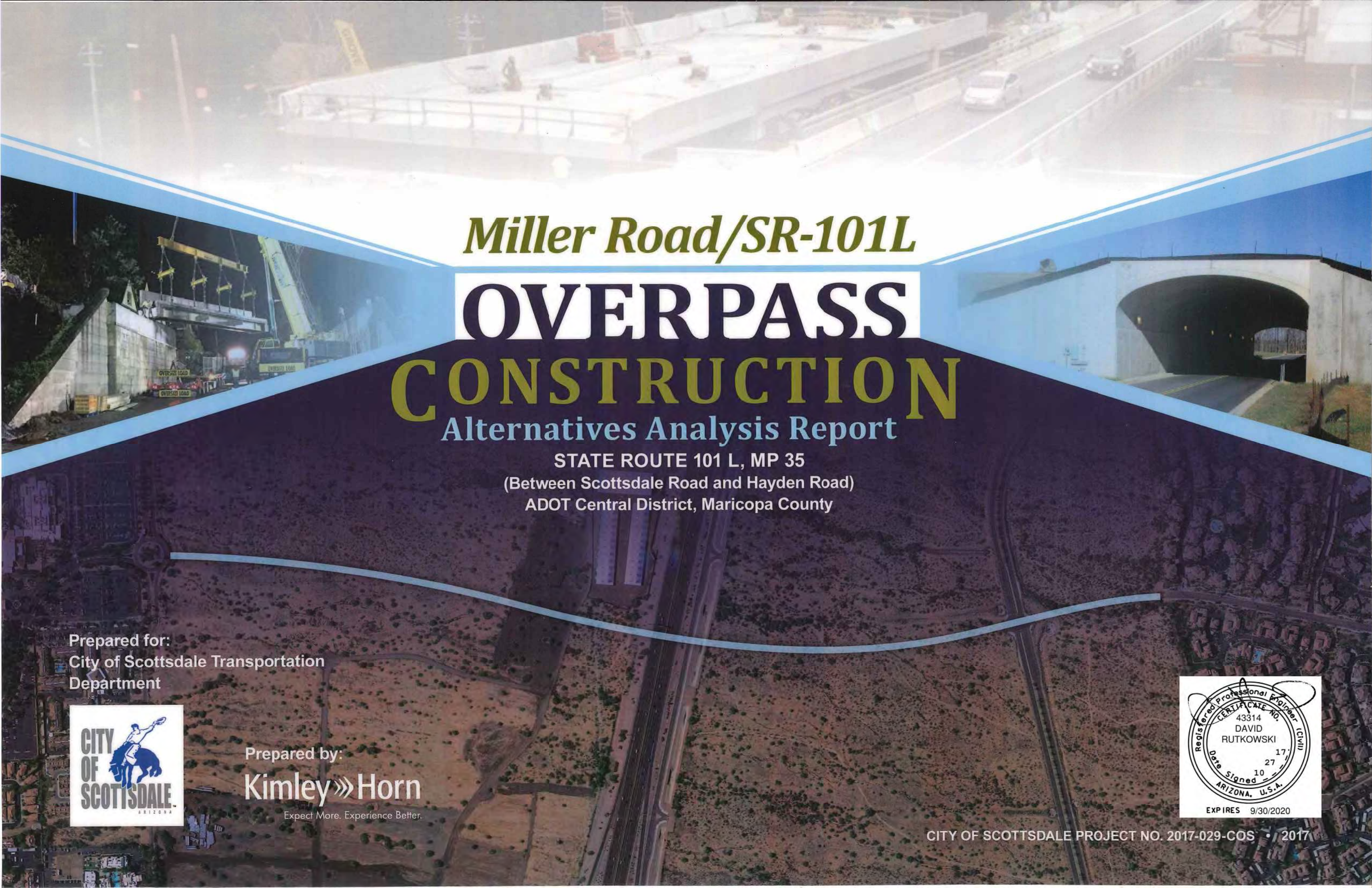

Miller Road/SR-101L

OVERPASS CONSTRUCTION

Alternatives Analysis Report

STATE ROUTE 101 L, MP 35
(Between Scottsdale Road and Hayden Road)
ADOT Central District, Maricopa County

Prepared for:
City of Scottsdale Transportation Department

Prepared by:
Kimley»Horn
Expect More. Experience Better.

CITY OF SCOTTSDALE PROJECT NO. 2017-029-COS • 2017

EXECUTIVE SUMMARY

In response to recent discussions between the City of Scottsdale (COS) and the Arizona Department of Transportation (ADOT) to add the Miller Road SR-101L crossing into the general-purpose lane (GPL) expansion project, this Construction Alternatives Analysis was established to determine the constraints for the contractor to build this crossing. The key constraints identified through this analysis include the construction cost, schedule and traffic delays. Determining these constraints ultimately allows the COS to plan for effects of potential freeway closures, project costs and future development of the area.

Based on public commitments through Proposition 400, this analysis focused on developing a Miller Road SR-101L overpass solution that could be implemented with minimal disturbance to SR-101L. To set a baseline for comparison purposes, one of the build alternatives selected included conventional construction. The remaining alternatives were selected based on their potential to expedite the construction of the crossing using accelerated bridge construction techniques.

The proposed Miller Road alignment runs roughly north-south, intersecting SR-101L approximately one half mile east of Scottsdale Road. Extending Miller Road from 76th Street on the north to Princess Drive on the south was identified in Proposition 400 which was passed by voters in November of 2004. Funding from Proposition 400 will fund 70% of the project with additional funding being supplied by the COS, and other stakeholders. The public outreach materials for Proposition 400 identified the proposed Miller Road SR-101L crossing as an overpass (SR-101L over Miller Road). This configuration improves the aesthetics and developability of the area.

PURPOSE AND NEED

Congestion at the Scottsdale Road and Hayden Road SR-101L interchanges is projected to increase as vacant parcels north and south of SR-101L are auctioned off by the Arizona State Land Department (ASLD). ASLD has recent interest in the land north and south of SR-101L at this location from developers, accelerating the need for the construction of Miller Road from 76th Street to Princess Drive. The project area is projected to grow as a mixed use of high density residential, commercial and industrial businesses that will add additional traffic to Scottsdale and Hayden Road to cross SR-101L if the Miller Road SR-101L crossing is not constructed.

CONSTRUCTION ALTERNATIVES

Development of alternatives was focused on accommodating the Miller Road SR-101L crossing in the ADOT GPL expansion project. At the first stakeholder workshop, multiple alternatives were presented and discussed.

The following is a list of those alternatives:

- Conventional Bridge Construction
- Bridge Slide
- Prefabricated Bridge Elements
- Self-Propelled Modular Transport
- Precast Arch
- Three-Sided Box Slide
- Precast Box Culvert Jacking
- Tunneling

After additional discussions with the project stakeholders four initial alternatives were selected for further evaluation. The alternatives removed from consideration were eliminated based on the potential for additional future maintenance (prefabricated bridge elements), costs associated with constructability (self-propelled modular transport) and additional freeway closures that would be necessary for certain alternatives based on input from project stakeholders (precast box culvert jacking and tunneling). Each alternative was detailed to a 15% design level to determine key parameters to size structures, determine right-of-way (R/W) impact, and estimate probable costs. Alternative 1A was added after the initial draft of this report was released to include the construction of retaining walls within ADOT's R/W. The final alternatives selected for additional analysis are as follows:

- Alternative 1 – Conventional Bridge Construction (Without Walls Inside of ADOT R/W)
- Alternative 1A – Conventional Bridge Construction (With Walls Inside of ADOT R/W)
- Alternative 2 – Bridge Slide
- Alternative 3 – Three-Sided Box Slide
- Alternative 4 – Precast Arch

PHASED IMPLEMENTATION PLAN

During this analysis, it was determined that the Miller Road SR-101L crossing could be constructed without fully constructing Miller Road between 76th Street and Princess Drive. Miller Road construction will be phased under two separate construction projects. Phase 1 construction will consist of implementing the SR-101L crossing concurrently with the ADOT GPL expansion project. This phase will include the proposed structure as needed to support SR-101L, FMS relocations and interim drainage provisions to allow water to flow under SR-101L through the crossing. The area under the structure will be backfilled as native to allow drainage from north to south under SR-101L. Phase 2 construction will consist of the City administering the construction of Miller Road between the end of 76th Street and Princess Road including curb, gutter, sidewalk, ect… and any structural features not constructed with the ADOT SR-101L GPL expansion project which includes portions of the retaining walls along Miller road and the full Miller Road typical section under SR-101L for all alternatives.

ESTIMATED IMPACTS

The potential closures and delays necessary to construct each of the alternatives are summarized below. Durations are in days unless otherwise noted. The overall construction duration and the delays shown are associated only with the construction of the Miller Road SR-101L crossing, exclusive of the SR-101L GPL project.

Alt. No.	Const. Duration	Median Construction Ingress/Egress	HOV Lane Closure Duration	Crossing Completion Date	Ramp Closure Duration	Frontage Road Closure Duration	Unmitigated Delay (HRS)	Additional Directional Mainline Weekend Closures (EA)
1 & 1A	205	107	0	10/27/19	102	89	365,488	3
2	170	23	2	9/22/19	130	161	568,652	4
3	142	23	7	8/25/19	123	110	469,732	4
4	121	30	19	8/4/19	95	91	398,326	3

ESTIMATED COST

Estimated costs for each alternative are summarized below including R/W costs if applicable.

Alt. No.	Phase 1	Phase 2	Total Cost
1	$6,120,000	$18,393,000	$24,513,000
1A	$7,957,000	$18,629,000	$26,586,000
2	$7,748,000	$18,393,000	$26,141,000
3	$9,261,000	$18,934,000	$28,195,000
4	$8,140,000	$18,934,000	$27,074,000

RECOMMENDATIONS

The rating process completed by the project stakeholders concluded with the four main alternatives ranked as follows starting with the best option: 1, 4, 2, 3. Alternative 1/1A – Conventional Bridge Construction was the front runner due to its low cost of construction and constructability advantages. However, the estimated construction schedule prepared for the analysis concluded that construction would not be complete until late October of 2019, based on an April 1, 2019 construction notice to proceed, which would be inside of the COS event schedule. Through additional discussion, it was determined that with additional construction crews, Alternative 1 could potentially be completed prior to the event schedule and should be considered a viable option for construction. Alternative 4 – Arch Structure received the second highest ratings due to its ability to be constructed cost effectively and efficiently with construction estimated to be completed in early August of 2019, well ahead of the beginning of the COS event schedule. Since the final determination of the alternative selected for construction resides with the ADOT design-build contractor, the recommendations of this report are provisions to limit impacts to the traveling public during construction rather than a preferred alternative. Utilizing the analysis data from these two alternatives, the following restrictions, incentives, and disincentives are recommended to be included in the ADOT SR-101L, I-17 to Princess Boulevard GPL expansion project request for proposal.

Restrictions/ Incentives/ Disincentives	
Median Construction via Ingress/Egress from HOV lanes	90 days Maximum
HOV Lane Closure Duration	20 days Maximum
Crossing Completion Date	September 30, 2019 or Earlier
Ramp Closure Duration	100 days Maximum
Frontage Road Closure Duration	90 days Maximum
Additional Directional Mainline Weekend Closures	two EB Closures, two WB Closures

RECOMMENDATION DETAILS, INCENTIVES, DISINCENTIVES

Median Construction

Construction within the median that requires ingress and egress from the WB and EB SR-101L HOV lanes shall be limited to the recommended duration. Ingress/egress begins as soon as one direction is shifted to the outside of SR-101L as shown in Alternative 1 Phase 6. Ingress/egress ends as soon as construction within the median is completed as shown in Alternative 1 Phase 12.

HOV Lane Closure Duration

HOV lane closure is not recommended for extended periods of time due to the traffic impacts associated with the closure, as estimated in Alternative 4. Incentives should be included to reduce the HOV lane closure. Incentives recommended are $1,000/day per direction ($40,000 maximum incentive). Alternatively, if the contractor cannot open the HOV lanes within the 20-day maximum closure window, liquidated damages should be assessed. Liquidated damages are recommended at $500 per 15-minute interval per direction.

Crossing Completion Date

The crossing completion date is based on the contractor shifting traffic back into the standard GPL construction temporary inside lane configuration, which would include one HOV lane and three GPLs in each direction with all ramps open between Scottsdale and Hayden Roads. Incentives should be included to reduce the construction duration. Incentives recommended are $5,000 per day ($50,000 maximum incentive). Alternatively, if the contractor cannot open the HOV lanes prior to the specified completion date, liquidated damages should be assessed. Liquidated damages are recommended at $20,000 per day past the completion date.

Ramp Closure Duration

Closure of the ramps is necessary to construct the ADOT GPL expansion project, however 100 days is assumed to be longer than the ADOT project would typically need. Incentives should be included to reduce the ramp closure durations. Incentives are recommended at $1,000 per day per ramp opened before the maximum closure duration ($120,000 maximum incentive). Alternatively, if the contractor cannot open the ramps prior to the specified completion date, liquidated damages should be assessed. Liquidated damages are recommended at $500 per 15-minute interval per ramp.

Frontage Road Closure Duration

Closure of the frontage road should only occur if construction interferes with traffic flow. If construction is not ongoing and the contractor is found to keep the frontage road closed they should be assessed liquidated damages in the amount of $500 per hour.

Additional Mainline Closures

It is assumed that the ADOT GPL expansion project will fully close this section of freeway twice during the construction of the GPL. The contractor will be allotted two additional directional closures to construct the Miller Road SR-101L crossing. If additional closures are necessary, liquidated damages should be assessed. Liquidated damages are recommended to be $50,000 per day per direction.

ADDITIONAL R/W REQUIREMENTS

In addition, it is recommended that a temporary construction easement (TCE) be acquired from ASLD in preparation for the ADOT GPL expansion project to allow all of the alternatives within this construction alternatives analysis to be considered by proposers.

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1. INTRODUCTION

1.1 BACKGROUND

The proposed Miller Road alignment runs roughly north-south, intersecting SR-101L approximately one half mile east of Scottsdale Road (see **Figure 1.1**). Extending Miller Road from 76th Street on the north to Princess Drive on the south was identified in Proposition 400, which was passed by voters in November of 2004. Funding from Proposition 400 will fund 70% of the project with additional funding being supplied by the COS, and other stakeholders. The public outreach materials for Proposition 400 identified the proposed Miller Road SR-101L crossing as an overpass (SR-101L over Miller Road). This configuration improves the aesthetics and developability of the area.

Connecting 76th Street to Princess Drive using the Miller Road alignment has gained momentum recently through discussions with the COS, Maricopa Association of Governments (MAG), ASLD and ADOT as developer interest in the parcels north and south of SR-101L has increased. Options for an overpass and underpass were developed and reviewed as part of the MAG Alternatives Analysis Study conducted by HDR in June 2016. This study concluded that the most efficient way to cross SR-101L was to take Miller Road over SR-101L, building the crossing as an underpass (SR-101L under Miller Road), which does not agree with public commitments that have been made for this crossing. The focus of implementing a crossing on the Miller Road alignment is now on how to construct Miller Road under SR-101L while minimizing construction costs and traffic impacts during construction on the adjacent local roadways and freeway segments. To minimize traffic impacts, expedited bridge construction techniques are being considered with input from the Federal Highway Administration (FHWA) regarding additional funding for innovative projects and history on innovative project costs.

ADOT is currently planning to expand SR-101L from I-17 to Princess Drive to add one additional general-purpose lane (GPL) in each direction along SR-101L, which requires modifying portions of the adjacent ramps. The associated improvements between Scottsdale and Hayden Roads ultimately influence the geometry of the proposed Miller Road SR-101L crossing creating the need to accelerate the selection of a viable crossing alternative. ADOT is currently considering reprogramming this project using a Design-Build delivery method to fiscal year 2018, which begins July 1, 2017.

1.2 NEED FOR THE PROJECT

Congestion at the Scottsdale Road and Hayden Road SR-101L interchanges is projected to increase as vacant parcels north and south of SR-101L are packaged and auctioned off by ASLD. ASLD has had recent interest in the land north and south of SR-101L at this location from developers, accelerating the need for the construction of Miller Road from 76th Street to Princess Drive. The project area is projected to grow as a mixed use of high density residential, commercial, and industrial businesses which will add additional traffic to Scottsdale and Hayden Road to cross SR-101L if the Miller Road SR-101L crossing is not constructed.

1.3 ANALYSIS GOAL

The goal of this analysis is to determine the most cost effective, and least impactful construction alternative for the Miller Road SR-101L crossing.

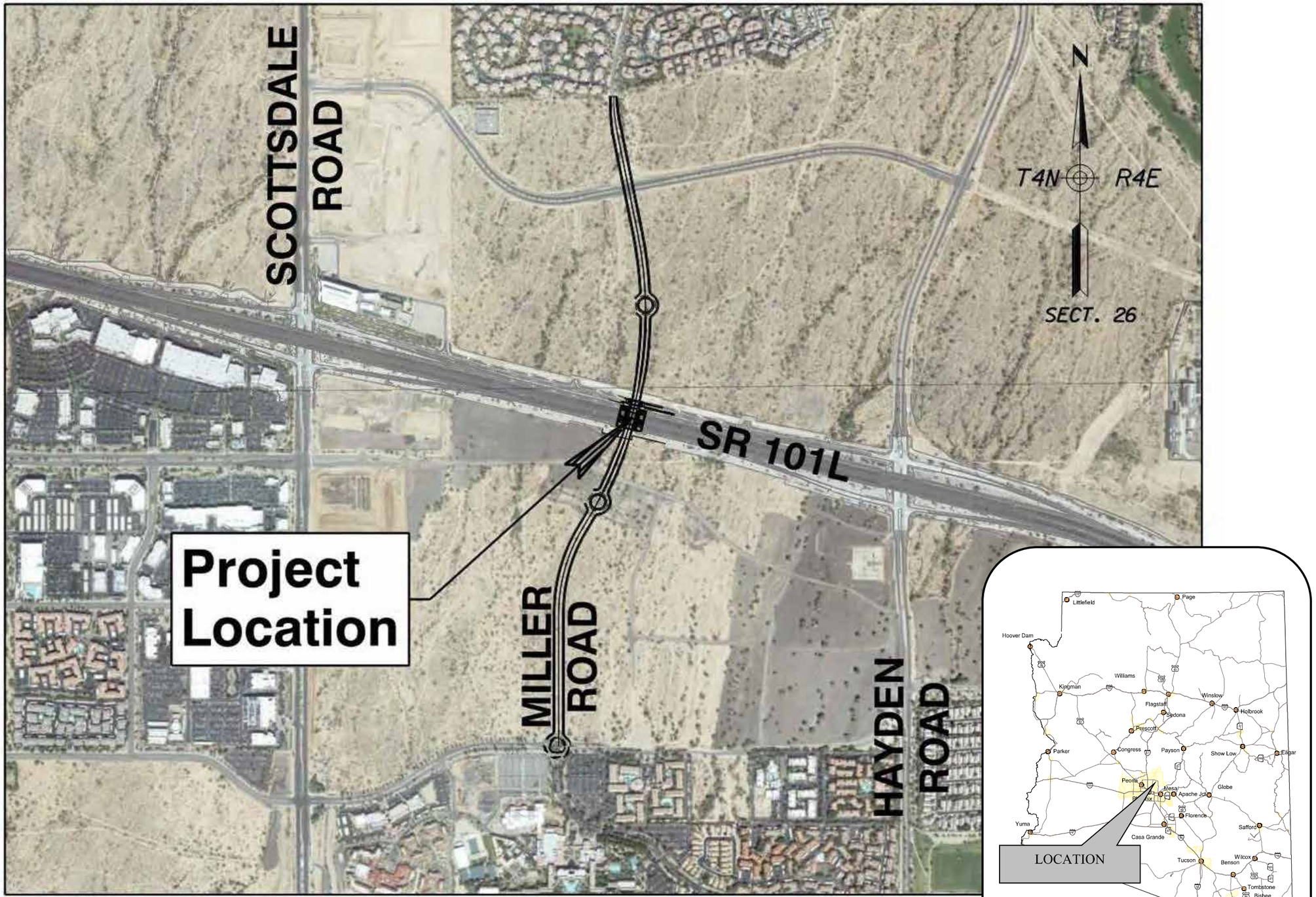


Figure 1.1 – Vicinity Map

2. PROJECT OVERVIEW

In response to recent discussions between COS and ADOT to add the Miller Road SR-101L crossing (see **Figure 2.1**) into the SR-101L GPL expansion project, this Construction Alternatives Analysis was established to determine the constraints for the contractor to build this crossing. The key constraints identified as part of this analysis include the construction cost, schedule, and traffic delays. Determining these constraints ultimately allows the COS to plan for the effects of potential freeway closures, project costs, and future development of the area.

Based on public commitments through Proposition 400, this analysis focused on developing a Miller Road SR-101L crossing solution that can be implemented with minimal disturbance to SR-101L. To set a baseline for comparison purposes, one of the build alternatives selected included conventional construction. The remaining alternatives were selected based on their potential to expedite the construction of the crossing using accelerated bridge construction (ABC) techniques.

2.1 THE ANALYSIS PROCESS

The Construction Alternatives Analysis was designed as a seven-step process to include stakeholder input throughout the analysis as outlined below:

- **Data collection –** Evaluate the existing site conditions including geotechnical characteristics, ADOT facility locations, traffic data, etc. Collect reference data including past reports and/or studies.
- **Initial Stakeholder Input -** Identify potential construction alternatives for the Miller Road SR-101L crossing overpass for discussion through a stakeholder workshop. Select four viable alternatives to be analyzed. Develop a list of analysis criteria. Develop a questionnaire to determine the relative importance of the criteria selected.
- **Alternative Development -** Develop four viable construction alternatives to a 15% design level for the Miller Road SR-101L crossing. Develop preliminary opinion of probable costs for each construction alternative. Develop preliminary construction phasing and maintenance of traffic (MOT) scenarios for each construction alternative.
- **Alternative Evaluation -** Evaluate impacts to SR-101L based on the selected construction alternatives to determine the best and worst case scenarios for each of the analysis criteria.
- **Final Stakeholder Input –** Communicate the findings of the alternative development and analysis through a second stakeholder workshop. Develop and distribute a questionnaire to rate the alternatives.
- **Alternative Selection –** Compile alternative ratings and apply relative importance factors to determine a final ranking of each alternative. Discuss the findings with the COS and prepare final recommendations to be communicated to the project stakeholders.
- **Report Preparation –** Compile all data into a comprehensive report for review and comment.

2.1.1 Baseline Analysis Assumptions

The following assumptions were considered to aid in the development of alternatives:

- The Miller Road SR-101L crossing will be an overpass (Miller Road under SR-101L).
- The profile of SR-101L will remain as constructed without adjustment.
- The Miller Road SR-101L crossing will be constructed with the ADOT GPL expansion project.
- The vertical alignment of Miller Road will be a sump condition as proposed in the 2016 MAG Alternatives Analysis Study.
- Encroachment onto ASLD parcels for the construction of the crossing during the ADOT GPL project is acceptable.
- Four lanes in each direction along SR-101L will be open for the majority of the duration of the crossing construction.
- Miller Road construction will be phased. Phase 1 will consist of constructing the crossing of SR-101L with the ADOT GPL expansion project. Phase 2 will consist of the City administering the construction of Miller Road between the end of 76th Street and Princess Road including any structural features not constructed with the ADOT SR-101L GPL expansion project.

2.1.2 Initial Analysis Criteria

Through coordination with COS, an initial list of analysis criteria was proposed to the project stakeholders as shown below.

- Constructability
- Need for a Specialty Contractor
- Risk
- Construction Safety
- Construction Quality Control
- Construction Cost of Alternative
- Future Maintenance Costs
- Drainage Impacts
- Existing Utility Impacts
- Environmental Impacts
- ADOT Facility Impacts
- Construction Schedule
- Additional Travel Time and Delays
- Motorist Safety
- Impact to Developable Land
- Aesthetics.

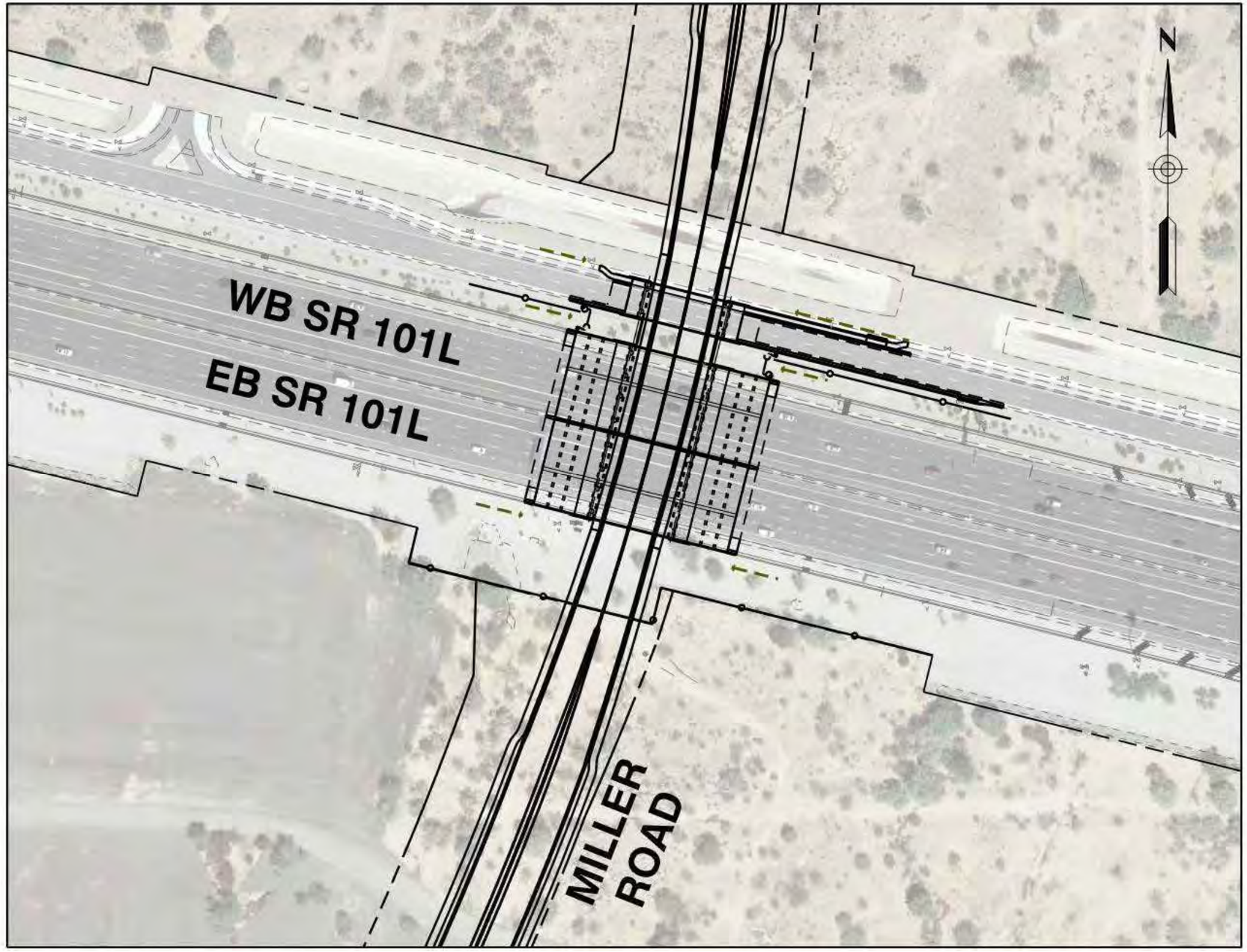


Figure 2.1 – Proposed Miller Road SR-101L Crossing (Alternative 1 Shown)

Project stakeholders were asked to rate each of the criteria based on their relative importance for this analysis. Results from the questionnaire that was distributed are provided in **Appendix A**. Upon reviewing the data with the COS, it was determined that some of the criteria could potentially be eliminated from consideration. After a further review of the criteria, it was determined that some of the criteria overlapped and that the criteria could be combined to effectively distribute the relative importance rantings. The final criteria and their relative importance (based on a 100 scale) are summarized below.

- **(33)** Constructability, Risk, Construction Safety, Motorist Safety
- **(26)** Construction Schedule, Utility Impacts, Additional Travel Time and Delays
- **(17)** Construction Cost, Need for a Specialty Contractor, ADOT Facility Impacts
- **(14)** Impacts to Developable Land, Drainage Impacts, Environmental Impacts, Aesthetics
- **(5)** Construction Quality Control
- **(5)** Future Maintenance Costs

2.2 CHARACTERISTICS OF THE PROJECT LOCATION

2.2.1 Existing Roadway

SR-101L near the study area has three GPL, one HOV lane, and an auxiliary lane in each direction. There are existing full access interchanges at Scottsdale Road to the west and Hayden Road to the east. The freeway is elevated over the at-grade cross streets at the interchanges, but transitions to only about eight feet above grade at the mid-mile point where the Miller Road SR-101L crossing is planned.

There is a two-lane westbound Frontage Road along the north side of SR-101L with right-in/right out local access points. The frontage road profile mimics the mainline profile.

Miller Road, within the study limits, is designated as a COS Major Collector, with two lanes and a bike lane in each direction and a two-way left turn lane separating the north and south travel directions. The facility is designed to have a five-foot landscape buffer and an eight-foot sidewalk.

North of SR-101L, Legacy Boulevard runs east-west between Scottsdale and Hayden Roads. Legacy Boulevard provides two lanes in each direction with striped bike lanes and a landscaped median. Local access north and south of Legacy Boulevard exists just east of Scottsdale Road as does an electric substation. An intersection with the alignment of Miller Road is already constructed at the midpoint of this section of roadway.

South of SR-101L, Princess Boulevard runs east-west between Scottsdale and Hayden Roads. Princess Boulevard west of the proposed Miller Road connection is two lanes in each direction with a landscaped median. East of the proposed connection, Princess Boulevard narrows to one lane in each direction eventually out-letting into a condominium development where the roadway weaves through parking lots and connects to Hayden Road with a right-in right-out intersection.

2.2.2 Existing Right-of-Way

Within the limits of the Miller Road SR-101L crossing, existing R/W along SR-101L is 400-feet wide positioned almost symmetrically on the SR-101L median (see **Figure 2.2**). The westbound frontage road between Scottsdale and Hayden Roads is contained within ADOT R/W.

North and south of SR-101L along the proposed Miller Road alignment all parcels are currently owned by ASLD. Legacy Boulevard and Princess Boulevard are within ASLD roadway easements.

2.2.3 Existing Drainage Characteristics

Offsite runoff from the Reatta Pass and Rawhide washes reach SR-101L through small tributary washes. The offsite runoff reaches SR-101L in a shallow sheet flow condition. Several box culverts are used to pass the offsite runoff under SR-101L. Peak discharges estimated during the initial SR-101L design were spread across the box culvert crossings. Soil cement lined channels capture and convey the runoff to the box culverts. Recently, a complex two-dimensional hydrologic and hydraulic model was completed with the COS, July 2013 Draft Pinnacle Peak South Area Drainage Master Study (ADMS). The ADMS was used to quantify runoff and flood hazards. The results of the ADMS indicate peak discharges much lower than the design peak discharges used for the box culvert designs. The ADMS model was used with this study to quantify the offsite runoff and determine the impacts at the new crossing. Refer to **Figure 2.3** for results from the modeling.

Figure 2.3 – Flow 2D Modeling Results

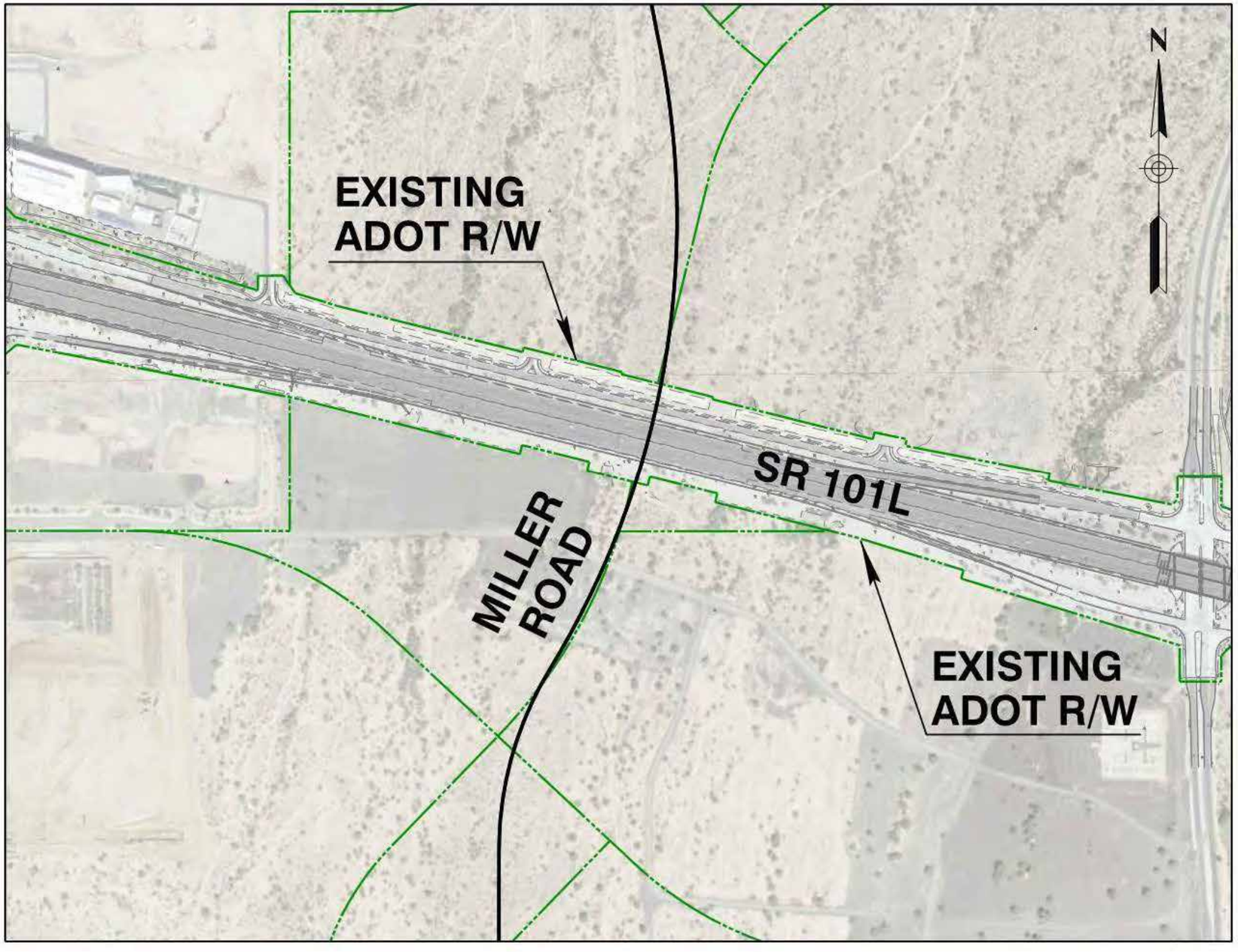


Figure 2.2 – Existing Right-of-Way

COS and ASLD recently completed the 2015 Crossroads East Infrastructure Design Concept Report (DCR) to determine regional flood control solutions to alleviate flooding in the area and provide outfalls for future developments. One future project planned in the area is the Miller Road channel. The Miller Road channel will convey runoff from the end of 76th Street to the two-barrel six-foot by six-foot box culvert west of the Miller Road crossing. The channel will continue south to Princess Boulevard. The channel will be lined with grouted riprap. In addition to development onsite runoff, the channel will also accept roadway runoff. Small storm drain systems will also discharge the roadway runoff into the channel.

2.2.4 Existing Topography

Most of the project area is undisturbed desert except for the previously constructed SR-101L improvements. The area has a gradient to the south of about 1.4% and all washes across and near the project area flow in that general direction.

2.2.5 Existing Land Use and Ownership

The land throughout the project limits is controlled by two main stakeholders, ADOT and ASLD. The land adjacent to the project area is undeveloped. Portions of the land within project limits have been graded for event parking with asphalt millings to prevent PM-10 dust emissions.

Based on the 2015 Crossroads East DCR prepared for the COS by TY Lin International, proposed land use varies throughout the limits of Miller Road between 76th Street and Princess Boulevard. North of Legacy Boulevard and south of the proposed Mayo Boulevard, land use is projected to be very high density residential. Between these points land use is projected to be general industrial (see **Figure 2.4**).

Table 2.1 lists parcels adjacent to the proposed Miller Road alignment. Property owners, parcel numbers, and zoning types are per the Maricopa County Assessor's database.

Table 2.1 – Parcels and Property Owners

Parcel Number	Owner	Zoning
215-07-014B	ARIZONA STATE LAND DEPARTMENT	Planned Commerce Development
215-07-015B	ARIZONA STATE LAND DEPARTMENT	Planned Commerce Development
215-07-006A	ARIZONA STATE LAND DEPARTMENT	Planned Commerce Development
215-07-209B	ARIZONA STATE LAND DEPARTMENT	Planned Commerce Development
215-07-012A	ARIZONA STATE LAND DEPARTMENT	Planned Commerce Development
212-36-015	ARIZONA STATE LAND DEPARTMENT	Planned Commerce Development
212-31-120	ARIZONA STATE LAND DEPARTMENT	Planned Commerce Development
212-36-014	ARIZONA STATE LAND DEPARTMENT	Planned Commerce Development
212-36-008	ARIZONA STATE LAND DEPARTMENT	Planned Commerce Development
212-36-009	ARIZONA STATE LAND DEPARTMENT	Planned Commerce Development
212-36-010	ARIZONA STATE LAND DEPARTMENT	Planned Commerce Development

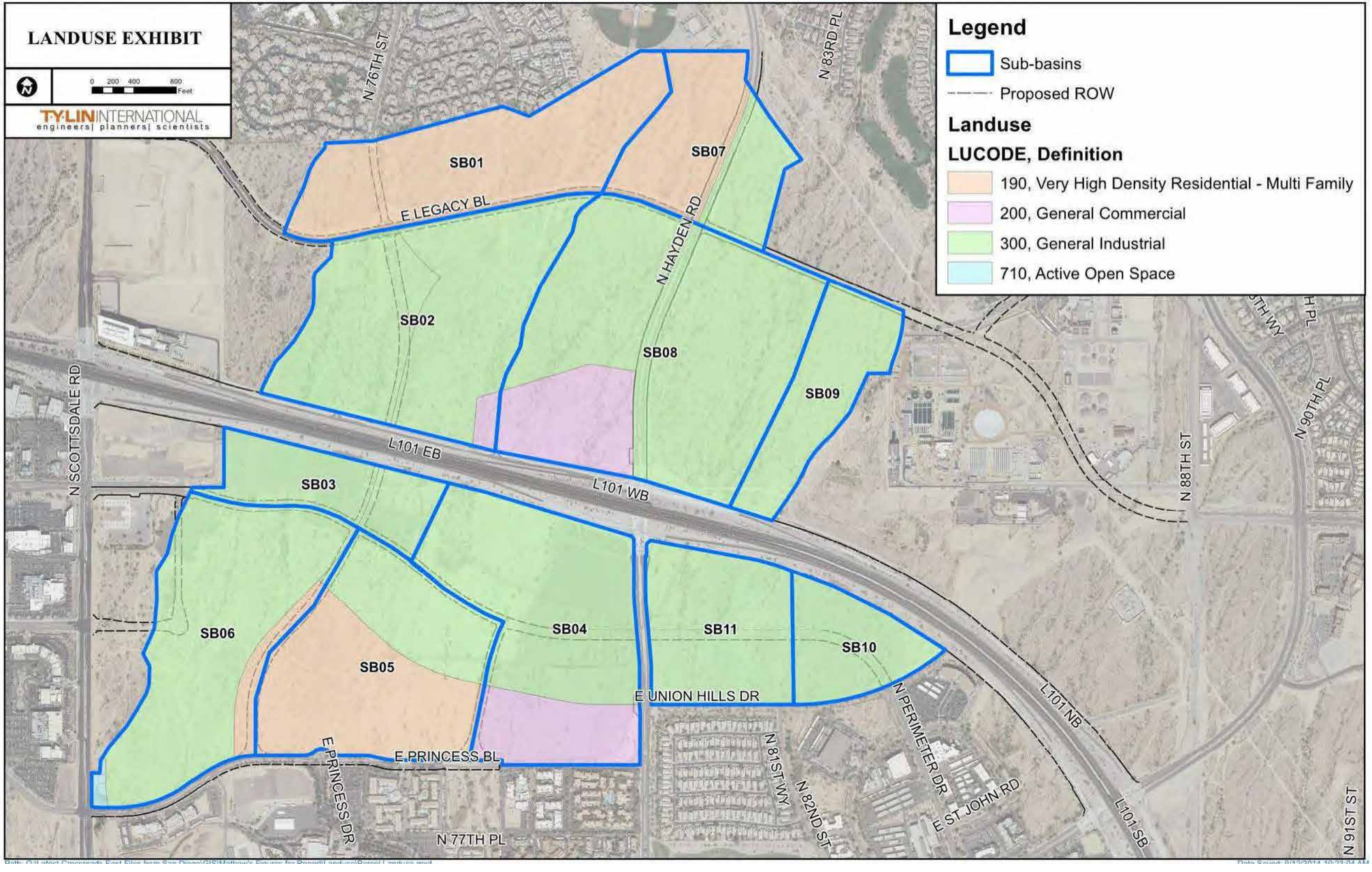


Figure 2.4 – Proposed Land Use Map

2.2.6 Existing Typical Section and Lane Configuration

SR-101L consists of three 12-foot GPL, one HOV lane and one Auxiliary lane in each direction. A concrete median barrier separates each direction. The existing inside and outside shoulders are 10-feet wide as shown below in **Figure 2.5**.

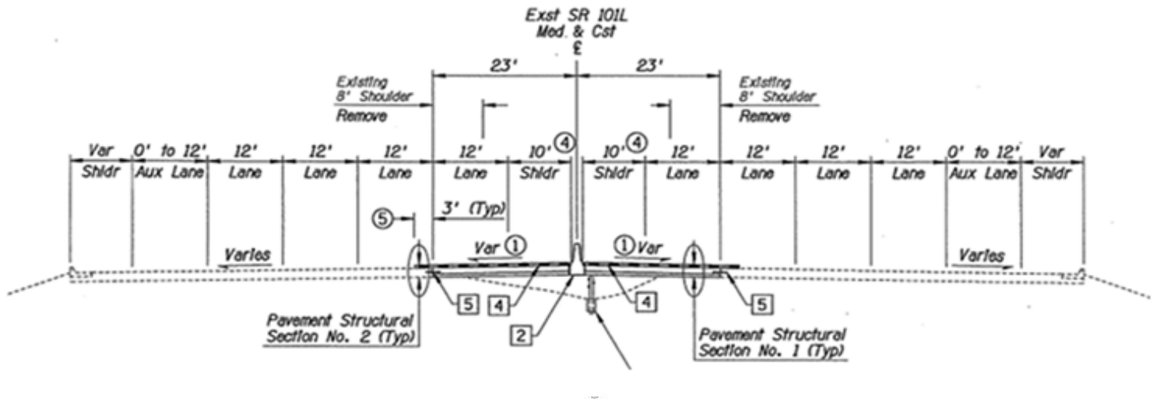


Figure 2.5 – Existing SR-101L Typical Section

This proposed segment of Miller Road is designated as a COS Major Collector in the Transportation Master Plan approved February 2007. Therefore, it will have two lanes and a bike lane in each direction, a two-way left turn lane separating the directions, a five-foot landscape buffer, and an eight-foot sidewalk requiring 100 feet of R/W as shown below in **Figure 2.6**.

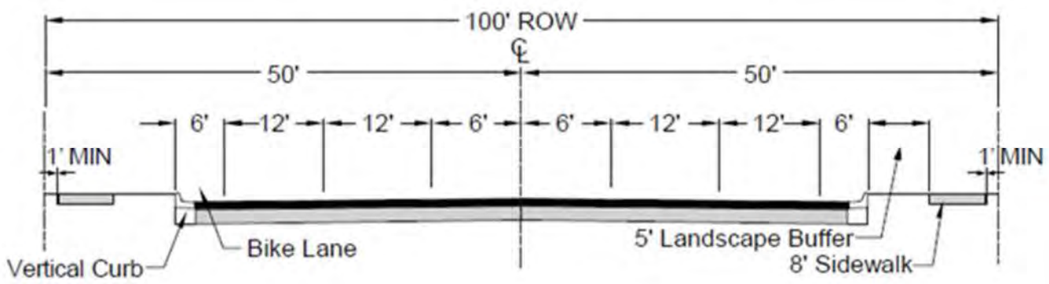


Figure 2.6 – Planned Miller Road Typical Section

The existing WB Hayden Road to Scottsdale Road frontage road consists of two 12-foot through lanes with a 4-foot paved shoulder on the north side of the roadway. Along the north side of the roadway there is a detached 4-foot sidewalk and soil cement lined channel as shown in **Figure 2.7**.

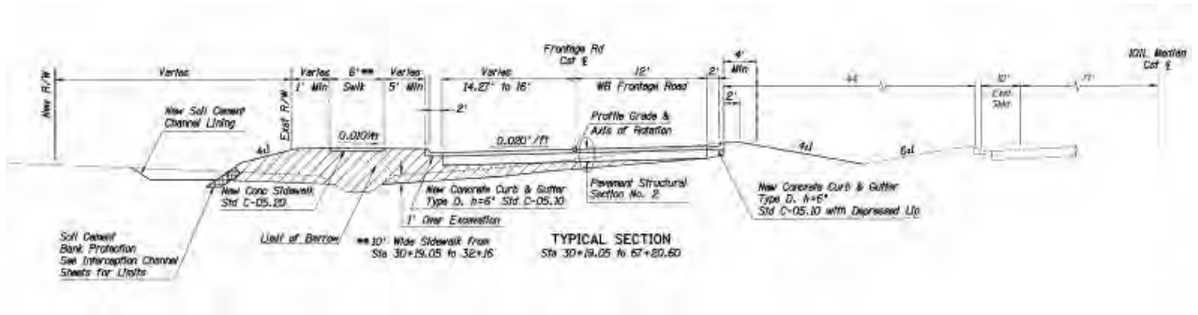


Figure 2.7- SR-101 WB Frontage Road Typical Section

2.2.7 Existing Utility Improvements

The existing utility improvements within the project limits were determined by submitting a Request for Information from Arizona Blue Stake. The request identified several utility owners within the project limits as shown in Table 2.2:

Table 2.2 – Existing Utilities

Utility Owner	Facility Type	Contact	Phone Number	Anticipated Conflict Status
ADOT	Electric, Fiber, Gas, Irrigation, Lighting, Propane, Sewer, Storm Drain, Telephone, Traffic Signals, Water	Scott Vollrath	602-568-3284	Conflict
AT&T	Coaxial, Fiber	Eric Nowicki	480-510-8107	No conflict
APS	Electric	TBD		Potential Conflict
Century Link	Coaxial Cable, Fiber Optic	Jaeger Moore	602-630-1885	Potential Conflict
City of Scottsdale	Reclaimed Water, Sewer, Water	Chris Hassert	480-312-5681	Potential Conflict
Cox Communications	CATV, Fiber Optic	TBD		No conflict
Crown Castle Solutions Corp	Fiber Optic	Rebecca Caldwell	724-416-9917	No facilities
Integra Telecom	Fiber Optic	Matt Burke	480-257-7714	No facilities
Southwest Gas	Gas, High Pressure Gas	Aaron Newell	602-763-9018	No facilities

There are existing utility sleeves for COS sewer, COS Water and a utility duct bank located under the SR-101L near Station 1886+50 that run north-south from R/W line to R/W line. It is assumed these utility crossings are vacant and for future development use to allow utilities to cross SR-101L.

A field review of the proposed project site was also conducted. The site visit revealed an existing groundwater monitoring well located just south of the ADOT R/W within the limits of the ultimate Miller Road footprint. It was determined that COS is the owner/operator of this groundwater monitoring well. COS Water Resources Planning and Engineering Department was consulted and it was determined that the groundwater monitoring well is no longer being used by COS and can be abandoned if necessary.

ADOT has active Freeway Management System (FMS) infrastructure and devices within the project limits. The FMS trunk line fiber optic cable runs along the north side of SR-101L only. FMS branch fiber optic cabling and device power conductor cabling exist along the south side of SR-101L at various locations. Critical FMS communications networks travel along the trunk line fiber optic cable, like node-to-node communications, which are required to keep the FMS operational. With the existing trunk line fiber optic cable located only on one side of SR-101L, the FMS within the project limits has limited redundancy (i.e. no communications ring topology like what exists when trunk line fiber exists on both sides of a freeway) to maintain the FMS if the trunk line fiber is damaged. Several FMS devices are located near the project limits including a Dynamic Messaging System (DMS) board just west of the proposed Miller Road alignment.

2.2.8 Existing Traffic Control Assumptions

The Miller Road SR-101L crossing will be constructed with ADOT's SR-101L GPL expansion project, which may initially shift traffic to the inside of SR-101L creating a widened work zone on the outsides of the freeway. To reset traffic, ADOT will need to close eastbound and westbound traffic at the onset of the project to restripe the roadway and set temporary construction barriers. At the end of the project, ADOT will need to close both directions one final time to remove the temporary construction barriers and restripe the roadway to its ultimate condition. In addition, ADOT will need to close both the Scottsdale and Hayden Roads' on and off ramps during construction to tie in the widened GPL pavement to the existing ramps.

2.2.9 Existing Structures

Existing SR-101L overpasses at Scottsdale and Hayden Roads will be widened with ADOT's proposed GPL expansion project. There is not an existing bridge at this crossing location; however, a new bridge will be constructed as part of this project. The new bridge will be constructed at grade with SR-101L over the proposed Miller Road Alignment.

2.3 CONTROLLING DESIGN CRITERIA

There is no existing crossing at the Miller Road alignment. The SR-101L overpass at Miller Road is being designed with minimal impact to existing SR-101L and will be constructed with the proposed GPL widening construction project.

American Association of State Highway and Transportation Officials (AASHTO) controlling design criteria evaluation is not used since the Miller Road SR-101L crossing is a new overpass.

2.3.1 Development of Design Criteria and Constraints

The design criteria for the project were determined using the following design standards:

- ADOT Roadway Design Guidelines (RDG), 2014 Revision to the 2012 Edition
- COS Design Standards & Policies Manual (DSPM), January 2010 Edition
- AASHTO Policy on Geometric Design of Highways and Streets, 2011, 6th Edition
- AASHTO Roadside Design Guide, 2011, 4th Edition

2.3.2 Design Criteria and Constraints

The design criteria were developed in coordination with COS at the project kickoff meeting on April 7, 2017 and through email correspondence following the meeting. The following design criteria were used for Miller Road:

- **Design Speed:** 35-mph
- **Minimum Lane Width:** 11 feet
- **Bike Lane Width:** 6 feet to face of curb
- **Minimum Sidewalk Width:** 8 feet
- **Minimum Vertical Clearance for Roadway:** 16.5 feet
- **Minimum Vertical Clearance for Sidewalk:** 8.5 feet (10 feet preferred)
- **Maximum Grade:** 10 percent
- **Minimum Grade:** 0.4 percent
- **Minimum Taper Rate:** Speed to 1

The following design criteria were used for the SR-101L mainline detours:

- **Design Speed:** 55-mph
- **Minimum Lane Width:** 11 feet
- **Minimum Shoulder Width:** 2 feet to face of temporary concrete barrier

The following design constraints were established for this study:

- Miller Road will be designed to pass under the SR-101L.
- The vertical profile of Miller Road shall be optimized to catch grade as soon as possible to minimize impacts to adjacent ASLD parcels.
- A raised median or center turn lane is not necessary at the SR-101L crossing (i.e. between the proposed roundabouts).
- A 12-foot center turn lane will be included outside of the SR-101L crossing (i.e. north and south of the proposed roundabouts).
- Sidewalk will be included on both sides of Miller Road.
- Bike lanes will be included on both sides of Miller Road.
- Sidewalk will be separated from the roadway by a landscape buffer where possible. At the SR-101L crossing, the sidewalk may be placed adjacent to the roadway but shall be elevated/separated by barrier.
- Consecutive traffic interchange (TI) closures will not be allowed

3. CONSTRUCTION ALTERNATIVES

The purpose of this Construction Alternatives Analysis report is to identify and evaluate alternatives to provide a cost effective, low impact construction technique for the proposed Miller Road SR-101L crossing. The proposed improvements to existing SR-101L will involve construction of a new crossroad crossing. Miller Road is not programed as a full traffic interchange. The analysis of the alternatives is intended to analyze both the interim (during construction) and ultimate (post construction) impacts and costs.

Recommendations presented within this report were determined through the development, selection and analysis of four main alternatives. Factors considered in the determination of the alternatives include, but are not limited to: geometrics, impacts to existing SR-101L infrastructure, impacts to SR-101L level of service and travel delays, R/W requirements, impacts to the environment, required drainage improvements, utility locations, constructability, risk, traffic control, connectivity, and cost.

3.1 FACTORS IMPACTING ALTERNATIVE DEVELOPMENT

Several factors impacted the development of viable alternatives for the project. The crossing is being constructed as part of the ADOT SR-101L GPL expansion project from I-17 to Princess Boulevard. The location of the crossing is centered between Scottsdale and Hayden Roads, which restricts the geometry of temporary ramp connections.

Existing terrain features also restrict the crossing design. The terrain immediately south of the SR-101L is substantially lower than the north side which affects the ability to construct temporary widening to facilitate phased construction.

3.1.1 Horizontal Alignment

The proposed Miller Road horizontal alignment shown in **Figure 3.1** was developed from analyzing existing constraints, starting with the existing SR-101L profile and existing features of the SR-101L that should be protected in place. Between Scottsdale and Hayden Roads, the existing profile of SR-101L rises to a crest about half-way between the existing traffic interchanges. This was determined to be an ideal location to locate an overpass as it would minimize the excavation required to construct the Miller Road SR-101L crossing. Major physical constraints include the ADOT DMS board and a utility duct bank which crosses the SR-101L just east of the ADOT DMS board. Both constraints were found to be in the same general location of the high point of SR-101L.

Two baseline alignments were also used to develop the proposed alignment for this alternatives analysis. In 2015, ASLD had previously set a preliminary alignment to locate Miller Road to complement future development. In 2016, the previously completed MAG study located the alignment east of the ASLD alignment based on a 45-mph design speed. Utilizing these two alignments as the baseline, additional coordination with the COS initially confirmed an acceptable design speed of no greater than 40-mph, ultimately accepting 35-mph, which allows additional flexibility in the placement of the Miller Road alignment.

The final constraint used to determine the location of the alignment was the Flow 2D analysis completed to assess the capacity of the existing box culverts east and west of the assumed alignment location. The Flow 2D analysis provided insight to where overland flow from the Reatta Pass and Rawhide washes inundate the existing topography north and south of SR-101L.

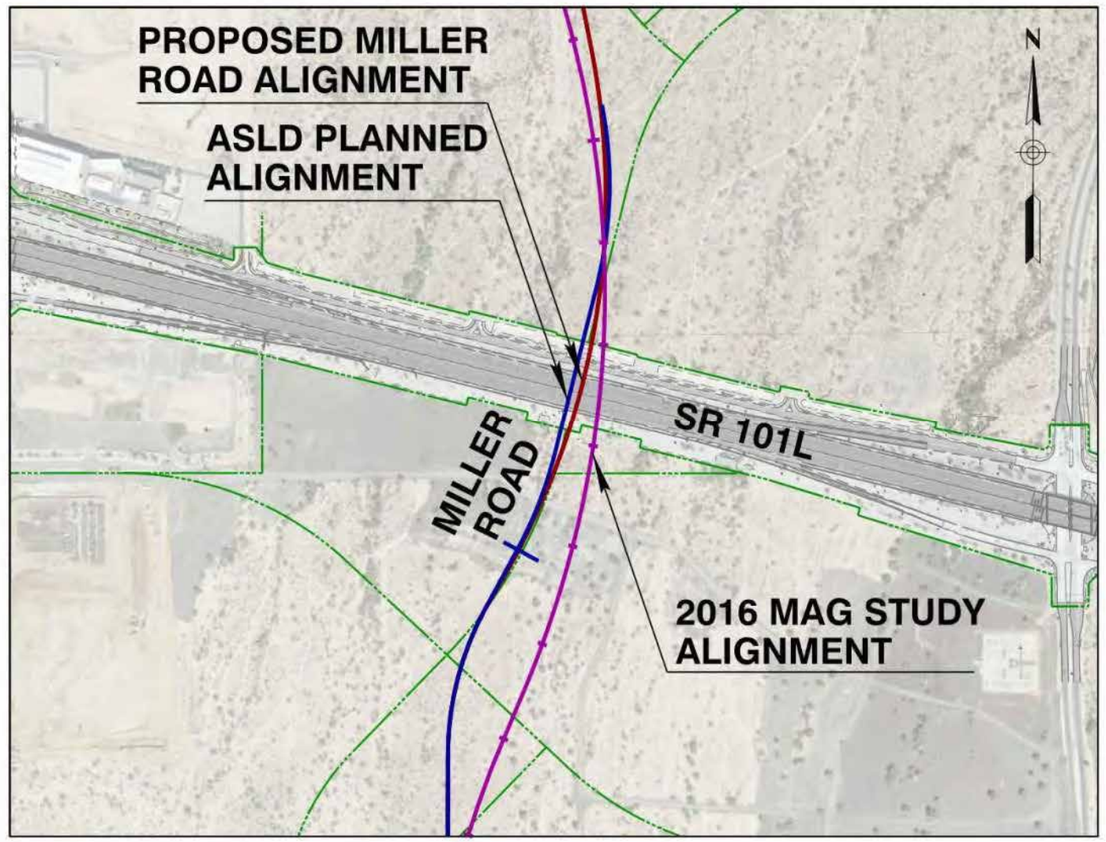


Figure 3.1 – Horizontal Alignment Comparison

After analyzing these constraints, a best fit alignment was developed to tie into future roundabouts approximately 1,000 feet to the north and 800 feet to the south of SR-101L, the existing Legacy Boulevard intersection to the north and the Princess Boulevard roundabout to the south. Ultimately the alignment was shifted west from the 2016 MAG study alignment protecting in place the ADOT DMS structure and future utility crossings. The alignment utilizes a 35-mph design speed with a 3,730-foot radius curve, which does not require super elevation of the roadway.

3.1.2 Typical Section

The typical section for each alternative was developed based on the limitations of the structure types and in coordination with COS. Modifications to the COS standard major collector typical section include:

- Utilizing 11-foot lanes at the SR-101L crossing to minimize the width of the crossing
- Replacing the outside curb and gutter with a half barrier to provide positive protection for pedestrians from adjacent vehicular traffic

- Raising the sidewalks to the top of the proposed half barrier to increase the separation between pedestrians and vehicular traffic and minimize excavation
- Eliminating the landscaped buffers at the SR-101L crossing to minimize the width of the crossing
- Eliminating the two-way center turn lane at the intersection of SR-101L to minimize the width of the crossing

Outside of the crossing, the Miller Road typical section is assumed to revert to the COS standard major collector typical section.

The typical section for SR-101L used for this construction alternatives analysis was developed based on the April 2016 ADOT SR-101L GPL expansion project Design Concept Report drawings. The SR-101L GPL expansion project will add an additional 12-foot lane in each direction of travel as depicted below in **Figure 2.7**.

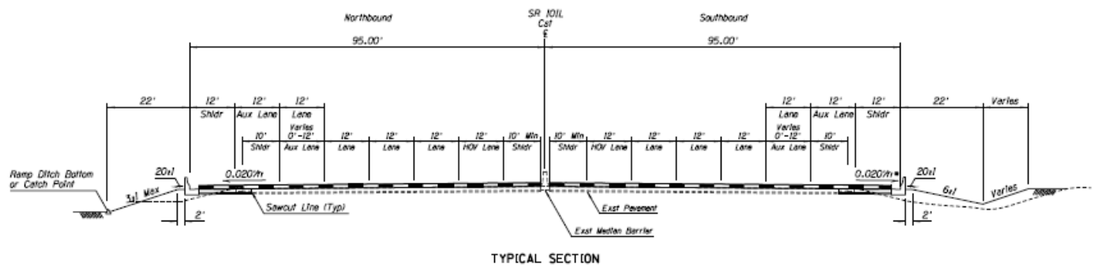


Figure 2.7- Proposed SR-101L GPL Expansion Project Typical Section

3.1.3 Existing Traffic Volumes and Modeling

Current Weekday AM, Weekday PM, and Weekend Mid-Day (MD) peak hour traffic volumes were obtained for the study area roadway network from the following sources:

- ADOT Transportation Data Management System (TDMS) website (azdot.gov/planning/DataandAnalysis) was used to obtain recent Weekday AM, Weekday PM, and Weekend MD SR-101L mainline and ramp volumes at the Scottsdale Road and Hayden Road TIs on multiple days.
  - These volumes were analyzed to identify peak hour volumes and time periods and to develop adjustment factors that could be applied to convert Weekday AM peak hour volumes into Weekday PM and Weekend MD (mid-day) peak hour volumes at locations where such volume data was not available.
  - The Weekday PM peak hour volumes were found, on average, to be 23 percent higher than the Weekday AM peak hour volumes.
  - The Weekend MD peak hour volumes were found, on average, to be 33 percent lower than the Weekday AM peak hour volumes.
- COS provided recent Weekday AM and Weekday PM traffic count data for the study area intersections along Scottsdale Road/SR-101L South (EB Ramps), SR-101L North (WB Ramps), Henkel Way, and Legacy Boulevard.
  - These traffic counts were analyzed to identify the Weekday AM and Weekday PM peak hour volumes.
  - Weekend MD volumes were estimated using the adjustment factor developed from the ADOT TDMS website volumes.
- Manual traffic counts were conducted at the Hayden Road/SR-101L and Hayden Road/SR-101L North intersections for a 15-minute period within a typical Weekday AM peak hour.
  - The 15-minute traffic counts were multiplied by a factor of four to approximate Weekday AM peak hour volumes.
  - Weekday PM peak hour volumes were developed as the inverse movements of the Weekday AM peak hour volumes (e.g., southbound left-turn volumes at the SR-101L South intersection in the Weekday AM would become westbound right-turn volumes at the SR-101L North intersection in the Weekday PM) with the adjustment factor developed from the ADOT TDMS website volumes.
  - Weekend MD peak hour volumes were developed as the average of the Weekday AM and Weekday PM volumes with the adjustment factor developed from the ADOT TDMS website volumes
- The Hayden Road/Legacy Boulevard intersection peak hour volumes were estimated based on the volume data available at adjacent intersections and the adjustment factors developed from the ADOT TDMS website volumes

Traffic modeling existing condition volumes are provided in **Appendix B.**

3.2 CONSTRUCTION ALTERNATIVES CONSIDERED

Development of alternatives was focused on accommodating the Miller Road SR-101L crossing as part of the ADOT GPL expansion project. At the first stakeholder workshop, multiple alternatives were presented and discussed. The following is a brief description of the alternatives and initial input received from the project stakeholders:

Conventional Bridge Construction*:* Eastbound and westbound SR-101L structures would be constructed using a phased approach building the outside of each structure first then shifting traffic onto the newly completed structure to allow for the construction of the inside of the structure. The proposed structure would be a cast-in-place box girder bridge to minimize structure depth and cost.

Bridge Slide: North and south of the SR-101L existing embankment, cast-in-place box girder bridges would be constructed on soffit fill and temporary substructures. Drilled shaft foundations would be constructed within the existing roadway under weekend closures. Once complete, each side of the structure would be slid into place under a weekend directional closure of SR-101L.

Prefabricated Bridge Elements: Under directional closures of SR-101L precast bridge elements would be trucked in and lifted into place to assemble the bridge in sections.

This alternative was given additional consideration but was eliminated from further consideration due to the potential maintenance issues with numerous closure pours due to the width of the bridge and bridge joints necessary to construct the bridge.

Self-Propelled Modular Transport: The full Miller Road crossing structure would be constructed offsite and moved into place using a self-propelled modular transport. The bridge installation would be completed under a full closure of SR-101L.

When physical constraints do not allow for a structure to be built offline adjacent its permanent location, self-propelled modular transports are typically used to transport a preassembled structure from an offsite construction yard further away. Since ample space is available to accomplish a bridge slide, which is a more cost-effective technique that relies on construction close to the permanent location, the modular transport alternative was eliminated from further consideration.

Precast Segmental Arch: North and south of SR-101L the roadway profile of Miller Road would be excavated to allow the assembly of precast arch segments. To complete the center sections of arch segments SR-101L traffic would be shifted to the outside of SR-101L on temporary pavement to allow for an inside work zone.

Three-Sided Box Slide: North and south of SR-101L the roadway profile of Miller Road would be excavated to construct a three-sided box structure offline of traffic. Once the box construction was complete each side of the box would be slid into place under a weekend directional closure of SR-101L.

Precast Box Culvert Jacking: Jacking and receiving pits would be excavated on both sides of SR-101L and jacks would be installed within the receiving pit. Precast segments of a box culvert would be lowered into the jacking pit and matched to a cutting shield. The jacks would be extended, pushing the box culvert sections into the cutting shield one by one. As the box sections and cutting shield are pushed into the embankment under SR-101L the embankment would be excavated from within the box culvert sections. The entire box culvert would be jacked into the SR-101L under live traffic.

After further discussions with representatives from ADOT's Central District and Structures Group this alternative was eliminated from further consideration due to unknowns with jacking under live traffic.

Tunneling: Launch and receiving pits would be excavated on both sides of SR-101L and a tunnel boring machine would be lowered into the launch pit. The tunnel boring machine would tunnel under live traffic securing the tunnel as the excavation occurs.

Tunneling was considered cost prohibitive by the stakeholders and eliminated from further consideration.

3.2.1 Construction Alternatives (Selected for Further Evaluation)

After additional discussions with COS and ADOT, four initial alternatives were selected for further evaluation. Each alternative was detailed to a 15% design level to determine key parameters to size structures, determine R/W impact, and estimate probable costs.

- Alternative 1 – Conventional Bridge Construction
- Alternative 2 – Bridge Slide
- Alternative 3 – Three-Sided Box Slide
- Alternative 4 – Precast Arch

After the initial draft of this report was released, Alternative 1A was added to the analysis. Alternative 1A is identical to Alternative 1 except for the addition of retaining wall construction inside ADOT's R/W. Alternative 1 assumed only partial retaining walls would be constructed to an interim depth just below the abutment cap whereas Alternative 1A will construct the retaining walls to the ultimate depth to the greatest extent possible within ADOT's R/W.

3.3 EVALUATION OF ALTERNATIVE

The evaluation of alternatives was based on the issues, concerns, and opportunities gathered during the analysis phase, as well as, criteria established by the project team. In addition, concerns and questions regarding each alternative at the workshops were considered. The summary of the evaluation is presented in Table 3.2.

The comparison of the alternatives consisted of analyzing the benefits of conventional bridge construction compared to the benefits of accelerated bridge construction techniques.

Table 3.1 - Alternative Evaluation Matrix

EVALUATION CRITERIA	ALTERNATIVE 1 CONVENTIONAL BRIDGE *Cast In Place Box Girder Bridge*	ALTERNATIVE 2 BRIDGE SLIDE *Box Girder Bridge*	ALTERNATIVE 3 BOX SLIDE *Cast-In-Place Three-Sided Box*	ALTERNATIVE 4 ARCH *Precast Arch Structures*
Constructability / Risk / Construction Safety / Motorist Safety	• Ingress and egress from median duration = 107 days (Longest) • Temporary pavement widening along SR101L is needed for construction phasing = 42,125 SF (Most) • Common construction techniques for bridge elements represent little risk • Minimal impact to north side channel during construction allows positive drainage protection • Minimal excavation needed under structure • Bridge constructed on soffit fill • Soffit fill does not need to be fully excavated at project completion which reduces equipment size • Work zone is fully protected by continuous temporary construction barrier • DMS Structure is not impacted by construction allowing messaging for construction as needed • Relocation of FMS prior to bridge construction is not necessary, FMS can be routed within structure eliminating the need for deep boring • Shoulder width on structure in ultimate construction reduced from 10-feet to 9.5-feet • Tight median work zone for bridge construction • Limited offset from traffic to work zone in all phases • Ingress and egress from median during inside bridge construction • Separate bridges for eastbound and westbound require wider median barrier width reducing ultimate shoulder widths • Multiple traffic shifts necessary to construct approach slabs • Tight work zone based on closure pour location restricts shoulder widths • Longer durations with narrowed lanes and shoulders • Light pole on bridge structure requires blister or light pole spacing needs to be adjusted to allow lighting to be relocated	• Ingress and egress from median duration = 23 days (Shortest) • Temporary pavement widening along SR101L is needed for construction phasing = 37,001 SF (Least) • Common construction techniques exclusive of slide • Minimal impact to north side channel allows positive drainage protection • Minimal excavation needed under structure • Bridge constructed on soffit fill • Entire width of structure for each direction of traffic built as one continuous structure • Majority of construction completed offline of traffic • Reduced median construction, reduces construction ingress and egress from median • Entire eastbound and westbound structures built offline • DMS Structure is not impacted by construction allowing messaging for construction as needed • FMS relocation must be bored under Miller Road profile depth, Boring Depth = 28 Feet • Shoulder width on structure in ultimate construction reduced from 10-feet to 9.5-feet • Tight median work zone for approach and anchor slabs • Construction/slide closures are more susceptible to weather impacts • Drilled shafts, temporary pavement and GPL MOT need to be constructed over weekend closures • Sliding structure adds complexity -Construction of integral abutment/sliding beams -Falsework necessary for slide -Shoring at abutment ends -Approach/anchor slab phased construction -Tight timeframe to complete slide over a weekend -Sliding is not a typical construction technique • Long hours lead to fatigue over weekend closures • Reduced visibility during night work will require temporary lighting which could distract drivers and potentially reduce safety for workers • Light pole on bridge structure requires blister or light pole spacing needs to be adjusted to allow lighting to be relocated	• Ingress and egress from median duration = 23 days (Shortest) • Temporary pavement widening along SR101L is needed for construction phasing = 38,680 SF (2nd Most) • Common construction techniques for cast-in-place box structure exclusive of slide • Majority of construction completed offline • Full median shoulder widths can be provided • Standard PCCP in lieu of approach and anchor slabs • Only one joint is necessary within the structure • Tensioning structure is not necessary • Tight median work zone for box slide and PCCP replacement • Existing DMS foundation must be shored to protect in place • FMS relocation must be bored under Miller Road profile depth, Boring Depth = 32 Feet • Significant work required over weekend closure - Install 30'+/- tall temporary shoring - 30' excavation - Slide heavy box over long distance - Significant backfill requirements - Construction of temporary AC pavement • Construction/slide closures are more susceptible to weather impacts • Matching boxes at joint requires precision sliding • Long hours lead to fatigue • Reduced visibility during night work will require temporary lighting which could distract drivers and potentially reduce safety for workers • Multiple traffic shifts necessary to reconstruct PCCP • HOV lane closures needed to complete slide • Sliding is not a typical construction technique • During storm events pumping of temporary excavation area may be necessary • Straight box structure requires construction of additional opening width requiring additional excavation• Existing light pole in conflict can be removed and reconstructed in the same location	• Ingress and egress from median duration = 30 days (2nd Shortest) • Temporary pavement widening along SR101L is needed for construction phasing = 37,001 SF (Least) • Curing time not necessary for precast components • Expedited median construction reduces closures for PCCP replacement • Full median shoulder widths can be provided • Standard PCCP in lieu of approach and anchor slabs • Tensioning structure is not necessary • Uniform components are easily cast • FMS relocation must be bored under Miller Road profile depth, Boring Depth = 37 Feet • Existing DMS foundation must be shored to protect in place • Manageable sized components allow lighter crane picks and are easier to set in place • No false work is required • Least amount of formwork to be constructed • Significant temporary shoring during weekend closure • Reduced visibility during night work will require temporary lighting which could distract drivers and potentially reduce safety for workers • Horizontal curve requires tapered precast components • Tight median work zone to complete center of arch • Closure pour necessary to complete arched structure requires forming • Lead time for arched structure forms and casting • Leveling of precast footings will require precision • Structure type is not typical for ADOT overpasses and may require special approval • Tight schedule for completing center section of arch to reduce duration of HOV lane closure • Median closure for construction • HOV lane closure reduces capacity • During storm events pumping of temporary excavation area may be necessary • Existing light pole in conflict can be removed and reconstructed in the same location
Construction Schedule / Additional Travel Time and Delays / Utility Impacts	• Construction Duration = 205 days (Longest, Construction ends on 10/27/2019 after Scottsdale event season begins) • Does not impact overall GPL construction schedule • Total Travel Delay = 365,488 hours (Lowest) • Directional Weekend Closures = 3 (Lowest) • Ramp Closure Duration = 102 days (2nd Lowest) • HOV Closure Duration = 0 (Lowest) • Frontage Road Closure Duration = 89 days (Lowest) • No additional delay to mainline SR101L in comparison to GPL construction	• Construction Duration = 170 days (2nd Longest, Construction ends on 9/22/2019 before Scottsdale event season begins) • Reduces construction duration of a bridge by 35 days • Total Travel Delay = 568,652 hours (Highest) • Directional Weekend Closures = 4 (Highest) • Ramp Closure Duration = 130 days (Highest) • HOV Closure Duration = 2 days (2nd Lowest) WB = LOS B/C --> LOS C • Frontage Road Closure Duration = 161 days (Highest)	• Construction Duration = 142 days (2nd Shortest, Construction ends on 8/25/2019 before Scottsdale event season begins) • Travel Time Delay = 469,732 hours (2nd Highest) • Directional Weekend Closures = 4 (Highest) • Ramp Closure Duration = 123 days (2nd Highest) • HOV Closure Duration = 7 days (2nd Highest) EB = LOS C/D --> LOS E, WB = LOS C/D --> LOS F • Frontage Road Closure Duration = 110 days (2nd Highest)	• Construction Duration = 121 days (Shortest, Construction ends on 8/4/2019 before Scottsdale event season begins) • Travel Time Delay = 398,326 hours (2nd Lowest) • Directional Weekend Closures = 3 (Lowest) • Ramp Closure Duration = 95 days (Lowest) • HOV Closure Duration = 19 days (Highest) EB = LOS C/D --> LOS E, WB = LOS C/D --> LOS F • Frontage Road Closure Duration = 91 days (2nd Lowest)

Table 3.1 - Alternative Evaluation Matrix

EVALUATION CRITERIA	ALTERNATIVE 1 CONVENTIONAL BRIDGE *Cast In Place Box Girder Bridge*	ALTERNATIVE 2 BRIDGE SLIDE *Box Girder Bridge*	ALTERNATIVE 3 BOX SLIDE *Cast-In-Place Three-Sided Box*	ALTERNATIVE 4 ARCH *Precast Arch Structures*
Construction Cost / Need for Specialty Contractor / ADOT Facility Impacts	• Construction Cost = $6,120,000 (Lowest) -Roadway = $565,000 (Lowest) -Structure = $2,752,000 (Lowest) -Traffic Control = $408,000 (2nd Lowest) • Specialty subcontractor is not necessary • Most impacts along mainline freeway are equivalent to what is anticipated for GPL construction • Existing median light pole will need to be mounted in the bridge barrier reducing the shoulder width • Temporary lighting will be needed to remove existing median light pole	• Construction Cost = $7,748,000 (2nd Lowest) -Roadway = $713,000 (2nd Lowest) -Structure = $3,431,000 (2nd Highest) -Traffic Control = $494,000 (2nd Highest) • Most impacts along mainline freeway are equivalent to what is anticipated for GPL construction • Specialty bridge slide subcontractor will be necessary • Temporary lighting will be needed to remove existing median light pole	• Construction Cost = $9,263,000 (Highest) -Roadway = $993,000 (2nd Highest) -Structure = $4,043,000 (Highest) -Traffic Control = $541,000 (Highest) • Existing high mast light pole can be replaced in kind at existing location • Specialty box slide subcontractor will be necessary • FMS relocation will need to be constructed/bored under box slide location • Temporary excavation overlaps with DMS foundation • Temporary lighting will be needed to remove existing	• Construction Cost = $8,140,000 (2nd Highest) -Roadway = $1,131,000 (Highest) -Structure = $3,426,000 (2nd Lowest) -Traffic Control = $347,000 (Lowest) • Setting of precast elements is common • Existing high mast light pole can be replaced in kind at existing location • Arch structure will require precasting subcontractor • FMS relocation will need to be constructed/bored under excavation pit • Temporary excavation overlaps with DMS foundation
Impact to Developable Land / Drainage Impacts / Environmental Impacts / Aesthetics	• Profile Low Point Elevation = 1589.61 (Shallowest) • Temporary Impact to ASLD = 0 SF (Smallest) • Bridge is constructed at ultimate location reducing construction footprint • Footprint of construction is contained within existing R/W • Least amount of impacts to existing offsite drainage facilities since bridges are constructed in ultimate location • Conventional cast-in-place box bridge and retaining walls are common structures and allow for aesthetic treatment to match corridor • Bridge superstructure is constructed in four separate pieces making the bottom of the structure discontinuous	• Profile Low Point Elevation = 1589.61 (Shallowest) • Temporary Impact to ASLD = 59,249 SF (2nd Smallest) • ADOT Channel reconfigured for future Miller Road • Construction footprint intrudes into State Land which will require environmental clearance • Conventional cast-in-place box bridge and retaining walls are common structures and allow for aesthetic treatment to match corridor	• Profile Low Point Elevation = 1589.12 (2nd Deepest) • Temporary Impact to ASLD = 84,254 SF (Largest) • ADOT Channel reconfigured for future Miller Road • Construction footprint intrudes into State Land which will require environmental clearance • Cast in place box allows form liners to be used for interior aesthetic treatments • Eastbound and westbound constructed as two separate structures only needing a single joint • 2nd deepest profile increases permanent cut slope widths along Miller Road • Temporary drainage channel necessary on north side to protect work zone • Drainage channel on the north side is cut off from east to west	• Profile Low Point Elevation = 1585.02 (Deepest) • Temporary Impact to ASLD = 73,154 SF (2nd Largest) • ADOT Channel reconfigured for future Miller Road • Construction footprint intrudes into State Land which will require environmental clearance • Arch structure provides enhanced architectural feature • Deepest profile increases permanent cut slope widths along Miller Road • Drainage channel on the north side is cut off from east to west • Temporary drainage channel necessary on north side to protect work zone • Arched structure will not allow for rustication
Construction Quality Control	• Common construction techniques and phased schedule allow for proper curing times without requiring higher strength materials and adequate time for quality control sampling and testing	• Offline bridge construction and construction duration allows for adequate testing and curing times • Accelerated backfill significantly reduces duration between quality testing • Accelerated drilled shaft construction and bridge slide could lead to quality issues	• Offline box construction and construction duration allow for adequate testing and curing times • Accelerated backfill significantly reduces duration between quality testing • Open cut excavation could cause settlement issues	• Precast components cast in a controlled environment • Accelerated backfill significantly reduces duration between quality testing • Arch components could be damaged during transport • Open cut excavation could cause settlement issues
Future Maintenance Costs	• Common bridge type, typical maintenance • Closure pour area between lanes is offset toward wheel path and adds extra construction joints could lead to future maintenance issues	• Common bridge type, typical maintenance • Closure pour is not necessary	• Limited joints in structure • Closure pour is not necessary • No bridge joints needed	• Soil/water leakage between joints if settlement occurs (joints flexible) • No bridge joints needed

4. MAJOR FEATURES OF THE ALTERNATIVES

This section provides a description of the major design features of the alternatives selected for further evaluation.

4.1 VERTICAL ALIGNMENTS

Vertical alignments were set to accommodate a minimum of 16-foot, 6-inches of clearance. Each alignment was set to allow the vertical alignment to come back to existing grade prior to the proposed roundabouts north and south of SR-101L. Each alignment was optimized to climb out of the proposed sump as soon as feasibly possible. Vertical alignments for each alternative are provided in **Appendix C** through **Appendix F** in their respective alternative plan sets.

4.2 TYPICAL SECTIONS

The Miller Road typical section varies slightly for each alternative as it passes under SR-101L. Raised sidewalks with safety rail are utilized with each alternative to separate vehicular and pedestrian traffic. Each alternative provides a six-foot bike lane with a two-foot gutter pan and a four-foot clearance for bicyclists. Variations to each of the typical sections are as noted below. Typical sections are provided in **Appendix C** through **Appendix F and Appendix L** in their respective alternative plan sets. Preliminary ultimate typical sections for Miller Road from 76th Street to Princess Boulevard are provided in **Appendix M**.

4.2.1 Alternative 1 and 1A – Conventional Bridge Construction

The conventional bridge alternative typical section requires a 77-foot width and provides two travel lanes in each direction. The inside lanes were set at 12 feet due to the proximity of opposing traffic, while the outside lanes were set at 11 feet since they are adjacent to bike and through travel lanes. A median barrier on Miller Road is not required with either bridge alternative since the bridge is configured as a single span structure.

4.2.2 Alternative 2– Bridge Slide

The bridge slide typical section is identical to the conventional bridge construction alternative.

4.2.3 Alternative 3 – Box Slide

The box slide alternative requires 87-feet of width and provides two travel lanes in each direction. The inside lanes were set at 13 feet to provide adequate shy distance to the adjacent median barrier. The outside lanes were set at 11 feet since they are adjacent to the bike and through travel lanes. Since a divided median was necessary under the SR-101L, the median island was continued north and south to tie into each proposed roundabout in compliance with the COS major collector typical section. The length of the overpass structure was set to accommodate the curved alignment of the roadway through the straight box culvert.

4.2.4 Alternative 4 – Arch Structure

The Precast Arch alternative requires the widest typical section at 96 feet. It provides two travel lanes in each direction. The inside and outside lane widths are similar to Alternative 3. This alternative allows for wider sidewalks (up to 13-feet, 10-inches) based on the configuration of the arch that is necessary to provide vertical clearance over the roadway.

4.3 STRUCTURE TYPES

4.3.1 Alternative 1 and 1A – Conventional Bridge Construction

Since the configuration of the project is an overpass (SR-101L over Miller Road), it was apparent early in the alternative development process that a cast-in-place post-tensioned (CIP PT) concrete box girder bridge would be the most cost effective structure type for conventional construction. This was because embankment to construct this type of structure on soffit fill already exists since Miller Road will be constructed under the existing SR-101L embankment. CIP PT concrete box girder bridges are a common bridge construction type in Arizona, specifically when they can be constructed on soffit fill like this location. In addition, they provide for a shallower superstructure depth than other common bridge types. Based on the bridge span, the superstructure depth for this bridge was set at 4.5 feet. Due to the phasing required for the conventional bridge construction, a closure pour is required.

The proposed bridge will have an overall bridge length of 94'-0". There will be separate bridges for SR-101L EB and SR-101L WB with overall widths of 96'-4 ½" for each bridge (93'-6 ½" Clear Width). This bridge width provides for six 12-foot travel lanes, a 12-foot outside shoulder and a 9.5-foot inside shoulder. A typical section of the bridge is provided in **Figure 4.1**.

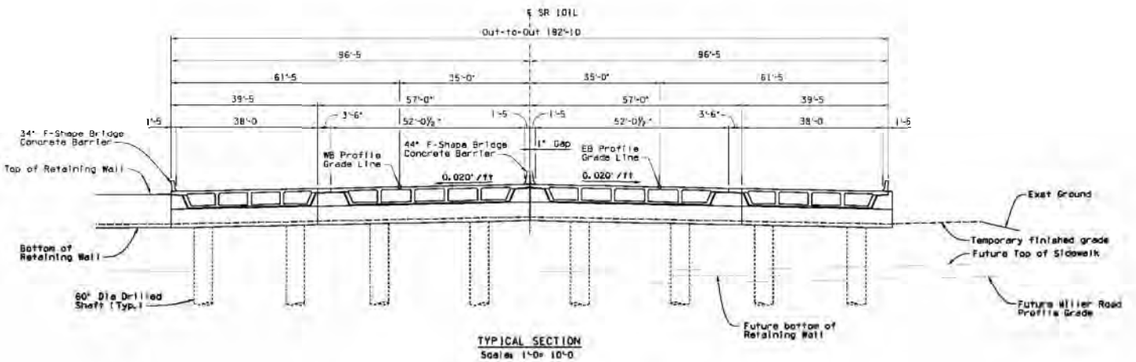


Figure 4.1 – Conventional Bridge Typical Section

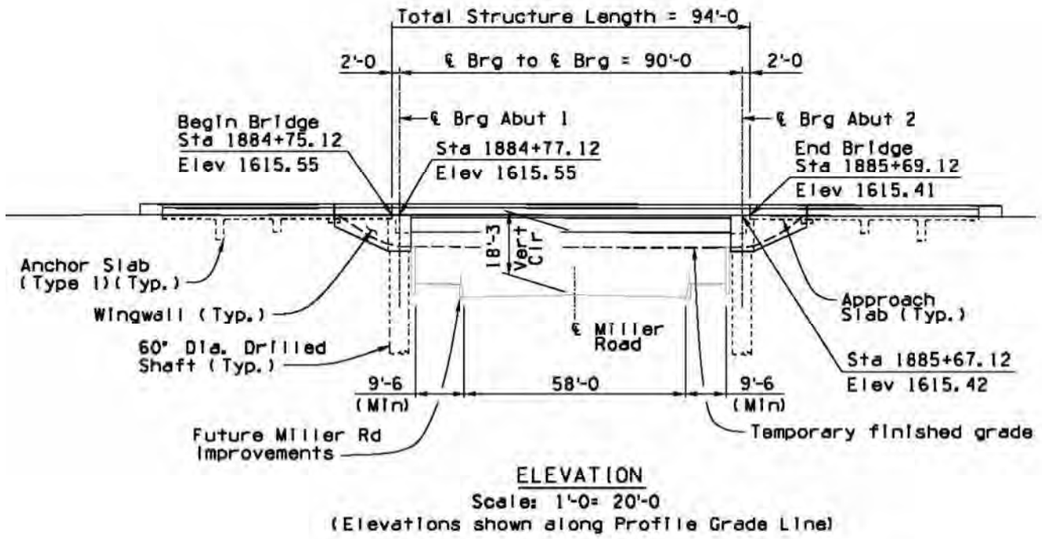


Figure 4.2 – Conventional Bridge Elevation

The bridge will be supported on short seat abutments supported on drilled shafts. It is assumed that the drilled shafts will be five-foot diameter shafts with an approximate length of 60-feet. As shown in **Figure 4.1**, the temporary grade will require limited excavation after the construction of the bridge. Therefore, a retaining wall at the face of the abutment/drilled shafts is not required with this phase of the project; however, ADOT and the City of Scottsdale agreed that if this alternative was selected, the retaining walls would be constructed with the ADOT project to the greatest extent possible as shown in Alternative 1A depicted in **Appendix L.** The geometry of the wing walls at each abutment are set for temporary grading prior to the Miller Road construction.

Future Miller Road construction will require excavation under the proposed bridge which will expose the existing retaining walls at the abutments which support the bridge approach embankment. This type of excavation with previously constructed retaining walls is common and the retaining wall foundations will be designed deep enough to ensure stability during the excavation. Additional retaining walls will be required along Miller Road to support the fills adjacent to the shoulders of SR-101L as Miller Road is excavated to go under SR-101L.

The Conventional Bridge will be constructed in 12 construction phases. As part of these construction phases there will be three directional weekend closures of the freeway. The construction phases are summarized below and shown in more detail in **Appendix C**. Detailed MOT activities and a construction schedule for this alternative are provided in **Appendix G** and **Appendix H** respectively. Is assumed that the detailing in these appendices will be the same for Alternative 1A.

Phases 1 – 4: Shift traffic to the inside as required for GPL construction. Close the WB Frontage Road. Construct outside portions of EB and WB bridges including approach and anchor slabs. Construct the WB Frontage Road bridge.

Phases 5 – 8: Construct temporary pavement on the outside shoulders of the EB and WB structures built in Phases 1-4. Shift traffic to the outside (one HOV + three GPL provided). Open the WB Frontage Road. Construct inside portion of EB and WB bridges including approach and anchor slabs.

Phases 9 – 12: Shift traffic back to the inside as required for GPL construction. Remove temporary pavement and construct permanent outside bridge barrier.

4.3.2 Alternative 2– Bridge Slide

The proposed superstructure type for the bridge slide is a CIP PT concrete box girder bridge similar to the Conventional Bridge alternative because of existing embankment that would be needed to set the sliding pads. The abutment caps will be constructed integral with the bridge superstructure to eliminate the need and time required to construct abutment caps during the roadway closure and bridge slide. The integral abutment caps will be cast with a flat bottom and therefore will have varying depths.

The proposed bridge will have an overall bridge length of 94'-0". There will be separate bridges for SR-101L EB and SR-101L WB with overall widths of 96'-4 ½" for each bridge (93'-6 ½" Clear Width). This bridge width also provides for six 12-foot travel lanes, a 12-foot outside shoulder and a 9.5-foot inside shoulder similar to Alternative 1. A typical section of the bridge is provided in **Figure 4.3**.

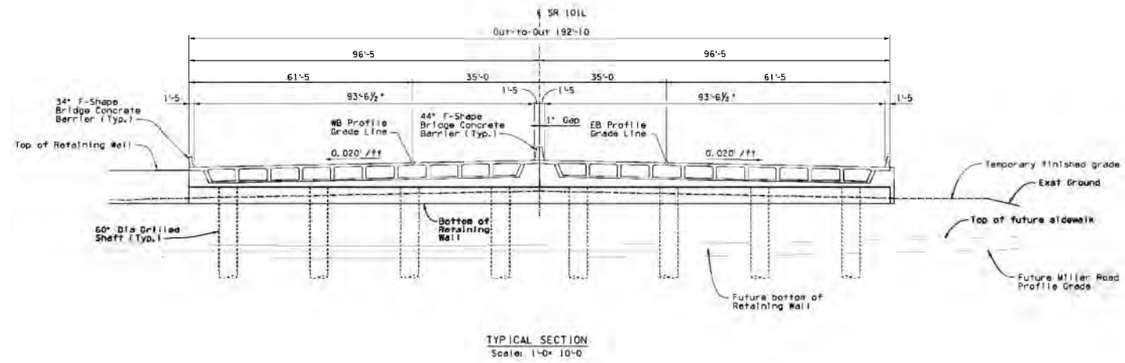


Figure 4.3 – Bridge Slide Typical Section

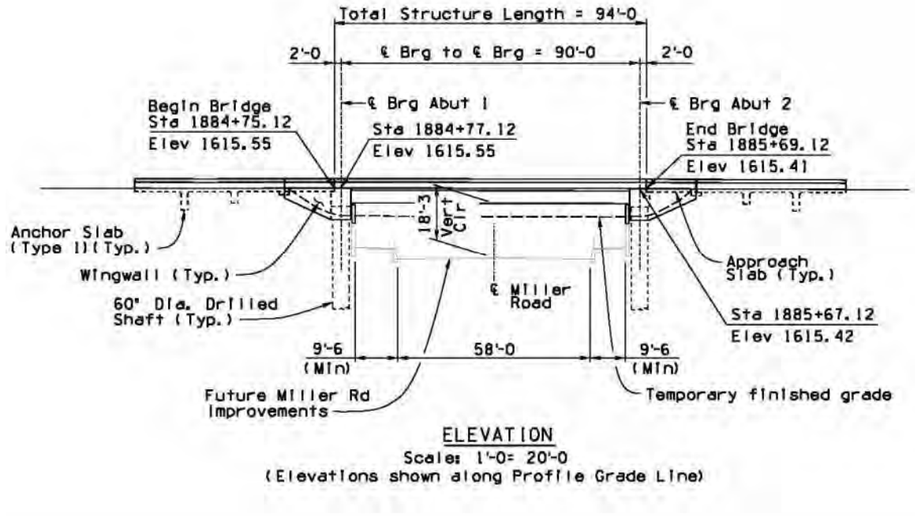


Figure 4.4 – Bridge Slide Elevation

The bridge will be supported on 5-foot diameter drilled shafts with an approximate length of 60 feet. As shown **in Figure 4.4**, the temporary grade will require limited excavation after the construction of the bridge. A short retaining wall will also be required due to the limited depth of the integral abutment compared to the conventional bridge alternative. The geometry of the wing walls at each abutment are set for temporary grading prior to the Miller Road construction.

As with the Conventional Bridge alternative, future Miller Road construction will require excavation under the proposed bridge to expose the previously constructed retaining walls at the abutments which support the bridge approach embankment.

The Bridge Slide will be constructed in 17 construction phases. Additional phases of construction were determined to be necessary to construct the approach and anchor slabs after the slide was completed. As part of these construction phases there will be four directional weekend closures of the freeway. The construction phases are summarized below and shown in more detail in **Appendix D**. Detailed MOT activities and construction schedule for this alternative are provided in **Appendix G** and **Appendix H** respectively.

Phases 1 – 3: Construct inside drilled shafts (four inside shafts for each bridge) during alternating weekend closures of EB and WB lanes. Shift traffic to the inside as required for GPL construction. Close the WB Frontage Road.

Phase 4: Construct the EB and WB bridges off alignment and on temporary substructure as required.

Phases 5 – 7: Slide the EB and WB bridges into place over alternating weekend closures. Construct temporary pavement as required to reopen the inside traffic lanes after the weekend closure. Begin construction of outside approach and anchor slabs and the WB Frontage Road Bridge. To expedite the bridge slide, the abutment will be cast integral with the superstructure. Therefore, the bridge will be slid onto the drilled shafts and not along an abutment cap. This will require an experienced contractor to complete this work.

Phase 8: Complete EB outside approach and anchor slabs and GPL Portland Cement Concrete Pavement (PCCP) construction. Continue WB outside approach and anchor slab construction and WB Frontage Road Bridge construction.

Phases 9-12: Complete WB outside approach and anchor slabs and GPL PCCP construction. Construct temporary pavement on the outside shoulders of the EB and WB lanes. Shift traffic to the outside (one HOV + three GPL provided). Construct EB and WB inside approach and anchor slabs. Continue WB Frontage Road Bridge construction.

Phases 13-17: Shift traffic back to the inside as required for GPL construction. Remove temporary pavement and construct permanent outside bridge barrier. Complete WB Frontage Road Bridge construction.

