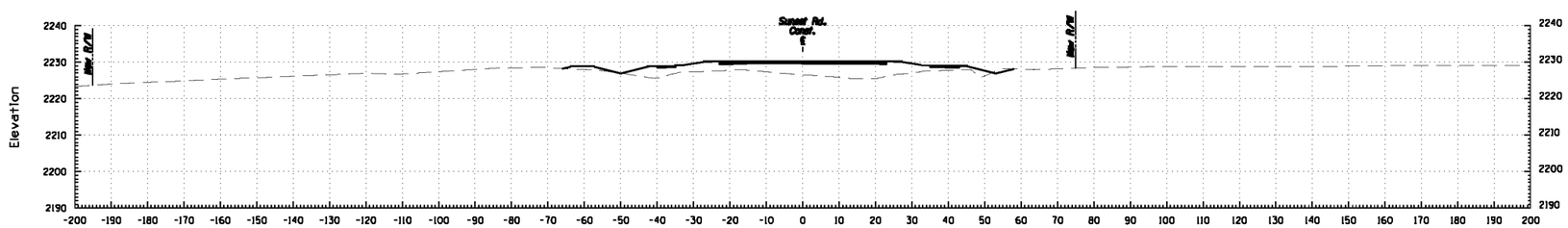


80+50

Scale: 1"=20'

AECOM

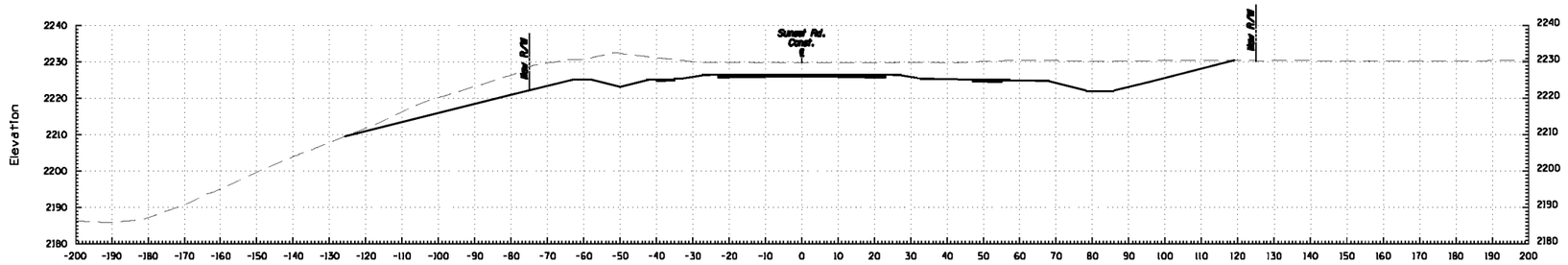
SUNSET ROAD

Sta. 80+50 to Sta. 82+50

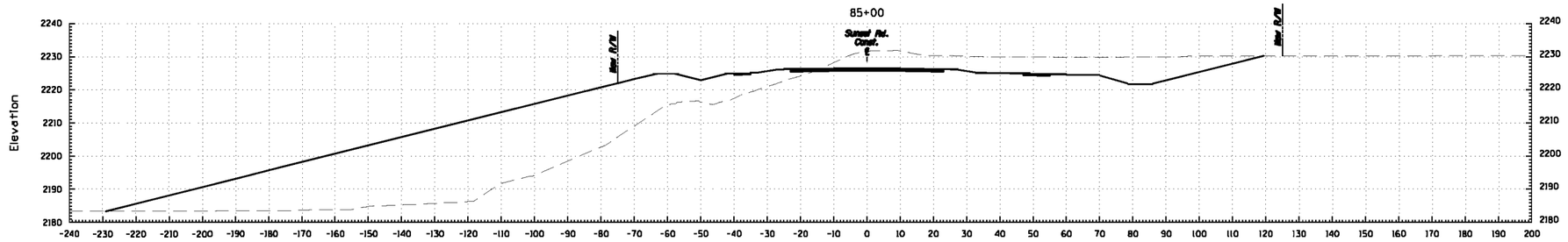
Sheet 6 of 20

SUNSET ROAD – SILVERBELL ROAD TO I-10 – PROJECT NO. 4RTSUN

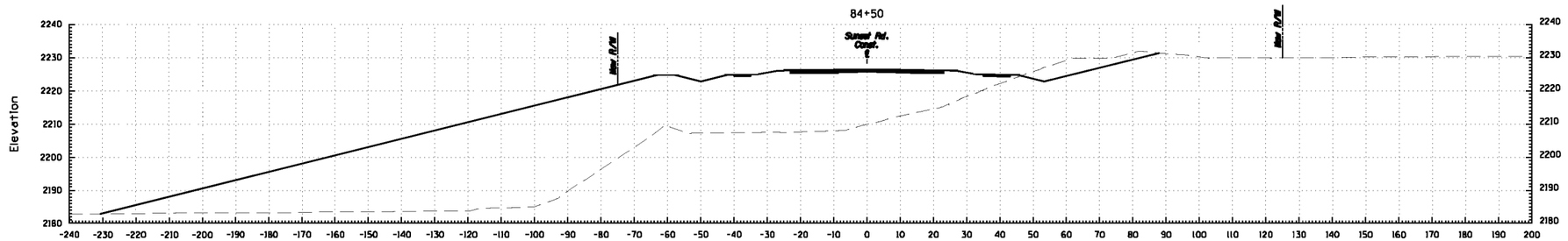
FILE NAME: P:\60311412 Sunset Rd\900-Work\910-CAD\20-SHEETS\4RTSUN_xsec_SS6.dgn DATE: 10/6/2014 TIME: 11:29:50 AM PRINTED BY: KershnerM



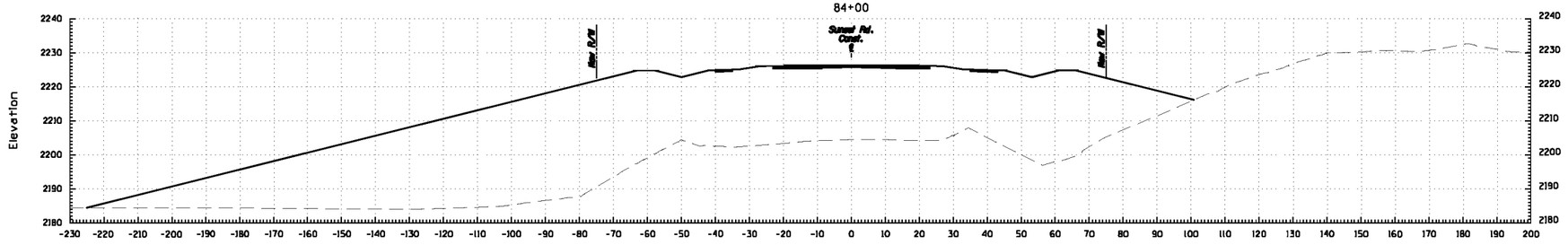
85+00



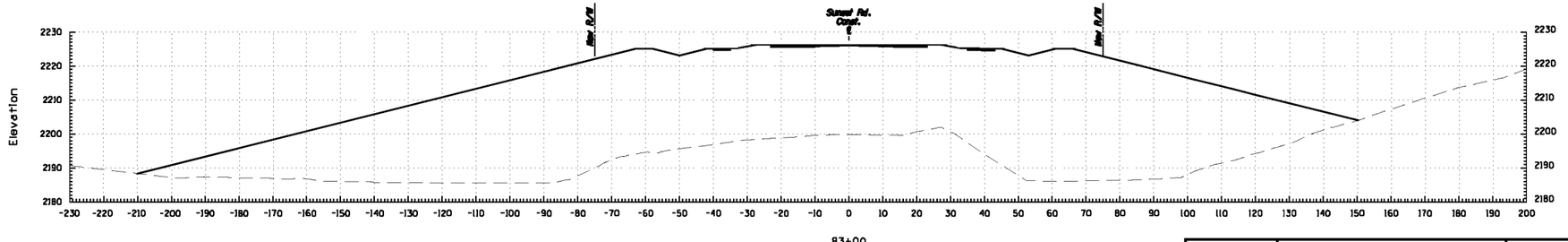
84+50



84+00



83+50



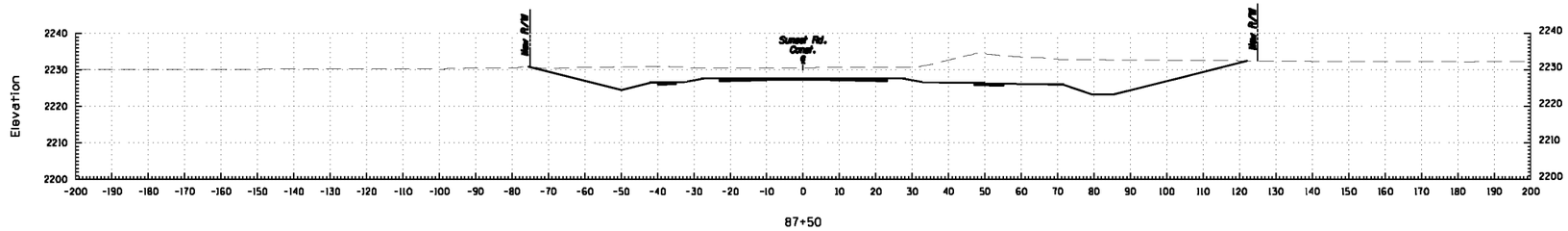
83+00

SUNSET ROAD – SILVERBELL ROAD TO I-10 – PROJECT NO. 4RTSUN

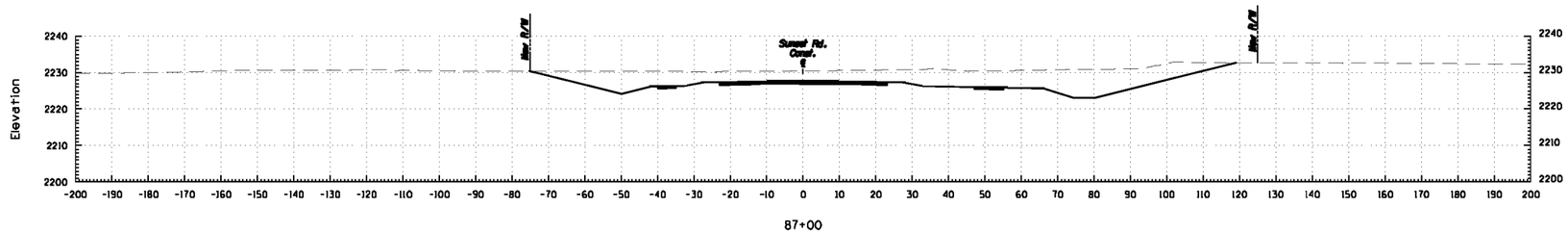
Scale: 1"=20'

AECOM	SUNSET ROAD	Sta. 83+00 to Sta. 85+00	Sheet 7 of 20

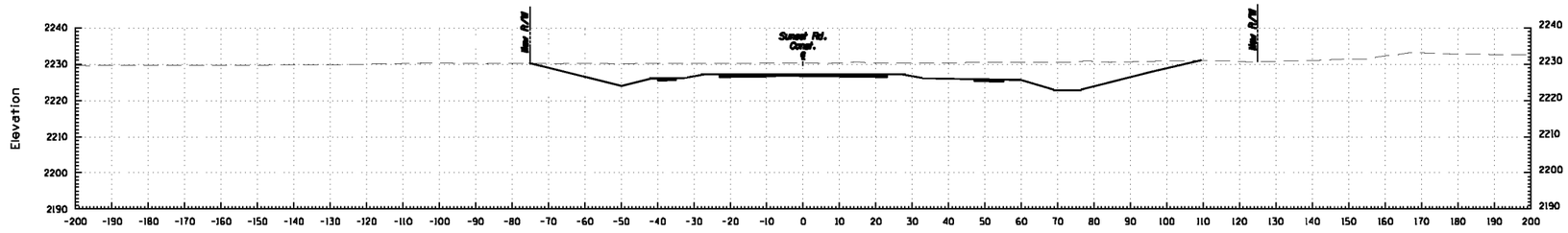
FILE NAME: P:\60311412 Sunset Rd\900-Work\910-CAD\20-SHEETS\4RTSUN_xsec_SS7.dgn DATE: 10/6/2014 TIME: 11:30:20 AM PRINTED BY: KershnerM



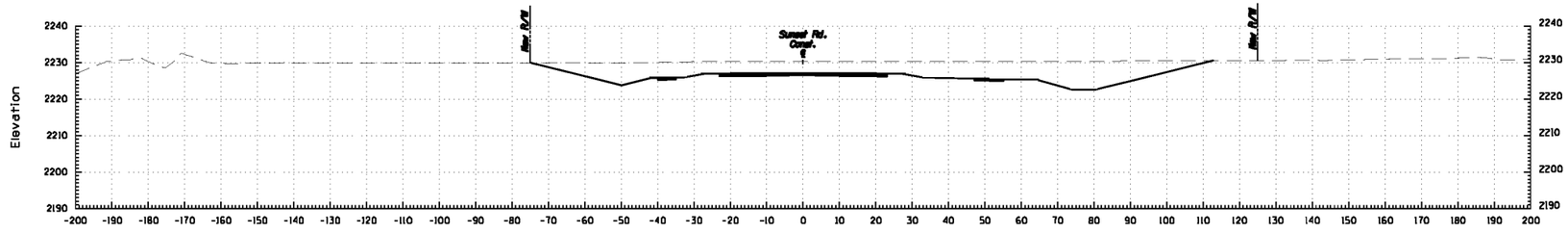
87+50



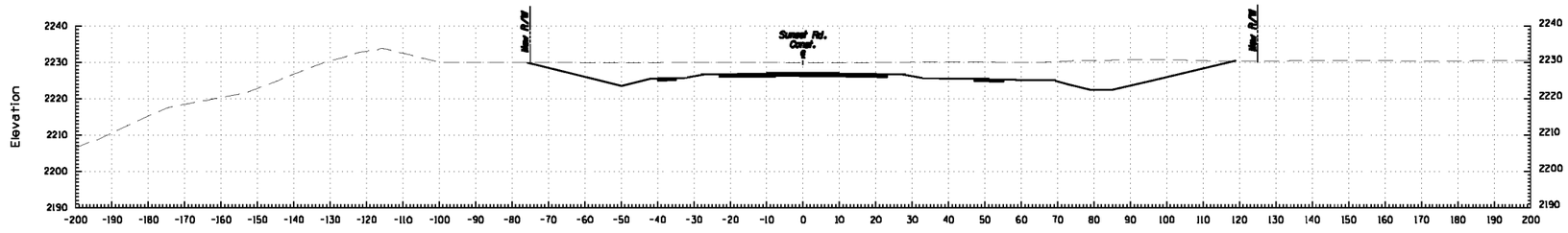
87+00



86+50



86+00



85+50

Scale: 1"=20'

AECOM

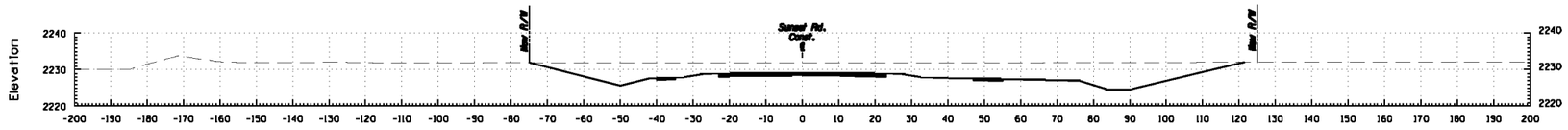
SUNSET ROAD

Sta. 85+50 to Sta. 87+50

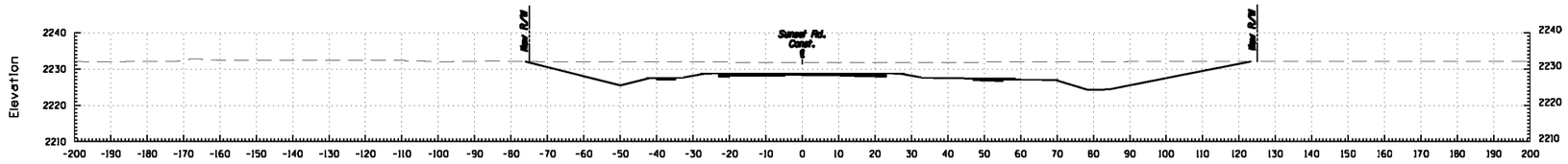
Sheet 8 of 20

SUNSET ROAD – SILVERBELL ROAD TO I-10 – PROJECT NO. 4RTSUN

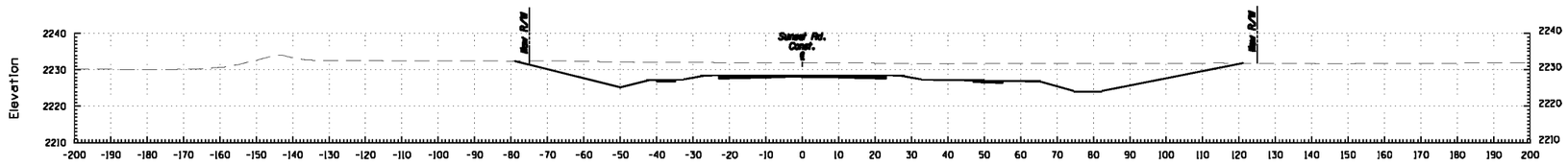
FILE NAME: P:\60311412 Sunset Rd\900-Work\910-CAD\20-SHEETS\4RTSUN_xsec_SS8.dgn DATE: 10/6/2014 TIME: 11:30:47 AM PRINTED BY: Kershner-M