4.3.3 Alternative 3 – Box Slide

The proposed bridge type for the box slide is a cast-in-place mildly reinforced three-sided concrete box structure. The box geometry was set to provide approximately four feet from the top of the SR-101L pavement to the top of the box structure. The length of the box was set to extend under SR-101L and the WB Frontage Road. The ends of the box are set approximately 19 feet outside of the edge of pavement to minimize the headwall height on the end of the box. Barrier will be required along the outside shoulder of SR-101L at the box location since the end of the box and the excavation/retaining walls for Miller Road will not be outside of the clear zone.

The typical section of the box consists of two 46'-0" clear spans with an overall width of the box being 98'-0". The clear spans allow for two travel lanes and a sidewalk in each direction as discussed in the Miller Road Typical Section. Even though the roadway is curved, the box was developed as a tangent alignment to maximize constructability. The three-sided box will be a rigid frame between the top slab and walls of the box. The walls will be pinned to the footings. A typical section of the bridge is provided in **Figure 4.5**.

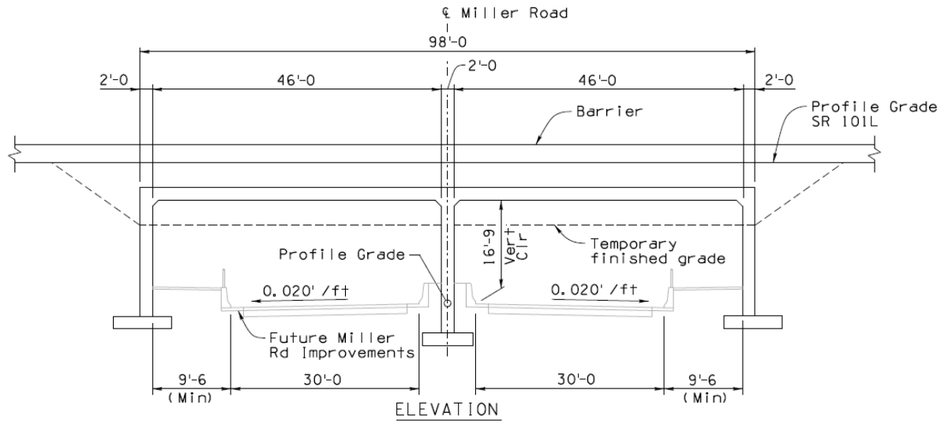


Figure 4.5 – Three-Sided Box Elevation

The footings for the three-sided concrete box are assumed to be spread footings and precast to expedite placement of the footings during weekend closures when the box is slid into place.

Future Miller Road construction will require excavation of the temporary fill material placed in the box, but will not require construction of retaining walls under SR-101L since the three-sided box already consists of full height walls. Additional retaining walls will likely be required along Miller Road to support the fills adjacent to the shoulders of SR-101L as Miller Road is excavated to go under SR-101L.

The box slide will be constructed in 16 construction phases. As part of these construction phases there will be four directional weekend closures of the freeway and seven days of HOV lane closures. The construction phases are summarized below and shown in more detail in **Appendix E**. Detailed MOT activities and construction schedule for this alternative are provided in **Appendix G** and **Appendix H** respectively.

Phases 1 – 3: Construct piles for temporary shoring to be used during box slide during alternating weekend closures of EB and WB lanes. Shift traffic to the inside as required for GPL construction. Begin construction of the EB Box structure. Shoring depths will be approximately 30 feet and will require large piles to support the future excavation. This creates larger than normal shoring costs. A typical soil nail wall shoring system, while more cost effective, is not feasible given the limited window for construction of the shoring during the excavation.

Phase 4: Close the WB Frontage Road. Install shoring along the outside shoulder of the shifted traffic lanes and excavate for construction of the box structure. Construct full length of EB and WB box structures off alignment.

Phases 5 – 6: Close EB SR-101L and slide box into place over a weekend closure. Place temporary asphaltic concrete (AC) pavement to reopen EB by Monday morning. Excavation depths of up to 30 feet will be required in a short window, therefore additional equipment and crews will likely be required to complete this work. This will increase the costs of the excavation.

Phase 6: Construct new PCCP for outside EB travel lanes.

Phase 7: Close WB SR-101L and slide box into place over a weekend closure. Place temporary AC pavement to reopen WB by Monday morning. Excavation requirements will be similar to Phase 5.

Phase 8: Construct new PCCP for outside WB and EB travel lanes.

Phases 9 – 12: Construct temporary pavement on the outside shoulders of the EB and WB lanes. Shift traffic to the outside (one HOV + three GPL provided). Complete WB Frontage Road construction and open to traffic. Construct new PCCP for inside travel lanes.

Phases 13 – 16: Shift traffic back to the inside as required for GPL construction. Remove temporary pavement and construct permanent barrier along the outside shoulder at the bridge location.

4.3.4 Alternative 4 – Arch Structure

The proposed bridge type for the arch alternative is a precast concrete arch structure. The layout of the precast concrete arch was set curved to follow the alignment of Miller Road under SR-101L to minimize span length requirements. The arch structure geometry was set to provide approximately 4 feet from the top of the SR-101L pavement to the top of the arch structure. The length of the arch structure was set to extend under SR-101L and the WB Frontage Road. The ends of the arch structure are set approximately 20 feet outside of the edge of pavement to minimize head wall height requirements. Barrier will be required along the outside shoulder of SR-101L at the arch structure location since the end of the arch structure and the excavation/retaining walls for Miller Road will not be outside of the clear zone.

The arch structure would consist of multiple elements due to the required span and to keep the size and weight of the precast elements manageable. Each segment would be approximately four feet in length. It is assumed that the structure would be supported on precast spread footings to expedite the construction and assembly. Precast concrete walls would then be placed to provide the height for the arch structure. The precast arch would then be placed on the precast concrete walls. A typical section of the bridge is provided in **Figure 4.6**.

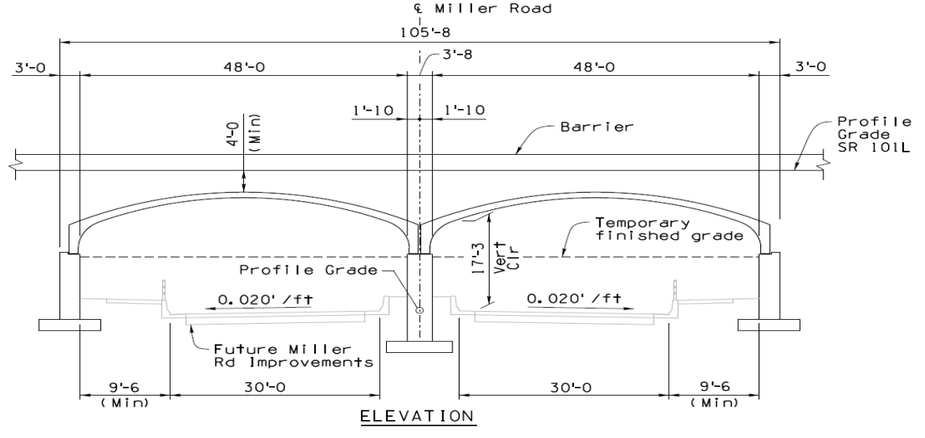


Figure 4.6 – Arch Structure Elevation

Future Miller Road construction will require excavation of the temporary fill material placed in the arch but will not require construction of retaining walls under SR-101L, since the arch already consists of full height walls. Additional retaining walls will likely be required along Miller Road to support the fills adjacent to the shoulders of SR-101L as Miller Road is excavated to go under SR-101L.

The Arch Structure will be constructed in 12 construction phases. There will be three directional weekend closures of the freeway and nineteen days of HOV lane closures. The construction phases are summarized below and shown in more detail in **Appendix F**. Detailed MOT activities and construction schedule for this alternative are provided in **Appendix G** and **Appendix H** respectively.

Phases 1 – 4: Shift traffic to the inside as required for GPL construction. Close the WB Frontage Road for the duration of the arch structure construction. Install shoring along the outside shoulder of the shifted traffic lanes and excavate the outside segments for the arch structure construction. Construct the outside portions of the EB and WB arch structures, back fill and construct new PCCP.

Phases 5 – 8: Construct temporary pavement on the outside shoulders of the EB and WB lanes. Shift traffic to the outside (only three GPL provided to minimize temporary pavement construction). Open the WB Frontage Road. Excavate the inside segment for the arch structure construction. Construct arch structure, back fill and construct new PCCP.

Phases 9 – 12: Shift traffic back to the inside as required for GPL construction. Remove temporary pavement and construct permanent barrier along the outside shoulder at the bridge location.

4.4 CONSTRUCTION PHASING

Through early coordination with project stakeholders the analysis team developed the following guidelines for developing the construction phasing scenarios shown in **Appendix C** through **Appendix F**:

- The Miller Road SR-101L crossing will be designed and constructed with the ADOT SR-101L GPL expansion project, which is estimated to start April 2019.
- SR-101L within the project limits experiences significant daily traffic. It also experiences significant event traffic from October to April each year. Construction activities associated with the Miller Road SR-101L crossing should be completed outside of the event season when traffic volumes are lower.
- SR-101L lane configuration during construction is preferred to maintain three GPL and one HOV lane in each direction.
- 11-foot lanes are acceptable on SR-101L in the vicinity of the Miller Road SR-101L crossing.
- A two-foot shy distance to adjacent face of temporary concrete barrier (TCB) is required.
- SR-101L on and off-ramps between Scottsdale Road and Hayden Road will be closed for a period when the GPL expansion project is being constructed. The Miller Road bridge construction should utilize this time to the extent possible.
- SR-101L will not be closed in both directions simultaneously. Bi-directional closures with detours will be utilized.
- EB SR-101L closures and traffic will be detoured to Legacy Boulevard, which is configured as a four-lane divided roadway and is currently underutilized. Traffic signal timing will be reconfigured to accommodate detour traffic.
- WB SR-101L closures and traffic will utilize the WB Frontage Road, which is currently underutilized. When the WB Frontage Road is closed for construction activities, WB SR-101L traffic will be detoured to Legacy Boulevard.
- Construction for each alternative will take advantage of the SR-101L GPL expansion project temporary lane configuration and closures.
- Any construction phases that change the SR-101L GPL expansion project traffic control lane configurations and closures are considered impacts that can create additional travel delays.
- ADOT and the contractor shall coordinate full freeway closures with the City of Scottsdale. Because of special event and seasonal traffic fluctuations, full weekend freeway closures of the segment between Scottsdale Rd and Pima Rd will not be allowed from October 31st to April 1st.
- Scottsdale Police Department shall be used for closures in Scottsdale.
- Rustication on retaining walls would be ADOT standard vertical rustication since the walls will be temporarily buried. The rustication will be protected by a sheet of plywood prior to backfilling the excavated area.

The proposed construction phasing for each alternative is provided as cross sections in **Appendix C** through **Appendix F** and summarized in the structure construction phasing plan. Detailed construction phasing, work activities, durations and closures are summarized in the MOT table provided in **Appendix G**.

The construction phasing developed for each alternative serves as a baseline for estimating the anticipated traffic operations impacts described in Section 4.6.

4.5 CONSTRUCTION SCHEDULES

Construction schedules provided in **Appendix H** were compiled as a joint effort between Kimley-Horn and FNF Construction based on the construction phasing necessary for each alternative. Each schedule is in calendar days and assumes the contractor will work 7-day work weeks. Schedule constraints considered while developing the construction schedules are shown below:

- COS Event Schedule: October to April
  - Known Major Events - Barret-Jackson, Phoenix, Open, Good Guys Car Show, Sun Country Horse Show and other events in the area held at West World and other venues.
- ADOT Holiday Moratorium: November to January

Rubberized Asphalt Friction Course (AR-ACFC) moratoriums were also considered but are not assumed to affect the construction schedule of the Miller Road SR-101L crossing since the AR-ACFC application schedule will largely depend on the completion of the GPL PCCP placement.

Start of construction for each alternative was assumed to be April 1, 2019 to coincide with the end of the COS event season. However, notice to proceed for material procurement may need to begin earlier for Alternative 4 (arch structure) to ensure that precasting can be completed ahead of time to allow efficient placement of the components outside of the moratoriums.

Schedules for each of the alternatives ranged from 121 days for the construction of Alternative 4 (arch structure) to 205 days for Alternative 1/1A (conventional bridge).

Alternative 2 (bridge slide) was shown to have a longer than expected duration of 170 days due to the additional construction phasing needed to construct the approach and anchor slabs of the structure.

The schedule for Alternative 4 (arch structure) was developed to add an element of Accelerated Bridge Construction (ABC) by reducing the duration of construction inside the median to approximately 12 days. This was because construction of the inside portion of the arch structure could be accomplished with a short-term closure of the HOV lanes, eliminating the need to add temporary pavement along the outsides of the arch structure which would have required the ends of the arch structure to be temporarily capped. This was the only alternative that reduced the minimum cross section on SR-101L to less than 3 GPL plus 1 HOV lane. This reduction is expected to last for 12 days.

4.6 TRAFFIC MODELING AND DELAYS

Traffic modeling was utilized to help estimate the anticipated traffic operations impacts near the proposed Miller Road SR-101L crossing associated with the various proposed construction alternatives. Traffic modeling also helped identify likely operational bottlenecks so mitigation measures could be developed where feasible and cost-effective. Traffic modeling consisted of the following main components subsequently described in more detail:

- Traffic volume development
- Surface street operations analysis
- Freeway operations analysis
- Summary of traffic modeling analysis findings

4.6.1 Traffic Volume Development

The Weekday morning (AM), Weekday afternoon (PM), and Weekend mid-day (MD) peak hours were selected as the traffic modeling analysis periods as they represent high traffic volume periods that would experience "worst-case" operational impacts from construction restrictions and closures.

4.6.2 Construction-Impacted Volumes

Once current Weekday AM, Weekday PM, and Weekend MD peak hour traffic volumes were developed, construction-impacted volumes were estimated using the following assumptions:

- No network volume reductions were made for ramp closure scenarios as drivers are expected to shift to the next available ramp within the network.
- No network volume reductions or rerouting of traffic were made for HOV lane closures as drivers are expected to remain on the mainline regardless of whether the HOV lane is open or closed.
- Weekend MD volumes were reduced by 60% for full mainline directional closure scenarios as many drivers are expected to completely avoid the area because of potentially severe traffic congestion.
- Where detours are required, it was assumed that all rerouted traffic uses the official detour with no diversion to other routes.

4.6.3 Surface Street Operations Analysis

The Synchro traffic simulation modeling software was used to analyze traffic operations at all surface street intersections affected by route detours caused by the bridge construction portion of the project.

4.6.3.1 Synchro Model Scenarios

Synchro models were developed for the following five scenarios – along with Existing (No-Build) models so measures of effectiveness (MOEs) can be compared – using the corresponding construction-impacted volumes and the assumptions listed below:

- Model 1: Weekday AM Ramp Closures with Legacy Boulevard Diversion:
  - Assumes all four SR-101L on/off ramps between Scottsdale Road and Hayden Road are shut down simultaneously for an extended duration (e.g., 60 days).
  - Mainline cross-section will have one HOV lane and three GPL in each direction with no auxiliary lane.
  - Current Weekday AM peak hour traffic volumes were used; only volumes of ramps being shut down were diverted.
  - Both EB and WB ramp volume detours will divert ramp traffic to use Legacy Boulevard.
- Model 2: Weekday PM Ramp Closures with Legacy Boulevard Diversion:
  - Assumes all four SR-101L on/off ramps between Scottsdale Road and Hayden Road are shut down simultaneously for an extended duration (e.g., 60 days).
  - Mainline cross-section will have one HOV and three GPLs in each direction with no auxiliary lane.
  - Current Weekday PM peak hour traffic volumes were used; only volumes of ramps that will be shut down were diverted.
  - Both EB and WB ramp volume detours will divert ramp traffic to use Legacy Boulevard.
- Model 3: Weekend MD Mainline Full Closure in Eastbound Direction with Legacy Boulevard Diversion:
  - Assumes full SR-101L EB mainline closure over a weekend (9pm Friday – 5am Monday) between Scottsdale Road and Hayden Road with traffic exiting the freeway at the Scottsdale Road EB off-ramp being diverted north to Legacy Boulevard and returning to the freeway at the Hayden Road EB on-ramp.
- Model 4: Weekend MD Mainline Full Closure in Westbound Direction with Legacy Boulevard Diversion:
  - Assumes full SR-101L WB mainline closure over a weekend (9pm Friday – 5am Monday) between Scottsdale Road and Hayden Road with traffic exiting the freeway at the Hayden Road WB off-ramp being diverted north to Legacy Boulevard and returning to the freeway at the Scottsdale Road WB on-ramp
  - Assumes WB Frontage Road is closed for construction during this same time.
- Model 5: Weekend MD Mainline Full Closure in Westbound Direction with Frontage Road Diversion:
  - Assumes full SR-101L WB mainline closure over a weekend (9pm Friday – 5am Monday) between Scottsdale Road and Hayden Road with traffic exiting the freeway at the Hayden Road WB off-ramp being diverted to the WB Frontage Road instead of Legacy Boulevard and returning to the freeway at the Scottsdale Road WB on-ramp.

Other assumptions that applied to all five Synchro models were:

- No modeling of the freeway mainline, weaving, or ramp merge/diverge operations is needed as the GPL construction zone will already be in place before the Miller Road construction project begins.
- The WB Frontage Road will provide two through lanes throughout when the WB weekend closure diverts traffic to the WB Frontage Road.
- No other geometric changes to intersections along the detour routes were considered. Changes in signal timing/phasing including left turn phasing modifications and coordination timing including offsets, splits, and cycle length may take place at any of the intersections.
- Other diversion routes were considered but were eliminated from further evaluation for the following reasons:
  - Frank Lloyd Wright Boulevard is already over capacity and would not be suitable for diversions.
  - Mayo Boulevard would require new R/W and constructing a new road east of Scottsdale Road.
  - Legacy Boulevard East of Hayden Road to Pima Road would require new R/W and constructing a short new road segment east of Hayden Road.

4.6.3.2 Synchro Measures of Effectiveness and Mitigation Measures

Intersection MOEs (e.g., level of service, delay, queues, volume-to-capacity ratios) and Network MOEs (e.g., delay, speed, travel time) were obtained from the Synchro models for each scenario.

Several of the models showed significant degradation in traffic operations due to the proposed construction closures and restrictions. Cost-effective temporary mitigation measures were developed to improve traffic operations. These mitigation measures involve changes to traffic signal phasing and lane geometry that can be accomplished using signage, traffic control devices, and minor striping changes. None of the mitigation measures involve construction or reconstruction of roadway surfaces.

It is recommended that the following mitigation measures be incorporated into the traffic control plans for whichever closure scenarios are ultimately implemented, where feasible:

- Scottsdale Road/SR-101L North (WB) Ramp/Frontage Rd intersection:
  - Change the outside SB through lane to a SB shared through/right-turn lane so that there is a second lane from which SB right turns can be made besides the existing SB right-turn lane. There are currently two receiving lanes on the ramp so this requires only temporary striping/signage on the SB approach.
  - Temporarily convert the northernmost WB left-turn lane to a WB shared left-turn/through lane and extend both lanes back to where the frontage road tapers from two lanes to one lane. There are currently two receiving lanes on the WB on-ramp so this requires only barricades/striping/signage changes on the WB approach. This change is only needed in the Weekend MD WB SR-101L closure with traffic rerouted along the frontage road scenario, as the ramp would be closed in the other scenarios.

- Scottsdale Road/Legacy Boulevard intersection:
  - Change the outside NB through lane to a NB shared through/right-turn lane so that there is a second lane from which NB right turns can be made besides the existing NB right-turn lane. There are currently two receiving lanes on Legacy Boulevard so this requires only temporary striping/signage on the NB approach.
  - Alter the signal timing to allow the NB right-turn movement to overlap with the WB left-turn movement. This can be accomplished by modifying the signal head for the NB right-turn movement.

- Hayden Road/Legacy Boulevard intersection:
  - Temporarily create a second NB left-turn lane using barricades where the pavement is currently hashed out on the NB approach.
  - Temporarily create a second EB right-turn lane using barricades where the pavement is currently hashed out on the EB approach and have both through lanes go into the EB right-turn lanes with a pocket for the EB left-turn lane.
  - Implement phasing/signal timing modifications to accommodate the increased volumes and new movements. Changes include making the NB left-turn movement protected and allowing the EB right-turn movement to overlap with the NB left-turn movement. This can be accomplished by changing the signal heads for those two movements.

After reviewing the MOEs for both the unmitigated and mitigated models, the following are notable findings for each study area intersection:

- Scottsdale Road/SR-101L (South)
  - For the Weekend EB SR-101L closure scenario (Model 3), the EB left-turn queue could exceed 2,000-feet, which means mainline EB traffic would likely be slowing down near the 64th Street interchange. The delay for this movement and scenario may exceed 500 seconds during peak times. This is a typical and expected condition when shutting down the mainline.

- Scottsdale Road/ SR-101L (North)
  - For all unmitigated scenarios, the SB right-turn queue exceeds the available storage length (400 feet) and will also likely back into the intersection of Scottsdale Road/Henkel Way. This issue also occurs in two scenarios after the proposed mitigations were applied:
    a) the Weekday PM with ramps closed (Model 2); and
    b) the Weekend MD WB SR-101L closure with traffic rerouted via Legacy Boulevard (Model 4).
  - In the other three scenarios, the mitigation measure brings the queue back within the available storage length. The delay for the SB right-turn movement may exceed 500 seconds in the Weekend MD WB SR-101L closure with traffic rerouted via Legacy Boulevard scenario (Model 4).
  - For the Weekend MD WB SR-101L closure with traffic rerouted along the Frontage Road scenario (Model 5), the WB through movement queue is expected to extend past the right-in right-out driveway access of Henkel. Even though this is also the case when applying the mitigation, the queue is expected to be reduced by nearly half.

- Scottsdale Road/Henkel Way
  - For the Weekend EB SR-101L closure scenario (Model 3), the NB through-queue exceeds the available length before backing into the SR-101L/Scottsdale Road (North) intersection. This queue is an extension of the NB queue at the Scottsdale Road/Legacy Boulevard intersection.

- Scottsdale Road/Legacy Boulevard
  - For all unmitigated scenarios, the NB right-turn queue exceeds the available storage length (150 feet). For the Weekend MD EB SR-101L closure unmitigated and mitigated scenarios (Model 3), the queues are expected to back into the Scottsdale Road/Henkel Way intersection. The delay for this movement may exceed 700 seconds even with the proposed mitigations applied.
  - For four of the five unmitigated and mitigated scenarios (Weekday AM and PM ramps closed, Weekend MD EB SR-101L closure, and Weekend MD WB SR-101L closure with traffic rerouted on Legacy Boulevard [Models 1 through 4]), the WB left-turn movement exceeds the available storage length (230 feet) and backs into the nearby North 73rd Street/Legacy Boulevard intersection (460 feet). There are several hundred seconds of delay associated with this movement dependent on the scenario.
  - For the Weekday AM and PM with ramps closed scenarios (Models 1 and 2), the SB left-turn movement exceeds the available storage length (800 feet) in both unmitigated and mitigated scenarios. Delay associated with this movement may exceed 600 seconds for all unmitigated and mitigated scenarios.

- Hayden Road/Legacy Boulevard
  - For four of the five unmitigated and mitigated scenarios (Weekday AM and PM ramps closed, Weekend MD EB SR-101L closure, and Weekend MD WB 101 closure with traffic rerouted on Legacy Boulevard [(Models 1 through 4]), the NB left-turn movement queue exceeds the available storage length (250 feet) and almost backs into the Hayden Road/SR-101L (North) intersection. With the mitigations recommended the queues for this movement still exceed the available storage but are significantly reduced. Delays with the recommended mitigations implemented are acceptable for the Weekday AM and PM scenarios (Models 1 and 2), but approach 300 seconds in the Weekend MD EB 101 closure scenario (Model 3) and 500 seconds in the Weekend MD WB SR-101L closure with traffic rerouted on Legacy Boulevard scenario (Model 4).
  - For all unmitigated scenarios, the EB right-turn movement exceeds the available storage length (250-feet). With the mitigations suggested the queues for this movement still exceed the available storage but are significantly reduced. Delays with the recommended mitigations implemented are acceptable for the Weekday AM and PM scenarios (Models 1 and 2), but approach 400 seconds in the Weekend MD EB SR-101L closure scenario (Model 3).

- Hayden Road/SR-101L (North)
  - The SB through-movement may experience high delay and queueing for all scenarios in both mitigated and unmitigated conditions. Specifically, the Weekend MD EB SR-101L closure scenario (Model 3) shows delay greater than 600 seconds and queueing exceeding 1,600 feet for SB through-movement.
  - For the Weekday PM with ramps closed scenario (Model 2), the WB right-turn lane queue may exceed 1,300 feet, which would put the back of the queue near the ramp gore point, potentially impacting the SR-101L mainline.
  - For the Weekend MD WB SR-101L closure with traffic rerouted along Legacy Boulevard scenario (Model 4), the WB right-turn lane queue could exceed 2,600-feet, which means mainline WB traffic would likely be slowing down near the Princess Drive interchange. The delay for this movement and scenario may exceed 600 seconds during peak times. This is a typical and expected condition when shutting down the mainline.
- Hayden Road/ SR-101L (South)
  - The SB left-turn movement in all scenarios exceeds the available storage and backs into the Hayden Road/SR-101L (North) intersection and beyond. Delays for the movement may exceed 100 seconds in both mitigated and unmitigated conditions. The Weekend MD EB SR-101L closure scenario (Model 3) shows the highest delay with nearly 600 seconds.

Findings suggest the two most problematic scenarios are when the EB SR-101L mainline is closed on a weekend (Model 3) and when the WB SR-101L mainline is closed on a weekend and the traffic is rerouted via Legacy Boulevard (Model 4). The MOEs for the Weekday AM and PM scenarios when the four ramps are closed (Models 1 and 2) are significantly improved by implementing the mitigation measures discussed previously. The mitigation measures also help all weekend mainline closure scenarios (EB SR-101L, WB SR-101L with traffic rerouted via Legacy Boulevard, and WB SR-101L with traffic rerouted via the Frontage Road [Models 3 through 5]) compared to unmitigated conditions.

4.6.4 Freeway Operations Analysis

The CORSIM traffic simulation modeling software platform was selected to analyze mainline freeway traffic operations.

4.6.4.1 CORSIM Model Scenarios

CORSIM models were developed for the following three scenarios – along with Existing (No-Build) models so MOEs can be compared – using the corresponding construction-impacted volumes and the assumptions listed below:

- Model 6: Weekday AM HOV Lane Closures:
  - Assumes the HOV lane is closed in each direction between Scottsdale Road and Hayden Road.
  - Mainline cross-section will maintain three GPL in each direction with no auxiliary lane.
  - Current Weekday AM peak hour traffic volumes will be used, with no volumes diverted.
- Model 7: Weekday PM HOV Lane Closures:
  - Assumes the HOV lane is closed in each direction between Scottsdale Road and Hayden Road.
  - Mainline cross-section will maintain three GPL in each direction with no auxiliary lane.
  - Current Weekday PM peak hour traffic volumes will be used, with no volumes diverted.
- Model 8: Weekend MD HOV Lane Closures:
  - Assumes the HOV lane is closed in each direction between Scottsdale Road and Hayden Road.
  - Mainline cross-section will maintain three GPL in each direction with no auxiliary lane.
  - Current Weekend MD peak hour traffic volumes will be used, with no volumes diverted.

4.6.4.2 CORSIM Measures of Effectiveness and Mitigation Measures

Link MOEs (e.g., level of service, delay, density, speed) and Network MOEs (e.g., vehicle miles, move time, delay time, speed) were obtained from the CORSIM models for each scenario. Queue lengths were visually estimated by viewing the model simulation.

After reviewing the MOEs for all CORSIM models, the following are notable findings for each scenario:

- In the Existing condition, all segments operate at LOS D or better:
  - In the Weekday AM peak hour the highest mainline congestion is in the EB direction; the WB direction does not have congestion
  - In the Weekday PM peak hour, the highest mainline congestion is in the WB direction; the EB direction does not have congestion
  - In the Weekend MD peak hour, there is no congestion in either direction
- In the HOV Lane Closed scenario:
  - In the Weekday AM peak hour (Model 6), the EB mainline traffic is expected to see a moderate increase in congestion and decrease in speed in the area where there is no HOV lane between the beginning of the HOV lane closure and the end of the HOV lane closure (approximately between Scottsdale Road and Hayden Road). The WB direction is expected to see a slight increase in congestion and decrease in speed.
  - In the Weekday PM peak hour (Model 7), the WB mainline traffic is expected to see a significant increase in congestion (LOS F) and decrease in speed in the area from the Hayden Road off-ramp to the Scottsdale Road off-ramp (with traffic backing up from the beginning of the HOV lane closure to the Hayden Road off-ramp). The EB direction is expected to see a slight increase in congestion and decrease in speed.
  - The impact of the HOV lane closure is more pronounced in the Weekday PM peak hour (Model 7) than the Weekday AM peak hour (Model 6) because the peak direction HOV lane traffic volume is much higher in the WB PM peak hour (1,135 vph) than in the EB AM peak hour (927 vph).
  - In the Weekend MD peak hour (Model 8), there is a slight increase in congestion with minimal impact on speed throughout the HOV lane closure area in both directions.

4.6.5 Summary of Traffic Modeling Analysis Findings

After comparing the Synchro and CORSIM MOEs, it was determined that the hours of delay MOE were a common metric between the two modeling programs that could be used to identify overall impacts of various construction alternatives.

Four different construction alternatives were developed, each with various phases that included one or more of the closure scenarios for which traffic operations were modeled (Models 1 through 8). Each phase has an assumed duration in terms of the number of days that the scenario is in place.

For comparative purposes, the total amount of added peak hour delay caused by construction was calculated for each alternative by multiplying the phase duration by the peak hour delay of the applicable models for each phase. To provide two peak hours of delay in each day, the Weekday AM and Weekday PM delay were summed for Weekday

delay while the Weekend MD delay was doubled to represent Weekend delay. As Models 1 through 5 have both unmitigated and mitigated delay values, total added delay was calculated and reported for both scenarios.

Alternative 1/1A is expected to cause the least overall added delay due to construction closures, followed closely by Alternative 4. Alternative 3 comes next and Alternative 2 is expected to cause the most overall added delay due to construction closures.

Detailed traffic modeling data is provided in **Appendix B** for reference.

4.7 UTILITY IMPACTS

Placement of the Miller Road alignment directly affects the impacts to utilities. By shifting Miller Road west of the MAG 2016 study alignment, the existing utility sleeves are not anticipated to be impacted by the proposed Miller Road SR-101L crossing, regardless of the selected construction alternative. While the groundwater monitoring well will not be impacted by the overpass construction, it will conflict with the construction of Miller Road between 76th Street and Princess Boulevard. The abandonment of the groundwater well should be coordinated during the final design of Miller Road.

4.8 ADOT FACILITY IMPACTS

Early in the study, multiple options for traffic control were considered including a contra-flow detour (both directions of traffic on one side of SR-101L). The contra-flow detour option was eliminated due to its effects on existing ADOT facilities. Substantial median barrier and roadway lighting would have needed to be removed and subsequently replaced to construct the crossovers.

The inside-outside approach, as depicted in the plans, minimizes those impacts; however, there are a few notable impacts as outlined below:

Dynamic Message Sign (DMS) Structure – The DMS structure can be protected in place in all alternatives; however, the box and arch structure alternatives require shoring around the existing foundation on the south side of SR-101L. The existing foundation in the median barrier of SR-101L was assumed to be protected in place; however, in the bridge alternatives protecting the existing concrete transition will need to be evaluated further in conjunction with the approach and anchor slab construction.

FMS Trunk Line - The fiber optic cabling installation and communications cutover will be affected by the SR-101L GPL expansion project since the existing FMS infrastructure resides under the proposed widening. However, the existing FMS conduit, pull boxes, and trunk line fiber optic cabling will also be impacted by the construction of the Miller Road SR-101L crossing. New FMS conduit and pull boxes need to be installed outside of the construction limits on both sides of SR-101L. Horizontally this can be achieved by placing the conduit alignment near the existing ADOT R/W. Vertically the conduit will need to be installed, via directional drill, at a depth of 20+ feet below existing grade to protect the cable during the construction of the Miller Road SR-101L crossing.

- *Roadway Lighting* – All four alternatives will require the removal and replacement of a single light pole. For consistency, the replacement of the light pole was assumed to be in the same location as the existing light pole. This requires a blister to be added to each of the bridge alternatives. If the light pole is relocated east or west of its existing location, light levels on SR-101L will need to be evaluated for hot and dark spots.
- *Pavement* – Removal and replacement of PCCP above and beyond what is assumed for the GPL expansion project will be increased with all alternatives. The bridge alternatives will need to remove additional PCCP to install the approach and anchor slabs, whereas the box slide and arch structure will require removal of the PCCP to excavate for the installation of each structure. For the purposes of this study the width for removal of PCCP was assumed to be the same since the footprints of each alternative were relatively the same.
- *Landscaping* – Impacts to landscaping were found to be substantial with each alternative; however, it was assumed that the GPL expansion would affect landscaping in a similar footprint. Since the landscaping impacts were assumed to be necessary for the GPL expansion these impacts were not included within this analysis.

4.9 IMPACTS TO DEVELOPABLE LAND

Interim affects to the adjacent parcels north and south of the freeway are largely related to drainage improvements as referenced in Section 4.10. Additional temporary impacts could also be necessary for construction site access. It is assumed that access along the north side of SR-101L will be from the westbound frontage road; however, access along the south side of SR-101L will most likely require a right of entry from ASLD along the proposed Mayo Boulevard alignment extension. ASLD currently leases this area out for COS event parking.

The ultimate effects to the parcels north and south of SR-101L are largely the same between alternatives. With the analysis focusing on a sump condition, laid back slopes or retaining walls will need to be considered north and south of SR-101L. For this analysis laid back slopes were assumed. Alternative 4 showed the largest ultimate impact to the adjacent parcels since the profile of Miller Road would have to be set four feet deeper than the other alternatives.

4.10 DRAINAGE IMPACTS

4.10.1 Alternative 1 – Conventional Bridge Construction

Interim – During and after construction of the structure, the existing soil-cement lined channels north of the westbound frontage road will not be affected and will remain in place without the need for modifications or temporary realignment. The offsite system will be unaffected and will function as it does today.

Ultimate – When the future Miller Road is constructed, the soil-lined channel will be removed where Miller Road will be located. The eastern lined channel will be extended to the west toward Miller Road and the western lined channel will be shortened to allow Miller Road to be constructed. The flows to the existing box culvert east of the Miller Road alignment will see a slight increase; however, the box culvert is currently sized to handle the additional flow. The box culvert west of the alignment will also see an increase in flow as it is assumed that once Miller Road is constructed the Cross Roads East Miller Road channel will also be constructed. The addition of flows from the Miller Road channel may overload the western box culvert; however, additional box culverts to the west could be interconnected into the system to distribute the flows accordingly.

Miller Road is designed as a sump. Two alternatives to drain the sump include a pump station and gravity drain trunk line. Because of the potential maintenance issues associated with a pump station a gravity drain trunk line was assumed as the outfall. Analysis of the gravity drain trunk line showed that the trunk line could catch the grade of the Miller Road channel before reaching Princess Boulevard.

4.10.2 Alternative 1A – Conventional Bridge Construction

Interim - Alternative 1A was developed under the assumption that the existing ADOT channel would not be affected by the construction of the westbound frontage road structure. However, with the addition of full depth retaining walls within ADOT's R/W, the channel will be disturbed and subsequently reconfigured to accommodate ultimate Miller Road. This condition will match the ultimate condition described in section 4.10.1.

4.10.3 Alternative 2– Bridge Slide

Interim – During construction of the structure, the existing soil-cement lined channels north of the WB frontage road will be affected and will require modifications or temporary realignment. Modifications could include ultimate improvements to allow the construction of Miller Road; however, the existing channel could be restored to its existing condition post construction of the crossing.

Ultimate – Affects to drainage in the ultimate condition are identical to Alternative 1/1A.

4.10.4 Alternative 3 – Box Slide

Interim – During construction of the structure, the existing soil-cement lined channels north of the WB frontage road will be affected and will require modifications and temporary realignment to protect the work zone. Modifications will include ultimate improvements to allow the construction of Miller Road and a temporary channel north of ADOT R/W to redirect flows to the western channel. The temporary channel is assumed to be earthen lined with 4:1 side slopes and a 10-foot bottom width upstream of the work zone. The temporary channel connects to the lined channel west of the work zone. The temporary channel will remain in place until the future construction of the Miller Road channel is completed.

Ultimate – Effects to drainage in the ultimate condition are identical to Alternative 1/1A.

4.10.5 Alternative 4 – Arch Structure

Interim – Effects to drainage in the interim condition are identical to Alternative 3; however, this alternative has the deepest profile and will require additional storm drain trunk line to be constructed to make up the sump elevation differential between the other alternatives.

Ultimate – Effects to drainage in the ultimate condition are identical to Alternative 1/1A.

5. OPINION OF PROBABLE COST ESTIMATE

Opinion of Probable estimates have been prepared for each alternative. Detailed cost estimates are included in **Appendix I**. A three-step process was completed for cost estimating. Kimley-Horn developed a full engineer's estimate including unit prices based on recent ADOT bid results for work in the general area. Once completed the unit prices were removed and the quantities were sent to FNF Construction for an independent review of the unit prices. The final step was a comparison of the Kimley-Horn and FNF estimates to compile a rectified estimate that was representative of current unit rates, economy of scale and construction knowledge.

The cost summary for Phase 1 alternatives is shown below in **Table 5.1**:

	Kimley-Horn	FNF	Rectified
Alternative 1	$6,936,000	$5,790,000	$6,120,000
Alternative 1A	$8,784,000	$7,679,000	$7,957,000
Alternative 2	$7,993,000	$6,911,000	$7,748,000
Alternative 3	$10,084,000	$7,502,000	$9,263,000
Alternative 4	$7,785,000	$8,090,000	$8,140,000

Table 5.1- Phase 1 Cost Summary

Phase 2 estimates for the additional work to construct Miller Road from 76th Street to Princess Boulevard were also developed. The costs shown below n **Table 5.2** include the full width of the roadway in addition to a concrete lined drainage channel and box culverts for future crossings along the west of Miller Road for the length of construction.

	Kimley-Horn
Alternative 1	$18,393,000
Alternative 1A	$18,629,000
Alternative 2	$18,393,000
Alternative 3	$18,934,000
Alternative 4	$18,934,000

Table 5.2- Phase 2 Estimates for Additional Work

Total combined cost of construction for both phases between building the structure and Miller Road from 76th Street to Princess Boulevard is as shown below in **Table 5.3**.

	Kimley-Horn
Alternative 1	$24,513,000
Alternative 1A	$26,586,000
Alternative 2	$26,141,000
Alternative 3	$28,197,000
Alternative 4	$27,074,000

Table 5.3- Total Cost of Construction for Phase 1 & 2

5.1 CONSTRUCTION COSTS AND ASSUMPTIONS

For the purposes of cost estimating, it was assumed that the Miller Road SR-101L crossing would be constructed with the ADOT SR-101L GPL expansion project from I-17 to Princess Boulevard. Since ADOT's project would be required to build PCCP and other roadway appurtenances through the project limits, deductions for each alternative were calculated to ensure that costs provided were reflective of the cost of the crossing only.

5.2 INNOVATION FUNDING

Throughout the Construction Alternatives Analysis FHWA provided input on potential innovation funding available to the project if one of the expedited construction techniques was selected. FHWA's preliminary review of these alternatives suggested that the bridge slide, box slide and arch structure could all potentially receive innovation funding; however, a grant will need to be applied for and approved through the normal process.

A summary of the available funding is as follows:

FHWA Accelerated Innovation Deployment (AID) Demonstration Grants - The AID Demonstration award is based on the cost of the innovation in a project (rather than the total project cost). The award amount may be up to the full cost of the innovation in the project, to a maximum of $1 million. AID Demonstration funds are available at an

80 percent federal share, which require a minimum 20 percent cost share. Arizona has been very successful in receiving these grants. This grant was recently awarded to Mohave County for the Sacramento Wash Bridge project. ADOT has also received two other AID grants for the Queen Creek Tunnel LED Lighting and the I-15 bridge monitoring. Any project that is awarded this grant must be ready to authorize for construction within 12 months of applying for AID Demonstration funding. The applications need to be reviewed and approved by the Division office and show that use of the innovation significantly accelerates construction. Applications can be found at https://www.fhwa.dot.gov/innovation/grants/

Section 1304 Funding – Section 1304 Funding results in an increased Federal share up to 5% of the total project cost. 1304 has been used on a few State projects but FHWA was not aware that this incentive has been used on local agency projects. Note that to ensure a wide variety of innovations and project types, awards will initially be limited to three projects per innovation. Applications must be submitted through http://www.grants.gov

6. CONCLUSIONS/RECOMMENDATIONS

As the analysis process progressed it was solidified that the Miller Road SR-101L crossing would become part of the SR-101L GPL expansion project from I-17 to Princess Boulevard. In response, the goal of selecting a preferred alternative was altered to determine closure and construction durations that could be recommended by COS to ADOT for inclusion within the Request for Proposal (RFP) issued to proposing contractors for the GPL expansion project.

The rating process completed by the project stakeholders (see **Appendix J**) showed that Alternative 1/1A – Conventional Bridge Construction was the front runner. However, the estimated construction schedule prepared for the analysis concluded that construction would not be complete until late October of 2019, based on an April 1, 2019 construction notice to proceed which would fall within the COS event schedule. Through additional discussion it was determined that with additional construction crews, Alternative 1/1A could potentially be completed prior to the event schedule and should be considered a viable option for construction. Alternative 4 – Arch Structure received the second highest ratings due to its ability to be constructed cost effectively and efficiently with construction estimated to be completed in early August of 2019, well ahead of the beginning of the COS event schedule. Since the final determination of the alternative selected for construction resides with the ADOT design-build contractor, the recommendations of this report are provisions to limit impacts to the traveling public during construction rather than a preferred alternative. Utilizing the analysis data from these two alternatives, the following restrictions, incentives and disincentives are recommended to be included in the ADOT SR-101L, I-17 to Princess Boulevard GPL expansion project RFP.

Restrictions/ Incentives/ Disincentives	
Median Construction via Ingress/Egress from HOV lanes	90 days Maximum (6.1.1)
HOV Lane Closure Duration	20 days Maximum (6.1.2)
Crossing Completion Date	September 30, 2019 or Earlier (6.1.3)
Ramp Closure Duration	100 days Maximum (6.1.4)
Frontage Road Closure Duration	90 days Maximum (6.1.5)
Additional Directional Mainline Weekend Closures	two EB Closures, two WB Closures (6.1.6)

Table 6.1- Restrictions/Incentives/Disincentives

6.1 RECOMMENDATION DETAILS

6.1.1 Median Construction

Construction within the median that requires ingress and egress from the WB and EB SR-101L HOV lanes shall be limited to the recommended duration. Ingress/egress begins as soon as one direction is shifted to the outside of SR-101L, as shown in Alternative 1 Phase 6. Ingress/egress ends as soon as construction within the median is completed, as shown in Alternative 1 Phase 12.

6.1.2 HOV Lane Closure Duration

HOV lane closure is not recommended for extended periods due to the traffic impacts associated with the closure as estimated in Alternative 4. Incentives should be included to reduce HOV lane closure durations. Incentives recommended are $1,000 per day per direction ($40,000 maximum incentive). Alternatively, if the contractor cannot open the HOV lanes within the 20-day maximum closure window, liquidated damages should be assessed. Liquidated damages are recommended at $500 per 15-minute interval per direction.

6.1.3 Crossing Completion Date

The crossing completion date is based on the contractor shifting traffic back into the standard general purpose construction temporary inside lane configuration, which would include one HOV lane and three GPL in each direction with all ramps open between Scottsdale and Hayden Roads. Incentives should be included to reduce the construction duration. Incentives recommended are $5,000 per day ($50,000 maximum incentive). Alternatively, if the contractor cannot open the HOV lanes prior to the specified completion date, liquidated damages should be assessed. Liquidated damages are recommended at $20,000 per day past the completion date.

6.1.4 Ramp Closure Duration

Closure of the ramps is necessary to construct the ADOT GPL expansion project; however, 100 days is assumed to be longer than the ADOT project would typically need. Incentives should be included to reduce the ramp closure durations. Incentives are recommended at $1,000 per day per ramp opened before the maximum closure duration ($120,000 maximum incentive). Alternatively, if the contractor cannot open the ramps prior to the specified completion date, liquidated damages should be assessed. Liquidated damages are recommended at $500 per 15-minute interval per ramp.

6.1.5 Frontage Road Closure Duration

Closure of the frontage road should only occur if construction interferes with traffic flow. If construction is not ongoing and the contractor is found to keep the frontage road closed they should be assessed liquidated damages in the amount of $500 per hour.

6.1.6 Additional Mainline Closures

It is assumed that the ADOT GPL expansion project will close this section of freeway twice during the construction of the GPL. The contractor will be allotted two additional directional closures to construct the Miller Road SR-101L crossing. If additional closures are necessary, liquidated damages should be assessed. Liquidated damages are recommended to be $50,000 per day per direction.

6.2 ADDITIONAL R/W REQUIREMENTS

In addition, it is recommended that a TCE be acquired from ASLD as part of the preparation for the ADOT GPL expansion project to allow additional alternatives to be considered that may require extensive excavation for construction. The TCE shown in Figure 6.1 is based on Alternative 3 which required the largest TCE out of all four alternatives. Preliminary ultimate R/W plans for Miller Road from 76th Street to Princess Boulevard are provided in **Appendix N**.

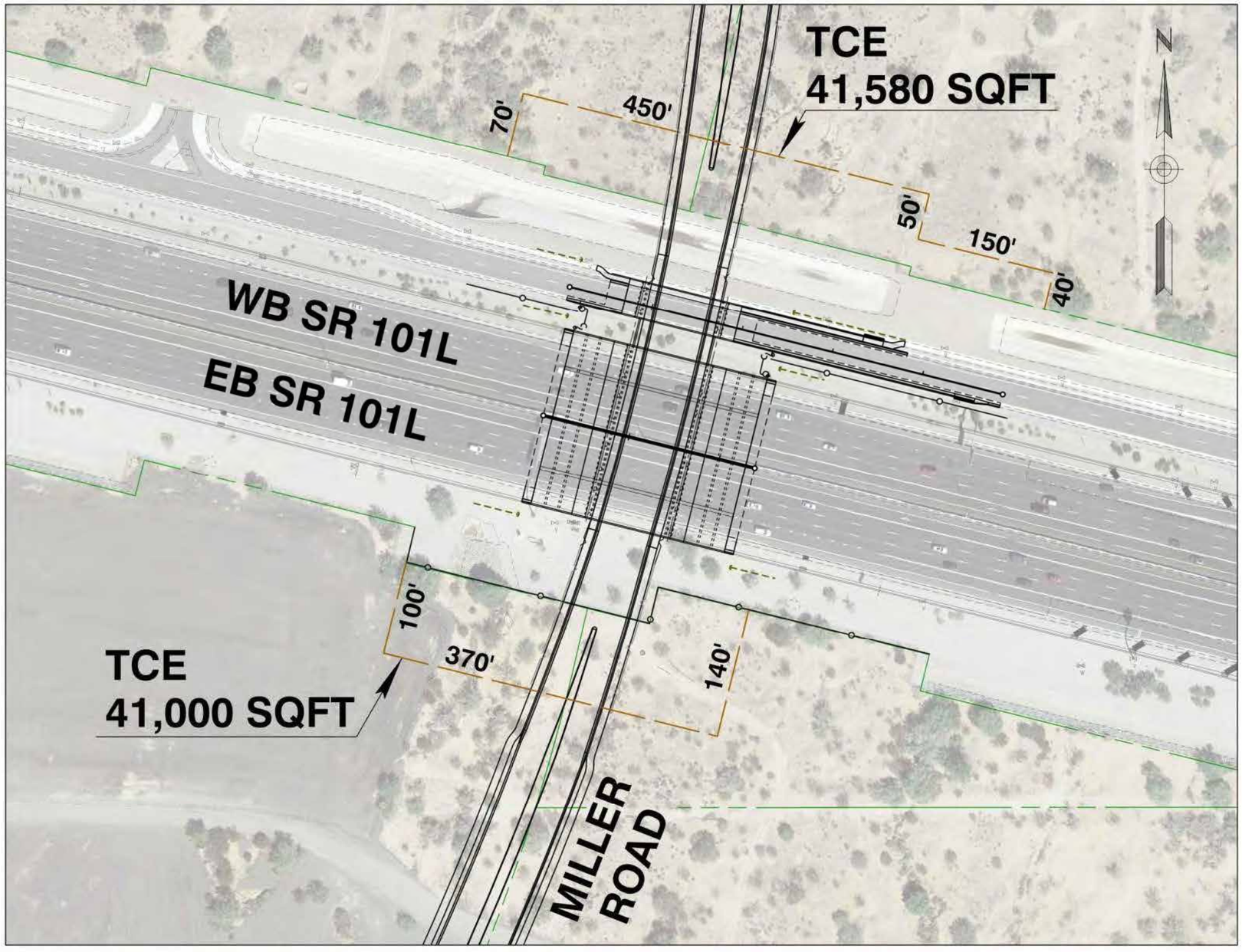
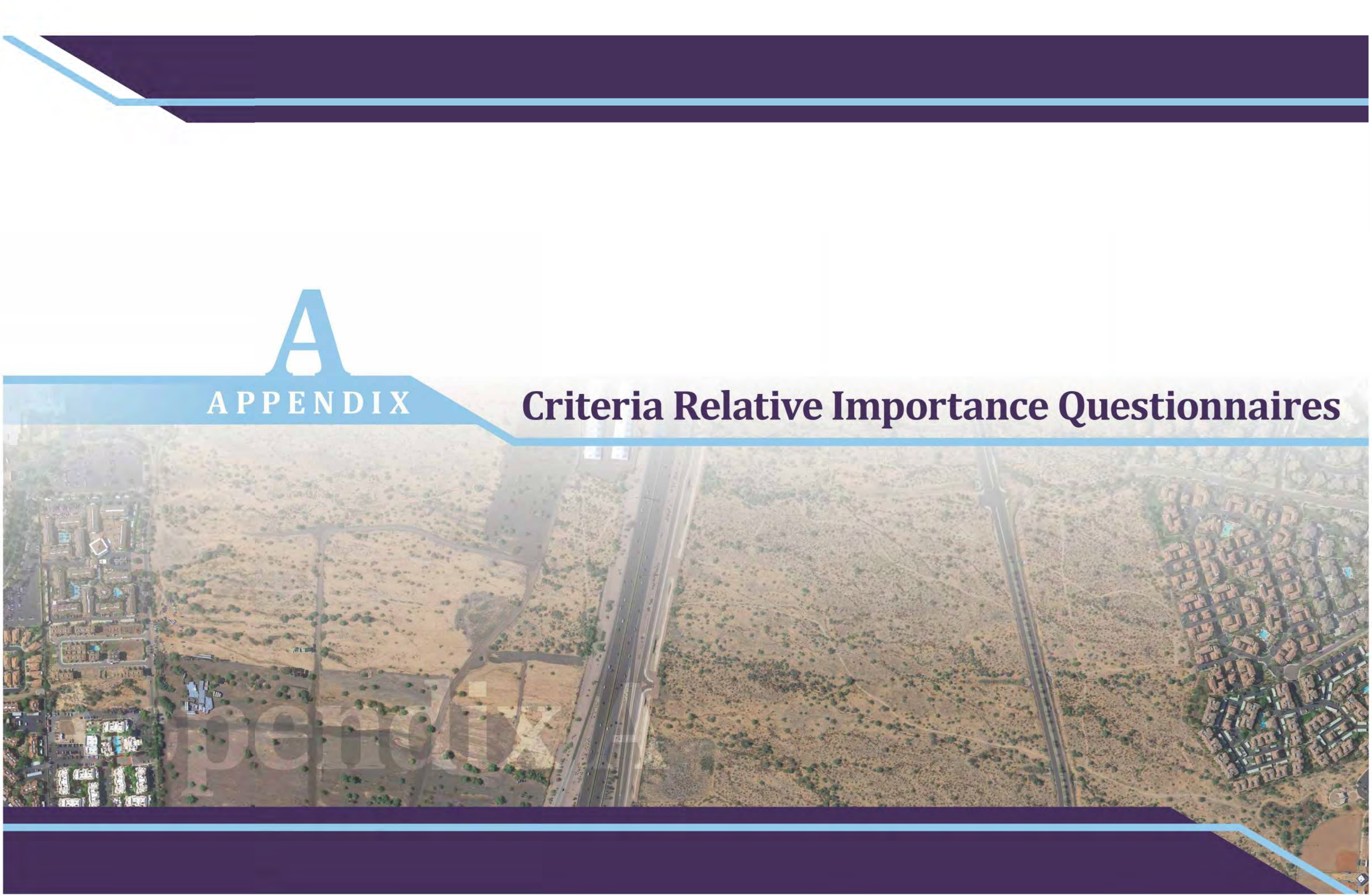


Figure 6.1 – Recommended Temporary Construction Easement

APPENDIX A

Criteria Relative Importance Questionnaires



Miller Road CAA
Relative Importance Questionnaire
SUMMARY OF AVERAGES

CRITERIA	Definition	KHA	ADOT	City of Scottsdale	MAG	ASLD	All Respondents
Constructability/Risk/Construction Safety/Motorist Safety	Does the alternative utilize common construction practices that are readily available in the contracting industry to complete the project and ensure efficient construction? Does the alternative minimize the potential of unnecessary additional costs or schedule delays? Does the alternative reduce the potential for unsafe conditions including unreasonably short construction durations, confined spaces or complicated construction techniques? Does the alternative maximize the safety of motorists traveling along SR101L and the local roadway network?	36.4	29.0	20.7	45.0	25.0	32.9
Construction Quality Control	Does the alternative provide adequate construction durations required to produce quality materials and craftsmanship?	4.8	6.5	8.0	5.0	0.0	5.3
Construction Cost/Need for Specialty Contractor/ADOT Facility Impacts	Does the alternative provide the best cost of construction? Can the alternative be constructed utilizing standard construction practices typically used within the state of Arizona? Does the alternative minimize impacts to ADOT facilities including Lighting, FMS, Signing/Marking, Pavement, etc…	16.4	16.0	20.3	15.0	10.0	16.5
Future Maintenance Costs	Does the alternative minimize costs of future maintenance?	5.4	5.5	5.7	4.0	5.0	5.3
Construction Schedule/Utility Impacts/Additional Travel Time and Delays	Does the alternative minimize the schedule of construction? Does the alternative minimize the impacts to existing and future utilities? Does the alternative minimize impacts to motorist travel times and delays?	26.0	27.5	34.0	18.5	20.0	26.4
Impact to Developable Land/Drainage Impacts/Environmental Impacts/Aesthetics	Is developable land maximized by the alternative? Does the alternative minimize negative impacts to offsite and onsite drainage patterns? Does the alternative minimize environmental impacts? Are there opportunities to incorporate aesthetics into the alternative?	11.1	15.5	11.3	12.5	40.0	13.7
	Relative Importance Total Points	100	100	100	100	100	100

APPENDIX B

Traffic Delay Modeling

Alternative	Phase	Model	Duration (days)	Increase in Peak Hour Delay (hr)	
				Unmitigated	Mitigated
Alternative 1	4 - EB/WB On-Ramp Weekday Closures	1, 2	89	316,128	105,020
	5 - EB Mainline Weekend Closure	3	2	18,904	11,712
	7 - WB Mainline Weekend Closure - Reroute to Frontage Rd	5	2	5,776	4,428
	9 - EB Mainline Weekend Closure	3	2	18,904	11,712
	11 - WB Mainline Weekend Closure - Reroute to Frontage Rd	5	2	5,776	4,428
	Total	**-**	**97**	**365,488**	**137,300**
Alternative 2	4 - EB/WB On-Ramp Weekday Closures	1, 2	103	365,856	121,540
	5 - EB Mainline Weekend Closure & WB HOV Closure	3, 8	2	18,908	11,716
	6 - EB/WB On-Ramp Weekday Closures	1, 2	5	17,760	5,900
	7 - WB Mainline Weekend Closure - Reroute to Legacy	4	2	30,988	9,580
	8 - EB/WB On-Ramp Weekday Closures	1, 2	19	67,488	22,420
	9 - EB Mainline Weekend Closure	3	2	18,904	11,712
	10 - EB/WB On-Ramp Weekday Closures	1, 2	5	17,760	5,900
	11 - WB Mainline Weekend Closure - Reroute to Legacy	4	2	30,988	9,580
	13 - EB Mainline Weekend Closure	3	2	18,904	11,712
	15 - WB Mainline Weekend Closure - Reroute to Legacy	4	2	30,988	9,580
	Total	**-**	**140**	**568,652**	**198,348**
Alternative 3	4 - EB/WB On-Ramp Weekday Closures	1, 2	96	340,992	113,280
	5 - EB Mainline Weekend Closure & EB/WB HOV Closure	3, 8	2	18,908	11,716
	6 - EB/WB On-Ramp Weekday Closures & EB/WB HOV Closure	1, 2, 6, 7	5	18,640	6,780
	7 - WB Mainline Weekend Closure - Reroute to Legacy & HOV Closure	4, 8	2	30,992	9,584
	8 - EB/WB On-Ramp Weekday Closures	1, 2	5	17,760	5,900
	9 - EB Mainline Weekend Closure	3	2	18,904	11,712
	10 - EB/WB On-Ramp Weekday Closures	1, 2	5	17,760	5,900
	11 - WB Mainline Weekend Closure - Reroute to Frontage Rd	5	2	5,776	4,428
	13 - EB Mainline Weekend Closure	3	2	18,904	11,712
	15 - WB Mainline Weekend Closure - Reroute to Frontage Rd	5	2	5,776	4,428
	Total	**-**	**119**	**469,732**	**169,300**
Alternative 4	4 - EB/WB On-Ramp Weekday Closures	1, 2	82	291,264	96,760
	5 - EB Mainline Weekend Closure	3	2	18,904	11,712
	6 - EB/WB On-Ramp Weekday Closures & EB/WB HOV Closure	1, 2, 6, 7	5	18,640	6,780
	7 - WB Mainline Weekend Closure - Reroute to Legacy	4	2	30,988	9,580
	8 - EB/WB HOV Closure	6, 7, 8	12	1,762	1,762
	9 - WB Mainline Weekend Closure - Reroute to Legacy & HOV Closure	4, 8	2	30,992	9,584
	10 - EB/WB HOV Closure	6, 7	5	880	880
	11 - WB Mainline Weekend Closure - Reroute to Frontage Rd	5	2	5,776	4,428
	Total	**-**	**112**	**399,206**	**141,486**

Network Measures of Effectiveness for Loop 101 in Miller Road Underpass Construction Scenarios

MEASURE OF EFFECTIVENESS	*WEEKDAY AM*		*WEEKDAY PM*		*WEEKEND MD*	
	EXISTING	HOV CLOSED	EXISTING	HOV CLOSED	EXISTING	HOV CLOSED
Total Vehicle Miles	31,118.9	30,791.9	31,450.6	30,548.4	21,830.9	21,452.8
Vehicle Hours of Move Time	488.9	483.6	493.9	480.3	345.1	338.6
Vehicle Hours of Delay Time	35.1	53.6	34.7	191.9	16.6	18.5
Total Time	524.0	537.2	528.6	672.2	361.7	357.0
Average Speed	59.4	57.3	59.5	45.4	60.4	60.1

Network Measure of Effectiveness	Scenario												
	Existing Weekday AM	Weekday AM Ramps Closed	Weekday AM Ramps Closed - Mitigated	Existing Weekday PM	Weekday PM Ramps Closed	Weekday PM Ramps Closed - Mitigated	Existing Weekend MD	Weekend MD EB Closure	Weekend MD EB Closure - Mitigated	Weekend MD WB Closure (Reroute on Legacy)	Weekend MD WB Closure (Reroute on Legacy) - Mitigated	Weekend MD WB Closure (Reroute on Frontage)	Weekend MD WB Closure (Reroute on Frontage) - Mitigated
Control Delay / Veh (s/v)	17	269	85	16	147	67	15	387	242	700	221	168	131
Queue Delay / Veh (s/v)	0	0	0	0	2	2	0	3	3	2	2	5	4
Total Delay / Veh (s/v)	17	269	85	16	149	69	15	391	245	702	223	173	135
Total Delay (hr)	113	2308	728	120	1477	685	97	4823	3025	7844	2492	1541	1204
Stops / Veh	0.40	0.53	0.53	0.42	0.55	0.60	0.39	0.57	0.56	0.71	0.60	0.58	0.63
Stops (#)	9176	16361	16204	11094	19676	21359	8896	25398	24938	28538	24109	18605	20185
Average Speed (mph)	20	4	9	21	6	11	22	3	4	2	4	6	7
Total Travel Time (hr)	299	2606	1026	363	1834	1043	293	5287	3489	8253	2900	1878	1542
Distance Traveled (mi)	5961	9328	9329	7780	11280	11280	6327	14442	14442	12830	12830	10564	10563
Fuel Consumed (gal)	393	2178	1019	485	1670	1102	398	4299	2977	6455	2508	1697	1459
Fuel Economy (mpg)	15.2	4.3	9.2	16.0	6.8	10.2	15.9	3.4	4.9	2.0	5.1	6.2	7.2
CO Emissions (kg)	27.47	152.24	71.24	33.88	116.75	77.01	27.82	300.47	208.11	451.21	175.29	118.63	101.99
NOx Emissions (kg)	5.34	29.62	13.86	6.59	22.72	14.98	5.41	58.46	40.49	87.79	34.11	23.08	19.84
VOC Emissions (kg)	6.37	35.28	16.51	7.85	27.06	17.85	6.45	69.64	48.23	104.57	40.63	27.49	23.64
Unserved Vehicles (#)	0	3957	1960	0	4116	1847	0	11456	10228	9968	7044	4487	3678
Vehicles in dilemma zone (#)	158	109	130	263	146	176	266	132	134	137	201	225	243
Performance Index	138.1	2353.2	773.2	151.0	1531.4	744.2	121.4	4893.6	3094.7	7923.5	2558.6	1592.3	1260.3

APPENDIX C

Alternative 1 – Conventional Bridge Plans

CITY OF SCOTTSDALE

PUBLIC IMPROVEMENTS

COUNCIL
W.J. "JIM" LANE, MAYOR
SUZANNE KLAPP
VIRGINIA KORTE
KATHY LITTLEFIELD
LINDA MILHAVEN
GUY PHILLIPS
DAVID N. SMITH

CITY MANAGER
JIM THOMPSON

CITY ATTORNEY
BRUCE WASHBURN

CITY CLERK
CAROLYN JAGGER

"AS-BUILT" CERTIFICATION

I HEREBY CERTIFY THAT THE "AS-BUILT" IMPROVEMENTS AS SHOWN HEREON ARE LOCATED AS NOTED, AND THE LOCATIONS ARE CORRECT TO THE BEST OF MY KNOWLEDGE AND BELIEF.

REGISTERED LAND SURVEYOR _____ DATE _____

CITY OF SCOTTSDALE

REVIEWED AND RECOMMENDED APPROVAL BY:

PAVING		STRUCTURES	
GRADING & DRAINAGE		BUILDING	
WATER & SEWER		PLUMBING	
TRAFFIC		MECHANICAL	
PLANNING IMPROVEMENTS		ELECTRICAL	
PLANNING FACILITIES		FIRE IMPROVEMENTS	
LANDSCAPE		FIRE FACILITIES	
NATIVE PLANT			

ENGINEERING COORDINATION MANAGER (OR DESIGNEE) _____ DATE _____

BUILDING OFFICIAL (OR DESIGNEE) _____ DATE _____

ENGINEER

ENGINEERING FIRM
LOGO & ADDRESS
GOES HERE

10/27/2017 3:57:43 PM DGN

MILLER ROAD/SR 101L OVERPASS
CONSTRUCTION ALTERNATIVE ANALYSIS
ALTERNATIVE 1 - CONVENTIONAL BRIDGE
PROJECT NO. SC03B

NO CONFLICT SIGNATURE BLOCK				
Utility	Utility Company	Name of Company Representative	Telephone Number	Date Signed
Electric				
Telephone				
Natural Gas				
Cable TV				
Water				
Sewer				

Engineer's Certification

I _____, as the Engineer of Record for this development, hereby certify that all utility companies listed above have been provided final improvement plans for review, and that all conflicts identified by the utilities have been resolved. In addition, "No Conflict" forms have been obtained from each utility company and are included in this submittal.

Signature _____ Date _____

Certificate of Approval to Construct — Maricopa County Environmental Services Department, Water and Waste Management Division

MCESD #

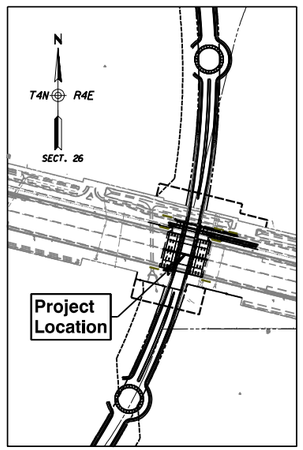
Public Water System ID Number 0407- (and/or) Waste Water System ID Number 0437-
Project Description:

Project Location:
Project Owner:

Pursuant to AAC Title 18: Chapter 4, Article 5: or AAC Title 18: Chapter 9, Article 8: and/or Maricopa County Environmental Health Code Chapters II or V. This certificate of Approval To Construct the above described facilities as represented in the attached plan is valid upon review and signature by a Maricopa County Environmental Services Department's representative given the following provisions.
1.) A Request for Certificate of Approval of Construction, together with an Engineer's Certificate of Completion, and sealed engineered as-built plans, shall be submitted to this Department prior to Approval of Construction and startup.
2.) The Approval to Construct is void if major modifications occur to the plans without the knowledge and consent of the department.
If Construction has not started within one year of the approval date, this certificate will be void. An extension of time may be available upon written request.

Approved By: _____ Date Approved: _____

CC: MCESD FILE: ADEQ
Engineer: AZ. Corp. Commission



Vicinity Map
N.T.S.

ALTERNATIVES ANALYSIS OCTOBER 2017

SHEET INDEX

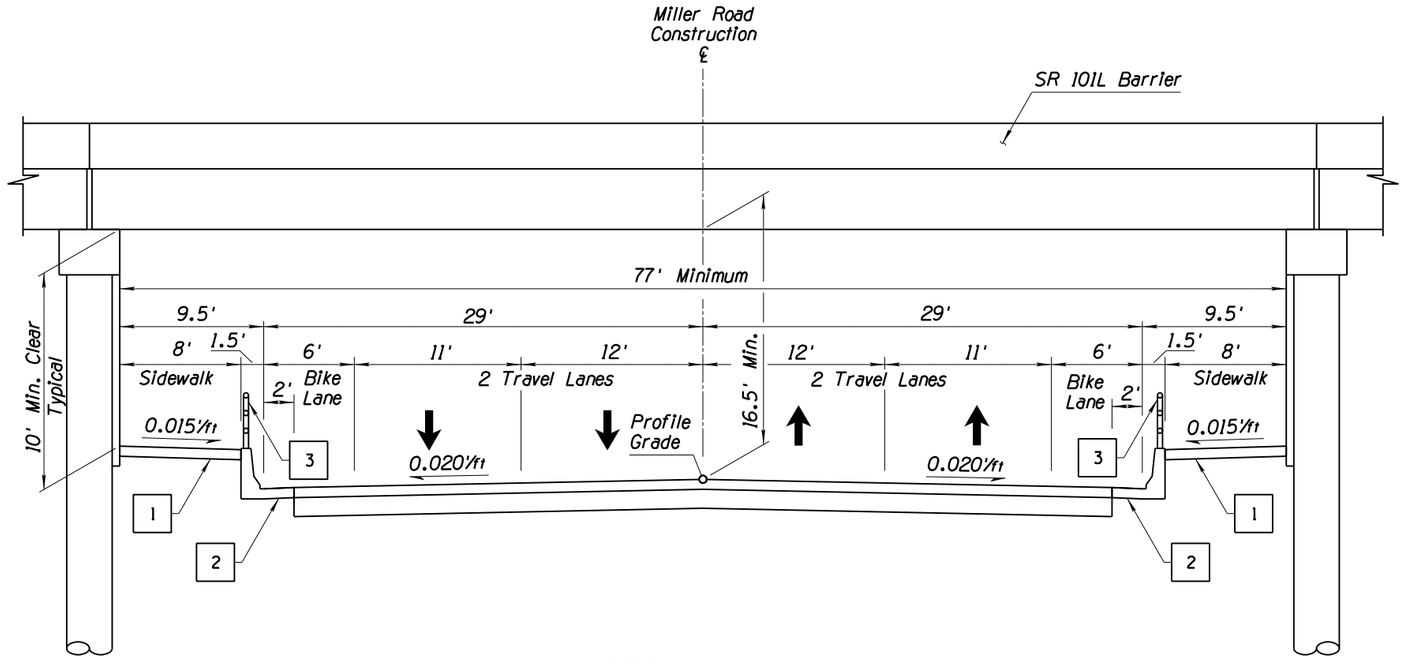
City of Scottsdale approved plans shall be kept on the job site at all times during the course of constuction.

ALTERNATIVE 1 - CONVENTIONAL BRIDGE
PROJECT NO. SC03B

DR/STAFF APPROVAL NO.

PLAN REVIEW NO.

SHT. 1



MILLER ROAD
TYPICAL SECTION

1 *New Concrete Sidewalk*

2 *New Concrete Half Barrier with Gutter*

3 *New Safety Rail*

REQUIRES: 77' MINIMUM WIDTH
PROVIDES: 2 TRAVEL LANES, 11' OUTSIDE, 12' INSIDE
PROVIDES: 8' SIDEWALK WITHOUT LANDSCAPE BUFFER

ALTERNATIVE 1 - CONVENTIONAL BRIDGE

ARIZONA BLUE STAKE
CALL TWO WORKING DAYS BEFORE YOU DIG
Dial 811 or 602-263-1100
1-800-STAKE-IT
(OUTSIDE MARICOPA COUNTY)

DATE	REVISION	BY

ENGINEER

PRELIMINARY
NOT FOR
CONSTRUCTION
OR RECORDING

CITY OF SCOTTSDALE ARIZONA

PUBLIC WORKS

CAPITAL PROJECT MANAGEMENT

7447 E. INDIAN SCHOOL RD.
SCOTTSDALE, ARIZONA 85251

SHEET TITLE
TYPICAL SECTION

PROJECT TITLE
MILLER ROAD/SR 101L OVERPASS
CONSTRUCTION ALTERNATIVE ANALYSIS

SCALE	DESIGNED	DATE	BID NO.	SHT.
HORIZ.	DRR	OCTOBER 2017		
VERT.	DRAWN JFM	AS-BUILT	PROJECT NO. SC03B	2 OF 16

SC03B

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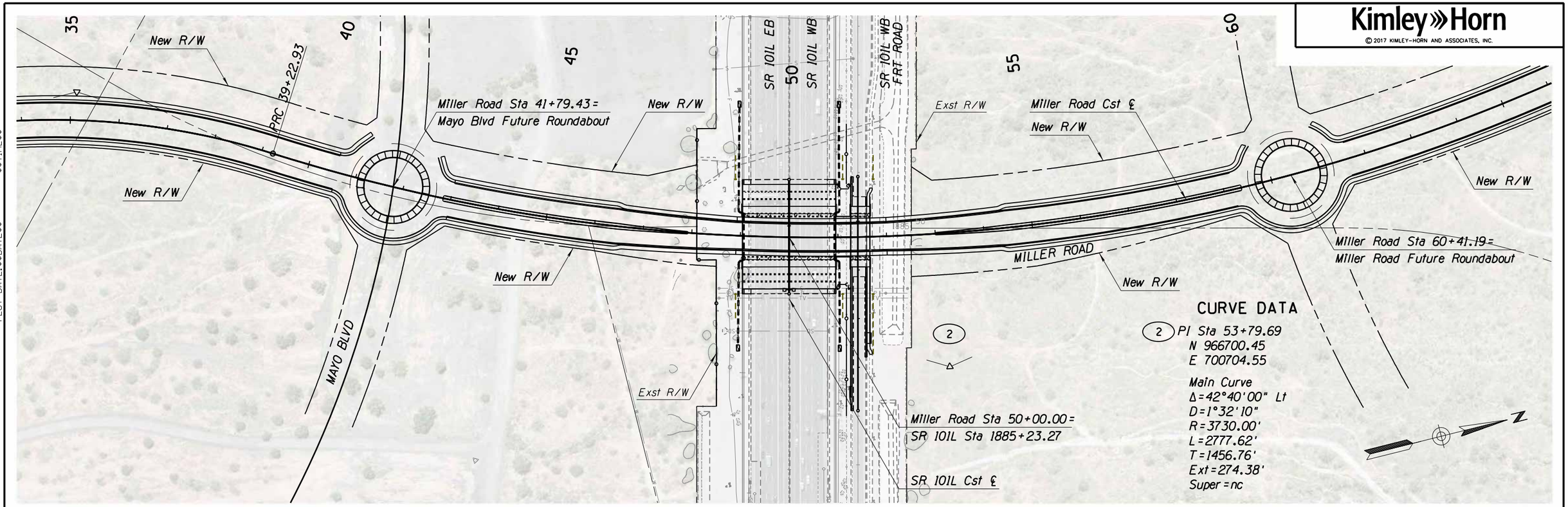
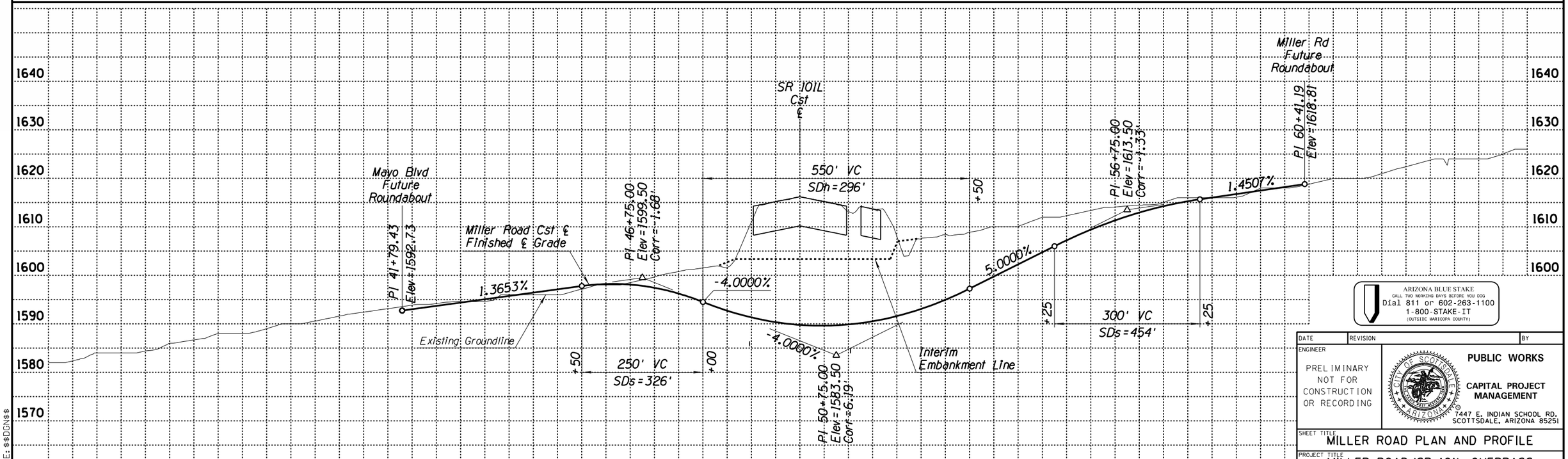
Kimley»Horn



CURVE DATA

(2) PI Sta 53+79.69
N 966700.45
E 700704.55

Main Curve
Δ=42°40'00" Lt
D=1°32'10"
R=3730.00'
L=2777.62'
T=1456.76'
Ext=274.38'
Super=nc



ALTERNATIVE 1 - CONVENTIONAL BRIDGE

ARIZONA BLUE STAKE
CALL TWO WORKING DAYS BEFORE YOU DIG
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1-800-STAKE-IT
(OUTSIDE MARICOPA COUNTY)

DATE	REVISION	BY

ENGINEER

PRELIMINARY
NOT FOR
CONSTRUCTION
OR RECORDING

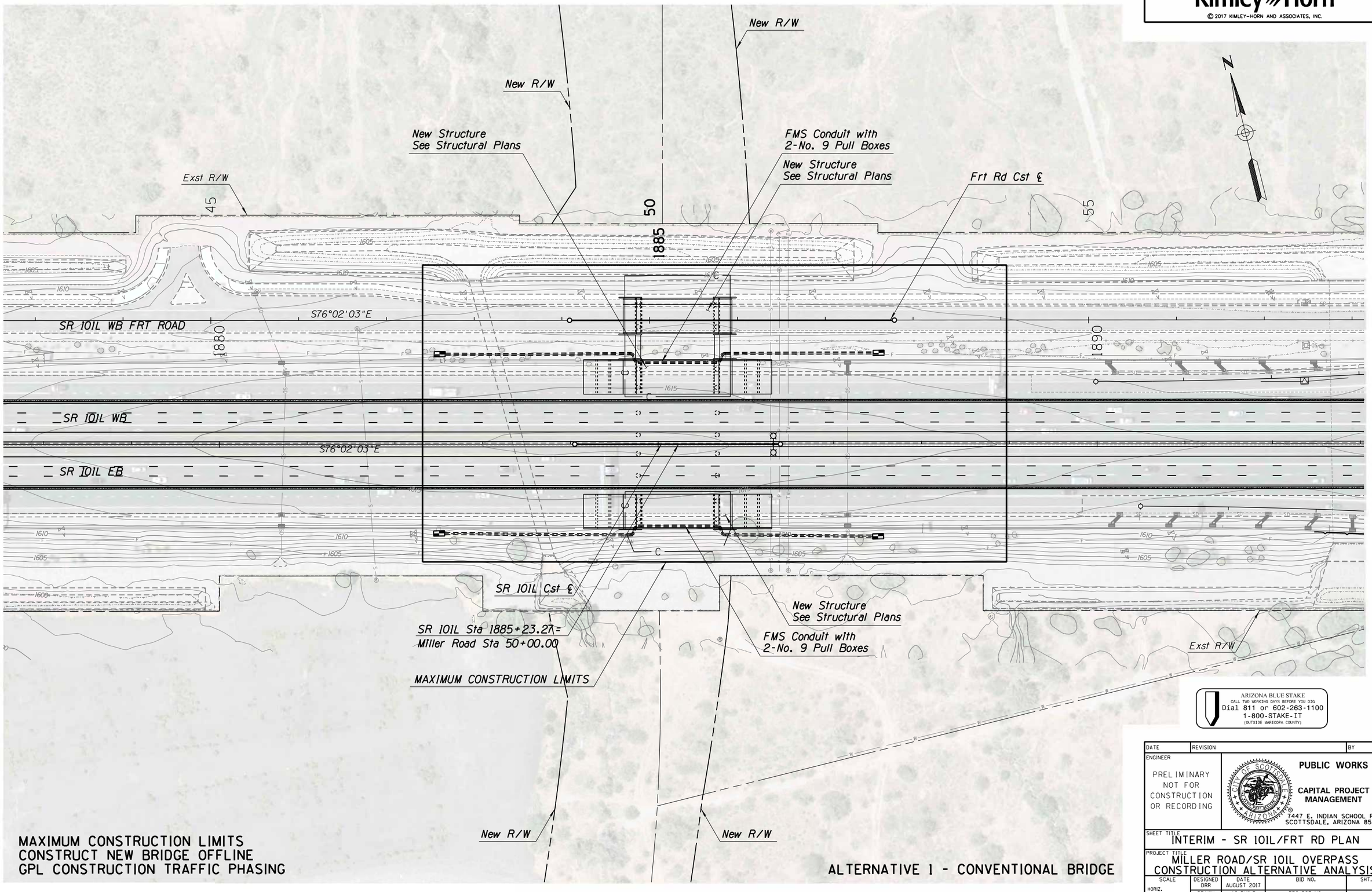
PUBLIC WORKS
CAPITAL PROJECT MANAGEMENT
7447 E. INDIAN SCHOOL RD.
SCOTTSDALE, ARIZONA 85251

SHEET TITLE
MILLER ROAD PLAN AND PROFILE

PROJECT TITLE
MILLER ROAD/SR 101L OVERPASS
CONSTRUCTION ALTERNATIVE ANALYSIS

SCALE	DESIGNED	DATE	BID NO.	SHT.
HORIZ. 1"=100'	DRR	AUGUST 2017		
VERT. 1"=10'	DRAWN JFM	AS-BUILT	PROJECT NO. SC03B	3 OF 16

SC03B



ARIZONA BLUE STAKE
CALL TWO WORKING DAYS BEFORE YOU DIG
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1-800-STAKE-IT
(OUTSIDE MARICOPA COUNTY)

DATE	REVISION	BY

ENGINEER

PRELIMINARY
NOT FOR
CONSTRUCTION
OR RECORDING

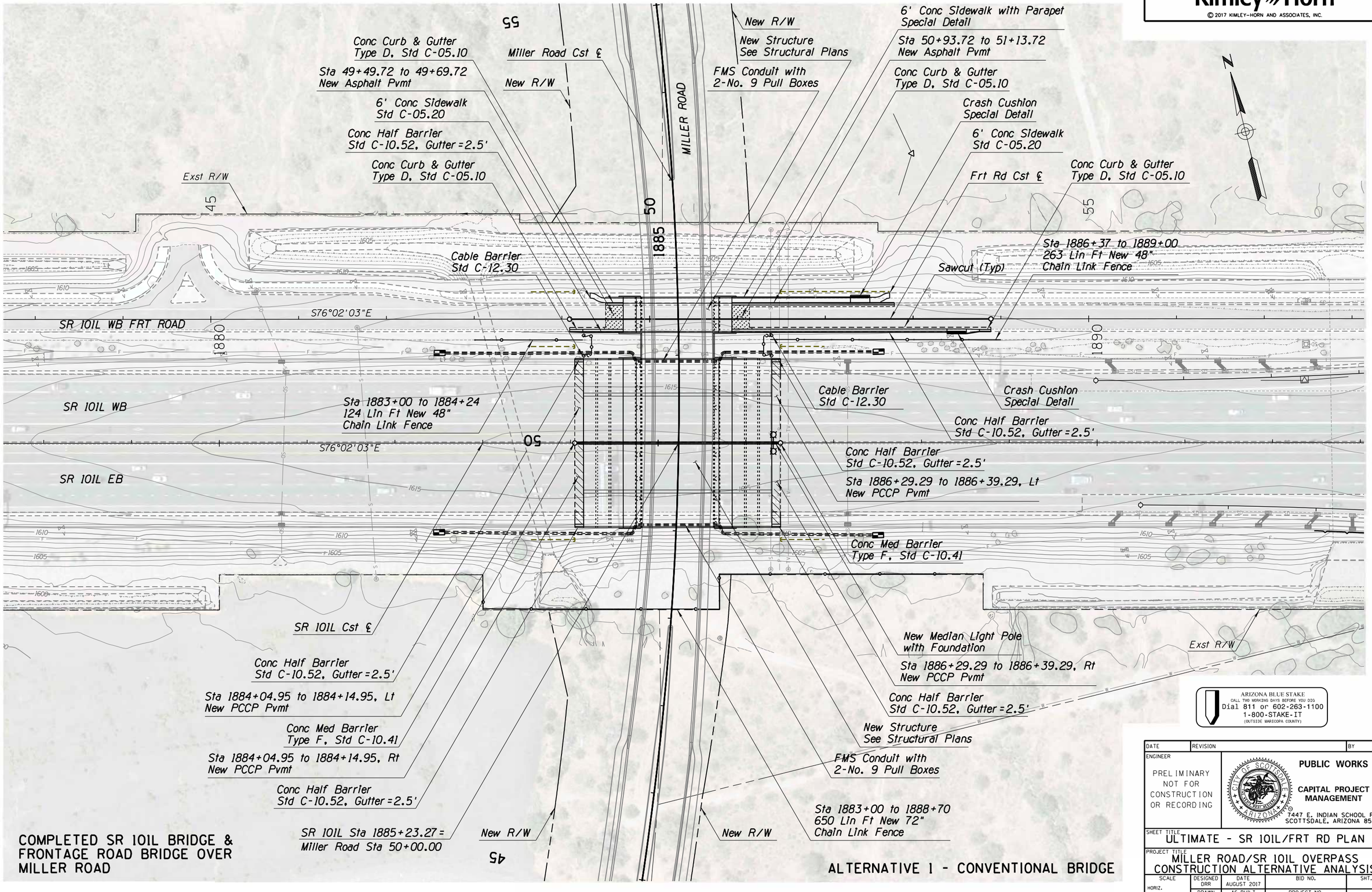
PUBLIC WORKS
CAPITAL PROJECT MANAGEMENT
7447 E. INDIAN SCHOOL RD.
SCOTTSDALE, ARIZONA 85251

SHEET TITLE
INTERIM - SR 101L/FRT RD PLAN

PROJECT TITLE
MILLER ROAD/SR 101L OVERPASS
CONSTRUCTION ALTERNATIVE ANALYSIS

SCALE	DESIGNED	DATE	BID NO.	SHT.
HORIZ.	DRR	AUGUST 2017		
VERT.	DRAWN JFM	AS-BUILT	PROJECT NO. SC03B	4 OF 16

SC03B



COMPLETED SR 101L BRIDGE & FRONTAGE ROAD BRIDGE OVER MILLER ROAD

ALTERNATIVE 1 - CONVENTIONAL BRIDGE

ARIZONA BLUE STAKE
CALL TWO WORKING DAYS BEFORE YOU DIG
Dial 811 or 602-263-1100
1-800-STAKE-IT
(OUTSIDE MARICOPA COUNTY)

DATE	REVISION	BY
ENGINEER		

PRELIMINARY NOT FOR CONSTRUCTION OR RECORDING

CITY OF SCOTTSDALE ARIZONA

PUBLIC WORKS
CAPITAL PROJECT MANAGEMENT
7447 E. INDIAN SCHOOL RD.
SCOTTSDALE, ARIZONA 85251

SHEET TITLE: ULTIMATE - SR 101L/FRT RD PLAN

PROJECT TITLE: MILLER ROAD/SR 101L OVERPASS CONSTRUCTION ALTERNATIVE ANALYSIS

SCALE	DESIGNED	DATE	BID NO.	SHT.
HORIZ.	DRR	AUGUST 2017		
VERT.	DRAWN	AS-BUILT	PROJECT NO.	5 OF 16
	JFM		SC03B	

SC03B

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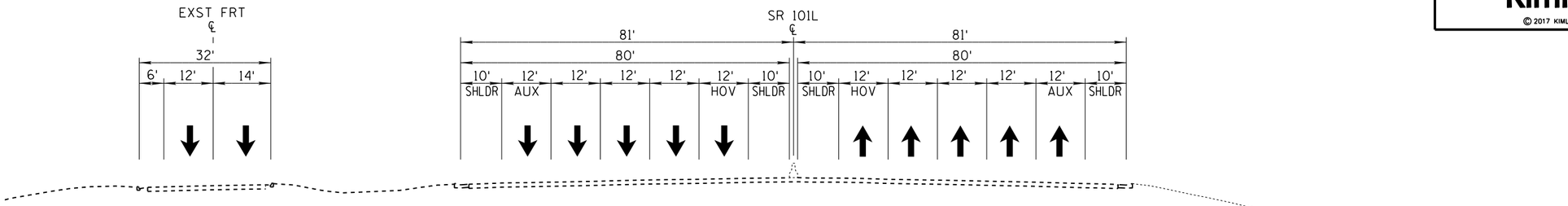
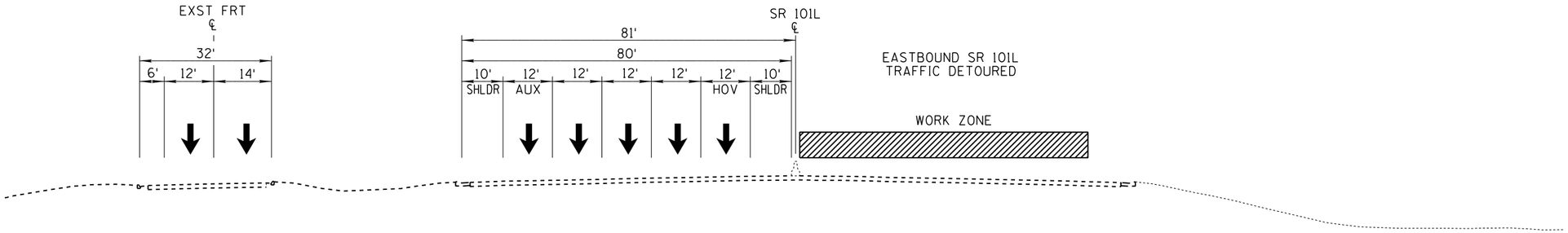
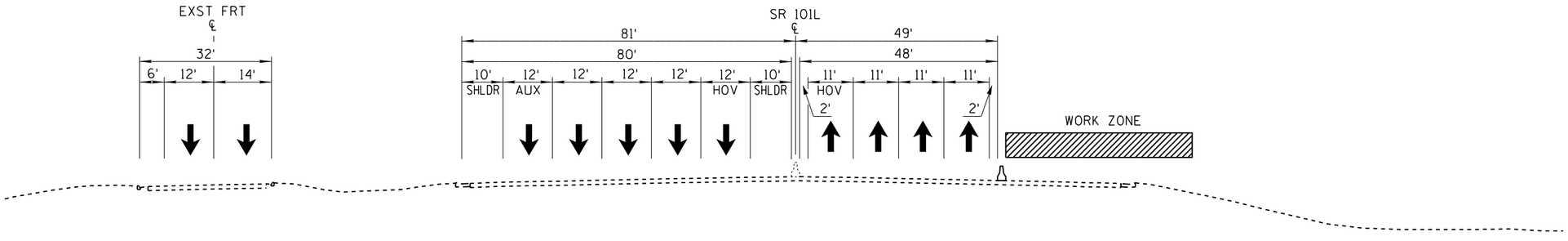


SR 101L EXISTING CONDITION AT MILLER ROAD



PHASE 1 – WEEKEND ACTIVITY



PHASE 2 – WEEKDAY CONDITION

SR 101L
LOOKING EAST

ALTERNATIVE 1 - CONVENTIONAL BRIDGE

DATE	REVISION	BY

ENGINEER

PRELIMINARY
NOT FOR
CONSTRUCTION
OR RECORDING

PUBLIC WORKS

CAPITAL PROJECT MANAGEMENT

7447 E. INDIAN SCHOOL RD.
SCOTTSDALE, ARIZONA 85251

SHEET TITLE: PHASING TYPICAL SECTIONS

PROJECT TITLE: MILLER ROAD/SR 101L OVERPASS CONSTRUCTION ALTERNATIVE ANALYSIS

SCALE	DESIGNED	DATE	BID NO.	SHT.
HORIZ.	KAC	AUGUST 2017		
VERT.	DRAWN JFM	AS-BUILT	PROJECT NO. SC03B	6 OF 16

SC03B

PLOT DATE:$$DATE$$ $$TIME$$

DESIGN FILE:$$DGN$$

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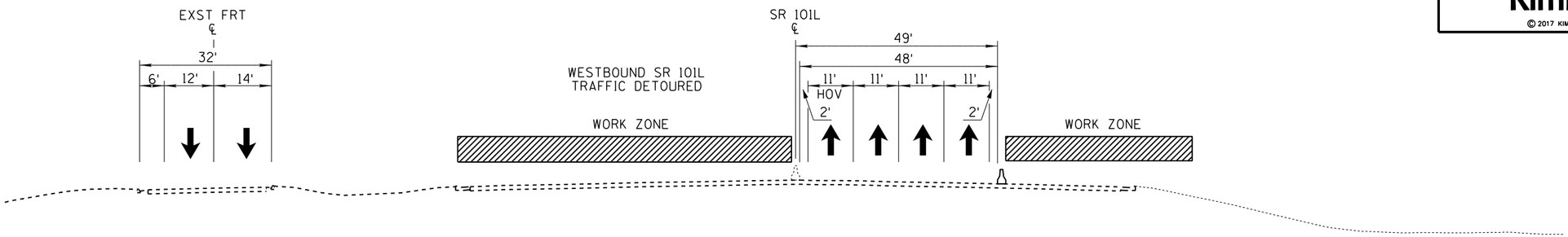
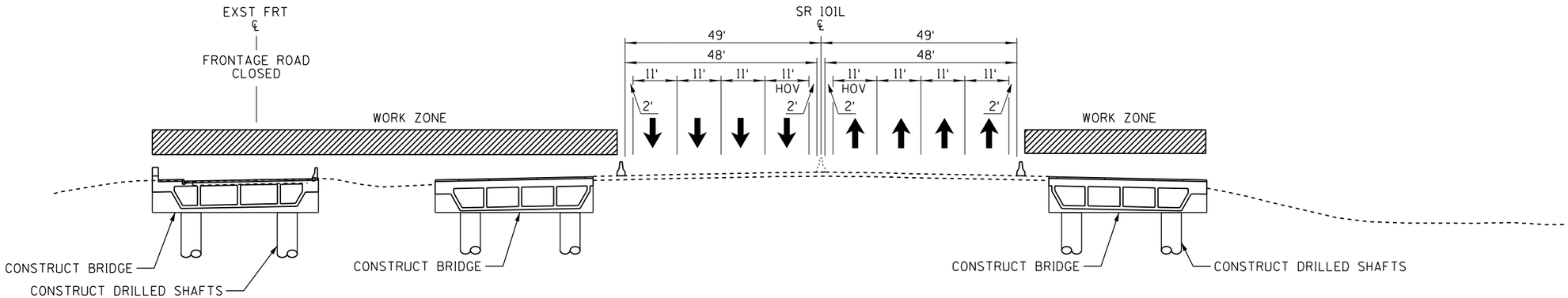
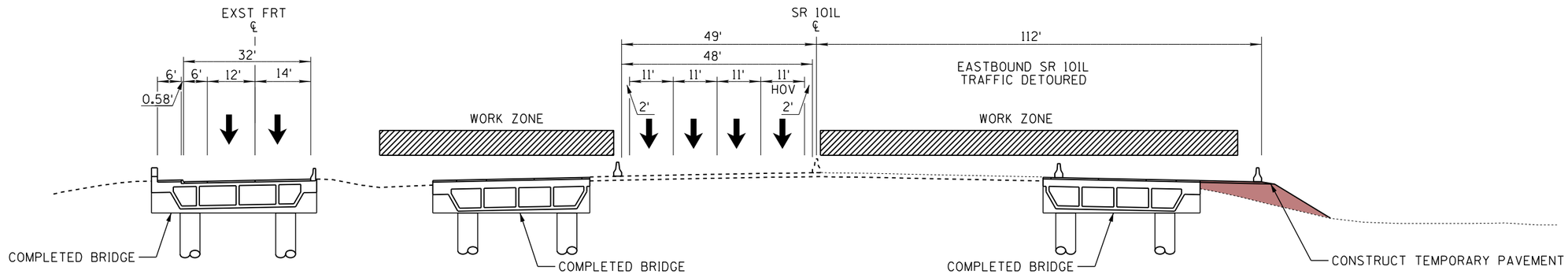


PHASE 3 – WEEKEND ACTIVITY



PHASE 4 – CONSTRUCT CONVENTIONAL BRIDGE OFF-LINE



PHASE 5 – WEEKEND ACTIVITY

SR 101L
LOOKING EAST

ALTERNATIVE 1 - CONVENTIONAL BRIDGE

DATE	REVISION	BY

ENGINEER

PRELIMINARY
NOT FOR
CONSTRUCTION
OR RECORDING

PUBLIC WORKS

CAPITAL PROJECT MANAGEMENT

7447 E. INDIAN SCHOOL RD.
SCOTTSDALE, ARIZONA 85251

SHEET TITLE: PHASING TYPICAL SECTIONS

PROJECT TITLE: MILLER ROAD/SR 101L OVERPASS
CONSTRUCTION ALTERNATIVE ANALYSIS

SCALE	DESIGNED	DATE	BID NO.	SHT.
HORIZ.	KAC	AUGUST 2017		
VERT.	DRAWN JFM	AS-BUILT	PROJECT NO. SC03B	7 OF 16

SC03B

PLOT DATE: $$DATE$$ $$TIME$$

DESIGN FILE: $$DGN$$

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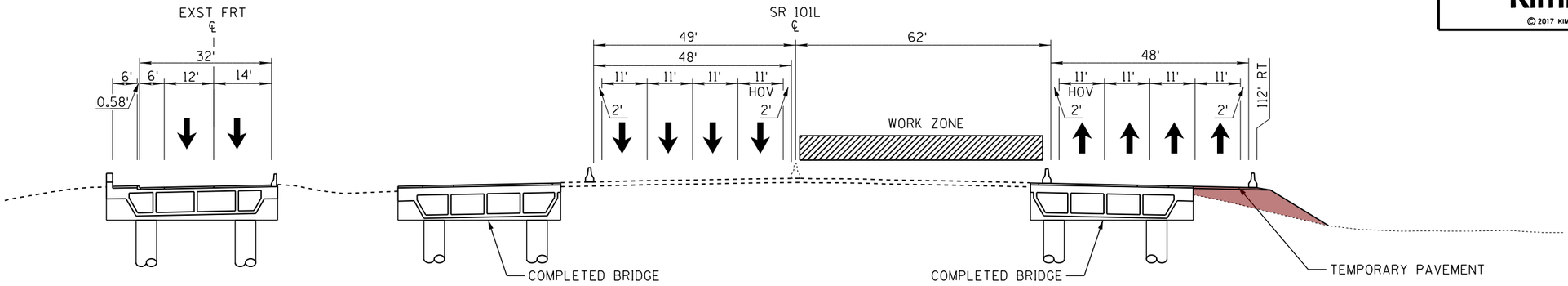
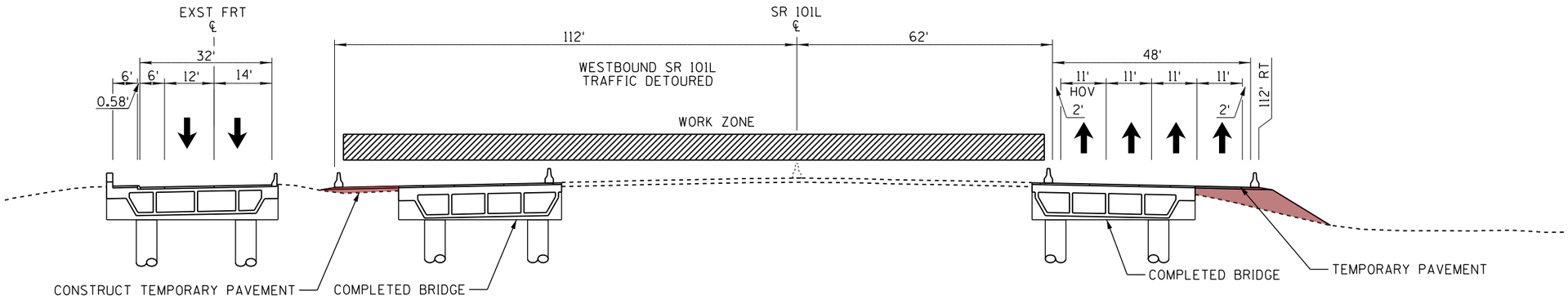
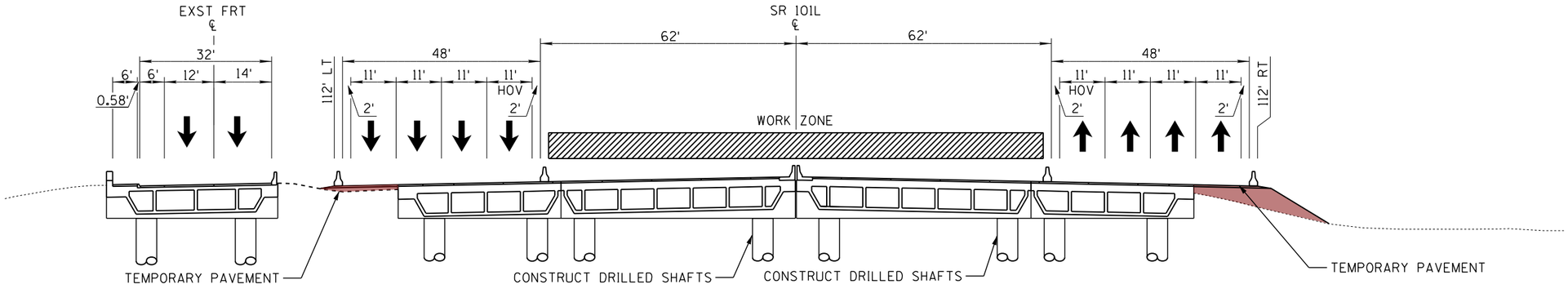


PHASE 6 – WEEKDAY CONDITION



PHASE 7 – WEEKEND ACTIVITY



PHASE 8 – CONSTRUCT CONVENTIONAL BRIDGE OFF-LINE

SR 101L
LOOKING EAST

ALTERNATIVE 1 - CONVENTIONAL BRIDGE

DATE	REVISION	BY

ENGINEER

PRELIMINARY
NOT FOR
CONSTRUCTION
OR RECORDING

PUBLIC WORKS
CAPITAL PROJECT MANAGEMENT
7447 E. INDIAN SCHOOL RD.
SCOTTSDALE, ARIZONA 85251

SHEET TITLE
PHASING TYPICAL SECTIONS

PROJECT TITLE
MILLER ROAD/SR 101L OVERPASS
CONSTRUCTION ALTERNATIVE ANALYSIS

SCALE	DESIGNED	DATE	BID NO.	SHT.
HORIZ.	KAC	AUGUST 2017		
VERT.	DRAWN JFM	AS-BUILT	PROJECT NO. SC03B	8 OF 16

SC03B

PLOT DATE:$$DATE$$ $$TIME$$
DESIGN FILE:$$DGN$$
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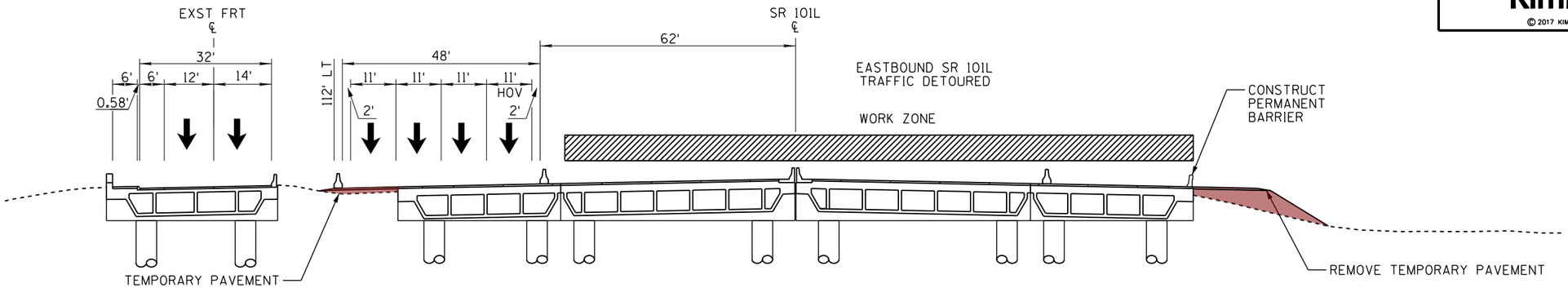
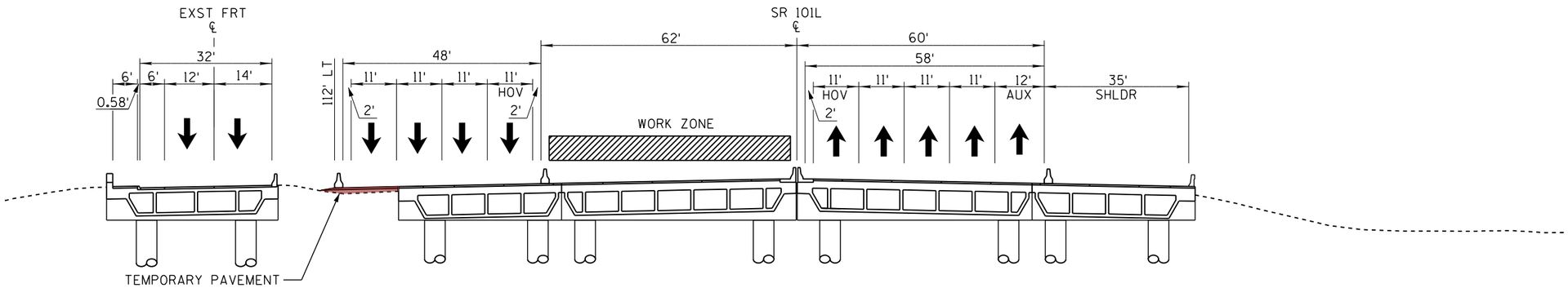
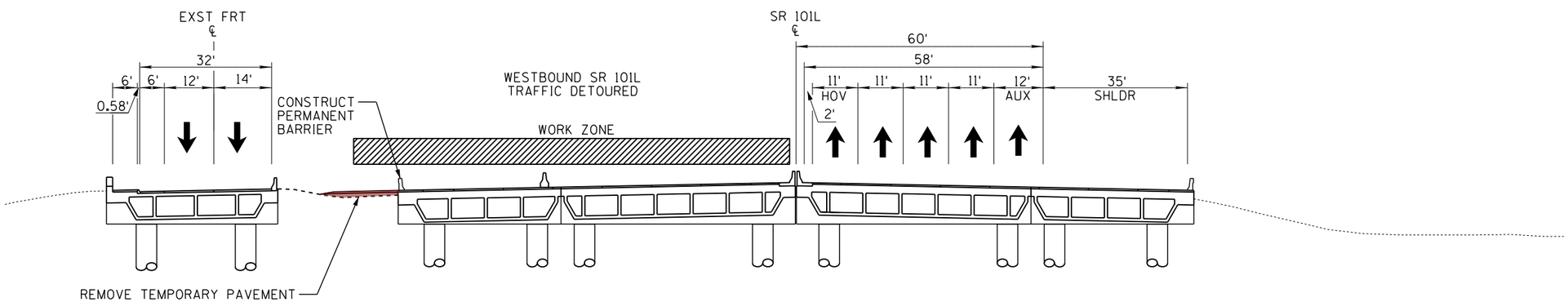


PHASE 9 – WEEKEND ACTIVITY



PHASE 10 – WEEKDAY CONDITION



PHASE 11 – WEEKEND ACTIVITY

SR 101L
LOOKING EAST

ALTERNATIVE 1 - CONVENTIONAL BRIDGE

DATE	REVISION	BY

ENGINEER

PRELIMINARY
NOT FOR
CONSTRUCTION
OR RECORDING

PUBLIC WORKS

CAPITAL PROJECT MANAGEMENT

7447 E. INDIAN SCHOOL RD.
SCOTTSDALE, ARIZONA 85251

SHEET TITLE
PHASING TYPICAL SECTIONS

PROJECT TITLE
MILLER ROAD/SR 101L OVERPASS
CONSTRUCTION ALTERNATIVE ANALYSIS

SCALE	DESIGNED KAC	DATE AUGUST 2017	BID NO.	SHT.
HORIZ.				
VERT.	DRAWN JFM	AS-BUILT	PROJECT NO. SC03B	9 OF 16

SC03B

PLOT DATE: $$DATE$$ $$TIME$$

DESIGN FILE: $$DGN$$

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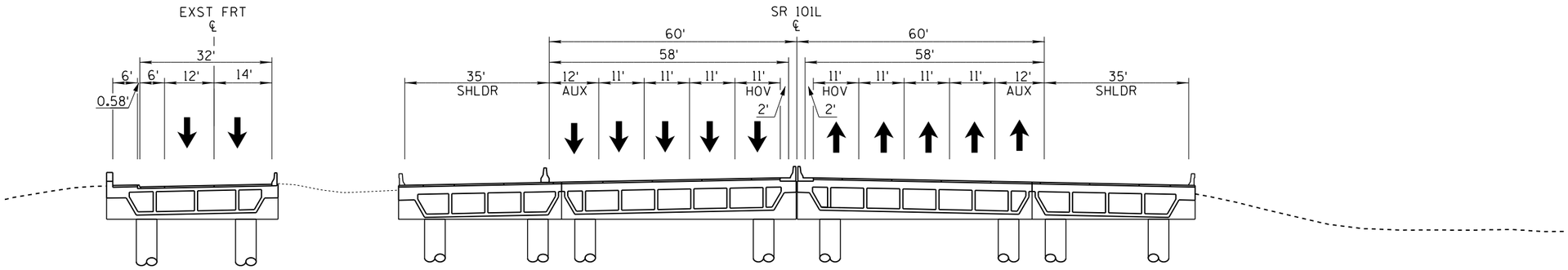
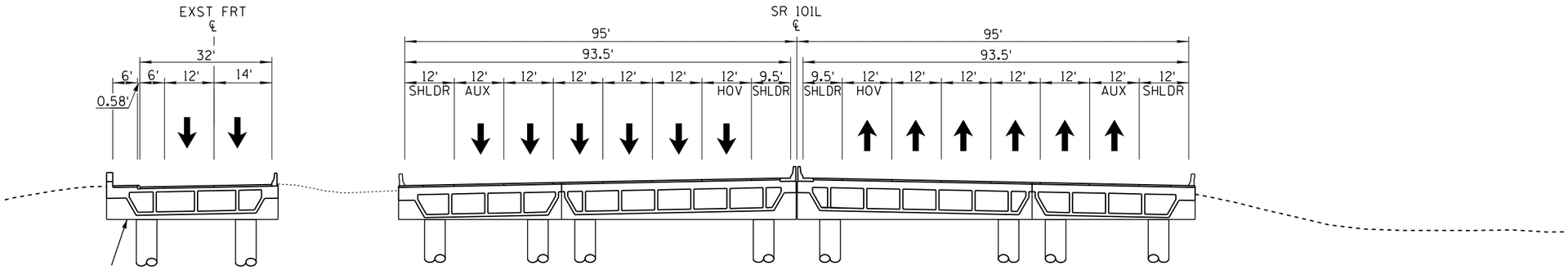


PHASE 12 – BRIDGE CONSTRUCTION COMPLETE – TRAFFIC IN GPL CONSTRUCTION CONFIGURATION



PHASE 13 – MILLER RD BRIDGE CONSTRUCTION COMPLETE – GPL CONSTRUCTION COMPLETE

SR 101L
LOOKING EAST

ALTERNATIVE 1 - CONVENTIONAL BRIDGE

DATE	REVISION	BY

ENGINEER

PRELIMINARY
NOT FOR
CONSTRUCTION
OR RECORDING

CITY OF SCOTTSDALE ARIZONA

PUBLIC WORKS

CAPITAL PROJECT MANAGEMENT

7447 E. INDIAN SCHOOL RD.
SCOTTSDALE, ARIZONA 85251

SHEET TITLE
PHASING TYPICAL SECTIONS

PROJECT TITLE
MILLER ROAD/SR 101L OVERPASS
CONSTRUCTION ALTERNATIVE ANALYSIS

SCALE	DESIGNED	DATE	BID NO.	SHT.
HORIZ.	KAC	AUGUST 2017		
VERT.	DRAWN JFM	AS-BUILT	PROJECT NO. SC03B	10 OF 16

SC03B

PLOT DATE: $$DATE$$ $$TIME$$

DESIGN FILE: $$DGN$$

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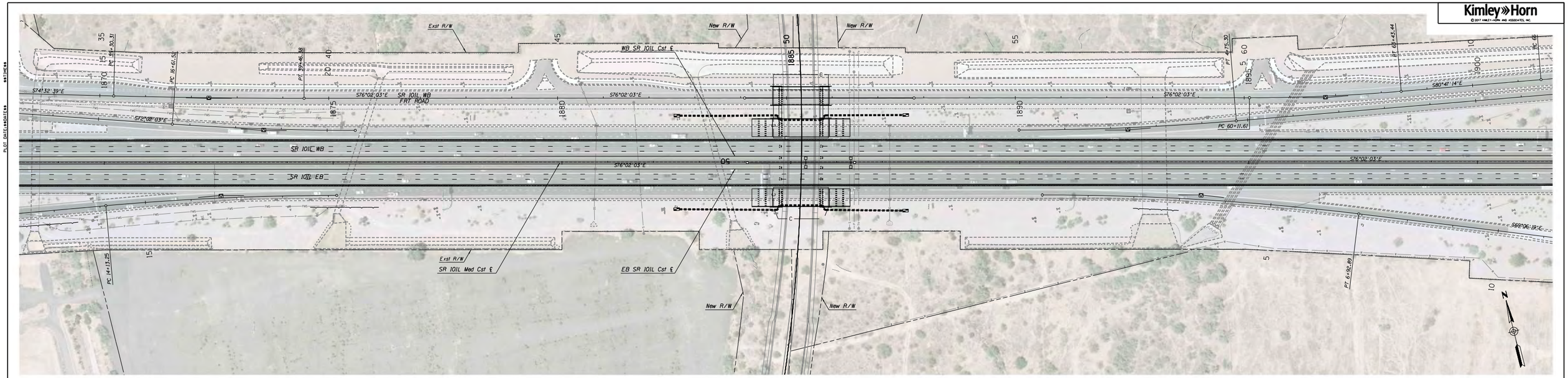
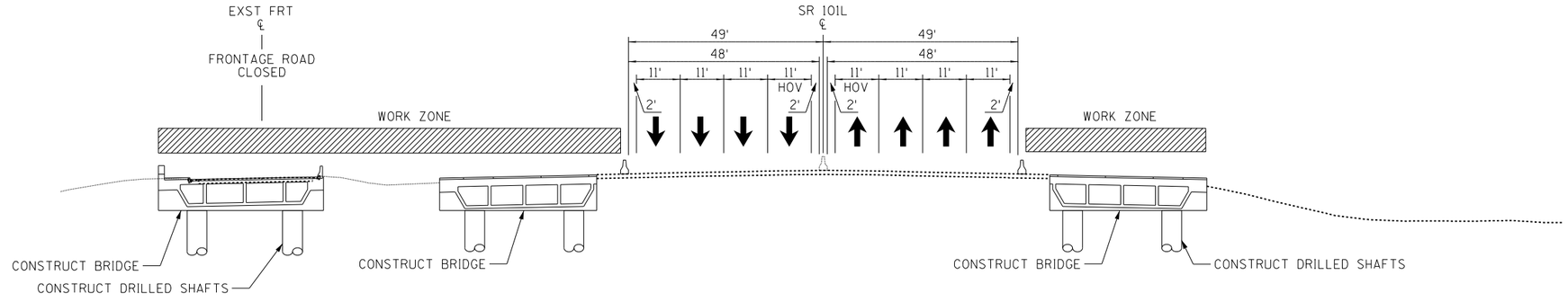




PHASE 4 – CONSTRUCT CONVENTIONAL BRIDGE OFF–LINE

ALTERNATIVE 1 - CONVENTIONAL BRIDGE

Kimley»Horn

ARIZONA BLUE STAKE, INC.
Dial 811 or 602-263-1100
1-800-STAKE-IT

DATE	REVISION	BY
ENGINEER		
PRELIMINARY NOT FOR CONSTRUCTION OR RECORDING		

PUBLIC WORKS
CAPITAL PROJECT MANAGEMENT
7447 E. INDIAN SCHOOL RD.
SCOTTSDALE, ARIZONA 85251

SHEET TITLE: TRAFFIC CONTROL PHASE 4

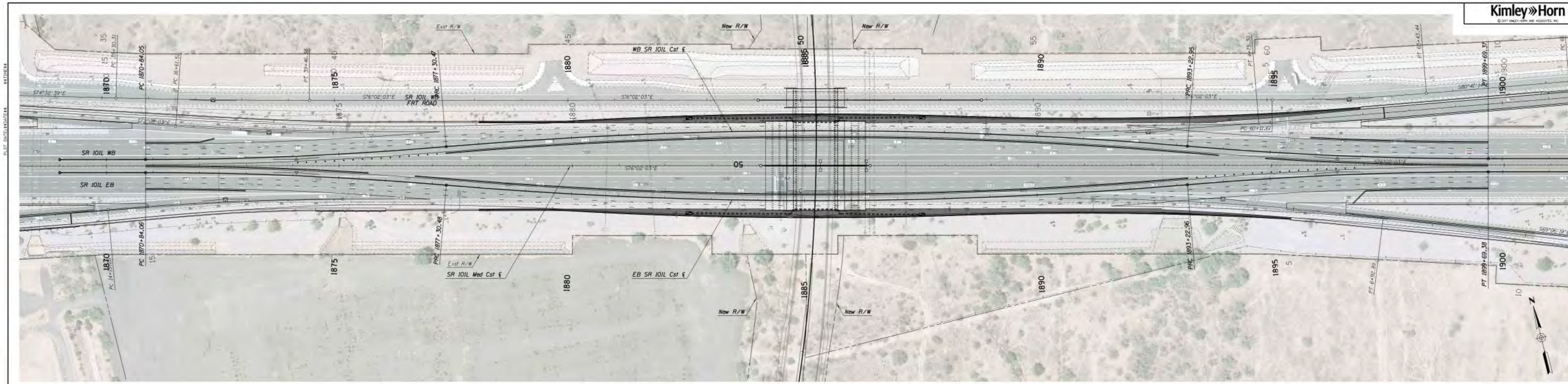
PROJECT NO.: MILLER ROAD/SR 101L OVERPASS CONSTRUCTION ALTERNATIVE ANALYSIS

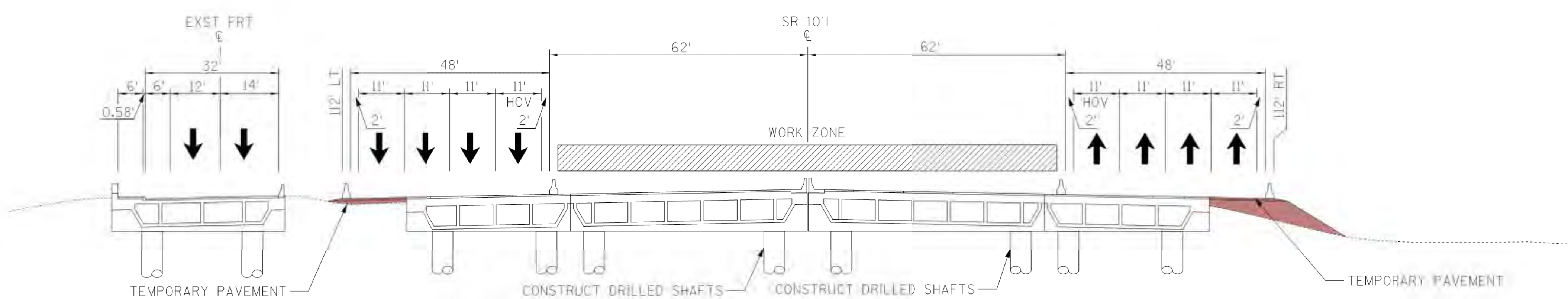
SCALE	DESIGNED	DATE	BID NO.	SHT.
HORZ.	DRAWN	AUGUST 2017		
VERT.	CHECKED JPM	AS-BUILT	PROJECT NO. 00088	11 OF 16

SK008

Kimley»Horn

© 2017 KIMLEY-HORN AND ASSOCIATES, INC.





PHASE 8 – CONSTRUCT CONVENTIONAL BRIDGE OFF-LINE

ALTERNATIVE 1 - CONVENTIONAL BRIDGE

PRELIMINARY NOT FOR CONSTRUCTION OR RECORDING

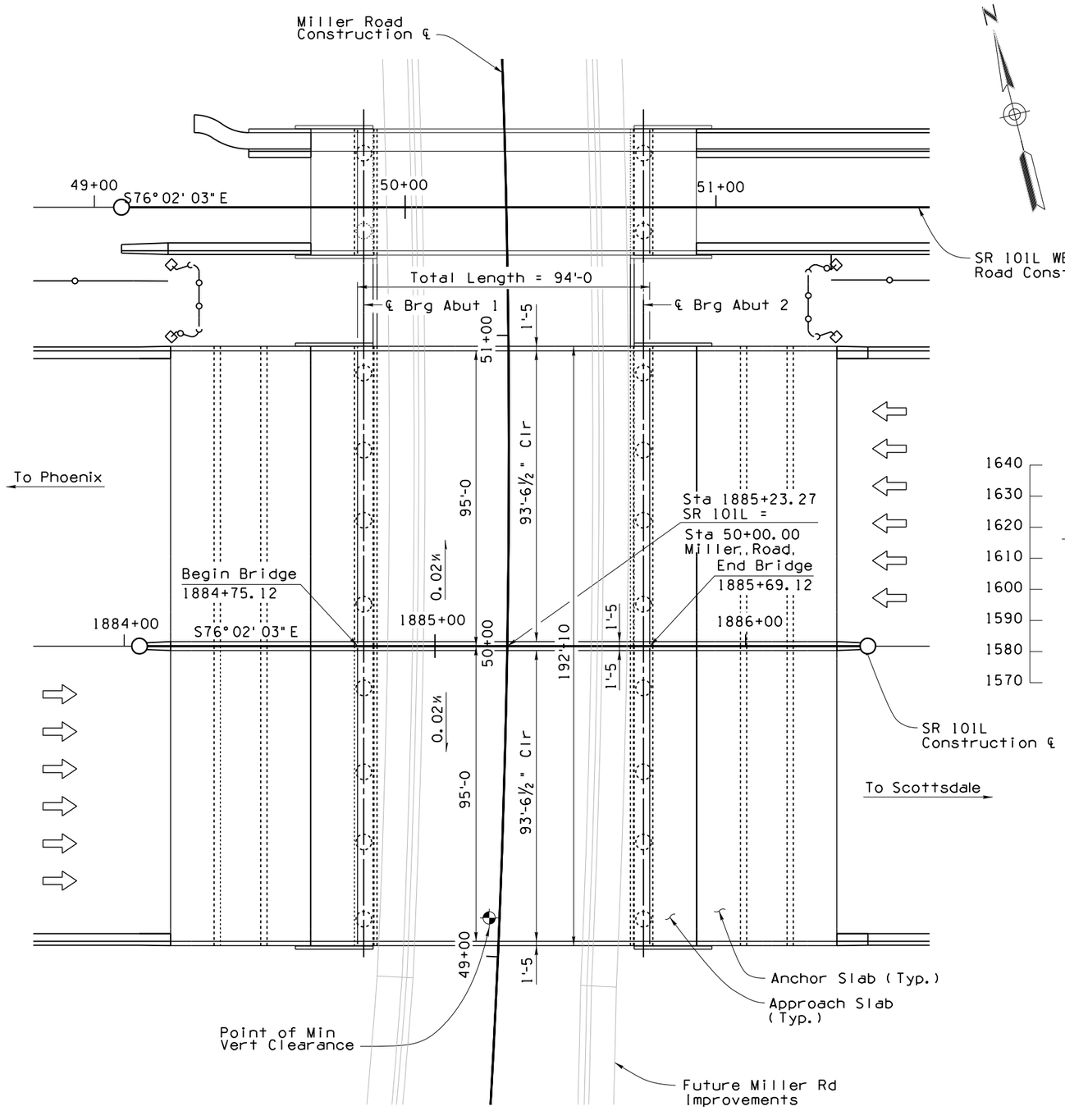
PUBLIC WORKS

CAPITAL PROJECT MANAGEMENT

TRAFFIC CONTROL PHASE 8

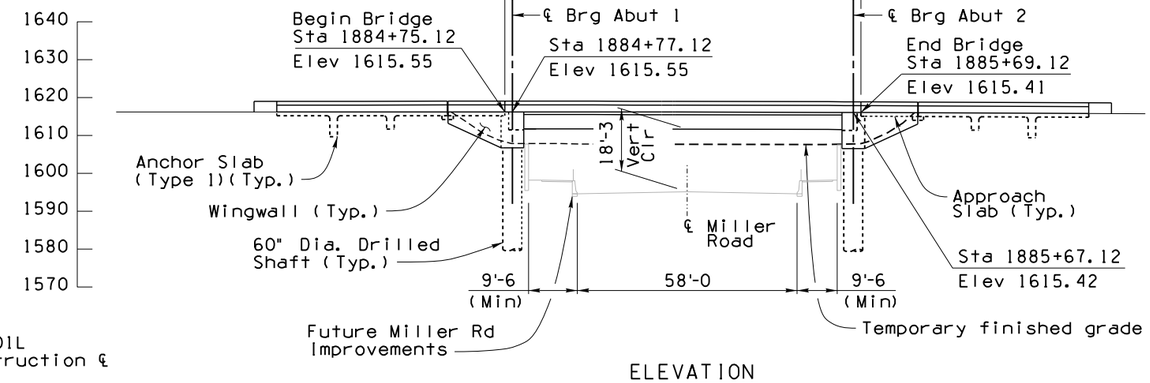
MILLER ROAD/SR 101L OVERPASS CONSTRUCTION ALTERNATIVE ANALYSIS

SC03B



PLAN

Single Span Cast-In-Place Post-Tensioned Concrete Bridge
Skew=0°
Scale: 1'-0= 20'-0



ELEVATION

Scale: 1'-0= 20'-0
(Elevations shown along Profile Grade Line)

ALTERNATIVE 1 - CONVENTIONAL BRIDGE

ARIZONA BLUE STAKE
CALL TWO WORKING DAYS BEFORE YOU DIG
Dial 811 or 602-263-1100
1-800-STAKE-IT
(OUTSIDE MARICOPA COUNTY)

DATE	REVISION	BY

ENGINEER

PRELIMINARY
NOT FOR
CONSTRUCTION
OR RECORDING

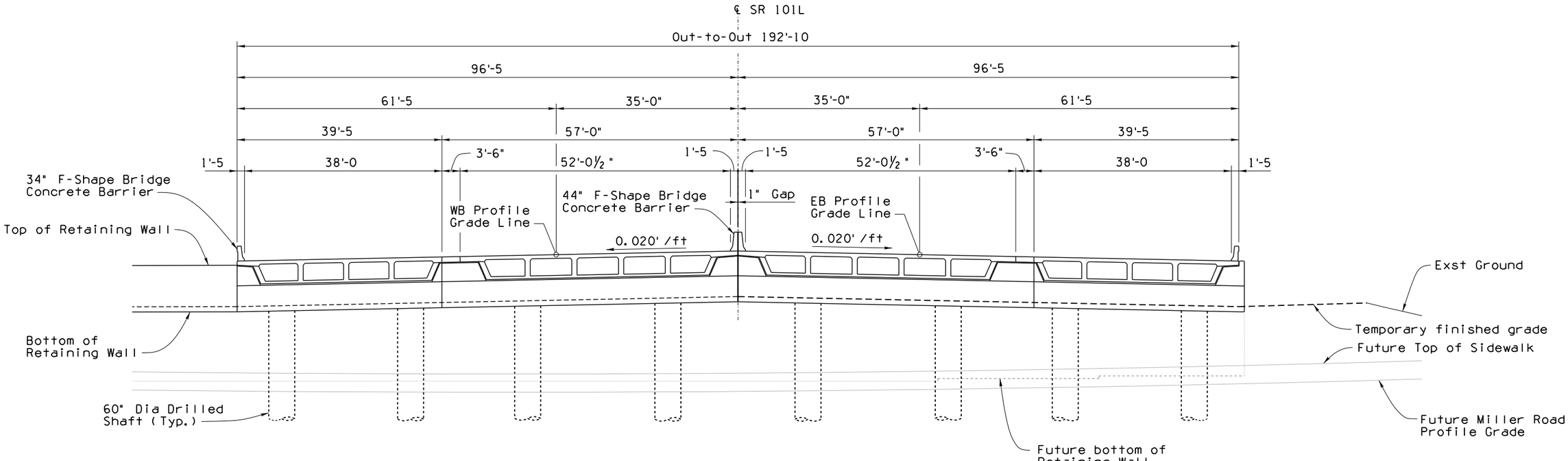
PUBLIC WORKS
CAPITAL PROJECT MANAGEMENT
7447 E. INDIAN SCHOOL RD.
SCOTTSDALE, ARIZONA 85251

SHEET TITLE
GENERAL PLAN & ELEVATION

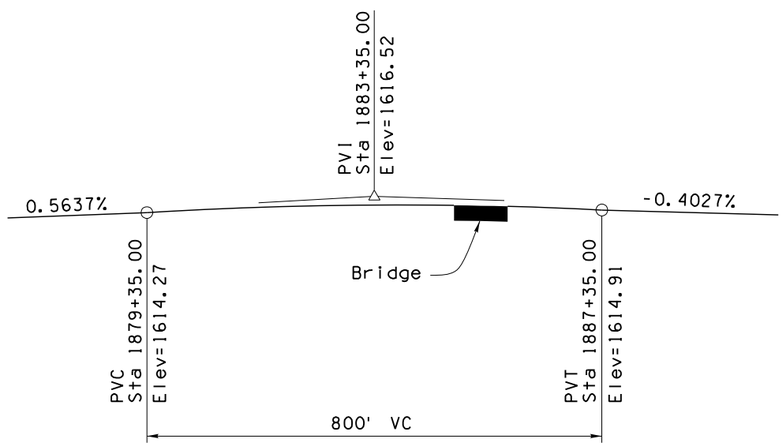
PROJECT TITLE
MILLER ROAD/SR 101L OVERPASS
CONSTRUCTION ALTERNATIVE ANALYSIS

SCALE	DESIGNED KJK	DATE AUGUST 2017	BID NO.	SHT.
HORIZ.				
VERT.	DRAWN MSK	AS-BUILT	PROJECT NO. SC03B	13 OF 16

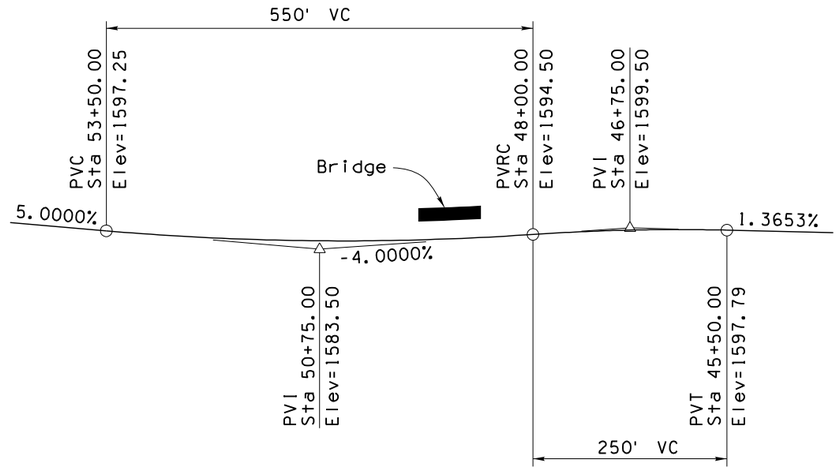
SC03B



TYPICAL SECTION
Scale: 1'-0= 10'-0



SR 101L PROFILE GRADE
No Scale



MILLER ROAD PROFILE GRADE
No Scale

ALTERNATIVE 1 - CONVENTIONAL BRIDGE

ARIZONA BLUE STAKE
CALL TWO WORKING DAYS BEFORE YOU DIG
Dial 811 or 602-263-1100
1-800-STAKE-IT
(OUTSIDE MARICOPA COUNTY)

DATE	REVISION	BY

ENGINEER
PRELIMINARY NOT FOR CONSTRUCTION OR RECORDING

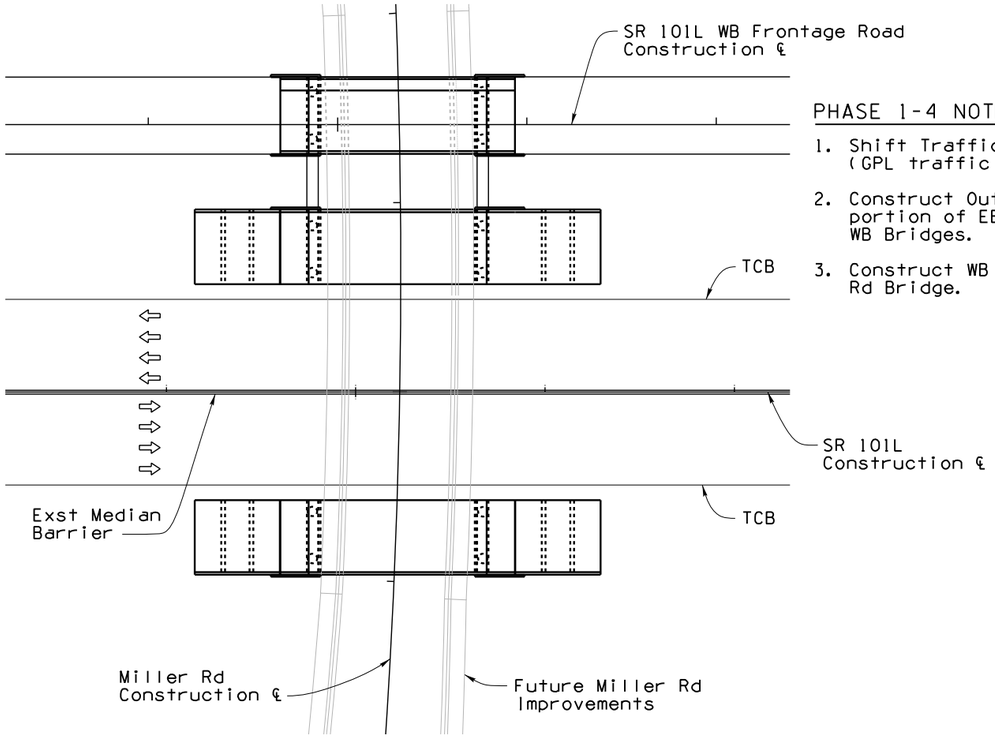
PUBLIC WORKS
CAPITAL PROJECT MANAGEMENT
7447 E. INDIAN SCHOOL RD.
SCOTTSDALE, ARIZONA 85251

SHEET TITLE
TYPICAL SECTION - TRADITIONAL

PROJECT TITLE
MILLER ROAD/SR 101L OVERPASS
CONSTRUCTION ALTERNATIVE ANALYSIS

SCALE	DESIGNED	DATE	BID NO.	SHT.
HORIZ.	KJK	AUGUST 2017		
VERT.	DRAWN MSK	AS-BUILT	PROJECT NO. SC03B	14 OF 16

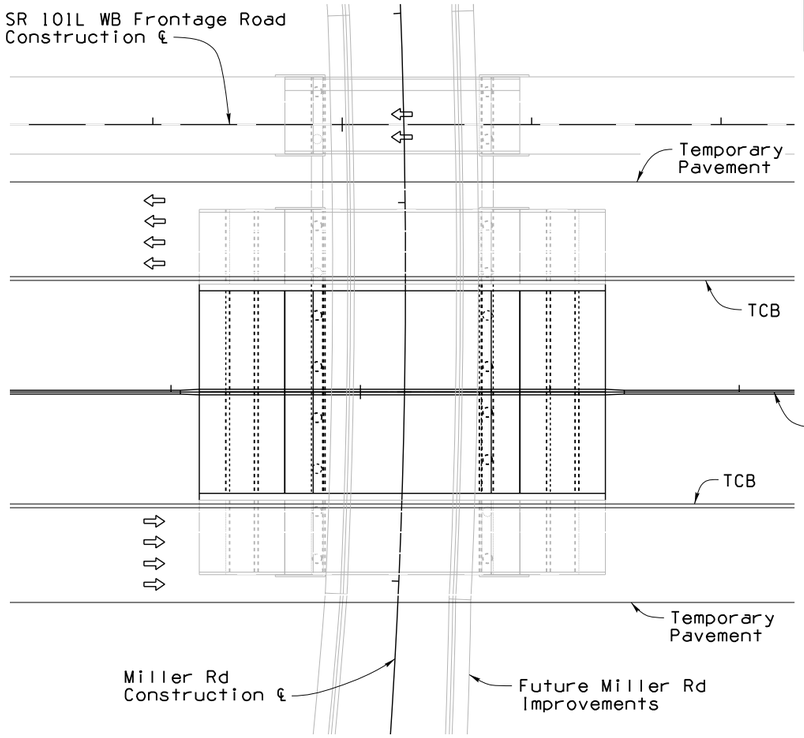
SC03B



PHASE 1-4

PHASE 1-4 NOTES:

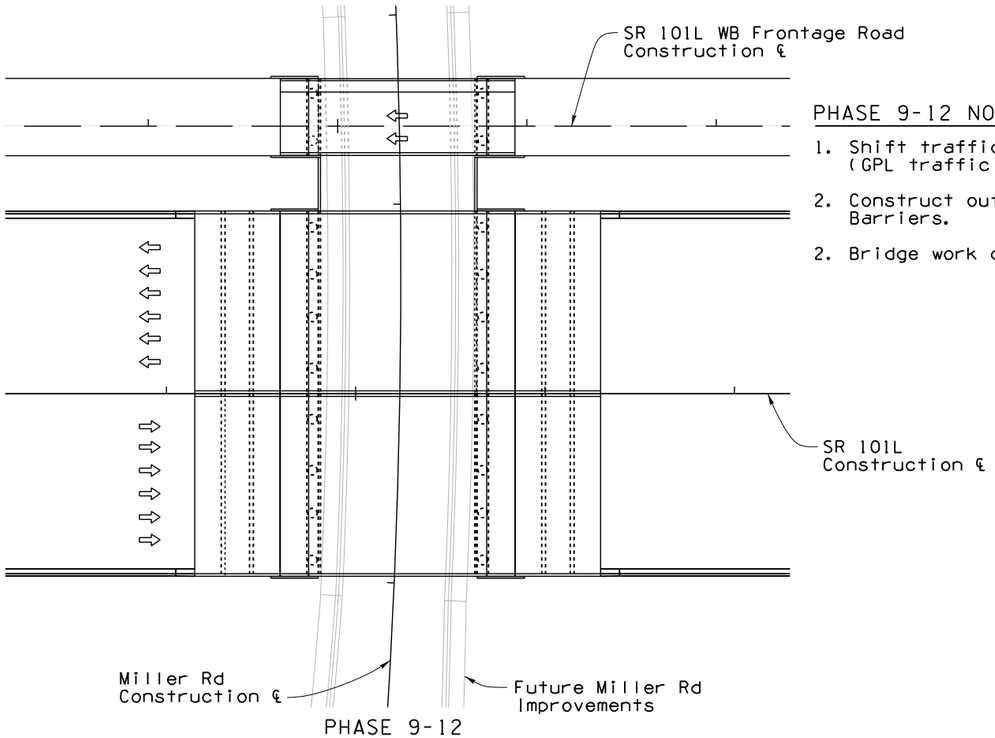
1. Shift Traffic to inside. (GPL traffic location)
2. Construct Outside portion of EB & WB Bridges.
3. Construct WB Frontage Rd Bridge.



PHASE 5-8

PHASE 5-8 NOTES:

1. Place Temporary Pavement for Outside Traffic Shift.
2. Shift traffic to Outside Open WB Frontage Rd to traffic.
3. Construct inside portion of EB & WB Bridges.
4. Construct Closure pour.



PHASE 9-12

(Note: Ultimate lane configuration shown)

PHASE 9-12 NOTES:

1. Shift traffic back to inside. (GPL traffic location).
2. Construct outside Bridge Barriers.
2. Bridge work complete.

ALTERNATIVE 1 - CONVENTIONAL BRIDGE

Kimley»Horn

ARIZONA BLUE STAKE
CALL TWO WORKING DAYS BEFORE YOU DIG
Dial 811 or 602-263-1100
1-800-STAKE-IT
(OUTSIDE MARICOPA COUNTY)

DATE	REVISION	BY

ENGINEER

PRELIMINARY
NOT FOR
CONSTRUCTION
OR RECORDING

PUBLIC WORKS

CAPITAL PROJECT MANAGEMENT

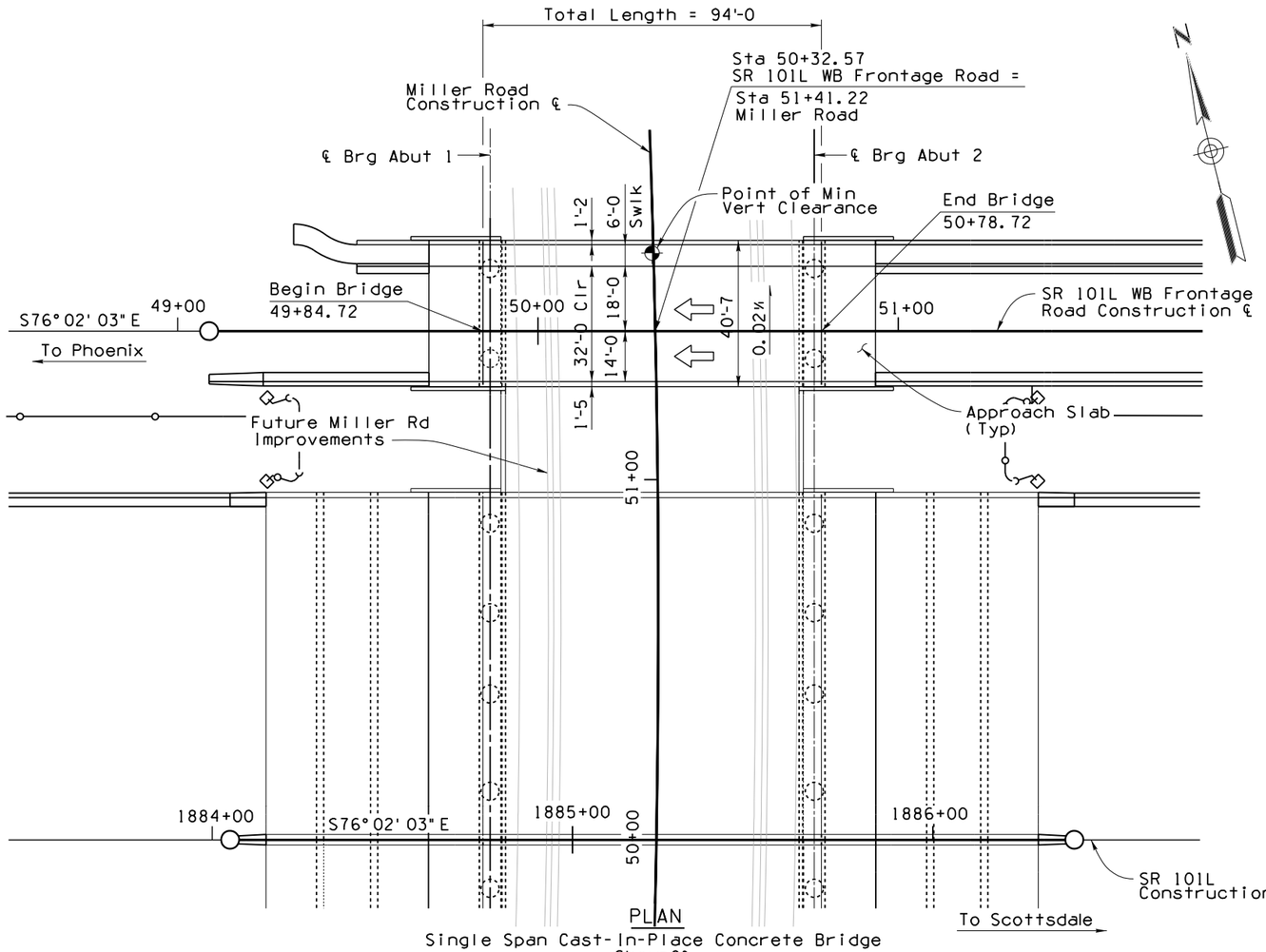
7447 E. INDIAN SCHOOL RD.
SCOTTSDALE, ARIZONA 85251

SHEET TITLE
CONSTRUCTION PHASING

PROJECT TITLE
MILLER ROAD/SR 101L OVERPASS
CONSTRUCTION ALTERNATIVE ANALYSIS

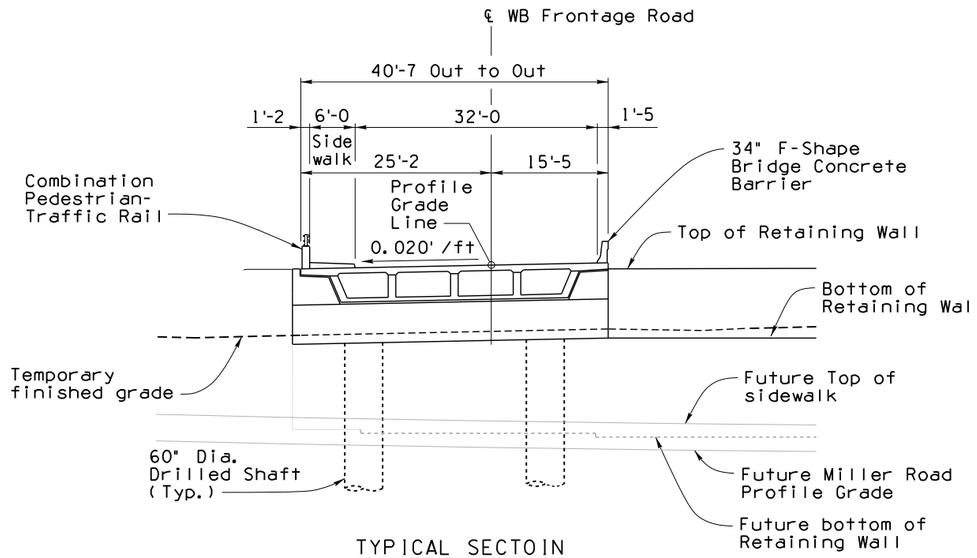
SCALE	DESIGNED	DATE	BID NO.	SHT.
HORIZ.	KJK	AUGUST 2017		
VERT.	DRAWN MSK	AS-BUILT	PROJECT NO. SC03B	15 OF 16

SC03B



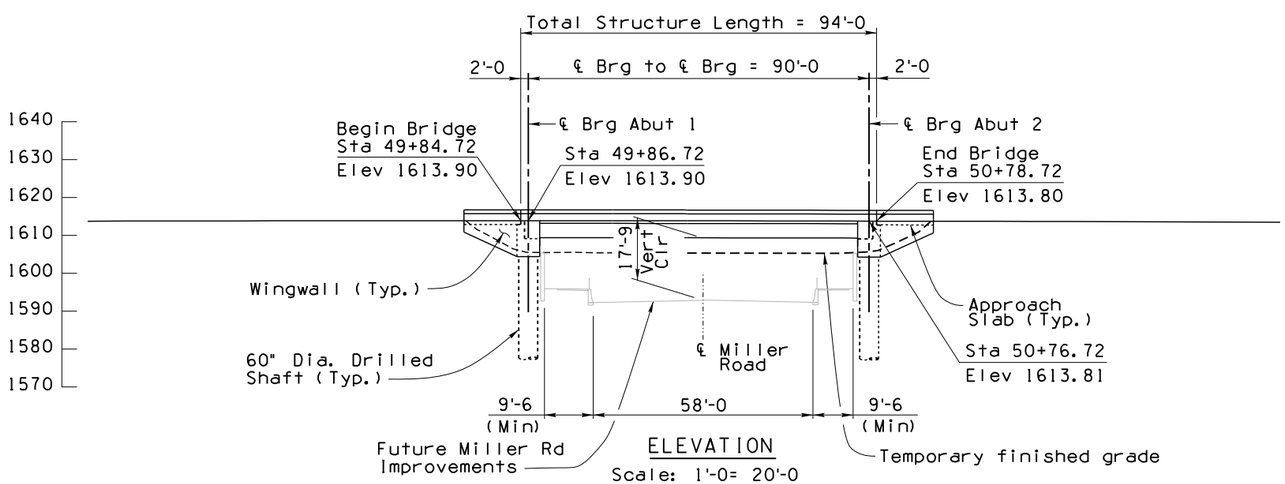
PLAN

Single Span Cast-In-Place Concrete Bridge
Skew=0°
Scale: 1'-0= 20'-0



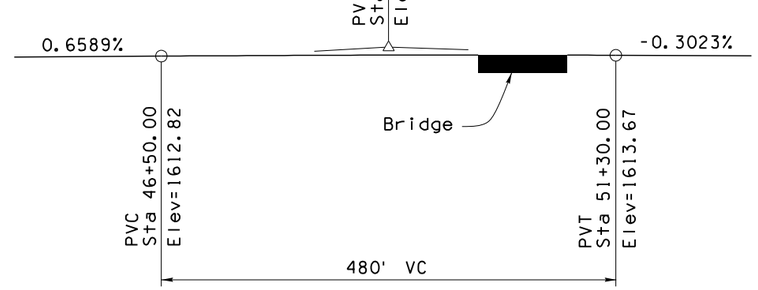
TYPICAL SECTOIN

Scale: 1'-0= 10'-0



ELEVATION

Scale: 1'-0= 20'-0



FRONTAGE ROAD PROFILE GRADE

No Scale

ALTERNATIVE 1 - CONVENTIONAL BRIDGE

ARIZONA BLUE STAKE
CALL TWO WORKING DAYS BEFORE YOU DIG
Dial 811 or 602-263-1100
1-800-STAKE-IT
(OUTSIDE MARICOPA COUNTY)

DATE	REVISION	BY

ENGINEER

PRELIMINARY NOT FOR CONSTRUCTION OR RECORDING

PUBLIC WORKS
CAPITAL PROJECT MANAGEMENT
7447 E. INDIAN SCHOOL RD.
SCOTTSDALE, ARIZONA 85251

SHEET TITLE
GENERAL PLAN / ELEVATION & TYP SEC

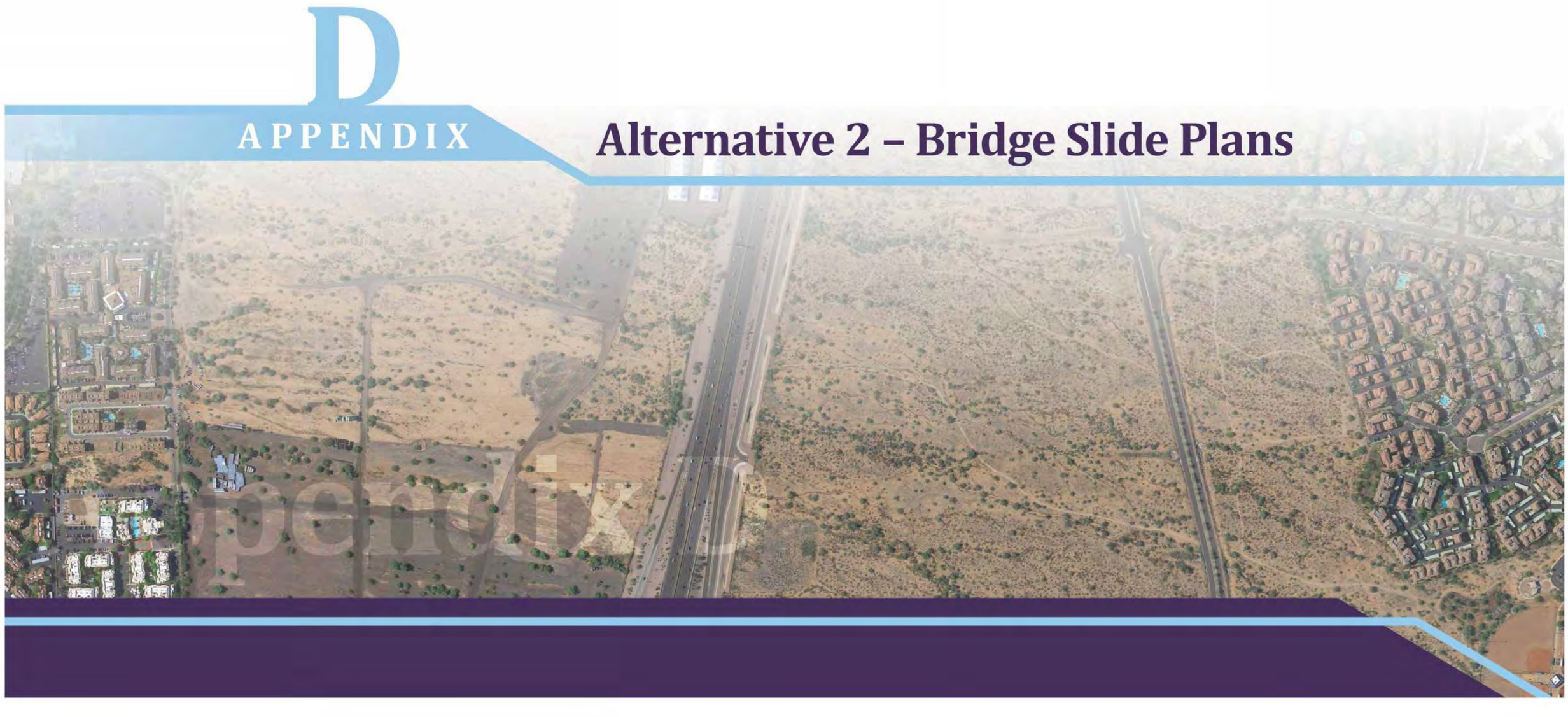
PROJECT TITLE
MILLER ROAD/SR 101L OVERPASS
CONSTRUCTION ALTERNATIVE ANALYSIS

SCALE	DESIGNED	DATE	BID NO.	SHT.
HORIZ.	KJK	AUGUST 2017		
VERT.	DRAWN	AS-BUILT	PROJECT NO.	16 OF 16
	MSK		SC03B	

SC03B

APPENDIX D

Alternative 2 – Bridge Slide Plans



CITY OF SCOTTSDALE

PUBLIC IMPROVEMENTS

COUNCIL
W.J. "JIM" LANE, MAYOR
SUZANNE KLAPP
VIRGINIA KORTE
KATHY LITTLEFIELD
LINDA MILHAVEN
GUY PHILLIPS
DAVID N. SMITH

CITY MANAGER
JIM THOMPSON

CITY ATTORNEY
BRUCE WASHBURN

CITY CLERK
CAROLYN JAGGER

"AS-BUILT" CERTIFICATION

I HEREBY CERTIFY THAT THE "AS-BUILT" IMPROVEMENTS AS SHOWN HEREON ARE LOCATED AS NOTED, AND THE LOCATIONS ARE CORRECT TO THE BEST OF MY KNOWLEDGE AND BELIEF.

REGISTERED LAND SURVEYOR _____ DATE _____

CITY OF SCOTTSDALE

REVIEWED AND RECOMMENDED APPROVAL BY:

PAVING		STRUCTURES	
GRADING & DRAINAGE		BUILDING	
WATER & SEWER		PLUMBING	
TRAFFIC		MECHANICAL	
PLANNING IMPROVEMENTS		ELECTRICAL	
PLANNING FACILITIES		FIRE IMPROVEMENTS	
LANDSCAPE		FIRE FACILITIES	
NATIVE PLANT			

ENGINEERING COORDINATION MANAGER (OR DESIGNEE) _____ DATE _____

BUILDING OFFICIAL (OR DESIGNEE) _____ DATE _____

ENGINEER

ENGINEERING FIRM
LOGO & ADDRESS
GOES HERE

10/27/2017 3:57:10 PM DGN

MILLER ROAD/SR 101L OVERPASS
CONSTRUCTION ALTERNATIVE ANALYSIS
ALTERNATIVE 2 - BRIDGE - SLIDE
PROJECT NO. SC03B

NO CONFLICT SIGNATURE BLOCK				
Utility	Utility Company	Name of Company Representative	Telephone Number	Date Signed
Electric				
Telephone				
Natural Gas				
Cable TV				
Water				
Sewer				

Engineer's Certification

I _____, as the Engineer of Record for this development, hereby certify that all utility companies listed above have been provided final improvement plans for review, and that all conflicts identified by the utilities have been resolved. In addition, "No Conflict" forms have been obtained from each utility company and are included in this submittal.

Signature _____ Date _____

Certificate of Approval to Construct — Maricopa County Environmental Services Department, Water and Waste Management Division

MCESD # _____

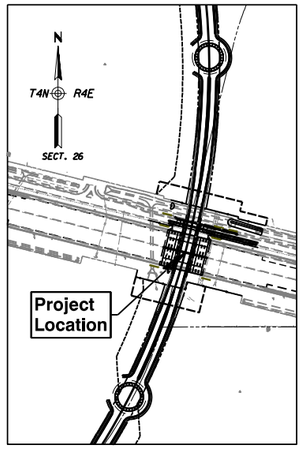
Public Water System ID Number 0407- (and/or) Waste Water System ID Number 0437-
Project Description:

Project Location:
Project Owner:

Pursuant to AAC Title 18: Chapter 4, Article 5: or AAC Title 18: Chapter 9, Article 8: and/or Maricopa County Environmental Health Code Chapters II or V. This certificate of Approval To Construct the above described facilities as represented in the attached plan is valid upon review and signature by a Maricopa County Environmental Services Department's representative given the following provisions.
1.) A Request for Certificate of Approval of Construction, together with an Engineer's Certificate of Completion, and sealed engineered as-built plans, shall be submitted to this Department prior to Approval of Construction and startup.
2.) The Approval to Construct is void if major modifications occur to the plans without the knowledge and consent of the department.
If Construction has not started within one year of the approval date, this certificate will be void. An extension of time may be available upon written request.

Approved By: _____ Date Approved: _____

CC: MCESD FILE: ADEQ
Engineer: AZ. Corp. Commission



Vicinity Map
N.T.S.

ALTERNATIVES ANALYSIS OCTOBER 2017

SHEET INDEX

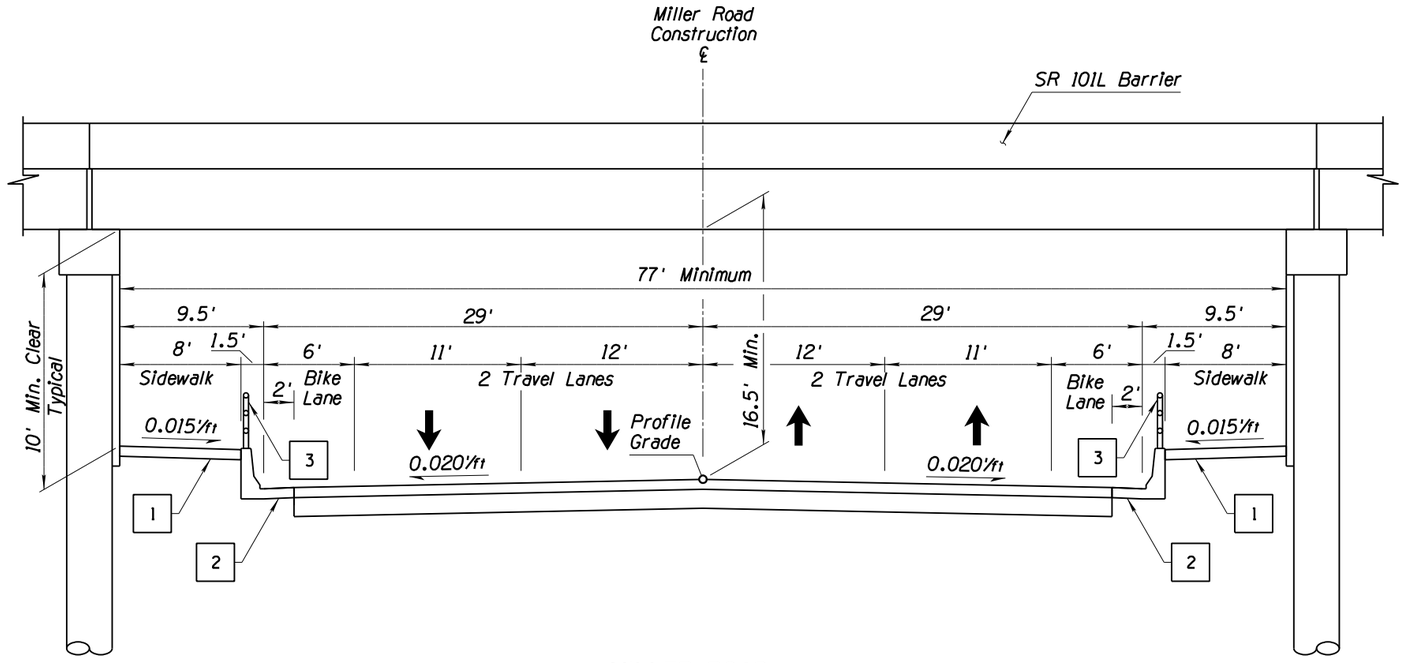
City of Scottsdale approved plans shall be kept on the job site at all times during the course of constuction.

DR/STAFF APPROVAL NO.

ALTERNATIVE 2 - BRIDGE - SLIDE
PROJECT NO. SC03B

PLAN REVIEW NO.

SHT. 1



MILLER ROAD
TYPICAL SECTION

1 *New Concrete Sidewalk*

2 *New Concrete Half Barrier with Gutter*

3 *New Safety Rail*

REQUIRES: 77' MINIMUM WIDTH
PROVIDES: 2 TRAVEL LANES, 11' OUTSIDE, 12' INSIDE
PROVIDES: 8' SIDEWALK WITHOUT LANDSCAPE BUFFER

ALTERNATIVE 2 - BRIDGE SLIDE

DATE	REVISION	BY

ENGINEER

PRELIMINARY
NOT FOR
CONSTRUCTION
OR RECORDING

CITY OF SCOTTSDALE
INCORPORATED 1951
ARIZONA

PUBLIC WORKS

CAPITAL PROJECT MANAGEMENT

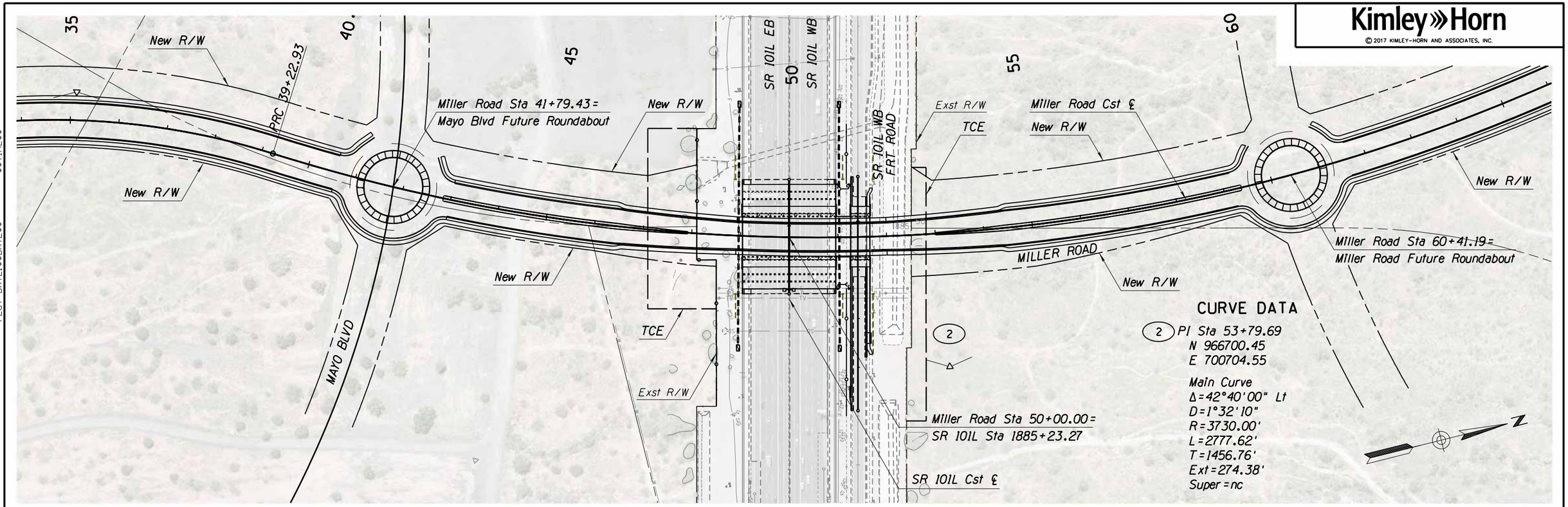
7447 E. INDIAN SCHOOL RD.
SCOTTSDALE, ARIZONA 85251

SHEET TITLE
TYPICAL SECTION

PROJECT TITLE
MILLER ROAD/SR 101L OVERPASS
CONSTRUCTION ALTERNATIVE ANALYSIS

SCALE	DESIGNED	DATE	BID NO.	SHT.
HORIZ.	DRR	OCTOBER 2017		
VERT.	DRAWN JFM	AS-BUILT	PROJECT NO. SC03B	2 OF 20

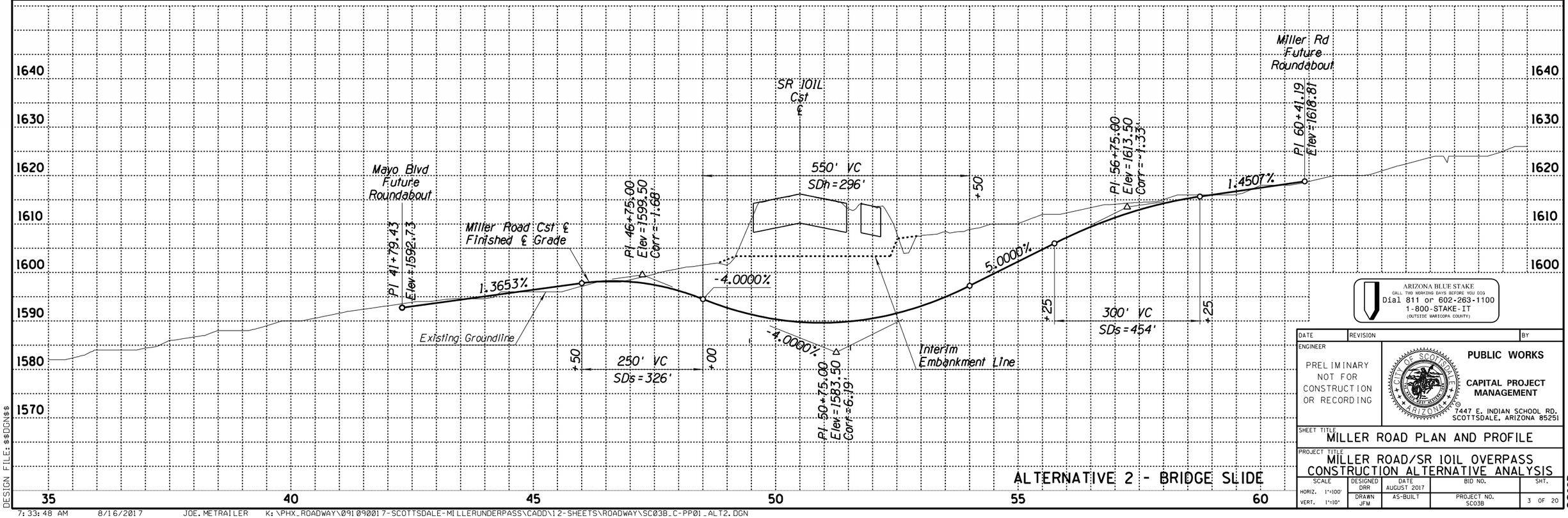
SC03B



CURVE DATA

(2) PI Sta 53+79.69
N 966700.45
E 700704.55

Main Curve
Δ=42°40'00" Lt
D=1°32'10"
R=3730.00'
L=2777.62'
T=1456.76'
Ext=274.38'
Super=nc



ALTERNATIVE 2 - BRIDGE SLIDE

ARIZONA BLUE STAKE
CALL TWO WORKING DAYS BEFORE YOU DIG
Dial 811 or 602-263-1100
1-800-STAKE-IT
(OUTSIDE MARICOPA COUNTY)

DATE	REVISION	BY

ENGINEER

PRELIMINARY
NOT FOR
CONSTRUCTION
OR RECORDING

PUBLIC WORKS
CAPITAL PROJECT MANAGEMENT
7447 E. INDIAN SCHOOL RD.
SCOTTSDALE, ARIZONA 85251

SHEET TITLE
MILLER ROAD PLAN AND PROFILE

PROJECT TITLE
MILLER ROAD/SR 101L OVERPASS
CONSTRUCTION ALTERNATIVE ANALYSIS

SCALE	DESIGNED	DATE	BID NO.	SHT.
HORIZ. 1"=100'	DRR	AUGUST 2017		
VERT. 1"=10'	DRAWN JFM	AS-BUILT	PROJECT NO. SC03B	3 OF 20

SC03B

New R/W
New R/W
Conc Channel
TCE
FMS Conduit with
2-No. 9 Pull Boxes
New Structure
See Structural Plans
Conc Channel
Exst R/W
45
+90
50
1885
+10
55
N
1605
1610
S76°02'03"E
SR 101L WB FRT ROAD
1880
1890
1615
SR 101L WB
S76°02'03"E
SR 101L EB
SR 101L Cst ℄
SR 101L Sta 1885+23.27=
Miller Road Sta 50+00.00
New Structure
See Structural Plans
FMS Conduit with
2-No. 9 Pull Boxes
Exst R/W
+00
+70
MAXIMUM CONSTRUCTION LIMITS
TCE
New R/W
New R/W

MAXIMUM CONSTRUCTION LIMITS
CONSTRUCT NEW BRIDGE OFFLINE
GPL CONSTRUCTION TRAFFIC PHASING

ALTERNATIVE 2 - BRIDGE SLIDE

ARIZONA BLUE STAKE
CALL TWO WORKING DAYS BEFORE YOU DIG
Dial 811 or 602-263-1100
1-800-STAKE-IT
(OUTSIDE MARICOPA COUNTY)

DATE	REVISION	BY
ENGINEER		

PRELIMINARY
NOT FOR
CONSTRUCTION
OR RECORDING

PUBLIC WORKS
CAPITAL PROJECT MANAGEMENT
7447 E. INDIAN SCHOOL RD.
SCOTTSDALE, ARIZONA 85251

SHEET TITLE
INTERIM - SR 101L/FRT RD PLAN

PROJECT TITLE
MILLER ROAD/SR 101L OVERPASS
CONSTRUCTION ALTERNATIVE ANALYSIS

SCALE	DESIGNED	DATE	BID NO.	SHT.
HORIZ.	DRR	AUGUST 2017		
VERT.	DRAWN JFM	AS-BUILT	PROJECT NO. SC03B	4 OF 20

SC03B

7:33:55 AM 8/16/2017 JOE.METRAILER K:\PHX_ROADWAY\091090017-SCOTTSDALE-MILLERUNDERPASS\CADD\12-SHEETS\ROADWAY\SC03B_C-PL01_ALT2-INTERIM.DGN

Conc Curb & Gutter Type D, Std C-05.10
Sta 49+49.72 to 49+69.72 New Ashphalt Pvmt
Conc Channel
6' Conc Sidewalk Std C-05.20
Conc Half Barrier Std C-10.52, Gutter=2.5'
Conc Curb & Gutter Type D, Std C-05.10
Exst R/W
Miller Road Cst ℄
New R/W
TCE
MILLER ROAD
New R/W
New Structure See Structural Plans
FMS Conduit with 2-No. 9 Pull Boxes
6' Conc Sidewalk with Parapet Special Detail
Sta 50+93.72 to 51+13.72 New Ashphalt Pvmt
Conc Curb & Gutter Type D, Std C-05.10
Crash Cushion Special Detail
6' Conc Sidewalk Std C-05.20
Conc Channel
Conc Curb & Gutter Type D, Std C-05.10
Cable Barrier Std C-12.30
Sta 1886+37 to 1889+00 263 Lin Ft New 48" Chain Link Fence
Sawcut (Typ)
S76°02'03"E
SR 101L WB FRT ROAD
Frt Rd Cst ℄
Cable Barrier Std C-12.30
Crash Cushion Special Detail
Conc Half Barrier Std C-10.52, Gutter=2.5'
SR 101L WB
Sta 1883+00 to 1884+24 124 Lin Ft New 48" Chain Link Fence
S76°02'03"E
SR 101L EB
Conc Half Barrier Std C-10.52, Gutter=2.5'
Sta 1886+29.29 to 1886+39.29, Lt New PCCP Pvmt
Conc Med Barrier Type F, Std C-10.41
New Median Light Pole with Foundation
Sta 1886+29.29 to 1886+39.29, Rt New PCCP Pvmt
Exst R/W
SR 101L Cst ℄
Conc Half Barrier Std C-10.52, Gutter=2.5'
Sta 1884+04.95 to 1884+14.95, Lt New PCCP Pvmt
Conc Med Barrier Type F, Std C-10.41
Sta 1884+04.95 to 1884+14.95, Rt New PCCP Pvmt
Conc Half Barrier Std C-10.52, Gutter=2.5'
Conc Half Barrier Std C-10.52, Gutter=2.5'
New Structure See Structural Plans
TCE
FMS Conduit with 2-No. 9 Pull Boxes
SR 101L Sta 1885+23.27 = Miller Road Sta 50+00.00
New R/W
New R/W
Sta 1883+00 to 1888+70 650 Lin Ft New 72" Chain Link Fence

COMPLETED SR 101L BRIDGE & FRONTAGE ROAD BRIDGE OVER MILLER ROAD

ALTERNATIVE 2 - BRIDGE SLIDE

ARIZONA BLUE STAKE
CALL TWO WORKING DAYS BEFORE YOU DIG
Dial 811 or 602-263-1100
1-800-STAKE-IT
(OUTSIDE MARICOPA COUNTY)

DATE	REVISION	BY

ENGINEER
PRELIMINARY NOT FOR CONSTRUCTION OR RECORDING

PUBLIC WORKS
CAPITAL PROJECT MANAGEMENT
7447 E. INDIAN SCHOOL RD.
SCOTTSDALE, ARIZONA 85251

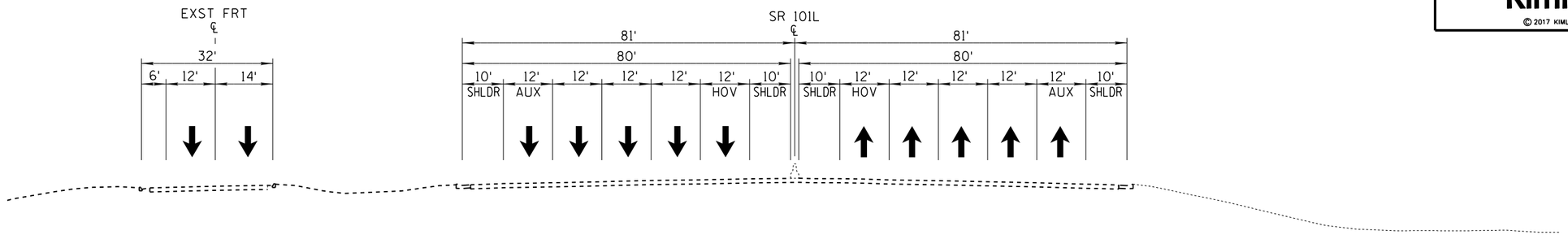
SHEET TITLE
ULTIMATE - SR 101L/FRT RD PLAN

PROJECT TITLE
MILLER ROAD/SR 101L OVERPASS
CONSTRUCTION ALTERNATIVE ANALYSIS

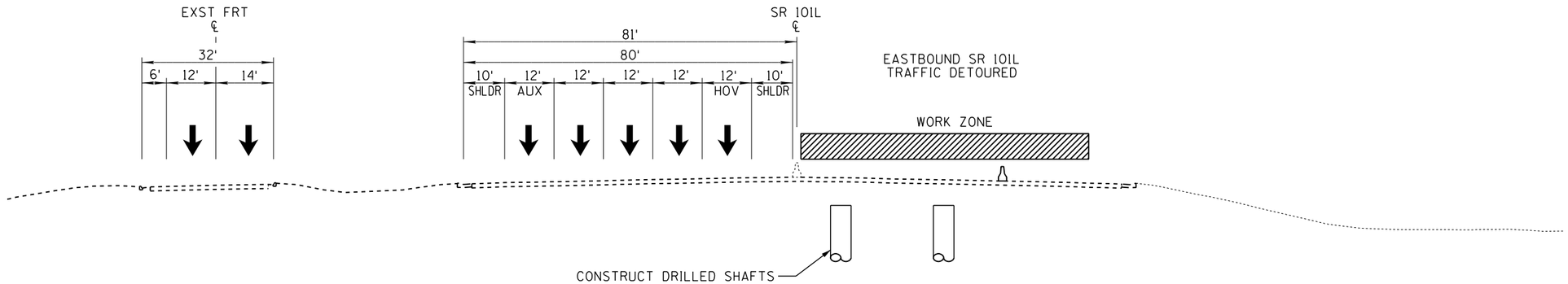
SCALE	DESIGNED	DATE	BID NO.	SHT.
HORIZ.	DRR	AUGUST 2017		
VERT.	DRAWN	AS-BUILT	PROJECT NO.	5 OF 20
	JFM		SC03B	

SC03B

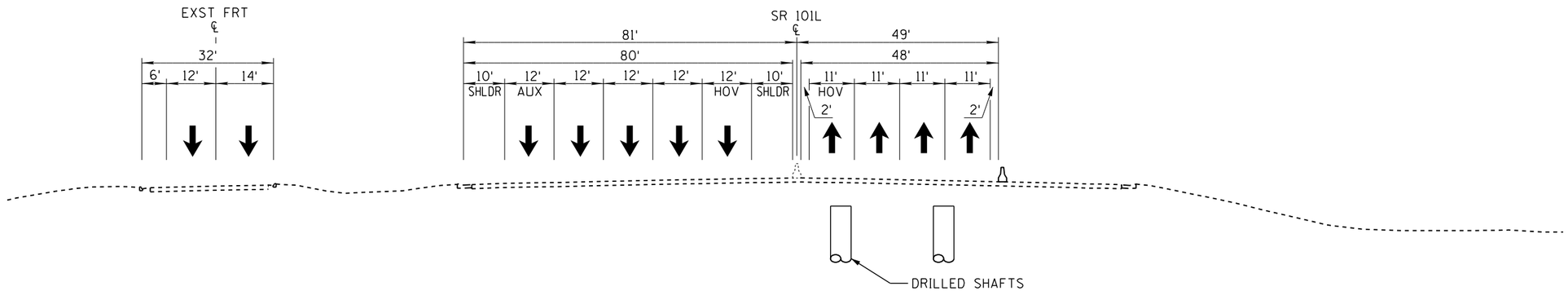
7:33:58 AM 8/16/2017 JOE.METRAILER K:\PHX_ROADWAY\091090017-SCOTTSDALE-MILLERUNDERPASS\CADD\12-SHEETS\ROADWAY\SC03B_C-PL01_ALT2.DGN



SR 101L EXISTING CONDITION AT MILLER ROAD



PHASE 1 – WEEKEND ACTIVITY



PHASE 2 – WEEKDAY CONDITION

SR 101L
LOOKING EAST

ALTERNATIVE 2 - BRIDGE SLIDE

DATE	REVISION	BY

ENGINEER

PRELIMINARY
NOT FOR
CONSTRUCTION
OR RECORDING

PUBLIC WORKS

CAPITAL PROJECT MANAGEMENT

7447 E. INDIAN SCHOOL RD.
SCOTTSDALE, ARIZONA 85251

SHEET TITLE: PHASING TYPICAL SECTIONS

PROJECT TITLE: MILLER ROAD/SR 101L OVERPASS CONSTRUCTION ALTERNATIVE ANALYSIS

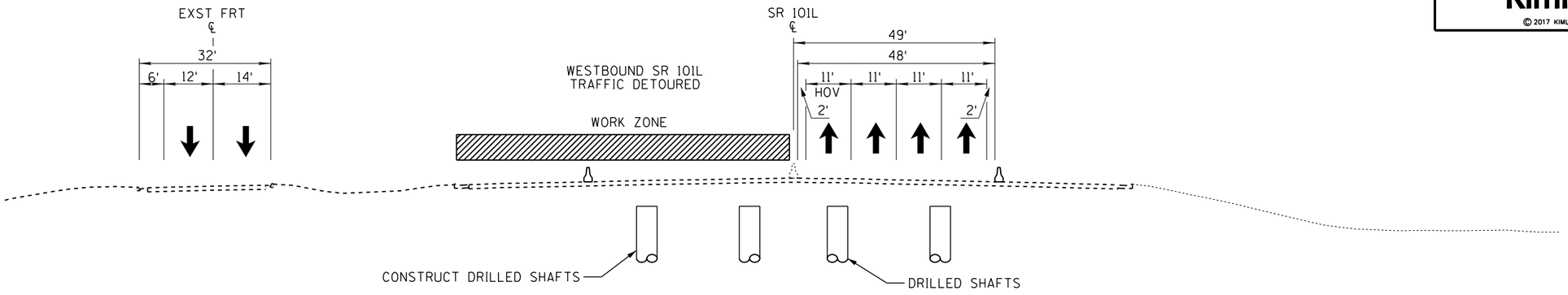
SCALE	DESIGNED	DATE	BID NO.	SHT.
HORIZ.	KAC	AUGUST 2017		
VERT.	DRAWN JFM	AS-BUILT	PROJECT NO. SC03B	6 OF 20

SC03B

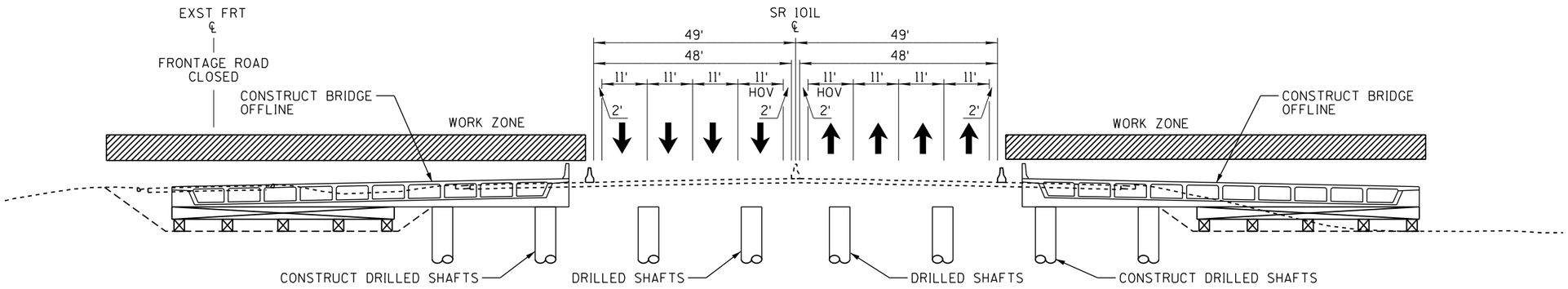
PLOT DATE: $$DATE$$ $$TIME$$

DESIGN FILE: $$DGN$$

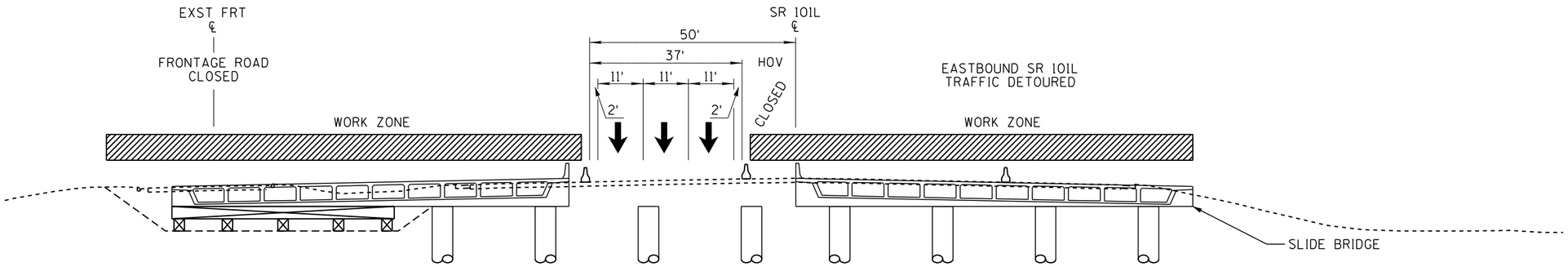
7:34:00 AM 8/16/2017 JOE.METRAILER K:\PHX_ROADWAY\091090017-SCOTTSDALE-MILLERUNDERPASS\CADD\12-SHEETS\TRAFFIC\SC03B_T-TYPICALS_ALT2_01.DGN



PHASE 3 – WEEKEND ACTIVITY



PHASE 4 – CONSTRUCT BRIDGE SLIDE OFF-LINE



PHASE 5 – WEEKEND ACTIVITY – SLIDE EB BRIDGE

SR 101L
LOOKING EAST

ALTERNATIVE 2 - BRIDGE SLIDE

DATE	REVISION	BY

ENGINEER

PRELIMINARY
NOT FOR
CONSTRUCTION
OR RECORDING

PUBLIC WORKS
CAPITAL PROJECT MANAGEMENT
7447 E. INDIAN SCHOOL RD.
SCOTTSDALE, ARIZONA 85251

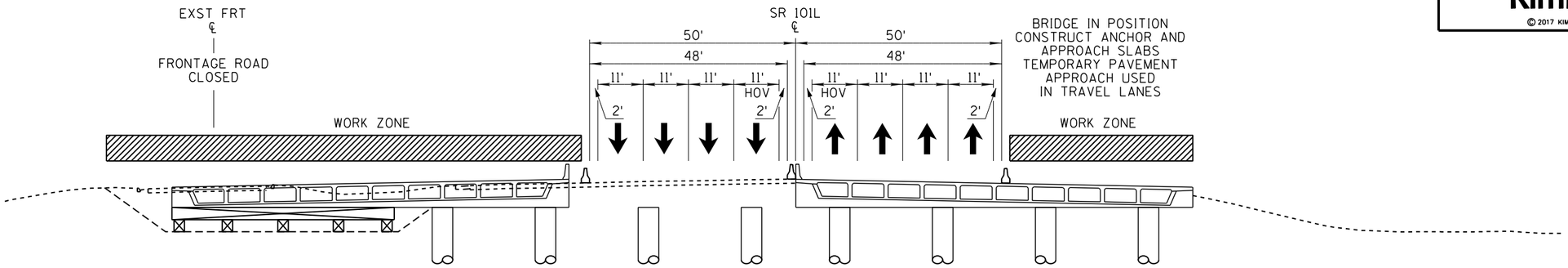
SHEET TITLE
PHASING TYPICAL SECTIONS

PROJECT TITLE
MILLER ROAD/SR 101L OVERPASS
CONSTRUCTION ALTERNATIVE ANALYSIS

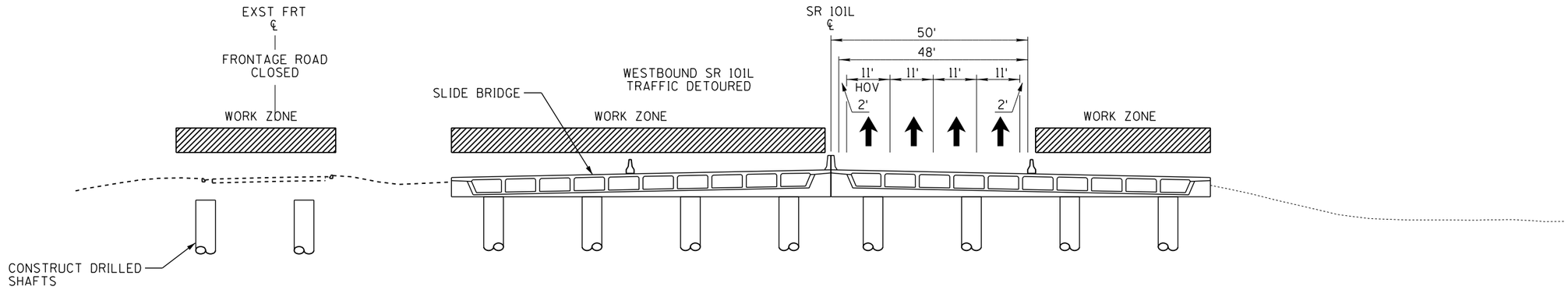
SCALE	DESIGNED	DATE	BID NO.	SHT.
HORIZ.	KAC	AUGUST 2017		
VERT.	DRAWN JFM	AS-BUILT	PROJECT NO. SC03B	7 OF 20