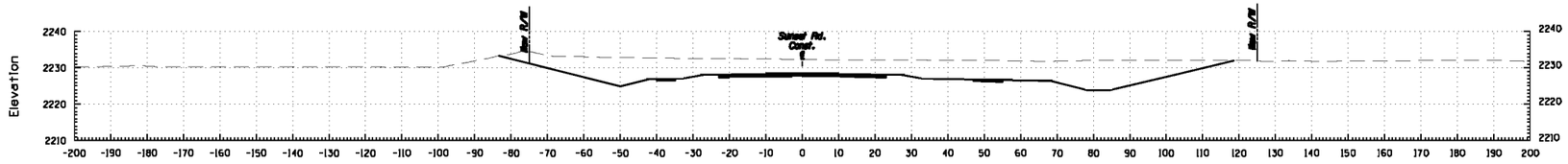
90+00



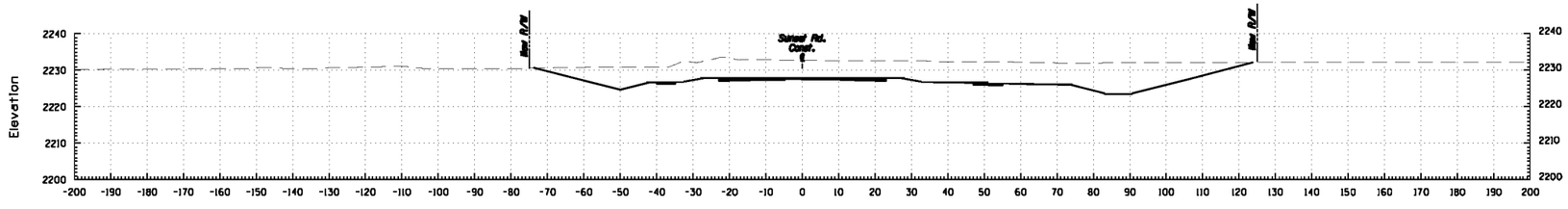
89+50



89+00



88+50

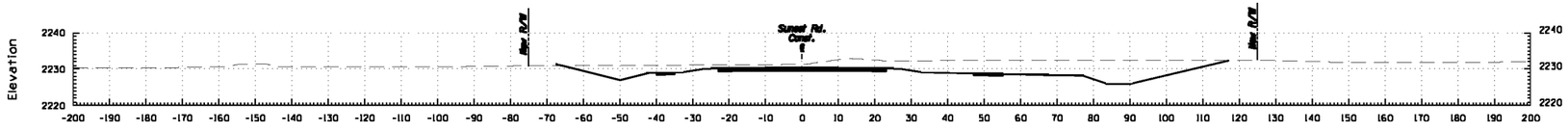


88+00

SUNSET ROAD – SILVERBELL ROAD TO I-10 – PROJECT NO. 4RTSUN

Scale: 1"=20' | AECOM | SUNSET ROAD | Sta. 88+00 to Sta. 90+00 | Sheet 9 of 20

FILE NAME: P:\60311412 Sunset Rd\900-Work\910-CAD\20-SHEETS\4RTSUN_xsec_SS9.dgn DATE: 10/6/2014 TIME: 11:31:10 AM PRINTED BY: KershnerM



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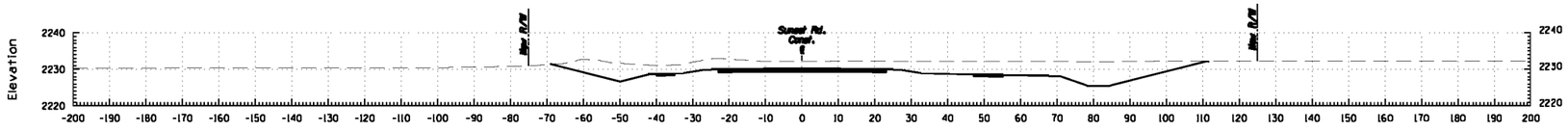
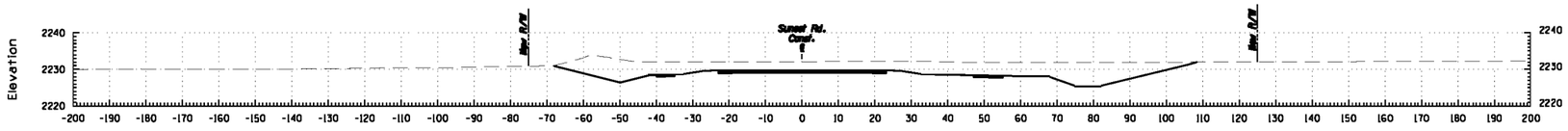
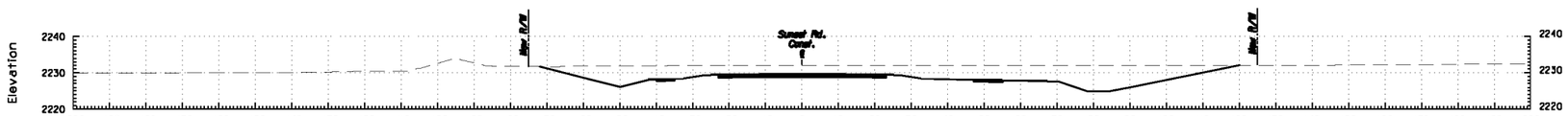


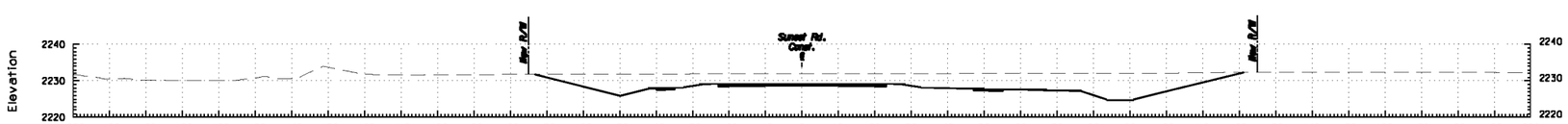
92+00



91+50



91+00



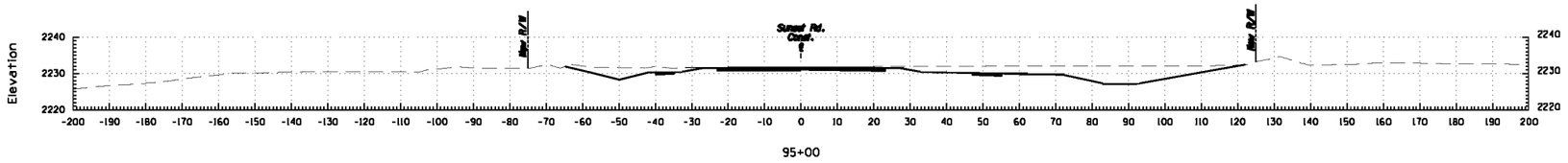
90+50

SUNSET ROAD – SILVERBELL ROAD TO I-10 – PROJECT NO. 4RTSUN

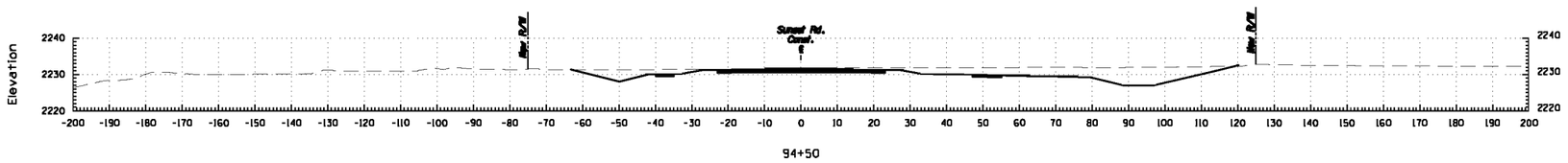
Scale: 1"=20'

AECOM	SUNSET ROAD	Sta. 90+50 to Sta. 92+50	Sheet 10 of 20

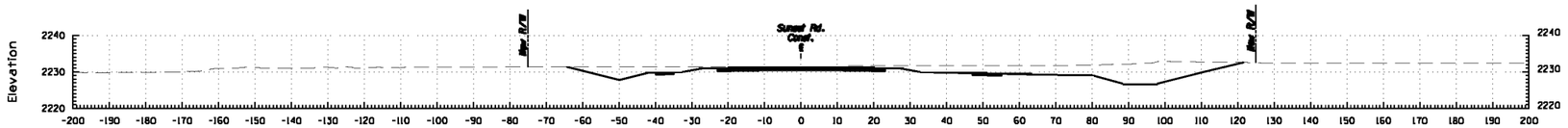
FILE NAME: P:\60311412 Sunset Rd\900-Work\910-CAD\20-SHEETS\4RTSUN_xsec_SS10.dgn DATE: 10/6/2014 TIME: 11:31:33 AM PRINTED BY: KershnerM