SC03B

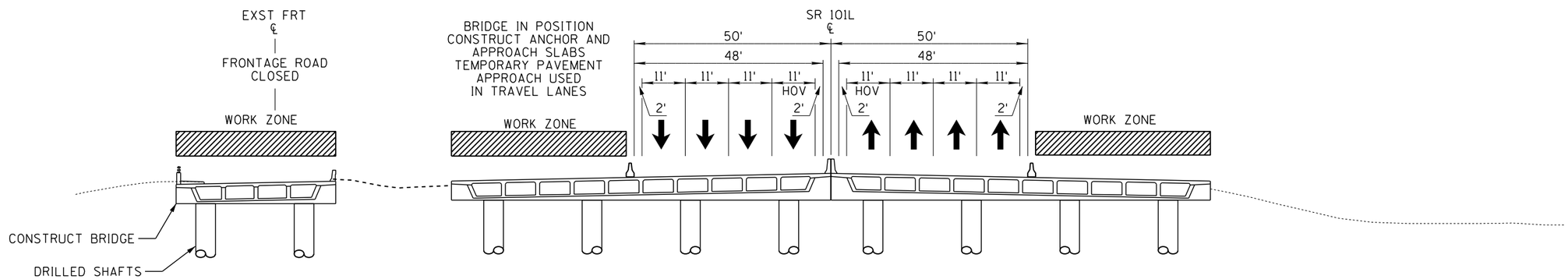
PLOT DATE: $$DATE$$ $$TIME$$
DESIGN FILE: $$DGN$$
7:34:00 AM 8/16/2017 JOE.METRAILER K:\PHX_ROADWAY\091090017-SCOTTSDALE-MILLERUNDERPASS\CADD\12-SHEETS\TRAFFIC\SC03B_T-TYPICALS_ALT2_02.DGN



PHASE 6 – WEEKDAY CONDITION



PHASE 7 – WEEKEND ACTIVITY – SLIDE WB BRIDGE



PHASE 8 – WEEKDAY CONDITION – CONSTRUCT FRONTAGE RD BRIDGE

SR 101L
LOOKING EAST

ALTERNATIVE 2 - BRIDGE SLIDE

DATE	REVISION	BY

ENGINEER

PRELIMINARY
NOT FOR
CONSTRUCTION
OR RECORDING

PUBLIC WORKS

CAPITAL PROJECT MANAGEMENT

7447 E. INDIAN SCHOOL RD.
SCOTTSDALE, ARIZONA 85251

SHEET TITLE
PHASING TYPICAL SECTIONS

PROJECT TITLE
MILLER ROAD/SR 101L OVERPASS
CONSTRUCTION ALTERNATIVE ANALYSIS

SCALE	DESIGNED	DATE	BID NO.	SHT.
HORIZ.	KAC	AUGUST 2017		
VERT.	DRAWN	AS-BUILT	PROJECT NO.	8 OF 20
	JFM		SC03B	

SC03B

PLOT DATE: $$DATE$$ $$TIME$$

DESIGN FILE: $$DGN$$

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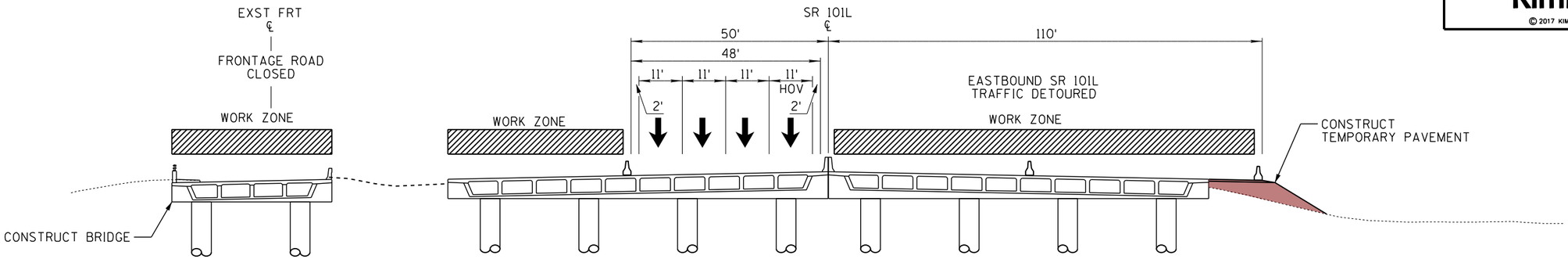
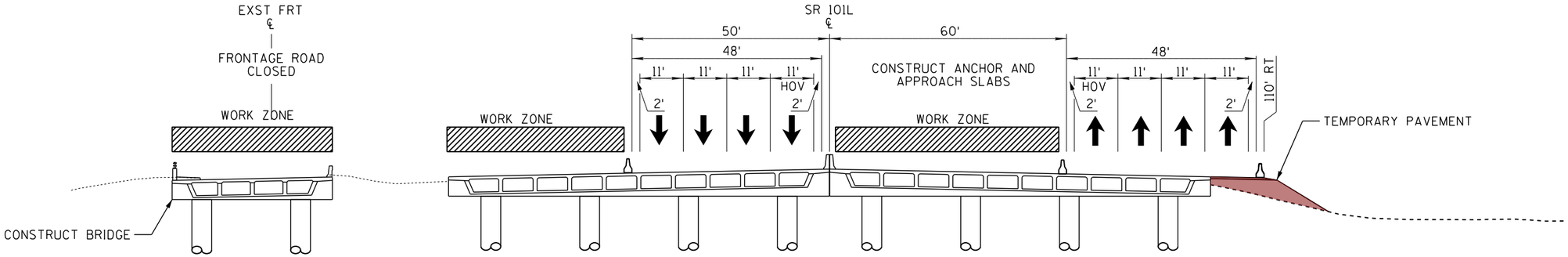
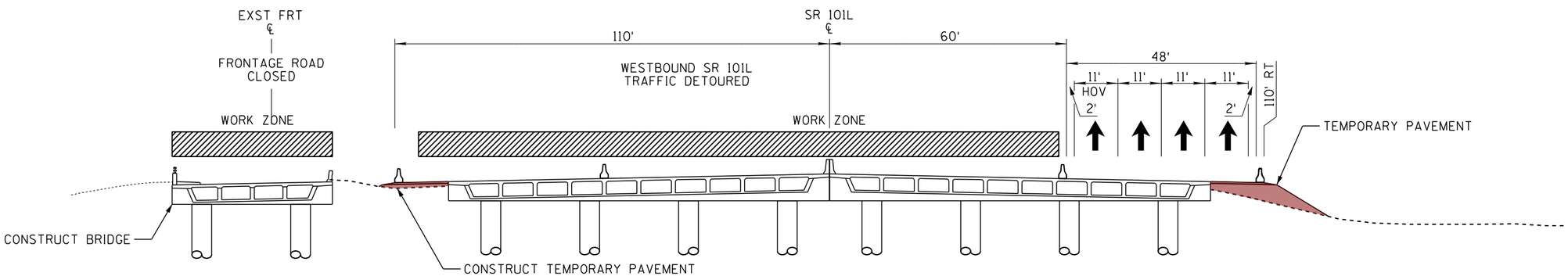


PHASE 9 – WEEKEND ACTIVITY



PHASE 10 – WEEKDAY CONDITION



PHASE 11 – WEEKEND ACTIVITY

SR 101L
LOOKING EAST

ALTERNATIVE 2 - BRIDGE SLIDE

DATE	REVISION	BY

ENGINEER

PRELIMINARY
NOT FOR
CONSTRUCTION
OR RECORDING

PUBLIC WORKS
CAPITAL PROJECT MANAGEMENT
7447 E. INDIAN SCHOOL RD.
SCOTTSDALE, ARIZONA 85251

SHEET TITLE
PHASING TYPICAL SECTIONS

PROJECT TITLE
MILLER ROAD/SR 101L OVERPASS
CONSTRUCTION ALTERNATIVE ANALYSIS

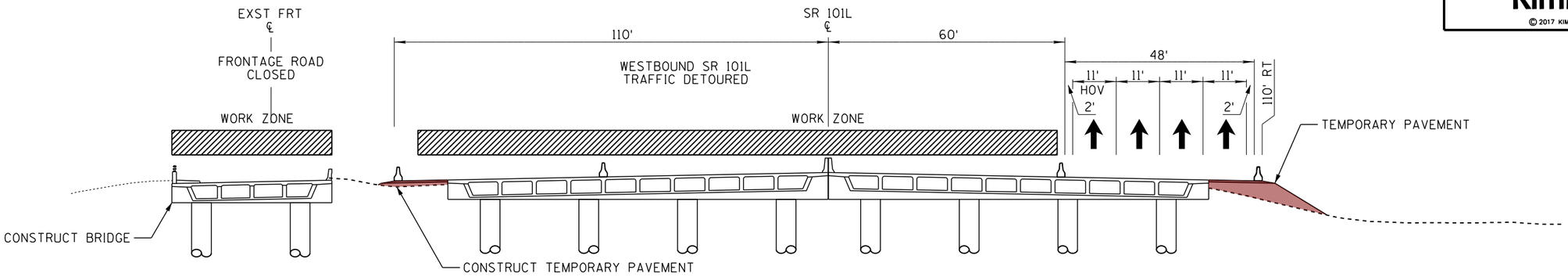
SCALE	DESIGNED	DATE	BID NO.	SHT.
HORIZ.	KAC	AUGUST 2017		
VERT.	DRAWN	AS-BUILT	PROJECT NO.	9 OF 20
	JFM		SC03B	

SC03B

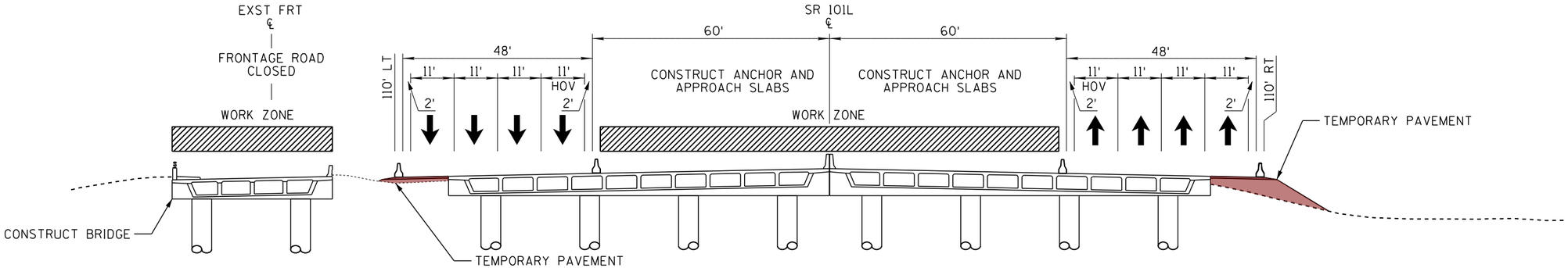
PLOT DATE:$$DATE$$ $$TIME$$

DESIGN FILE:$$DGN$$

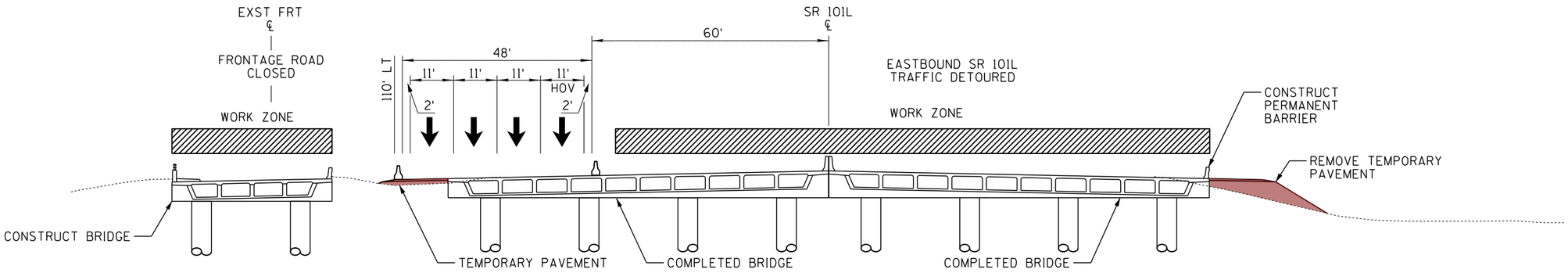
7:34:01 AM 8/16/2017 JOE.METRAILER K:\PHX_ROADWAY\091090017-SCOTTSDALE-MILLERUNDERPASS\CADD\12-SHEETS\TRAFFIC\SC03B_T-TYPICALS_ALT2_04.DGN



PHASE 11 – WEEKEND ACTIVITY



PHASE 12 – CONSTRUCTION ACTIVITY



PHASE 13 – WEEKEND ACTIVITY

SR 101L
LOOKING EAST

ALTERNATIVE 2 - BRIDGE SLIDE

DATE	REVISION	BY

ENGINEER

PRELIMINARY
NOT FOR
CONSTRUCTION
OR RECORDING

PUBLIC WORKS

CAPITAL PROJECT MANAGEMENT

7447 E. INDIAN SCHOOL RD.
SCOTTSDALE, ARIZONA 85251

SHEET TITLE: PHASING TYPICAL SECTIONS

PROJECT TITLE: MILLER ROAD/SR 101L OVERPASS CONSTRUCTION ALTERNATIVE ANALYSIS

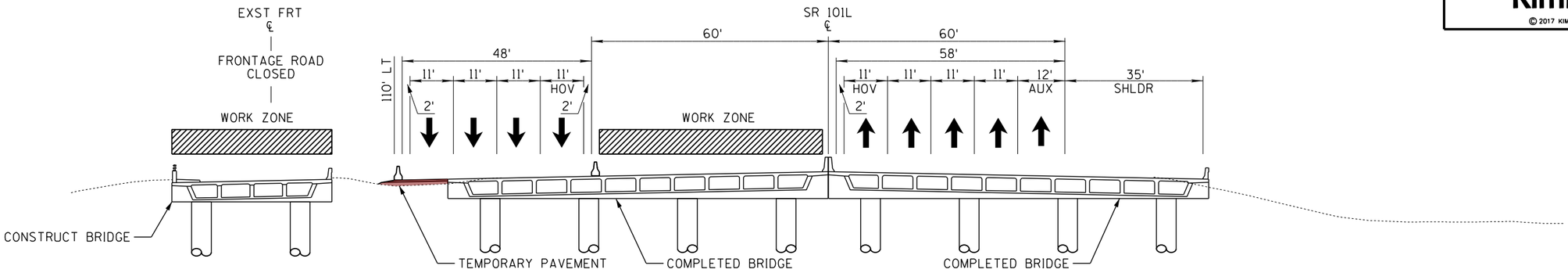
SCALE	DESIGNED	DATE	BID NO.	SHT.
HORIZ.	KAC	AUGUST 2017		
VERT.	DRAWN JFM	AS-BUILT	PROJECT NO. SC03B	10 OF 20

SC03B

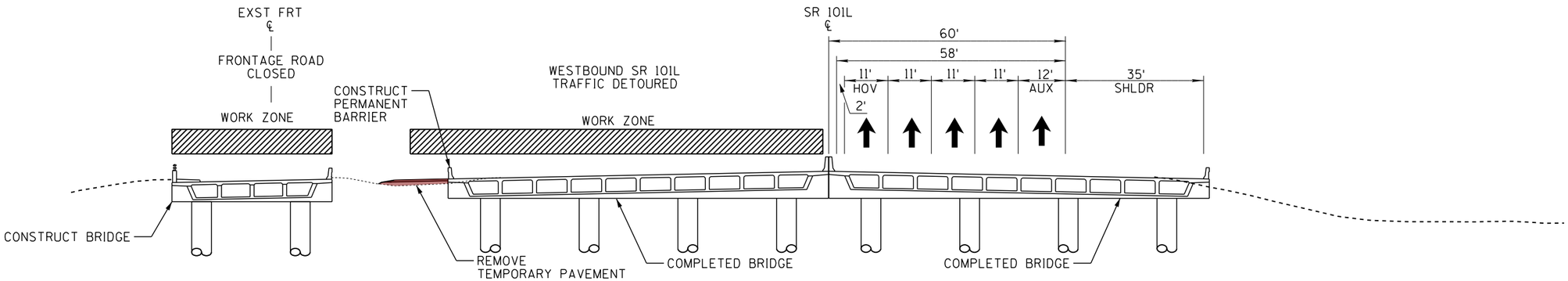
PLOT DATE:$$DATE$$ $$TIME$$

DESIGN FILE:$$DGN$$

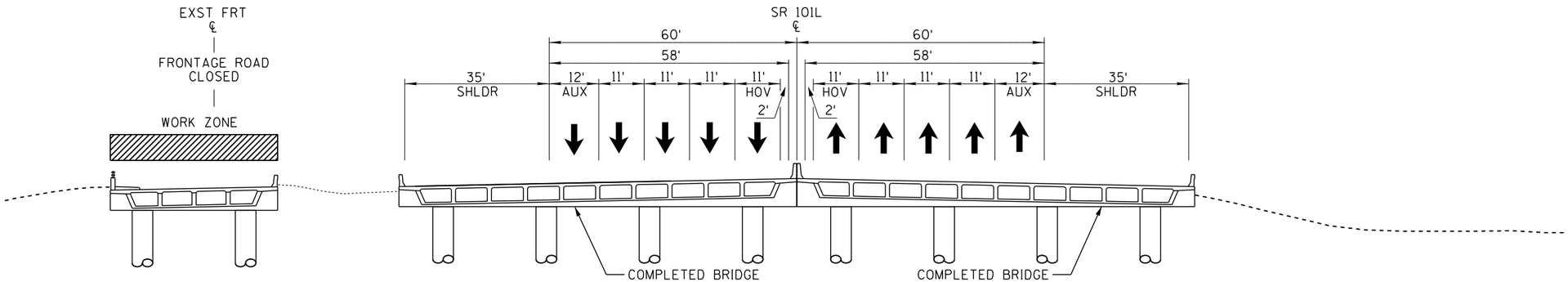
7:34:02 AM 8/16/2017 JOE.METRAILER K:\PHX_ROADWAY\091090017-SCOTTSDALE-MILLERUNDERPASS\CADD\12-SHEETS\TRAFFIC\SC03B_T-TYPICALS_ALT2_05.DGN



PHASE 14 – WEEKDAY CONDITION



PHASE 15 – WEEKEND ACTIVITY



PHASE 16 – MILLER RD BRIDGE CONSTRUCTION COMPLETE – TRAFFIC IN GPL CONSTRUCTION CONFIGURATION

SR 101L
LOOKING EAST

ALTERNATIVE 2 - BRIDGE SLIDE

DATE	REVISION	BY
ENGINEER		

PRELIMINARY
NOT FOR
CONSTRUCTION
OR RECORDING

PUBLIC WORKS
CAPITAL PROJECT MANAGEMENT
7447 E. INDIAN SCHOOL RD.
SCOTTSDALE, ARIZONA 85251

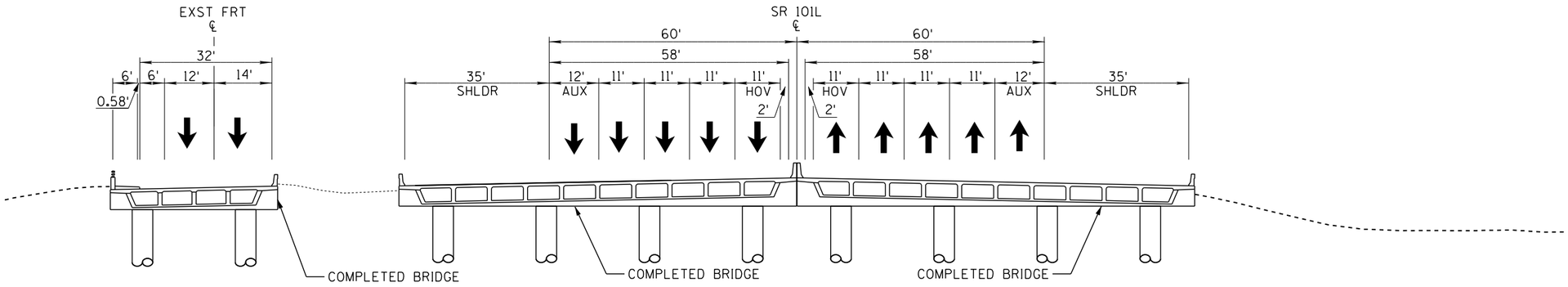
SHEET TITLE: PHASING TYPICAL SECTIONS

PROJECT TITLE: MILLER ROAD/SR 101L OVERPASS CONSTRUCTION ALTERNATIVE ANALYSIS

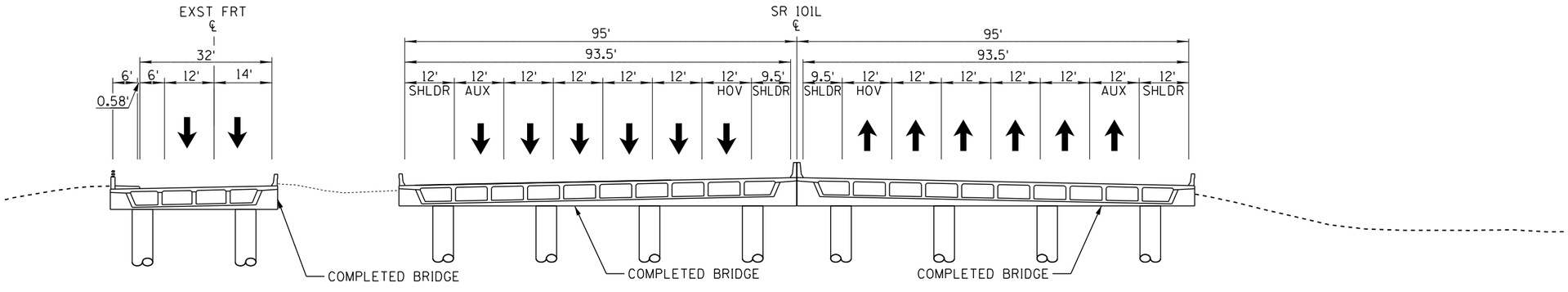
SCALE	DESIGNED	DATE	BID NO.	SHT.
HORIZ.	KAC	AUGUST 2017		
VERT.	DRAWN JFM	AS-BUILT	PROJECT NO. SC03B	11 OF 20

SC03B

PLOT DATE: $$DATE$$ $$TIME$$
DESIGN FILE: $$DGN$$
7:34:02 AM 8/16/2017 JOE.METRAILER K:\PHX_ROADWAY\091090017-SCOTTSDALE-MILLERUNDERPASS\CADD\12-SHEETS\TRAFFIC\SC03B_T-TYPICALS_ALT2_06.DGN



PHASE 17 – FRT RD BRIDGE CONSTRUCTION COMPLETE – TRAFFIC IN GPL CONSTRUCTION CONFIGURATION



PHASE 18 – MILLER RD BRIDGE CONSTRUCTION COMPLETE – GPL CONSTRUCTION COMPLETE

SR 101L
LOOKING EAST

ALTERNATIVE 2 - BRIDGE SLIDE

DATE	REVISION	BY

ENGINEER

PRELIMINARY
NOT FOR
CONSTRUCTION
OR RECORDING

PUBLIC WORKS

CAPITAL PROJECT MANAGEMENT

7447 E. INDIAN SCHOOL RD.
SCOTTSDALE, ARIZONA 85251

SHEET TITLE
PHASING TYPICAL SECTIONS

PROJECT TITLE
MILLER ROAD/SR 101L OVERPASS
CONSTRUCTION ALTERNATIVE ANALYSIS

SCALE	DESIGNED	DATE	BID NO.	SHT.
HORIZ.	KAC	AUGUST 2017		
VERT.	DRAWN JFM	AS-BUILT	PROJECT NO. SC03B	12 OF 20

SC03B

PLOT DATE: $$DATE$$ $$TIME$$

DESIGN FILE: $$DGN$$

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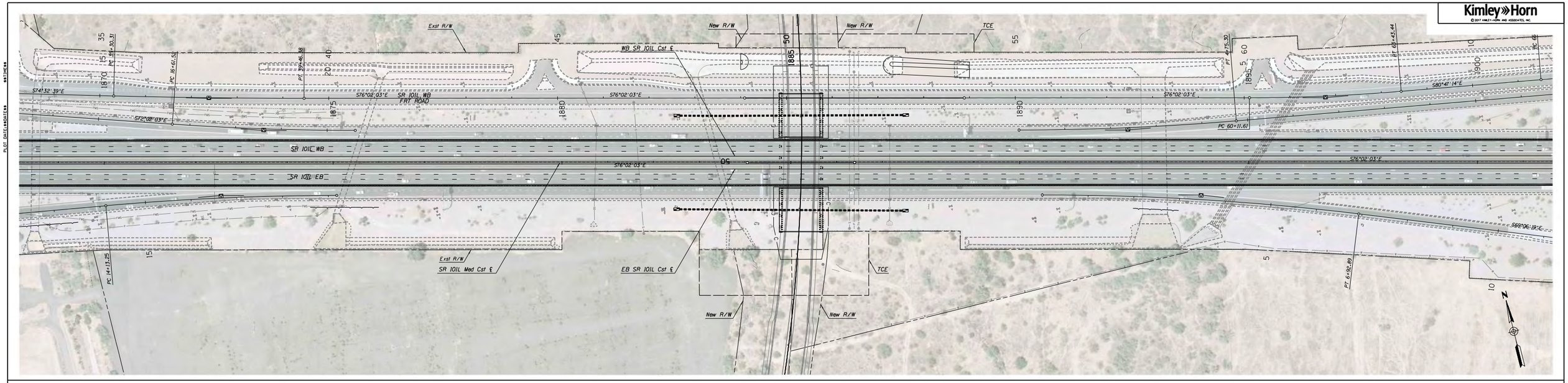
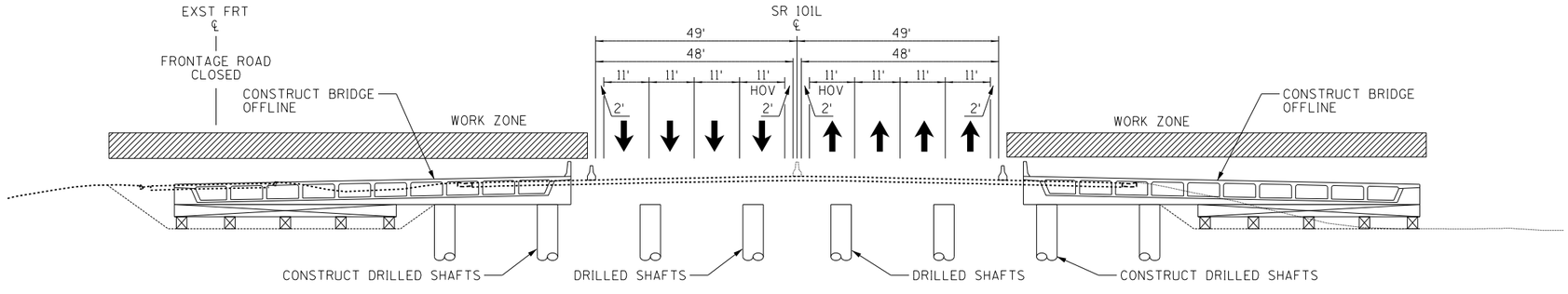




PHASE 4 – CONSTRUCT BRIDGE SLIDE OFF-LINE

ALTERNATIVE 1 - BRIDGE SLIDE

Kimley»Horn

ARIZONA BLUE STAKE, INC.
DIAL 811 or 602-263-1100
1-800-STAKE-IT

DATE	REVISION	BY
ENGINEER		

PRELIMINARY NOT FOR CONSTRUCTION OR RECORDING

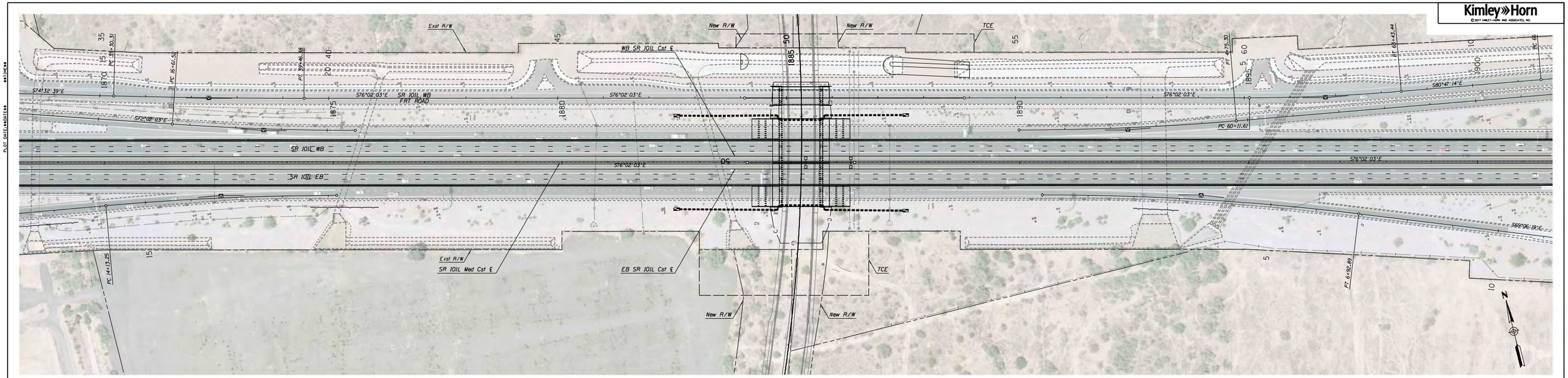
PUBLIC WORKS
CAPITAL PROJECT MANAGEMENT
7447 E. INDIAN SCHOOL RD.
SCOTTSDALE, ARIZONA 85251

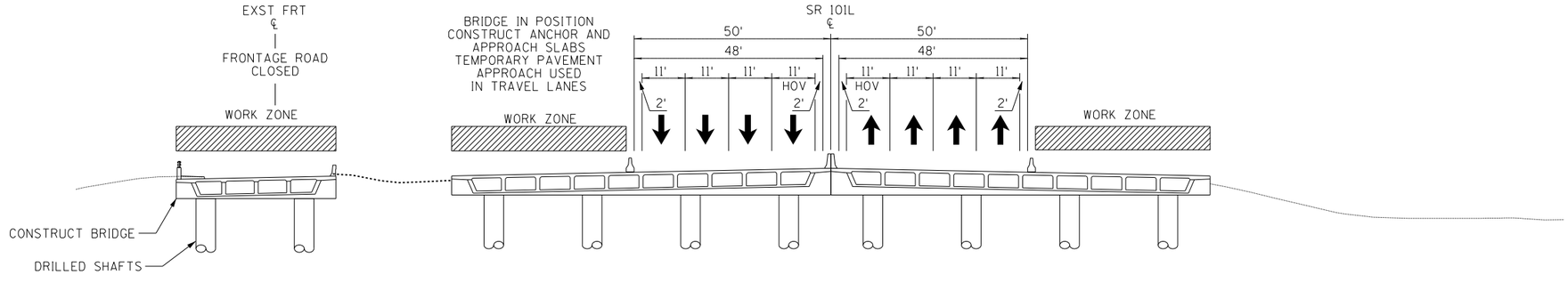
SHEET TITLE: TRAFFIC CONTROL PHASE 4

PROJECT NO.: MILLER ROAD/SR 101L OVERPASS CONSTRUCTION ALTERNATIVE ANALYSIS

SCALE	DESIGNED	DATE	BID NO.	SHT.
HORZ.	DRAWN	AUGUST 2017		
VERT.	CHECKED	AS-BUILT	PROJECT NO.	15 OF 20

SK103B





PHASE 8 – WEEKDAY CONDITION – CONSTRUCT FRONTAGE RD BRIDGE

ALTERNATIVE 2 - BRIDGE SLIDE

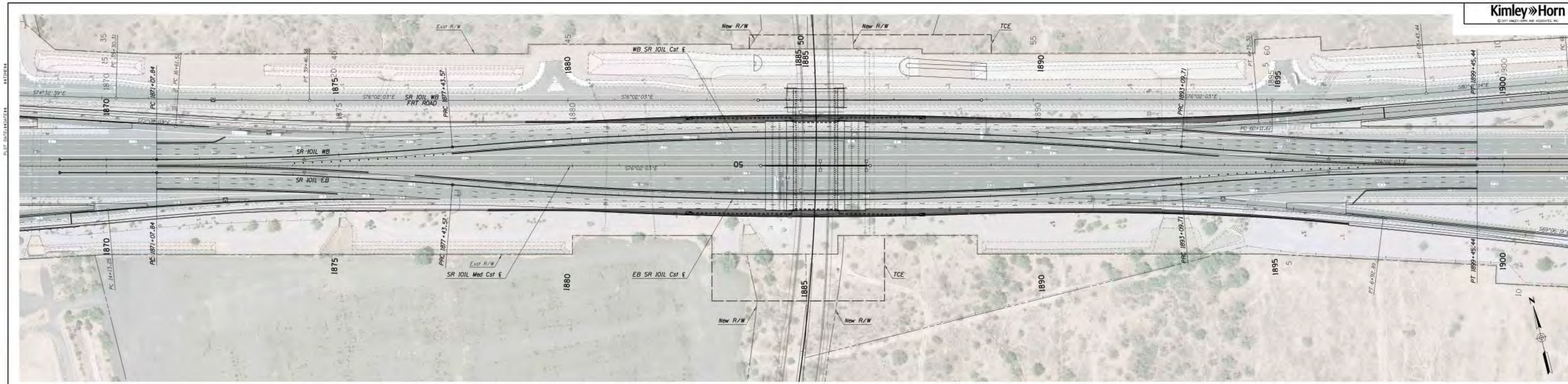
DATE	REVISION		BY
ENGINEER			
PRELIMINARY NOT FOR CONSTRUCTION OR RECORDING		PUBLIC WORKS CAPITAL PROJECT MANAGEMENT 7447 E. INDIAN SCHOOL RD. SCOTTSDALE, ARIZONA 85251	
SHEET TITLE	TRAFFIC CONTROL PHASE 8		
PROJECT NO.	MILLER ROAD/SR 101L OVERPASS CONSTRUCTION ALTERNATIVE ANALYSIS		
SCALE: HORZ. VERT.	DESIGNED - DRAWN - JPM	DATE: AUGUST 2017 AS-BUILT	BID NO. PROJECT NO. 0008
			SHT. 14 OF 20

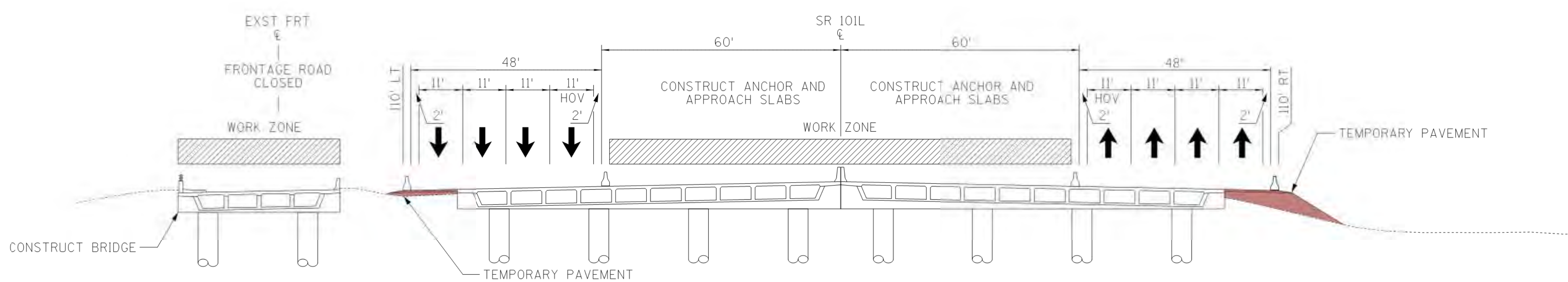
ARIZONA BLUE STAKE, INC. Arizona's Underground Protection
811 or 602-263-1100
1-800-STAKE-IT
(OUTSIDE MARICOPA COUNTY)

SCI08B

DESIGN FILE: sht08a.dgn

7:34:09 AM 8/16/2017 JOE.METRAILER K:\PHX_ROADWAY\BRIDGE\0007-SCOTTSDALE-MILLERUNDERPASS\CADD\12-SHEETS\TRAFFIC\SCI08B_T-ROLLBI-PH08-ALT2.DGN





PHASE 12 – CONSTRUCTION ACTIVITY

ALTERNATIVE 4 - PRECAST ARCH

PRELIMINARY NOT FOR CONSTRUCTION OR RECORDING

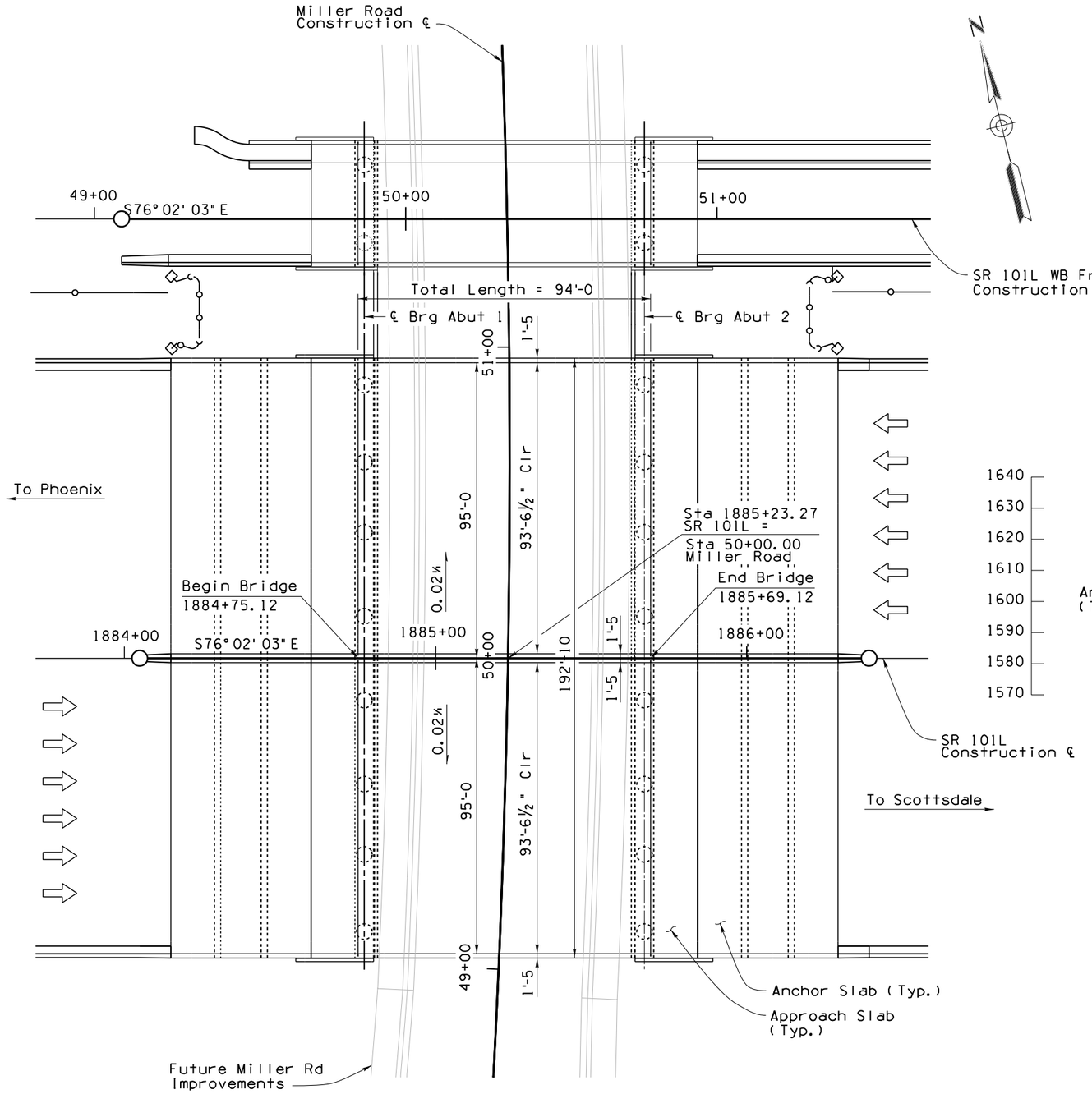
PUBLIC WORKS

CAPITAL PROJECT MANAGEMENT

TRAFFIC CONTROL PHASE 12

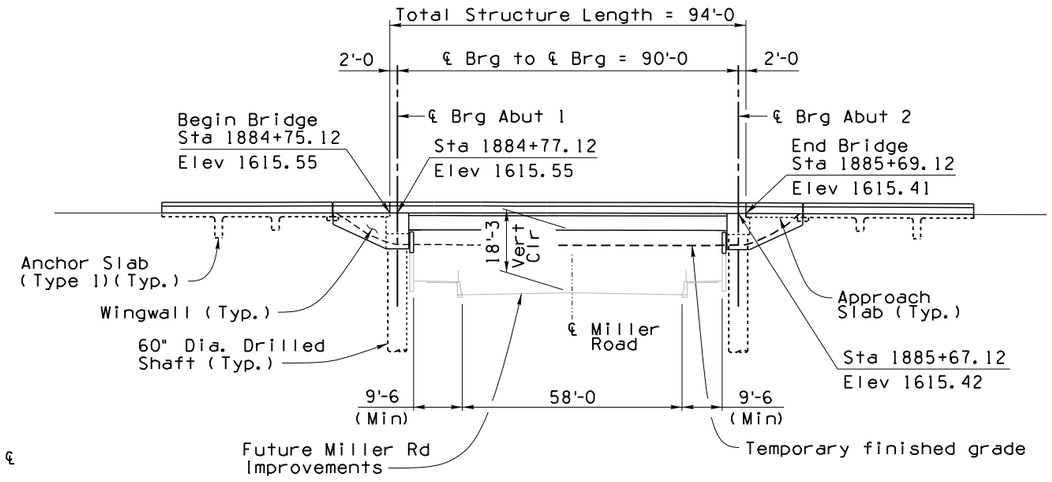
MILLER ROAD/SR 101L OVERPASS
CONSTRUCTION ALTERNATIVE ANALYSIS

SC03B



PLAN

Single Span Cast-In-Place Post-Tensioned Concrete Bridge Slide
Skew=0°
Scale: 1'-0= 20'-0



ELEVATION

Scale: 1'-0= 20'-0
(Elevations shown along Profile Grade Line)

ALTERNATIVE 2 - BRIDGE SLIDE

ARIZONA BLUE STAKE
CALL TWO WORKING DAYS BEFORE YOU DIG
Dial 811 or 602-263-1100
1-800-STAKE-IT
(OUTSIDE MARICOPA COUNTY)

DATE	REVISION	BY

ENGINEER

PRELIMINARY
NOT FOR
CONSTRUCTION
OR RECORDING

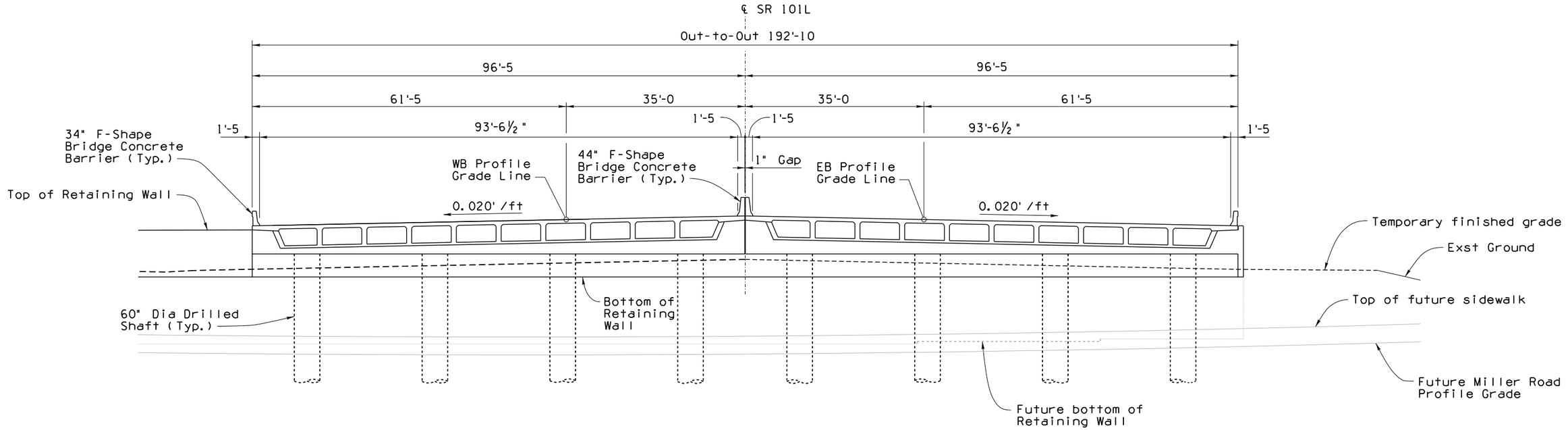
PUBLIC WORKS
CAPITAL PROJECT MANAGEMENT
7447 E. INDIAN SCHOOL RD.
SCOTTSDALE, ARIZONA 85251

SHEET TITLE
GENERAL PLAN & ELEVATION

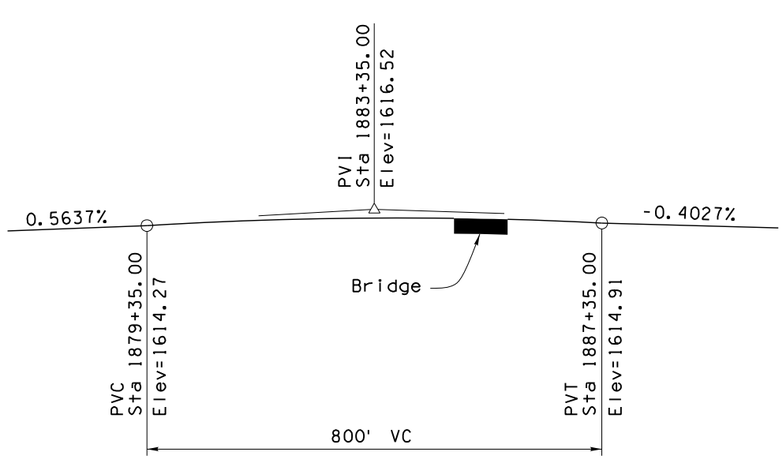
PROJECT TITLE
MILLER ROAD/SR 101L OVERPASS
CONSTRUCTION ALTERNATIVE ANALYSIS

SCALE	DESIGNED KJK	DATE AUGUST 2017	BID NO.	SHT.
HORIZ.	DRAWN MSK	AS-BUILT	PROJECT NO. SC03B	16 OF 20
VERT.				

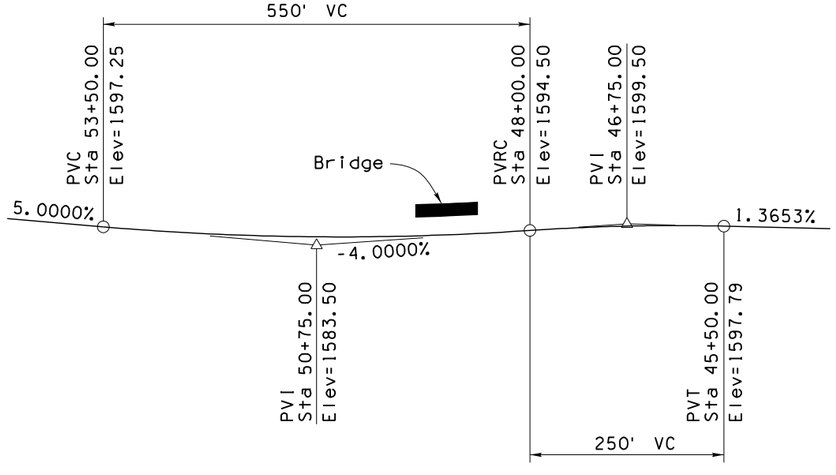
SC03B



TYPICAL SECTION
Scale: 1'-0= 10'-0



SR 101L PROFILE GRADE
No Scale



MILLER ROAD PROFILE GRADE
No Scale

ALTERNATIVE 2 - BRIDGE SLIDE

ARIZONA BLUE STAKE
CALL TWO WORKING DAYS BEFORE YOU DIG
Dial 811 or 602-263-1100
1-800-STAKE-IT
(OUTSIDE MARICOPA COUNTY)

DATE	REVISION	BY

ENGINEER
PRELIMINARY NOT FOR CONSTRUCTION OR RECORDING

PUBLIC WORKS
CAPITAL PROJECT MANAGEMENT
7447 E. INDIAN SCHOOL RD.
SCOTTSDALE, ARIZONA 85251

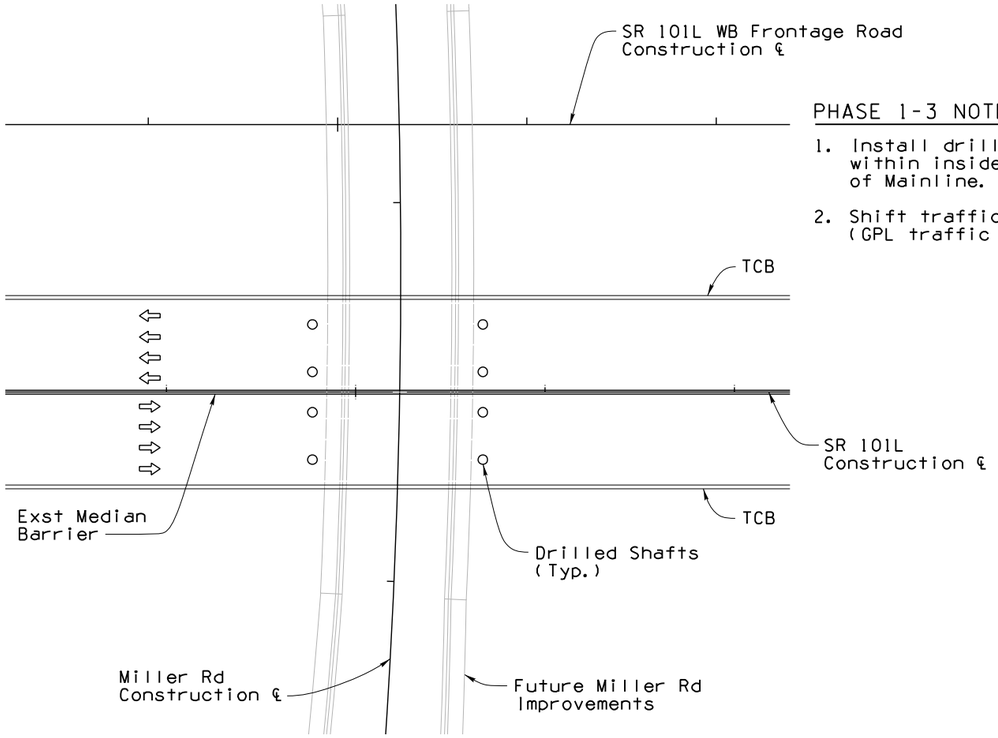
SHEET TITLE
TYPICAL SECTION

PROJECT TITLE
MILLER ROAD/SR 101L OVERPASS
CONSTRUCTION ALTERNATIVE ANALYSIS

SCALE	DESIGNED	DATE	BID NO.	SHT.
HORIZ.	KJK	AUGUST 2017		
VERT.	DRAWN MSK	AS-BUILT	PROJECT NO. SC03B	17 OF 20

SC03B

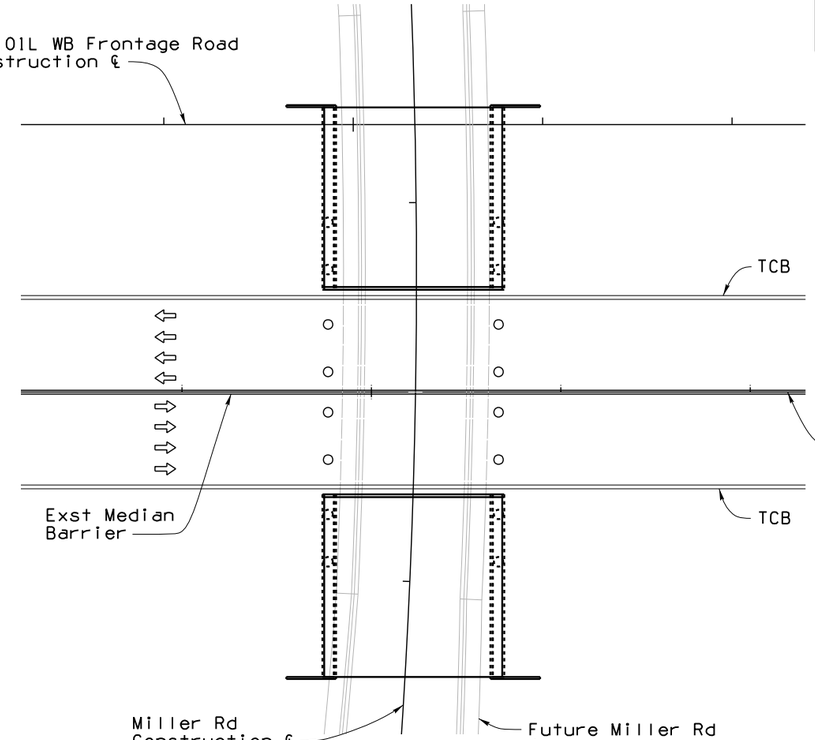
7:34:21 AM 8/16/2017 JOE.METRAILER K:\PHX_ROADWAY\091090017-SCOTTSDALE-MILLERUNDERPASS\CADD\12-SHEETS\STRUCTURES\SC03B_ALT 2_2_GP01-TYPICAL SECTION.DGN



PHASE 1-3

PHASE 1-3 NOTES:

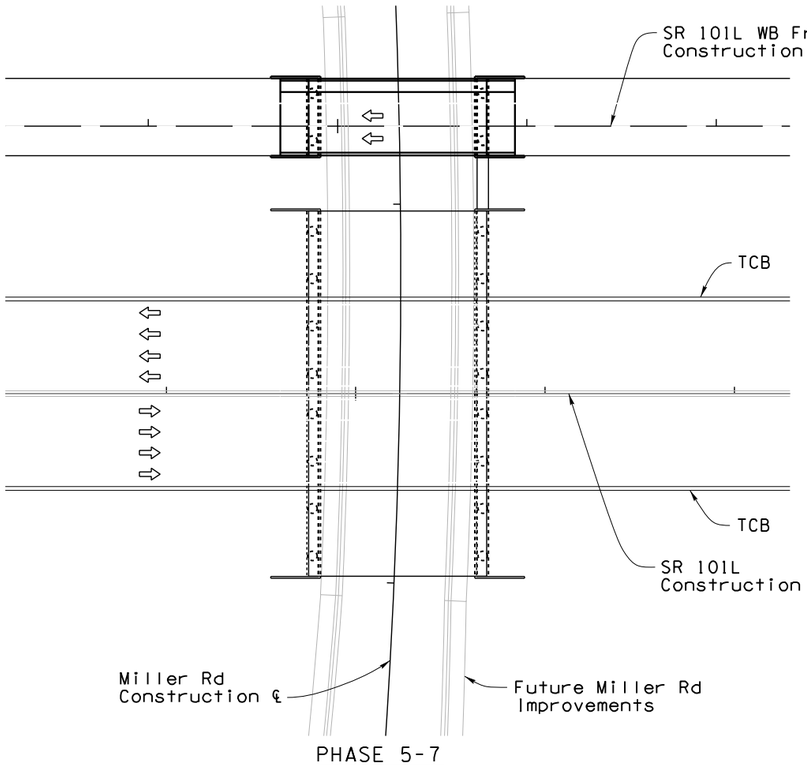
1. Install drilled shafts within inside portion of Mainline.
2. Shift traffic to inside. (GPL traffic location).



PHASE 4

PHASE 4 NOTES:

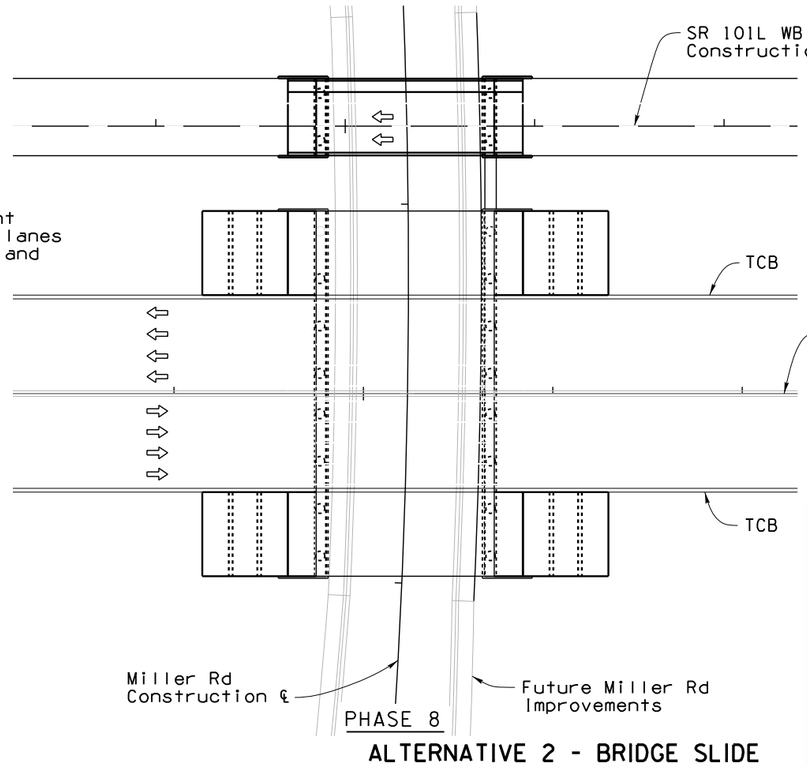
1. Close WB Frontage road.
2. Construct EB & WB bridges off alignment.



PHASE 5-7

PHASE 5-7 NOTES:

1. Weekend closure EB SR 101L & slide EB bridge into final location.
2. Construct temporary pavement and open EB SR 101L inside lanes and begin outside approach and anchor slab construction.
3. Weekend closure WB SR 101L & slide WB bridge into final location.
4. Construct temporary pavement and open WB SR 101L inside lanes.
5. Begin WB Frontage Road bridge construction.



PHASE 8

PHASE 8 NOTES:

1. Continue WB Frontage Road bridge construction.
2. Complete EB outside anchor and approach slabs.
3. Continue WB outside anchor and approach slabs.

ALTERNATIVE 2 - BRIDGE SLIDE

DATE	REVISION	BY

ENGINEER

PRELIMINARY
NOT FOR
CONSTRUCTION
OR RECORDING

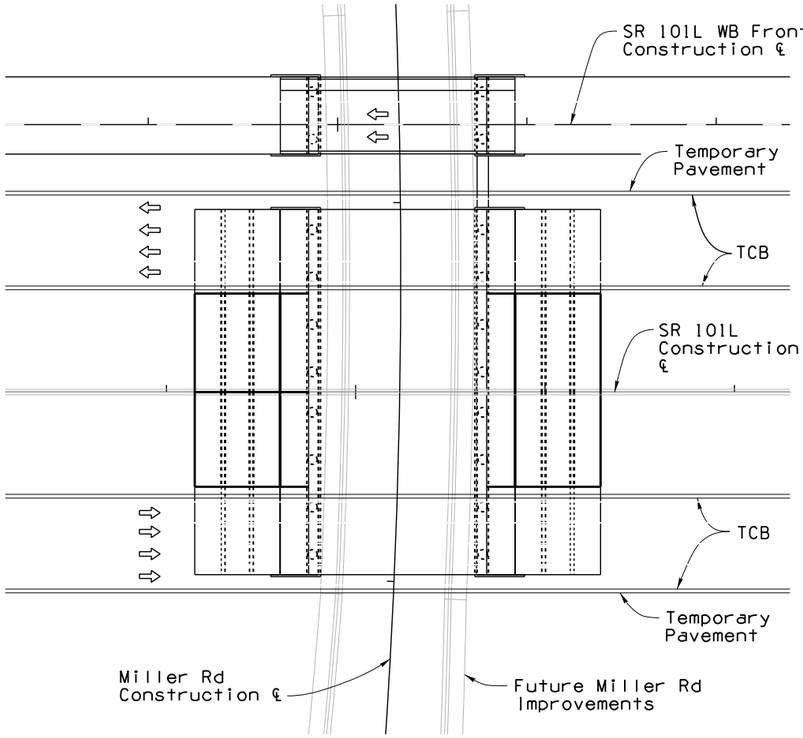
PUBLIC WORKS
CAPITAL PROJECT MANAGEMENT
7447 E. INDIAN SCHOOL RD.
SCOTTSDALE, ARIZONA 85251

SHEET TITLE
CONSTRUCTION PHASING

PROJECT TITLE
MILLER ROAD/SR 101L OVERPASS
CONSTRUCTION ALTERNATIVE ANALYSIS

SCALE	DESIGNED	DATE	BID NO.	SHT.
HORIZ.	KJK	AUGUST 2017		
VERT.	DRAWN MSK	AS-BUILT	PROJECT NO. SC03B	18 OF 20

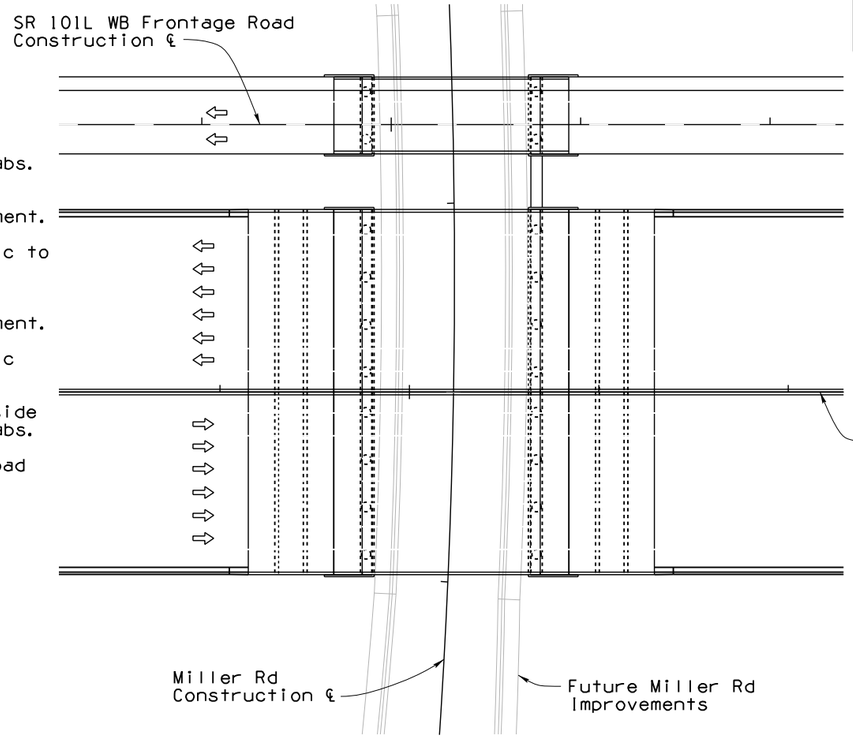
SC03B



PHASE 9-12

PHASE 9-12 NOTES:

1. Complete WB outside anchor and approach slabs.
2. Construct EB SR 101L outside temporary pavement.
3. Shift EB SR 101L traffic to outside lanes.
4. Construct WB SR 101L outside temporary pavement.
5. Shift WB SR 101L traffic to outside lanes.
6. Construct EB and WB inside anchor and approach slabs.
7. Continue WB Frontage Road bridge construction.



PHASE 13-17

(Note: Ultimate lane configuration shown)

PHASE 13-17 NOTES:

1. Shift traffic to inside. (GPL traffic location).
2. Construct outside bridge barriers.
3. Complete WB Frontage Road bridge.
4. Bridge work complete.

ALTERNATIVE 2 - BRIDGE SLIDE

ARIZONA BLUE STAKE
CALL TWO WORKING DAYS BEFORE YOU DIG
Dial 811 or 602-263-1100
1-800-STAKE-IT
(OUTSIDE MARICOPA COUNTY)

DATE	REVISION	BY

ENGINEER

PRELIMINARY
NOT FOR
CONSTRUCTION
OR RECORDING

PUBLIC WORKS

CAPITAL PROJECT MANAGEMENT

7447 E. INDIAN SCHOOL RD.
SCOTTSDALE, ARIZONA 85251

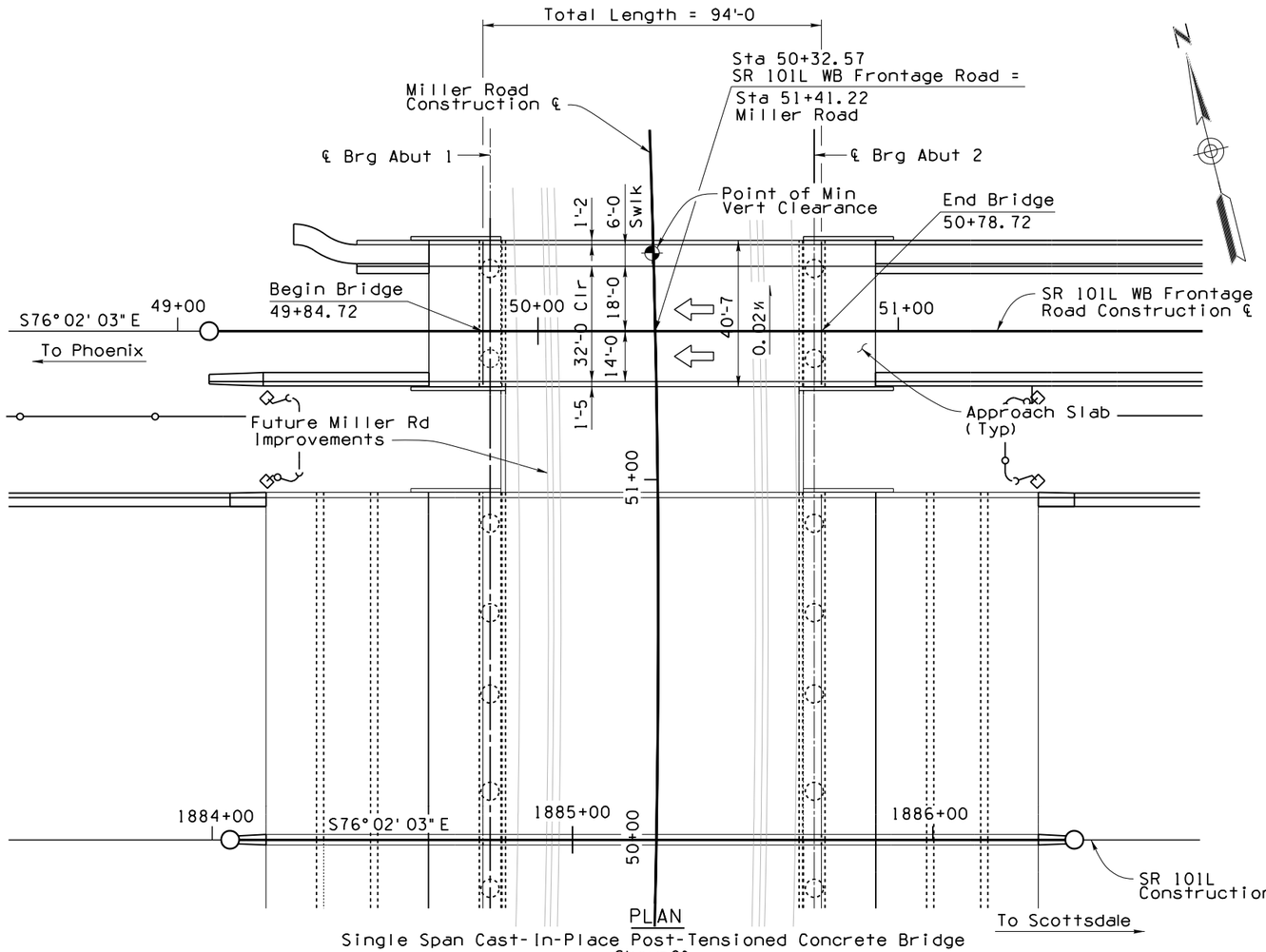
SHEET TITLE
CONSTRUCTION PHASING

PROJECT TITLE
MILLER ROAD/SR 101L OVERPASS
CONSTRUCTION ALTERNATIVE ANALYSIS

SCALE	DESIGNED	DATE	BID NO.	SHT.
HORIZ.	KJK	AUGUST 2017		
VERT.	DRAWN MSK	AS-BUILT	PROJECT NO. SC03B	19 OF 20

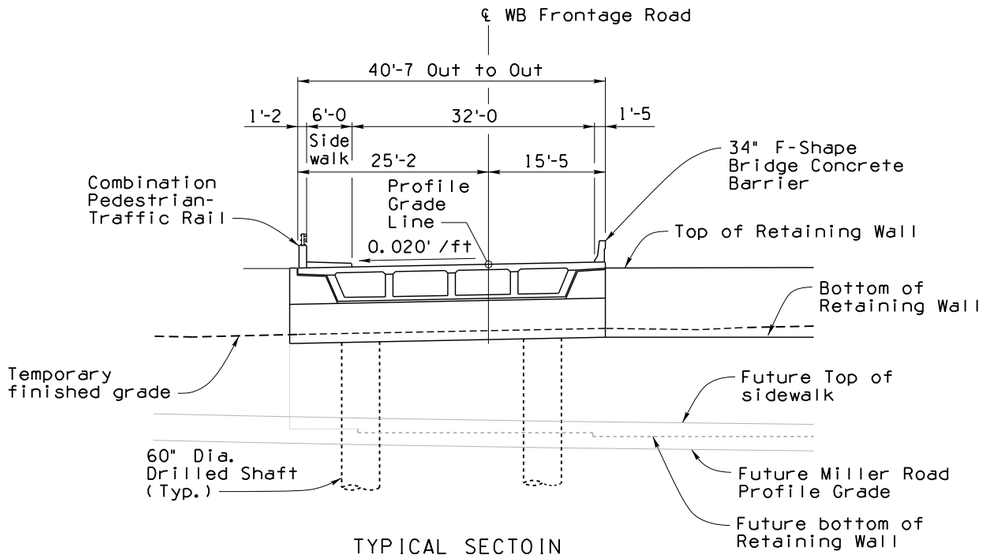
SC03B

7:34:22 AM 8/16/2017 JOE.METRAILER K:\PHX_ROADWAY\091090017-SCOTTSDALE-MILLERUNDERPASS\CADD\12-SHEETS\STRUCTURES\SC03B_ALT 2_4_CP02-SLIDE-BRIDGE.DGN



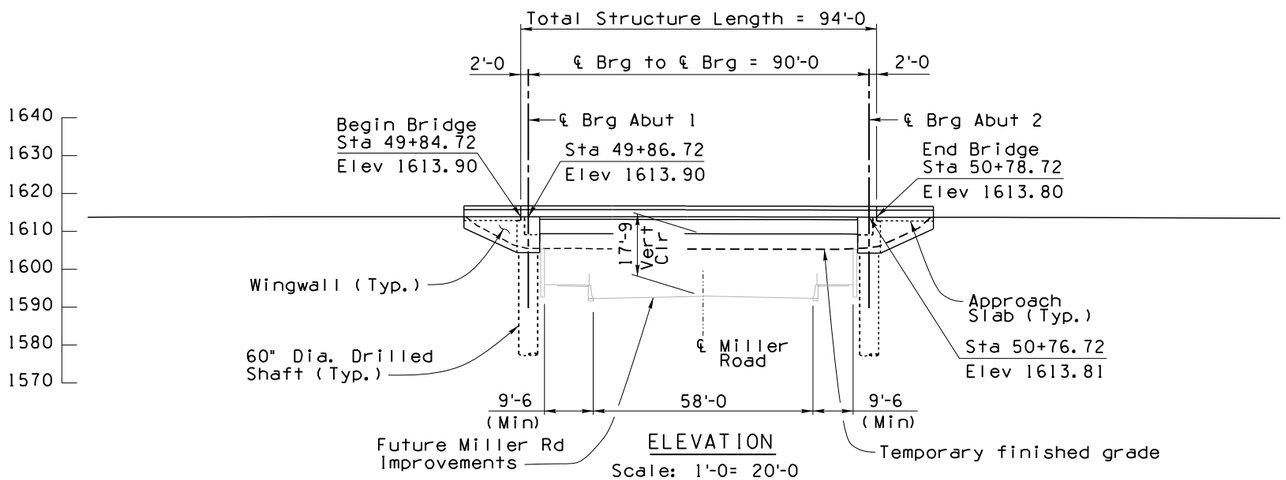
PLAN

Single Span Cast-In-Place Post-Tensioned Concrete Bridge
Skew=0°
Scale: 1'-0= 20'-0



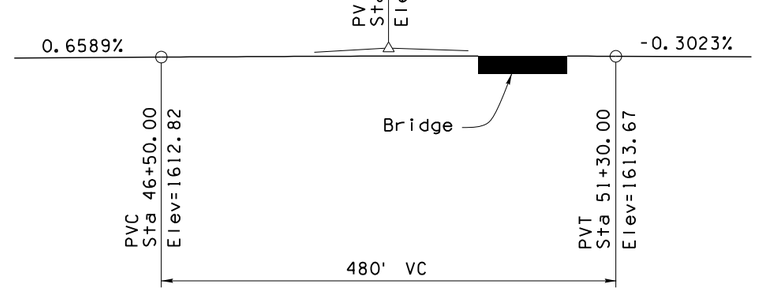
TYPICAL SECTOIN

Scale: 1'-0= 10'-0



ELEVATION

Scale: 1'-0= 20'-0



FRONTAGE ROAD PROFILE GRADE

No Scale

ALTERNATIVE 2 - BRIDGE SLIDE

ARIZONA BLUE STAKE
CALL TWO WORKING DAYS BEFORE YOU DIG
Dial 811 or 602-263-1100
1-800-STAKE-IT
(OUTSIDE MARICOPA COUNTY)

DATE	REVISION	BY

ENGINEER

PRELIMINARY NOT FOR CONSTRUCTION OR RECORDING

PUBLIC WORKS
CAPITAL PROJECT MANAGEMENT
7447 E. INDIAN SCHOOL RD.
SCOTTSDALE, ARIZONA 85251

SHEET TITLE: GENERAL PLAN / ELEVATION & TYP SEC

PROJECT TITLE: MILLER ROAD/SR 101L OVERPASS CONSTRUCTION ALTERNATIVE ANALYSIS

SCALE	DESIGNED	DATE	BID NO.	SHT.
HORIZ.	KJK	AUGUST 2017		
VERT.	DRAWN	AS-BUILT	PROJECT NO.	20 OF 20
	MSK		SC03B	

SC03B

APPENDIX E

Alternative 3 – Box Slide Plans

CITY OF SCOTTSDALE

PUBLIC IMPROVEMENTS

COUNCIL
W.J. "JIM" LANE, MAYOR
SUZANNE KLAPP
VIRGINIA KORTE
KATHY LITTLEFIELD
LINDA MILHAVEN
GUY PHILLIPS
DAVID N. SMITH

CITY MANAGER
JIM THOMPSON

CITY ATTORNEY
BRUCE WASHBURN

CITY CLERK
CAROLYN JAGGER

"AS-BUILT" CERTIFICATION

I HEREBY CERTIFY THAT THE "AS-BUILT" IMPROVEMENTS AS SHOWN HEREON ARE LOCATED AS NOTED, AND THE LOCATIONS ARE CORRECT TO THE BEST OF MY KNOWLEDGE AND BELIEF.

REGISTERED LAND SURVEYOR _____ DATE _____

CITY OF SCOTTSDALE

REVIEWED AND RECOMMENDED APPROVAL BY:

PAVING		STRUCTURES	
GRADING & DRAINAGE		BUILDING	
WATER & SEWER		PLUMBING	
TRAFFIC		MECHANICAL	
PLANNING IMPROVEMENTS		ELECTRICAL	
PLANNING FACILITIES		FIRE IMPROVEMENTS	
LANDSCAPE		FIRE FACILITIES	
NATIVE PLANT			

ENGINEERING COORDINATION MANAGER (OR DESIGNEE) _____ DATE _____

BUILDING OFFICIAL (OR DESIGNEE) _____ DATE _____

ENGINEER

ENGINEERING FIRM
LOGO & ADDRESS
GOES HERE

10/27/2017 3:58:17 PM DGN

MILLER ROAD/SR 101L OVERPASS
CONSTRUCTION ALTERNATIVE ANALYSIS
ALTERNATIVE 3 - BOX SLIDE
PROJECT NO. SC03B

NO CONFLICT SIGNATURE BLOCK				
Utility	Utility Company	Name of Company Representative	Telephone Number	Date Signed
Electric				
Telephone				
Natural Gas				
Cable TV				
Water				
Sewer				

Engineer's Certification

I _____, as the Engineer of Record for this development, hereby certify that all utility companies listed above have been provided final improvement plans for review, and that all conflicts identified by the utilities have been resolved. In addition, "No Conflict" forms have been obtained from each utility company and are included in this submittal.

Signature _____ Date _____

Certificate of Approval to Construct — Maricopa County Environmental Services Department, Water and Waste Management Division

MCESD # _____

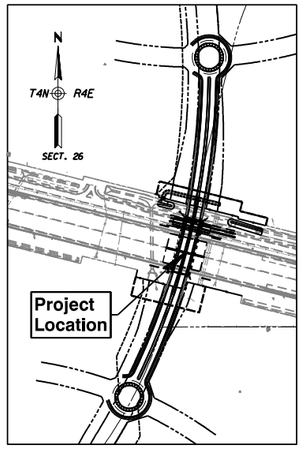
Public Water System ID Number 0407- (and/or) Waste Water System ID Number 0437-
Project Description:

Project Location:
Project Owner:

Pursuant to AAC Title 18: Chapter 4, Article 5: or AAC Title 18: Chapter 9, Article 8: and/or Maricopa County Environmental Health Code Chapters II or V. This certificate of Approval To Construct the above described facilities as represented in the attached plan is valid upon review and signature by a Maricopa County Environmental Services Department's representative given the following provisions.
1.) A Request for Certificate of Approval of Construction, together with an Engineer's Certificate of Completion, and sealed engineered as-built plans, shall be submitted to this Department prior to Approval of Construction and startup.
2.) The Approval to Construct is void if major modifications occur to the plans without the knowledge and consent of the department.
If Construction has not started within one year of the approval date, this certificate will be void. An extension of time may be available upon written request.

Approved By: _____ Date Approved: _____

CC: MCESD FILE: ADEQ
Engineer: AZ. Corp. Commission



Vicinity Map
N.T.S.

ALTERNATIVES ANALYSIS OCTOBER 2017

SHEET INDEX

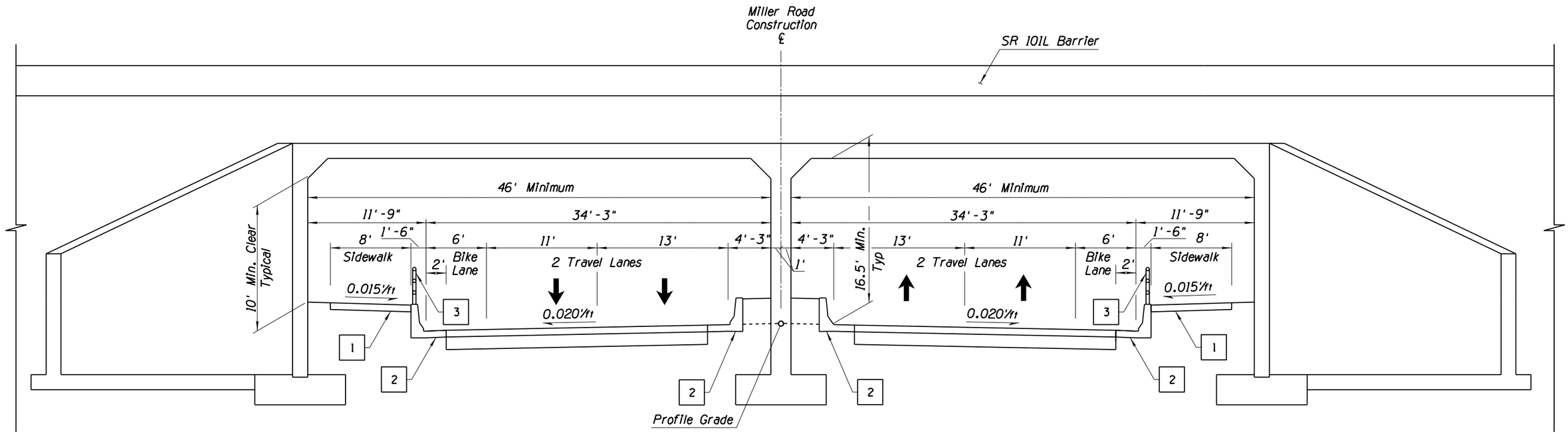
City of Scottsdale approved plans shall be kept on the job site at all times during the course of constuction.

DR/STAFF APPROVAL NO.

ALTERNATIVE 3 - BOX SLIDE
PROJECT NO. SC03B

PLAN REVIEW NO.

SHT. 1



MILLER ROAD
TYPICAL SECTION

1 *New Concrete Sidewalk*

2 *New Concrete Half Barrier with Gutter*

3 *New Safety Rail*

REQUIRES: 87' MINIMUM WIDTH
PROVIDES: 2 TRAVEL LANES, 11' OUTSIDE, 13' INSIDE
PROVIDES: 8' SIDEWALK WITHOUT LANDSCAPE BUFFER

ALTERNATIVE 3 - BOX SLIDE

ARIZONA BLUE STAKE
CALL TWO WORKING DAYS BEFORE YOU DIG
Dial 811 or 602-263-1100
1-800-STAKE-IT
(OUTSIDE MARICOPA COUNTY)

DATE	REVISION	BY

ENGINEER
PRELIMINARY
NOT FOR
CONSTRUCTION
OR RECORDING

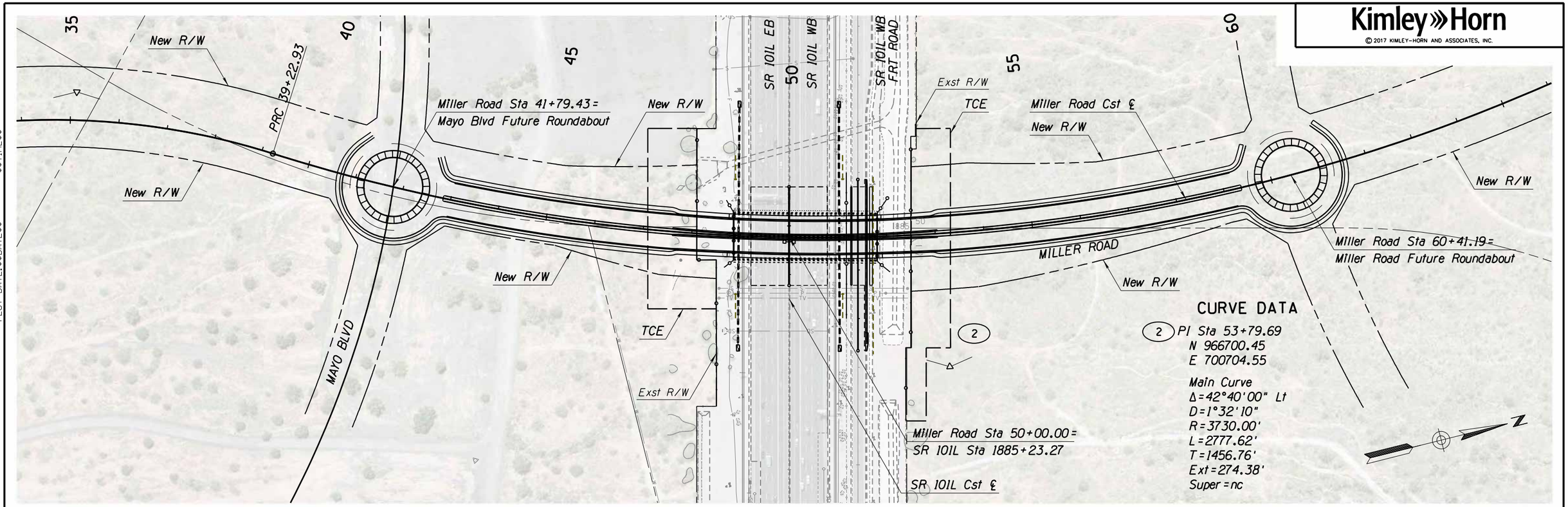
PUBLIC WORKS
CAPITAL PROJECT MANAGEMENT
7447 E. INDIAN SCHOOL RD.
SCOTTSDALE, ARIZONA 85251

SHEET TITLE: TYPICAL SECTION

PROJECT TITLE: MILLER ROAD/SR 101L OVERPASS CONSTRUCTION ALTERNATIVE ANALYSIS

SCALE	DESIGNED	DATE	BID NO.	SHT.
HORIZ.	DRR	OCTOBER 2017		
VERT.	DRAWN JFM	AS-BUILT	PROJECT NO. SC03B	2 OF 17

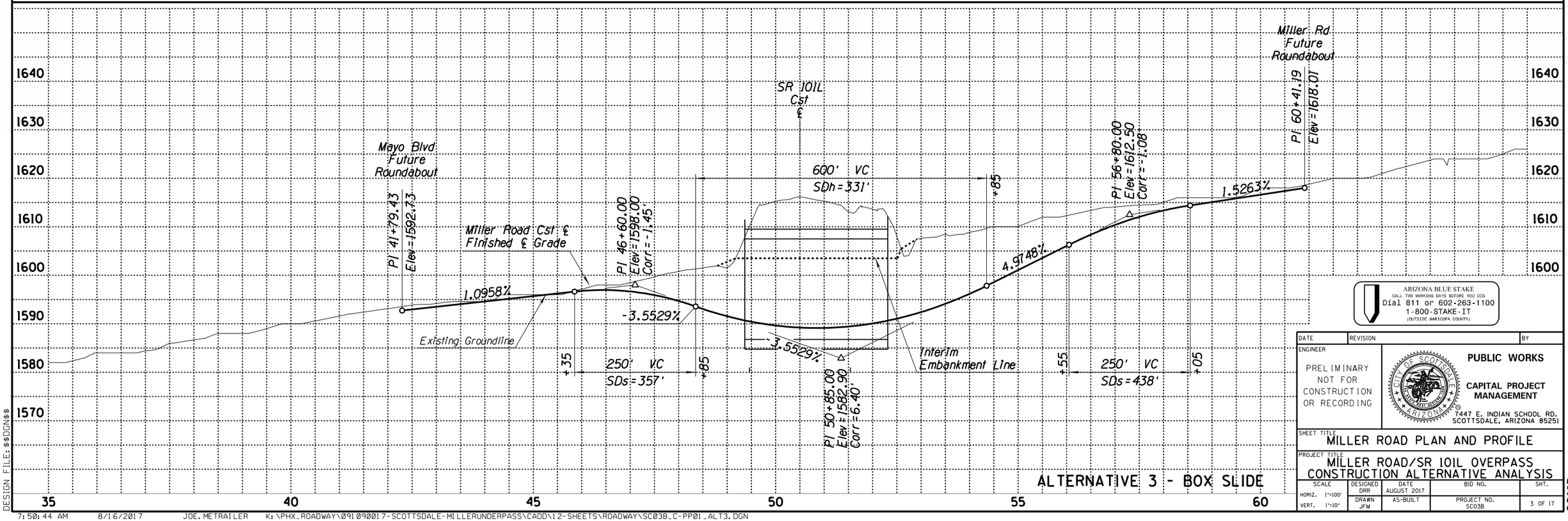
SC03B



CURVE DATA

(2) PI Sta 53+79.69
N 966700.45
E 700704.55

Main Curve
Δ=42°40'00" Lt
D=1°32'10"
R=3730.00'
L=2777.62'
T=1456.76'
Ext=274.38'
Super=nc



ALTERNATIVE 3 - BOX SLIDE

ARIZONA BLUE STAKE
CALL TWO WORKING DAYS BEFORE YOU DIG
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1-800-STAKE-IT
(OUTSIDE MARICOPA COUNTY)

DATE	REVISION	BY

ENGINEER

PRELIMINARY
NOT FOR
CONSTRUCTION
OR RECORDING

PUBLIC WORKS
CAPITAL PROJECT MANAGEMENT
7447 E. INDIAN SCHOOL RD.
SCOTTSDALE, ARIZONA 85251

SHEET TITLE
MILLER ROAD PLAN AND PROFILE

PROJECT TITLE
MILLER ROAD/SR 101L OVERPASS
CONSTRUCTION ALTERNATIVE ANALYSIS

SCALE	DESIGNED	DATE	BID NO.	SHT.
HORIZ. 1"=100'	DRR	AUGUST 2017		
VERT. 1"=10'	DRAWN JFM	AS-BUILT	PROJECT NO. SC03B	3 OF 17

SC03B

PLOT DATE: $$DATE$$ $$TIME$$
DESIGN FILE: $$DGN$$
7:50:44 AM 8/16/2017 JOE.METRAILER K:\PHX_ROADWAY\091090017-SCOTTSDALE-MILLERUNDERPASS\CADD\12-SHEETS\ROADWAY\SC03B_C-PP01_ALT3.DGN

New R/W
New R/W
Conc Channel
TCE
Earthen Channel
New Structure
See Structural Plans
FMS Conduit with
2-No. 9 Pull Boxes
Exst R/W
+10
+60
Conc Channel
+10
45
50
55
1885
1880
1890
SR 101L WB FRT ROAD
S76°02'03"E
SR 101L WB
S76°02'03"E
SR 101L EB
SR 101L Cst ℄
+00
+70
FMS Conduit with
2-No. 9 Pull Boxes
Exst R/W
SR 101L Sta 1885+23.27 =
Miller Road Sta 50+00.00
TCE
New Structure
See Structural Plans
MAXIMUM CONSTRUCTION LIMITS
New R/W
New R/W
MAXIMUM CONSTRUCTION LIMITS
CONSTRUCT NEW BOX OFFLINE
GPL CONSTRUCTION TRAFFIC PHASING
ALTERNATIVE 3 - BOX SLIDE

N

ARIZONA BLUE STAKE
CALL TWO WORKING DAYS BEFORE YOU DIG
Dial 811 or 602-263-1100
1-800-STAKE-IT
(OUTSIDE MARICOPA COUNTY)

DATE	REVISION	BY

ENGINEER
PRELIMINARY
NOT FOR
CONSTRUCTION
OR RECORDING

PUBLIC WORKS
CAPITAL PROJECT MANAGEMENT
7447 E. INDIAN SCHOOL RD.
SCOTTSDALE, ARIZONA 85251

SHEET TITLE
INTERIM - SR 101L/FRT RD PLAN

PROJECT TITLE
MILLER ROAD/SR 101L OVERPASS
CONSTRUCTION ALTERNATIVE ANALYSIS

SCALE	DESIGNED	DATE	BID NO.	SHT.
HORIZ.	DRR	AUGUST 2017		
VERT.	DRAWN JFM	AS-BUILT	PROJECT NO. SC03B	4 OF 17

SC03B

7:50:53 AM 8/16/2017 JOE.METRAILER K:\PHX_ROADWAY\091090017-SCOTTSDALE-MILLERUNDERPASS\CADD\12-SHEETS\ROADWAY\SC03B_C-PL01_ALT3-INTERIM.DGN

Conc Half Barrier
Std C-10.52, Gutter=2.5'

Sta 49+29.60 to 51+31.60
New Asphalt Pvmt

Conc Channel

6' Conc Sidewalk
Std C-05.20

Miller Road Cst ℄

New R/W

TCE

MILLER ROAD

New R/W

Interim
Earthen Channel

Safety Rail
Special Detail

FMS Conduit with
2-No. 9 Pull Boxes

New Structure
See Structural Plans

Crash Cushion
Special Detail

Sta 1883+00 to 1889+00
630 Lin Ft New 72"
Chain Link Fence

Conc Channel

Frt Rd Cst ℄

Exst R/W

SR 101L WB FRT ROAD

S76°02'03"E

SR 101L WB

SR 101L EB

S76°02'03"E

Sawcut (Typ)

Sta 1884+00 to 1887+00
300 Lin Ft New 48"
Chain Link Fence

SR 101L Cst ℄

Sta 1884+20.00 to 1886+22.00, Lt
New PCCP Pvmt

Conc Med Barrier
Type F, Std C-10.41

Sta 1884+20.00 to 1886+22.00, Rt
New PCCP Pvmt

SR 101L Sta 1885+23.27 =
Miller Road Sta 50+00.00

TCE

Conc Curb & Gutter
Type D, Std C-05.10

New Median Light Pole
with Foundation

FMS Conduit with
2-No. 9 Pull Boxes

Safety Rail
Special Detail

Sta 1883+00 to 1888+70
650 Lin Ft New 72"
Chain Link Fence

New R/W

New R/W

Exst R/W

COMPLETED BOX UNDER SR 101L &
FRONTAGE ROAD

ALTERNATIVE 3 - BOX SLIDE

ARIZONA BLUE STAKE
CALL TWO WORKING DAYS BEFORE YOU DIG
Dial 811 or 602-263-1100
1-800-STAKE-IT
(OUTSIDE MARICOPA COUNTY)

DATE	REVISION	BY
ENGINEER		

PRELIMINARY
NOT FOR
CONSTRUCTION
OR RECORDING

PUBLIC WORKS
CAPITAL PROJECT MANAGEMENT
7447 E. INDIAN SCHOOL RD.
SCOTTSDALE, ARIZONA 85251

SHEET TITLE
ULTIMATE - SR 101L/FRT RD PLAN

PROJECT TITLE
MILLER ROAD/SR 101L OVERPASS
CONSTRUCTION ALTERNATIVE ANALYSIS

SCALE	DESIGNED	DATE	BID NO.	SHT.
HORIZ.	DRR	AUGUST 2017		
VERT.	DRAWN JFM	AS-BUILT	PROJECT NO. SC03B	5 OF 17

SC03B

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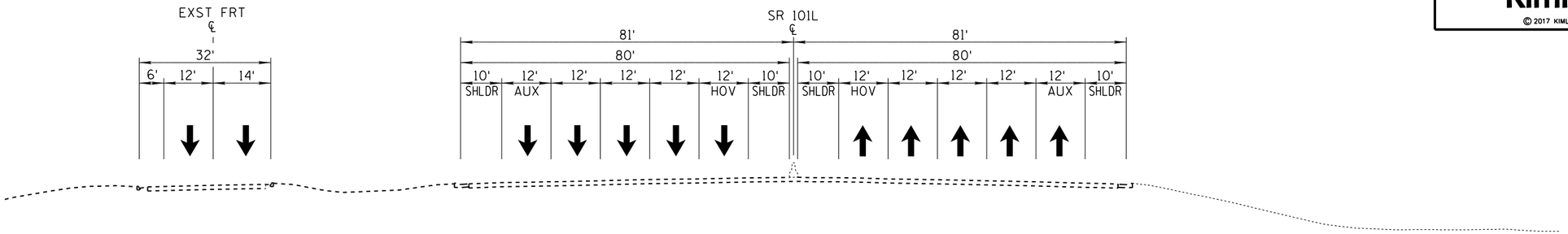
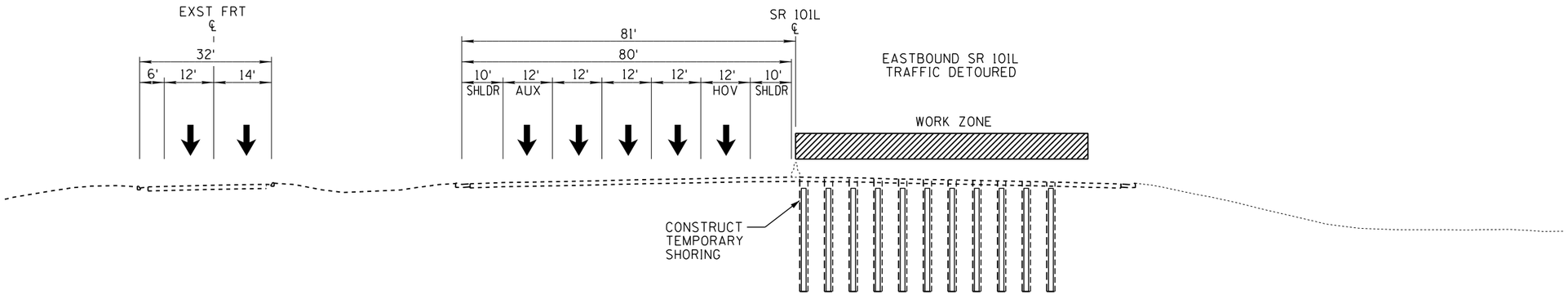
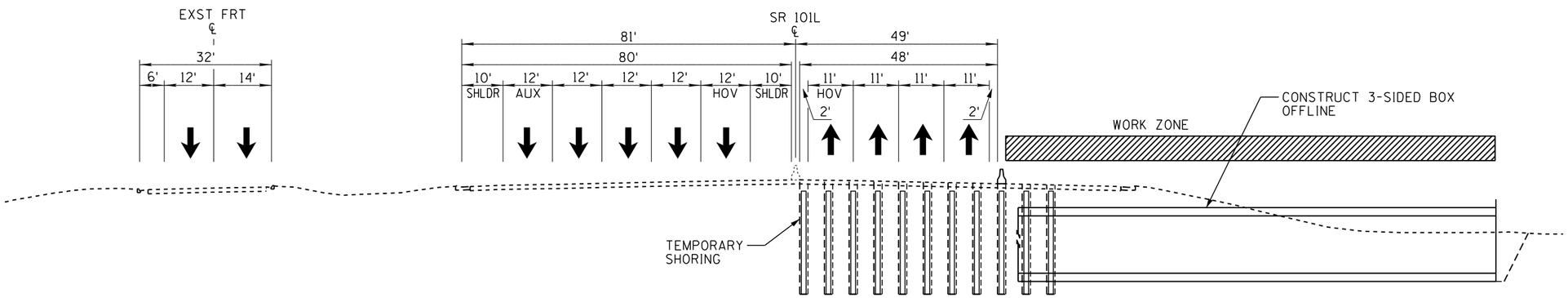


SR 101L EXISTING CONDITION AT MILLER ROAD



PHASE 1 – WEEKEND ACTIVITY



PHASE 2 – WEEKDAY CONDITION

SR 101L
LOOKING EAST

ALTERNATIVE 3 - BOX SLIDE

DATE	REVISION	BY

ENGINEER

PRELIMINARY
NOT FOR
CONSTRUCTION
OR RECORDING

PUBLIC WORKS
CAPITAL PROJECT MANAGEMENT
7447 E. INDIAN SCHOOL RD.
SCOTTSDALE, ARIZONA 85251

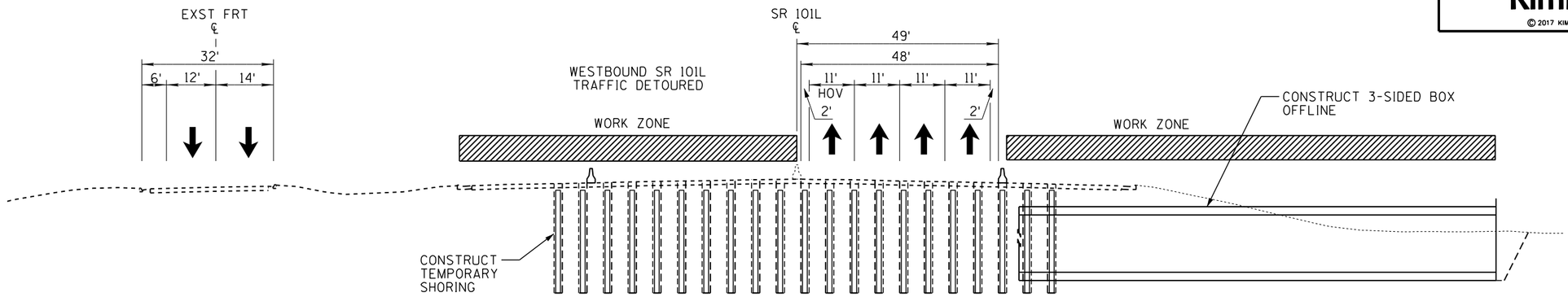
SHEET TITLE: PHASING TYPICAL SECTIONS

PROJECT TITLE: MILLER ROAD/SR 101L OVERPASS
CONSTRUCTION ALTERNATIVE ANALYSIS

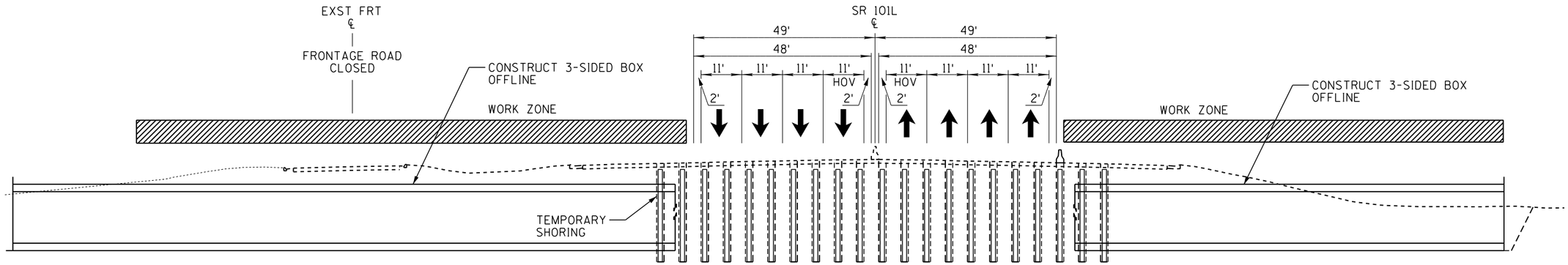
SCALE	DESIGNED	DATE	BID NO.	SHT.
HORIZ.	KAC	AUGUST 2017		
VERT.	DRAWN JFM	AS-BUILT	PROJECT NO. SC03B	6 OF 17

SC03B

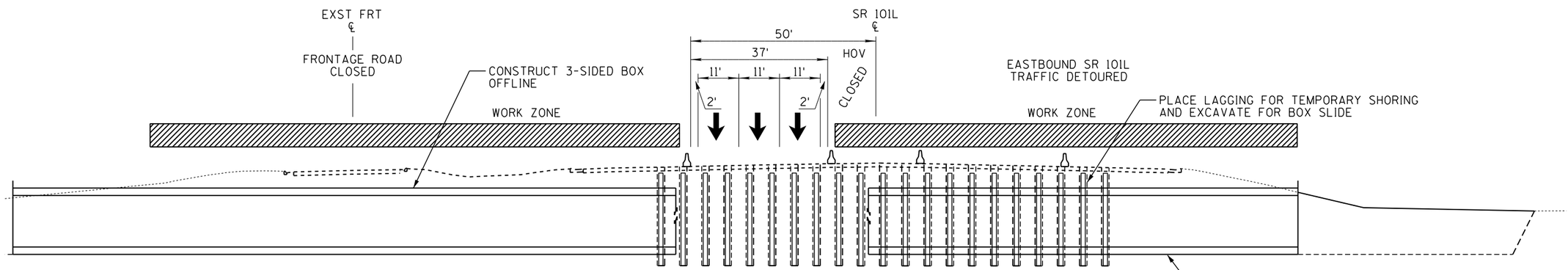
PLOT DATE: $$DATE$$ $$TIME$$
DESIGN FILE: $$DGN$$
7:50:58 AM 8/16/2017 JOE.METRAILER K:\PHX_ROADWAY\091090017-SCOTTSDALE-MILLERUNDERPASS\CADD\12-SHEETS\TRAFFIC\SC03B_T-TYPICALS_ALT3_01.DGN



PHASE 3 – WEEKEND ACTIVITY



PHASE 4 – CONSTRUCT BOX SLIDE OFF-LINE



PHASE 5 – WEEKEND ACTIVITY SLIDE EB BOX

SR 101L
LOOKING EAST

ALTERNATIVE 3 - BOX SLIDE

DATE	REVISION	BY

ENGINEER

PRELIMINARY
NOT FOR
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OR RECORDING

PUBLIC WORKS
CAPITAL PROJECT MANAGEMENT
7447 E. INDIAN SCHOOL RD.
SCOTTSDALE, ARIZONA 85251

SHEET TITLE: PHASING TYPICAL SECTIONS

PROJECT TITLE: MILLER ROAD/SR 101L OVERPASS
CONSTRUCTION ALTERNATIVE ANALYSIS

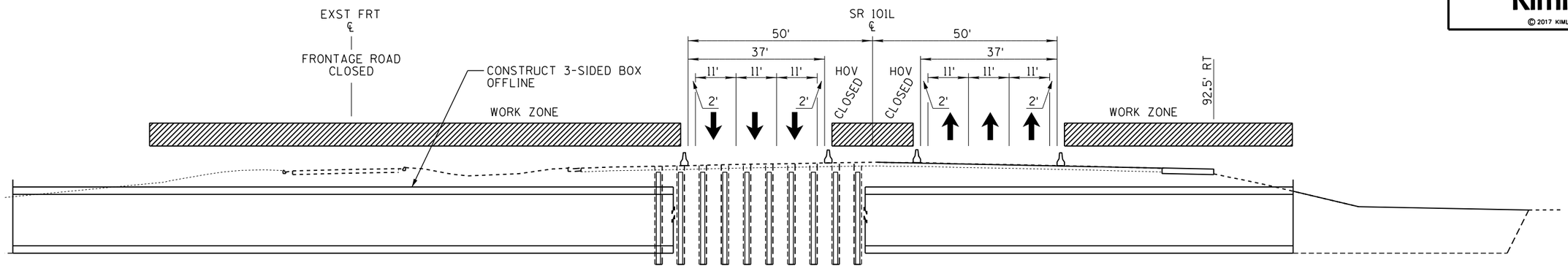
SCALE	DESIGNED	DATE	BID NO.	SHT.
HORIZ.	KAC	AUGUST 2017		
VERT.	DRAWN JFM	AS-BUILT	PROJECT NO. SC03B	7 OF 17

SC03B

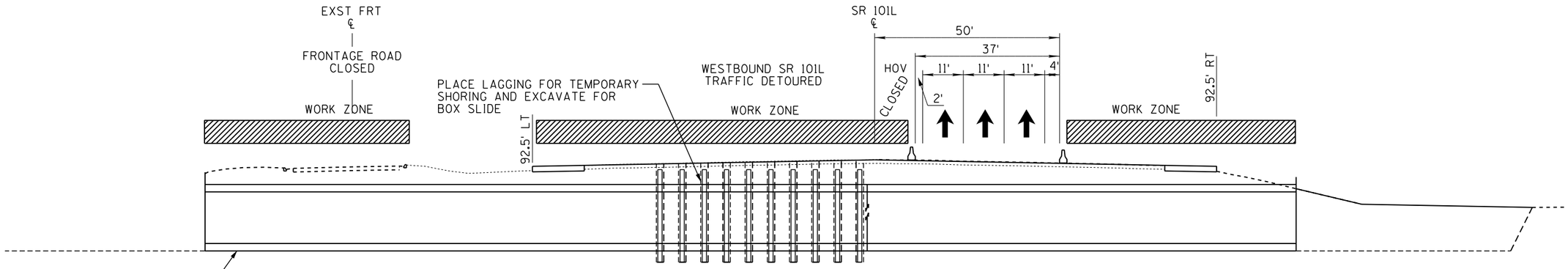
PLOT DATE: $$DATE$$ $$TIME$$

DESIGN FILE: $$DGN$$

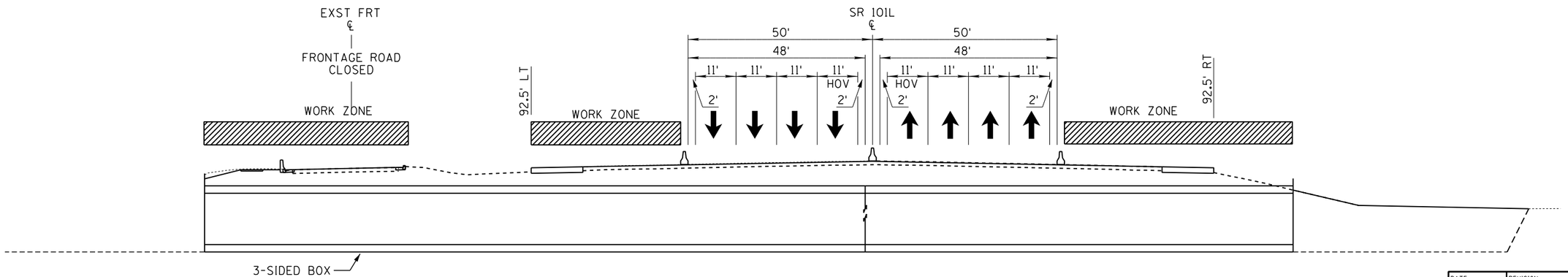
7:50:58 AM 8/16/2017 JOE.METRAILER K:\PHX_ROADWAY\091090017-SCOTTSDALE-MILLERUNDERPASS\CADD\12-SHEETS\TRAFFIC\SC03B_T-TYPICALS_ALT3_02.DGN



PHASE 6 – WEEKDAY CONDITION



PHASE 7 – WEEKEND ACTIVITY – SLIDE WB BOX



PHASE 8 – WEEKDAY CONDITION – CONSTRUCT FRONTAGE ROAD

SR 101L
LOOKING EAST

ALTERNATIVE 3 - BOX SLIDE

DATE	REVISION	BY

ENGINEER

PRELIMINARY
NOT FOR
CONSTRUCTION
OR RECORDING

PUBLIC WORKS
CAPITAL PROJECT MANAGEMENT
7447 E. INDIAN SCHOOL RD.
SCOTTSDALE, ARIZONA 85251

SHEET TITLE: PHASING TYPICAL SECTIONS

PROJECT TITLE: MILLER ROAD/SR 101L OVERPASS
CONSTRUCTION ALTERNATIVE ANALYSIS

SCALE	DESIGNED	DATE	BID NO.	SHT.
HORIZ.	KAC	AUGUST 2017		
VERT.	DRAWN JFM	AS-BUILT	PROJECT NO. SC03B	8 OF 17

SC03B

$$TIME$$
PLOT DATE:$$DATE$$
DESIGN FILE:$$DGN$$

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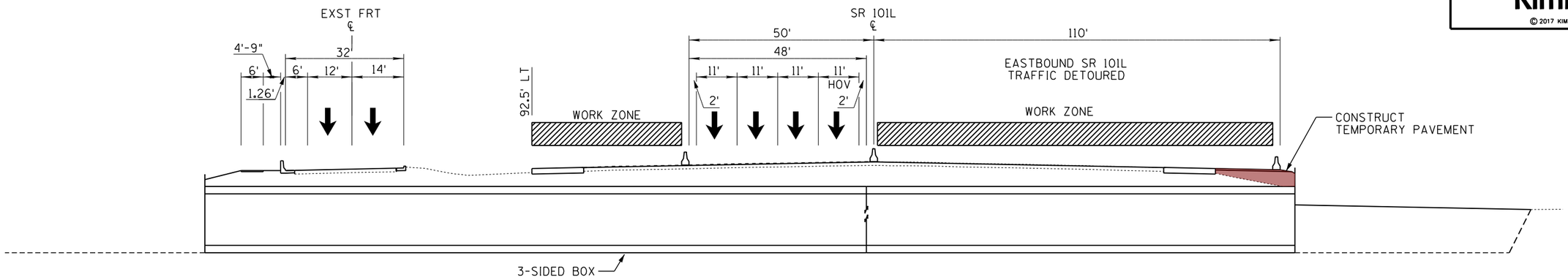
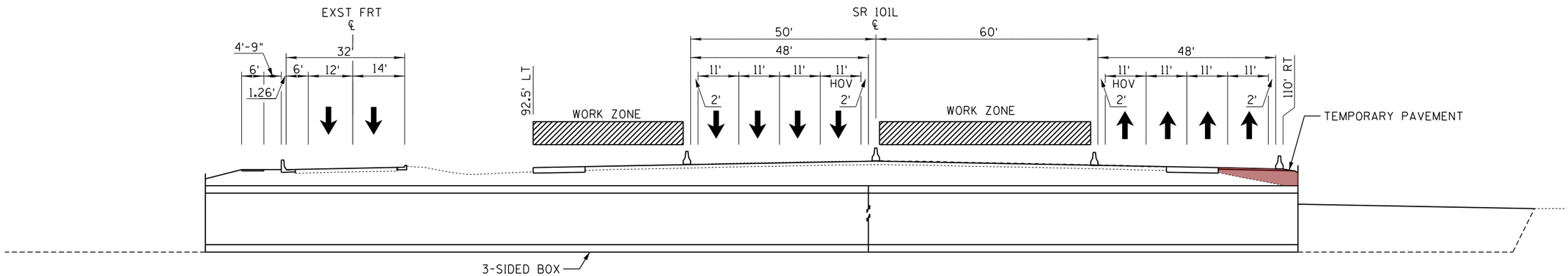
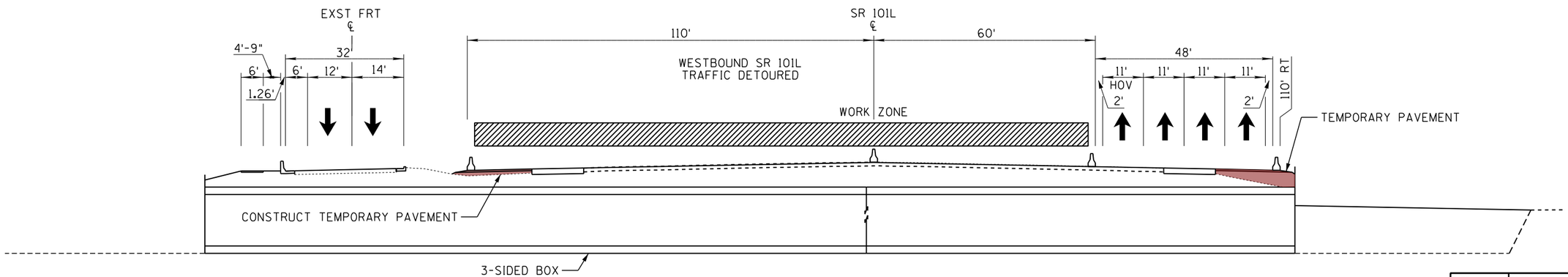


PHASE 9 – WEEKEND ACTIVITY



PHASE 10 – WEEKDAY CONDITION



PHASE 11 – WEEKEND ACTIVITY

SR 101L
LOOKING EAST

ALTERNATIVE 3 - BOX SLIDE

DATE	REVISION	BY

ENGINEER

PRELIMINARY
NOT FOR
CONSTRUCTION
OR RECORDING

PUBLIC WORKS

CAPITAL PROJECT MANAGEMENT

7447 E. INDIAN SCHOOL RD.
SCOTTSDALE, ARIZONA 85251

SHEET TITLE: PHASING TYPICAL SECTIONS

PROJECT TITLE: MILLER ROAD/SR 101L OVERPASS CONSTRUCTION ALTERNATIVE ANALYSIS

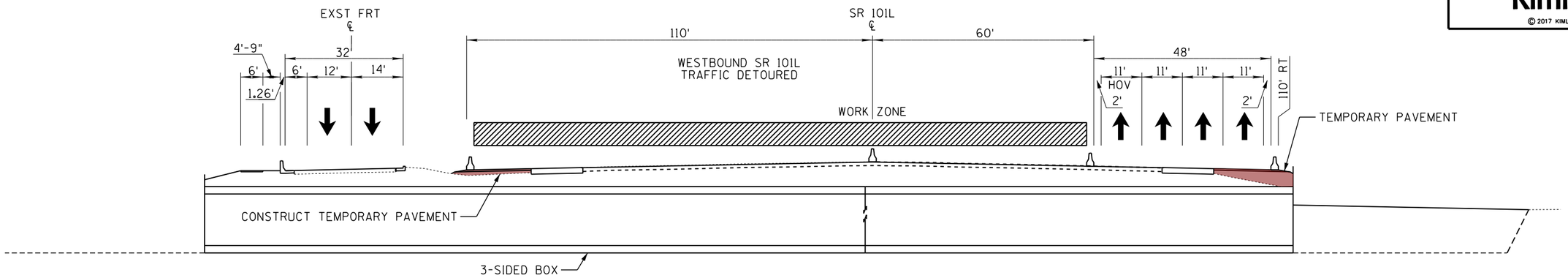
SCALE	DESIGNED	DATE	BID NO.	SHT.
HORIZ.	KAC	AUGUST 2017		
VERT.	DRAWN JFM	AS-BUILT	PROJECT NO. SC03B	9 OF 17

SC03B

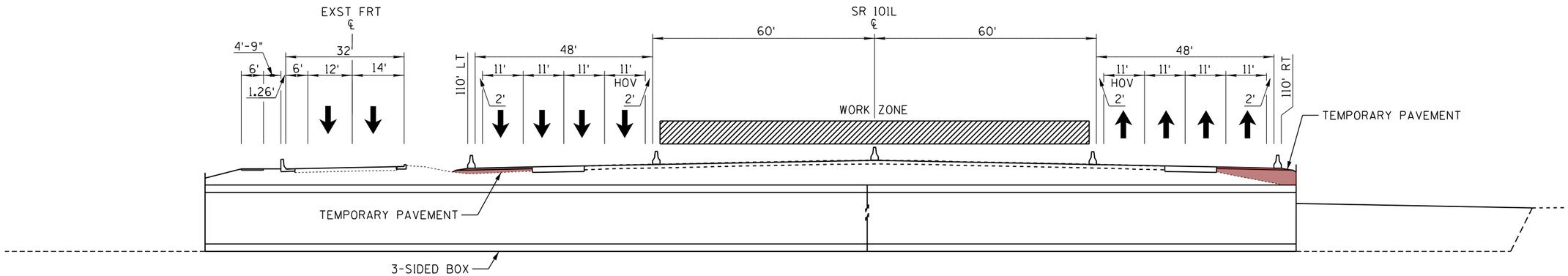
PLOT DATE: $$DATE$$ $$TIME$$

DESIGN FILE: $$DGN$$

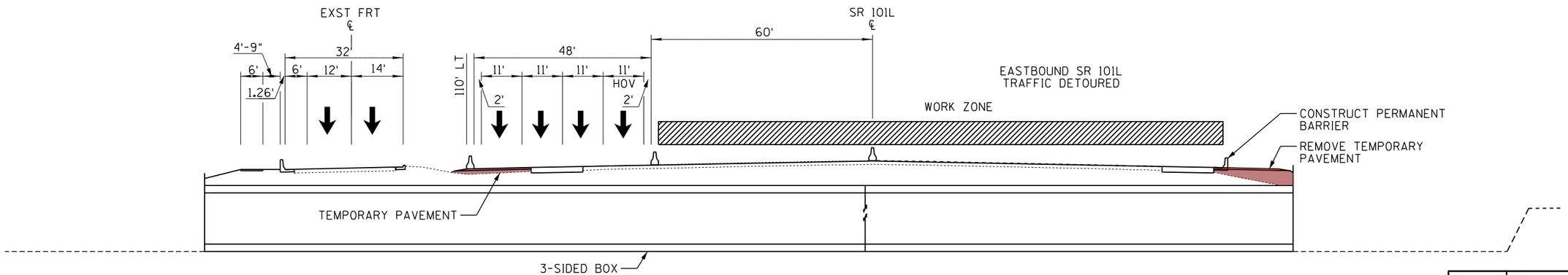
7:51:01 AM 8/16/2017 JOE.METRAILER K:\PHX_ROADWAY\091090017-SCOTTSDALE-MILLERUNDERPASS\CADD\12-SHEETS\TRAFFIC\SC03B_T-TYPICALS_ALT3_04.DGN



PHASE 11 – WEEKEND ACTIVITY



PHASE 12 – CONSTRUCTION ACTIVITY



PHASE 13 – WEEKEND ACTIVITY

SR 101L
LOOKING EAST

ALTERNATIVE 3 - BOX SLIDE

DATE	REVISION	BY

ENGINEER

PRELIMINARY
NOT FOR
CONSTRUCTION
OR RECORDING

PUBLIC WORKS

CAPITAL PROJECT MANAGEMENT

7447 E. INDIAN SCHOOL RD.
SCOTTSDALE, ARIZONA 85251

SHEET TITLE: PHASING TYPICAL SECTIONS

PROJECT TITLE: MILLER ROAD/SR 101L OVERPASS
CONSTRUCTION ALTERNATIVE ANALYSIS

SCALE	DESIGNED	DATE	BID NO.	SHT.
HORIZ.	KAC	AUGUST 2017		
VERT.	DRAWN JFM	AS-BUILT	PROJECT NO. SC03B	10 OF 17

SC03B

PLOT DATE: $$DATE$$ $$TIME$$

DESIGN FILE: $$DGN$$

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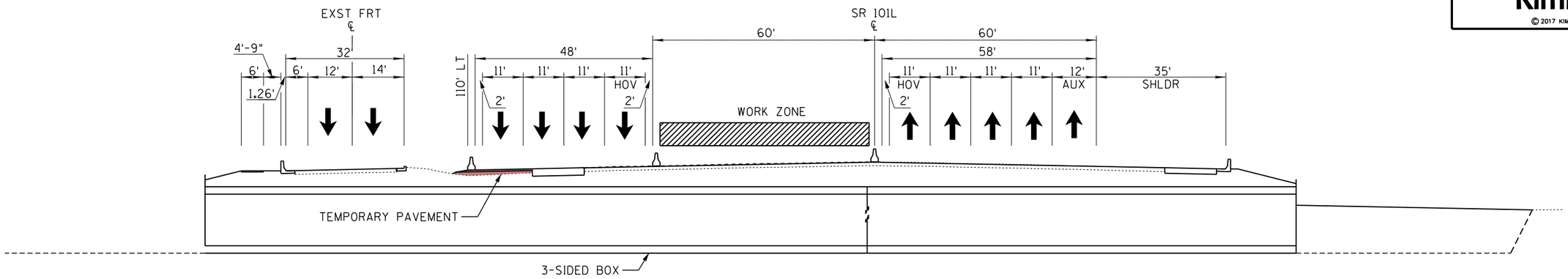
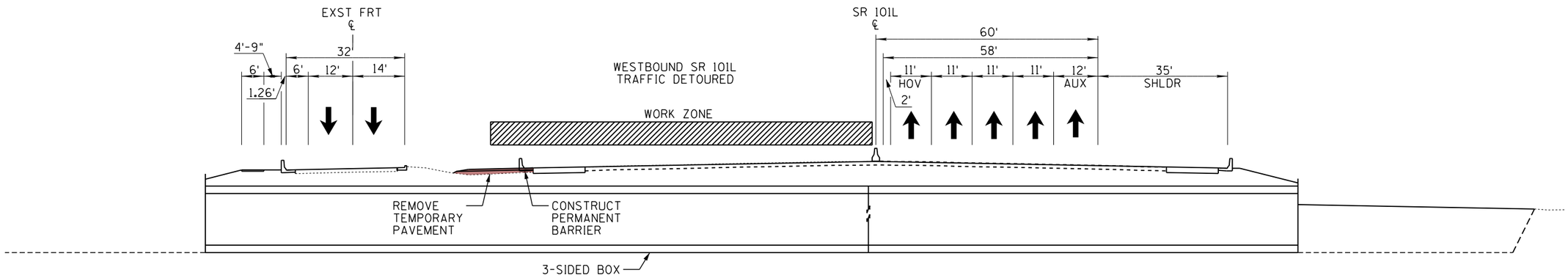
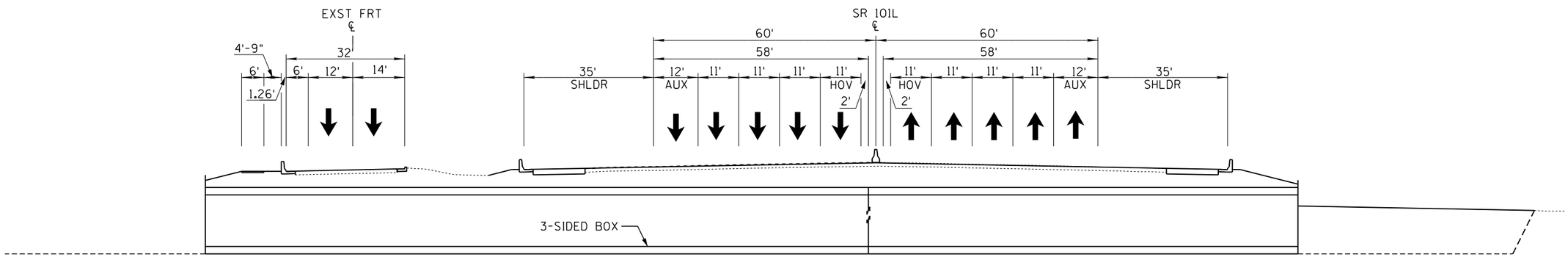


PHASE 14 – WEEKDAY CONDITION



PHASE 15 – WEEKEND ACTIVITY



PHASE 16 – MILLER RD BOX CONSTRUCTION COMPLETE – TRAFFIC IN GPL CONSTRUCTION CONFIGURATION

SR 101L
LOOKING EAST

ALTERNATIVE 3 - BOX SLIDE

DATE	REVISION	BY

ENGINEER

PRELIMINARY
NOT FOR
CONSTRUCTION
OR RECORDING

PUBLIC WORKS

CAPITAL PROJECT MANAGEMENT

7447 E. INDIAN SCHOOL RD.
SCOTTSDALE, ARIZONA 85251

SHEET TITLE: PHASING TYPICAL SECTIONS

PROJECT TITLE: MILLER ROAD/SR 101L OVERPASS CONSTRUCTION ALTERNATIVE ANALYSIS

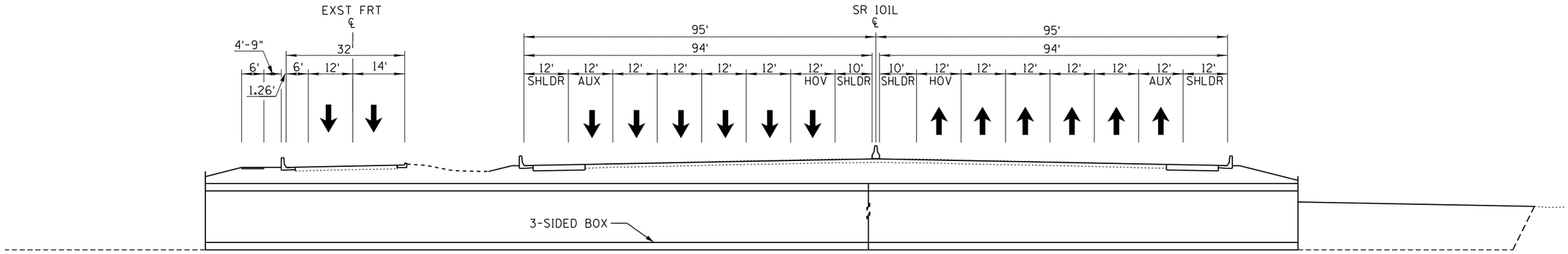
SCALE	DESIGNED	DATE	BID NO.	SHT.
HORIZ.	KAC	AUGUST 2017		
VERT.	DRAWN JFM	AS-BUILT	PROJECT NO. SC03B	11 OF 17

SC03B

PLOT DATE: $$DATE$$ $$TIME$$

DESIGN FILE: $$DGN$$

7:51:02 AM 8/16/2017 JOE.METRAILER K:\PHX_ROADWAY\091090017-SCOTTSDALE-MILLERUNDERPASS\CADD\12-SHEETS\TRAFFIC\SC03B_T-TYPICALS_ALT3_06.DGN



PHASE 17 – MILLER RD BOX CONSTRUCTION COMPLETE – GPL CONSTRUCTION COMPLETE

SR 101L
LOOKING EAST

ALTERNATIVE 3 - BOX SLIDE

DATE	REVISION	BY

ENGINEER

PRELIMINARY
NOT FOR
CONSTRUCTION
OR RECORDING

PUBLIC WORKS

CAPITAL PROJECT MANAGEMENT

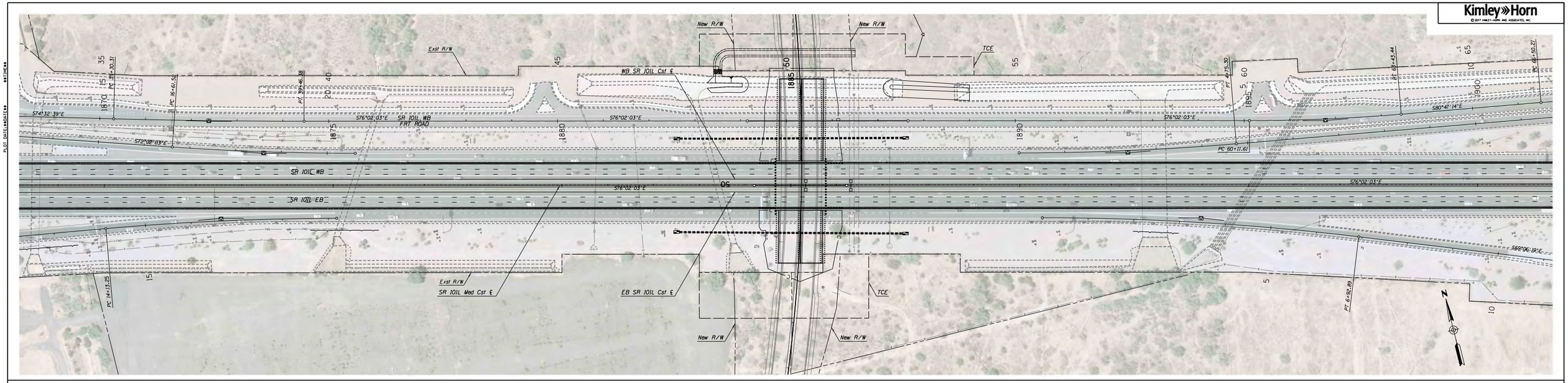
7447 E. INDIAN SCHOOL RD.
SCOTTSDALE, ARIZONA 85251

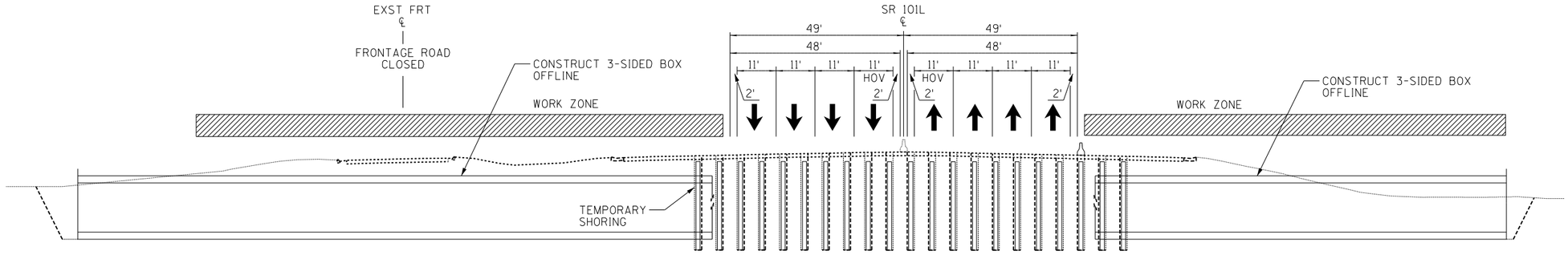
SHEET TITLE: PHASING TYPICAL SECTIONS

PROJECT TITLE: MILLER ROAD/SR 101L OVERPASS CONSTRUCTION ALTERNATIVE ANALYSIS

SCALE	DESIGNED	DATE	BID NO.	SHT.
HORIZ.	KAC	AUGUST 2017		
VERT.	DRAWN JFM	AS-BUILT	PROJECT NO. SC03B	12 OF 17

SC03B





PHASE 4 – CONSTRUCT BOX SLIDE OFF-LINE

ALTERNATIVE 3 - BOX SLIDE

Kimley»Horn

ARIZONA BLUE STAKE, INC.
Dial 811 or 602-263-1100
1-800-STAKE-IT

DATE	REVISION	BY
ENGINEER		
PRELIMINARY NOT FOR CONSTRUCTION OR RECORDING		

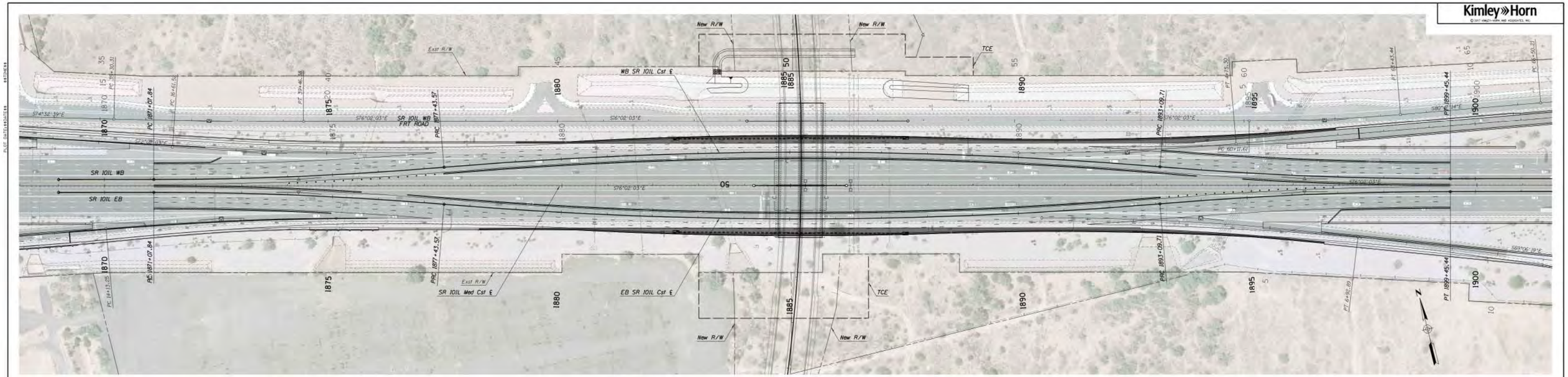
PUBLIC WORKS
CAPITAL PROJECT MANAGEMENT
7447 E. INDIAN SCHOOL RD.
SCOTTSDALE, ARIZONA 85251

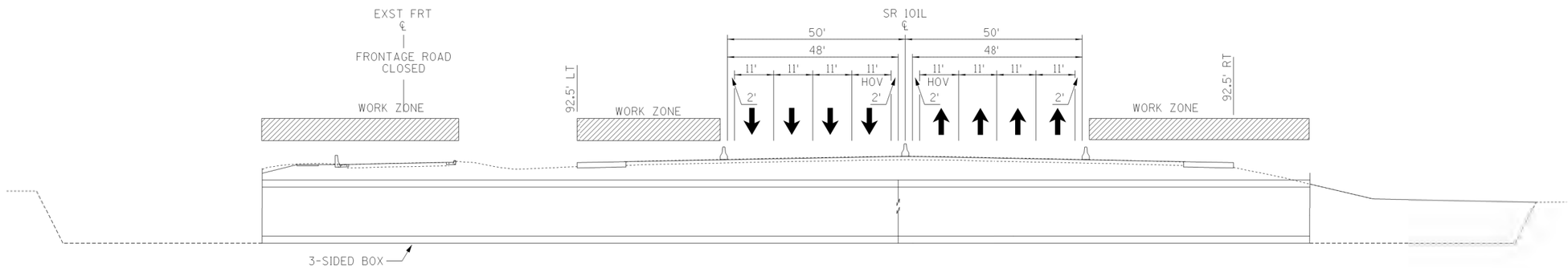
SHEET TITLE: TRAFFIC CONTROL PHASE 4

PROJECT NO.: MILLER ROAD/SR 101L OVERPASS CONSTRUCTION ALTERNATIVE ANALYSIS

SCALE	DESIGNED	DATE	BID NO.	SHT.
HORZ.	DRAWN	AUGUST 2017		
VERT.	CHECKED	AS-BUILT	PROJECT NO. 0008	13 OF 17

SK008





PHASE 8 – WEEKDAY CONDITION – CONSTRUCT FRONTAGE ROAD

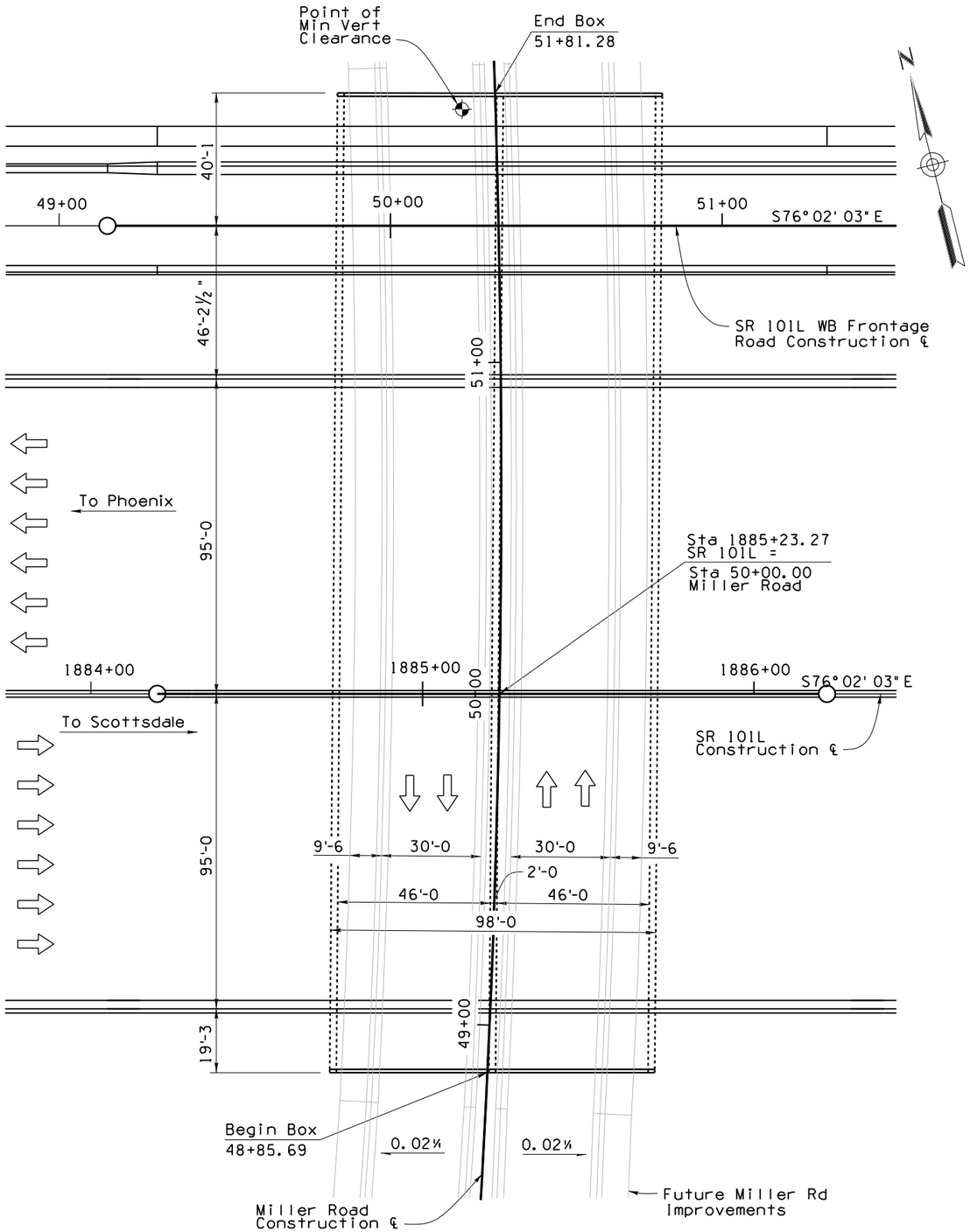
ALTERNATIVE 3 - BOX SLIDE

PUBLIC WORKS
CAPITAL PROJECT MANAGEMENT

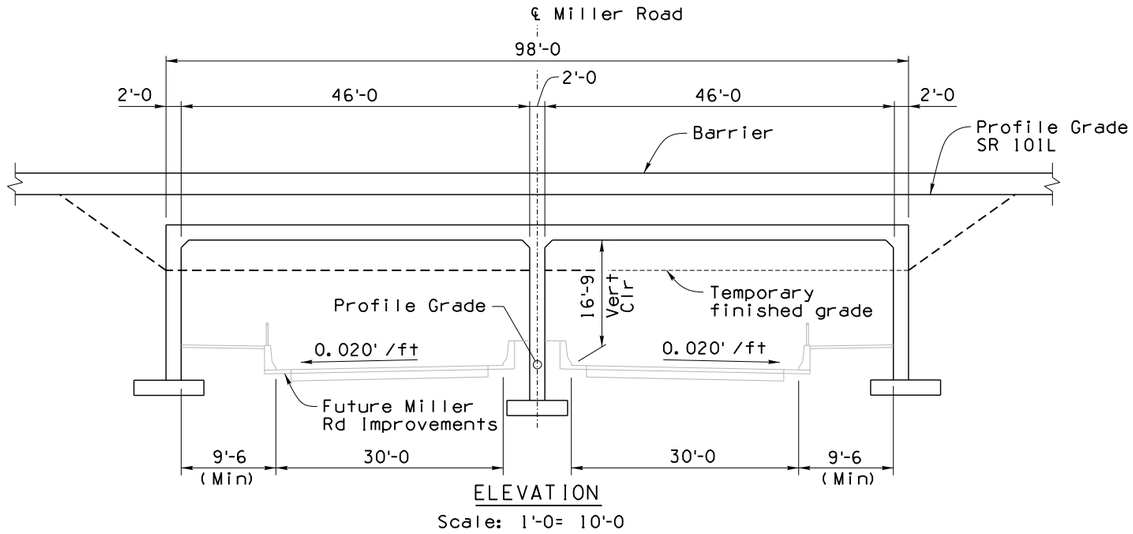
TRAFFIC CONTROL PHASE 8

MILLER ROAD/SR 101L OVERPASS
CONSTRUCTION ALTERNATIVE ANALYSIS

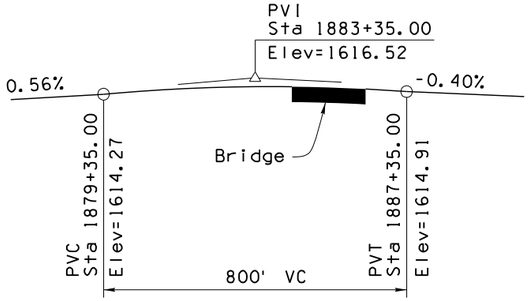
SC038



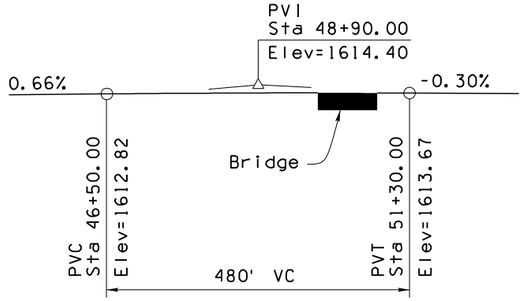
PLAN
Cast-In-Place Concrete Box
Skew=0°
Scale: 1'-0= 20'-0



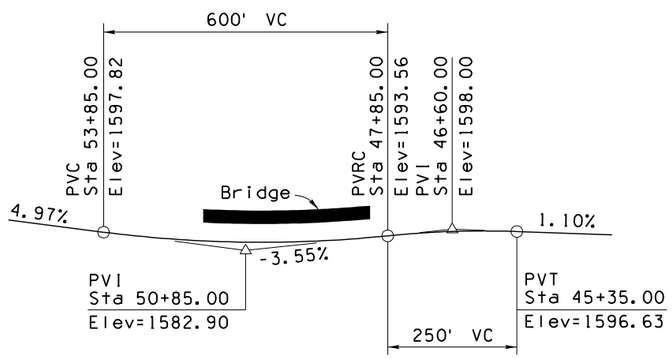
ELEVATION
Scale: 1'-0= 10'-0



SR 101L PROFILE GRADE
No Scale



FRONTAGE ROAD PROFILE GRADE
No Scale



MILLER ROAD PROFILE GRADE
No Scale

ALTERNATIVE 3 - BOX SLIDE

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1-800-STAKE-IT
(OUTSIDE MARICOPA COUNTY)

DATE	REVISION	BY
ENGINEER		

PRELIMINARY NOT FOR CONSTRUCTION OR RECORDING

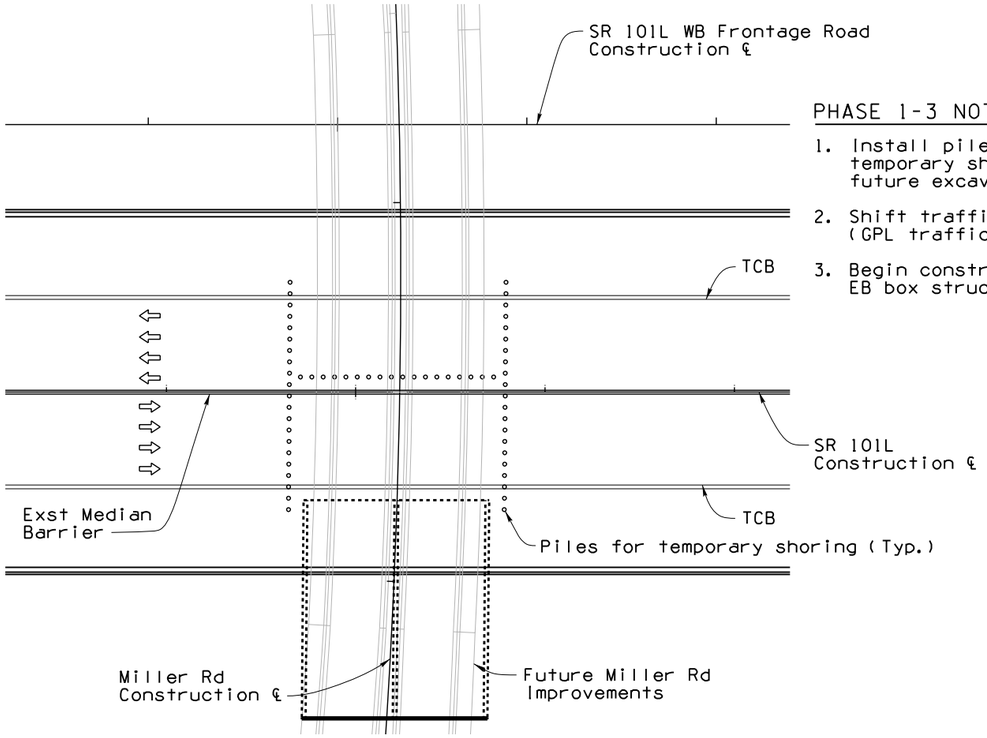
PUBLIC WORKS
CAPITAL PROJECT MANAGEMENT
7447 E. INDIAN SCHOOL RD.
SCOTTSDALE, ARIZONA 85251

SHEET TITLE
GENERAL PLAN & ELEVATION

PROJECT TITLE
MILLER ROAD/SR 101L OVERPASS
CONSTRUCTION ALTERNATIVE ANALYSIS

SCALE	DESIGNED	DATE	BID NO.	SHT.
HORIZ.	KJK	AUGUST 2017		
VERT.	DRAWN MSK	AS-BUILT	PROJECT NO. SC03B	15 OF 17

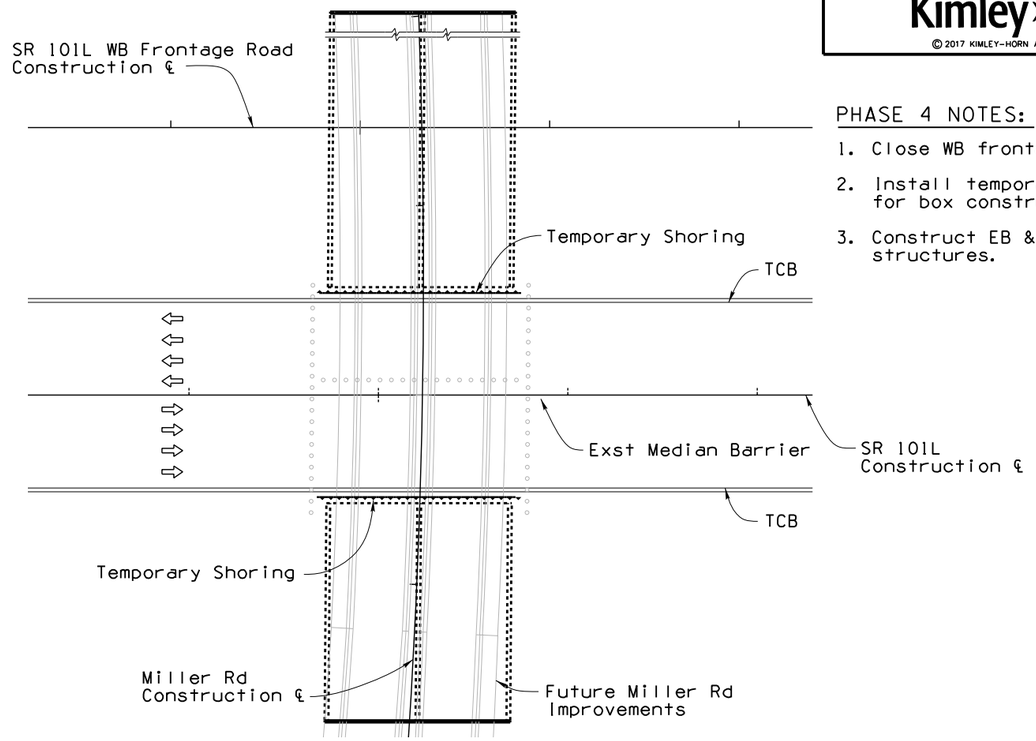
SC03B



PHASE 1-3

PHASE 1-3 NOTES:

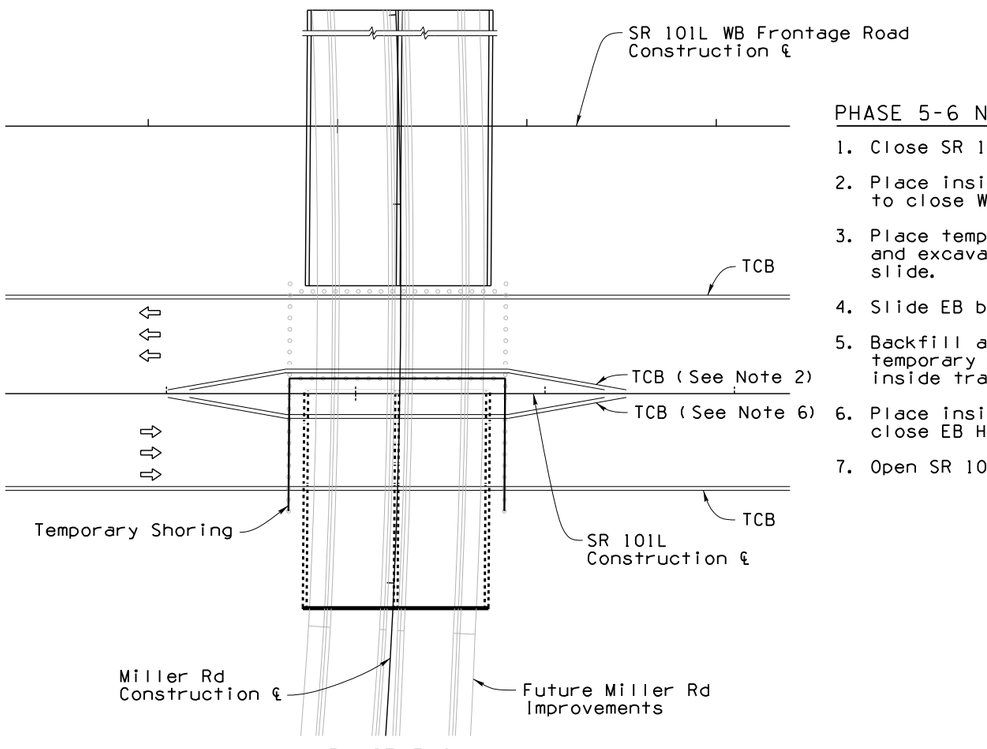
1. Install piles for temporary shoring for future excavation.
2. Shift traffic to inside. (GPL traffic location).
3. Begin construction of EB box structure.



PHASE 4

PHASE 4 NOTES:

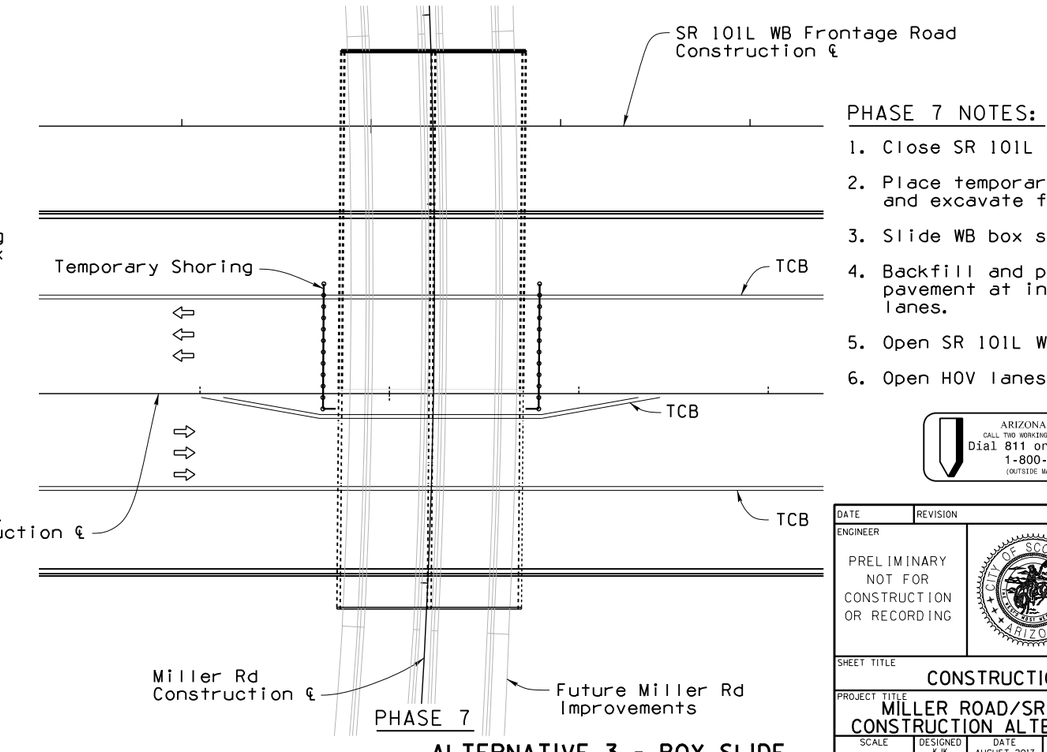
1. Close WB frontage road.
2. Install temporary shoring for box construction.
3. Construct EB & WB box structures.



PHASE 5-6

PHASE 5-6 NOTES:

1. Close SR 101L EB.
2. Place inside WB TCB to close WB HOV.
3. Place temporary shoring and excavate for EB box slide.
4. Slide EB box structure.
5. Backfill and place temporary pavement at inside travel lanes.
6. Place inside EB TCB to close EB HOV.
7. Open SR 101L EB.



PHASE 7

PHASE 7 NOTES:

1. Close SR 101L WB
2. Place temporary shoring and excavate for WB box slide.
3. Slide WB box structure.
4. Backfill and place temporary pavement at inside travel lanes.
5. Open SR 101L WB.
6. Open HOV lanes.

ALTERNATIVE 3 - BOX SLIDE

DATE	REVISION	BY

ENGINEER

PRELIMINARY
NOT FOR
CONSTRUCTION
OR RECORDING

CITY OF SCOTTSDALE ARIZONA

PUBLIC WORKS

CAPITAL PROJECT MANAGEMENT

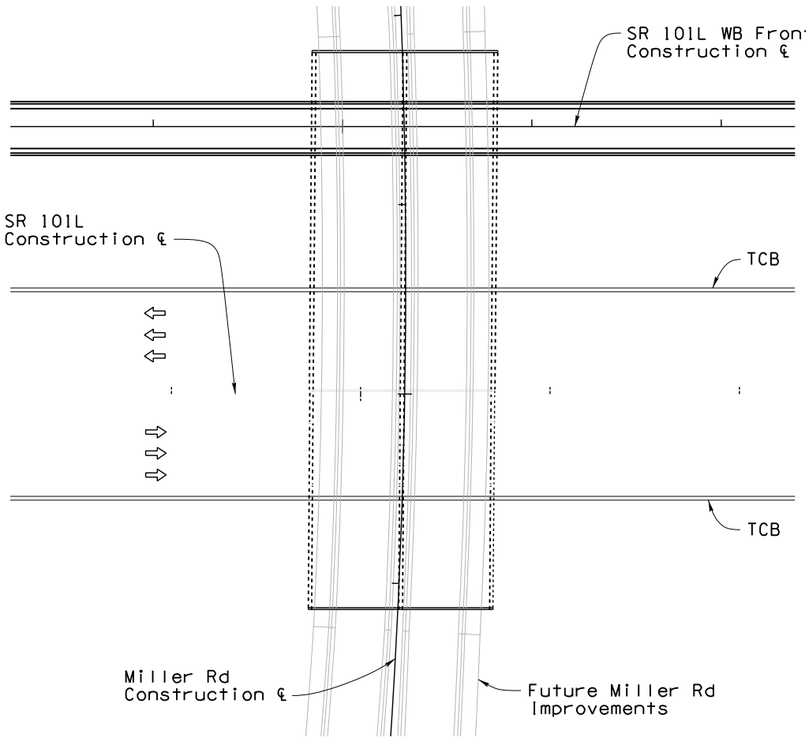
7447 E. INDIAN SCHOOL RD.
SCOTTSDALE, ARIZONA 85251

SHEET TITLE
CONSTRUCTION PHASING

PROJECT TITLE
MILLER ROAD/SR 101L OVERPASS
CONSTRUCTION ALTERNATIVE ANALYSIS

SCALE	DESIGNED	DATE	BID NO.	SHT.
HORIZ.	KJK	AUGUST 2017		
VERT.	DRAWN MSK	AS-BUILT	PROJECT NO. SC03B	16 OF 17

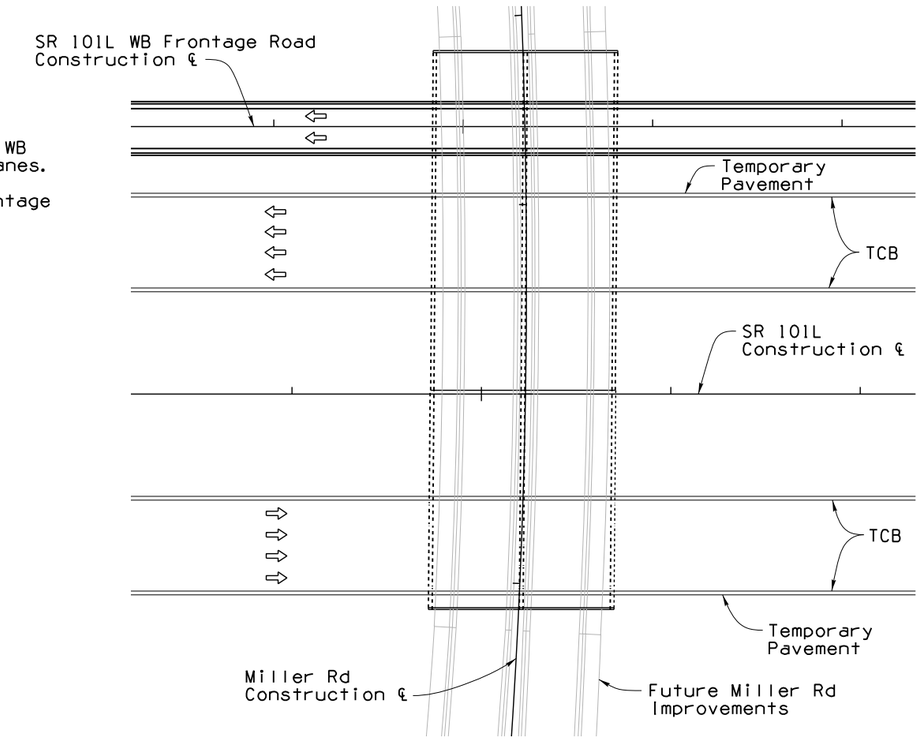
SC03B



PHASE 8

PHASE 8 NOTES:

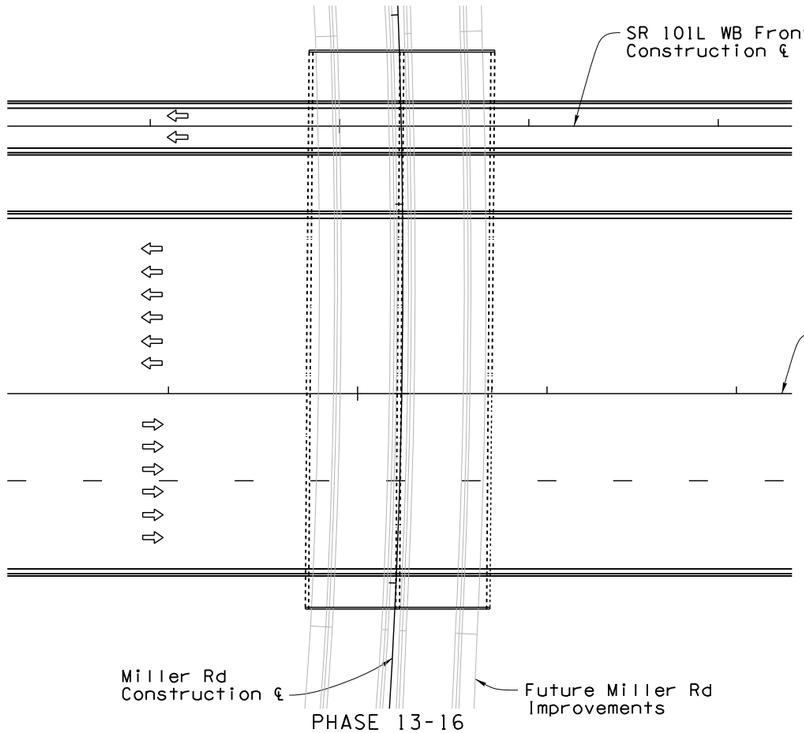
1. Construct EB and WB outside travel lanes.
2. Construct WB frontage road.



PHASE 9-12

PHASE 9-12 NOTES:

1. Construct temporary pavement EB outside.
2. Shift EB traffic to outside lanes.
3. Construct temporary pavement WB outside.
4. Shift WB traffic to outside lanes.
5. Complete WB frontage road and open to traffic.
6. Constuct inside travel lanes.



PHASE 13-16

PHASE 13-16 NOTES:

1. Shift traffic back to inside.
2. Construct outside barriers.
3. Bridge work complete.

(Note: Ultimate lane configuration shown)

ALTERNATIVE 3 - BOX SLIDE

Kimley»Horn

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(OUTSIDE MARICOPA COUNTY)

DATE	REVISION	BY

ENGINEER

PRELIMINARY
NOT FOR
CONSTRUCTION
OR RECORDING

PUBLIC WORKS

CAPITAL PROJECT MANAGEMENT

7447 E. INDIAN SCHOOL RD.
SCOTTSDALE, ARIZONA 85251

SHEET TITLE
CONSTRUCTION PHASING

PROJECT TITLE
MILLER ROAD/SR 101L OVERPASS
CONSTRUCTION ALTERNATIVE ANALYSIS

SCALE	DESIGNED	DATE	BID NO.	SHT.
HORIZ.	KJK	AUGUST 2017		
VERT.	DRAWN	AS-BUILT	PROJECT NO.	17 OF 17
	MSK		SC03B	

SC03B

APPENDIX **F**

Alternative 4 – Arch Structure Plans

CITY OF SCOTTSDALE

PUBLIC IMPROVEMENTS

COUNCIL
W.J. "JIM" LANE, MAYOR
SUZANNE KLAPP
VIRGINIA KORTE
KATHY LITTLEFIELD
LINDA MILHAVEN
GUY PHILLIPS
DAVID N. SMITH

CITY MANAGER
JIM THOMPSON

CITY ATTORNEY
BRUCE WASHBURN

CITY CLERK
CAROLYN JAGGER

"AS-BUILT" CERTIFICATION

I HEREBY CERTIFY THAT THE "AS-BUILT" IMPROVEMENTS AS SHOWN HEREON ARE LOCATED AS NOTED, AND THE LOCATIONS ARE CORRECT TO THE BEST OF MY KNOWLEDGE AND BELIEF.

REGISTERED LAND SURVEYOR _____ DATE _____

CITY OF SCOTTSDALE

REVIEWED AND RECOMMENDED APPROVAL BY:

PAVING		STRUCTURES	
GRADING & DRAINAGE		BUILDING	
WATER & SEWER		PLUMBING	
TRAFFIC		MECHANICAL	
PLANNING IMPROVEMENTS		ELECTRICAL	
PLANNING FACILITIES		FIRE IMPROVEMENTS	
LANDSCAPE		FIRE FACILITIES	
NATIVE PLANT			

ENGINEERING COORDINATION MANAGER (OR DESIGNEE) _____ DATE _____

BUILDING OFFICIAL (OR DESIGNEE) _____ DATE _____

ENGINEER

ENGINEERING FIRM
LOGO & ADDRESS
GOES HERE

10/27/2017 3:58:49 PM DGN

MILLER ROAD/SR 101L OVERPASS
CONSTRUCTION ALTERNATIVE ANALYSIS
ALTERNATIVE 4 - PRECAST ARCH
PROJECT NO. SC03B

NO CONFLICT SIGNATURE BLOCK				
Utility	Utility Company	Name of Company Representative	Telephone Number	Date Signed
Electric				
Telephone				
Natural Gas				
Cable TV				
Water				
Sewer				

Engineer's Certification

I _____, as the Engineer of Record for this development, hereby certify that all utility companies listed above have been provided final improvement plans for review, and that all conflicts identified by the utilities have been resolved. In addition, "No Conflict" forms have been obtained from each utility company and are included in this submittal.

Signature _____ Date _____

Certificate of Approval to Construct — Maricopa County Environmental Services Department, Water and Waste Management Division

MCESD # _____

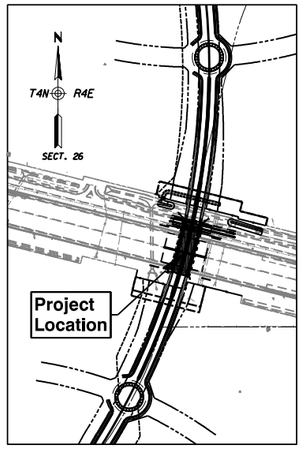
Public Water System ID Number 0407- (and/or) Waste Water System ID Number 0437-
Project Description:

Project Location:
Project Owner:

Pursuant to AAC Title 18: Chapter 4, Article 5: or AAC Title 18: Chapter 9, Article 8: and/or Maricopa County Environmental Health Code Chapters II or V. This certificate of Approval To Construct the above described facilities as represented in the attached plan is valid upon review and signature by a Maricopa County Environmental Services Department's representative given the following provisions.
1.) A Request for Certificate of Approval of Construction, together with an Engineer's Certificate of Completion, and sealed engineered as-built plans, shall be submitted to this Department prior to Approval of Construction and startup.
2.) The Approval to Construct is void if major modifications occur to the plans without the knowledge and consent of the department.
If Construction has not started within one year of the approval date, this certificate will be void. An extension of time may be available upon written request.

Approved By: _____ Date Approved: _____

CC: MCESD FILE: ADEQ
Engineer: AZ. Corp. Commission



Vicinity Map
N.T.S.

ALTERNATIVES ANALYSIS OCTOBER 2017

SHEET INDEX

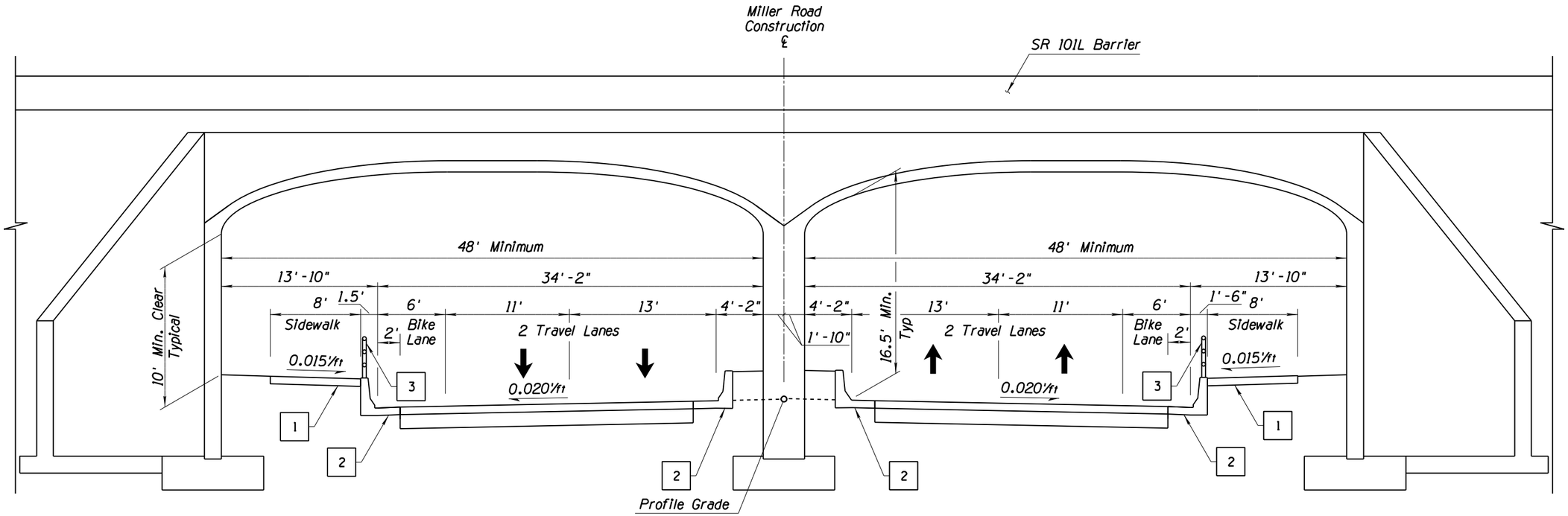
City of Scottsdale approved plans shall be kept on the job site at all times during the course of constuction.

DR/STAFF APPROVAL NO.

ALTERNATIVE 4 - PRECAST ARCH
PROJECT NO. SC03B

PLAN REVIEW NO.

SHT. 1



MILLER ROAD
TYPICAL SECTION

1 *New Concrete Sidewalk*

2 *New Concrete Half Barrier with Gutter*

3 *New Safety Rail*

REQUIRES: 96' MINIMUM WIDTH
PROVIDES: 2 TRAVEL LANES, 11' OUTSIDE, 13' INSIDE
PROVIDES: 8' SIDEWALK WITHOUT LANDSCAPE BUFFER

ALTERNATIVE 4 - PRECAST ARCH

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1-800-STAKE-IT
(OUTSIDE MARICOPA COUNTY)

DATE	REVISION	BY

ENGINEER

PRELIMINARY
NOT FOR
CONSTRUCTION
OR RECORDING

CITY OF SCOTTSDALE ARIZONA

PUBLIC WORKS

CAPITAL PROJECT MANAGEMENT

7447 E. INDIAN SCHOOL RD.
SCOTTSDALE, ARIZONA 85251

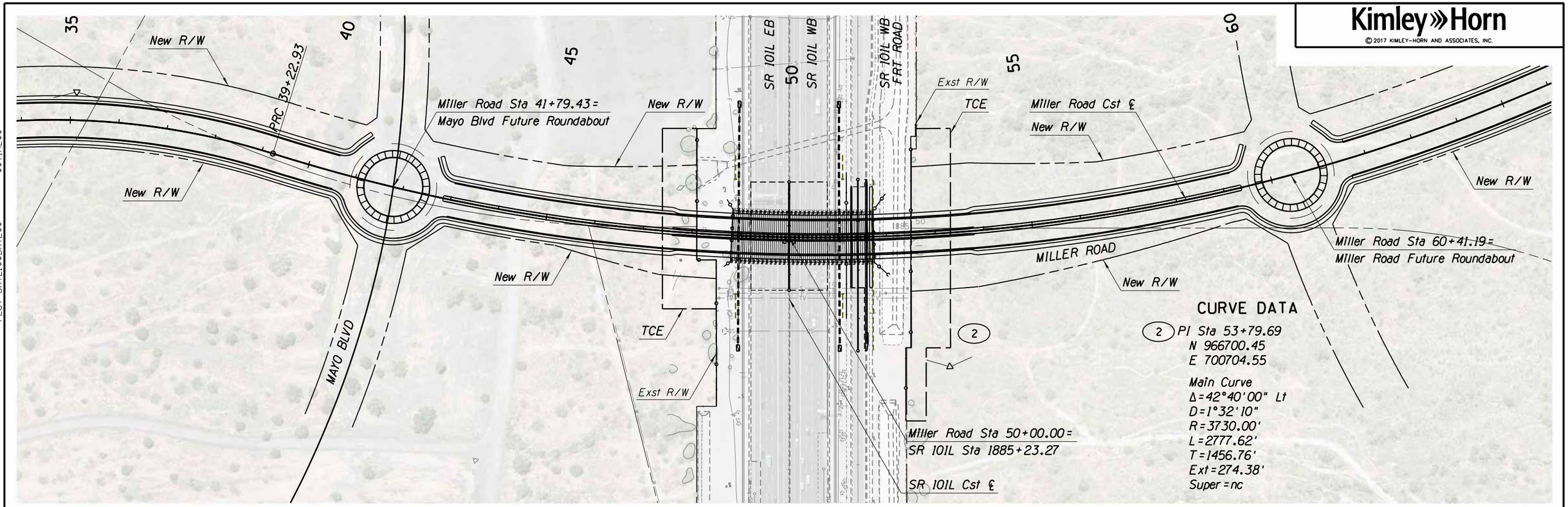
SHEET TITLE
TYPICAL SECTION

PROJECT TITLE
MILLER ROAD/SR 101L OVERPASS
CONSTRUCTION ALTERNATIVE ANALYSIS

SCALE	DESIGNED	DATE	BID NO.	SHT.
HORIZ.	DRR	OCTOBER 2017		
VERT.	DRAWN JFM	AS-BUILT	PROJECT NO. SC03B	2 OF 14

SC03B

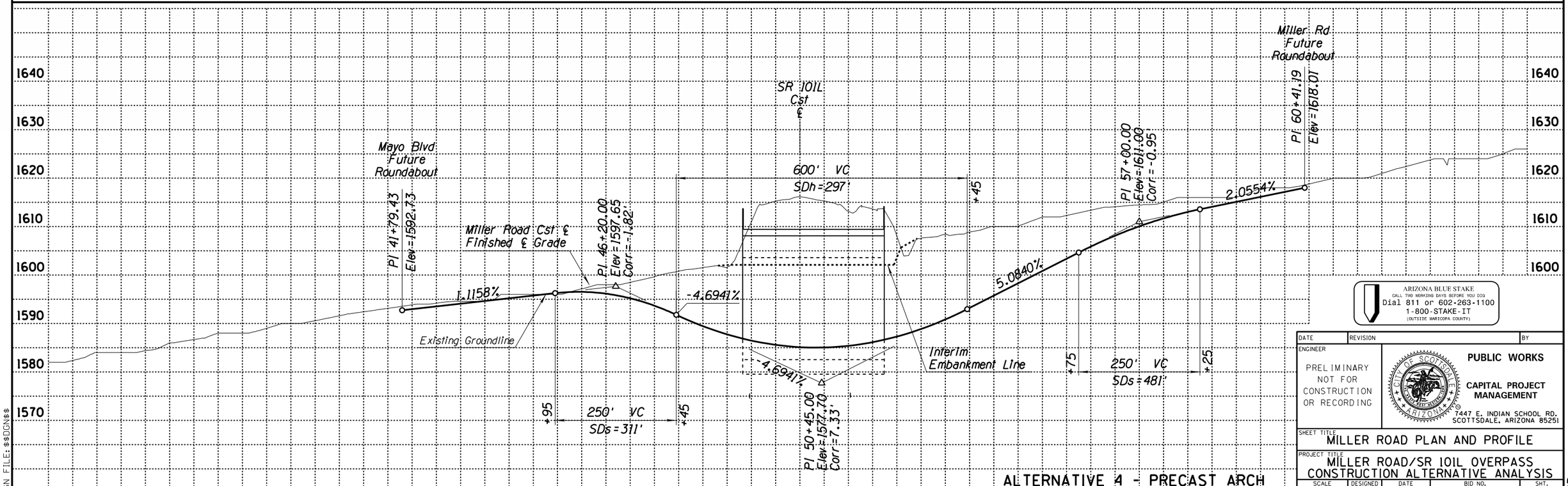
3:58:50 PM 10/27/2017 JOE.METRAILER K:\PHX_ROADWAY\091090017-SCOTTSDALE-MILLERUNDERPASS\CADD\12-SHEETS\ROADWAY\SC03B_DS-TYP-ALT4.DGN



CURVE DATA

(2) PI Sta 53+79.69
N 966700.45
E 700704.55

Main Curve
Δ=42°40'00" Lt
D=1°32'10"
R=3730.00'
L=2777.62'
T=1456.76'
Ext=274.38'
Super=nc



ALTERNATIVE 4 - PRECAST ARCH

DATE	REVISION	BY

ENGINEER

PRELIMINARY NOT FOR CONSTRUCTION OR RECORDING

PUBLIC WORKS
CAPITAL PROJECT MANAGEMENT
7447 E. INDIAN SCHOOL RD.
SCOTTSDALE, ARIZONA 85251

SHEET TITLE
MILLER ROAD PLAN AND PROFILE

PROJECT TITLE
MILLER ROAD/SR 101L OVERPASS
CONSTRUCTION ALTERNATIVE ANALYSIS

SCALE	DESIGNED	DATE	BID NO.	SHT.
HORIZ. 1"=100'	DRR	AUGUST 2017		
VERT. 1"=10'	DRAWN JFM	AS-BUILT	PROJECT NO. SC03B	3 OF 14

SC03B

New R/W
New R/W
FMS Conduit with 2-No. 9 Pull Boxes
Interim Earthen Channel
Conc Channel
New Structure See Structural Plans
TCE
+10
+60
Exst R/W
45
50
1885
Conc Channel
+10
55
N
1605
1610
S76°02'03"E
SR 101L WB FRT ROAD
1880
1890
SR 101L WB
S76°02'03"E
SR 101L EB
SR 101L Cst ℄
+00
+70
Exst R/W
SR 101L Sta 1885+23.27 =
Miller Road Sta 50+00.00
TCE
FMS Conduit with
2-No. 9 Pull Boxes
MAXIMUM CONSTRUCTION LIMITS
New R/W
New R/W

MAXIMUM CONSTRUCTION LIMITS
CONSTRUCT NEW PRECAST ARCH OFFLINE
GPL CONSTRUCTION TRAFFIC PHASING

ALTERNATIVE 4 - PRECAST ARCH

ARIZONA BLUE STAKE
CALL TWO WORKING DAYS BEFORE YOU DIG
Dial 811 or 602-263-1100
1-800-STAKE-IT
(OUTSIDE MARICOPA COUNTY)

DATE	REVISION	BY

ENGINEER
PRELIMINARY
NOT FOR
CONSTRUCTION
OR RECORDING

CITY OF SCOTTSDALE ARIZONA

PUBLIC WORKS
CAPITAL PROJECT MANAGEMENT
7447 E. INDIAN SCHOOL RD.
SCOTTSDALE, ARIZONA 85251

SHEET TITLE
INTERIM - SR 101L/FRT RD PLAN

PROJECT TITLE
MILLER ROAD/SR 101L OVERPASS
CONSTRUCTION ALTERNATIVE ANALYSIS

SCALE	DESIGNED	DATE	BID NO.	SHT.
HORIZ.	DRR	AUGUST 2017		
VERT.	DRAWN	AS-BUILT	PROJECT NO.	4 OF 14
	JFM		SC03B	

SC03B

Conc Half Barrier
Std C-10.52, Gutter=2.5'

Sta 49+29.60 to 51+31.60
New Asphalt Pvmt

Conc Channel

6' Conc Sidewalk
Std C-05.20

Miller Road Cst ℄

Interim
Earthen Channel

New
R/W

TCE

MILLER ROAD

New
R/W

Safety Rail
Special Detail

FMS Conduit with
2-No. 9 Pull Boxes

New Structure
See Structural Plans

Crash Cushion
Special Detail

Sta 1883+00 to 1889+00
630 Lin Ft New 72"
Chain Link Fence

Conc Channel

Frt Rd Cst ℄

Exst R/W

SR 101L WB FRT ROAD

S76°02'03"E

SR 101L WB

S76°02'03"E

SR 101L EB

Sawcut (Typ)

Sta 1884+00 to 1887+00
300 Lin Ft New 48"
Chain Link Fence

SR 101L Cst ℄

Sta 1884+20.00 to 1886+22.00, Lt
New PCCP Pvmt

Conc Med Barrier
Type F, Std C-10.41

Sta 1884+20.00 to 1886+22.00, Rt
New PCCP Pvmt

SR 101L Sta 1885+23.27 =
Miller Road Sta 50+00.00

TCE

New R/W

New R/W

Conc Curb & Gutter
Type D, Std C-05.10

New Median Light Pole
with Foundation

FMS Conduit with
2-No. 9 Pull Boxes

Safety Rail
Special Detail

Sta 1883+00 to 1888+70
650 Lin Ft New 72"
Chain Link Fence

Exst R/W

COMPLETED PRECAST ARCH UNDER SR 101L &
FRONTAGE ROAD

ALTERNATIVE 4 - PRECAST ARCH

ARIZONA BLUE STAKE
CALL TWO WORKING DAYS BEFORE YOU DIG
Dial 811 or 602-263-1100
1-800-STAKE-IT
(OUTSIDE MARICOPA COUNTY)

DATE	REVISION	BY
ENGINEER		

PRELIMINARY
NOT FOR
CONSTRUCTION
OR RECORDING

PUBLIC WORKS
CAPITAL PROJECT MANAGEMENT
7447 E. INDIAN SCHOOL RD.
SCOTTSDALE, ARIZONA 85251

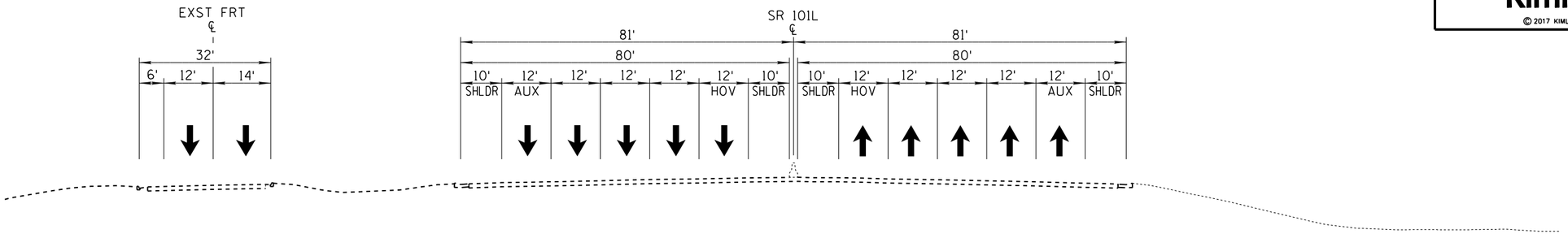
SHEET TITLE
ULTIMATE - SR 101L/FRT RD PLAN

PROJECT TITLE
MILLER ROAD/SR 101L OVERPASS
CONSTRUCTION ALTERNATIVE ANALYSIS

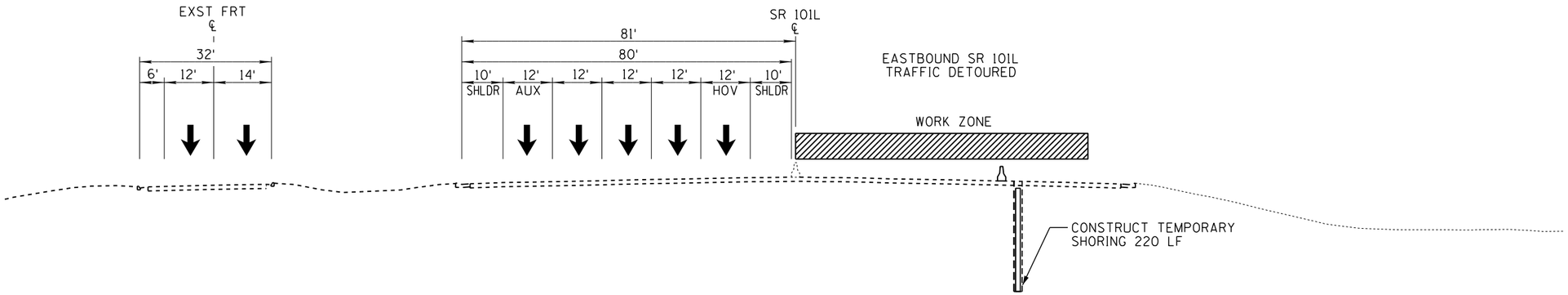
SCALE	DESIGNED	DATE	BID NO.	SHT.
HORIZ.	DRR	AUGUST 2017		
VERT.	DRAWN JFM	AS-BUILT	PROJECT NO. SC03B	5 OF 14

SC03B

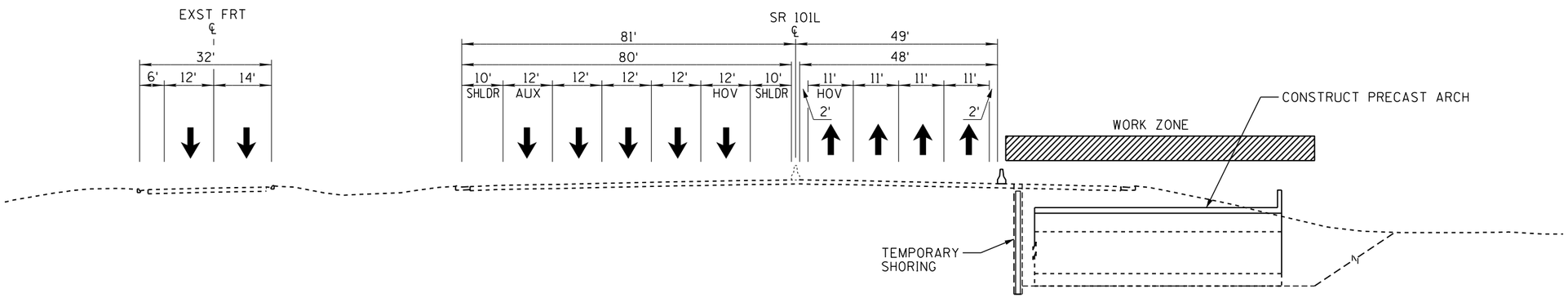
7:43:19 AM 8/16/2017 JOE.METRAILER K:\PHX_ROADWAY\091090017-SCOTTSDALE-MILLERUNDERPASS\CADD\12-SHEETS\ROADWAY\SC03B_C-PL01_ALT4.DGN