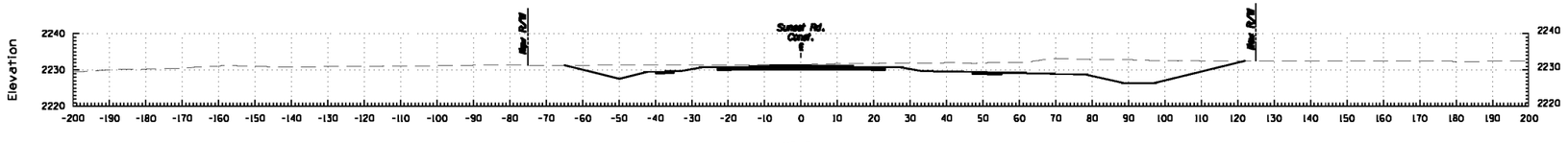
95+00



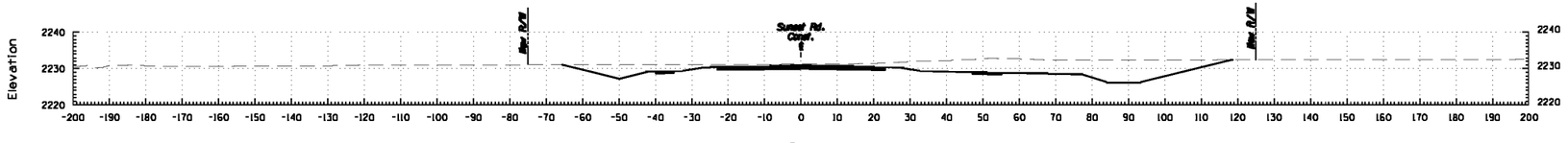
94+50



94+00



93+50

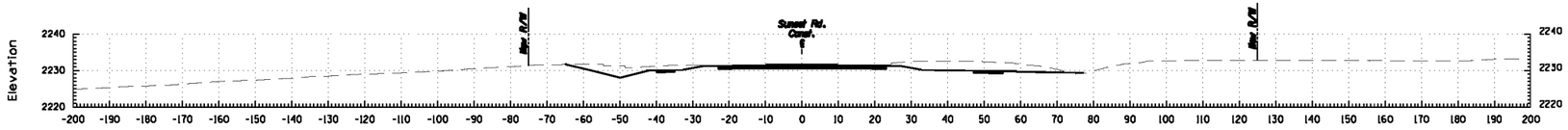


93+00

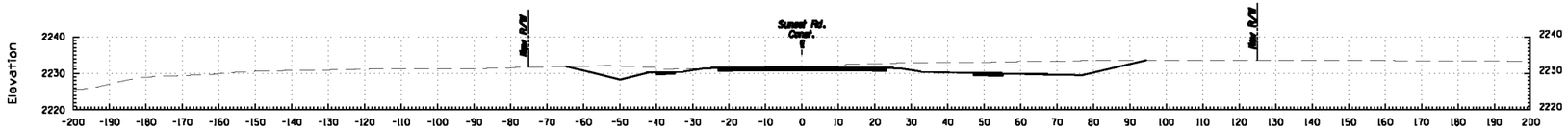
SUNSET ROAD – SILVERBELL ROAD TO I-10 – PROJECT NO. 4RTSUN

Scale: 1"=20' | AECOM | SUNSET ROAD | Sta. 93+00 to Sta. 95+00 | Sheet 11 of 20

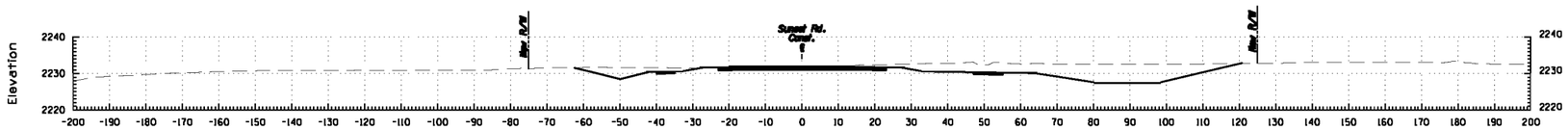
FILE NAME: P:\60311412 Sunset Rd\900-Work\910-CAD\20-SHEETS\4RTSUN_xsec_SS11.dgn DATE: 10/6/2014 TIME: 11:31:57 AM PRINTED BY: Kershner-M



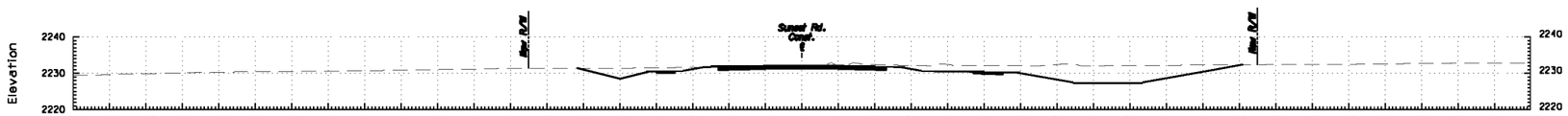
97+50



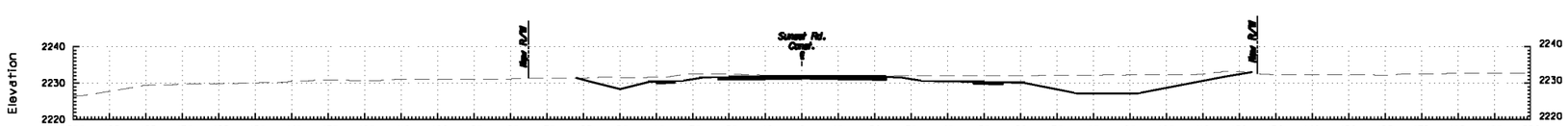
97+00



96+50



96+00

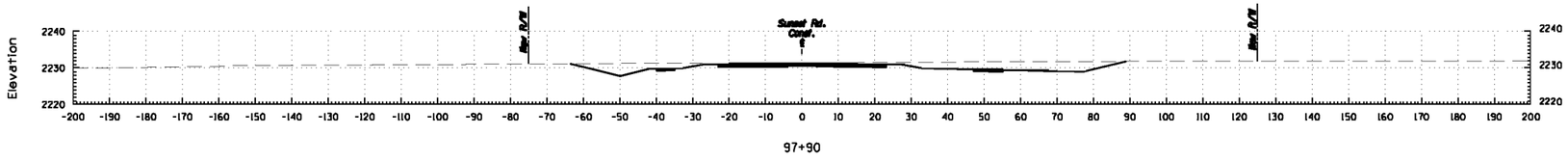


95+50

SUNSET ROAD – SILVERBELL ROAD TO I-10 – PROJECT NO. 4RTSUN

Scale: 1"=20' | AECOM | SUNSET ROAD | Sta. 95+50 to Sta. 97+50 | Sheet 12 of 20

FILE NAME: P:\60311412 Sunset Rd\900-Work\910-CAD\20-SHEETS\4RTSUN_xsec_SS12.dgn DATE: 10/6/2014 TIME: 11:32:26 AM PRINTED BY: KershnerM