SR 101L EXISTING CONDITION AT MILLER ROAD



PHASE 1 – WEEKEND ACTIVITY



PHASE 2 – WEEKDAY CONDITION

SR 101L
LOOKING EAST

ALTERNATIVE 4 - PRECAST ARCH

DATE	REVISION	BY

ENGINEER

PRELIMINARY
NOT FOR
CONSTRUCTION
OR RECORDING

PUBLIC WORKS
CAPITAL PROJECT MANAGEMENT
7447 E. INDIAN SCHOOL RD.
SCOTTSDALE, ARIZONA 85251

SHEET TITLE: PHASING TYPICAL SECTIONS

PROJECT TITLE: MILLER ROAD/SR 101L OVERPASS
CONSTRUCTION ALTERNATIVE ANALYSIS

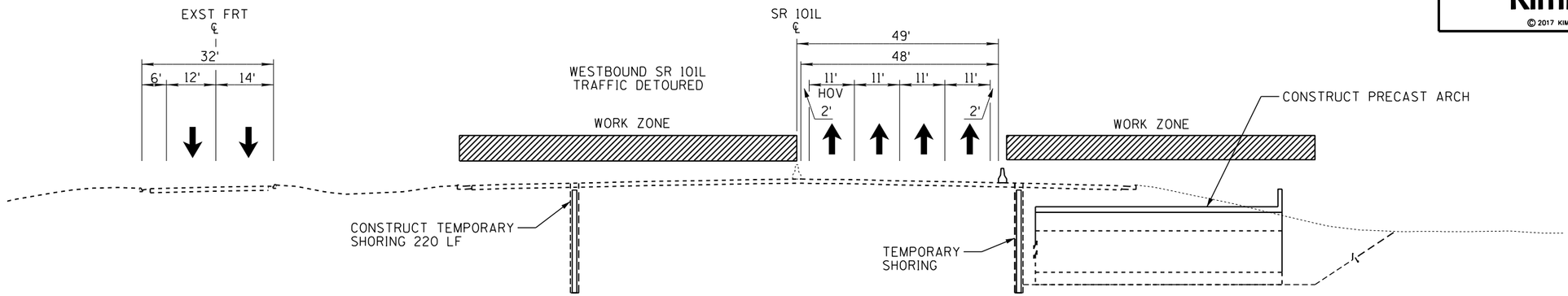
SCALE	DESIGNED	DATE	BID NO.	SHT.
HORIZ.	KAC	AUGUST 2017		
VERT.	DRAWN JFM	AS-BUILT	PROJECT NO. SC03B	6 OF 14

SC03B

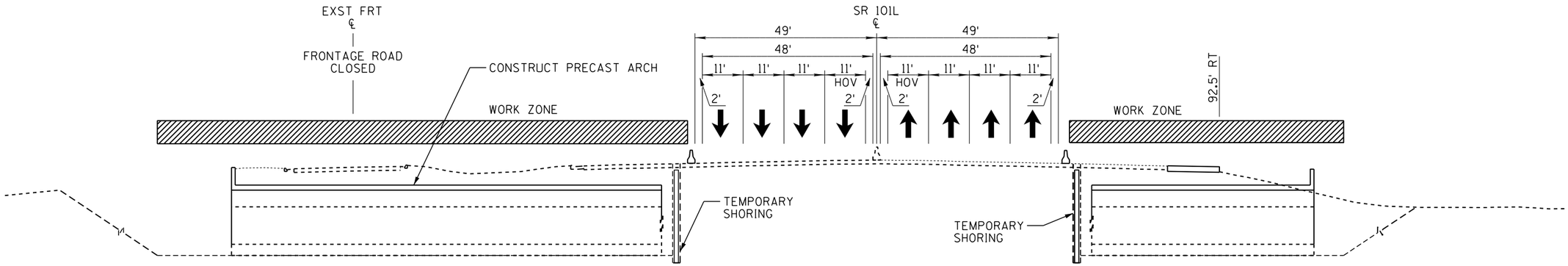
PLOT DATE:$$DATE$$ $$TIME$$

DESIGN FILE: $$DGN$$

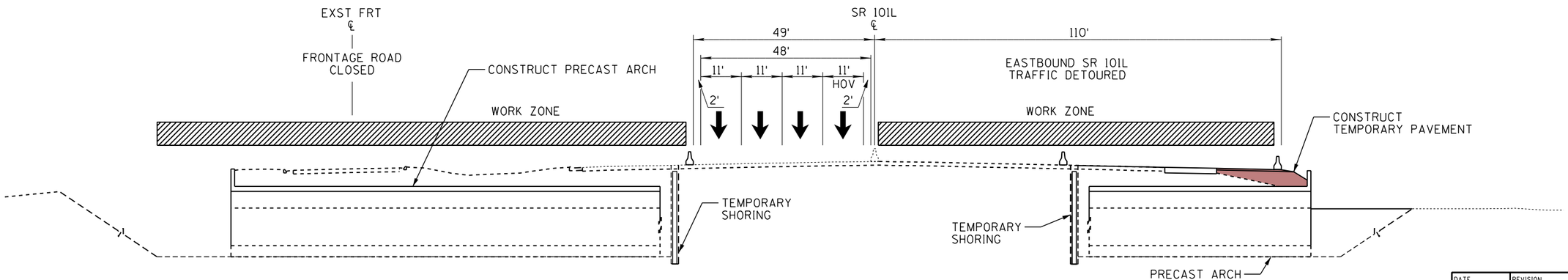
7:43:21 AM 8/16/2017 JOE.METRAILER K:\PHX_ROADWAY\091090017-SCOTTSDALE-MILLERUNDERPASS\CADD\12-SHEETS\TRAFFIC\SC03B_T-TYPICALS_ALT4_01.DGN



PHASE 3 – WEEKEND ACTIVITY



PHASE 4 – CONSTRUCT PRECAST ARCH OFF-LINE



PHASE 5 – WEEKEND ACTIVITY

SR 101L
LOOKING EAST

ALTERNATIVE 4 - PRECAST ARCH

DATE	REVISION	BY

ENGINEER

PRELIMINARY
NOT FOR
CONSTRUCTION
OR RECORDING

PUBLIC WORKS
CAPITAL PROJECT MANAGEMENT
7447 E. INDIAN SCHOOL RD.
SCOTTSDALE, ARIZONA 85251

SHEET TITLE: PHASING TYPICAL SECTIONS

PROJECT TITLE: MILLER ROAD/SR 101L OVERPASS CONSTRUCTION ALTERNATIVE ANALYSIS

SCALE	DESIGNED	DATE	BID NO.	SHT.
HORIZ.	KAC	AUGUST 2017		
VERT.	DRAWN JFM	AS-BUILT	PROJECT NO. SC03B	7 OF 14

SC03B

PLOT DATE: $$DATE$$ $$TIME$$

DESIGN FILE: $$DGN$$

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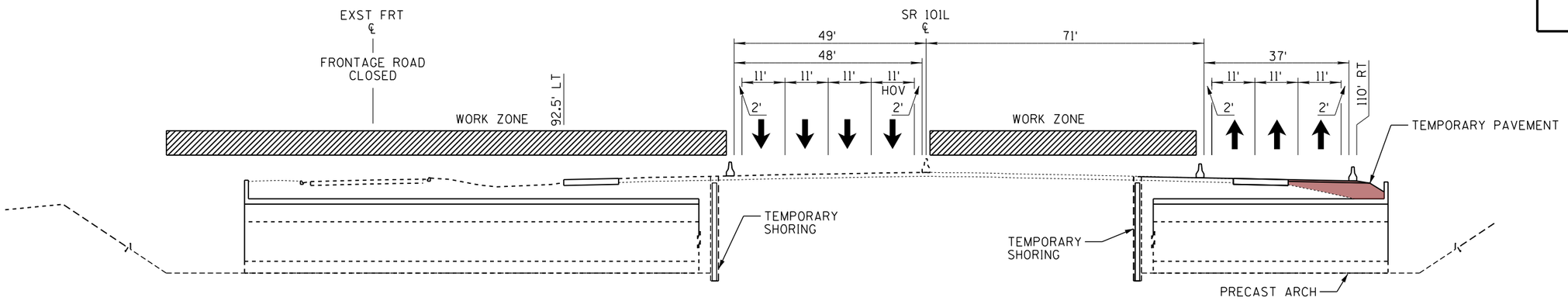
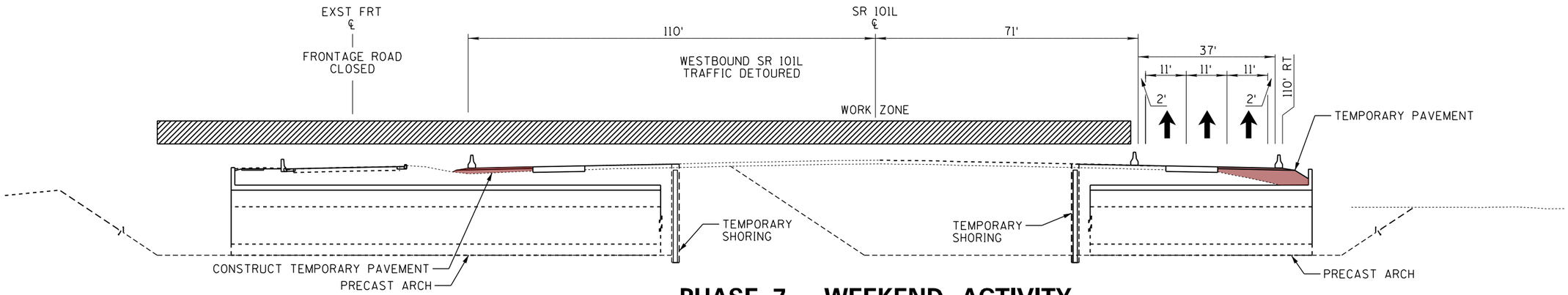
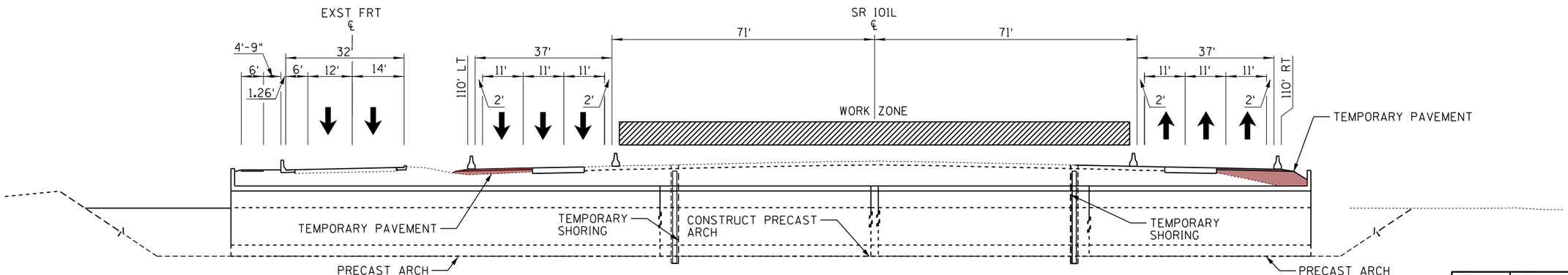


PHASE 6 – WEEKDAY CONDITION



PHASE 7 – WEEKEND ACTIVITY



PHASE 8 – CONSTRUCT PRECAST ARCH OFF-LINE

SR 101L
LOOKING EAST

ALTERNATIVE 4 - PRECAST ARCH

DATE	REVISION	BY

ENGINEER

PRELIMINARY
NOT FOR
CONSTRUCTION
OR RECORDING

PUBLIC WORKS
CAPITAL PROJECT MANAGEMENT
7447 E. INDIAN SCHOOL RD.
SCOTTSDALE, ARIZONA 85251

SHEET TITLE: PHASING TYPICAL SECTIONS

PROJECT TITLE: MILLER ROAD/SR 101L OVERPASS CONSTRUCTION ALTERNATIVE ANALYSIS

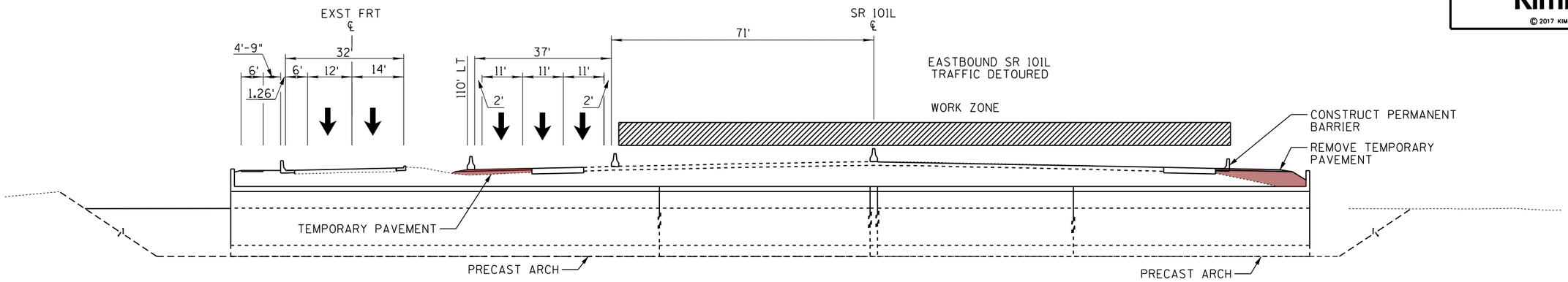
SCALE	DESIGNED	DATE	BID NO.	SHT.
HORIZ.	KAC	AUGUST 2017		
VERT.	DRAWN JFM	AS-BUILT	PROJECT NO. SC03B	8 OF 14

SC03B

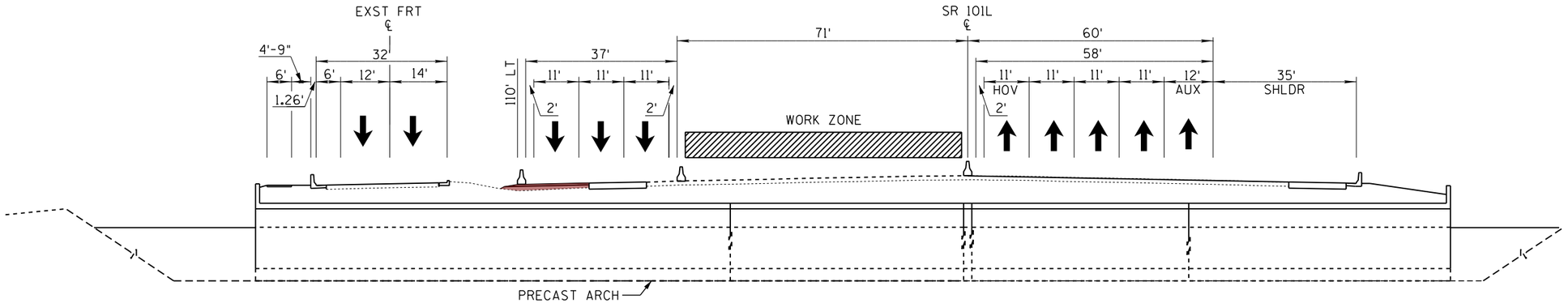
PLOT DATE:$$DATE$$ $$TIME$$

DESIGN FILE: $$DGN$$

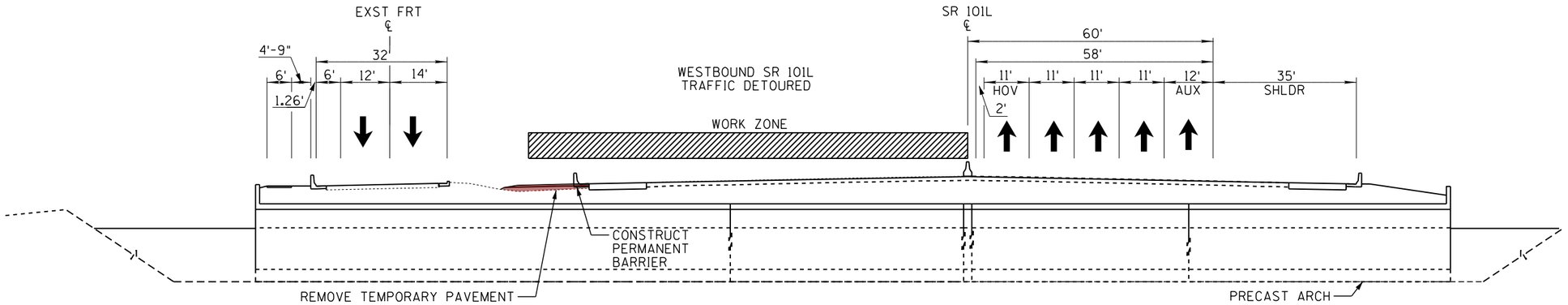
7:43:22 AM 8/16/2017 JOE.METRAILER K:\PHX_ROADWAY\091090017-SCOTTSDALE-MILLERUNDERPASS\CADD\12-SHEETS\TRAFFIC\SC03B_T-TYPICALS_ALT4_03.DGN



PHASE 9 – WEEKEND ACTIVITY



PHASE 10 – WEEKDAY CONDITION



PHASE 11 – WEEKEND ACTIVITY

SR 101L
LOOKING EAST

ALTERNATIVE 4 - PRECAST ARCH

DATE	REVISION	BY

ENGINEER

PRELIMINARY
NOT FOR
CONSTRUCTION
OR RECORDING

PUBLIC WORKS

CAPITAL PROJECT MANAGEMENT

7447 E. INDIAN SCHOOL RD.
SCOTTSDALE, ARIZONA 85251

SHEET TITLE: PHASING TYPICAL SECTIONS

PROJECT TITLE: MILLER ROAD/SR 101L OVERPASS
CONSTRUCTION ALTERNATIVE ANALYSIS

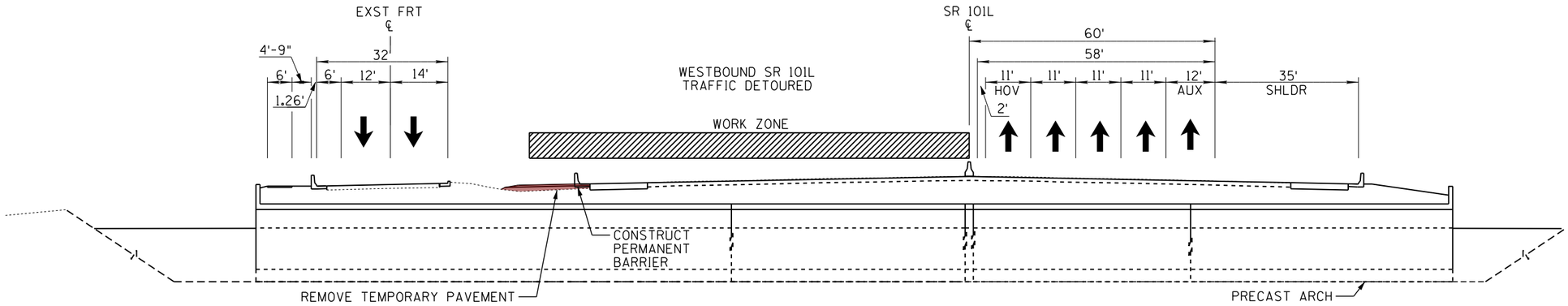
SCALE	DESIGNED	DATE	BID NO.	SHT.
HORIZ.	KAC	AUGUST 2017		
VERT.	DRAWN JFM	AS-BUILT	PROJECT NO. SC03B	9 OF 14

SC03B

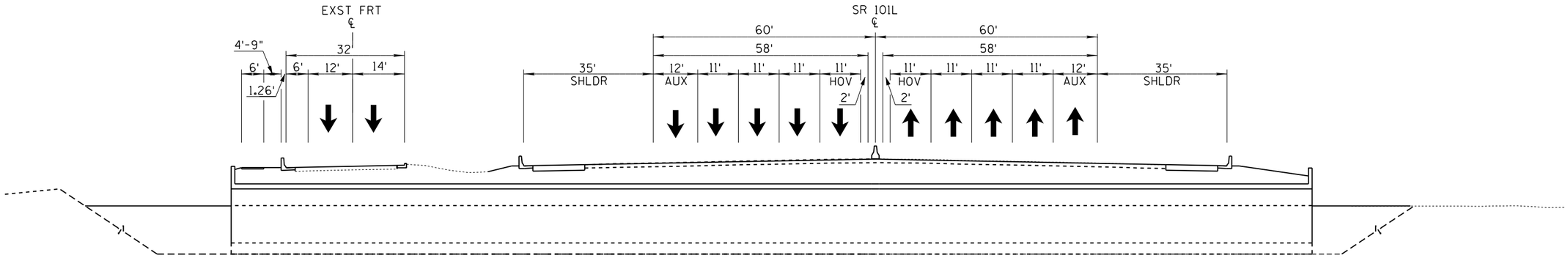
PLOT DATE: $$DATE$$ $$TIME$$

DESIGN FILE: $$DGN$$

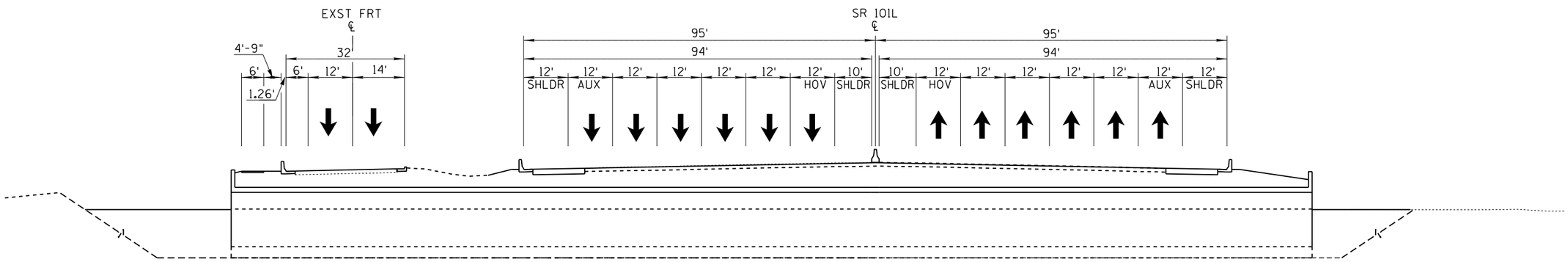
7:43:23 AM 8/16/2017 JOE.METRAILER K:\PHX_ROADWAY\091090017-SCOTTSDALE-MILLERUNDERPASS\CADD\12-SHEETS\TRAFFIC\SC03B_T-TYPICALS_ALT4_04.DGN



PHASE 11 – WEEKEND ACTIVITY



PHASE 12 – PRECAST ARCH CONSTRUCTION COMPLETE – TRAFFIC IN GPL CONSTRUCTION CONFIGURATION



PHASE 13 – MILLER RD PRECAST ARCH CONSTRUCTION COMPLETE
GPL CONSTRUCTION COMPLETE

SR 101L
LOOKING EAST

ALTERNATIVE 4 - PRECAST ARCH

DATE	REVISION	BY

ENGINEER

PRELIMINARY
NOT FOR
CONSTRUCTION
OR RECORDING

CITY OF SCOTTSDALE ARIZONA

PUBLIC WORKS

CAPITAL PROJECT MANAGEMENT

7447 E. INDIAN SCHOOL RD.
SCOTTSDALE, ARIZONA 85251

SHEET TITLE
PHASING TYPICAL SECTIONS

PROJECT TITLE
MILLER ROAD/SR 101L OVERPASS
CONSTRUCTION ALTERNATIVE ANALYSIS

SCALE	DESIGNED	DATE	BID NO.	SHT.
HORIZ.	KAC	AUGUST 2017		
VERT.	DRAWN	AS-BUILT	PROJECT NO.	
	JFM		SC03B	10 OF 14

SC03B

PLOT DATE:$$DATE$$ $$TIME$$

DESIGN FILE:$$DGN$$

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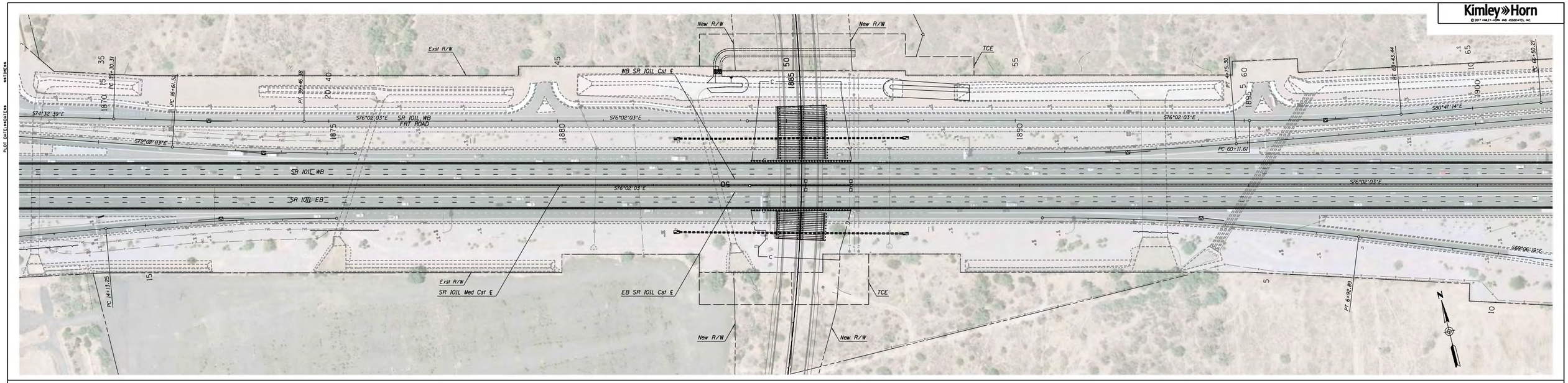
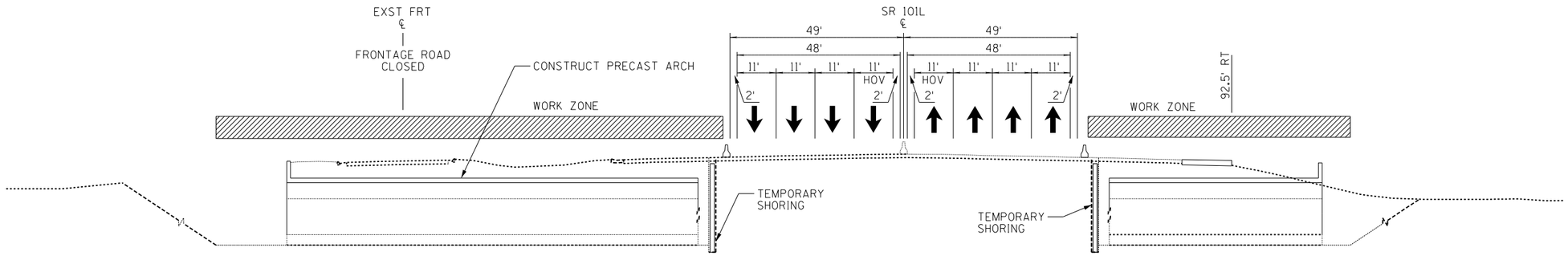




PHASE 4 – CONSTRUCT PRECAST ARCH OFF–LINE

ALTERNATIVE 4 - PRECAST ARCH

Kimley»Horn

ARIZONA BLUE STAKE, INC.
Dial 811 or 602-263-1100
1-800-STAKE-IT

DATE	REVISION	BY
ENGINEER		

PRELIMINARY
NOT FOR CONSTRUCTION OR RECORDING

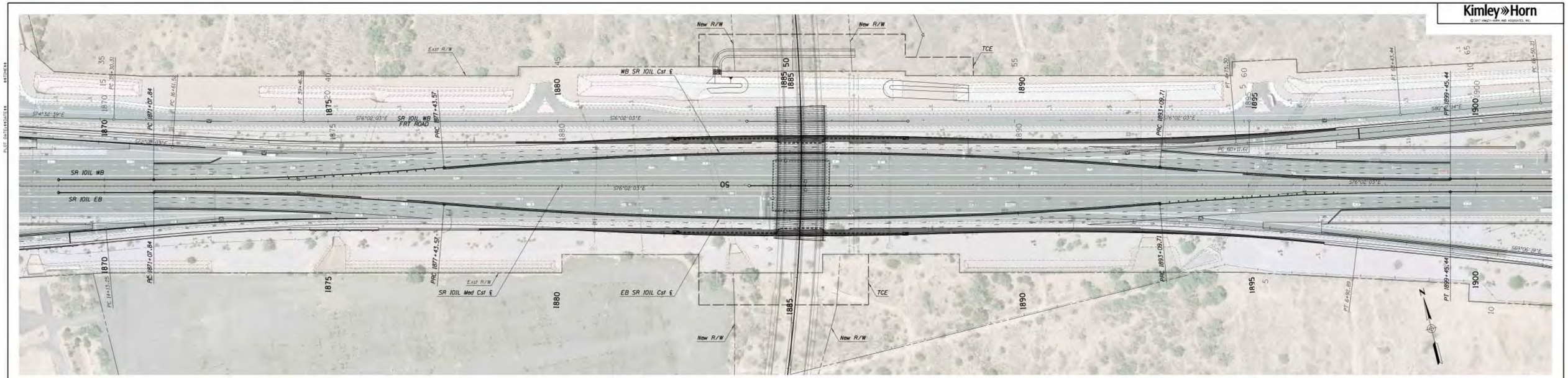
PUBLIC WORKS
CAPITAL PROJECT MANAGEMENT
7447 E. INDIAN SCHOOL RD.
SCOTTSDALE, ARIZONA 85251

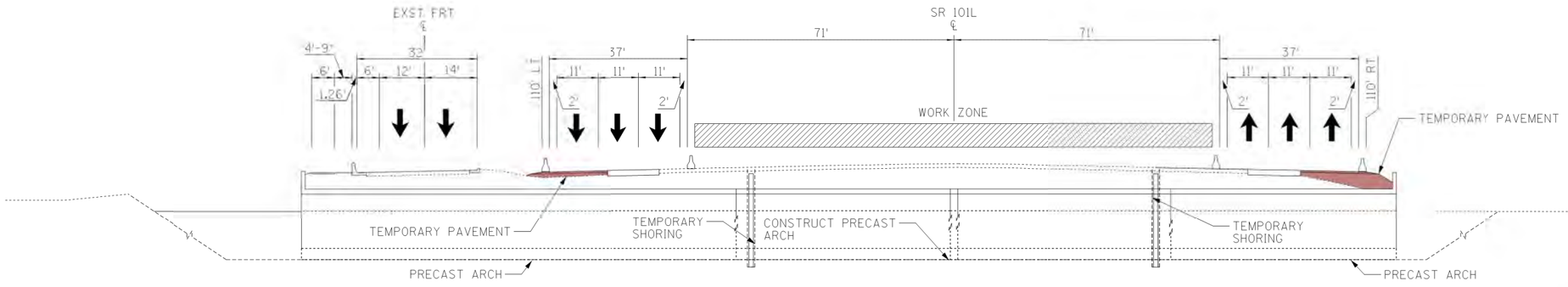
SHEET TITLE: TRAFFIC CONTROL PHASE 4

PROJECT TITLE: MILLER ROAD/SR 101L OVERPASS
CONSTRUCTION ALTERNATIVE ANALYSIS

SCALE	DESIGNED	DATE	BID NO.	SHT.
HORZ.	DRAWN	AUGUST 2017		
VERT.	CHECKED JPM	AS-BUILT	PROJECT NO. 00338	11 OF 14

SK00338





PHASE 8 – CONSTRUCT PRECAST ARCH OFF–LINE

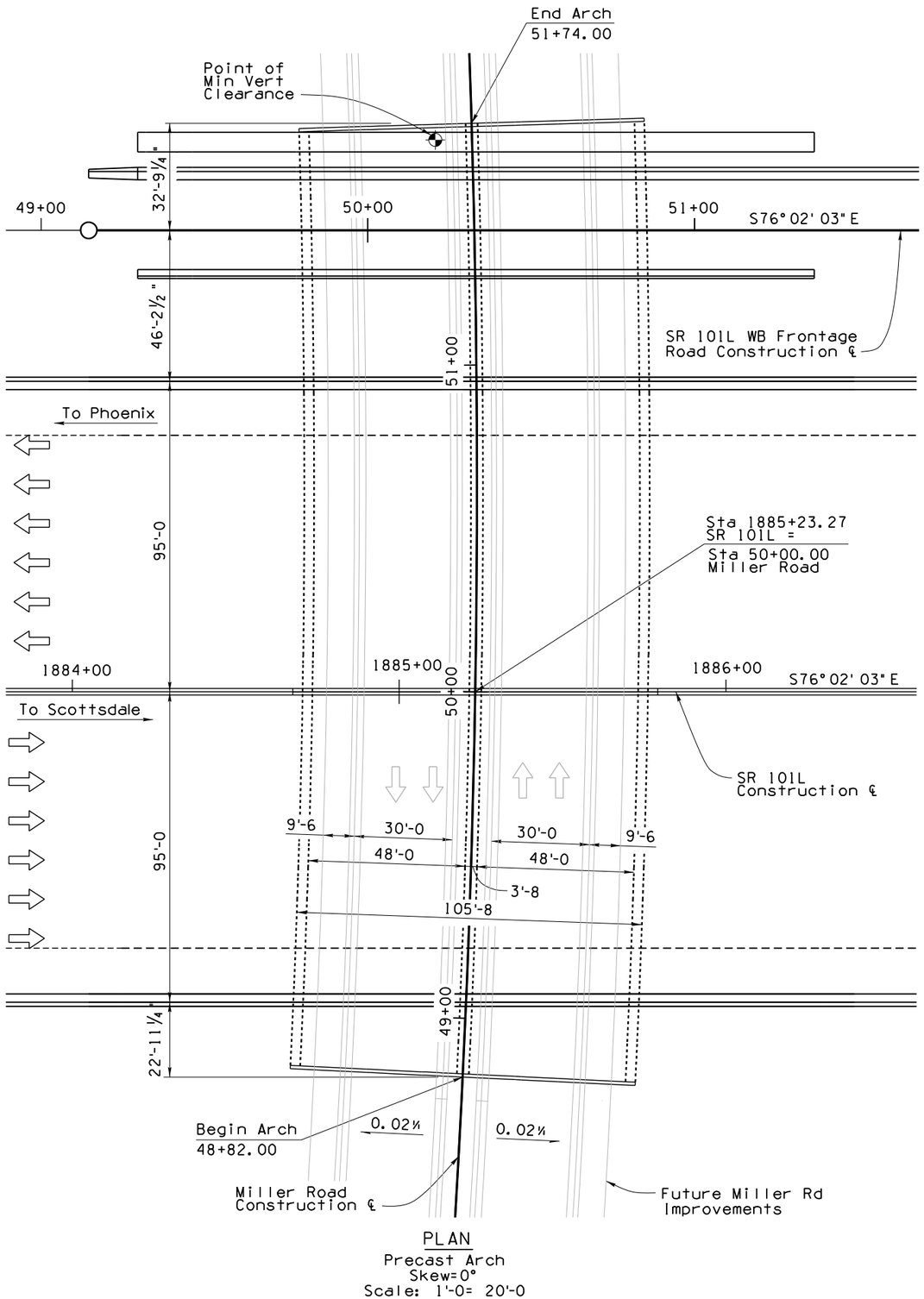
ALTERNATIVE 4 - PRECAST ARCH

PUBLIC WORKS
CAPITAL PROJECT MANAGEMENT

TRAFFIC CONTROL PHASE 8

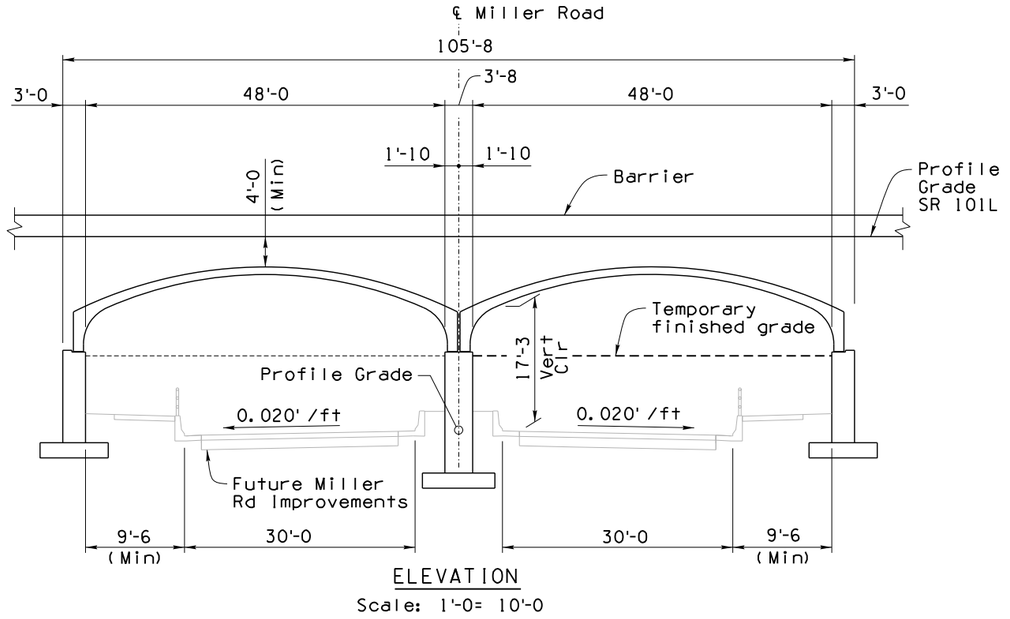
MILLER ROAD/SR 101L OVERPASS CONSTRUCTION ALTERNATIVE ANALYSIS

SC038



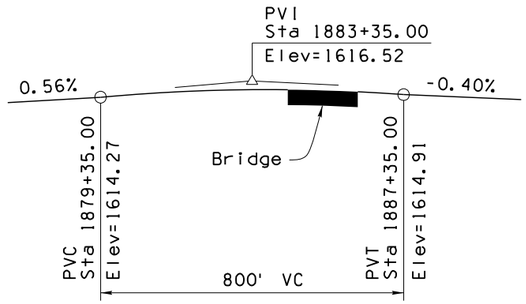
PLAN

Precast Arch
Skew=0°
Scale: 1'-0= 20'-0



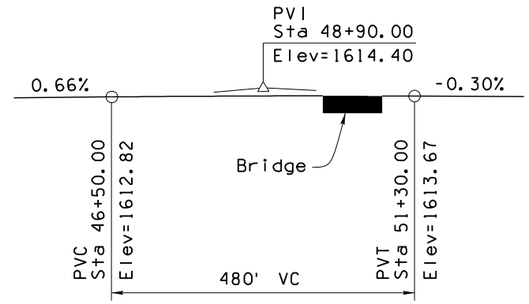
ELEVATION

Scale: 1'-0= 10'-0



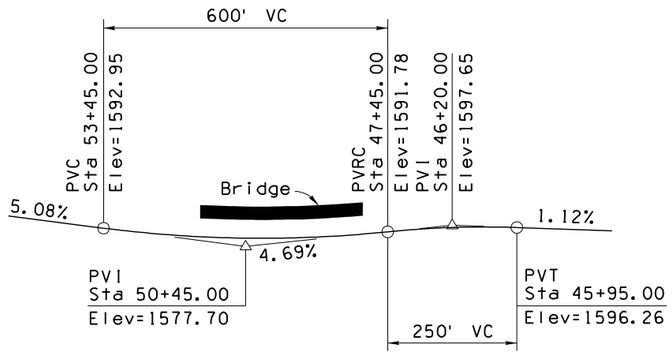
SR 101L PROFILE GRADE

No Scale



FRONTAGE ROAD PROFILE GRADE

No Scale



MILLER ROAD PROFILE GRADE

No Scale

ALTERNATIVE 4 - PRECAST ARCH

Kimley»Horn

ARIZONA BLUE STAKE
CALL TWO WORKING DAYS BEFORE YOU DIG
Dial 811 or 602-263-1100
1-800-STAKE-IT
(OUTSIDE MARICOPA COUNTY)

DATE	REVISION	BY

ENGINEER

PRELIMINARY
NOT FOR
CONSTRUCTION
OR RECORDING

PUBLIC WORKS

CAPITAL PROJECT MANAGEMENT

7447 E. INDIAN SCHOOL RD.
SCOTTSDALE, ARIZONA 85251

SHEET TITLE

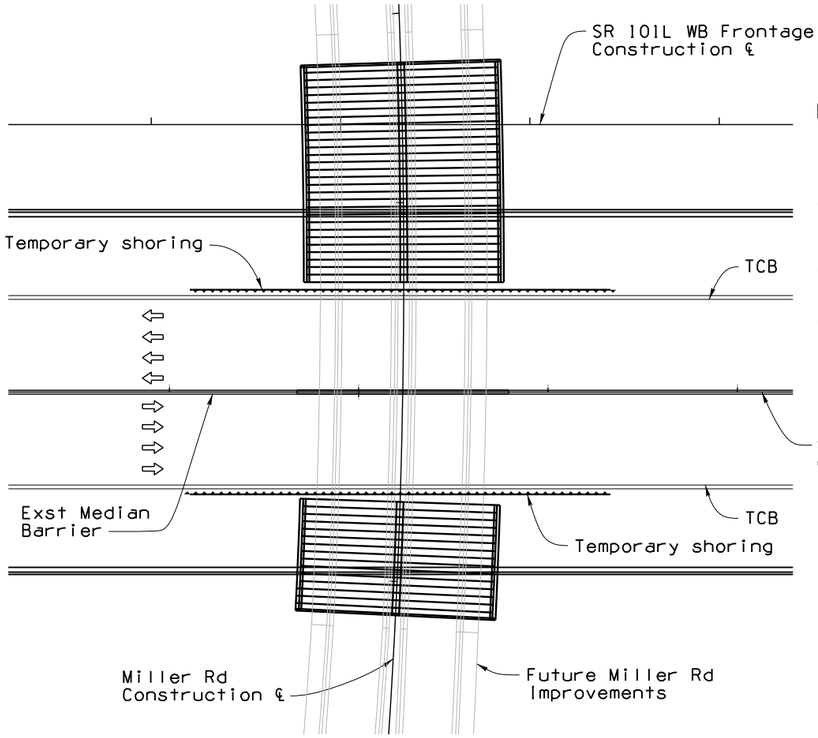
GENERAL PLAN & ELEVATION

PROJECT TITLE

MILLER ROAD/SR 101L OVERPASS
CONSTRUCTION ALTERNATIVE ANALYSIS

SCALE	DESIGNED	DATE	BID NO.	SHT.
HORIZ.	KJK	AUGUST 2017		
VERT.	DRAWN	AS-BUILT	PROJECT NO.	13 OF 14
	MSK		SC03B	

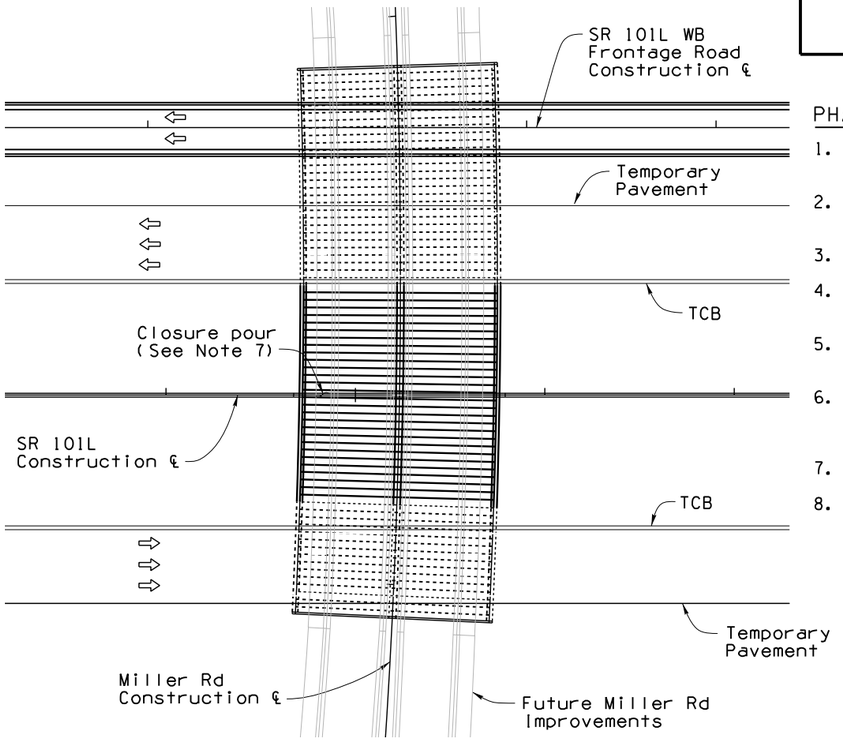
SC03B



PHASE 1-4

PHASE 1-4 NOTES:

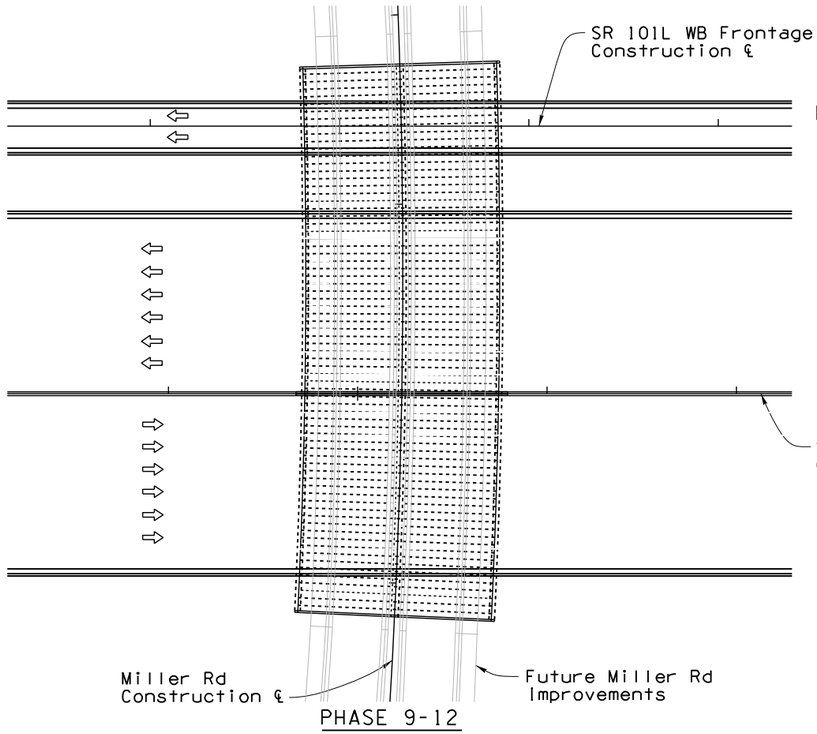
1. Shift traffic to inside. (GPL traffic location).
2. Close WB frontage road.
3. Install temporary shoring.
4. Construct outside segments of Precast Arch structure.
5. Construct outside PCCP paving.



PHASE 5-8

PHASE 5-8 NOTES:

1. Construct temporary pavement outside EB.
2. Shift EB traffic to outside lanes.
3. Construct WB frontage road.
4. Construct temporary pavement outside WB.
5. Shift WB traffic to outside lanes.
6. Excavate and Construct inside segments of Precast Arch structure.
7. Pour closure pour.
8. Construct inside PCCP paving.



PHASE 9-12

PHASE 9-12 NOTES:

1. Shift traffic back to inside. (GPL traffic location).
2. Remove temporary pavement.
3. Construct outside barriers.
4. Bridge work complete.

(Note: Ultimate lane configuration shown)

ALTERNATIVE 4 - PRECAST ARCH

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CONSTRUCTION
OR RECORDING

PUBLIC WORKS

CAPITAL PROJECT MANAGEMENT

7447 E. INDIAN SCHOOL RD.
SCOTTSDALE, ARIZONA 85251

SHEET TITLE
CONSTRUCTION PHASING

PROJECT TITLE
MILLER ROAD/SR 101L OVERPASS
CONSTRUCTION ALTERNATIVE ANALYSIS

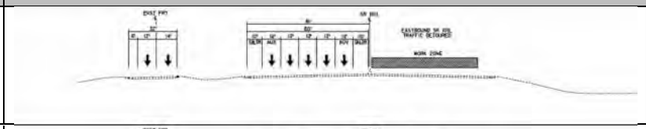
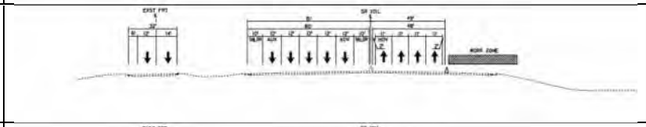
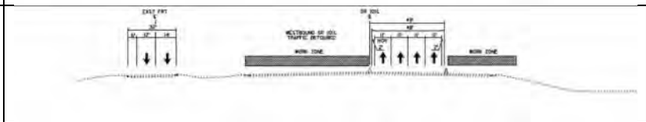
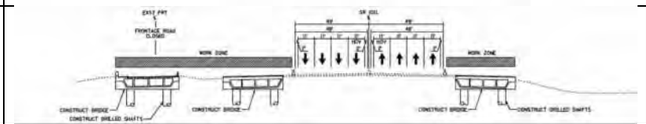
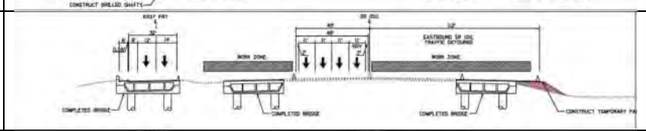
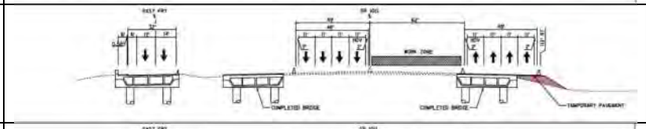
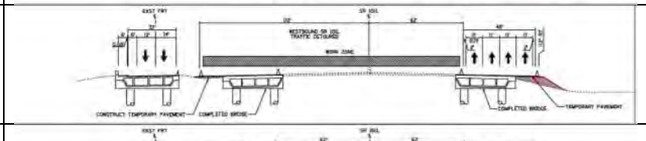
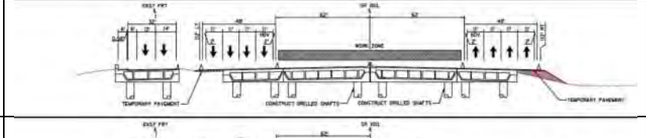
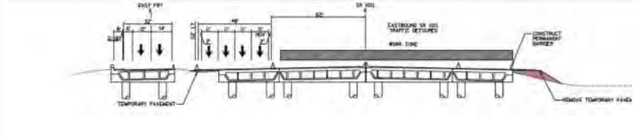
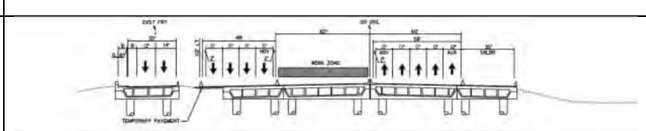
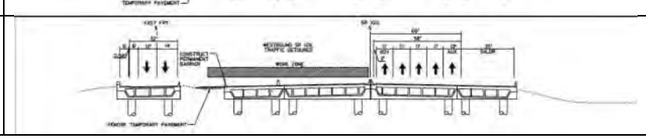
SCALE	DESIGNED	DATE	BID NO.	SHT.
HORIZ.	KJK	AUGUST 2017		
VERT.	DRAWN MSK	AS-BUILT	PROJECT NO. SC03B	14 OF 14

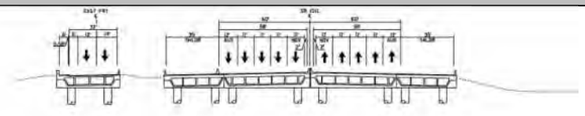
SC03B

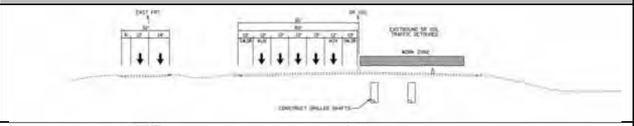
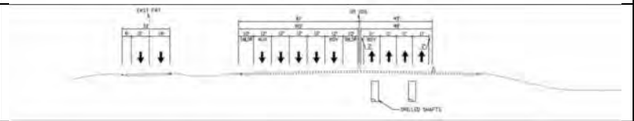
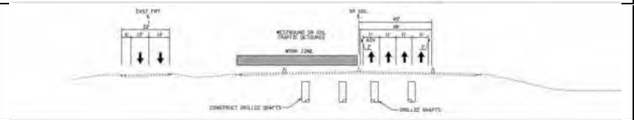
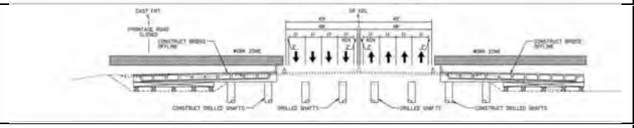
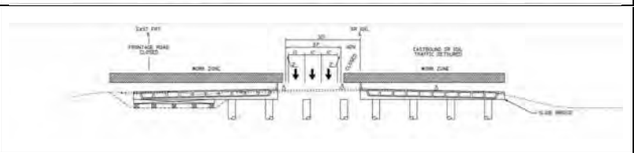
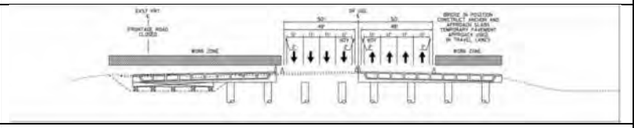
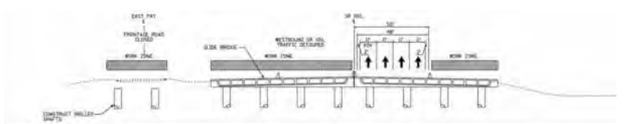
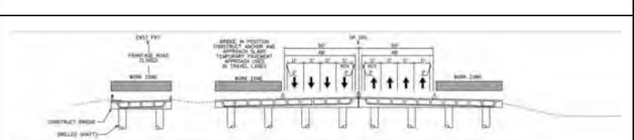
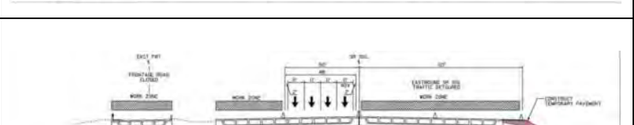
G

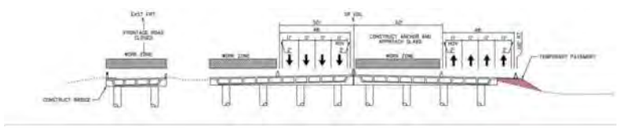
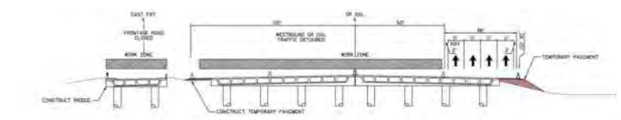
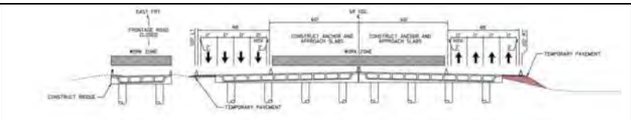
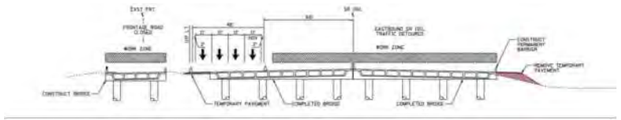
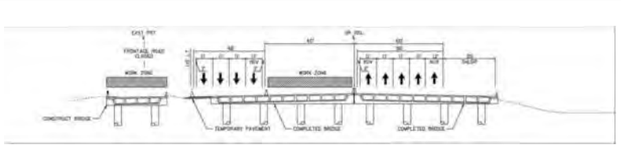
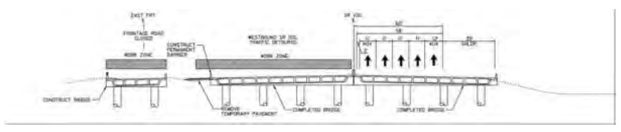
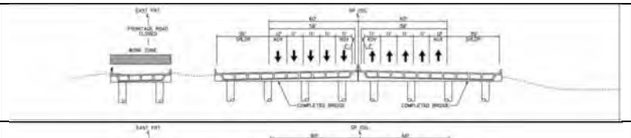
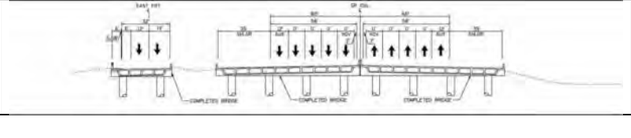
APPENDIX

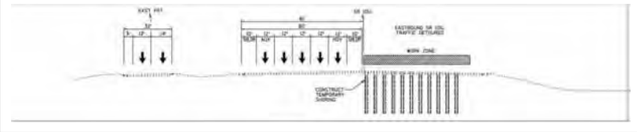
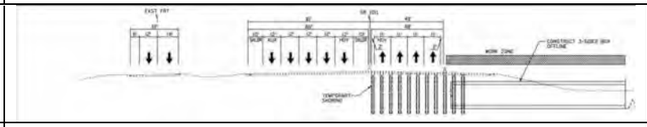
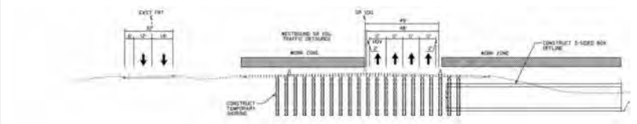
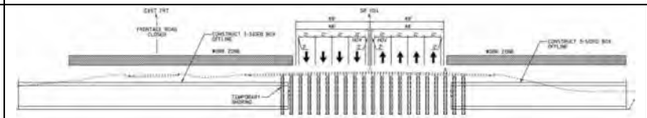
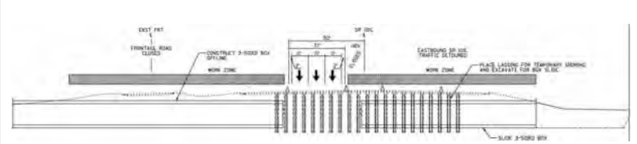
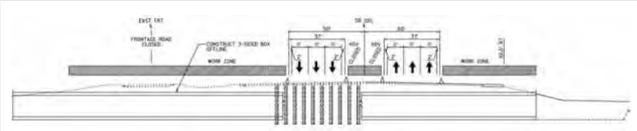
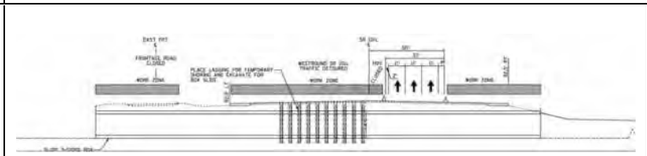
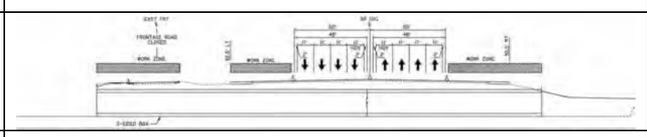
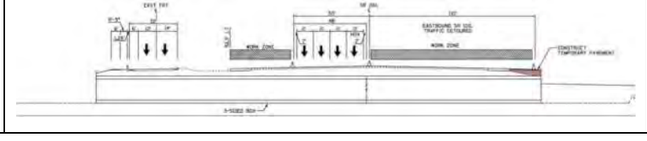
Maintenance of Traffic Table

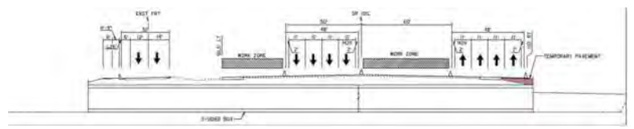
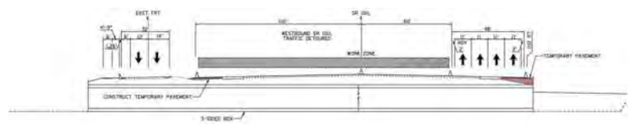
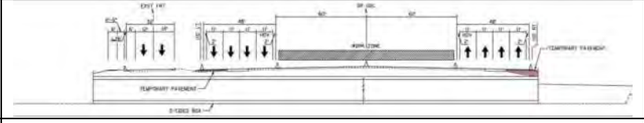
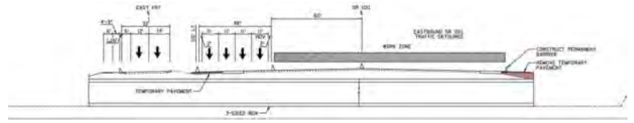
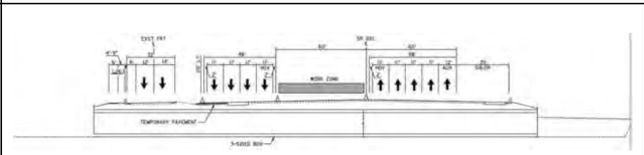
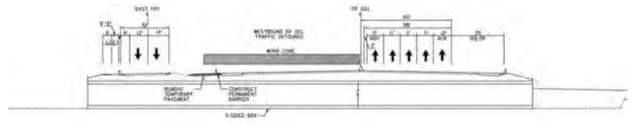
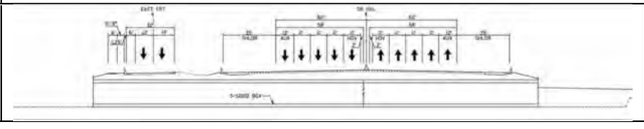
ALTERNATIVE ONE: CONVENTIONAL BRIDGE CONSTRUCTION ACTIVITY / MAINTENANCE OF TRAFFIC				
Phase #	**Construction Activity**	**Maintenance of Traffic**	**MOT Typical Section Detail**	**Duration / Model**
1	• Restripe EB SR 101L to narrow and shift lanes to the inside • Set EB Temporary Concrete Barrier (TCB)	• Close EB SR 101L and detour traffic to Legacy • Close EB on ramp at Scottsdale and off ramp at Hayden • WB traffic maintained in existing SR 101L travel lanes.		2-Day Weekend Closure (Friday 9p to Monday 5a) ***Traffic Impact by GPL***
2	• Open EB travel lanes	• EB on ramp at Scottsdale and off ramp at Hayden closed • EB traffic in temp travel lanes-1 HOV and 3 general • WB Traffic on existing travel lanes		5-Day ***Traffic Impacts by GPL***
3	• Restripe WB SR 101L to narrow and shift lanes to the inside (By GPL) • Set WB TCB (By GPL)	• Close WB SR 101L and detour onto existing WB Frontage Rd • Close WB on ramp at Hayden and off ramp at Scottsdale • EB traffic maintained in temp travel lanes-1 HOV and 3 general		2-Day Weekend Closure (Friday 9p to Monday 5a) ***Traffic Impacts by GPL***
4	• Construct EB Bridge (outside) • Construct WB Bridge (outside) • Construct WB frontage Rd Bridge	• WB & EB on Ramp between Scottsdale and Hayden Closed • EB & WB mainline traffic in temp travel lanes-1 HOV and 3 general • All ramp traffic detoured to Legacy • WB Frontage Rd closed		89-Days ***Traffic Models 1 & 2***
5	• Construct temp pavement EB (outside) • Set EB TCB (Outside) on temp pavement • Restripe EB SR 101L to shift lanes to outside • Reset EB TCB (inside) onto new Bridge	• Close EB SR 101L and detour to Legacy • WB traffic in temp travel lanes-1 HOV and 3 general (inside) • WB on and off ramps closed Hayden and Scottsdale • WB Frontage Rd closed		2-Day Weekend Closure (Friday 9p to Monday 5a) ***Traffic Model 3***
6	• Open EB temp outside travel lanes • Open WB Frontage Rd	• EB on/off ramps between Scottsdale and Hayden open • EB mainline traffic in temp travel lanes-1 HOV and 3 general (outside) • WB mainline traffic in temp travel lanes-1 HOV and 3 general (inside) • WB mainline ramps closed and utilizes WB frontage road.		5-Day ***Traffic Model same as GPL***
7	• Construct temp pavement WB (outside) • Set WB TCB (Outside) on temp pavement • Restripe WB SR 101L to shift lanes to outside • Reset WB TCB onto Bridge (inside)	• Close WB SR 101L and detour to WB frontage Rd • EB traffic maintained in temp travel lanes-1 HOV and 3 general • EB on and off ramps open between Scottsdale and Hayden		2-Day Weekend Closure (Friday 9p to Monday 5a) ***Traffic Model 5***
8	• Construct EB & WB bridges (inside) • Construct bridge closure pours	• EB & WB on and off ramps between Scottsdale and Hayden open • EB & WB mainline traffic in temp travel lanes-1 HOV and 3 general (outside)		89-Day ***Traffic Model same as GPL***
9	• Restripe EB SR 101L to shift lanes to GPL temp lane alignment (inside) • Construct EB bridge barrier (outside) • Remove EB temp pavement • Remove EB TCB (inside & outside)	• Close EB SR 101L and detour to Legacy • WB traffic maintained in temp travel lanes-1 HOV and 3 general (outside) • WB on and off ramps open between Hayden and Scottsdale		2-Day Weekend Closure (Friday 9p to Monday 5a) ***Traffic Model 3***
10	• Open EB lanes to traffic	• EB & WB on/off ramps between Scottsdale and Hayden open • EB mainline traffic in GPL temp lane configuration 1 HOV, 3 general lanes, 1 aux lane • WB mainline traffic in temp travel lane-1 HOV and 3 general (outside)		5-Day ***Traffic model same as GPL***
11	• Restripe WB SR 101L to shift lanes to GPL temp lane alignment • Construct WB bridge barrier (outside) • Remove WB temp pavement • Remove WB TCB (inside & outside)	• Close WB SR 101L and detour to WB frontage road • EB traffic maintained in GPL temp travel lanes-1 HOV, 3 general, and 1 Aux lane.		2-Day Weekend Closure (Friday 9p to Monday 5a) ***Traffic Model 5***

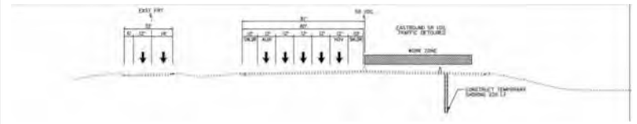
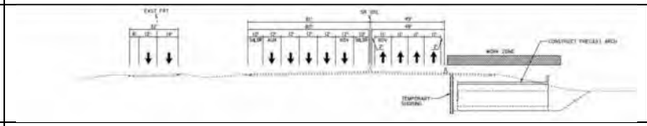
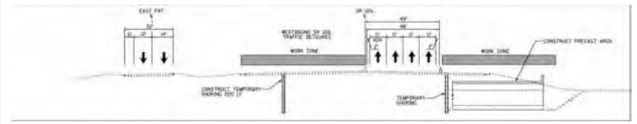
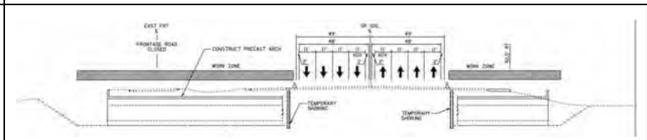
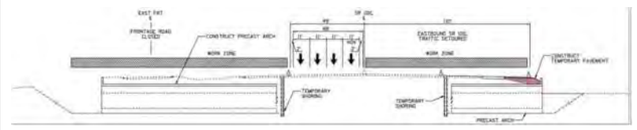
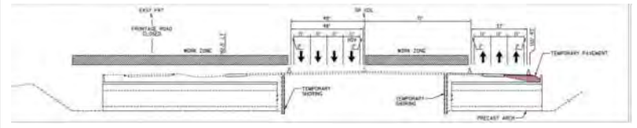
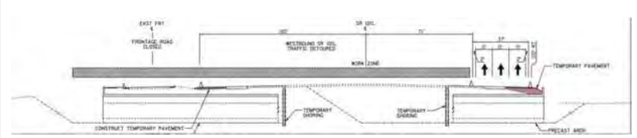
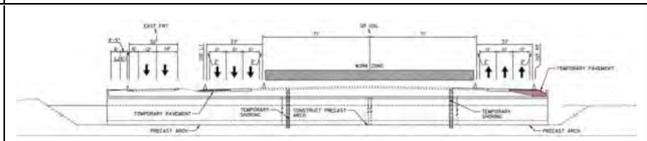
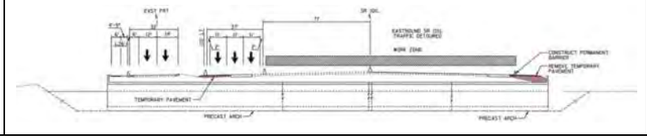
ALTERNATIVE ONE: CONVENTIONAL BRIDGE CONSTRUCTION ACTIVITY / MAINTENANCE OF TRAFFIC				
Phase #	**Construction Activity**	**Maintenance of Traffic**	**MOT Typical Section Detail**	**Duration / Model**
12	• Open WB lanes to traffic • Miller Bridge activities complete	• EB & WB on/off ramps between Scottsdale and Hayden open • WB mainline traffic in GPL temp lane configuration 1 HOV, 3 general lanes, 1 aux lane • EB mainline traffic in GPL temp travel lane-1 HOV, 3 general, 1 aux lane		0 Days ***Traffic Model by GPL***

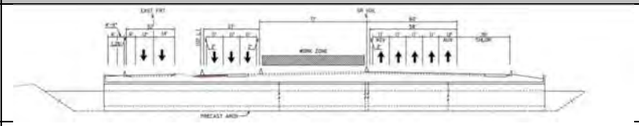
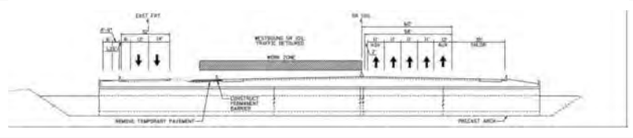
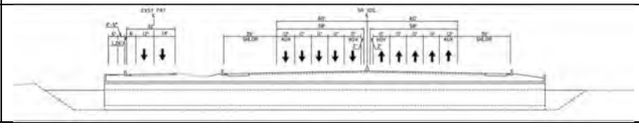
ALTERNATIVE TWO: BRIDGE SLIDE CONSTRUCTION ACTIVITY / MAINTENANCE OF TRAFFIC				
Phase #	**Construction Activity**	**Maintenance of Traffic**	**MOT Typical Section Detail**	**Duration (Calendar Days)**
1	• Restripe EB SR 101L to narrow and shift lanes to the inside • Set EB Temp Concrete Barrier (TCB) • Construct drill shafts for EB bridge inside lanes	• Close EB SR 101L and detour traffic to Legacy • Close EB on ramp at Scottsdale and off ramp at Hayden • WB traffic maintained in existing SR 101L travel lanes-1 HOV, 3 general, and 1 aux.		2-Day Weekend Closure (Friday 9p to Monday 5a) ***Traffic Model By GPL***
2	• Open EB travel lanes	• EB on ramp at Scottsdale and off ramp at Hayden closed • EB traffic in temp travel lanes-1 HOV and 3 general • WB traffic on existing travel lanes-1 HOV, 3 general, and 1 aux		5-Day ***Traffic Model By GPL***
3	• Restripe WB SR 101L to narrow and shift lanes to the inside (By GPL) • Set WB TCB (By GPL) • Construct drill shafts for WB bridge inside lanes	• Close WB SR 101L and detour to onto existing WB Frontage Rd • Close WB on ramp at Hayden and off ramp at Scottsdale • EB traffic maintained in temp travel lanes-1 HOV and 3 general		2-Day Weekend Closure (Friday 9p to Monday 5a) ***Traffic Model By GPL***
4	• Construct EB Bridge • Construct WB Bridge	• WB & EB on Ramp between Scottsdale and Hayden Closed • EB & WB mainline traffic in temp travel lanes-1 HOV and 3 general • All ramp traffic detoured to Legacy. • WB Frontage Rd Closed		103-Day ***Traffic Models 1 & 2***
5	• Excavate inside lanes for EB Bridge slide • Slide EB Bridge to final alignment • Stripe over bridge for EB SR 101L inside lane configuration • Reset EB TCB along bridge	• Close WB HOV lane • Close EB SR 101L and detour to Legacy • WB traffic in temp travel lanes-1 HOV and 3 general (inside) • WB on and off ramps closed Hayden and Scottsdale • WB Frontage Rd Closed		2-Day Weekend Closure (Friday 9p to Monday 5a) ***Traffic Model 3 & 8*** ***HOV Closure***
6	• Open EB temp travel lanes • Construct EB anchor and approach slab (outside)	• WB & EB on Ramp between Scottsdale and Hayden Closed • EB mainline traffic in temp travel lanes-1 HOV and 3 general (inside) • WB mainline traffic in temp travel lanes-1 HOV and 3 general (inside) • All ramp traffic detoured to Legacy		5-Day ***Traffic Model 1 & 2***
7	• Excavate inside lanes for WB Bridge slide • Slide WB bridge to final alignment • Stripe over bridge for WB SR 101L inside lane configuration • Reset WB TCB along bridge limits • Start construction of drilled shaft on WB Frontage Rd • Continue EB anchor and approach slab construction (outside)	• Close WB SR 101L and detoured to Legacy • EB traffic maintained in temp travel lanes-1 HOV and 3 general • EB on Ramp between Scottsdale and Hayden Closed • Ramp traffic detoured to Legacy • WB Frontage Rd Closed		2-Day Weekend Closure (Friday 9p to Monday 5a) ***Traffic Model 4***
8	• Open WB temp travel lanes • Construct WB anchor and approach slab (outside) • Start WB Frontage Rd Bridge construction	• EB & WB mainline traffic in temp travel lanes-1 HOV and 3 general (inside) • EB & WB on Ramp between Scottsdale and Hayden Closed • Ramp traffic detoured to Legacy • WB Frontage Rd Closed		5-Days ***Traffic Model 1 & 2***
9	• Restripe EB SR 101L to shift lanes to outside • Reset EB TCB (inside) • Construct temp pavements EB outside • Set TCB on temp EB pavement • Continue construction of WB Frontage Rd bridge • Continue construction of WB anchor and approach slabs (outside)	• Close EB SR 101L and detour to Legacy • WB traffic in temp GPL travel lanes-1 HOV and 3 general (inside) • WB on and off ramps closed Hayden and Scottsdale • WB ramp traffic detoured to Legacy.		2-Day Weekend Closure (Friday 9p to Monday 5a) ***Traffic Model 3***

ALTERNATIVE TWO: BRIDGE SLIDE CONSTRUCTION ACTIVITY / MAINTENANCE OF TRAFFIC				
Phase #	**Construction Activity**	**Maintenance of Traffic**	**MOT Typical Section Detail**	**Duration (Calendar Days)**
10	• Open EB temp travel lanes • Construct EB anchor and approach slab (inside) • Continue construction of WB anchor and approach slabs • Continue construction of WB Frontage Rd bridge	• EB mainline traffic in temp travel lanes-1 HOV and 3 general (outside) • WB mainline traffic in temp travel lanes-1 HOV and 3 general (inside) • EB & WB on Ramp between Scottsdale and Hayden Closed • Ramp traffic detoured to Legacy • WB Frontage Rd Closed		5-Days ***Traffic Model 1&2***
11	• Restripe WB SR 101L to shift lanes to outside • Reset TCB WB (inside) • Construct temp pavement WB (outside) • Set TCB on temp WB pavement (outside) • Continue WB Frontage Rd construction	• Close WB SR 101L and detour to Legacy • EB traffic maintained in temp travel lanes-1 HOV and 3 general (outside) • WB on and off ramps open between Hayden and Scottsdale • WB Frontage Rd closed		2-Days Weekend Closure (Friday 9p to Monday 5a) ***Traffic Model 4***
12	• Open WB temp travel lanes • Construct WB anchor and approach slabs (inside) • Complete EB anchor and approach slab (inside) • Continue WB Frontage Rd construction	• EB & WB on/off ramps between Scottsdale and Hayden open • EB & WB mainline traffic in temp lane configuration 1 HOV and 3 general (outside) • WB Frontage Rd closed		5-Days ***Traffic model same as GPL***
13	• Remove TCB EB • Restripe EB SR 101L to shift lanes to GPL temp lane alignment • Construct EB bridge barrier (outside) • Continue WB Frontage Rd bridge construction • Remove temporary EB pavement	• Close EB SR 101L and detour to Legacy • WB traffic maintained in temp travel lanes-1 HOV and 3 general (outside) • WB Frontage Rd closed		2-Days Weekend Closure (Friday 9p to Monday 5a) ***Traffic Model 3***
14	• Open EB to GPL temp travel lane • Continue WB Frontage Rd bridge construction • Continue WB anchor and approach slabs (inside)	• EB traffic is maintained in the GPL temp travel lanes 1 HOV, 3 general, and 1 aux • WB traffic is maintained in temp travel lanes-1 HOV and 3 general (outside) • EB & WB on/off ramps between Scottsdale and Hayden open • WB Frontage Rd closed		5-Days ***Traffic model same as GPL***
15	• Remove TCB WB • Restripe WB SR 101L to shift lanes to GPL temp lane alignment • Construct bridge barrier WB (outside) • Continue WB Frontage Rd bridge construction • Remove temporary WB pavement	• Close WB SR 101L and detour to Legacy • EB traffic maintained in GPL temp travel lanes-1 HOV, 3 general, and 1 aux • EB on and off ramps open between Scottsdale and Hayden • WB Frontage Rd Closed		2-Days Weekend Closure (Friday 9p to Monday 5a) ***Traffic Model 4***
16	• Continue WB Frontage Rd bridge Construction	• WB Frontage Rd Closed • EB & WB traffic maintained in GPL temp travel lanes 1 HOV, 3 general, and 1 aux.		21-Days ***Traffic model same as GPL***
17	• Open WB to GPL temp travel lane • Open WB Frontage Rd Miller Bridge activities complete	• EB & WB traffic is maintained in the GPL temp travel lanes 1 HOV, 3 general, and 1 aux.		***Traffic model by GPL***

ALTERNATIVE THREE: BOX SLIDE CONSTRUCTION ACTIVITY / MAINTENANCE OF TRAFFIC				
Phase #	**Construction Activity**	**Maintenance of Traffic**	**MOT Typical Section Detail**	**Duration**
1	• Restripe EB SR 101L to narrow and shift lanes to the inside (By GPL) • Set EB Temp Concrete Barrier (TCB) (By GPL) • Install H Piles for future temporary shoring	• Close EB SR 101L and detour traffic to Legacy • Close EB on ramp at Scottsdale and off ramp at Hayden • WB traffic maintained in existing SR 101L travel lanes-1 HOV, 3 general, and 1 aux.		2-Days Weekend Closure (Friday 9p to Monday 5a) ***Traffic model by GPL***
2	• Open EB temp travel lanes • Start EB box construction off alignment	• EB on ramp at Scottsdale and off ramp at Hayden closed • EB traffic in temp GPL travel lanes-1 HOV and 3 general • WB traffic on existing travel lanes-1 HOV, 3 general, and 1 aux		5-Days ***Traffic model by GPL***
3	• Restripe WB SR 101L to narrow and shift lanes to the inside (By GPL) • Set WB TCB (By GPL) • Install H Piles for future temporary shoring	• Close WB SR 101L and detour to onto existing WB Frontage Rd • Close WB on ramp at Hayden and off ramp at Scottsdale • EB traffic maintained in temp travel lanes-1 HOV and 3 general		2-Days Weekend Closure (Friday 9p to Monday 5a) ***Traffic model by GPL***
4	• Continue construction of EB Box • Start construction of WB Box off alignment	• WB & EB on Ramp between Scottsdale and Hayden Closed • EB & WB mainline traffic in temp travel lanes-1 HOV and 3 general • All ramp traffic detoured to Legacy. • Close WB Frontage Rd		96 Days ***Traffic Models 1 & 2***
5	• Removal of median barrier • Slide EB box into final location • Construct temp pavement EB inside • Stripe temp pavement • Set TCB Inside for EB & WB • Continue WB box construction	• Close WB HOV to set TCB • Close EB SR 101L and detour to Legacy • WB traffic in temp travel lanes-3 general (inside) • WB on and off ramps closed Hayden and Scottsdale • WB Frontage Rd closed		2-Days Weekend Closure (Friday 9p to Monday 5a) ***Traffic Model 3 &8***
6	• Open EB temp travel lanes • Construct EB PCCP (outside)	• WB & EB on Ramp between Scottsdale and Hayden Closed • EB mainline traffic in temp travel lanes-3 general (inside) • WB mainline traffic in temp travel lanes-3 general (inside) • EB & WB HOV Closed • All ramp traffic detoured to Legacy		5-Days ***Traffic Model 1, 2, 6 & 7***
7	• Slide WB box into final location • Construct temp pavement WB inside • Stripe temporary pavement • Set WB TCB (outside) on temp pavement • Continue construction EB PCCP (outside) • Remove TCB WB (inside)	• Close WB SR 101L and detour to Legacy • EB traffic maintained in temp travel lanes-3 general • WB & EB on Ramp between Scottsdale and Hayden Closed • Ramp traffic detoured to Legacy • WB Frontage Rd closed		2-Days Weekend Closure (Friday 9p to Monday 5a) ***Traffic Model 4 & 8***
8	• Open WB temp travel lanes • Construct WB PCCP (outside) • Construct WB Frontage Rd pavement	• EB & WB mainline traffic in temp travel lanes-1 HOV and 3 general (inside) • EB & WB on Ramp between Scottsdale and Hayden Closed • Ramp traffic detoured to Legacy		5-Days ***Traffic Models 1 & 2***
9	• Construct temporary pavement EB (outside) • Stripe EB SR 101L to outside • Reset EB TCB (inside) • Open WB Frontage Rd	• Close EB SR 101L and detour to Legacy • WB traffic in temp GPL travel lanes-1 HOV and 3 general (inside) • WB on and off ramps closed Hayden and Scottsdale • WB ramp traffic detoured to WB Frontage Rd • WB Frontage Rd Open		2-Days Weekend Closure (Friday 9p to Monday 5a) ***Traffic Model 3***

ALTERNATIVE THREE: BOX SLIDE CONSTRUCTION ACTIVITY / MAINTENANCE OF TRAFFIC				
Phase #	**Construction Activity**	**Maintenance of Traffic**	**MOT Typical Section Detail**	**Duration**
10	• Open EB temp travel lanes (outside) • Construct EB PCCP (inside) • Continue construction of WB PCCP (outside)	• EB mainline traffic in temp travel lanes-1 HOV and 3 general (outside) • WB mainline traffic in temp travel lanes-1 HOV and 3 general (inside) • EB & WB on Ramp between Scottsdale and Hayden Closed • Ramp traffic detoured to Legacy • WB Frontage Rd Open		5 Days ***Traffic models same as GPL***
11	• Construct temporary pavement WB (outside) • Restripe WB SR 101L to shift lanes to outside • Reset TCB WB (inside & outside)	• Close WB SR 101L and detour to WB Frontage Rd • EB traffic maintained in temp travel lanes-1 HOV and 3 general (outside) • EB on and off ramps open between Hayden and Scottsdale		2-Day Weekend Closure (Friday 9p to Monday 5a) ***Traffic Model 5***
12	• WB open to traffic in temp lanes (outside) • Construct WB PCCP (inside) • Continue construction of EB PCCP (Inside) • Construct permanent median barrier	• EB & WB on/off ramps between Scottsdale and Hayden open • EB & WB mainline traffic in temp lane configuration 1 HOV and 3 general (outside) • WB Frontage Rd open		5-Days ***Traffic model same as GPL***
13	• Remove TCB EB • Remove EB temporary pavement • Restripe EB SR 101L to shift lanes to GPL temp lane alignment	• Close EB SR 101L and detour to Legacy • WB traffic maintained in temp travel lanes-1 HOV and 3 general (outside)		2-Day Weekend Closure (Friday 9p to Monday 5a) ***Traffic Model 5***
14	• Open EB to GPL travel lanes • Complete construction of EB PCCP (inside)	• EB traffic is maintained in the GPL temp travel lanes 1 HOV, 3 general, and 1 aux • WB traffic is maintained in temp travel lanes-1 HOV and 3 general (outside) • EB & WB on/off ramps between Scottsdale and Hayden open • WB Frontage Rd open		5-Day ***Traffic model same as GPL***
15	• Remove TCB WB • Remove WB temporary pavement • Restripe WB SR 101L to shift lanes to GPL temp lane alignment	• Close WB SR 101L and detour to WB Frontage Rd • EB traffic maintained in GPL temp travel lanes-1 HOV, 3 general, and 1 aux • EB on and off ramps open between Scottsdale and Hayden		2-Day Weekend Closure (Friday 9p to Monday 5a) ***Traffic Model 3***
16	• Open WB to GPL travel lanes • Miller Bridge activities complete	• EB & WB traffic is maintained in the GPL temp travel lanes 1 HOV, 3 general, and 1 aux.		0-days ***Traffic model by GPL***

ALTERNATIVE FOUR: PRECAST ARCH CONSTRUCTION ACTIVITY / MAINTENANCE OF TRAFFIC				
Phase #	**Construction Activity**	**Maintenance of Traffic**	**MOT Typical Section Detail**	**Duration**
1	• Restripe EB SR 101L to narrow and shift lanes to the inside (By GPL) • Set EB Temp Concrete Barrier (TCB) (By GPL) • Construct temporary shoring along EB SR 101L • Install H Piles for temporary shoring along Miller Road (EB Inside Lanes)	• Close EB SR 101L and detour traffic to Legacy • Close EB on ramp at Scottsdale and off ramp at Hayden • WB traffic maintained in existing SR 101L travel lanes-1 HOV, 3 general, and 1 aux.		2-Days Weekend Closure (Friday 9p to Monday 5a) ***Traffic model by GPL***
2	• Open EB travel lanes • Start outer EB Precast Arch construction	• EB on ramp at Scottsdale and off ramp at Hayden closed • EB traffic in temp GPL travel lanes-1 HOV and 3 general • WB traffic on existing travel lanes-1 HOV, 3 general, and 1 aux		5-Days ***Traffic model by GPL***
3	• Restripe WB SR 101L to narrow and shift lanes to the inside (By GPL) • Set WB TCB (By GPL) • Construct temporary shoring along EB SR 101L • Install H Piles for temporary shoring along Miller Road (EB Inside Lanes)	• Close WB SR 101L and detour to onto existing WB Frontage Rd • Close WB on ramp at Hayden and off ramp at Scottsdale • EB traffic maintained in temp travel lanes-1 HOV and 3 general		2-Days Weekend Closure (Friday 9p to Monday 5a) ***Traffic model by GPL***
4	• Open WB travel lanes • Construct EB PCCP (outside) • Continue construction of EB Precast Arch (outside) • Start construction of WB Precast Arch (outside)	• WB & EB on Ramp between Scottsdale and Hayden Closed • EB & WB mainline traffic in temp travel lanes-1 HOV and 3 general (inside) • All ramp traffic detoured to Legacy. • Close WB Frontage Rd		82-Days ***Traffic Models 1 & 2***
5	• Construct temp pavement EB outside • Set EB TCB (outside) on temp pavement • Stripe for EB SR 101L outside temp condition • Reset EB TCB (inside) • Complete construction of GPL PCCP EB	• Close EB SR 101L and detour to Legacy • WB traffic in temp travel lanes-1 HOV and 3 general (inside) • WB on and off ramps closed Hayden and Scottsdale • WB Frontage Rd Closed		2-Days Weekend Closure (Friday 9p to Monday 5a) ***Traffic Model 3***
6	• Open EB temp travel lanes • Construct Precast Arch EB (inside) • Continue construction of WB Precast Arch (outside) • Complete temporary shoring and excavation for EB SR 101L Precast Arch construction (inside) • Construct WB PCCP (outside)	• WB & EB on Ramp between Scottsdale and Hayden Closed • EB mainline traffic in temp travel lanes-3 general (outside) • WB mainline traffic in temp travel lanes-1 HOV and 3 general (inside) • All ramp traffic detoured to Legacy		5-Days ***Traffic Model 1, 2, & 6***
7	• Construct temp pavement WB outside • Set WB TCB (outside) on temp pavement • Reset WB TCB (inside) • Restripe for WB SR 101L temp striping • Construct EB Precast Arch (inside) • Complete construction of GPL PCCP WB	• Close WB SR 101L and detour to Legacy • EB traffic maintained in temp travel lanes-3 general (outside) • WB & EB on Ramp between Scottsdale and Hayden Closed • Ramp traffic detoured to Legacy		2-Days Weekend Closure (Friday 9p to Monday 5a) ***Traffic Model 4***
8	• Open WB temp travel lanes • Open WB Frontage Rd • Construct EB PCCP (inside) • Continue construction of EB Precast Arch (inside) • Construct WB precast arch (inside)	• EB & WB mainline traffic in temp travel lanes-3 general (outside) • EB & WB on Ramp between Scottsdale and Hayden Open • WB Frontage Rd open		12-Days ***Traffic model 6, 7, & 8***
9	• Stripe EB SR 101L to temporary GPL lane alignment • Remove TCB on temp pavement and inside • Remove temporary pavement	• Close EB SR 101L and detour to Legacy • WB traffic in temp travel lanes-3 general (outside) • WB Frontage Rd Open		2-Days Weekend Closure (Friday 9p to Monday 5a) ***Traffic Model 4 & 8***

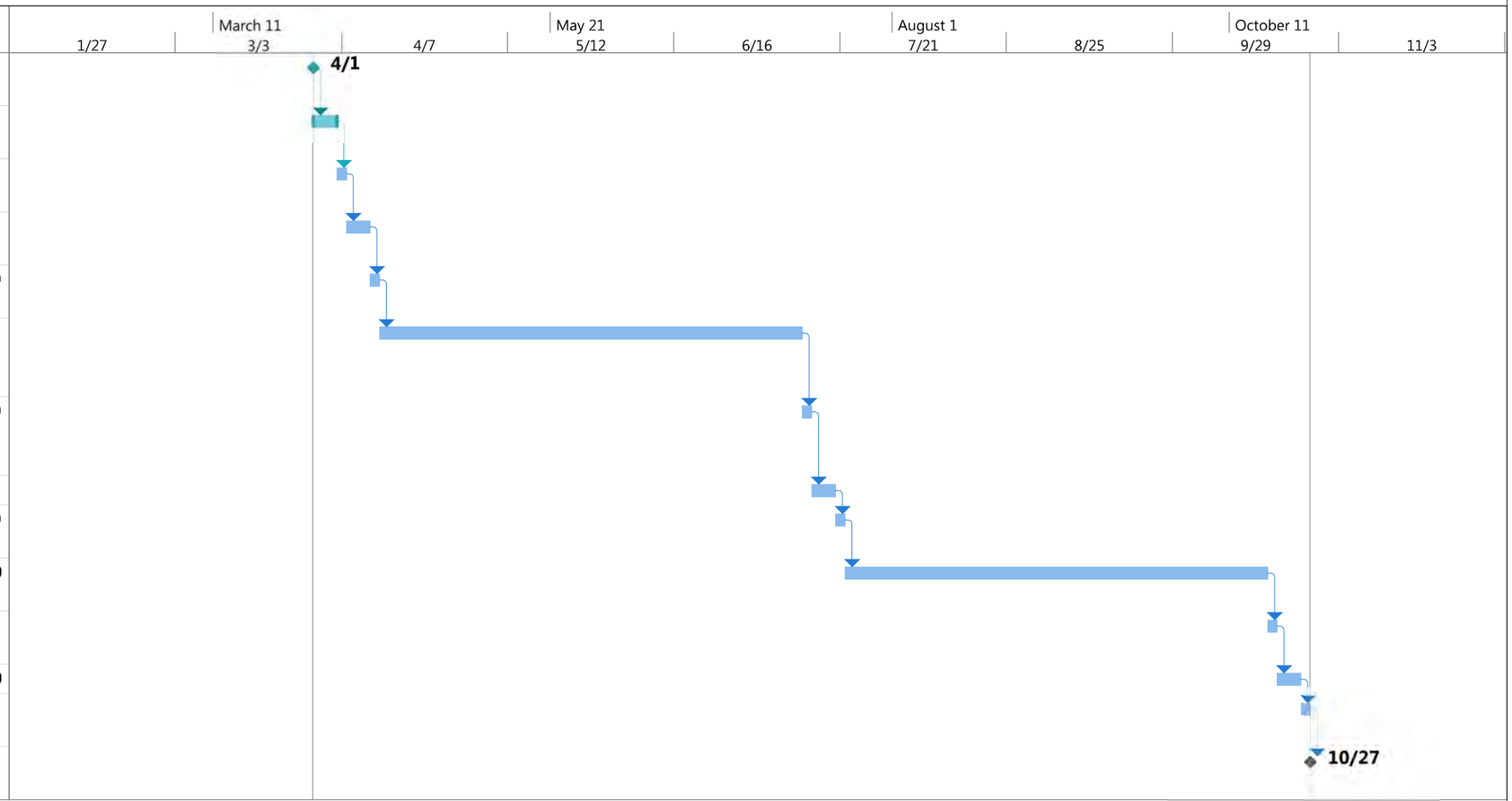
ALTERNATIVE FOUR: PRECAST ARCH CONSTRUCTION ACTIVITY / MAINTENANCE OF TRAFFIC				
Phase #	**Construction Activity**	**Maintenance of Traffic**	**MOT Typical Section Detail**	**Duration**
10	• Open EB to GPL temp travel lane alignment • Construct WB PCCP (inside)	• EB mainline traffic in temp GPL travel lanes-1 HOV, 3 general, and 1 aux • WB mainline traffic in temp travel lanes-3 general (outside) • WB Frontage Rd Open		5 Days ***Traffic Models 7***
11	• Restripe WB SR 101L to shift lanes to temp GPL lane alignment • Remove TCB • Remove temporary pavement	• Close WB SR 101L and detour to WB Frontage Rd • EB traffic maintained in GPL temp travel lanes-1 HOV, 3 general, 1 aux • WB on and off ramps open between Hayden and Scottsdale		2-Day Weekend Closure (Friday 9p to Monday 5a) ***Traffic Model 5***
12	• Open WB to GPL travel lanes Miller Bridge activities complete	• EB & WB traffic is maintained in the GPL temp travel lanes 1 HOV, 3 general, and 1 aux.		0-days ***Traffic model by GPL***

APPENDIX H

Construction Schedules

Alternative 1
Conventional Bridge

ID	Task Name	Duration	Start	Finish
1	Construction NTP	0 days	Mon 4/1/19	Mon 4/1/19
2	Mobilization	5 days	Mon 4/1/19	Fri 4/5/19
3	Phase 1 - EB Close / Restripe to Inside	2 days	Sat 4/6/19	Sun 4/7/19
4	Phase 2 - Start EB Bridge Const	5 days	Mon 4/8/19	Fri 4/12/19
5	Phase 3 - WB Close / Restripe to Inside	2 days	Sat 4/13/19	Sun 4/14/19
6	Phase 4 - Cont EB Bridge Const / Start WB Bridge Const / Start Frontage Road Bridge Const	89 days	Mon 4/15/19	Fri 7/12/19
7	Phase 5 - EB Close / Restripe to Outside / Finish Frontage Road Bridge Const	2 days	Sat 7/13/19	Sun 7/14/19
8	Phase 6 - Begin EB Median Cons	5 days	Mon 7/15/19	Fri 7/19/19
9	Phase 7 - WB Close / Restripe to Outside	2 days	Sat 7/20/19	Sun 7/21/19
10	Phase 8 - Cont EB Median Const / Start WB Median Const	89 days	Mon 7/22/19	Fri 10/18/19
11	Phase 9 - EB Close / Restripe to GPL Inside	2 days	Sat 10/19/19	Sun 10/20/19
12	Phase 10 - Finish WB Bridge	5 days	Mon 10/21/1	Fri 10/25/19
13	Phase 11 - WB Close / Restripe to GPL Inside	2 days	Sat 10/26/19	Sun 10/27/19
14	Phase 12 - Miller Crossing Const Complete	0 days	Sun 10/27/19	Sun 10/27/19



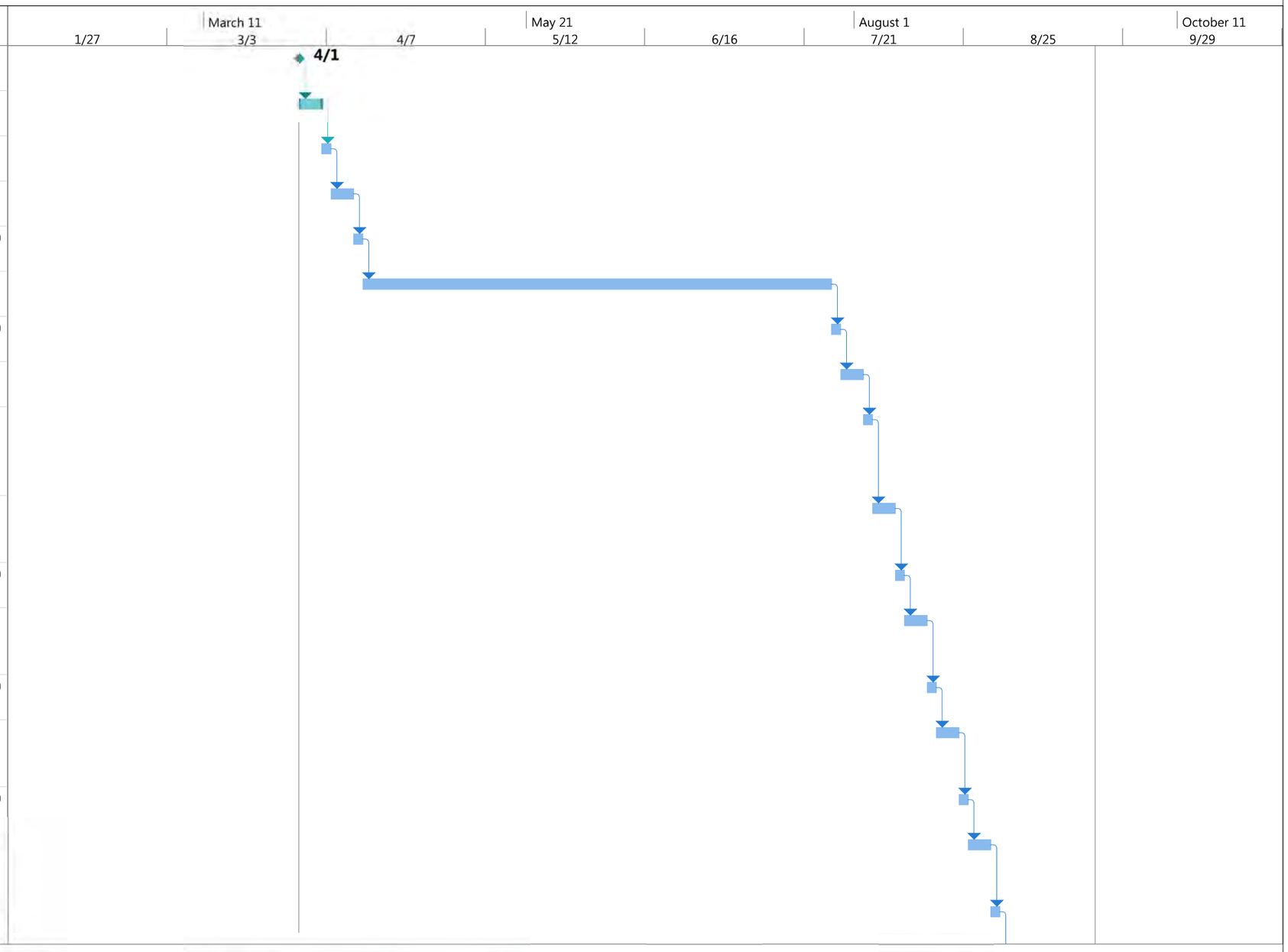
Project: Alt1_Conventional Brid
Date: Wed 6/21/17

Task	Project Summary	Manual Task	Start-only	Deadline
Split	Inactive Task	Duration-only	Finish-only	Progress
Milestone	Inactive Milestone	Manual Summary Rollup	External Tasks	Manual Progress
Summary	Inactive Summary	Manual Summary	External Milestone	

H01

Alternative 2
Bridge Slide

ID	Task Name	Duration	Start	Finish
1	Construction NTP	0 days	Mon 4/1/19	Mon 4/1/19
2	Mobilization	5 days	Mon 4/1/19	Fri 4/5/19
3	Phase 1 - EB Close / Restripe to Inside / Drilled Shafts	2 days	Sat 4/6/19	Sun 4/7/19
4	Phase 2 - Start EB Bridge Const	5 days	Mon 4/8/19	Fri 4/12/19
5	Phase 3 - WB Close / Restripe to Inside / Drilled Shafts	2 days	Sat 4/13/19	Sun 4/14/19
6	Phase 4 - Cont EB Bridge Const / Start WB Bridge Const	103 days	Mon 4/15/19	Fri 7/26/19
7	Phase 5 - EB Close / Slide Bridge	2 days	Sat 7/27/19	Sun 7/28/19
8	Phase 6 - Begin EB Outside Approach Slab	5 days	Mon 7/29/19	Fri 8/2/19
9	Phase 7 - WB Close / Slide Bridge / Begin Frontage Road Bridge Const / Cont EB Outside Approach Slab	2 days	Sat 8/3/19	Sun 8/4/19
10	Phase 8 - Finish EB Outside Approach Slab / Start WB Outside Approach Slab	5 days	Mon 8/5/19	Fri 8/9/19
11	Phase 9 - EB Close / Restripe to Outside	2 days	Sat 8/10/19	Sun 8/11/19
12	Phase 10 - Start EB Inside Approach Slab / Finish WB Outside Approach Slab	5 days	Mon 8/12/19	Fri 8/16/19
13	Phase 11 - WB Close / Restripe to Outside	2 days	Sat 8/17/19	Sun 8/18/19
14	Phase 12 - Start WB Inside Approach Slab / Finish EB Inside Approach Slab	5 days	Mon 8/19/19	Fri 8/23/19
15	Phase 13 - EB Close / Restripe to GPL Inside	2 days	Sat 8/24/19	Sun 8/25/19
16	Phase 14 - Cont Frontage Road Bridge Const / Finish WB Inside Approach Slab	5 days	Mon 8/26/19	Fri 8/30/19
17	Phase 15 - WB Close / Restripe to GPL Inside	2 days	Sat 8/31/19	Sun 9/1/19



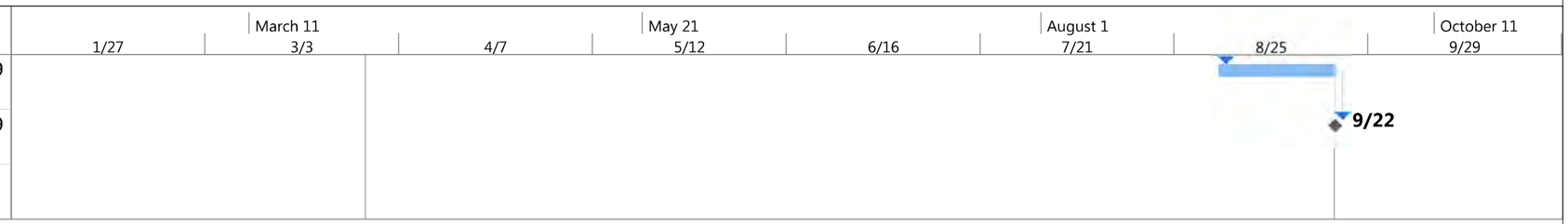
Project: Alt2_Bridge Slide.mpp
Date: Wed 6/21/17

Task
Split
Milestone
Summary
Project Summary
Inactive Task
Inactive Milestone
Inactive Summary
Manual Task
Duration-only
Manual Summary Rollup
Manual Summary
Start-only
Finish-only
External Tasks
External Milestone
Deadline
Progress
Manual Progress

H02

Alternative 2
Bridge Slide

ID	Task Name	Duration	Start	Finish
18	Phase 16 - Finish Frontage Road Bridge Const	21 days	Mon 9/2/19	Sun 9/22/19
19	Phase 17 - Miller Crossing Const Complete	0 days	Sun 9/22/19	Sun 9/22/19
20				



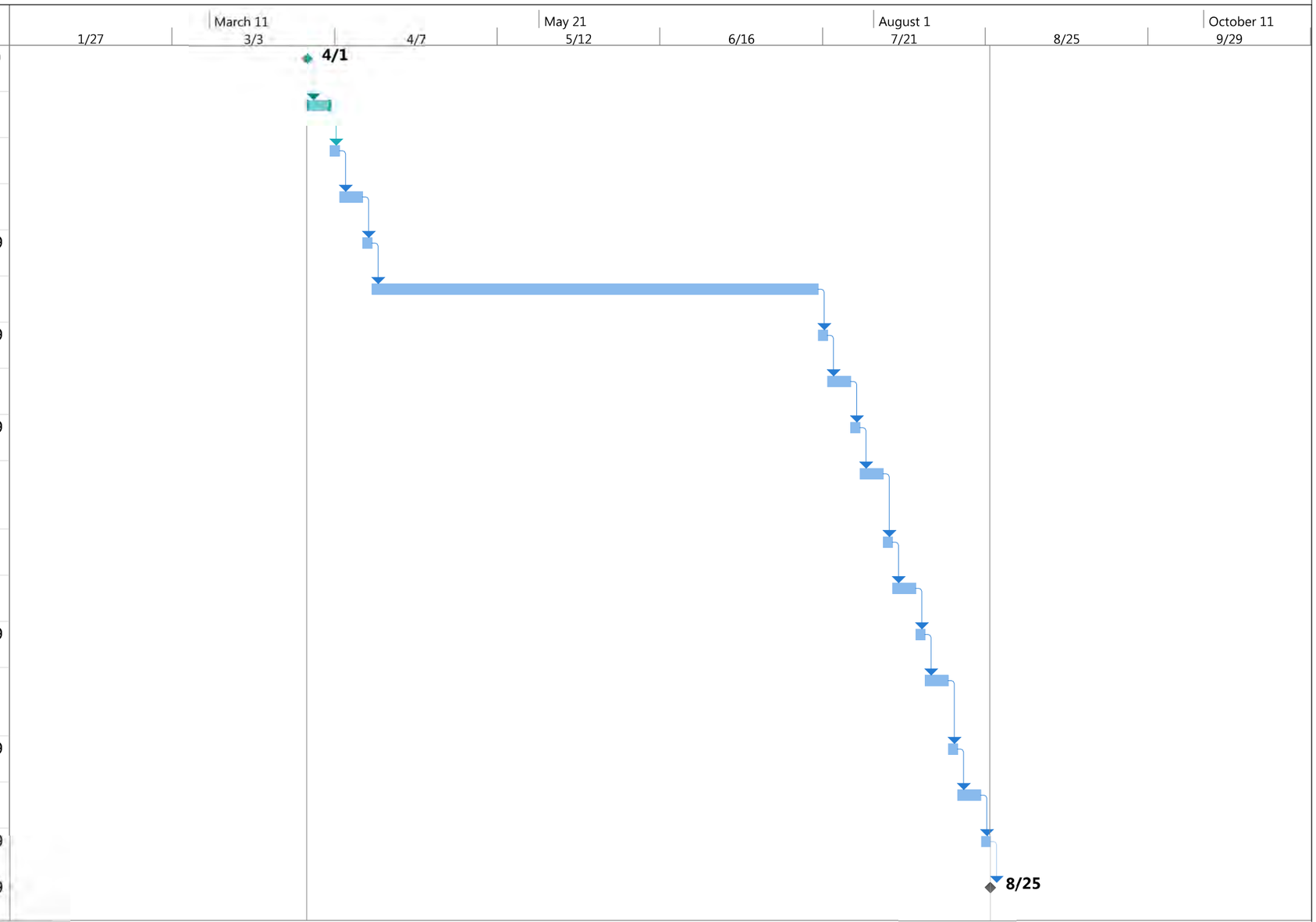
Project: Alt2_Bridge Slide.mpp
Date: Wed 6/21/17

Task	Project Summary	Manual Task	Start-only	Deadline	
Split	Inactive Task	Duration-only	Finish-only	Progress	
Milestone	Inactive Milestone	Manual Summary Rollup	External Tasks	Manual Progress	
Summary	Inactive Summary	Manual Summary	External Milestone		

H03

Alternative 3
Box Slide

ID	Task Name	Duration	Start	Finish
1	Construction NTP	0 days	Mon 4/1/19	Mon 4/1/19
2	Mobilization	5 days	Mon 4/1/19	Fri 4/5/19
3	Phase 1 - EB Close / Restripe to Inside / Shoring	2 days	Sat 4/6/19	Sun 4/7/19
4	Phase 2 - Start EB Box Const	5 days	Mon 4/8/19	Fri 4/12/19
5	Phase 3 - WB Close / Restripe to Inside / Shoring	2 days	Sat 4/13/19	Sun 4/14/19
6	Phase 4 - Cont EB Box Const / Start WB Box Const	96 days	Mon 4/15/19	Fri 7/19/19
7	Phase 5 - EB Close / Slide Box	2 days	Sat 7/20/19	Sun 7/21/19
8	Phase 6 - Begin EB PCCP Replacement	5 days	Mon 7/22/19	Fri 7/26/19
9	Phase 7 - WB Close / Slide Box	2 days	Sat 7/27/19	Sun 7/28/19
10	Phase 8 - Cont EB PCCP Replacement / Start WB PCCP Replacement	5 days	Mon 7/29/19	Fri 8/2/19
11	Phase 9 - EB Close / Restripe to Outside	2 days	Sat 8/3/19	Sun 8/4/19
12	Phase 10 - Finish EB PCCP Replacement	5 days	Mon 8/5/19	Fri 8/9/19
13	Phase 11 - WB Close / Restripe to Outside	2 days	Sat 8/10/19	Sun 8/11/19
14	Phase 12 - Finish EB PCCP Replacement / Cont WB PCCP Replacement	5 days	Mon 8/12/19	Fri 8/16/19
15	Phase 13 - EB Close / Restripe to GPL Inside	2 days	Sat 8/17/19	Sun 8/18/19
16	Phase 14 - Finish WB PCCP Replacement	5 days	Mon 8/19/19	Fri 8/23/19
17	Phase 15 - WB Close / Restripe to GPL Inside	2 days	Sat 8/24/19	Sun 8/25/19
18	Phase 16 - Miller Crossing Const Complete	0 days	Sun 8/25/19	Sun 8/25/19



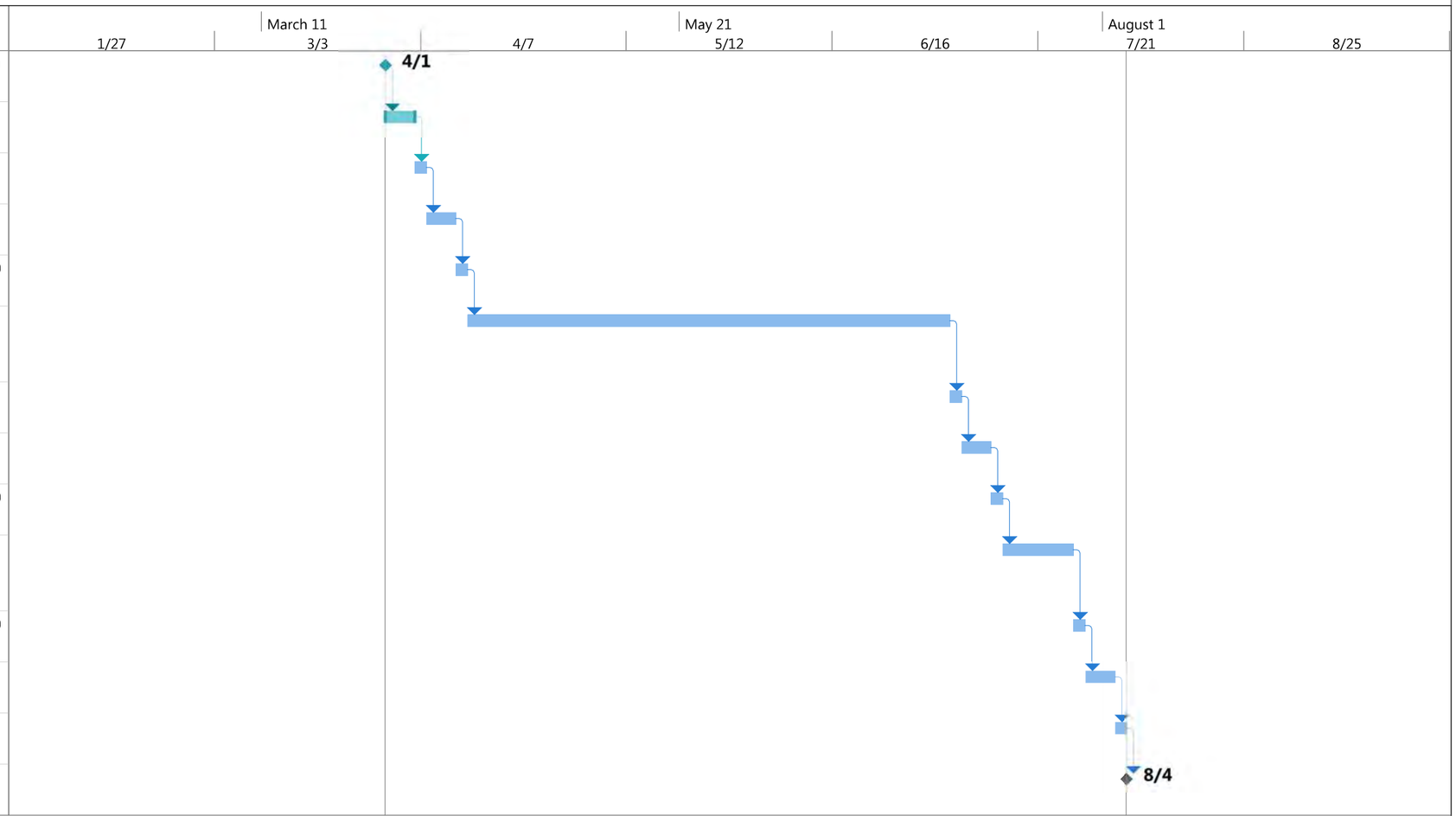
Project: Alt3_Box Slide.mpp
Date: Wed 6/21/17

Task
Split
Milestone
Summary
Project Summary
Inactive Task
Inactive Milestone
Inactive Summary
Manual Task
Duration-only
Manual Summary Rollup
Manual Summary
Start-only
Finish-only
External Tasks
External Milestone
Deadline
Progress
Manual Progress

H04

Alternative 4
Arch

ID	Task Name	Duration	Start	Finish
1	Construction NTP	0 days	Mon 4/1/19	Mon 4/1/19
2	Mobilization	5 days	Mon 4/1/19	Fri 4/5/19
3	Phase 1 - EB Close/Restripe to Inside/Shoring	2 days	Sat 4/6/19	Sun 4/7/19
4	Phase 2 - Start EB Arch Const	5 days	Mon 4/8/19	Fri 4/12/19
5	Phase 3 - WB Close/Restripe to Inside/Shoring	2 days	Sat 4/13/19	Sun 4/14/19
6	Phase 4 - Cont EB Arch Const / Start WB Arch Const / Complete Outside PCCP	82 days	Mon 4/15/19	Fri 7/5/19
7	Phase 5 - EB Close/Restripe to Outside	2 days	Sat 7/6/19	Sun 7/7/19
8	Phase 6 - Cont EB Arch Const	5 days	Mon 7/8/19	Fri 7/12/19
9	Phase 7 - WB Close/Restripe to Outside	2 days	Sat 7/13/19	Sun 7/14/19
10	Phase 8 - Finish EB Arch Const / Cont WB Arch Const / Replace PCCP	12 days	Mon 7/15/19	Fri 7/26/19
11	Phase 9 - EB Close/Restripe to GPL Inside	2 days	Sat 7/27/19	Sun 7/28/19
12	Phase 10 - Finish WB Arch and PCCP Const	5 days	Mon 7/29/19	Fri 8/2/19
13	Phase 11 - WB Close/Restripe to Inside GPL	2 days	Sat 8/3/19	Sun 8/4/19
14	Phase 12 - Miller Crossing Const Complete	0 days	Sun 8/4/19	Sun 8/4/19



Project: Alt4_Arch Structure.mp
Date: Wed 6/21/17

Task	Project Summary	Manual Task	Start-only	Deadline
Split	Inactive Task	Duration-only	Finish-only	Progress
Milestone	Inactive Milestone	Manual Summary Rollup	External Tasks	Manual Progress
Summary	Inactive Summary	Manual Summary	External Milestone	

H05

APPENDIX

Cost Estimates

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CITY OF SCOTTSDALE

Miller Road/SR 101L Construction Alternatives Analysis
ITEMIZED COST ESTIMATE

Project Location: Miller Road/SR 101L Construction Alternatives Analysis
COS Project No.: 2017-029-COS
Alternative: Alt 1 - CIP Bridge-Conventional

						FNF ESTIMATE			UPDATED ESTIMATE	
ITEM NO	ITEM DESCRIPTION	UNIT	QUANTITY	UNIT PRICE	AMOUNT	UNIT PRICE	AMOUNT	DIFFERENCE	UNIT PRICE	AMOUNT
2010011	CLEARING AND GRUBBING	ACRE	6	$1,500.00	$9,107	$1,000.00	$6,071	$3,036	$1,250.00	$7,589
2020021	REMOVAL OF CONCRETE CURB AND GUTTER	L.FT.	809	$3.00	$2,427	$6.00	$4,854	($2,427)	$4.50	$3,641
2020023	REMOVE EXISTING CONCRETE MEDIAN BARRIER	L.FT.	234	$30.00	$7,033	$20.00	$4,689	$2,344	$25.00	$5,861
2020025	REMOVAL OF CONCRETE SIDEWALKS, DRIVEWAYS AND SLABS	SQ.FT.	1,995	$1.50	$2,992	$1.50	$2,992	$0	$1.50	$2,992
2020029	REMOVAL OF ASPHALTIC CONCRETE PAVEMENT	SQ.YD.	5,290	$2.50	$13,225	$2.50	$13,225	$0	$2.50	$13,225
2020031	REMOVAL OF PORTLAND CEMENT CONCRETE PAVEMENT	SQ.YD.	3,669	$9.00	$33,025	$17.00	$62,381	($29,356)	$10.00	$36,695
2020100	REMOVE FENCE (72")	L.FT.	649	$2.00	$1,299	$3.00	$1,948	($649)	$2.50	$1,623
2020101	REMOVE FENCE	L.FT.	600	$1.00	$600	$3.00	$1,800	($1,200)	$2.00	$1,200
2020201	SAW CUTTING	L.FT.	1,316	$1.50	$1,973	$10.00	$13,157	($11,184)	$3.00	$3,947
2030301	ROADWAY EXCAVATION	CU.YD.	9,406	$7.00	$65,840	$11.00	$103,462	($37,622)	$11.00	$103,462
4010012	PORTLAND CEMENT CONCRETE PAVEMENT (12")	SQ.YD.	343	$32.00	$10,990	$45.00	$15,455	($4,465)	$38.50	$13,222
4090006	ASPHALTIC CONCRETE (MISCELLANEOUS STRUCTURAL) (SPECIAL M	TON	1,381	$120.00	$165,751	$70.00	$96,688	$69,063	$100.00	$138,126
6080101	MISCELLANEOUS WORK (SIGNS)	L.SUM	1	$10,000.00	$10,000	$5,000.00	$5,000	$5,000	$7,500.00	$7,500
7015010	TEMPORARY CONCRETE BARRIER (INSTALLATION AND REMOVAL)	L.FT.	13,524	$10.00	$135,240	$6.00	$81,144	$54,096	$7.00	$94,668
7015020	TEMPORARY IMPACT ATTENUATORS (INSTALLATION AND REMOVAL	EACH	8	$2,000.00	$16,000	$700.00	$5,600	$10,400	$1,500.00	$12,000
7015042	TEMPORARY PAINTED MARKING (STRIPE)	L.FT.	67,243	$0.20	$13,449	$0.30	$20,173	($6,724)	$0.25	$16,811
7015091	SPECIALTY SIGNS	SQ.FT.	715	$16.00	$11,440	$20.00	$14,300	($2,860)	$18.00	$12,870
7016020	TEMPORARY CONCRETE BARRIER (IN USE)	L.FT./DAY	676,200	$0.05	$33,810	$0.03	$20,286	$13,524	$0.04	$27,048
7016021	TEMPORARY IMPACT ATTENUATORS (IN -USE)	EACH-DAY	400	$24.00	$9,600	$20.00	$8,000	$1,600	$22.00	$8,800
7016030	BARRICADE (TYPE II, VERT.PANEL, TUBULAR MARKER)	EACH-DAY	6,640	$0.60	$3,984	$0.12	$797	$3,187	$0.25	$1,660
7016031	BARRICADE (TYPE III, HIGH LEVEL FLAG TREES)	EACH-DAY	66	$0.90	$59	$0.25	$17	$42	$0.50	$33
7016032	PORTABLE SIGN STANDS (RIGID)	EACH-DAY	75	$0.70	$53	$0.30	$23	$30	$0.50	$38
7016033	PORTABLE SIGN STANDS (SPRING TYPE)	EACH-DAY	1,117	$1.25	$1,396	$0.25	$279	$1,117	$0.60	$670
7016035	WARNING LIGHTS (TYPE A)	EACH-DAY	1,310	$0.30	$393	$0.10	$131	$262	$0.20	$262
7016037	WARNING LIGHTS (TYPE C)	EACH-DAY	2,212	$0.80	$1,770	$0.12	$265	$1,505	$0.40	$885
7016051	TEMPORARY SIGN (LESS THAN 10 S.F.)	EACH-DAY	309	$0.50	$155	$0.12	$37	$118	$0.50	$155
7016052	TEMPORARY SIGN (10 S.F. OR MORE)	EACH-DAY	859	$0.70	$601	$0.25	$215	$386	$0.70	$601
7016061	FLASHING ARROW PANEL	EACH-DAY	24	$35.00	$840	$12.00	$288	$552	$20.00	$480
7016078	FLAGGING SERVICES (LOCAL ENFORCEMENT OFFICER)	HOUR	1,520	$60.00	$91,200	$67.00	$101,840	($10,640)	$63.50	$96,520
7016080	FLAGGING SERVICES (DPS)	HOUR	1,520	$65.26	$99,195	$65.26	$99,195	$0	$65.26	$99,195
7020007	IMPACT ATTENUATION DEVICE (CRASH CUSHION)	EACH	2	$20,000.00	$40,000	$15,000.00	$30,000	$10,000	$17,500.00	$35,000
7041501	PAVEMENT MARKINGS	L.SUM	1	$5,000.00	$5,000	$5,000.00	$5,000	$0	$5,000.00	$5,000
7320293	ELECTRICAL CONDUIT (3-3") (PVC)	L.FT.	1,080	$50.00	$54,000	$20.00	$21,600	$32,400	$35.00	$37,800
7320456	PULL BOX (NO. 9)	EACH	4	$2,800.00	$11,200	$2,500.00	$10,000	$1,200	$2,650.00	$10,600
7379044	TEMPORARY LIGHTING AND POWER	L.SUM	1	$20,000.00	$20,000	$5,000.00	$5,000	$15,000	$12,500.00	$12,500
8030092	GRANITE MULCH (1 1/4" MINUS)	SQ.YD.	29,385	$2.00	$58,769	$2.50	$73,461	($14,692)	$2.25	$66,115
8080384	PIPE (PVC) (3") (SCHEDULE 40)	L.FT.	374	$3.25	$1,217	$7.00	$2,621	($1,404)	$7.00	$2,621
9020002	CHAIN LINK FENCE, TYPE 1 (48")	L.FT.	387	$20.00	$7,732	$10.00	$3,866	$3,866	$20.00	$7,732
9020004	CHAIN LINK FENCE, TYPE 1 (72")	L.FT.	649	$40.00	$25,972	$12.00	$7,792	$18,180	$30.00	$19,479
9040001	CHAIN LINK CABLE BARRIER	L.FT.	50	$100.00	$5,000	$100.00	$5,000	$0	$100.00	$5,000
9080086	CONCRETE CURB AND GUTTER (C-05.10, TYPE D)	L.FT.	248	$12.00	$2,979	$15.00	$3,724	($745)	$13.50	$3,352
9080201	CONCRETE SIDEWALK (C-05.20)	SQ.FT.	351	$7.00	$2,455	$3.00	$1,052	$1,403	$7.00	$2,455
9100008	CONCRETE BARRIER (C-10.52 WITH 2.5' GUTTER)	L.FT.	326	$45.00	$14,670	$40.00	$13,040	$1,630	$42.50	$13,855
9100201	CONCRETE MEDIAN BARRIER	L.FT.	20	$40.00	$800	$150.00	$3,000	($2,200)	$150.00	$3,000
9240111	MISCELLANEOUS WORK (CONCRETE PARAPET WITH SIDEWALK)	L.FT.	135	$270.00	$36,450	$265.00	$35,775	$675	$267.50	$36,113
				Civil Subtotal	**$1,029,691**		**$905,243**	**$124,448**		**$972,401**

Kimley»Horn

CITY OF SCOTTSDALE

Miller Road/SR 101L Construction Alternatives Analysis
ITEMIZED COST ESTIMATE

Project Location: Miller Road/SR 101L Construction Alternatives Analysis
COS Project No.: 2017-029-COS
Alternative: Alt 1 - CIP Bridge-Conventional

ITEM NO	ITEM DESCRIPTION	UNIT	QUANTITY	UNIT PRICE	AMOUNT	FNF ESTIMATE UNIT PRICE	FNF ESTIMATE AMOUNT	DIFFERENCE	UPDATED ESTIMATE UNIT PRICE	UPDATED ESTIMATE AMOUNT
STRUCTURES										
MILLER RD OP EB BRIDGE										
2030501	STRUCTURAL EXCAVATION	CU.YD.	2,040	$40.00	$81,600	$30.00	$61,200	$20,400	$20.00	$40,800
2030506	STRUCTURE BACKFILL	CU.YD.	224	$45.00	$10,080	$50.00	$11,200	($1,120)	$47.50	$10,640
6010003	STRUCTURAL CONCRETE (CLASS S) (F'C = 3,500)	CU.YD.	306	$350.00	$107,100	$400.00	$122,400	($15,300)	$375.00	$114,750
6010005	STRUCTURAL CONCRETE (CLASS S) (F'C = 4,500)	CU.YD.	577	$450.00	$259,650	$450.00	$259,650	$0	$450.00	$259,650
6011140	F-SHAPE BRIDGE CONCRETE BARRIER AND TRANSITION (34")	L.FT.	215	$70.00	$15,050	$80.00	$17,200	($2,150)	$75.00	$16,125
6011141	F-SHAPE BRIDGE CONCRETE BARRIER AND TRANSITION (44")	L.FT.	215	$75.00	$16,125	$95.00	$20,425	($4,300)	$85.00	$18,275
6011347	DECK JOINT ASSEMBLY (3X3 COMPRESSION SEAL)	L.FT.	94	$250.00	$23,500	$200.00	$18,800	$4,700	$225.00	$21,150
6011371	APPROACH SLAB (SD 2.01)	SQ.FT.	2,893	$25.00	$72,325	$16.00	$46,288	$26,037	$25.00	$72,325
6011373	ANCHOR SLAB (TYPE 2) (SD 2.03)	SQ.FT.	8,678	$30.00	$260,340	$18.00	$156,204	$104,136	$20.00	$173,560
6015101	RESTRAINERS, VERTICAL EARTHQUAKE (FIXED)	EACH	9	$100.00	$900	$100.00	$900	$0	$100.00	$900
6015102	RESTRAINERS, VERTICAL EARTHQUAKE (EXPANSION)	EACH	9	$200.00	$1,800	$150.00	$1,350	$450	$175.00	$1,575
6020001	PRESTRESSING CAST-IN-PLACE CONCRETE- STA (1884+75)	L.SUM	1	$50,000.00	$50,000	$50,000.00	$50,000	$0	$50,000.00	$50,000
6050002	REINFORCING STEEL	LB.	184,090	$1.15	$211,704	$0.70	$128,863	$82,841	$0.85	$156,477
6090060	DRILLED SHAFT FOUNDATION (60")	L.FT.	610	$350.00	$213,500	$300.00	$183,000	$30,500	$325.00	$198,250
				MILLER RD OP EB BRIDGE Subtotal	$1,323,674		$1,077,480	$246,194		$1,134,477
MILLER RD OP WB BRIDGE										
2030501	STRUCTURAL EXCAVATION	CU.YD.	2,049	$40.00	$81,960	$30.00	$61,470	$20,490	$20.00	$40,980
2030506	STRUCTURE BACKFILL	CU.YD.	207	$45.00	$9,315	$50.00	$10,350	($1,035)	$47.50	$9,833
6010003	STRUCTURAL CONCRETE (CLASS S) (F'C = 3,500)	CU.YD.	293	$350.00	$102,550	$400.00	$117,200	($14,650)	$375.00	$109,875
6010005	STRUCTURAL CONCRETE (CLASS S) (F'C = 4,500)	CU.YD.	577	$450.00	$259,650	$450.00	$259,650	$0	$450.00	$259,650
6011140	F-SHAPE BRIDGE CONCRETE BARRIER AND TRANSITION (34")	L.FT.	215	$70.00	$15,050	$80.00	$17,200	($2,150)	$75.00	$16,125
6011141	F-SHAPE BRIDGE CONCRETE BARRIER AND TRANSITION (44")	L.FT.	215	$75.00	$16,125	$95.00	$20,425	($4,300)	$85.00	$18,275
6011347	DECK JOINT ASSEMBLY (3X3 COMPRESSION SEAL)	L.FT.	94	$250.00	$23,500	$200.00	$18,800	$4,700	$225.00	$21,150
6011371	APPROACH SLAB (SD 2.01)	SQ.FT.	2,893	$25.00	$72,325	$16.00	$46,288	$26,037	$25.00	$72,325
6011373	ANCHOR SLAB (TYPE 2) (SD 2.03)	SQ.FT.	8,678	$30.00	$260,340	$18.00	$156,204	$104,136	$20.00	$173,560
6015101	RESTRAINERS, VERTICAL EARTHQUAKE (FIXED)	EACH	9	$100.00	$900	$100.00	$900	$0	$100.00	$900
6015102	RESTRAINERS, VERTICAL EARTHQUAKE (EXPANSION)	EACH	9	$200.00	$1,800	$150.00	$1,350	$450	$175.00	$1,575
6020001	PRESTRESSING CAST-IN-PLACE CONCRETE- STA (1884+75)	L.SUM	1	$50,000.00	$50,000	$50,000.00	$50,000	$0	$50,000.00	$50,000
6050002	REINFORCING STEEL	LB.	181,640	$1.15	$208,886	$0.70	$127,148	$81,738	$0.85	$154,394
6090060	DRILLED SHAFT FOUNDATION (60")	L.FT.	610	$350.00	$213,500	$300.00	$183,000	$30,500	$325.00	$198,250
9140153	RETAINING WALL (SOIL NAIL WALL)	SQ.FT.	559	$45.00	$25,155	$60.00	$33,540	($8,385)	$52.50	$29,348
				MILLER RD OP WB BRIDGE Subtotal	$1,341,056		$1,103,525	$237,531		$1,156,240
FRONTAGE RD OP BRIDGE										
2030501	STRUCTURAL EXCAVATION	CU.YD.	925	$40.00	$37,000	$20.00	$18,500	$18,500	$20.00	$18,500
2030506	STRUCTURE BACKFILL	CU.YD.	101	$45.00	$4,545	$50.00	$5,050	($505)	$47.50	$4,798
6010003	STRUCTURAL CONCRETE (CLASS S) (F'C = 3,500)	CU.YD.	135	$350.00	$47,250	$400.00	$54,000	($6,750)	$375.00	$50,625
6010005	STRUCTURAL CONCRETE (CLASS S) (F'C = 4,500)	CU.YD.	242	$450.00	$108,900	$450.00	$108,900	$0	$450.00	$108,900
6011132	COMBINATION PEDESTRIAN-TRAFFIC BRIDGE RAILING	L.FT.	124	$250.00	$31,000	$150.00	$18,600	$12,400	$200.00	$24,800
6011140	F-SHAPE BRIDGE CONCRETE BARRIER AND TRANSITION (34")	L.FT.	124	$70.00	$8,680	$100.00	$12,400	($3,720)	$85.00	$10,540
6011347	DECK JOINT ASSEMBLY (3X3 COMPRESSION SEAL)	L.FT.	38	$250.00	$9,500	$150.00	$5,700	$3,800	$200.00	$7,600
6011371	APPROACH SLAB (SD 2.01)	SQ.FT.	1,218	$25.00	$30,450	$17.00	$20,706	$9,744	$21.00	$25,578
6015101	RESTRAINERS, VERTICAL EARTHQUAKE (FIXED)	EACH	4	$100.00	$400	$100.00	$400	$0	$100.00	$400
6015102	RESTRAINERS, VERTICAL EARTHQUAKE (EXPANSION)	EACH	4	$200.00	$800	$150.00	$600	$200	$175.00	$700
6020001	PRESTRESSING CAST-IN-PLACE CONCRETE- STA (1884+75)	L.SUM	1	$25,000.00	$25,000	$25,000.00	$25,000	$0	$25,000.00	$25,000
6050002	REINFORCING STEEL	LB.	78,800	$1.15	$90,620	$0.80	$63,040	$27,580	$0.85	$66,980
6090060	DRILLED SHAFT FOUNDATION (60")	L.FT.	350	$350.00	$122,500	$320.00	$112,000	$10,500	$335.00	$117,250
				FRONTAGE RD OP BRIDGE Subtotal	$516,645		$444,896	$71,749		$461,671
				Structures Subtotal	$3,181,375		$2,625,901	$555,474		$2,752,388
				Civil and Structures Subtotal	$4,211,066		$3,531,144	$679,922		$3,724,789

Kimley»Horn

CITY OF SCOTTSDALE

Miller Road/SR 101L Construction Alternatives Analysis
ITEMIZED COST ESTIMATE

Project Location: Miller Road/SR 101L Construction Alternatives Analysis
COS Project No.: 2017-029-COS
Alternative: Alt 1 - CIP Bridge-Conventional

ITEM NO	ITEM DESCRIPTION	UNIT	QUANTITY	UNIT PRICE	AMOUNT	FNF ESTIMATE UNIT PRICE	FNF ESTIMATE AMOUNT	DIFFERENCE	UPDATED ESTIMATE UNIT PRICE	UPDATED ESTIMATE AMOUNT
101 GPL CONSTRUCTION DEDUCTIONS										
2020021	REMOVAL OF CONCRETE CURB AND GUTTER	L.FT.	469	$3.00	-$1,406	$6.00	-$2,812	$1,406	$4.50	-$2,109
4010012	PORTLAND CEMENT CONCRETE PAVEMENT (12")	SQ.YD.	729	$32.00	-$23,329	$45.00	-$32,807	$9,478	$38.50	-$28,068
9100008	CONCRETE BARRIER (C-10.52 WITH 2.5' GUTTER)	L.FT.	469	$45.00	-$21,090	$40.00	-$18,746	($2,344)	$42.50	-$19,918
				Deductions Subtotal	**($45,825)**		**-$54,365**	**$8,540**		**($50,095)**
				Project Subtotal	**$4,165,241**		**$3,476,779**	**$688,462**		**$3,674,694**
PROJECT WIDE										
	Unidentified Item Allowance (15%)				$ 624,800		$521,600	$103,200		$551,300
				Project Wide Subtotal	**$4,790,041**		**$3,998,379**	**$791,662**		**$4,225,994**
	Water Supply/Dust Palliative (2%)				$ 95,900		$80,000	$15,900		$84,600
	Erosion Control (1%)				$ 48,000		$40,000	$8,000		$42,300
	Contractor Quality Control (2%)				$ 95,900		$80,000	$15,900		$84,600
	Construction Surveying And Layout (2%)				$ 95,900		$80,000	$15,900		$84,600
				Subtotal	**$5,125,741**		**$4,278,379**	**$847,362**		**$4,522,094**
	Mobilization (10%)				$ 512,600		$427,900	$84,700		$452,300
				Project Wide Total	**$ 5,638,341**		**$4,706,279**	**$932,062**		**$4,974,394**
OTHER COST										
	PCCP Quality Incentive ($1.50 per SY)				$ 515		$515	$0		$515
	Construction Engineering and Contingencies (15%)				$ 845,800		$706,000	$139,800		$746,200
	Ergineering Design (8%)				$ 451,100		$376,600	$74,500		$398,000
	TOTAL Miller Road/SR 101L Construction Alternatives Analysis ALT 1 COST				**$ 6,936,000**		**$5,790,000**	**$1,146,000**		**$6,120,000**

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Miller Road/SR 101L Construction Alternatives Analysis
ITEMIZED COST ESTIMATE

Project Location: Miller Road/SR 101L Construction Alternatives Analysis
COS Project No.: 2017-029-COS
Alternative: Alt 1A - CIP Bridge-Conventional

ITEM NO	ITEM DESCRIPTION	UNIT	QUANTITY	UNIT PRICE	AMOUNT	FNF ESTIMATE UNIT PRICE	FNF ESTIMATE AMOUNT	DIFFERENCE	UPDATED ESTIMATE UNIT PRICE	UPDATED ESTIMATE AMOUNT
2010011	CLEARING AND GRUBBING	ACRE	6	$1,500.00	$9,107	$1,000.00	$6,071	$3,036	$1,250.00	$7,589
2020021	REMOVAL OF CONCRETE CURB AND GUTTER	L.FT.	809	$3.00	$2,427	$6.00	$4,854	($2,427)	$4.50	$3,641
2020023	REMOVE EXISTING CONCRETE MEDIAN BARRIER	L.FT.	234	$30.00	$7,033	$20.00	$4,689	$2,344	$25.00	$5,861
2020025	REMOVAL OF CONCRETE SIDEWALKS, DRIVEWAYS AND SLABS	SQ.FT.	1,995	$1.50	$2,992	$1.50	$2,992	$0	$1.50	$2,992
2020029	REMOVAL OF ASPHALTIC CONCRETE PAVEMENT	SQ.YD.	5,290	$2.50	$13,225	$2.50	$13,225	$0	$2.50	$13,225
2020031	REMOVAL OF PORTLAND CEMENT CONCRETE PAVEMENT	SQ.YD.	3,669	$9.00	$33,025	$17.00	$62,381	($29,356)	$10.00	$36,695
2020100	REMOVE FENCE (72")	L.FT.	649	$2.00	$1,299	$3.00	$1,948	($649)	$2.50	$1,623
2020101	REMOVE FENCE	L.FT.	600	$1.00	$600	$3.00	$1,800	($1,200)	$2.00	$1,200
2020201	SAW CUTTING	L.FT.	1,316	$1.50	$1,973	$10.00	$13,157	($11,184)	$3.00	$3,947
2030301	ROADWAY EXCAVATION	CU.YD.	19,937	$10.00	$199,371	$11.00	$219,308	($19,937)	$10.50	$209,340
4010012	PORTLAND CEMENT CONCRETE PAVEMENT (12")	SQ.YD.	343	$32.00	$10,990	$45.00	$15,455	($4,465)	$38.50	$13,222
4090006	ASPHALTIC CONCRETE (MISCELLANEOUS STRUCTURAL) (SPECIAL	TON	1,381	$120.00	$165,751	$70.00	$96,688	$69,063	$100.00	$138,126
6080101	MISCELLANEOUS WORK (SIGNS)	L.SUM	1	$10,000.00	$10,000	$5,000.00	$5,000	$5,000	$7,500.00	$7,500
6110201	METAL HANDRAIL	L.FT.	200	$45.00	$9,000	$0.00	$0	$9,000	$22.50	$4,500
7015010	TEMPORARY CONCRETE BARRIER (INSTALLATION AND REMOVAL)	L.FT.	13,524	$10.00	$135,240	$6.00	$81,144	$54,096	$7.00	$94,668
7015020	TEMPORARY IMPACT ATTENUATORS (INSTALLATION AND REMOVAI	EACH	8	$2,000.00	$16,000	$700.00	$5,600	$10,400	$1,500.00	$12,000
7015042	TEMPORARY PAINTED MARKING (STRIPE)	L.FT.	67,243	$0.20	$13,449	$0.30	$20,173	($6,724)	$0.25	$16,811
7015091	SPECIALTY SIGNS	SQ.FT.	715	$16.00	$11,440	$20.00	$14,300	($2,860)	$18.00	$12,870
7016020	TEMPORARY CONCRETE BARRIER (IN USE)	L.FT./DAY	676,200	$0.05	$33,810	$0.03	$20,286	$13,524	$0.04	$27,048
7016021	TEMPORARY IMPACT ATTENUATORS (IN -USE)	EACH-DAY	400	$24.00	$9,600	$20.00	$8,000	$1,600	$22.00	$8,800
7016030	BARRICADE (TYPE II, VERT.PANEL, TUBULAR MARKER)	EACH-DAY	6,640	$0.60	$3,984	$0.12	$797	$3,187	$0.25	$1,660
7016031	BARRICADE (TYPE III, HIGH LEVEL FLAG TREES)	EACH-DAY	66	$0.90	$59	$0.25	$17	$42	$0.50	$33
7016032	PORTABLE SIGN STANDS (RIGID)	EACH-DAY	75	$0.70	$53	$0.30	$23	$30	$0.50	$38
7016033	PORTABLE SIGN STANDS (SPRING TYPE)	EACH-DAY	1,117	$1.25	$1,396	$0.25	$279	$1,117	$0.60	$670
7016035	WARNING LIGHTS (TYPE A)	EACH-DAY	1,310	$0.30	$393	$0.10	$131	$262	$0.20	$262
7016037	WARNING LIGHTS (TYPE C)	EACH-DAY	2,212	$0.80	$1,770	$0.12	$265	$1,505	$0.40	$885
7016051	TEMPORARY SIGN (LESS THAN 10 S.F.)	EACH-DAY	309	$0.50	$155	$0.12	$37	$118	$0.50	$155
7016052	TEMPORARY SIGN (10 S.F. OR MORE)	EACH-DAY	859	$0.70	$601	$0.25	$215	$386	$0.70	$601
7016061	FLASHING ARROW PANEL	EACH-DAY	24	$35.00	$840	$12.00	$288	$552	$20.00	$480
7016078	FLAGGING SERVICES (LOCAL ENFORCEMENT OFFICER)	HOUR	1,520	$60.00	$91,200	$67.00	$101,840	($10,640)	$63.50	$96,520
7016080	FLAGGING SERVICES (DPS)	HOUR	1,520	$65.26	$99,195	$65.26	$99,195	$0	$65.26	$99,195
7020007	IMPACT ATTENUATION DEVICE (CRASH CUSHION)	EACH	2	$20,000.00	$40,000	$15,000.00	$30,000	$10,000	$17,500.00	$35,000
7041501	PAVEMENT MARKINGS	L.SUM	1	$5,000.00	$5,000	$5,000.00	$5,000	$0	$5,000.00	$5,000
7320293	ELECTRICAL CONDUIT (3-3") (PVC)	L.FT.	1,080	$50.00	$54,000	$20.00	$21,600	$32,400	$35.00	$37,800
7320456	PULL BOX (NO. 9)	EACH	4	$2,800.00	$11,200	$2,500.00	$10,000	$1,200	$2,650.00	$10,600
7379044	TEMPORARY LIGHTING AND POWER	L.SUM	1	$20,000.00	$20,000	$5,000.00	$5,000	$15,000	$12,500.00	$12,500
8030092	GRANITE MULCH (1 1/4" MINUS)	SQ.YD.	29,385	$2.00	$58,769	$2.50	$73,461	($14,692)	$2.25	$66,115
8080384	PIPE (PVC) (3") (SCHEDULE 40)	L.FT.	374	$3.25	$1,217	$7.00	$2,621	($1,404)	$7.00	$2,621
9020002	CHAIN LINK FENCE, TYPE 1 (48")	L.FT.	387	$20.00	$7,732	$10.00	$3,866	$3,866	$20.00	$7,732
9020004	CHAIN LINK FENCE, TYPE 1 (72")	L.FT.	649	$40.00	$25,972	$12.00	$7,792	$18,180	$30.00	$19,479
9040001	CHAIN LINK CABLE BARRIER	L.FT.	50	$100.00	$5,000	$100.00	$5,000	$0	$100.00	$5,000
9080086	CONCRETE CURB AND GUTTER (C-05.10, TYPE D)	L.FT.	248	$12.00	$2,979	$15.00	$3,724	($745)	$13.50	$3,352

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Miller Road/SR 101L Construction Alternatives Analysis
ITEMIZED COST ESTIMATE

Project Location: Miller Road/SR 101L Construction Alternatives Analysis
COS Project No.: 2017-029-COS
Alternative: Alt 1A - CIP Bridge-Conventional

ITEM NO	ITEM DESCRIPTION	UNIT	QUANTITY	UNIT PRICE	AMOUNT	FNF ESTIMATE UNIT PRICE	FNF ESTIMATE AMOUNT	DIFFERENCE	UPDATED ESTIMATE UNIT PRICE	UPDATED ESTIMATE AMOUNT
9080201	CONCRETE SIDEWALK (C-05.20)	SQ.FT.	351	$7.00	$2,455	$3.00	$1,052	$1,403	$7.00	$2,455
9100008	CONCRETE BARRIER (C-10.52 WITH 2.5' GUTTER)	L.FT.	326	$45.00	$14,670	$40.00	$13,040	$1,630	$42.50	$13,855
9100201	CONCRETE MEDIAN BARRIER	L.FT.	20	$40.00	$800	$150.00	$3,000	($2,200)	$150.00	$3,000
9140155	RETAINING WALL (RW1)	SQ.FT.	5,990	$85.00	$509,150	$90.00	$539,100	($29,950)	$87.50	$524,125
9140156	RETAINING WALL (RW2)	SQ.FT.	5,860	$85.00	$498,100	$90.00	$527,400	($29,300)	$87.50	$512,750
9240111	MISCELLANEOUS WORK (CONCRETE PARAPET WITH SIDEWALK)	L.FT.	135	$270.00	$36,450	$265.00	$35,775	$675	$267.50	$36,113
				Civil Subtotal	**$2,179,472**		**$2,087,589**	**$91,883**		**$2,119,654**

Kimley»Horn

Miller Road/SR 101L Construction Alternatives Analysis
ITEMIZED COST ESTIMATE

Project Location: Miller Road/SR 101L Construction Alternatives Analysis
COS Project No.: 2017-029-COS
Alternative: Alt 1A - CIP Bridge-Conventional

ITEM NO	ITEM DESCRIPTION	UNIT	QUANTITY	UNIT PRICE	AMOUNT	FNF ESTIMATE UNIT PRICE	FNF ESTIMATE AMOUNT	DIFFERENCE	UPDATED ESTIMATE UNIT PRICE	UPDATED ESTIMATE AMOUNT
STRUCTURES										
MILLER RD OP EB BRIDGE										
2030501	STRUCTURAL EXCAVATION	CU.YD.	2,040	$40.00	$81,600	$30.00	$61,200	$20,400	$20.00	$40,800
2030506	STRUCTURE BACKFILL	CU.YD.	224	$45.00	$10,080	$50.00	$11,200	($1,120)	$47.50	$10,640
6010003	STRUCTURAL CONCRETE (CLASS S) (F'C = 3,500)	CU.YD.	293	$350.00	$102,550	$400.00	$117,200	($14,650)	$375.00	$109,875
6010005	STRUCTURAL CONCRETE (CLASS S) (F'C = 4,500)	CU.YD.	577	$450.00	$259,650	$450.00	$259,650	$0	$450.00	$259,650
6011140	F-SHAPE BRIDGE CONCRETE BARRIER AND TRANSITION (34")	L.FT.	215	$70.00	$15,050	$80.00	$17,200	($2,150)	$75.00	$16,125
6011141	F-SHAPE BRIDGE CONCRETE BARRIER AND TRANSITION (44")	L.FT.	215	$75.00	$16,125	$95.00	$20,425	($4,300)	$85.00	$18,275
6011347	DECK JOINT ASSEMBLY (3X3 COMPRESSION SEAL)	L.FT.	94	$250.00	$23,500	$200.00	$18,800	$4,700	$225.00	$21,150
6011371	APPROACH SLAB (SD 2.01)	SQ.FT.	2,893	$25.00	$72,325	$16.00	$46,288	$26,037	$25.00	$72,325
6011373	ANCHOR SLAB (TYPE 2) (SD 2.03)	SQ.FT.	8,678	$30.00	$260,340	$18.00	$156,204	$104,136	$20.00	$173,560
6015101	RESTRAINERS, VERTICAL EARTHQUAKE (FIXED)	EACH	9	$100.00	$900	$100.00	$900	$0	$100.00	$900
6015102	RESTRAINERS, VERTICAL EARTHQUAKE (EXPANSION)	EACH	9	$200.00	$1,800	$150.00	$1,350	$450	$175.00	$1,575
6020001	PRESTRESSING CAST-IN-PLACE CONCRETE- STA (1884+75)	L.SUM	1	$50,000.00	$50,000	$50,000.00	$50,000	$0	$50,000.00	$50,000
6050002	REINFORCING STEEL	LB.	181,640	$1.15	$208,886	$0.70	$127,148	$81,738	$0.85	$154,394
6090060	DRILLED SHAFT FOUNDATION (60")	L.FT.	610	$350.00	$213,500	$300.00	$183,000	$30,500	$325.00	$198,250
				MILLER RD OP EB BRIDGE Subtotal	**$1,316,306**		**$1,070,565**	**$245,741**		**$1,127,519**
MILLER RD OP WB BRIDGE										
2030501	STRUCTURAL EXCAVATION	CU.YD.	2,049	$40.00	$81,960	$30.00	$61,470	$20,490	$20.00	$40,980
2030506	STRUCTURE BACKFILL	CU.YD.	207	$45.00	$9,315	$50.00	$10,350	($1,035)	$47.50	$9,833
6010003	STRUCTURAL CONCRETE (CLASS S) (F'C = 3,500)	CU.YD.	293	$350.00	$102,550	$400.00	$117,200	($14,650)	$375.00	$109,875
6010005	STRUCTURAL CONCRETE (CLASS S) (F'C = 4,500)	CU.YD.	577	$450.00	$259,650	$450.00	$259,650	$0	$450.00	$259,650
6011140	F-SHAPE BRIDGE CONCRETE BARRIER AND TRANSITION (34")	L.FT.	215	$70.00	$15,050	$80.00	$17,200	($2,150)	$75.00	$16,125
6011141	F-SHAPE BRIDGE CONCRETE BARRIER AND TRANSITION (44")	L.FT.	215	$75.00	$16,125	$95.00	$20,425	($4,300)	$85.00	$18,275
6011347	DECK JOINT ASSEMBLY (3X3 COMPRESSION SEAL)	L.FT.	94	$250.00	$23,500	$200.00	$18,800	$4,700	$225.00	$21,150
6011371	APPROACH SLAB (SD 2.01)	SQ.FT.	2,893	$25.00	$72,325	$16.00	$46,288	$26,037	$25.00	$72,325
6011373	ANCHOR SLAB (TYPE 2) (SD 2.03)	SQ.FT.	8,678	$30.00	$260,340	$18.00	$156,204	$104,136	$20.00	$173,560
6015101	RESTRAINERS, VERTICAL EARTHQUAKE (FIXED)	EACH	9	$100.00	$900	$100.00	$900	$0	$100.00	$900
6015102	RESTRAINERS, VERTICAL EARTHQUAKE (EXPANSION)	EACH	9	$200.00	$1,800	$150.00	$1,350	$450	$175.00	$1,575
6020001	PRESTRESSING CAST-IN-PLACE CONCRETE- STA (1884+75)	L.SUM	1	$50,000.00	$50,000	$50,000.00	$50,000	$0	$50,000.00	$50,000
6050002	REINFORCING STEEL	LB.	181,640	$1.15	$208,886	$0.70	$127,148	$81,738	$0.85	$154,394
6090060	DRILLED SHAFT FOUNDATION (60")	L.FT.	610	$350.00	$213,500	$300.00	$183,000	$30,500	$325.00	$198,250
				MILLER RD OP WB BRIDGE Subtotal	**$1,315,901**		**$1,069,985**	**$245,916**		**$1,126,892**
FRONTAGE RD OP BRIDGE										
2030501	STRUCTURAL EXCAVATION	CU.YD.	925	$40.00	$37,000	$20.00	$18,500	$18,500	$20.00	$18,500
2030506	STRUCTURE BACKFILL	CU.YD.	101	$45.00	$4,545	$50.00	$5,050	($505)	$47.50	$4,798
6010003	STRUCTURAL CONCRETE (CLASS S) (F'C = 3,500)	CU.YD.	122	$350.00	$42,700	$400.00	$48,800	($6,100)	$375.00	$45,750
6010005	STRUCTURAL CONCRETE (CLASS S) (F'C = 4,500)	CU.YD.	242	$450.00	$108,900	$450.00	$108,900	$0	$450.00	$108,900
6011132	COMBINATION PEDESTRIAN-TRAFFIC BRIDGE RAILING	L.FT.	124	$250.00	$31,000	$150.00	$18,600	$12,400	$200.00	$24,800

Kimley»Horn

Miller Road/SR 101L Construction Alternatives Analysis
ITEMIZED COST ESTIMATE

Project Location: Miller Road/SR 101L Construction Alternatives Analysis
COS Project No.: 2017-029-COS
Alternative: Alt 1A - CIP Bridge-Conventional

ITEM NO	ITEM DESCRIPTION	UNIT	QUANTITY	UNIT PRICE	AMOUNT	FNF ESTIMATE UNIT PRICE	FNF ESTIMATE AMOUNT	DIFFERENCE	UPDATED ESTIMATE UNIT PRICE	UPDATED ESTIMATE AMOUNT
6011140	F-SHAPE BRIDGE CONCRETE BARRIER AND TRANSITION (34")	L.FT.	124	$70.00	$8,680	$100.00	$12,400	($3,720)	$85.00	$10,540
6011347	DECK JOINT ASSEMBLY (3X3 COMPRESSION SEAL)	L.FT.	38	$250.00	$9,500	$150.00	$5,700	$3,800	$200.00	$7,600
6011371	APPROACH SLAB (SD 2.01)	SQ.FT.	1,218	$25.00	$30,450	$17.00	$20,706	$9,744	$21.00	$25,578
6015101	RESTRAINERS, VERTICAL EARTHQUAKE (FIXED)	EACH	4	$100.00	$400	$100.00	$400	$0	$100.00	$400
6015102	RESTRAINERS, VERTICAL EARTHQUAKE (EXPANSION)	EACH	4	$200.00	$800	$150.00	$600	$200	$175.00	$700
6020001	PRESTRESSING CAST-IN-PLACE CONCRETE- STA (1884+75)	L.SUM	1	$25,000.00	$25,000	$25,000.00	$25,000	$0	$25,000.00	$25,000
6050002	REINFORCING STEEL	LB.	76,090	$1.15	$87,504	$0.80	$60,872	$26,632	$0.85	$64,677
6090060	DRILLED SHAFT FOUNDATION (60")	L.FT.	350	$350.00	$122,500	$320.00	$112,000	$10,500	$335.00	$117,250
				FRONTAGE RD OP BRIDGE Subtotal	$508,979		$437,528	$71,451		$454,493
				Structures Subtotal	$3,141,186		$2,578,078	$563,108		$2,708,904
				Civil and Structures Subtotal	$5,320,658		$4,665,667	$654,991		$4,828,558

Kimley»Horn

Miller Road/SR 101L Construction Alternatives Analysis
ITEMIZED COST ESTIMATE

Project Location: Miller Road/SR 101L Construction Alternatives Analysis
COS Project No.: 2017-029-COS
Alternative: Alt 1A - CIP Bridge-Conventional

ITEM NO	ITEM DESCRIPTION	UNIT	QUANTITY	UNIT PRICE	AMOUNT	FNF ESTIMATE UNIT PRICE	FNF ESTIMATE AMOUNT	DIFFERENCE	UPDATED ESTIMATE UNIT PRICE	UPDATED ESTIMATE AMOUNT
101 GPL CONSTRUCTION DEDUCTIONS										
2020021	REMOVAL OF CONCRETE CURB AND GUTTER	L.FT.	469	$3.00	-$1,406	$6.00	-$2,812	$1,406	$4.50	-$2,109
4010012	PORTLAND CEMENT CONCRETE PAVEMENT (12")	SQ.YD.	729	$32.00	-$23,329	$45.00	-$32,807	$9,478	$38.50	-$28,068
9100008	CONCRETE BARRIER (C-10.52 WITH 2.5' GUTTER)	L.FT.	469	$45.00	-$21,090	$40.00	-$18,746	($2,344)	$42.50	-$19,918
				Deductions Subtotal	**($45,825)**		**-$54,365**	**$8,540**		**($50,095)**
				Project Subtotal	**$5,274,833**		**$4,611,302**	**$663,531**		**$4,778,463**
PROJECT WIDE										
	Unidentified Item Allowance (15%)				$ 791,300		$691,700	$99,600		$716,800
				Project Wide Subtotal	**$6,066,133**		**$5,303,002**	**$763,131**		**$5,495,263**
	Water Supply/Dust Palliative (2%)				$ 121,400		$106,100	$15,300		$110,000
	Erosion Control (1%)				$ 60,700		$53,100	$7,600		$55,000
	Contractor Quality Control (2%)				$ 121,400		$106,100	$15,300		$110,000
	Construction Surveying And Layout (2%)				$ 121,400		$106,100	$15,300		$110,000
				Subtotal	**$6,491,033**		**$5,674,402**	**$816,631**		**$5,880,263**
	Mobilization (10%)				$ 649,200		$567,500	$81,700		$588,100
				Project Wide Total	**$ 7,140,233**		**$6,241,902**	**$898,331**		**$6,468,363**
OTHER COST										
	PCCP Quality Incentive ($1.50 per SY)				$ 515		$515	$0		$515
	Construction Engineering and Contingencies (15%)				$ 1,071,100		$936,300	$134,800		$970,300
	Engineering Design (8%)				$ 571,300		$499,400	$71,900		$517,500
	TOTAL Miller Road/SR 101L Construction Alternatives Analysis ALT 1 COST				**$ 8,784,000**		**$7,679,000**	**$1,105,000**		**$7,957,000**

Kimley»Horn

CITY OF SCOTTSDALE

Miller Road/SR 101L Construction Alternatives Analysis
ITEMIZED COST ESTIMATE

Project Location: Miller Road/SR 101L Construction Alternatives Analysis
COS Project No.: 2017-029-COS
Alternative: Alt 2 - CIP Bridge-Slide

						FNF ESTIMATE			UPDATED ESTIMATE	
ITEM NO	ITEM DESCRIPTION	UNIT	QUANTITY	UNIT PRICE	AMOUNT	UNIT PRICE	AMOUNT	DIFFERENCE	UNIT PRICE	AMOUNT
2010011	CLEARING AND GRUBBING	ACRE	6	$1,500.00	$9,107	$1,000.00	$6,071	$3,036	$1,250.00	$7,589.00
2020021	REMOVAL OF CONCRETE CURB AND GUTTER	L.FT.	809	$3.00	$2,427	$6.00	$4,854	($2,427)	$4.50	$3,641.00
2020023	REMOVE EXISTING CONCRETE MEDIAN BARRIER	L.FT.	234	$30.00	$7,033	$20.00	$4,689	$2,344	$25.00	$5,861.00
2020025	REMOVAL OF CONCRETE SIDEWALKS, DRIVEWAYS AND SLABS	SQ.FT.	1,995	$1.50	$2,992	$1.50	$2,992	$0	$1.50	$2,992.00
2020029	REMOVAL OF ASPHALTIC CONCRETE PAVEMENT	SQ.YD.	4,721	$2.50	$11,802	$2.50	$11,802	$0	$2.50	$11,802.00
2020031	REMOVAL OF PORTLAND CEMENT CONCRETE PAVEMENT	SQ.YD.	3,669	$9.00	$33,025	$17.00	$62,381	($29,356)	$10.00	$36,695.00
2020100	REMOVE FENCE (72")	L.FT.	1,180	$2.00	$2,360	$3.00	$3,540	($1,180)	$2.50	$2,950.00
2020101	REMOVE FENCE	L.FT.	600	$1.00	$600	$3.00	$1,800	($1,200)	$2.00	$1,200.00
2020168	REMOVE (CHANNEL LINING)	SQ.FT.	15,495	$2.00	$30,990	$3.00	$46,485	($15,495)	$2.50	$38,738.00
2020201	SAW CUTTING	L.FT.	1,316	$1.50	$1,973	$10.00	$13,157	($11,183)	$3.00	$3,947.00
2030301	ROADWAY EXCAVATION	CU.YD.	11,841	$7.00	$82,884	$11.00	$130,246	($47,362)	$11.00	$130,246.00
4010012	PORTLAND CEMENT CONCRETE PAVEMENT (12")	SQ.YD.	343	$32.00	$10,990	$45.00	$15,455	($4,465)	$38.50	$13,222.00
4090006	ASPHALTIC CONCRETE (MISCELLANEOUS STRUCTURAL) (SPECIAL M	TON	1,221	$120.00	$146,538	$70.00	$85,481	$61,058	$100.00	$122,115.00
6080101	MISCELLANEOUS WORK (SIGNS)	L.SUM	1	$10,000.00	$10,000	$5,000.00	$5,000	$5,000	$7,500.00	$7,500.00
7015010	TEMPORARY CONCRETE BARRIER (INSTALLATION AND REMOVAL)	L.FT.	14,126	$10.00	$141,260	$6.00	$84,756	$56,504	$7.00	$98,882.00
7015020	TEMPORARY IMPACT ATTENUATORS (INSTALLATION AND REMOVAL	EACH	8	$2,000.00	$16,000	$700.00	$5,600	$10,400	$1,500.00	$12,000.00
7015042	TEMPORARY PAINTED MARKING (STRIPE)	L.FT.	77,000	$0.20	$15,400	$0.30	$23,100	($7,700)	$0.25	$19,250.00
7015091	SPECIALTY SIGNS	SQ.FT.	330	$16.00	$5,280	$20.00	$6,600	($1,320)	$18.00	$5,940.00
7016020	TEMPORARY CONCRETE BARRIER (IN USE)	L.FT./DAY	99,360	$0.05	$4,968	$0.03	$2,981	$1,987	$0.04	$3,974.00
7016021	TEMPORARY IMPACT ATTENUATORS (IN -USE)	EACH-DAY	62	$24.00	$1,488	$20.00	$1,240	$248	$22.00	$1,364.00
7016030	BARRICADE (TYPE II, VERT.PANEL, TUBULAR MARKER)	EACH-DAY	5,965	$0.60	$3,579	$0.12	$716	$2,863	$0.25	$1,491.00
7016031	BARRICADE (TYPE III, HIGH LEVEL FLAG TREES)	EACH-DAY	516	$0.90	$464	$0.25	$129	$335	$0.50	$258.00
7016032	PORTABLE SIGN STANDS (RIGID)	EACH-DAY	1,648	$0.70	$1,154	$0.30	$494	$659	$0.50	$824.00
7016033	PORTABLE SIGN STANDS (SPRING TYPE)	EACH-DAY	1,167	$1.25	$1,459	$0.25	$292	$1,167	$0.60	$700.00
7016035	WARNING LIGHTS (TYPE A)	EACH-DAY	4,518	$0.30	$1,355	$0.10	$452	$904	$0.20	$904.00
7016037	WARNING LIGHTS (TYPE C)	EACH-DAY	2,949	$0.80	$2,359	$0.12	$354	$2,005	$0.40	$1,180.00
7016050	TRUCK MOUNTED ATTENUATOR	EACH-DAY	2	$300.00	$600	$500.00	$1,000	($400)	$400.00	$800.00
7016051	TEMPORARY SIGN (LESS THAN 10 S.F.)	EACH-DAY	2,717	$0.50	$1,359	$0.15	$408	$951	$0.50	$1,359.00
7016052	TEMPORARY SIGN (10 S.F. OR MORE)	EACH-DAY	372	$0.70	$260	$0.25	$93	$167	$0.70	$260.00
7016061	FLASHING ARROW PANEL	EACH-DAY	38	$35.00	$1,330	$12.00	$456	$874	$20.00	$760.00
7016078	FLAGGING SERVICES (LOCAL ENFORCEMENT OFFICER)	HOUR	2,400	$60.00	$144,000	$67.00	$160,800	($16,800)	$63.50	$152,400.00
7016080	FLAGGING SERVICES (DPS)	HOUR	2,400	$65.26	$156,624	$65.26	$156,624	$0	$65.26	$156,624.00
7020007	IMPACT ATTENUATION DEVICE (CRASH CUSHION)	EACH	2	$20,000.00	$40,000	$15,000.00	$30,000	$10,000	$17,500.00	$35,000.00
7041501	PAVEMENT MARKINGS	L.SUM	1	$5,000.00	$5,000	$5,000.00	$5,000	$0	$5,000.00	$5,000.00
7320293	ELECTRICAL CONDUIT (3-3") (PVC)	L.FT.	1,080	$50.00	$54,000	$20.00	$21,600	$32,400	$20.00	$21,600.00
7320456	PULL BOX (NO. 9)	EACH	4	$2,800.00	$11,200	$2,500.00	$10,000	$1,200	$2,650.00	$10,600.00
7379044	TEMPORARY LIGHTING AND POWER	L.SUM	1	$20,000.00	$20,000	$5,000.00	$5,000	$15,000	$12,500.00	$12,500.00
8030092	GRANITE MULCH (1 1/4" MINUS)	SQ.YD.	29,385	$2.00	$58,769	$2.50	$73,461	($14,692)	$2.25	$66,115.00
8050003	SEEDING (CLASS II)	ACRE	0.41	$3,000.00	$1,233	$3,000.00	$1,233	$0	$3,000.00	$1,233.00
8080384	PIPE (PVC) (3") (SCHEDULE 40)	L.FT.	374	$3.25	$1,217	$7.00	$2,621	($1,404)	$7.00	$2,621.00
9020002	CHAIN LINK FENCE, TYPE 1 (48")	L.FT.	387	$20.00	$7,732	$10.00	$3,866	$3,866	$20.00	$7,732.00
9020004	CHAIN LINK FENCE, TYPE 1 (72")	L.FT.	1,180	$40.00	$47,196	$12.00	$14,159	$33,037	$20.00	$23,598.00
9040001	CHAIN LINK CABLE BARRIER	L.FT.	50	$90.00	$4,500	$100.00	$5,000	($500)	$95.00	$4,750.00
9080086	CONCRETE CURB AND GUTTER (C-05.10, TYPE D)	L.FT.	248	$12.00	$2,979	$15.00	$3,724	($745)	$13.50	$3,352.00
9080201	CONCRETE SIDEWALK (C-05.20)	SQ.FT.	351	$7.00	$2,455	$3.00	$1,052	$1,403	$7.00	$2,455.00
9100008	CONCRETE BARRIER (C-10.52 WITH 2.5' GUTTER)	L.FT.	326	$45.00	$14,670	$40.00	$13,040	$1,630	$42.50	$13,855.00
9100201	CONCRETE MEDIAN BARRIER	L.FT.	20	$40.00	$800	$150.00	$3,000	($2,200)	$150.00	$3,000.00
9201001	CONCRETE LINED CHANNEL	SQ.YD.	786	$125.00	$98,196	$265.00	$208,176	($109,980)	$140.00	$109,980.00
9240111	MISCELLANEOUS WORK (CONCRETE PARAPET WITH SIDEWALK)	L.FT.	135	$270.00	$36,450	$265.00	$35,775	$675	$267.50	$36,113.00
				Civil Subtotal	$1,258,057		$1,276,752	($18,695)		$1,206,972

Kimley»Horn

CITY OF SCOTTSDALE

Miller Road/SR 101L Construction Alternatives Analysis
ITEMIZED COST ESTIMATE

Project Location: Miller Road/SR 101L Construction Alternatives Analysis
COS Project No.: 2017-029-COS
Alternative: Alt 2 - CIP Bridge-Slide

ITEM NO	ITEM DESCRIPTION	UNIT	QUANTITY	UNIT PRICE	AMOUNT	FNF ESTIMATE UNIT PRICE	FNF ESTIMATE AMOUNT	DIFFERENCE	UPDATED ESTIMATE UNIT PRICE	UPDATED ESTIMATE AMOUNT
STRUCTURES										
MILLER RD OP EB BRIDGE										
2030501	STRUCTURAL EXCAVATION	CU.YD.	1,825	$40.00	$73,000	$20.00	$36,500	$36,500	$20.00	$36,500.00
2030506	STRUCTURE BACKFILL	CU.YD.	154	$45.00	$6,930	$50.00	$7,700	($770)	$47.50	$7,315.00
6010005	STRUCTURAL CONCRETE (CLASS S) (F'C = 4,500)	CU.YD.	770	$450.00	$346,500	$450.00	$346,500	$0	$450.00	$346,500.00
6011140	F-SHAPE BRIDGE CONCRETE BARRIER AND TRANSITION (34")	L.FT.	215	$70.00	$15,050	$80.00	$17,200	($2,150)	$75.00	$16,125.00
6011141	F-SHAPE BRIDGE CONCRETE BARRIER AND TRANSITION (44")	L.FT.	215	$75.00	$16,125	$90.00	$19,350	($3,225)	$82.50	$17,738.00
6011347	DECK JOINT ASSEMBLY (3X3 COMPRESSION SEAL)	L.FT.	94	$250.00	$23,500	$200.00	$18,800	$4,700	$225.00	$21,150.00
6011371	APPROACH SLAB (SD 2.01)	SQ.FT.	2,893	$25.00	$72,325	$15.00	$43,395	$28,930	$25.00	$72,325.00
6011373	ANCHOR SLAB (TYPE 2) (SD 2.03)	SQ.FT.	8,678	$30.00	$260,340	$17.00	$147,526	$112,814	$20.00	$173,560.00
6015101	RESTRAINERS, VERTICAL EARTHQUAKE (FIXED)	EACH	10	$100.00	$1,000	$100.00	$1,000	$0	$100.00	$1,000.00
6015102	RESTRAINERS, VERTICAL EARTHQUAKE (EXPANSION)	EACH	10	$200.00	$2,000	$150.00	$1,500	$500	$175.00	$1,750.00
6020001	PRESTRESSING CAST-IN-PLACE CONCRETE- STA (1884+75)	L.SUM	1	$50,000.00	$50,000	$50,000.00	$50,000	$0	$50,000.00	$50,000.00
6050002	REINFORCING STEEL	LB.	163,165	$1.15	$187,640	$0.70	$114,216	$73,424	$0.85	$138,690.00
6090060	DRILLED SHAFT FOUNDATION (60")	L.FT.	636	$350.00	$222,600	$300.00	$190,800	$31,800	$325.00	$206,700.00
9240050	MISCELLANEOUS WORK (BRIDGE SLIDE)	L.SUM	1	$220,000.00	$220,000	$200,000.00	$200,000	$20,000	$385,000.00	$385,000.00
				MILLER RD OP EB BRIDGE Subtotal	**$1,497,010**		**$1,194,487**	**$302,523**		**$1,474,353**
MILLER RD OP WB BRIDGE										
2030501	STRUCTURAL EXCAVATION	CU.YD.	1,851	$40.00	$74,040	$20.00	$37,020	$37,020	$20.00	$37,020.00
2030506	STRUCTURE BACKFILL	CU.YD.	146	$45.00	$6,570	$50.00	$7,300	($730)	$47.50	$6,935.00
6010005	STRUCTURAL CONCRETE (CLASS S) (F'C = 4,500)	CU.YD.	756	$450.00	$340,200	$450.00	$340,200	$0	$450.00	$340,200.00
6011140	F-SHAPE BRIDGE CONCRETE BARRIER AND TRANSITION (34")	L.FT.	215	$70.00	$15,050	$80.00	$17,200	($2,150)	$75.00	$16,125.00
6011141	F-SHAPE BRIDGE CONCRETE BARRIER AND TRANSITION (44")	L.FT.	215	$75.00	$16,125	$90.00	$19,350	($3,225)	$82.50	$17,738.00
6011347	DECK JOINT ASSEMBLY (3X3 COMPRESSION SEAL)	L.FT.	94	$250.00	$23,500	$200.00	$18,800	$4,700	$225.00	$21,150.00
6011371	APPROACH SLAB (SD 2.01)	SQ.FT.	2,893	$25.00	$72,325	$15.00	$43,395	$28,930	$25.00	$72,325.00
6011373	ANCHOR SLAB (TYPE 2) (SD 2.03)	SQ.FT.	8,678	$30.00	$260,340	$17.00	$147,526	$112,814	$20.00	$173,560.00
6015101	RESTRAINERS, VERTICAL EARTHQUAKE (FIXED)	EACH	10	$100.00	$1,000	$100.00	$1,000	$0	$100.00	$1,000.00
6015102	RESTRAINERS, VERTICAL EARTHQUAKE (EXPANSION)	EACH	10	$200.00	$2,000	$150.00	$1,500	$500	$175.00	$1,750.00
6020001	PRESTRESSING CAST-IN-PLACE CONCRETE- STA (1884+75)	L.SUM	1	$50,000.00	$50,000	$50,000.00	$50,000	$0	$50,000.00	$50,000.00
6050002	REINFORCING STEEL	LB.	160,400	$1.15	$184,460	$0.70	$112,280	$72,180	$0.85	$136,340.00
6090060	DRILLED SHAFT FOUNDATION (60")	L.FT.	636	$350.00	$222,600	$300.00	$190,800	$31,800	$325.00	$206,700.00
9140153	RETAINING WALL (SOIL NAIL WALL)	SQ.FT.	557	$45.00	$25,065	$60.00	$33,420	($8,355)	$52.50	$29,243.00
9240050	MISCELLANEOUS WORK (BRIDGE SLIDE)	L.SUM	1	$220,000.00	$220,000	$200,000.00	$200,000	$20,000	$385,000.00	$385,000.00
				MILLER RD OP WB BRIDGE Subtotal	**$1,513,275**		**$1,219,791**	**$293,484**		**$1,495,086**
FRONTAGE RD OP BRIDGE										
2030501	STRUCTURAL EXCAVATION	CU.YD.	925	$40.00	$37,000	$20.00	$18,500	$18,500	$20.00	$18,500.00
2030506	STRUCTURE BACKFILL	CU.YD.	101	$45.00	$4,545	$50.00	$5,050	($505)	$47.50	$4,798.00
6010003	STRUCTURAL CONCRETE (CLASS S) (F'C = 3,500)	CU.YD.	135	$350.00	$47,250	$400.00	$54,000	($6,750)	$375.00	$50,625.00
6010005	STRUCTURAL CONCRETE (CLASS S) (F'C = 4,500)	CU.YD.	242	$450.00	$108,900	$450.00	$108,900	$0	$450.00	$108,900.00
6011132	COMBINATION PEDESTRIAN-TRAFFIC BRIDGE RAILING	L.FT.	124	$250.00	$31,000	$150.00	$18,600	$12,400	$200.00	$24,800.00
6011140	F-SHAPE BRIDGE CONCRETE BARRIER AND TRANSITION (34")	L.FT.	124	$70.00	$8,680	$100.00	$12,400	($3,720)	$85.00	$10,540.00
6011347	DECK JOINT ASSEMBLY (3X3 COMPRESSION SEAL)	L.FT.	38	$250.00	$9,500	$150.00	$5,700	$3,800	$200.00	$7,600.00
6011371	APPROACH SLAB (SD 2.01)	SQ.FT.	1,218	$25.00	$30,450	$17.00	$20,706	$9,744	$21.00	$25,578.00
6015101	RESTRAINERS, VERTICAL EARTHQUAKE (FIXED)	EACH	4	$100.00	$400	$100.00	$400	$0	$100.00	$400.00
6015102	RESTRAINERS, VERTICAL EARTHQUAKE (EXPANSION)	EACH	4	$200.00	$800	$150.00	$600	$200	$175.00	$700.00
6020001	PRESTRESSING CAST-IN-PLACE CONCRETE- STA (1884+75)	L.SUM	1	$25,000.00	$25,000	$25,000.00	$25,000	$0	$25,000.00	$25,000.00
6050002	REINFORCING STEEL	LB.	78,800	$1.15	$90,620	$0.80	$63,040	$27,580	$0.85	$66,980.00
6090060	DRILLED SHAFT FOUNDATION (60")	L.FT.	350	$350.00	$122,500	$320.00	$112,000	$10,500	$335.00	$117,250.00
				FRONTAGE RD OP BRIDGE Subtotal	**$516,345**		**$444,896**	**$71,749**		**$461,671**
				Structures Subtotal	**$3,526,930**		**$2,859,174**	**$667,756**		**$3,431,110**
				Civil and Structures Subtotal	**$4,784,987**		**$4,135,926**	**$649,061**		**$4,638,082**

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CITY OF SCOTTSDALE

Miller Road/SR 101L Construction Alternatives Analysis
ITEMIZED COST ESTIMATE

Project Location: Miller Road/SR 101L Construction Alternatives Analysis
COS Project No.: 2017-029-COS
Alternative: Alt 2 - CIP Bridge-Slide

ITEM NO	ITEM DESCRIPTION	UNIT	QUANTITY	UNIT PRICE	AMOUNT	FNF ESTIMATE UNIT PRICE	FNF ESTIMATE AMOUNT	DIFFERENCE	UPDATED ESTIMATE UNIT PRICE	UPDATED ESTIMATE AMOUNT
101 GPL CONSTRUCTION DEDUCTIONS										
2020021	REMOVAL OF CONCRETE CURB AND GUTTER	L.FT.	469	$3.00	-$1,406	$6.00	-$2,812	$1,406	$4.50	-$2,109
4010012	PORTLAND CEMENT CONCRETE PAVEMENT (12")	SQ.YD.	729	$32.00	-$23,329	$45.00	-$32,807	$9,478	$38.50	-$28,068
9100008	CONCRETE BARRIER (C-10.52 WITH 2.5' GUTTER)	L.FT.	469	$45.00	-$21,090	$40.00	-$18,746	($2,343)	$42.50	-$19,918
				Deductions Subtotal	**($45,325)**		**-$54,365**	**$8,540**		**-$50,095**
				Project Subtotal	**$4,739,162**		**$4,081,560**	**$657,602**		**$4,587,987**
PROJECT WIDE										
	Unidentified Item Allowance (15%)				$ 710,900		$ 612,300	$ 98,600		$ 688,200
				Project Wide Subtotal	**$5,495,387**		**$4,748,226**	**$747,661**		**$5,326,282**
	Water Supply/Dust Palliative (2%)				$ 110,000		$ 95,000	$ 15,000		$ 106,600
	Erosion Control (1%)				$ 55,000		$ 47,500	$ 7,500		$ 53,300
	Environmental Mitigation ($0.25/Sq.Ft. of New TCE)	L.SUM			$ 15,000		$ 15,000	$ -		$ 15,000
	Contractor Quality Control (2%)				$ 110,000		$ 95,000	$ 15,000		$ 106,600
	Construction Surveying And Layout (2%)				$ 110,000		$ 95,000	$ 15,000		$ 106,600
				Subtotal	**$5,895,387**		**$5,095,726**	**$800,161**		**$5,714,382**
	Mobilization (10%)				$ 589,600		$ 509,600	$ 80,000		$ 571,500
				Project Wide Total	**$ 6,485,487**		**$ 5,605,326**	**$880,161**		**$ 6,285,882**
OTHER COST										
	PCCP Quality Incentive ($1.50 per SY)				$ 515		$ 515	$ -		$ 515
	Construction Engineering and Contingencies (15%)				$ 972,900		$ 840,800	$ 132,100		$ 942,900
	Engineering Design (8%)				$ 518,900		$ 448,500	$ 70,400		$ 502,900
				Construction Total	**$ 7,978,000**		**$ 6,896,000**	**$1,082,000**		**$ 7,733,000**
	New TCE ($0.25/Sq.Ft. @ 59250 Sq.Ft.)	$/Sq.Ft. =	$0.25		$ 14,813	$0.25	$ 14,813	$ -		$ 14,813
	TOTAL Miller Road/SR 101L Construction Alternatives Analysis ALT 2 COST				**$ 7,993,000**		**$ 6,911,000**	**$1,082,000**		**$ 7,748,000**

Kimley»Horn

CITY OF SCOTTSDALE

Miller Road/SR 101L Construction Alternatives Analysis
ITEMIZED COST ESTIMATE

Project Location: Miller Road/SR 101L Construction Alternatives Analysis
COS Project No.: 2017-029-COS
Alternative: Alt 3 - Box Slide

						FNF ESTIMATE			UPDATED ESTIMATE	
ITEM NO	ITEM DESCRIPTION	UNIT	QUANTITY	UNIT PRICE	AMOUNT	UNIT PRICE	AMOUNT	DIFFERENCE	UNIT PRICE	AMOUNT
2010011	CLEARING AND GRUBBING	ACRE	6	$1,500.00	$9,070	$1,000.00	$6,046	$3,023	$1,250.00	$7,558
2020021	REMOVAL OF CONCRETE CURB AND GUTTER	L.FT.	217	$3.00	$652	$6.00	$1,303	($652)	$4.50	$977
2020023	REMOVE EXISTING CONCRETE MEDIAN BARRIER	L.FT.	202	$30.00	$6,060	$20.00	$4,040	$2,020	$25.00	$5,050
2020025	REMOVAL OF CONCRETE SIDEWALKS, DRIVEWAYS AND SLABS	SQ.FT.	1,212	$1.50	$1,818	$1.50	$1,818	$0	$1.50	$1,818
2020029	REMOVAL OF ASPHALTIC CONCRETE PAVEMENT	SQ.YD.	4,949	$2.50	$12,372	$2.50	$12,372	$0	$2.50	$12,372
2020031	REMOVAL OF PORTLAND CEMENT CONCRETE PAVEMENT	SQ.YD.	3,479	$9.00	$31,310	$17.00	$59,141	($27,831)	$10.00	$34,789
2020100	REMOVE FENCE (72")	L.FT.	1,280	$2.00	$2,559	$3.00	$3,839	($1,280)	$2.50	$3,199
2020101	REMOVE FENCE	L.FT.	300	$1.00	$300	$3.00	$900	($600)	$2.00	$600
2020168	REMOVE (CHANNEL LINING)	SQ.FT.	18,215	$2.00	$36,431	$3.00	$54,646	($18,215)	$2.50	$45,539
2020201	SAW CUTTING	L.FT.	919	$1.50	$1,379	$10.00	$9,191	($7,813)	$4.00	$3,676
2030301	ROADWAY EXCAVATION	CU.YD.	15,289	$7.00	$107,026	$11.00	$168,183	($61,158)	$11.00	$168,183
2030401	DRAINAGE EXCAVATION	CU.YD.	174	$8.00	$1,391	$20.00	$3,477	($2,086)	$12.00	$2,086
4010012	PORTLAND CEMENT CONCRETE PAVEMENT (12")	SQ.YD.	3,479	$32.00	$111,324	$45.00	$156,550	($45,225)	$45.00	$156,550
4090006	ASPHALTIC CONCRETE (MISCELLANEOUS STRUCTURAL) (SPECIAL MIX)	TON	1,392	$120.00	$167,027	$70.00	$97,432	$69,594	$100.00	$139,189
6080101	MISCELLANEOUS WORK (SIGNS)	L.SUM	1	$10,000.00	$10,000	$5,000.00	$5,000	$5,000	$7,500.00	$7,500
6110202	METAL HANDRAIL (SAFETY RAIL - MAG DTL 145)	L.FT.	329	$35.00	$11,499	$50.00	$16,428	($4,928)	$50.00	$16,428
7015010	TEMPORARY CONCRETE BARRIER (INSTALLATION AND REMOVAL)	L.FT.	21,382	$10.00	$213,820	$6.00	$128,292	$85,528	$7.00	$149,674
7015020	TEMPORARY IMPACT ATTENUATORS (INSTALLATION AND REMOVAL)	EACH	13	$2,000.00	$26,000	$700.00	$9,100	$16,900	$1,500.00	$19,500
7015042	TEMPORARY PAINTED MARKING (STRIPE)	L.FT.	78,500	$0.20	$15,700	$0.30	$23,550	($7,850)	$0.25	$19,625
7015091	SPECIALTY SIGNS	SQ.FT.	220	$16.00	$3,520	$20.00	$4,400	($880)	$18.00	$3,960
7016020	TEMPORARY CONCRETE BARRIER (IN USE)	L.FT./DA	185,308	$0.05	$9,265	$0.03	$5,559	$3,706	$0.04	$7,412
7016021	TEMPORARY IMPACT ATTENUATORS (IN -USE)	EACH-D	113	$24.00	$2,712	$20.00	$2,260	$452	$22.00	$2,486
7016030	BARRICADE (TYPE II, VERT.PANEL, TUBULAR MARKER)	EACH-D	7,973	$0.60	$4,784	$0.12	$957	$3,827	$0.25	$1,993
7016031	BARRICADE (TYPE III, HIGH LEVEL FLAG TREES)	EACH-D	216	$0.90	$194	$0.25	$54	$140	$0.50	$108
7016032	PORTABLE SIGN STANDS (RIGID)	EACH-D	868	$0.70	$608	$0.30	$260	$347	$0.50	$434
7016033	PORTABLE SIGN STANDS (SPRING TYPE)	EACH-D	527	$1.25	$659	$0.25	$132	$527	$1.00	$527
7016035	WARNING LIGHTS (TYPE A)	EACH-D	2,340	$0.30	$702	$0.10	$234	$468	$0.20	$468
7016037	WARNING LIGHTS (TYPE C)	EACH-D	3,184	$0.80	$2,547	$0.12	$382	$2,165	$0.40	$1,274
7016050	TRUCK MOUNTED ATTENUATOR	EACH-D	12	$300.00	$3,600	$500.00	$6,000	($2,400)	$400.00	$4,800
7016051	TEMPORARY SIGN (LESS THAN 10 S.F.)	EACH-D	1,430	$0.50	$715	$0.12	$172	$543	$0.50	$715
7016052	TEMPORARY SIGN (10 S.F. OR MORE)	EACH-D	322	$0.70	$225	$0.25	$81	$145	$0.70	$225
7016061	FLASHING ARROW PANEL	EACH-D	48	$35.00	$1,680	$12.00	$576	$1,104	$20.00	$960
7016078	FLAGGING SERVICES (LOCAL ENFORCEMENT OFFICER)	HOUR	2,400	$60.00	$144,000	$67.00	$160,800	($16,800)	$63.50	$152,400
7016080	FLAGGING SERVICES (DPS)	HOUR	2,400	$65.26	$156,624	$65.26	$156,624	$0	$65.26	$156,624
7020007	IMPACT ATTENUATION DEVICE (CRASH CUSHION)	EACH	1	$20,000.00	$20,000	$15,000.00	$15,000	$5,000	$17,500.00	$17,500
7041501	PAVEMENT MARKINGS	L.SUM	1	$5,000.00	$5,000	$5,000.00	$5,000	$0	$5,000.00	$5,000
7320293	ELECTRICAL CONDUIT (3-3") (HDPE DIRECTIONAL DRILL, 20' DEEP)	L.FT.	1,080	$50.00	$54,000	$20.00	$21,600	$32,400	$35.00	$37,800
7320456	PULL BOX (NO. 9)	EACH	4	$2,800.00	$11,200	$2,500.00	$10,000	$1,200	$2,650.00	$10,600
7360350	UNDERDECK LIGHTING	L.SUM	1	$15,000.00	$15,000	$25,000.00	$25,000	($10,000)	$20,000.00	$20,000
7379044	TEMPORARY LIGHTING AND POWER	L.SUM	1	$20,000.00	$20,000	$5,000.00	$5,000	$15,000	$12,500.00	$12,500
8030092	GRANITE MULCH (1 1/4" MINUS)	SQ.YD.	29,265	$2.00	$58,530	$2.50	$73,162	($14,632)	$2.25	$65,846
8050003	SEEDING (CLASS II)	ACRE	2	$3,000.00	$5,803	$3,000.00	$5,803	$0	$3,000.00	$5,803
8080384	PIPE (PVC) (3") (SCHEDULE 40)	L.FT.	565	$3.25	$1,835	$7.00	$3,952	($2,117)	$7.00	$3,952
9020002	CHAIN LINK FENCE, TYPE 1 (48")	L.FT.	300	$20.00	$6,000	$10.00	$3,000	$3,000	$20.00	$6,000
9020004	CHAIN LINK FENCE, TYPE 1 (72")	L.FT.	1,280	$40.00	$51,184	$12.00	$15,355	$35,829	$20.00	$25,592
9080086	CONCRETE CURB AND GUTTER (C-05.10, TYPE D)	L.FT.	217	$12.00	$2,606	$15.00	$3,258	($652)	$13.50	$2,932
9080201	CONCRETE SIDEWALK (C-05.20)	SQ.FT.	1,212	$7.00	$8,484	$3.00	$3,636	$4,848	$6.00	$7,272
9100008	CONCRETE BARRIER (C-10.52 WITH 2.5' GUTTER)	L.FT.	314	$45.00	$14,135	$40.00	$12,565	$1,571	$42.50	$13,350
9100201	CONCRETE MEDIAN BARRIER	L.FT.	202	$40.00	$8,080	$100.00	$20,200	($12,120)	$100.00	$20,200
9130001	RIPRAP (DUMPED)	CU.YD.	13	$100.00	$1,333	$150.00	$2,000	($667)	$125.00	$1,667
9201001	CONCRETE LINED CHANNEL	SQ.YD.	1,064	$125.00	$132,954	$35.00	$37,227	$95,727	$140.00	$148,908
				Civil Subtotal	**$1,513,716**		**$1,361,556**	**$152,160**		**$1,533,621**

Kimley»Horn

Miller Road/SR 101L Construction Alternatives Analysis
ITEMIZED COST ESTIMATE

Project Location: Miller Road/SR 101L Construction Alternatives Analysis
COS Project No.: 2017-029-COS
Alternative: Alt 3 - Box Slide