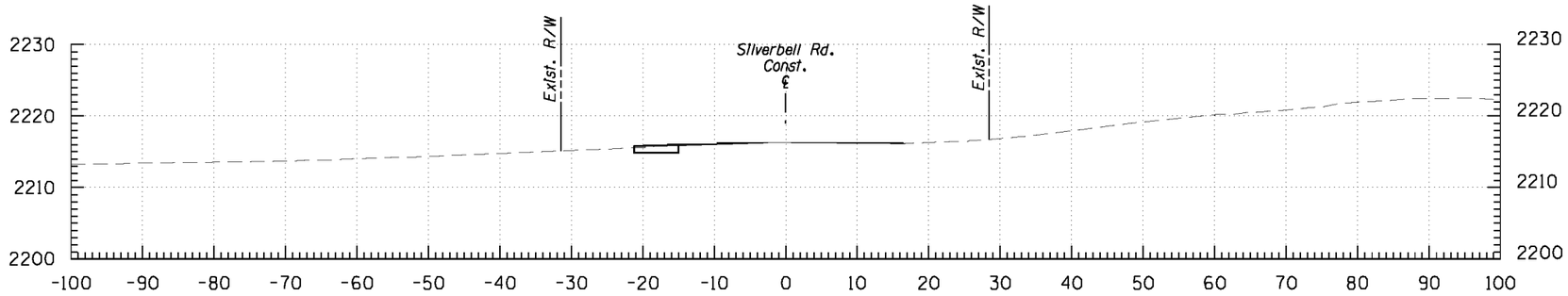


SUNSET ROAD – SILVERBELL ROAD TO I-10 – PROJECT NO. 4RTSUN

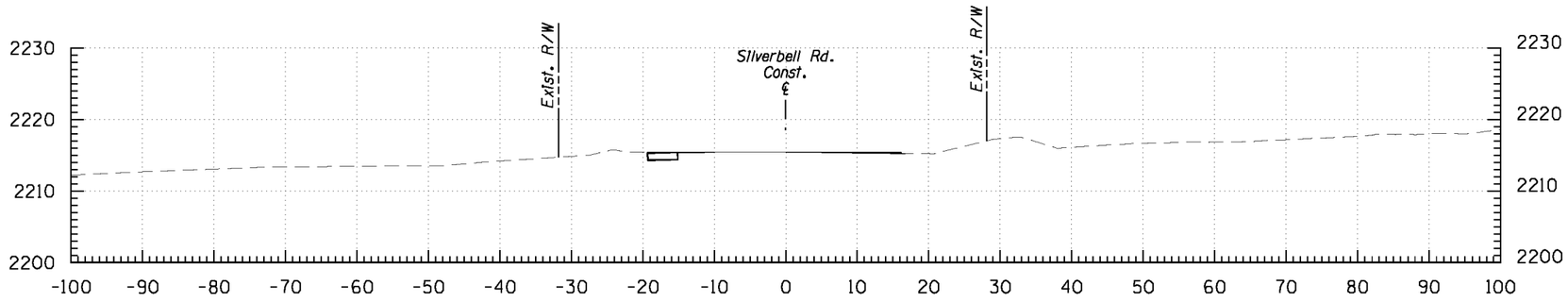
Scale: 1"=20'

AECOM	SUNSET ROAD	Sta. 97+90	Sheet 13 of 20

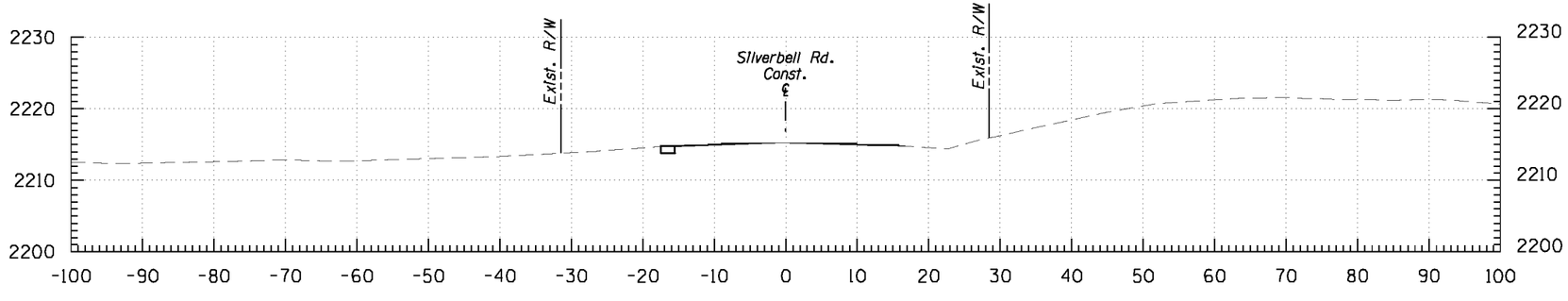
FILE NAME: P:\60311412 Sunset Rd\900-Work\910-CAD\20-SHEETS\4RTSUN_xsec_SS13.dgn DATE: 10/6/2014 TIME: 11:32:52 AM PRINTED BY: KershnerM



247+00



246+00



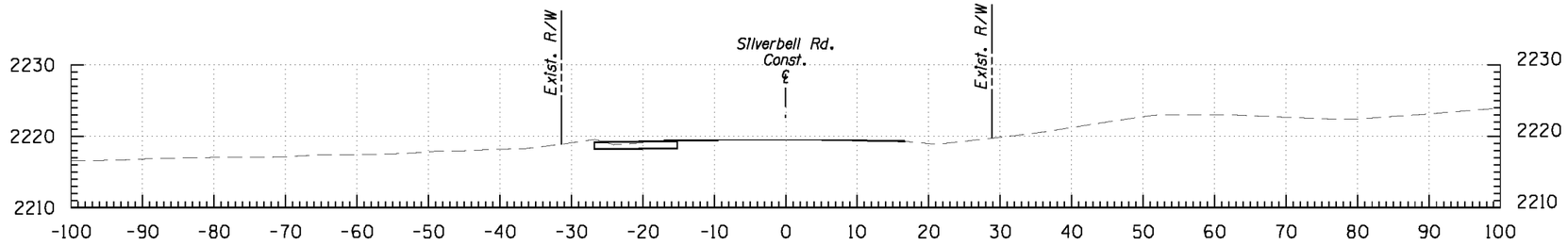
245+00

SUNSET ROAD – SILVERBELL ROAD TO I-10 – PROJECT NO. 4RTSUN

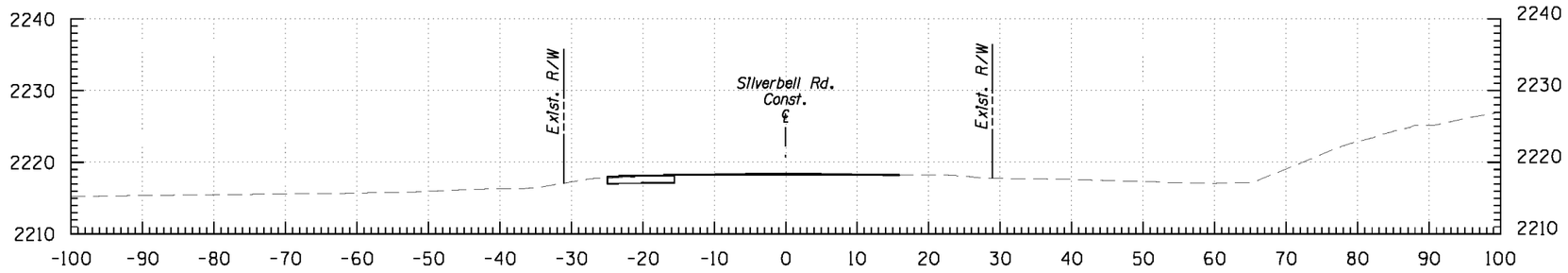
Scale: 1"=10'

AECOM | SILVERBELL ROAD | Sta. 245+00 to Sta. 247+00 | Sheet 14 of 20

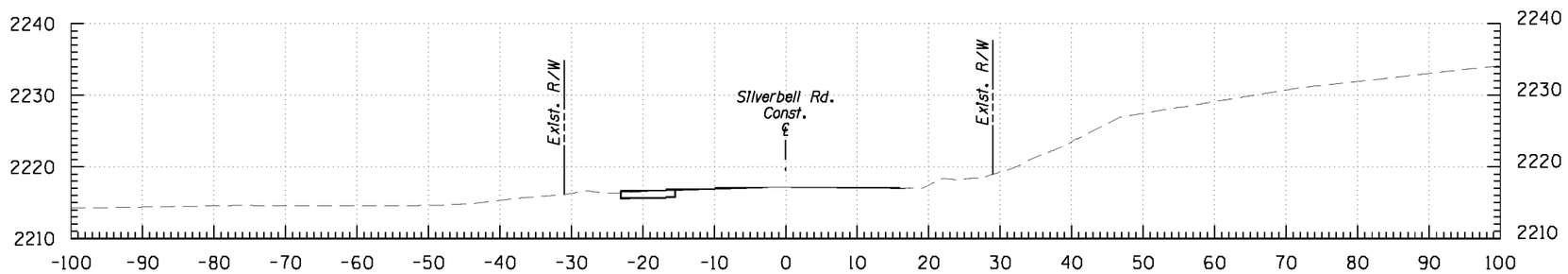
FILE NAME: P:\60311412 Sunset Rd\900-Work\910-CAD\20-SHEETS\4RTSUN_xsec_SB1.dgn DATE: 10/6/2014 TIME: 11:33:31 AM PRINTED BY: Kershner M



250+00



249+00



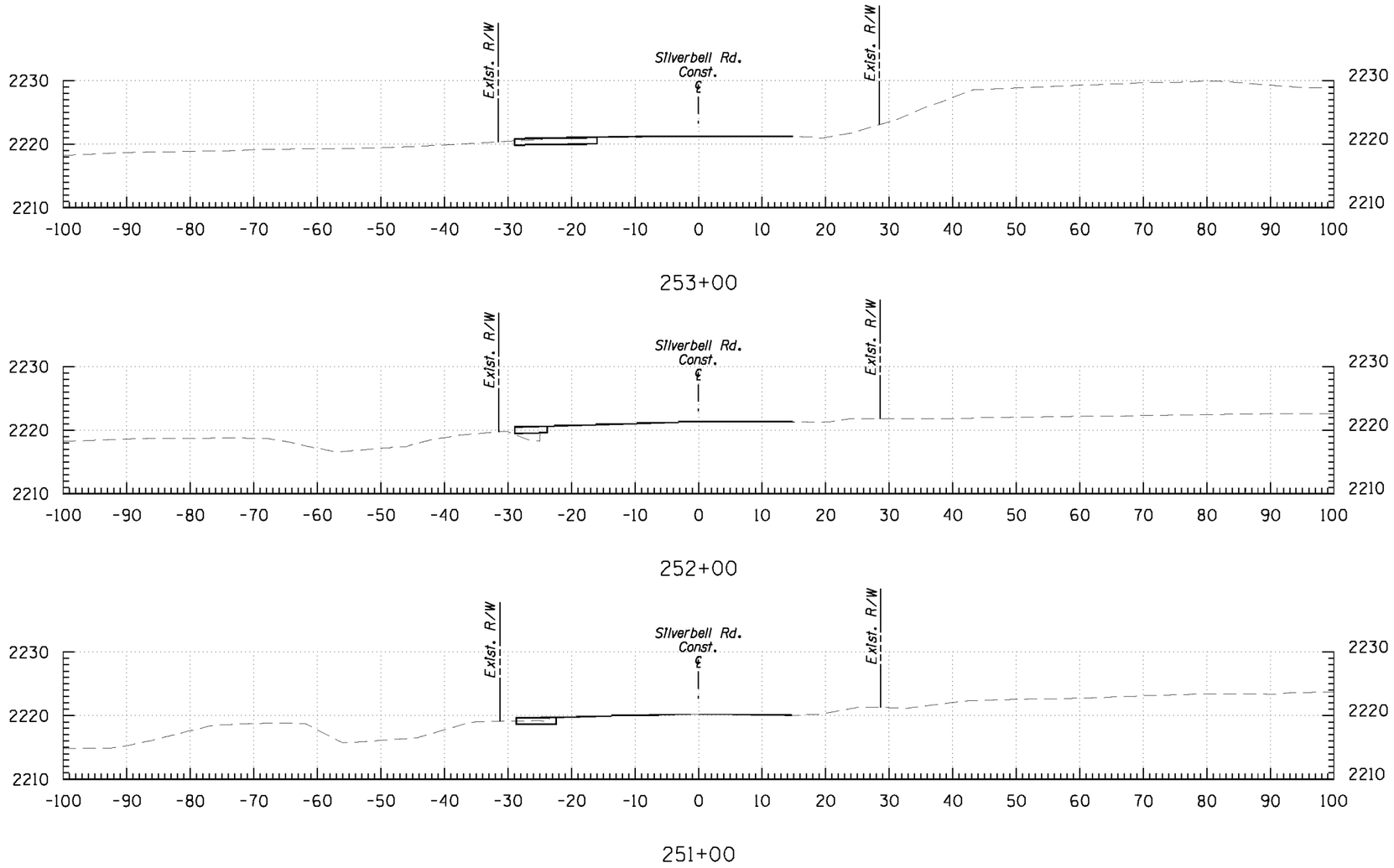
248+00

SUNSET ROAD – SILVERBELL ROAD TO I-10 – PROJECT NO. 4RTSUN

Scale: 1"=10'

AECOM | SILVERBELL ROAD | Sta. 248+00 to Sta. 250+00 | Sheet 15 of 20

FILE NAME: P:\60311412 Sunset Rd\900-Work\910-CAD\20-SHEETS\4RTSUN_xsec_SB2.dgn DATE: 10/6/2014 TIME: 11:34:07 AM PRINTED BY: Kershner-M

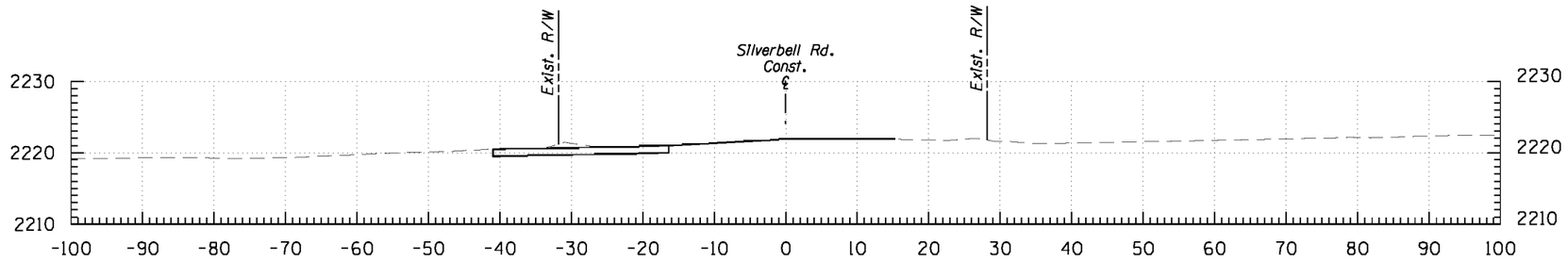


SUNSET ROAD – SILVERBELL ROAD TO I-10 – PROJECT NO. 4RTSUN

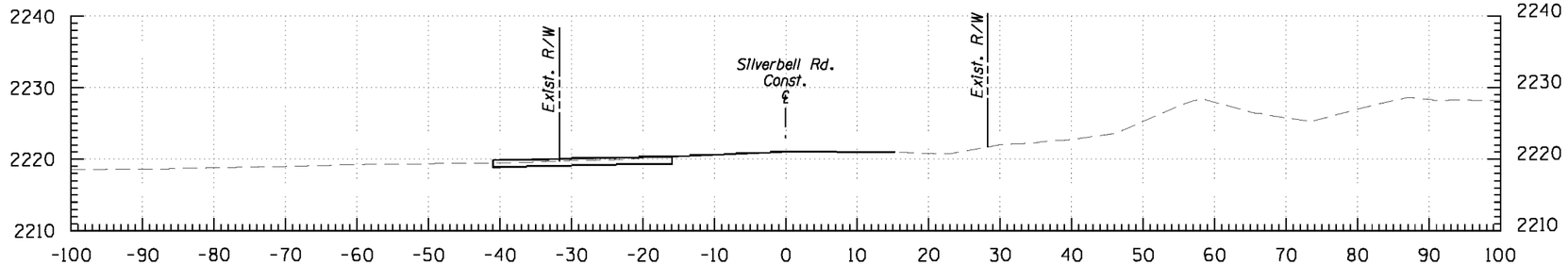
Scale: 1"=10'

AECOM | SILVERBELL ROAD | Sta. 251+00 to Sta. 253+00 | Sheet 16 of 20

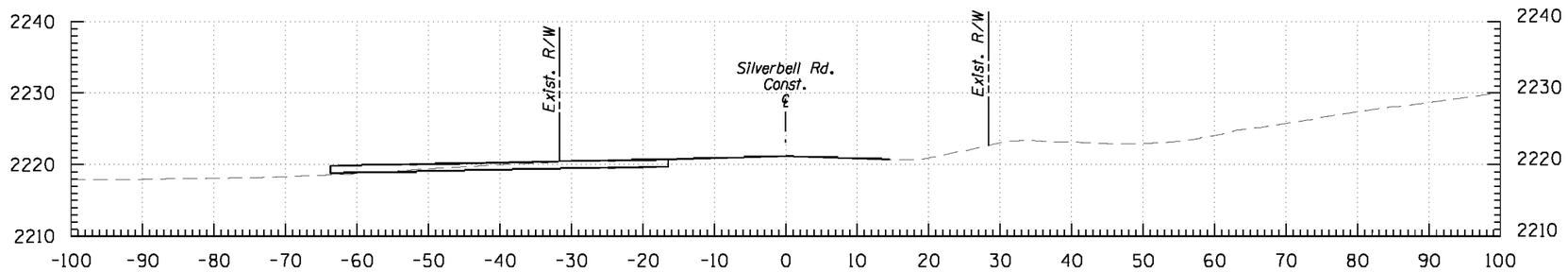
FILE NAME: P:\60311412 Sunset Rd\900-Work\910-CAD\20-SHEETS\4RTSUN_xsec_S83.dgn DATE: 10/6/2014 TIME: 11:34:41 AM PRINTED BY: Kershner-M



256+00



255+00



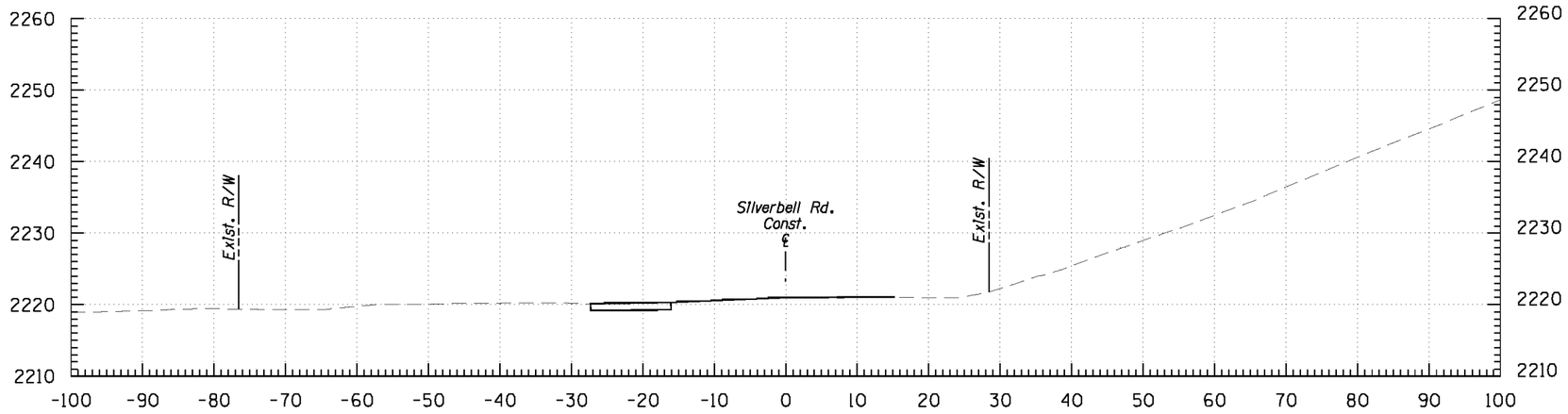
254+00

SUNSET ROAD – SILVERBELL ROAD TO I-10 – PROJECT NO. 4RTSUN

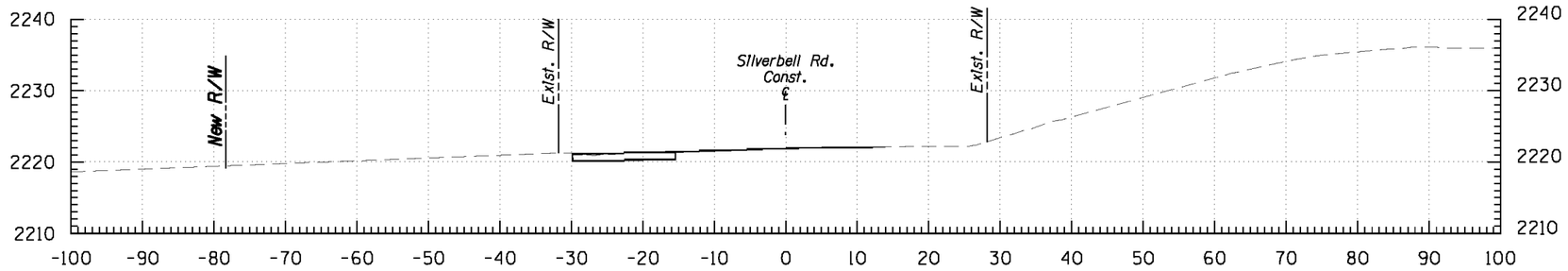
Scale: 1"=10'

AECOM | SILVERBELL ROAD | Sta. 254+00 to Sta. 256+00 | Sheet 17 of 20

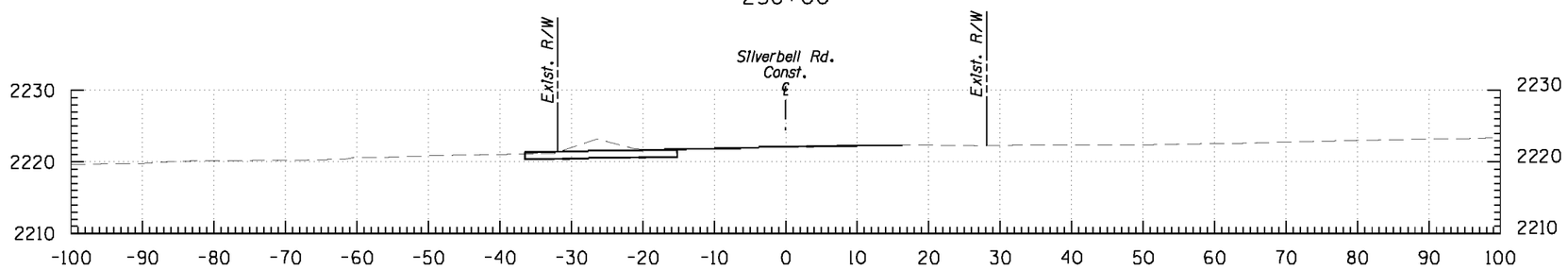
FILE NAME: P:\60311412 Sunset Rd\900-Work\910-CAD\20-SHEETS\4RTSUN_xsec_S04.dgn DATE: 10/6/2014 TIME: 11:35:15 AM PRINTED BY: Kershner-M



259+00



258+00

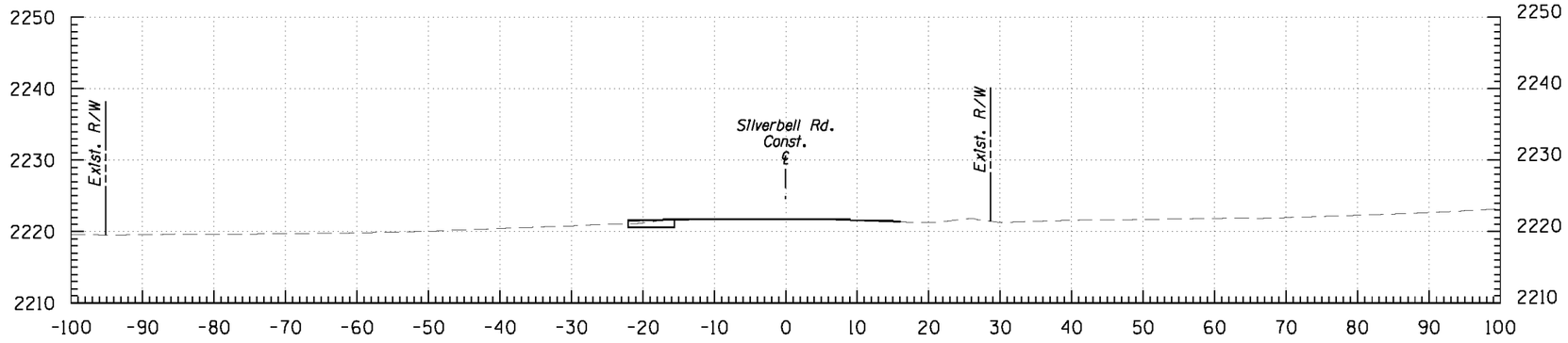


257+00

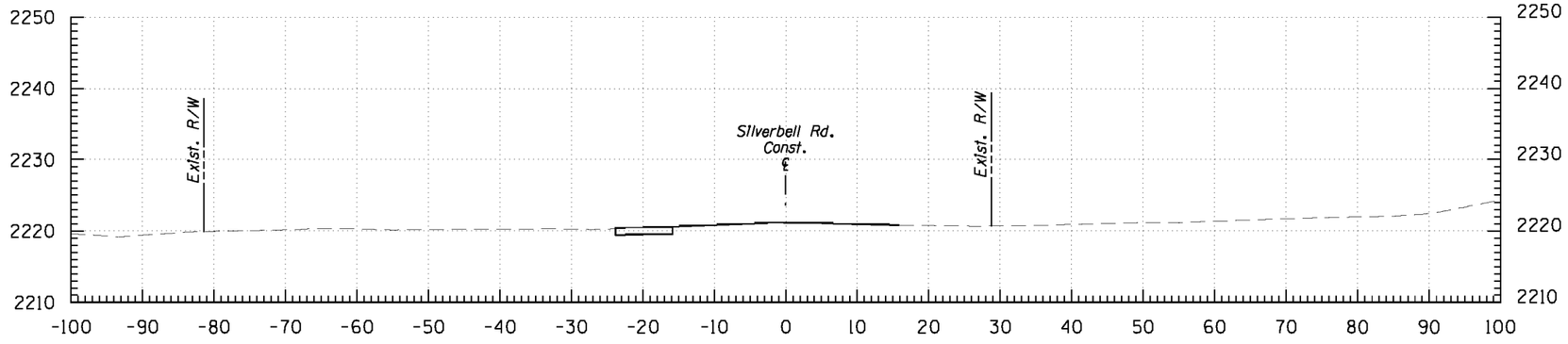
SUNSET ROAD – SILVERBELL ROAD TO I-10 – PROJECT NO. 4RTSUN

Scale: 1"=10' | AECOM | SILVERBELL ROAD | Sta. 257+00 to Sta. 259+00 | Sheet 18 of 20

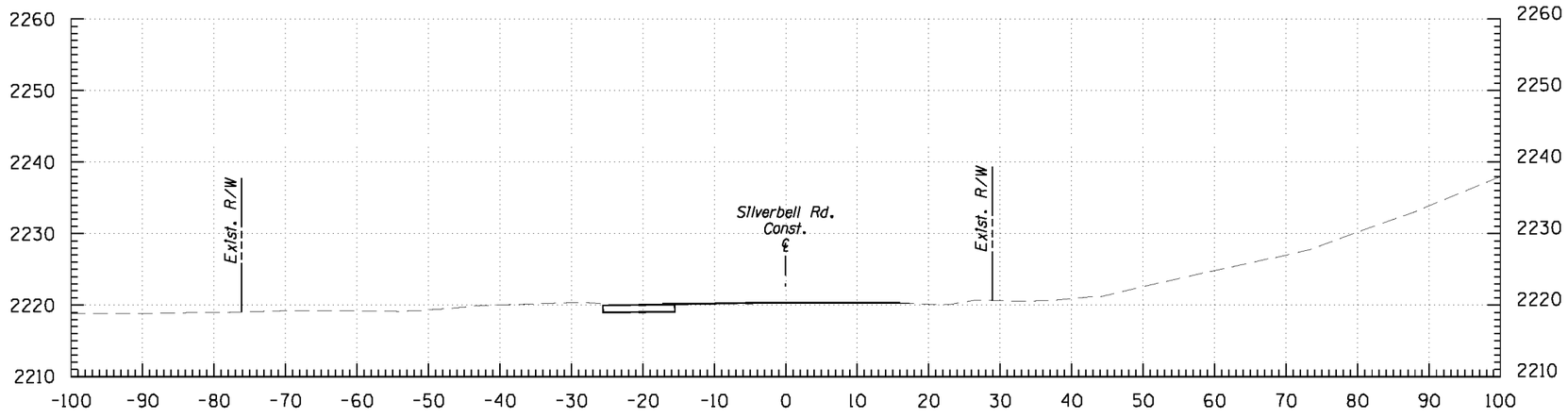
FILE NAME: P:\60311412 Sunset Rd\900-Work\910-CAD\20-SHEETS\4RTSUN_xsec_SB5.dgn DATE: 10/6/2014 TIME: 11:35:56 AM PRINTED BY: KershnerM



262+00



261+00



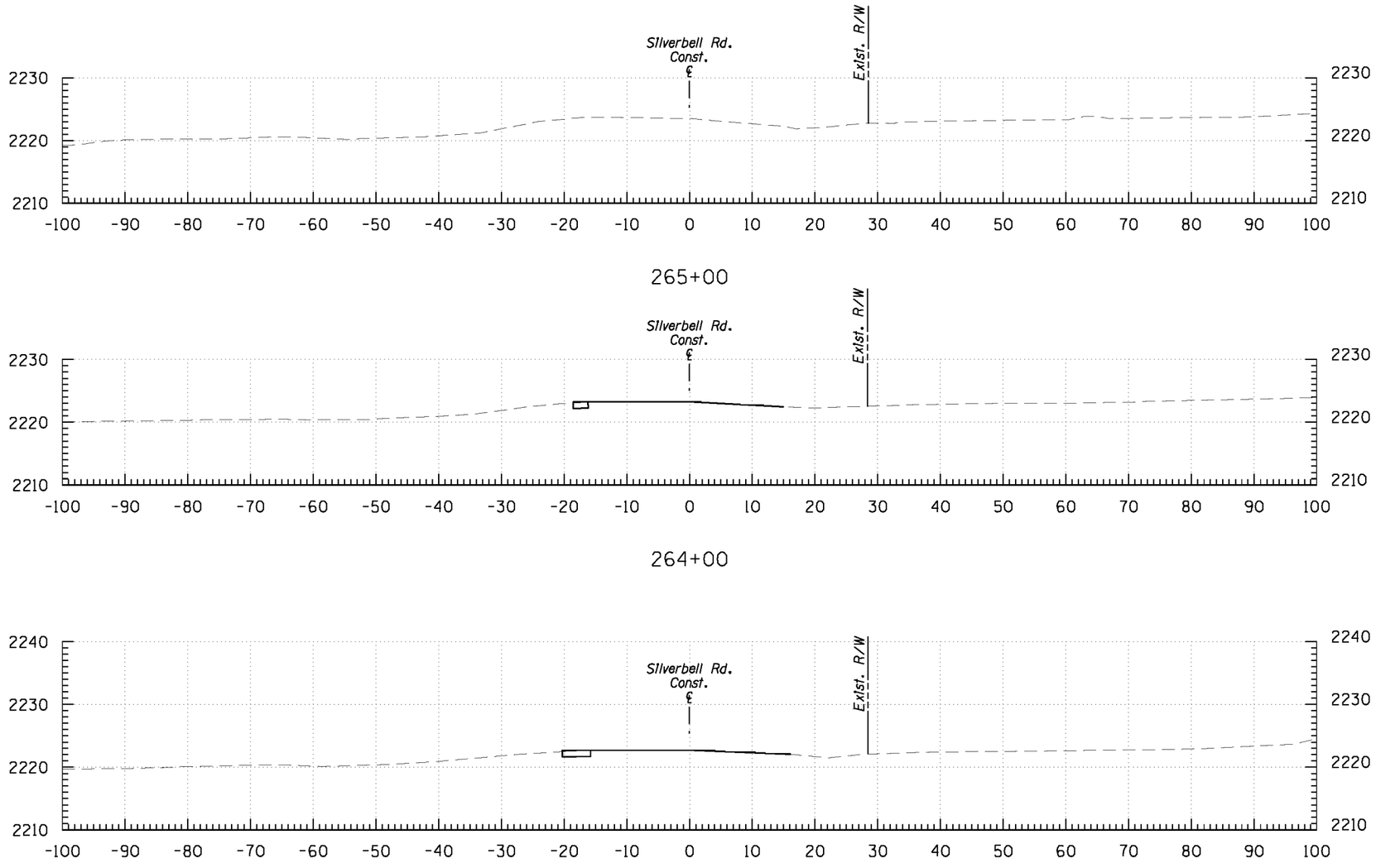
260+00

Scale: 1"=10'

AECOM | SILVERBELL ROAD | Sta. 260+00 to Sta. 262+00 | Sheet 19 of 20

FILE NAME: P:\60311412 Sunset Rd\900-Work\910-CAD\20-SHEETS\4RTSUN_xsec_S86.dgn | DATE: 10/6/2014 | TIME: 11:36:21 AM | PRINTED BY: KershnerM

SUNSET ROAD – SILVERBELL ROAD TO I-10 – PROJECT NO. 4RTSUN



SUNSET ROAD – SILVERBELL ROAD TO I-10 – PROJECT NO. 4RTSUN

Scale: 1"=10' | AECOM | SILVERBELL ROAD | Sta. 263+00 to Sta. 265+00 | Sheet 20 of 20

FILE NAME: P:\60311412 Sunset Rd\900-Work\910-CAD\20-SHEETS\4RTSUN_xsec_SB7.dgn DATE: 10/6/2014 TIME: 11:36:50 AM PRINTED BY: KershnerM

SUNSET ROAD
SILVERBELL ROAD TO INTERSTATE 10

PIMA COUNTY BOARD OF SUPERVISORS

SHARON BRONSON, CHAIRMAN, DISTRICT 3
ALLY MILLER, DISTRICT 1 RAY CARROLL, DISTRICT 4
RAMON VALADEZ, DISTRICT 2 RICHARD ELIAS, DISTRICT 5

PROJECT IN SUPERVISOR DISTRICT 1

PROJECT NUMBER
4RTSUN

ROADWAY CROSS SECTIONS

OCTOBER 2014

CROSS SECTIONS FOR DRAFT DCR SUBMITTAL

SUNSET ROAD – SILVERBELL ROAD TO I-10 – PROJECT NO. 4RTSUN

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No.	Revisions	Engineer	Date
No.	As Built	Engineer	Date
Project No.	4RTSUN		

PRELIMINARY
STAGE 1

Pima County Department of Transportation
201 N. Stone Ave. 4th floor Tucson, Arizona 85701
Phone Number: 740-6410
Priscilla S. Cornelio, P.E. Director

Reviewed by	Engineer	Date
Mgr. Trans Engr.		
Mgr. Traffic Engr.		
Mgr. Field Engr.		
Mgr. WMM		
Sheet No. CS01 of CS01		Page No. – of 20

Approved: _____20__

_____
Director

FILE NAME: P:\60311412 Sunset Rd\900-Work\910-CAD\20-SHEETS\4RTSUN_ xsecofs.dgn DATE: 10/28/2014 TIME: 2:35:08 PM KershnerM