ITEM NO	ITEM DESCRIPTION	UNIT	QUANTITY	UNIT PRICE	AMOUNT	FNF ESTIMATE UNIT PRICE	FNF ESTIMATE AMOUNT	DIFFERENCE	UPDATED ESTIMATE UNIT PRICE	UPDATED ESTIMATE AMOUNT
STRUCTURES										
2030501	STRUCTURAL EXCAVATION	CU.YD.	30,661	$12.50	$383,263	$10.00	$306,610	$76,653	$11.25	$344,936
2030506	STRUCTURE BACKFILL	CU.YD.	1,885	$40.00	$75,400	$30.00	$56,550	$18,850	$35.00	$65,975
6010003	STRUCTURAL CONCRETE (CLASS S) (F'C = 3,500)	CU.YD.	3,961	$400.00	$1,584,400	$350.00	$1,386,350	$198,050	$375.00	$1,485,375
6050002	REINFORCING STEEL	LB.	732,785	$1.00	$732,785	$0.70	$512,950	$219,836	$0.85	$622,867
9240050	MISCELLANEOUS WORK (BRIDGE SLIDE)	L.SUM	1	$770,000.00	$770,000	$400,000.00	$400,000	$370,000	$770,000.00	$770,000
9300601	SHORING AND BRACING	L.SUM	1	$1,007,700.00	$1,007,700	$500,000.00	$500,000	$507,700	$753,850.00	$753,850
				Structures Subtotal	**$4,553,548**		**$3,162,460**	**$1,391,088**		**$4,043,003**
				Civil and Structures Subtotal	**$5,067,263**		**$4,524,016**	**$1,543,248**		**$5,576,624**
101 GPL CONSTRUCTION DEDUCTIONS										
2020021	REMOVAL OF CONCRETE CURB AND GUTTER	L.FT.	444	$3.00	-$1,332	$6.00	-$2,664	$1,332	$4.50	-$1,998
4010012	PORTLAND CEMENT CONCRETE PAVEMENT (12")	SQ.YD.	691	$32.00	-$22,101	$45.00	-$31,080	$8,979	$38.50	-$26,590
9100008	CONCRETE BARRIER (C-10.52 WITH 2.5' GUTTER)	L.FT.	444	$45.00	-$19,980	$40.00	-$17,760	($2,220)	$42.50	-$18,870
				Deductions Subtotal	**($43,413)**		**($51,504)**	**$8,091**		**($47,458)**
				Project Subtotal	**$5,023,850**		**$4,472,512**	**$1,551,338**		**$5,529,166**
PROJECT WIDE										
	Unidentified Item Allowance (15%)				$ 903,600		$ 670,900	$ 232,700		$ 829,400
				Project Wide Subtotal	**$5,927,450**		**$5,143,412**	**$1,784,038**		**$6,358,566**
	Water Supply/Dust Palliative (2%)				$ 138,600		$102,900	$ 35,700		$ 127,200
	Erosion Control (1%)				$ 69,300		$51,500	$ 17,800		$ 63,600
	Contractor Quality Control (2%)				$ 138,600		$102,900	$ 35,700		$ 127,200
	Construction Surveying And Layout (2%)				$ 138,600		$102,900	$ 35,700		$ 127,200
	Environmental Mitigation ($0.25/Sq.Ft. of New TCE)	L.SUM			$ 22,000		$22,000	$ -		$ 22,000
				Subtotal	**$7,434,550**		**$5,525,612**	**$1,908,938**		**$6,825,766**
	Mobilization (10%)				$ 743,500		$552,600	$ 190,900		$ 682,600
				Project Wide Total	**$ 8,178,050**		**$6,078,212**	**$2,099,838**		**$ 7,508,366**
OTHER COST										
	PCCP Quality Incentive ($1.50 per SY)				$ 5,218		$5,218	$ -		$ 5,218
	Construction Engineering and Contingencies (15%)				$ 1,226,800		$911,800	$ 315,000		$ 1,126,300
	Engineering Design (8%)				$ 654,300		$486,300	$ 168,000		$ 600,700
				Construction Total	**$ 10,065,000**		**$7,482,000**	**$2,583,000**		**$ 9,241,000**
	New TCE ($0.25/Sq.Ft. @ 84260 Sq.Ft.)	$/Sq.Ft.	$0.25		$ 21,065		$21,065	$ -		$ 21,065
	TOTAL Miller Road/SR 101L Construction Alternatives Analysis ALT 3 COST				**$ 10,087,000**		**$7,504,000**	**$2,583,000**		**$ 9,263,000**

Kimley»Horn

CITY OF SCOTTSDALE

Miller Road/SR 101L Construction Alternatives Analysis
ITEMIZED COST ESTIMATE

Project Location: Miller Road/SR 101L Construction Alternatives Analysis
COS Project No.: 2017-029-COS
Alternative: Alt 4 - PC Arch

						FNF ESTIMATE			UPDATED ESTIMATE	
ITEM NO	ITEM DESCRIPTION	UNIT	QUANTITY	UNIT PRICE	AMOUNT	UNIT PRICE	AMOUNT	DIFFERENCE	UNIT PRICE	AMOUNT
2010011	CLEARING AND GRUBBING	ACRE	6	$1,500.00	$9,107	$1,000.00	$6,071	$3,036	$1,250.00	$7,589
2020021	REMOVAL OF CONCRETE CURB AND GUTTER	L.FT.	558	$3.00	$1,674	$6.00	$3,348	($1,674)	$4.50	$2,511
2020023	REMOVE EXISTING CONCRETE MEDIAN BARRIER	L.FT.	222	$30.00	$6,660	$20.00	$4,440	$2,220	$25.00	$5,550
2020025	REMOVAL OF CONCRETE SIDEWALKS, DRIVEWAYS AND SLABS	SQ.FT.	1,242	$1.50	$1,863	$1.50	$1,863	$0	$1.50	$1,863
2020029	REMOVAL OF ASPHALTIC CONCRETE PAVEMENT	SQ.YD.	4,777	$2.50	$11,941	$2.50	$11,941	$0	$2.50	$11,941
2020031	REMOVAL OF PORTLAND CEMENT CONCRETE PAVEMENT	SQ.YD.	3,823	$9.00	$34,410	$17.00	$64,997	($30,587)	$10.00	$38,233
2020100	REMOVE FENCE (72")	L.FT.	1,280	$2.00	$2,560	$3.00	$3,840	($1,280)	$2.50	$3,200
2020101	REMOVE FENCE	L.FT.	300	$1.00	$300	$3.00	$900	($600)	$2.00	$600
2020168	REMOVE (CHANNEL LINING)	SQ.FT.	18,215	$2.00	$36,431	$3.00	$54,646	($18,215)	$2.50	$45,539
2020201	SAW CUTTING	L.FT.	954	$1.50	$1,431	$10.00	$9,541	($8,110)	$3.00	$2,862
2030301	ROADWAY EXCAVATION	CU.YD.	26,504	$7.00	$185,526	$11.00	$291,541	($106,015)	$11.00	$291,541
2030401	DRAINAGE EXCAVATION	CU.YD.	174	$8.00	$1,391	$20.00	$3,477	($2,086)	$12.00	$2,086
4010012	PORTLAND CEMENT CONCRETE PAVEMENT (12")	SQ.YD.	3,823	$32.00	$122,347	$45.00	$172,050	($49,703)	$45.00	$172,050
4090006	ASPHALTIC CONCRETE (MISCELLANEOUS STRUCTURAL) (SPECIAL MIX)	TON	1,343	$120.00	$161,209	$70.00	$94,039	$67,170	$100.00	$134,341
6080101	MISCELLANEOUS WORK (SIGNS)	L.SUM	1	$10,000.00	$10,000	$5,000.00	$5,000	$5,000	$7,500.00	$7,500
6110202	METAL HANDRAIL (SAFETY RAIL - MAG DTL 145)	L.FT.	338	$35.00	$11,829	$50.00	$16,898	($5,069)	$50.00	$16,898
7015010	TEMPORARY CONCRETE BARRIER (INSTALLATION AND REMOVAL)	L.FT.	13,140	$10.00	$131,400	$6.00	$78,840	$52,560	$7.00	$91,980
7015020	TEMPORARY IMPACT ATTENUATORS (INSTALLATION AND REMOVAL)	EACH	8	$2,000.00	$16,000	$700.00	$5,600	$10,400	$1,500.00	$12,000
7015042	TEMPORARY PAINTED MARKING (STRIPE)	L.FT.	62,000	$0.20	$12,400	$0.30	$18,600	($6,200)	$0.25	$15,500
7015091	SPECIALTY SIGNS	SQ.FT.	110	$16.00	$1,760	$20.00	$2,200	($440)	$18.00	$1,980
7016020	TEMPORARY CONCRETE BARRIER (IN USE)	L.FT./DAY	162,480	$0.05	$8,124	$0.03	$4,874	$3,250	$0.04	$6,499
7016021	TEMPORARY IMPACT ATTENUATORS (IN -USE)	EACH-DAY	96	$24.00	$2,304	$20.00	$1,920	$384	$22.00	$2,112
7016030	BARRICADE (TYPE II, VERT.PANEL, TUBULAR MARKER)	EACH-DAY	3,108	$0.60	$1,865	$0.12	$373	$1,492	$0.30	$932
7016031	BARRICADE (TYPE III, HIGH LEVEL FLAG TREES)	EACH-DAY	115	$0.90	$104	$0.25	$29	$75	$0.50	$58
7016032	PORTABLE SIGN STANDS (RIGID)	EACH-DAY	554	$0.70	$388	$0.30	$166	$222	$0.50	$277
7016033	PORTABLE SIGN STANDS (SPRING TYPE)	EACH-DAY	352	$1.25	$440	$0.25	$88	$352	$1.00	$352
7016035	WARNING LIGHTS (TYPE A)	EACH-DAY	1,374	$0.30	$412	$0.10	$137	$275	$0.20	$275
7016037	WARNING LIGHTS (TYPE C)	EACH-DAY	1,851	$0.80	$1,481	$0.12	$222	$1,259	$0.40	$740
7016051	TEMPORARY SIGN (LESS THAN 10 S.F.)	EACH-DAY	899	$0.50	$450	$0.12	$108	$342	$0.50	$450
7016052	TEMPORARY SIGN (10 S.F. OR MORE)	EACH-DAY	298	$0.70	$209	$0.25	$75	$134	$0.70	$209
7016061	FLASHING ARROW PANEL	EACH-DAY	24	$35.00	$840	$12.00	$288	$552	$20.00	$480
7016078	FLAGGING SERVICES (LOCAL ENFORCEMENT OFFICER)	HOUR	1,520	$60.00	$91,200	$67.00	$101,840	($10,640)	$63.50	$96,520
7016080	FLAGGING SERVICES (DPS)	HOUR	1,520	$65.26	$99,195	$65.26	$99,195	$0	$65.26	$99,195
7020007	IMPACT ATTENUATION DEVICE (CRASH CUSHION)	EACH	1	$20,000.00	$20,000	$15,000.00	$15,000	$5,000	$17,500.00	$17,500
7041501	PAVEMENT MARKINGS	L.SUM	1	$5,000.00	$5,000	$5,000.00	$5,000	$0	$5,000.00	$5,000
7320293	ELECTRICAL CONDUIT (3-3") (HDPE DIRECTIONAL DRILL, 20' DEEP)	L.FT.	1,080	$50.00	$54,000	$20.00	$21,600	$32,400	$30.00	$32,400
7320456	PULL BOX (NO. 9)	EACH	4	$2,800.00	$11,200	$2,500.00	$10,000	$1,200	$2,650.00	$10,600
7360350	UNDERDECK LIGHTING	L.SUM	1	$10,000.00	$10,000	$25,000.00	$25,000	($15,000)	$17,500.00	$17,500
7379044	TEMPORARY LIGHTING AND POWER	L.SUM	1	$20,000.00	$20,000	$5,000.00	$5,000	$15,000	$12,500.00	$12,500
8030092	GRANITE MULCH (1 1/4" MINUS)	SQ.YD.	29,385	$2.00	$58,769	$2.50	$73,461	($14,692)	$2.25	$66,115
8050003	SEEDING (CLASS II)	ACRE	1.68	$3,000.00	$5,038	$3,000.00	$5,038	$0	$3,000.00	$5,038
8080384	PIPE (PVC) (3") (SCHEDULE 40)	L.FT.	546	$3.25	$1,775	$7.00	$3,822	($2,048)	$7.00	$3,822
9020002	CHAIN LINK FENCE, TYPE 1 (48")	L.FT.	300	$20.00	$6,000	$10.00	$3,000	$3,000	$20.00	$6,000
9020004	CHAIN LINK FENCE, TYPE 1 (72")	L.FT.	1,280	$40.00	$51,184	$12.00	$15,355	$35,829	$20.00	$25,592
9080086	CONCRETE CURB AND GUTTER (C-05.10, TYPE D)	L.FT.	222	$12.00	$2,666	$15.00	$3,333	($667)	$13.50	$2,999
9080201	CONCRETE SIDEWALK (C-05.20)	SQ.FT.	1,242	$7.00	$8,694	$3.00	$3,726	$4,968	$6.00	$7,452
9100008	CONCRETE BARRIER (C-10.52 WITH 2.5' GUTTER)	L.FT.	444	$45.00	$19,980	$40.00	$17,760	$2,220	$42.50	$18,870
9100201	CONCRETE MEDIAN BARRIER	L.FT.	222	$40.00	$8,880	$100.00	$22,200	($13,320)	$100.00	$22,200
9130001	RIPRAP (DUMPED)	CU.YD.	13.33	$100.00	$1,333	$150.00	$2,000	($667)	$125.00	$1,667
9201001	CONCRETE LINED CHANNEL	SQ.YD.	1,064	$125.00	$132,954	$35.00	$37,227	$95,727	$140.00	$148,908
				Civil Subtotal	**$1,384,722**		**$1,327,671**	**$57,051**		**$1,478,026**

Kimley»Horn

CITY OF SCOTTSDALE

Miller Road/SR 101L Construction Alternatives Analysis
ITEMIZED COST ESTIMATE

Project Location: Miller Road/SR 101L Construction Alternatives Analysis
COS Project No.: 2017-029-COS
Alternative: Alt 4 - PC Arch

ITEM NO	ITEM DESCRIPTION	UNIT	QUANTITY	UNIT PRICE	AMOUNT	FNF ESTIMATE UNIT PRICE	FNF ESTIMATE AMOUNT	DIFFERENCE	UPDATED ESTIMATE UNIT PRICE	UPDATED ESTIMATE AMOUNT
STRUCTURES										
2030501	STRUCTURAL EXCAVATION	CU.YD.	35,591	$12.50	$444,888	$10.00	$355,910	$88,978	$11.25	$400,399
2030506	STRUCTURE BACKFILL	CU.YD.	1,525	$40.00	$61,000	$40.00	$61,000	$0	$40.00	$61,000
6010005	STRUCTURAL CONCRETE (CLASS S) (F'C = 4,500)	CU.YD.	54	$650.00	$35,100	$500.00	$27,000	$8,100	$575.00	$31,050
6050002	REINFORCING STEEL	LB.	8,100	$1.15	$9,315	$0.70	$5,670	$3,645	$0.93	$7,533
9240050	MISCELLANEOUS WORK (INSTALL ARCH SYSTEM)	L.SUM	1	$250,000.00	$250,000	$367,771.00	$367,771	($117,771)	$308,885.50	$308,886
9240111	MISCELLANEOUS WORK (48" PRECAST ARCH)	L.FT.	288	$4,500.00	$1,296,000	$6,619.87	$1,906,523	($610,523)	$5,559.94	$1,601,263
9240112	MISCELLANEOUS WORK (PRECAST FOOTING)	L.FT.	864	$340.00	$293,760	$500.17	$432,145	($138,385)	$420.08	$362,949
9240114	MISCELLANEOUS WORK (PRECAST HEADWALL)	HOUR	212	$300.00	$63,600	$441.33	$93,561	($29,961)	$370.66	$78,580
9300601	SHORING AND BRACING	L.SUM	1	$848,000.00	$848,000	$300,000.00	$300,000	$548,000	$574,000.00	$574,000
				Structures Subtotal	**$3,301,663**		**$3,549,580**	**($247,918)**		**$3,425,660**
				Civil and Structures Subtotal	**$4,686,384**		**$4,877,251**	**($190,867)**		**$4,903,686**
101 GPL CONSTRUCTION DEDUCTIONS										
2020021	REMOVAL OF CONCRETE CURB AND GUTTER	L.FT.	444	$3.00	-$1,332	$6.00	-$2,664.00	$1,332	$4.50	($1,998)
4010012	PORTLAND CEMENT CONCRETE PAVEMENT (12")	SQ.YD.	691	$32.00	-$22,101	$45.00	-$31,079.70	$8,979	$38.50	($26,590)
9100008	CONCRETE BARRIER (C-10.52 WITH 2.5' GUTTER)	L.FT.	444	$45.00	-$19,980	$40.00	-$17,760.00	($2,220)	$42.50	($18,870)
				Deductions Subtotal	**($43,413)**		**($51,504)**	**$8,091**		**($47,458)**
				Project Subtotal	**$4,642,971**		**$4,825,748**	**($182,776)**		**$4,856,228**
PROJECT WIDE										
	Unidentified Item Allowance (15%)				$ 696,500		$ 723,900	($27,400)		$ 728,500
				Project Wide Subtotal	**$5,339,471**		**$5,549,648**	**($210,176)**		**$5,584,728**
	Water Supply/Dust Palliative (2%)				$ 106,800		$ 111,000	($4,200)		$ 111,700
	Erosion Control (1%)				$ 53,400		$ 55,500	($2,100)		$ 55,900
	Contractor Quality Control (2%)				$ 106,800		$ 111,000	($4,200)		$ 111,700
	Construction Surveying And Layout (2%)				$ 106,800		$ 111,000	($4,200)		$ 111,700
	Environmental Mitigation ($0.25/Sq.Ft. of New TCE)	L.SUM			$ 19,000		$ 19,000	$0		$ 19,000
				Subtotal	**$5,732,271**		**$5,957,148**	**($224,876)**		**$5,994,728**
	Mobilization (10%)				$ 573,300		$ 595,800	($22,500)		$ 599,500
				Project Wide Total	**$ 6,305,571**		**$ 6,552,948**	**$ (247,376)**		**$ 6,594,228**
OTHER COST										
	AC Quality Incentive ($3 per ton)				$ 4,030		$ 4,030	$0		$ 4,030
	PCCP Quality Incentive ($1.50 per SY)				$ 5,735		$ 5,735	$0		$ 5,735
	Construction Engineering and Contingencies (15%)				$ 945,900		$ 983,000	($37,100)		$ 989,200
	Engineering Design (8%)				$ 504,500		$ 524,300	($19,800)		$ 527,600
				Construction Total	**$ 7,766,000**		**$ 8,071,000**	**$ (305,000)**		**$ 8,121,000**
	New TCE ($0.25/Sq.Ft. @ 73150 Sq.Ft.)	$/Sq.Ft =	$0.25		$ 18,288		$ 18,288	$0		$ 18,288
	TOTAL Miller Road/SR 101L Construction Alternatives Analysis ALT 4 COST				**$ 7,785,000**		**$ 8,090,000**	**$ (305,000)**		**$ 8,140,000**

Kimley»Horn

CITY OF SCOTTSDALE

Miller Road/SR 101L Construction Alternatives Analysis
ITEMIZED COST ESTIMATE

Project Location: Miller Road/SR 101L Construction Alternatives Analysis
COS Project No.: 2017-029-COS
Alternative: Alt 1 - CIP Bridge-Conventional

ITEM NO	ITEM DESCRIPTION	UNIT	QUANTITY	UNIT PRICE	AMOUNT
2010011	CLEARING AND GRUBBING	ACRE	27	$1,500.00	$41,107
2020021	REMOVAL OF CONCRETE CURB AND GUTTER	L.FT.	294	$3.00	$882
2020025	REMOVAL OF CONCRETE SIDEWALKS, DRIVEWAYS AND SLABS	SQ.FT.	1,989	$1.50	$2,984
2020029	REMOVAL OF ASPHALTIC CONCRETE PAVEMENT	SQ.YD.	1,491	$2.50	$3,728
2020201	SAW CUTTING	L.FT.	478	$1.50	$717
2030301	ROADWAY EXCAVATION	CU.YD.	109,022	$5.00	$545,109
2030401	DRAINAGE EXCAVATION	CU.YD.	49,984	$6.00	$299,906
2030501	STRUCTURAL EXCAVATION	CU.YD.	169	$40.00	$6,760
2030506	STRUCTURE BACKFILL	CU.YD.	39	$45.00	$1,755
4090006	ASPHALTIC CONCRETE (MISCELLANEOUS STRUCTURAL) (SPECIAL MIX)	TON	12,129	$120.00	$1,455,535
5011024	PIPE, REINFORCED CONCRETE, CLASS IV, 24"	L.FT.	160	$100.00	$16,000
5030274	CATCH BASIN,TYPE M-1 (L=17')(PHOENIX DET. P-1569)	EACH	16	$6,000.00	$96,000
6010003	STRUCTURAL CONCRETE (CLASS S) (F'C = 3,500)	CU.YD.	43	$600.00	$25,800
6016087	HEADWALL	EACH	8	$2,500.00	$20,000
6050002	REINFORCING STEEL	LB.	8,460	$1.15	$9,729
7020007	IMPACT ATTENUATION DEVICE (CRASH CUSHION)	EACH	2	$20,000.00	$40,000
7040005	PAVEMENT MARKING (WHITE EXTRUDED THERMOPLASTIC) (0.090")	L.FT.	14,902	$0.40	$5,961
7040006	PAVEMENT MARKING (YELLOW EXTRUDED THERMOPLASTIC) (0.090")	L.FT.	11,787	$0.40	$4,715
7320456	PULL BOX (NO. 9 AND ADD LIGHT POLE)	EACH	121	$2,500.00	$303,044
9080086	CONCRETE CURB AND GUTTER (C-05.10, TYPE D)	L.FT.	10,381	$12.00	$124,575
9080107	CONCRETE SINGLE CURB (MAG DET. 222)	L.FT.	2,302	$10.00	$23,018
9080201	CONCRETE SIDEWALK (C-05.20)	SQ.FT.	95,688	$4.00	$382,753
9100008	CONCRETE BARRIER (C-10.52 WITH 2.5' GUTTER)	L.FT.	1,596	$45.00	$71,838
9140153	RETAINING WALL (SOIL NAIL WALL)	SQ.FT.	6,838	$45.00	$307,710
9201001	CONCRETE LINED CHANNEL	SQ.YD.	31,308	$125.00	$3,913,500
9210011	MEDIAN PAVING	SQ.YD.	1,259	$80.00	$100,752
9240111	MISCELLANEOUS WORK (TRENCH, BACKFILL, CONDUIT)	L.FT.	11,922	$20.00	$238,435
				Project Subtotal	**$8,042,315**
PROJECT WIDE					
	Unidentified Item Allowance (15%)				$ 1,206,400
				Project Wide Subtotal	**$9,248,715**
	Water Supply/Dust Palliative (2%)				$ 185,000
	Erosion Control (1%)				$ 92,500
	Contractor Quality Control (2%)				$ 185,000
	Construction Surveying And Layout (2%)				$ 185,000
				Subtotal	**$9,896,215**
	Mobilization (10%)				$ 989,700
				Project Wide Total	**$ 10,885,915**
OTHER COST					
	Construction Engineering and Contingencies (15%)				$ 1,632,900
	Engineering Design (8%)				$ 870,900
	Signing				$ 10,000
	Traffic Control (2%)				$ 217,800
				Construction Total	**$ 13,618,000**
	Right-of-way ($4/Sq.Ft. @ 1193758.92 Sq.Ft.)	$/Sq.Ft. =	$4		$ 4,775,000
	TOTAL : Miller Road/SR 101L Construction Alternatives Analysis : ALT 1 COST				**$ 18,393,000**

Kimley»Horn

CITY OF SCOTTSDALE

Miller Road/SR 101L Construction Alternatives Analysis
ITEMIZED COST ESTIMATE

Project Location: Miller Road/SR 101L Construction Alternatives Analysis
COS Project No.: 2017-029-COS
Alternative: Alt 2 - CIP Bridge-Slide

ITEM NO	ITEM DESCRIPTION	UNIT	QUANTITY	UNIT PRICE	AMOUNT
2010011	CLEARING AND GRUBBING	ACRE	27	$1,500.00	$41,107
2020021	REMOVAL OF CONCRETE CURB AND GUTTER	L.FT.	294	$3.00	$882
2020025	REMOVAL OF CONCRETE SIDEWALKS, DRIVEWAYS AND SLABS	SQ.FT.	1,989	$1.50	$2,984
2020029	REMOVAL OF ASPHALTIC CONCRETE PAVEMENT	SQ.YD.	1,491	$2.50	$3,728
2020201	SAW CUTTING	L.FT.	478	$1.50	$717
2030301	ROADWAY EXCAVATION	CU.YD.	109,022	$5.00	$545,109
2030401	DRAINAGE EXCAVATION	CU.YD.	49,984	$6.00	$299,906
2030501	STRUCTURAL EXCAVATION	CU.YD.	169	$40.00	$6,760
2030506	STRUCTURE BACKFILL	CU.YD.	39	$45.00	$1,755
4090006	ASPHALTIC CONCRETE (MISCELLANEOUS STRUCTURAL) (SPECIAL M	TON	12,130	$120.00	$1,455,559
5011024	PIPE, REINFORCED CONCRETE, CLASS IV, 24"	L.FT.	160	$100.00	$16,000
5030274	CATCH BASIN,TYPE M-1 (L=17')(PHOENIX DET. P-1569)	EACH	16	$6,000.00	$96,000
6010003	STRUCTURAL CONCRETE (CLASS S) (F'C = 3,500)	CU.YD.	43	$600.00	$25,800
6016087	HEADWALL	EACH	8	$2,500.00	$20,000
6050002	REINFORCING STEEL	LB.	8,460	$1.15	$9,729
7020007	IMPACT ATTENUATION DEVICE (CRASH CUSHION)	EACH	2	$20,000.00	$40,000
7040005	PAVEMENT MARKING (WHITE EXTRUDED THERMOPLASTIC) (0.090"	L.FT.	14,902	$0.40	$5,961
7040006	PAVEMENT MARKING (YELLOW EXTRUDED THERMOPLASTIC) (0.090'	L.FT.	11,787	$0.40	$4,715
7320456	PULL BOX (NO. 9 AND ADD LIGHT POLE)	EACH	121	$2,500.00	$303,044
9080086	CONCRETE CURB AND GUTTER (C-05.10, TYPE D)	L.FT.	10,381	$12.00	$124,576
9080107	CONCRETE SINGLE CURB (MAG DET. 222)	L.FT.	2,302	$10.00	$23,018
9080201	CONCRETE SIDEWALK (C-05.20)	SQ.FT.	95,683	$4.00	$382,730
9100008	CONCRETE BARRIER (C-10.52 WITH 2.5' GUTTER)	L.FT.	1,596	$45.00	$71,838
9140153	RETAINING WALL (SOIL NAIL WALL)	SQ.FT.	6,838	$45.00	$307,710
9201001	CONCRETE LINED CHANNEL	SQ.YD.	31,308	$125.00	$3,913,500
9210011	MEDIAN PAVING	SQ.YD.	1,259	$80.00	$100,752
9240111	MISCELLANEOUS WORK (TRENCH, BACKFILL, CONDUIT)	L.FT.	11,922	$20.00	$238,435
				Project Subtotal	**$8,042,316**
PROJECT WIDE					
	Unidentified Item Allowance (15%)				$ 1,206,400
				Project Wide Subtotal	**$9,248,716**
	Water Supply/Dust Palliative (2%)				$ 185,000
	Erosion Control (1%)				$ 92,500
	Contractor Quality Control (2%)				$ 185,000
	Construction Surveying And Layout (2%)				$ 185,000
				Subtotal	**$9,896,216**
	Mobilization (10%)				$ 989,700
				Project Wide Total	**$ 10,885,916**
OTHER COST					
	Construction Engineering and Contingencies (15%)				$ 1,632,900
	Engineering Design (8%)				$ 870,900
	Signing				$ 10,000
	Traffic Control (2%)				$ 217,800
				Construction Total	**$ 13,618,000**
	Right-of-way ($4/Sq.Ft. @ 1193758.92 Sq.Ft.)	$/Sq.Ft. =	$4		$ 4,775,000
	TOTAL : Miller Road/SR 101L Construction Alternatives Analysis : ALT 2 COST				**$ 18,393,000**

Kimley»Horn

Miller Road/SR 101L Construction Alternatives Analysis
ITEMIZED COST ESTIMATE

Project Location: Miller Road/SR 101L Construction Alternatives Analysis
COS Project No.: 2017-029-COS
Alternative: Alt 3 - Box Slide

ITEM NO	ITEM DESCRIPTION	UNIT	QUANTITY	UNIT PRICE	AMOUNT
2010011	CLEARING AND GRUBBING	ACRE	29	$1,500.00	$43,216
2020021	REMOVAL OF CONCRETE CURB AND GUTTER	L.FT.	294	$3.00	$882
2020025	REMOVAL OF CONCRETE SIDEWALKS, DRIVEWAYS AND SLABS	SQ.FT.	1,989	$1.50	$2,984
2020029	REMOVAL OF ASPHALTIC CONCRETE PAVEMENT	SQ.YD.	1,491	$2.50	$3,728
2020201	SAW CUTTING	L.FT.	478	$1.50	$717
2030301	ROADWAY EXCAVATION	CU.YD.	153,026	$5.00	$765,132
2030401	DRAINAGE EXCAVATION	CU.YD.	49,984	$6.00	$299,906
2030501	STRUCTURAL EXCAVATION	CU.YD.	919	$40.00	$36,760
2030506	STRUCTURE BACKFILL	CU.YD.	344	$45.00	$15,480
4090006	ASPHALTIC CONCRETE (MISCELLANEOUS STRUCTURAL) (SPECIAL M	TON	12,078	$120.00	$1,449,330
5011024	PIPE, REINFORCED CONCRETE, CLASS IV, 24"	L.FT.	160	$100.00	$16,000
5030274	CATCH BASIN,TYPE M-1 (L=17')(PHOENIX DET. P-1569)	EACH	16	$6,000.00	$96,000
6010005	STRUCTURAL CONCRETE (CLASS S) (F'C = 4,500)	CU.YD.	204	$600.00	$122,400
6016087	HEADWALL	EACH	8	$2,500.00	$20,000
6050002	REINFORCING STEEL	LB.	40,800	$1.15	$46,920
7020007	IMPACT ATTENUATION DEVICE (CRASH CUSHION)	EACH	2	$20,000.00	$40,000
7040005	PAVEMENT MARKING (WHITE EXTRUDED THERMOPLASTIC) (0.090")	L.FT.	14,905	$0.40	$5,962
7040006	PAVEMENT MARKING (YELLOW EXTRUDED THERMOPLASTIC) (0.090'	L.FT.	10,778	$0.40	$4,311
7320456	PULL BOX (NO. 9 AND ADD LIGHT POLE)	EACH	121	$2,500.00	$303,044
9080086	CONCRETE CURB AND GUTTER (C-05.10, TYPE D)	L.FT.	10,689	$12.00	$128,264
9080107	CONCRETE SINGLE CURB (MAG DET. 222)	L.FT.	2,078	$10.00	$20,781
9080201	CONCRETE SIDEWALK (C-05.20)	SQ.FT.	95,714	$4.00	$382,857
9100008	CONCRETE BARRIER (C-10.52 WITH 2.5' GUTTER)	L.FT.	2,480	$45.00	$111,600
9201001	CONCRETE LINED CHANNEL	SQ.YD.	31,308	$125.00	$3,913,500
9210011	MEDIAN PAVING	SQ.YD.	1,864	$80.00	$149,094
9240111	MISCELLANEOUS WORK (TRENCH, BACKFILL, CONDUIT)	L.FT.	11,922	$20.00	$238,435
				Project Subtotal	**$8,217,304**
PROJECT WIDE					
	Unidentified Item Allowance (15%)			$	1,232,600
				Project Wide Subtotal	**$9,449,904**
	Water Supply/Dust Palliative (2%)			$	189,000
	Erosion Control (1%)			$	94,500
	Contractor Quality Control (2%)			$	189,000
	Construction Surveying And Layout (2%)			$	189,000
				Subtotal	**$10,111,404**
	Mobilization (10%)			$	1,011,200
				Project Wide Total	**$ 11,122,604**
OTHER COST					
	Construction Engineering and Contingencies (15%)			$	1,668,400
	Engineering Design (8%)			$	889,900
	Signing			$	10,000
	Traffic Control (2%)			$	222,500
				Construction Total	**$ 13,914,000**
	Right-of-way ($4/Sq.Ft. @ 1254997.98 Sq.Ft.)	$/Sq.Ft. =	$4	$	5,019,992
	TOTAL Miller Road/SR 101L Construction Alternatives Analysis ALT 4 COST				**$ 18,934,000**

Kimley»Horn

Miller Road/SR 101L Construction Alternatives Analysis
ITEMIZED COST ESTIMATE

Project Location: Miller Road/SR 101L Construction Alternatives Analysis
COS Project No.: 2017-029-COS
Alternative: Alt 4 - PC Arch

ITEM NO	ITEM DESCRIPTION	UNIT	QUANTITY	UNIT PRICE	AMOUNT
2010011	CLEARING AND GRUBBING	ACRE	29	$1,500.00	$43,216
2020021	REMOVAL OF CONCRETE CURB AND GUTTER	L.FT.	294	$3.00	$882
2020025	REMOVAL OF CONCRETE SIDEWALKS, DRIVEWAYS AND SLABS	SQ.FT.	1,989	$1.50	$2,984
2020029	REMOVAL OF ASPHALTIC CONCRETE PAVEMENT	SQ.YD.	1,491	$2.50	$3,728
2020201	SAW CUTTING	L.FT.	478	$1.50	$717
2030301	ROADWAY EXCAVATION	CU.YD.	153,026	$5.00	$765,132
2030401	DRAINAGE EXCAVATION	CU.YD.	49,984	$6.00	$299,906
2030501	STRUCTURAL EXCAVATION	CU.YD.	919	$40.00	$36,760
2030506	STRUCTURE BACKFILL	CU.YD.	344	$45.00	$15,480
4090006	ASPHALTIC CONCRETE (MISCELLANEOUS STRUCTURAL) (SPECIAL M	TON	12,078	$120.00	$1,449,330
5011024	PIPE, REINFORCED CONCRETE, CLASS IV, 24"	L.FT.	160	$100.00	$16,000
5030274	CATCH BASIN,TYPE M-1 (L=17')(PHOENIX DET. P-1569)	EACH	16	$6,000.00	$96,000
6010005	STRUCTURAL CONCRETE (CLASS S) (F'C = 4,500)	CU.YD.	204	$600.00	$122,400
6016087	HEADWALL	EACH	8	$2,500.00	$20,000
6050002	REINFORCING STEEL	LB.	40,800	$1.15	$46,920
7020007	IMPACT ATTENUATION DEVICE (CRASH CUSHION)	EACH	2	$20,000.00	$40,000
7040005	PAVEMENT MARKING (WHITE EXTRUDED THERMOPLASTIC) (0.090")	L.FT.	14,905	$0.40	$5,962
7040006	PAVEMENT MARKING (YELLOW EXTRUDED THERMOPLASTIC) (0.090'	L.FT.	10,778	$0.40	$4,311
7320456	PULL BOX (NO. 9 AND ADD LIGHT POLE)	EACH	121	$2,500.00	$303,044
9080086	CONCRETE CURB AND GUTTER (C-05.10, TYPE D)	L.FT.	10,689	$12.00	$128,264
9080107	CONCRETE SINGLE CURB (MAG DET. 222)	L.FT.	2,078	$10.00	$20,781
9080201	CONCRETE SIDEWALK (C-05.20)	SQ.FT.	95,714	$4.00	$382,857
9100008	CONCRETE BARRIER (C-10.52 WITH 2.5' GUTTER)	L.FT.	2,480	$45.00	$111,600
9201001	CONCRETE LINED CHANNEL	SQ.YD.	31,308	$125.00	$3,913,500
9210011	MEDIAN PAVING	SQ.YD.	1,864	$80.00	$149,094
9240111	MISCELLANEOUS WORK (TRENCH, BACKFILL, CONDUIT)	L.FT.	11,922	$20.00	$238,435
				Project Subtotal	**$8,217,304**
PROJECT WIDE					
	Unidentified Item Allowance (15%)			$	1,232,600
				Project Wide Subtotal	**$9,449,904**
	Water Supply/Dust Palliative (2%)			$	189,000
	Erosion Control (1%)			$	94,500
	Contractor Quality Control (2%)			$	189,000
	Construction Surveying And Layout (2%)			$	189,000
				Subtotal	**$10,111,404**
	Mobilization (10%)			$	1,011,200
				Project Wide Total	**$ 11,122,604**
OTHER COST					
	Construction Engineering and Contingencies (15%)			$	1,668,400
	Engineering Design (8%)			$	889,900
	Signing			$	10,000
	Traffic Control (2%)			$	222,500
				Construction Total	**$ 13,914,000**
	Right-of-way ($4/Sq.Ft. @ 1254997.98 Sq.Ft.)	$/Sq.Ft. =	$4	$	5,020,000
	TOTAL Miller Road/SR 101L Construction Alternatives Analysis ALT 4 COST				**$ 18,934,000**

Kimley»Horn

CITY OF SCOTTSDALE

Miller Road/SR 101L Construction Alternatives Analysis
ITEMIZED COST ESTIMATE

Project Location: Miller Road/SR 101L Construction Alternatives Analysis
COS Project No.: 2017-029-COS
Alternative: Alt 1A

ITEM NO	ITEM DESCRIPTION	UNIT	QUANTITY	UNIT PRICE	AMOUNT
2010011	CLEARING AND GRUBBING	ACRE	27	$1,500.00	$41,107
2020021	REMOVAL OF CONCRETE CURB AND GUTTER	L.FT.	294	$3.00	$882
2020025	REMOVAL OF CONCRETE SIDEWALKS, DRIVEWAYS AND SLABS	SQ.FT.	1,989	$1.50	$2,984
2020029	REMOVAL OF ASPHALTIC CONCRETE PAVEMENT	SQ.YD.	1,491	$2.50	$3,728
2020201	SAW CUTTING	L.FT.	478	$1.50	$717
2030301	ROADWAY EXCAVATION	CU.YD.	89,085	$5.00	$445,424
2030401	DRAINAGE EXCAVATION	CU.YD.	49,984	$6.00	$299,906
2030501	STRUCTURAL EXCAVATION	CU.YD.	169	$40.00	$6,760
2030506	STRUCTURE BACKFILL	CU.YD.	39	$45.00	$1,755
4090006	ASPHALTIC CONCRETE (MISCELLANEOUS STRUCTURAL) (SPECIAL MIX)	TON	12,129	$120.00	$1,455,535
5011024	PIPE, REINFORCED CONCRETE, CLASS IV, 24"	L.FT.	160	$100.00	$16,000
5030274	CATCH BASIN,TYPE M-1 (L=17')(PHOENIX DET. P-1569)	EACH	16	$6,000.00	$96,000
6010003	STRUCTURAL CONCRETE (CLASS S) (F'C = 3,500)	CU.YD.	43	$600.00	$25,800
6016087	HEADWALL	EACH	8	$2,500.00	$20,000
6050002	REINFORCING STEEL	LB.	8,460	$1.15	$9,729
7020007	IMPACT ATTENUATION DEVICE (CRASH CUSHION)	EACH	2	$20,000.00	$40,000
7040005	PAVEMENT MARKING (WHITE EXTRUDED THERMOPLASTIC) (0.090")	L.FT.	14,902	$0.40	$5,961
7040006	PAVEMENT MARKING (YELLOW EXTRUDED THERMOPLASTIC) (0.090")	L.FT.	11,787	$0.40	$4,715
7320456	PULL BOX (NO. 9 AND ADD LIGHT POLE)	EACH	121	$2,500.00	$303,044
9080086	CONCRETE CURB AND GUTTER (C-05.10, TYPE D)	L.FT.	10,381	$12.00	$124,575
9080107	CONCRETE SINGLE CURB (MAG DET. 222)	L.FT.	2,302	$10.00	$23,018
9080201	CONCRETE SIDEWALK (C-05.20)	SQ.FT.	95,688	$4.00	$382,753
9100008	CONCRETE BARRIER (C-10.52 WITH 2.5' GUTTER)	L.FT.	1,596	$45.00	$71,838
9140153	RETAINING WALL (REINFORCED CONCRETE)	SQ.FT.	12,150	$45.00	$546,750
9201001	CONCRETE LINED CHANNEL	SQ.YD.	31,308	$125.00	$3,913,500
9210011	MEDIAN PAVING	SQ.YD.	1,259	$80.00	$100,752
9240111	MISCELLANEOUS WORK (TRENCH, BACKFILL, CONDUIT)	L.FT.	11,922	$20.00	$238,435
				Project Subtotal	**$8,181,670**

PROJECT WIDE

Unidentified Item Allowance (15%)		$ 1,227,300
	Project Wide Subtotal	**$9,408,970**
Water Supply/Dust Palliative (2%)		$ 188,200
Erosion Control (1%)		$ 94,100
Contractor Quality Control (2%)		$ 188,200
Construction Surveying And Layout (2%)		$ 188,200
	Subtotal	**$10,067,670**
Mobilization (10%)		$ 1,006,800
	Project Wide Total	**$ 11,074,470**

OTHER COST

Construction Engineering and Contingencies (15%)		$ 1,661,200
Engineering Design (8%)		$ 886,000
Signing		$ 10,000
Traffic Control (2%)		$ 221,500
	Construction Total	**$ 13,854,000**
Right-of-way ($4/Sq.Ft. @ 1193758.92 Sq.Ft.)	$/Sq.Ft. = $4	$ 4,775,000
TOTAL Miller Road/SR 101L Construction Alternatives Analysis ALT 1 COST		**$ 18,629,000**

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APPENDIX

Alternative Ratings Questionnaires

Miller Road CAA
Rating Questionnaire
SUMMARY

Criteria	Definition	Alternative #1 Conventional Bridge Average Score	Alternative #2 Bridge Slide Average Score	Alternative #3 Box Slide Average Score	Alternative #4 Arch Average Score
Constructability/Risk/Construction Safety/Motorist Safety	Does the alternative utilize common construction practices that are readily available in the contracting industry to complete the project and ensure efficient construction? Does the alternative minimize the potential of unnecessary additional costs or schedule delays? Does the alternative reduce the potential for unsafe conditions including unreasonably short construction durations, confined spaces or complicated construction techniques? Does the alternative maximize the safety of motorists traveling along SR101L and the local roadway network?	124	79	57	87
Construction Schedule/Utility Impacts/Additional Travel Time and Delays	Does the alternative minimize the schedule of construction? Does the alternative minimize the impacts to existing and future utilities? Does the alternative minimize impacts to motorist travel times and delays?	64	68	71	85
Construction Cost/Need for Specialty Contractor/ADOT Facility Impacts	Does the alternative provide the best cost of construction? Can the alternative be constructed utilizing standard construction practices typically used within the state of Arizona? Does the alternative minimize impacts to ADOT facilities including Lighting, FMS, Signing/Marking, Pavement, etc…	61	39	21	48
Impact to Developable Land/Drainage Impacts/Environmental Impacts/Aesthetics	Is developable land maximized by the alternative? Does the alternative minimize negative impacts to offsite and onsite drainage patterns? Does the alternative minimize environmental impacts? Are there opportunities to incorporate aesthetics into the alternative?	50	39	29	32
Construction Quality Control	Does the alternative provide adequate construction durations required to produce quality materials and craftsmanship?	20	14	13	15
Future Maintenance Costs	Does the alternative minimize costs of future maintenance?	17	15	16	15
	Alt Score Total	336	255	207	282
	Rank	**1**	**3**	**4**	**2**

Name	Company	Alt#1 Score	Alt#2 Score	Alt#3 Score	Alt#4 Score	Preferred Alt
Anthony Brozich	ADOT	331	229	205	273	1
David Locher	ADOT	374	267	147	178	1
Rashidul Haque	ADOT	279	262	226	292	4
Rimpal Shah	ADOT	287	244	260	282	1
Steve Boschen	ADOT	374	386	365	381	2
Mark Edelman	AZLand	341	226	226	386	4
Quinn Castro	AZMAG	342	220	286	153	1
Eric Waldo	City of Scottsdale	390	279	130	207	1
Paul Basha	City of Scottsdale	309	266	100	324	4
Greg Harasha	FNF	321	258	153	263	1
Hugh Boyle	H.Boyle Engineering	389	297	239	332	1
Dave Leistiko	KHA	326	280	247	314	1
David Rutkowski	KHA	310	208	177	304	1
Joe Metrailer	KHA	347	182	156	316	1
John Kissinger	KHA	320	193	194	280	1
Kevin Kimm	KHA	363	251	166	348	1
Zach Schmidt	KHA	314	280	247	169	1

APPENDIX K

Stakeholder Workshop Meeting Notes

Distribution Date: Tuesday, May 24, 2017

From: David Rutkowski, Kimley-Horn and Associates, Inc.

Meeting Date: Tuesday, April 25, 2017

Meeting Time: 1:00 pm

Location: Kimley-Horn and Associates, 7740 N 16th St, Ste 300, Phoenix, AZ 85020

Subject: 2017-029-COS / Stakeholder Meeting for Miller Rd. Overpass Const. Alternatives Analysis

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The following meeting notes for the Miller Road Overpass Construction Alternatives Analysis project are for your information, use, and distribution. Please contact David Rutkowski (david.rutkowski@kimley-horn.com) at (602) 216-1271 if you have comments or questions. The team list/sign-in sheet is also included following the notes. If there is any missing information or addition to the notes, please let David know.

I. ACTION ITEMS

II. INTRODUCTIONS

- Attendees were self-introduced and confirmed contact information.
- Consultant Team

Kimley-Horn	Prime Consultant
FNF Construction	Cost Estimation and Constructability
Hugh Boyle Engineering	Expedited Bridge Design
Pat Fly	Precast Specialist

- Stakeholders
  - City of Scottsdale
  - Arizona Department of Transportation (ADOT)
  - Maricopa Association of Governments (MAG)
  - Arizona State Land Department (ASLD)
  - Federal Highways Administration (FHWA)

III. PROJECT OVERVIEW

This project is a Construction Alternatives Analysis (CAA) for the Miller Road alignment SR-101L (Pima) freeway overpass (SR101L over Miller Road). The project will focus on identifying and selecting a preferred design and construction method for the overpass. Several construction alternatives will be evaluated and may include the following:

- Typical phased construction
- Accelerated Bridge Construction (ABC)
  - Slide-in Bridge Construction
  - Prefabricated Bride Elements
  - Self-Propelled Modular Transport
- Precast Segmental Arch Structure
- Precast Three-Sided Box Slide
- Precast Box Culvert Jacking
- Tunneling

Miller Road/SR-101L OVERPASS CONSTRUCTION
Alternatives Analysis

The preferred construction concept that is identified in this study will be presented to the Arizona Department of Transportation (ADOT) for incorporation into the upcoming SR-101L, I-17 to Princess Drive general purpose lanes widening project which is anticipated to start design in the summer of 2017 and go to construction in April 2019.

IV. SCHEDULE/PROCESS

David Rutkowski provided an overview of the project schedule and the process that will be used to evaluate the construction alternatives for the Miller Road Overpass.

V. PRELIMINARY CONSTRAINTS

- Roadway
  - Typical Section
    - Mark Edelman agreed with the suggestion to narrow the Miller Road typical section under the SR 101L freeway.
    - George Williams asked about how long it takes to get Miller Road back up to grade and mentioned that this distance will determine how quickly the median needs to open. He added that the median does not have to be zero feet under the bridge and instead could be 2 feet, 4 feet or more. The consensus among the team was to let the grade of the roadway determine the width of the median under the bridge.
    - It was confirmed that there will likely be no access point between Mayo Blvd and SR 101L because of the roadway grade. Mark added that the distance to first access point north of the SR 101L will likely be the same distance as the south side.
      - Paul Basha suggested that access from Miller Road should be provided as soon as possible and profile grades should be optimized to accomplish this. Paul confirmed that the profile grades should dictate the first access location and not the median width.
      - The Mayo Blvd and Miller Rd intersection is anticipated to be a roundabout at this point in development. It was discussed that a roundabout north of SR 101L would also be a safe assumption.
      - George Williams added that the preference would be to have roundabouts on both ends of Miller Rd.
      - With roundabouts on both sides, speeds above 40mph will be unlikely, thus 40 mph is a good design speed.
  - Design Speed
    - George Williams mentioned that 40 mph is a good starting point for the Miller Road design speed.
    - Currently, the adjacent land use is a mixture of high density residential and commercial/industrial
      - Mark Edelman added that the land use along the freeway is anticipated to be mixed use commercial/corporate.
    - Bob Hazlett reached out to Brian Bombardier with HDR during the meeting and confirmed that the design speed chosen for the Miller Road MAG Study was 45 mph.

- Paul Basha added that the generous curve alignment and design speed of 45 mph should be evaluated to ensure we are providing sufficient sight distance along the curve under the bridge.
- Paul added that it may be worth evaluating the use of a different design speed for horizontal than vertical design.

- Horizontal/Vertical Alignment
  - Mark Edelman mentioned that an application has been submitted for development of the parcels in the area but has not been approved/finalized.
    - No parcel breaks have been defined/finalized at this point.
    - Subsequent to the meeting, Mark Edelman confirmed that there is recent interest in the land north and south of the SR 101L by developers and they are curious about the final alignment of Miller Road.
  - The team discussed the differences between the current ASLD alignment for Miller Road with the alignment that was shown in the MAG Study.
    - Bob Hazlett added that the alignment in the MAG study was chosen to avoid drainage and utility impacts.
    - The current ASLD alignment may have significant drainage impacts.
    - **Kimley-Horn to evaluate horizontal alignment options to minimize impacts while also accommodating ASLD mayo alignment**
    - **Kimley-Horn will also follow up with Brian Bombardier to better understand the criteria that drove the HDR alignment recommendation shown in the MAG Study.**
  - Utilities
    - Paul Basha asked if the Miller Rd alignment was adjusted if the existing utility sleeves could be protected in place. Zach Schmidt confirmed that they could be saved but the impacts to drainage would need to be evaluated.

- Structures
  - Kevin Kimm stated that the bridge type will need to be acceptable to ADOT for maintenance and availability.
  - Several different bridge types will be evaluated for constructability.
    - The challenges associated with the weight of precast components will be worked through with FNF.
    - Dave Locher added that the bridge type is not big priority.
    - Constructability will be one of the bigger priorities for ADOT.
    - Paul Basha asked if there were any prohibited bridge types.
      - Dave Locher added that he does not know of any prohibited bridge types and added that ADOT is open to a variety of alternatives.
      - Kevin Kimm added that he does not anticipate any special bridge types being needed that ADOT is not already familiar with.
    - Dave Leistiko added that there are different types of Caltrans bridges, such as bulb tees and others, that could be used over structural steel.
    - **Kimley-Horn will work with Dave Benton to make sure they are comfortable with recommendations**

Miller Road/SR-101L OVERPASS CONSTRUCTION
Alternatives Analysis

- Dave Locher – Are sound walls necessary on the bridge? Likely not with commercial on both sides. Walls will be necessary if the land use changes to residential.
- The current SR 101L DCR does not show sound walls in this area. Planned commercial land use would necessitate maximizing visibility to each parcel.

- Drainage
  - Zach Schmidt mentioned that the design should be able to protect the new sump crossing from offsite runoff because the alignment runs along a small highpoint.
  - Zach Schmidt added that the new crossing will need to accommodate the future Miller Road channel and other future drainage improvements.
  - Paul Basha asked if the capacity of the existing box culverts under the SR 101L has been evaluated
    - Zach Schmidt answered that the box culverts are most likely oversized providing excess capacity since the newer Flow2D hydrologic methods are more accurate and less conservative than older hydrologic methods.
  - Paul Basha asked if the contract of this project includes evaluation of the capacity of the existing box culverts.
    - Zach Schmidt mentioned that Kimley-Horn will evaluate the capacity of the existing box culverts.
    - David Rutkowski added that Kimley-Horn is scoped to evaluate any/all constraints that may affect the chosen bridge alternatives.
    - Paul Basha added that now would be the appropriate time to address the box culverts if it is determined that the culverts need more capacity for future conditions.
  - A priority of this project will be to determine how to properly drain the sump. The preference will be to utilize a gravity drain and identify an outfall.
  - Paul Basha asked what the natural grade was. The natural grade is approximately 1.2%-1.5%.
- Utilities
  - There is an existing 16” water line the runs east-west through the parcel on the south side of SR 101L.
    - Mark Edelman added that the waterline will most likely be relocated under the Mayo alignment when the parcel is developed.
  - Mark Edelman mentioned that there are some sewer lines under Hayden Road.
  - The MAG Study showed a proposed utility sleeve corridor. **Kimley-Horn will coordinate with HDR regarding the utility sleeve corridor.**
  - Proposed utilities
    - Mark Edelman mentioned that a sewer line north of freeway may be in the planning stages.
    - **Kimley-Horn will coordinate with Chris Hassert at the City of Scottsdale Utilities/Wastewater Department.**
- Construction Phasing and MOT
  - Dave Locher mentioned that the preference would be to keep 3 general purpose (GP) lanes and 1 High Occupancy Vehicle (HOV) lane open during construction similar to SR 101L GPL project recently completed.

- Dave added that a reduction in lane width to 11' is acceptable and a worthwhile sacrifice.
- Bob Hazlett added that the aux lanes are typically closed during construction.
- Kim Carroll asked if a 1' buffer to temporary concrete barrier (TCB) would be acceptable.
  - David Rutkowski added that the 1' buffer would be limited to the bridge location and would widen out beyond bridge limits.
  - It was decided that since this analysis is for a study, 11' lanes with a minimum 2' shoulder should be used for the analysis. The shoulder should only be reduced if absolutely needed.
  - Dave Locher mentioned that the barrier itself is 2' wide and additional width is needed on the construction side of barrier.
- Bob Hazlett mentioned that the Miller Road bridge will be included with the SR 101L GPL project and construction will need to be accommodated within the phasing of the SR 101L project.
- Dave Locher mentioned that the ramps for Scottsdale Road and Hayden Road will likely be shut down for long periods of time for SR 101 GPL widening project.
  - Eric Waldo asked if there would be a benefit to coordinating the Scottsdale/Hayden ramp closures with the Miller Road bridge construction?
  - John Kissinger added that the frontage road is underutilized and could be used to direct traffic around ramp closures.
  - Paul added that the frontage road should be considered for directing EB traffic during EB closures (i.e. opposite direction)
  - Bob Hazlett recommend evaluating the closure of the WB Hayden Road on-ramp throughout the duration of construction.
    - David Rutkowski added that the WB Scottsdale Rd off ramp could be closed as well in this scenario. Paul Basha agreed.
  - Kevin Kimm added that if the bridge slide is chosen, the bridge will be temporarily built in the same location as the frontage road.
  - Paul Basha mentioned that the City is open to closing ramps as needed to construct the GPL lanes and Miller Road bridge.
    - Any closures should occur during the City's tourism off season.
    - Dave Locher mentioned that the ramp closures for Miller Road will likely be longer than typical ramp closures for GPL widening. Paul Basha agreed.
    - Dave Locher added that consecutive Traffic Interchange (TI) closures will not be allowed. He added that this strategy worked very well for the recently completed SR 101L project.
  - Kim mentioned that the SR 101L ADT is approximately 135,000 with a directional factor of approximately 56%.
- Kim Carroll mentioned that any closures for GPL lanes and/or Miller Rd should be bidirectional. The freeway cannot be closed in both directions simultaneously.
- It was discussed that the south and north side construction of Miller Road can be phased such that they do not immediately follow one another.

Miller Road/SR-101L OVERPASS CONSTRUCTION
Alternatives Analysis

- Paul Basha mentioned that the traffic analysis for this project should determine the difference in delay due to the Miller Road construction and the delay associated with only the GPL construction.
- Bob Hazlett mentioned that the MAG cashflow indicated that the SR 101L, SR-51 to Pima Road construction is anticipated to begin in April 2020 and the duration is estimated to be 18-24 months. Bob added that these dates are subject to change.
  - The MAG cashflow shows $20 Million of total funding available for the Miller Road Bridge Project with $14.07 million coming from the region and $6 million coming from Scottsdale which equates to a 70/30 match, (70% from the region, 30% from Scottsdale).
  - Paul Basha mentioned that the City may contribute more if needed.
- Paul asked the team to consider constructing a disposable frontage road on the south side of SR 101L.
  - George Williams added that the benefit of using Mayo Blvd would be to build some of the ultimate Mayo Blvd with this project.
  - In this scenario, EB traffic could get off on 64th St and drive south to Mayo Blvd to go east since the through movement capacity at Scottsdale Road is greater than the left turn capacity from southbound Scottsdale Road.
  - These movements would be preferred over having traffic exit on Scottsdale and then trying to make a quick left at Mayo Blvd.
- Kim Carroll mentioned that the AM peak period is more condensed (school and work start about the same time) while the PM peak period is more spread out (school lets out at different times than work).

- Lighting
  - Dave Locher mentioned that the intent would be to keep roadway lighting functional throughout construction.
- FMS
  - Dave Leistiko added that the depth of trunk line is expected to be about 4' deep.
  - Dave Leistiko asked how difficult it would be to drop the FMS below Miller Road. John Kissinger mentioned it is not difficult but can be expensive.
  - Dave Locher mentioned that ADOT does not want to introduce new splices into the FMS trunk line unless it is necessary.
  - Dave Locher also asked if there is other fiber in the conduits? **Kimley-Horn will evaluate.**
- Right of Way
  - When the ultimate R/W for Miller Rd is acquired by the City, it will need to be advertised for 10 weeks
  - Mark Edelman mentioned that it is better to assume more land is needed early than to come back for more later.
- Environmental
  - Mark Edelman mentioned that the State Land parcels were cleared for archaeology more than 10 years ago and would need to be updated.
  - Mark Edelman will provide the team with the jurisdictional determination limits.
  - Mark Edelman will provide the locations of historical arch sites in the area if they exist.

- Future Projects
  - MAG is currently studying SR 101L access from Hayden Road to Raintree Drive
    - Quinn Castro mentioned they are waiting for a final draft. Once it is finished, it will be available to the public. It is expected to be available in the next few weeks.
- Construction Schedule
  - Construction currently anticipated to begin in April 2019

VI. RATING CRITERIA AND RELATIVE IMPORTANCE OF CRITERIA

- David Rutkowski provided an explanation of the rating criteria and their relative importance
  - Bob Hazlett mentioned that the list was comprehensive but suggested to check the recent Cost Risk Assessment (CRA) from the SR 101 to see if there are additional criteria listed. **Quinn Castro will provide Kimley-Horn with the CRA.**
  - George Williams mentioned that it may be worth evaluating each alternative for throwaway improvements vs. permanent improvements.
    - **Kimley-Horn to work with the City to determine if it should be added as an additional criterion.**
  - Eric Waldo asked what would be considered as an aesthetic concern.
    - David Rutkowski mentioned that the bridge type may be an aesthetic concern.
    - Eric Waldo asked if there is much difference between various alternatives when it comes to the impact to developable land. He mentioned that the footprint appears to be pretty much set by the horizontal and vertical alignment.
      - Kevin Kimm mentioned that the profile will vary based on the bridge alternative that is chosen. Paul added that the variation in profile could affect the amount of developable land available.
      - Mark Edelman added that land costs in the area will likely be on the higher end.
      - Paul Basha mentioned that the criteria should be kept at this point because there may be large variability in bridge construction options.
- Relative Importance of criteria
  - Paul provided the example that if the cost is low, cost will likely not be important; however, as the cost starts to rise, the importance starts to rise exponentially.
- David Rutkowski added that the questionnaire will be sent out in the next week or two.

VII. PRELIMINARY BRIDGE CONSTRUCTION ALTERNATIVES

- Phased conventional construction
  - Kevin Kimm provided an overview of the conventional construction options and the associated phasing. Two phasing options were discussed:
    - Northside/Southside Phasing
    - Inside/Outside Phasing
  - Dave Leistiko mentioned that the conventional construction options work because the bridges will be built on soffit which allows for temporary pavement.
  - Bob reiterated his preference to shut down Scottsdale and Hayden Ramps throughout the bridge construction to avoid merging issues.

Miller Road/SR-101L OVERPASS CONSTRUCTION
Alternatives Analysis

  - Paul Basha mentioned that the inside/outside phasing seems to make the most sense.
    - The team agreed that the north side/south side phasing option should be eliminated.
    - Greg Harasha from FNF agreed that the inside/outside phasing was the better option from a constructability standpoint since it more closely matches the phasing for the rest of the GPL project.
- Expedited Bridge Construction
  - Bridge Slide
    - Kevin mentioned that there is plenty of room to construct the bridges offline.
    - Kevin added that closures will be needed to construct the foundations (approximately 4 drilled shafts for each abutment).
      - It is anticipated that 2 weekend closures for each direction would be needed to drill the foundations.
      - 1 weekend closure per direction would be needed to slide the bridge into place.
    - Dave Leistiko added that the bridge slide would be about 55-60 feet if the traffic was moved to the inside using the inside/outside phasing.
      - The slide would be about 95 feet if traffic was not shifted to the inside and was instead maintained in its current location.
    - Kevin Kimm added that construction of the bridge anchor slabs and approach slabs would complicate the phasing. However, this will be a challenge for all options that include a bridge.
      - It was also noted that the slide could be used for one direction (likely EB) with conventional construction used for the other direction. However, this would require the north side/south side phasing concept which would further complicate the issue.
  - Prefabricated Bridge elements
    - Pre-decked units
      - Kevin mentioned that since these bridges are very wide, there would likely be many individual pieces (because of weight). This would lead to a lot of closure pours/joints.
    - The anticipated closures would be similar to the bridge slide for construction of anchor/approach slabs.
  - Self-Propelled Modular Transport
    - Kevin Kimm mentioned that the benefit to this method is that a temporary substructure would not be required. However, the cost would be very high.
  - Precast Segmental Arch Structure
    - Dave Leistiko mentioned that the pieces for the segmental arch are about 4-5 feet wide because of the weight. Thus, about 20 pieces would be required for each bound.
    - Kevin added that the timing of placing pieces would be critical and the feasibility would depend on how many pieces can be placed in one weekend.
    - It was added that this alternative potentially reduces the number of closures depending on how fast they can be placed.

        - Paul asked how many pieces would be needed when compared to the prefabricated bridge elements. Kevin estimated the arch would require about twice as many pieces.
      - Dave Leistiko added that the curvature of the arch and the need to provide 16½ feet of clearance over the entire drivable area of Miller Road would push the profile of Miller Road down about 5 more feet when compared to the other options.
  - Precast 3-sided box slide
    - Kevin mentioned that the flat top of the box reduces the amount of profile drop needed when compared to the arch option.
    - Kevin added that additional excavation associated with installation of the footings will be the biggest challenge.
  - Precast Box Culvert Jacking
    - Eric Waldo asked if another project has been done with a box of this size
      - David Leistiko and Kevin Kimm mentioned that they were not aware of one.
    - It was mentioned that because of the floor associated with the box, the height of box gets larger to accommodate the vertical curve in the profile.
    - Zach added that the low point in the profile would need to be located outside of the box to be able to drain the sump.
  - Tunneling
    - Cost will make this option prohibitive.
    - Dave Locher suggested considering a middle pier to reduce the weight of the precast deck components.
      - Kevin Kimm agreed that it is an option but added that it would add more foundation work thus increasing the number of closure pours.
        - The balance between additional closure pours will need to be weighed against the reduce number of precast elements.
      - Eric Waldo mentioned that since there will be a median of some sort under the bridge, adding a pier in the middle would not be a big concern anymore.
        - Kevin Kimm added that a narrow pier wall could be used to minimize the median width.
      - Dave Locher added that a median pier would also reduce the bridge thickness and foundation depths.
- The team discussed all the alternatives and agreed to remove the following alternatives from the analysis:
  - Tunneling
  - Precast Box Culvert Jacking
  - SPMT
- Eric Waldo mentioned that the additional depth needed for the precast segmental arch structure may keep it from being a feasible alternative. **The team agreed that Kimley-Horn should perform some additional research on the arch alternative before the alternative is removed from the analysis.**
  - Bob Hazlett reiterated that cost is an important consideration and added that the Region will not contribute more money than is budgeted ($14 Million) to the project.

Miller Road/SR-101L OVERPASS CONSTRUCTION Alternatives Analysis

      - Paul Basha added that the City might contribute more money if it is needed.
    - Bob added that $54.4 million is funded for the widening of SR 101L from SR 51 to Pima Rd
      - Bob Hazlett added that cost overruns on that project, due to the construction of this project, will need to be accommodated by this project and that MAG will not contribute more funds than budgeted for the entire project ($68.4 Million).
- The question was asked about how much money is available from the Federal Government for Accelerated Bridge Construction (ABC).
  - David Rutkowski mention that, per direction from FHWA, there is up to $1 million additional funding that can be applied for if you are using ABC.
  - David Leistiko added that FHWA may be open to contributing more funds for ABC based on the recent success on the Sacramento Wash project.

VIII. ATTACHMENTS

- Sign-In Sheet
- Meeting Packet

Kimley»Horn

SIGN-IN SHEET & DISTRIBUTION LIST

PRESENT	NAME	COMPANY/SECTION	PHONE	ADDRESS/email
SCOTTSDALE CONTACTS				
✓	Eric Waldo	**City of Scottsdale - Capitol Improvements**	Ph (480) 312-7245	EWaldo@Scottsdaleaz.gov
	Paul Basha	**City of Scottsdale - Transportation**	Ph (480) 312-7651	pbasha@ScottsdaleAZ.gov
	Dave Lipinski	**City of Scottsdale - Capital Project Management**	Ph (480) 312-2641	dlipinski@scottsdaleaz.gov
✓	Kory Ekblaw	**City of Scottsdale - Preserve**	Ph (480) 312-7064	kekblaw@scottsdaleaz.gov
✓	George Williams	**City of Scottsdale - Transportation**	Ph (480) 312-7623	gwilliams2@scottsdaleaz.gov
	Phil Kercher	**City of Scottsdale - Transportation**	Ph (480) 312-7645	pkercher@scottsdaleaz.gov
		-	Ph	
		-	Ph	
		-	Ph	
		-	Ph	
OTHER AGENCIES / ENTITIES				
	Dave Benton	**ADOT Bridge Group**	Ph (602) 712-7910	dbenton@azdot.gov
	Ron McCally	**ADOT PMG**	Ph (602) 712-7646	rmccally@azdot.gov
	David Locher	**ADOT Construction District**	Ph (602) 712-2317	dlocher@azdot.gov
	Scott Orrahood	**ADOT Traffic**	Ph (602) 712-7800	sorrahood@azdot.gov
	Bob Hazlett	**MAG**	Ph (602) 254-5026	bhazlett@mag.maricopa.gov
	Quinn Castro	**MAG**	Ph (602) 254-6300	qcastro@azmag.gov
	Tom Deitering	**FHWA Project Delivery**	Ph (602) 382-8971	thomas.deitering@dot.gov
	Eunice Chan	**FHWA Area Engineer**	Ph (602) 382-8965	eunice.chan@dot.gov
	Mark Edelman	**ASLD**	Ph (602) 542-6331	medelman@azland.gov
	Max Masel	**ASLD Director**	Ph (602) 542-3000	mmasel@azland.gov
	Wesley Mehl	**ASLD Deputy Commissioner**	Ph (602) 542-4621	wmehl@azland.gov
	Scott Nodes	**ADOT Traffic**	Ph (602) 712-7766	snodes@azdot.gov
	Tom Tarbet	ADOT TRAFFIC	(602) 712-7995	Ttarbet@azdot.gov
			Ph	
			Ph	
CONSULTANT TEAM				
DMR	David Rutkowski	**Kimley-Horn and Associates**	Ph (602) 216-1271	David.Rutkowski@Kimley-Horn.com
KK	Kevin Kimm	**Kimley-Horn and Associates Structures**	Ph (602) 216-1202	Kevin.Kimm@Kimley-Horn.com
DL	Dave Leistiko	**Kimley-Horn and Associates Structures**	Ph (602) 906-1124	Dave.Leistiko@Kimley-Horn.com
	Robert Lyons	**Kimley-Horn and Associates Utilities**	Ph (602) 678-3440	Robert.Lyons@Kimley-Horn.com
JK	John Kissinger	**Kimley-Horn and Associates Traffic**	Ph (602) 906-1135	John.Kissinger@Kimley-Horn.com
ZS	Zach Schmidt	**Kimley-Horn and Associates Water Resources**	Ph (602) 906-1116	Zach.Schmidt@Kimley-Horn.com
TE	Taylor Ehrick	**Kimley-Horn and Associates Roadway Design**	Ph (602) 906-1151	Taylor.Ehrick@Kimley-Horn.com
	Steve Haney	**Kimley-Horn and Associates Land Development**	Ph (602) 906-1121	Steve.Haney@Kimley-Horn.com
KK	Kim Carroll	**Kimley-Horn and Associates Traffic**	Ph (602) 906-1122	Kim.Carroll@Kimley-Horn.com
GCH	Greg Harasha	**FNF Construction Construction Estimating**	Ph (602) 571-4612	Greg.Harasha@fnfinc.com
	Shawn Sheble	**FNF Construction Construction Estimating**	Ph (480) 784-2910	Shawn.Sheble@fnfinc.com

Distribution Date: Monday, July 24, 2017

From: David Rutkowski, Kimley-Horn and Associates, Inc.

Meeting Date: Tuesday, June 27, 2017

Meeting Time: 1:00 pm

Location: City of Scottsdale
Agave Conference Room, 2nd Floor, NE corner
7447 E. Indian School Rd., Suite 205
Scottsdale, AZ 85251

Subject: 2017-029-COS / Stakeholder Meeting for Miller Rd. Overpass Const. Alternatives Analysis Workshop #2

The following meeting notes for the Miller Road Overpass Construction Alternatives Analysis project are for your information, use, and distribution. Please contact David Rutkowski (david.rutkowski@kimley-horn.com) at (602) 216-1271 if you have comments or questions. The team list/sign-in sheet is also included following the notes. If there is any missing information or addition to the notes, please let David know.

I. ACTION ITEMS

II. INTRODUCTIONS

- Attendees were self-introduced and confirmed contact information.
- Consultant Team
  - Kimley-Horn — Prime Consultant
  - FNF Construction — Cost Estimation and Constructability
  - Hugh Boyle Engineering — Expedited Bridge Design
  - Pat Fly — Precast Specialist
- Stakeholders
  - City of Scottsdale
  - Arizona Department of Transportation (ADOT)
  - Maricopa Association of Governments (MAG)- Quinn Castro
  - Arizona State Land Department (ASLD)
  - Federal Highways Administration (FHWA)- Eunice Chan

III. PROJECT OVERVIEW

This project is a Construction Alternatives Analysis (CAA) for the Miller Road alignment SR-101L (Pima) freeway overpass (SR101L over Miller Road). Design-Build construction method is set as the basis for the alternative comparisons and will focus on identifying and selecting a preferred design for the overpass. Box jacking was thrown out early after discussions with ADOT leaving four construction alternatives that were evaluated; included the following:

- Conventional Construction
- Bridge Slide
- 3-Sided Box Slide
- Precast Arch Structure

Miller Road/SR-101L OVERPASS CONSTRUCTION
Alternatives Analysis

The preferred construction concept that is identified in this study will be presented to the Arizona Department of Transportation (ADOT) for incorporation into the upcoming SR-101L, I-17 to Princess Drive general purpose lanes (GPL) widening project which is anticipated to start design in the summer of 2017 and go to construction in April 2019.

IV. GOALS AND OBJECTIVES

- David explained that the goal of the study was to determine how much flexibility would be provided to the contractor to construct the bridge? (Schedule, mobility of public, etc)
- David added that the goal of today's meeting was to go over the data/numbers and get feedback from the attendees.

V. STUDY PROGRESS

- Alignment Determination
  - MAG study vs. ASLD vs. Kimley-Horn Alignment
    - The revised Kimley-Horn alignment nearly matches the original ASLD alignment and avoids impacts to the existing utilities, box culvert and DMS sign structure.
- Offsite Drainage Analysis
  - Zach Schmidt provided an overview of the offsite drainage analysis.
    - Eric Waldo added that the general topography is flowing from the northeast to the southwest and this project will be intercepting a portion of that runoff and will pick it up on the west side of Miller Road. Once Miller Road starts to dive under the SR101L, it will be difficult to convey offsite water under Miller Road.
      - Zach Schmidt responded that most of the water being intercepted will be directed to the box culverts on the east side of Miller Road. There will be a small watershed area crossing under Miller Road and most of the water will cross Miller Road north of the proposed roundabout where the road is nearly at grade.
- Project Footprint
  - Rashidul Haque asked about the footprint of the project and David Rutkowski clarified that this project will only incorporate the Miller Road crossing at the SR 101L. The remainder of Miller Road will be constructed at a later date by developers.
  - Rashidul Haque asked if the project will be completely contained within ADOT R/W.
    - David Rutkowski answered that it would depend on the alternative chosen.
    - Rashidul added that the Design Concept Report (DCR) for the SR 101L had a Categorical Exclusion (CE) done that did not include areas outside of ADOT R/W.
- Relative Importance
  - David Rutkowski explained that there was a bit of overlap between the original evaluation criteria. As a result, the criteria were revised and consolidated and David explained the process and logic behind consolidating criteria.
    - Eric Waldo added that some of the criteria were combined because there was little to no variation in impact to the criteria among the different alternatives. Also, some of the lower rated criteria were lumped together.

VI. ALTERNATIVES OVERVIEW

- **Alternative 1 - Conventional Bridge**
  - Kevin Kimm provided an overview of the Conventional Bridge Alternative.
  - The following assumptions were made during the analysis of the conventional bridge alternative:
    - Construction is assumed to occur at the beginning of the Design-Build (D/B) project outside of the Scottsdale Event Schedule.
    - It was assumed that the ramps for Scottsdale Rd and Hayden Rd would be closed during the construction of the Miller Road bridge.
    - Rashidul Haque asked if the preferred construction time extends from April to the end of September?
      - David Rutkowski and Paul Basha both confirmed that this would be the preferred construction time for the Miller Road Overpass.
  - Some of the pros for this alternative include the following:
    - Traffic control for the conventional bridge alternative matches anticipated traffic control for SR 101L GPL project.
    - The approach and anchor slabs can be constructed at the same time the bridge is being constructed.
    - The HOV lane can be maintained throughout the entire duration of the project
    - The overall project cost is the lowest of the four alternatives.
      - Kim Carroll added that all the costs were calculated as an increase over costs associated SR101L GPL project.
      - Rashidul Haque asked if the traffic control costs are exclusive of the SR-101L GPL project?
        - Kevin Kimm confirmed that they are.
  - Some of the cons for this alternative include the following:
    - The bridge construction duration is the longest and overlaps into the Scottsdale Event Schedule.
      - Greg Harasha mentioned that the total duration could be reduced by about one month because bridge construction is very man-hour driven. The construction could be accelerated by allocating more manpower to the bridge construction.
  - Rashidul Haque asked about the approximate length of the structure?
    - Kevin Kimm answered that the bridge was about 90 feet long.
  - Rashidul Haque asked what the borrow quantity was for Alternative 1.
    - David Rutkowski answered that the borrow quantity is approximately the same as what would be needed for the SR-101L GPL project.
    - Hugh Boyle added that there is a potential to provide a gap between bridges to reduce the temporary pavement quantity and avoid the inside shoulder width design exception and provide some natural light on Miller Road under the SR-101L.

Miller Road/SR-101L OVERPASS CONSTRUCTION
Alternatives Analysis

- **Alternative 2 - Bridge Slide**
  - Kevin Kimm provided an overview of the bridge structure and the different slide options available.
  - *Drilled Shaft Construction*
    - Kevin provided an overview of the drilled shaft construction process that would need to occur over a weekend closure.
    - Kim Carroll added that all weekend closures would be directional, meaning that eastbound (EB) and westbound (WB) SR 101L would not be closed simultaneously.
    - Paul Basha asked if the contractor would need to drill through the PCCP?
      - Kevin Kimm answered that they might but added that the contractor would likely saw cut the PCCP, drill the shafts, backfill and place temporary pavement.
      - Rashidul Haque asked if all this work would occur over one weekend closure.
      - Kevin Kimm confirmed that it would occur over one weekend closure per direction.
    - John Kissinger asked if multiple shafts could be drilled simultaneously.
      - Kevin Kimm and Greg Harasha confirmed that they could since the drilled shafts are separated by a large amount of distance.
    - Dave Locher asked how deep the drilled shafts were?
      - Kevin Kimm answered that they would likely be about 50-60 feet since the first 15 feet of the drilled shaft would eventually be exposed when Miller Road was constructed.
      - Kevin added that the drilled shafts would be 4-5 feet in diameter. 5-foot diameter drilled shafts are shown in the estimates.
      - Dave Locher voiced concern regarding the amount of time available in a weekend to perform all the work needed to install drilled shafts, including time to drill the shafts, place the rebar cage, pour the concrete, cure the concrete, backfill and place temporary pavement.
        - Greg Harasha answered it could be done if foam was used for backfill or multiple drilling rigs were used and various other strategies.
      - Paul Basha asked Dave Locher to expand on his biggest concern regarding the drilled shaft timing?
        - Dave Locher responded that ADOT is very concerned with the SR 101L not being opened to traffic on Monday morning. He added that detours in the area are not sufficient to accommodate the Monday morning freeway traffic and mentioned that the town would likely experience gridlock if the SR 101L is not opened on Monday morning.
    - Paul Basha asked if the drilled shafts could be installed during the summer?
      - Rashidul Haque mentioned that construction may start as early as September of 2018 as opposed to April 2019, which was the start date assumed for the study.
      - It was confirmed that if construction started in September 2018, the drilled shafts could be installed in September 2018 prior to the Scottsdale Event Season. The rest of the bridge construction would occur during the summer of 2019.

- Dave Locher asked if traffic could be consolidated down to 2 lanes to avoid weekend closures?
  - Kevin Kimm answered that traffic could be moved to the outside lanes to install the inside drilled shafts and then do the reverse to install the outside drilled shafts.
  - David Rutkowski added that there will already be full closures for GPL lanes project to set up traffic control and the intent would be to install the drilled shafts during those weekend closures.
- Paul Basha added that the risk of the drilled shaft installation spilling over into a Monday morning would need to be evaluated further.
  - Greg Harasha commented he is not overly concerned with the drilled shafts spilling over into Monday because if something went wrong, the contractor would just backfill the hole and place temporary pavement to ensure the road was opened Monday morning.

○ *Lane Configuration*

- Rimpal asked what the current lane configuration on SR-101L is.
- David Rutkowski answered that the current lane configuration is 3 general purpose lanes with an HOV lane (3+1) and an auxiliary lane.
- Rimpal asked what the lane configuration was for the recent SR 101L GPL project that was constructed between Shea Blvd and SR 202L.
  - Dave Locher answered the lane configuration during construction of that project was 3+1 for the entire length.
- Rimpal asked if the City of Scottsdale would be ok with three (3) lanes in each direction for a short period of time, such as 3 weeks.
  - Paul Basha answered that the City would be ok with it but added that the decision would be up to ADOT.
  - Rashidul Haque answered that the decision would need to be discussed internally at ADOT.
  - It was mentioned that Madhu Reddy had mentioned that it was done on the Black Mountain Blvd at SR 101L project.
  - Paul Basha added that the City of Scottsdale's traffic is very seasonal and the impact would depend on time of year.
  - David Rutkowski added that the temporary pavement quantities are not prohibitively large (15-16 feet wide) so there likely wouldn't be a need to reduce to three lanes.

○ *Anchor/Approach Slab Construction*

- Paul Basha asked about the benefits of providing an extra week of cure time for the PCCP in regard to the long-term quality of the freeway.
  - Greg Harasha answered that the longer PCCP is given to cure, the less cracking there will be. He added that ADOT anchor slabs often have cracking issues during traditional construction.
- Hugh Boyle asked what the anchor slab was for.
  - Kevin Kimm and Greg Harasha answered that the anchor slabs are installed to prevent the PCCP from expanding/contracting against the approach slabs and pushing the approach slabs up against the bridge.

CITY OF SCOTTSDALE
Miller Road/SR-101L OVERPASS CONSTRUCTION
Alternatives Analysis

○ *Construction Schedule*

- David Rutkowski said that additional time was included in the construction schedule for the bridge slide alternative to finish the frontage road bridge after the mainline bridges were slid into place.
  - Kevin Kimm added that because of the slide and the WB bridge being constructed off the mainline, the frontage road bridge cannot be built until after the mainline bridge is slid into place.
- Rashidul Haque asked if the frontage road bridge was included in Alternative 1
  - Kevin Kimm confirmed that it was and added that it is assumed to be constructed at the same time as the mainline bridges.
- Paul Basha asked how long it would take to construct the bridge prior to the slide.
  - Kevin Kimm answered that it would take about three (3) months +/- and added that it would constructed completely offline with no impact to traffic.
  - Rashidul Haque asked if the timeframe for the bridge construction could be accelerated.
    - Greg Harasha mentioned that the bridge construction could be accelerated by throwing more manpower at it. He also added that the approach and anchor slabs could be constructed in as little as a week with additional manpower. However, he added that more time usually results in better quality and safer work conditions.
- Paul Basha asked if all the weekend closures could occur during the summer or if some would move into fall.
  - Kevin Kimm answered that all weekend closures would occur during the late spring/summer.
  - David Rutkowski added that it was assumed that the closures would only be allowed during the off-peak season.
  - Paul Basha mentioned that there is some variation in the event season duration and that the event season could be considered to start in November and end at the end of March.

○ *Bridge Slide Complexities*

- Hugh Boyle added that the proposed slide is not a simple slide since it is occurring on top of individual drilled shafts.
  - Eric Waldo asked Hugh Boyle to expand on the complexity associated with the drilled shafts.
  - Hugh Boyle answered that contractors typically like to have one continuous sliding surface
- Paul Basha asked Hugh to expand on the risks involved with sliding a bridge.
  - Hugh Boyle responded that it really depends on the contractor. He added that if the slide is planned well with good oversight, it typically goes well. In Hugh's experience, problem slides are typically a result of poor planning and management.
  - Hugh Boyle added that a very solid/controlled survey is needed.

- Paul Basha asked what the worst-case consequence would be if something went wrong?
  - Hugh Boyle responded that the delay would be a few weeks at the most. He added that in his experience, the delay is usually limited to a single day, such as a weekend closure spilling into Monday.
  - Rashidul Haque asked if there were statistics associated with bridge slide failure and/or delay?
- Hugh Boyle answered that of the 20+ bridge slides he has worked on, only one bridge slide experienced a delay, which was limited to about 12-15 hours.
  - Hugh added that he has not heard of any real big issues with bridge slides throughout the country
- Dave Locher asked if both bridges could be slid into place from the south to avoid shutting down the frontage road.
  - Hugh Boyle answered it could be done but it would take longer
  - Kevin Kimm asked if could it still be done in one weekend?
    - Hugh answered that it would be more difficult and it would add the risk of having both traffic directions shut down on Monday morning.

○ *Accelerated Bridge Construction (ABC)*

- Paul Basha asked about the criteria for ABC funding?
  - Eunice Chan mentioned that to qualify for ABC funding, the bridge slides would need to occur within a small enough window. Eunice was unsure what the exact time frame would need to be.

○ *Additional Discussion*

- Paul Basha asked how much time there was between phases 5 and 7.
  - Kevin Kimm answered 2 weeks.
- Rashidul Haque asked if any geotechnical information was available.
  - David Rutkowski answered that per original SR 101L project, the soils appeared to be typical of the Phoenix area, such as cobbles with no notable resistance or drilling difficulty noted.
  - Rashidul asked about the timing of the geotechnical investigation.
    - Kevin Kimm responded that all the alternatives would require sufficient geotechnical investigation during final design.
- Rashidul Haque asked how much effort has been put into environmental clearance for this area and asked if the NEPA process has been started for any other projects in the area.
  - Paul Basha answered that not much environmental investigation has been done in the area. Mark Edelman added that the previous SR 101L project may have been locally funded.

- **Alternative 3 - Box Slide**

○ *Construction Schedule*

- Rimpal asked how long the HOV closure durations would be for this alternative.
  - David Rutkowski answered that the HOV closures are estimated to be about 1 week and 2 weekends.

CITY OF SCOTTSDALE
Miller Road/SR-101L OVERPASS CONSTRUCTION
Alternatives Analysis

- Eric Waldo asked how long it would take to install all the required shoring.
  - Kevin Kimm answered it would need to be done in one weekend but added that it was a large risk. He added that there is a lot of shoring cost built into estimate.
  - Paul Basha asked Dave Locher if he agreed with the shoring concerns and Dave agreed that the shoring appeared to be a big risk.

○ *Drainage Issues*

- Eric Waldo commented that since work will be occurring during the monsoon season, construction drainage will be a concern.
- Zach Schmidt explained why drainage improvements are needed for this alternative as opposed to the bridge alternatives.

○ *Box Slide Complexities*

- David Rutkowski added that there are concerns associated with sliding the box across the precast footings since they are multiple pieces.
  - Hugh Boyle commented that it would have the same risk as the bridge slide on the drilled shafts.

- Alternative 4 - Arch Structure

○ *ABC Funding*

- David Rutkowski asked Eunice Chan if the center arch structure was constructed in 12 days, would it qualify for ABC funding.
  - Eunice Chan answered it would need to be reviewed and evaluated to determine if it qualifies.

○ *Construction Schedule*

- John Kissinger asked if the 19 days of HOV closure were for each direction or total.
  - David Rutkowski answered that both HOV lanes would be closed at the same time for a total of 19 days.

○ Kevin Kimm commented that the arch structure would save money down the road when Miller Road is constructed because the walls would already be constructed as a part of the arch. There would not be a need to build soil nail walls as would be needed for the conventional bridge and bridge slide alternatives.

○ Rashidul Haque asked if the deeper profile worked with design speed of Miller Road.

- David Rutkowski confirmed that the profiles for all the alternatives worked with the selected design speed of Miller Road.

- Additional Comments/Discussions

○ *Intent of the Study*

- Rimpal asked if the intent of this study was to provide a recommended structure type for SR 101L Design-Build project?
  - Paul Basha answered that ADOT will make the decision of what to include in the RFP and added that the goal of the study is to identify a feasible alternative for ADOT and ADOT's contractor to consider.
  - Rashidul Haque added that this study will provide information to help ADOT set the criteria for the structure construction for the RFP, such as the allowable time to construct, the acceptable number of closures allowed, etc.

- *Right-of-Way*
  - Rashidul Haque also commented that the alternatives need to be evaluated more deeply regarding environmental clearance and added that although ASLD is supportive of the project, they may not necessarily be ready to hand over property.
    - Mark Edelman confirmed that ASLD is supportive of the project but added that per AZ Supreme Court decisions, ASLD cannot give land to ADOT without compensation.
    - He also added that per the urban lands act, necessary R/W could be attached to a land sale such that the land buyer would give R/W to the local agency.
  - Rashidul Haque asked what timeline was for acquiring R/W from ASLD.
    - Mark Edelman answered that R/W needs should be identified as soon as possible since demand for land is very high in the area.
    - Mark also added that access to the land can be provided quickly.

VII. ATTACHMENTS

- Sign-In Sheet

Kimley»Horn

SIGN-IN SHEET & DISTRIBUTION LIST

PRESENT	NAME	COMPANY/SECTION	PHONE	ADDRESS/email
SCOTTSDALE CONTACTS				
EWI	Eric Waldo	**City of Scottsdale - Capitol Improvements**	Ph (480) 312-7245	EWaldo@Scottsdaleaz.gov
PB	Paul Basha	**City of Scottsdale - Transportation**	Ph (480) 312-7651	pbasha@ScottsdaleAZ.gov
	Dave Lipinski	**City of Scottsdale - Capital Project Management**	Ph (480) 312-2641	dlipinski@scottsdaleaz.gov
	Kory Ekblaw	**City of Scottsdale - Preserve**	Ph (480) 312-7064	kekblaw@scottsdaleaz.gov
	George Williams	**City of Scottsdale - Transportation**	Ph (480) 312-7623	gwilliams2@scottsdaleaz.gov
	Phil Kercher	**City of Scottsdale - Transportation**	Ph (480) 312-7645	pkercher@scottsdaleaz.gov
OTHER AGENCIES / ENTITIES				
	Madhu Reddy	**ADOT Construction District**	Ph (602) 712-8965	mreddy@azdot.gov
	Yung Hsu	**ADOT Bridge Group**	Ph (602) 712-8613	shsu@azdot.gov
	Dave Benton	**ADOT Bridge Group**	Ph (602) 712-7910	dbenton@azdot.gov
	Ron McCally	**ADOT PMG**	Ph (602) 712-7646	rmccally@azdot.gov
DL	David Locher	**ADOT Construction District**	Ph (602) 712-2317	dlocher@azdot.gov
	Scott Orrahood	**ADOT Traffic**	Ph (602) 712-7800	sorrahood@azdot.gov
	Bob Hazlett	**MAG**	Ph (602) 254-5026	bhazlett@mag.maricopa.gov
QC	Quinn Castro	**MAG**	Ph (602) 254-6300	qcastro@azmag.gov
	Tom Deitering	**FHWA Project Delivery**	Ph (602) 382-8971	thomas.deitering@dot.gov
ec	Eunice Chan	**FHWA Area Engineer**	Ph (602) 382-8965	eunice.chan@dot.gov
MG	Mark Edelman	**ASLD**	Ph (602) 542-6331	medelman@azland.gov
	Max Masel	**ASLD Director**	Ph (602) 542-3000	mmasel@azland.gov
	Wesley Mehl	**ASLD Deputy Commissioner**	Ph (602) 542-4621	wmehl@azland.gov
	Scott Nodes	**ADOT Traffic**	Ph (602) 712-7766	snodes@azdot.gov
TT	Tom Tortice	**ADOT Traffic**	Ph (602) 712-7995	ttortice@azdot.gov
	Steve Boschen	**ADOT**	Ph (602) 712-7391	sboschen@azdot.gov
RH	Rashidul Haque	**AZDOT**	Ph (602) 712-7352	rhaque@azdot.gov
	Annette Riley	**AZDOT**	Ph (602) 712-4282	ariley@azdot.gov
CONSULTANT TEAM				
DRR	David Rutkowski	**Kimley-Horn and Associates Roadway Design**	Ph (602) 216-1271	David.Rutkowski@Kimley-Horn.com
KJK	Kevin Kimm	**Kimley-Horn and Associates Structures**	Ph (602) 216-1202	Kevin.Kimm@Kimley-Horn.com
	Dave Leistiko	**Kimley-Horn and Associates Structures**	Ph (602) 906-1124	Dave.Leistiko@Kimley-Horn.com
	Robert Lyons	**Kimley-Horn and Associates Utilities**	Ph (602) 678-3440	Robert.Lyons@Kimley-Horn.com
JCK	John Kissinger	**Kimley-Horn and Associates Traffic**	Ph (602) 906-1135	John.Kissinger@Kimley-Horn.com
ZDS	Zach Schmidt	**Kimley-Horn and Associates Water Resources**	Ph (602) 906-1116	Zach.Schmidt@Kimley-Horn.com
TE	Taylor Ehrick	**Kimley-Horn and Associates Roadway Design**	Ph (602) 906-1151	Taylor.Ehrick@Kimley-Horn.com
	Steve Haney	**Kimley-Horn and Associates Land Development**	Ph (602) 906-1121	Steve.Haney@Kimley-Horn.com
KC	Kim Carroll	**Kimley-Horn and Associates Traffic**	Ph (602) 906-1122	Kim.Carroll@Kimley-Horn.com
GCH	Greg Harasha	**FNF Construction Construction Estimating**	Ph (602) 571-4612	g.harasha@fnfinc.com
	Shawn Sheble	**FNF Construction Construction Estimating**	Ph (480) 784-2910	ssheble@fnfinc.com
	Joe Metrailer	**Kimley-Horn and Associates Roadway Design**	Ph (602) 371-4574	Joe.Metrailer@kimley-horn.com
HB	Hugh Boyle	**H. Boyle Engineering, Inc.**	Ph	hugh@hbe-bridges.com
BS	Rimrid Shek	ADOT, PMG	602 712-2167	BShek@azdot.gov

APPENDIX L

Alternative 1A – Conventional Bridge Plans

CITY OF SCOTTSDALE

PUBLIC IMPROVEMENTS

COUNCIL
W.J. "JIM" LANE, MAYOR
SUZANNE KLAPP
VIRGINIA KORTE
KATHY LITTLEFIELD
LINDA MILHAVEN
GUY PHILLIPS
DAVID N. SMITH

CITY MANAGER
JIM THOMPSON

CITY ATTORNEY
BRUCE WASHBURN

CITY CLERK
CAROLYN JAGGER

"AS-BUILT" CERTIFICATION

I HEREBY CERTIFY THAT THE "AS-BUILT" IMPROVEMENTS AS SHOWN HEREON ARE LOCATED AS NOTED, AND THE LOCATIONS ARE CORRECT TO THE BEST OF MY KNOWLEDGE AND BELIEF.

REGISTERED LAND SURVEYOR _____ DATE _____

CITY OF SCOTTSDALE

REVIEWED AND RECOMMENDED APPROVAL BY:

PAVING		STRUCTURES	
GRADING & DRAINAGE		BUILDING	
WATER & SEWER		PLUMBING	
TRAFFIC		MECHANICAL	
PLANNING IMPROVEMENTS		ELECTRICAL	
PLANNING FACILITIES		FIRE IMPROVEMENTS	
LANDSCAPE		FIRE FACILITIES	
NATIVE PLANT			

ENGINEERING COORDINATION MANAGER (OR DESIGNEE) _____ DATE _____

BUILDING OFFICIAL (OR DESIGNEE) _____ DATE _____

ENGINEER

ENGINEERING FIRM
LOGO & ADDRESS
GOES HERE

10/27/2017 2:32:36 PM DGN

MILLER ROAD/SR 101L OVERPASS CONSTRUCTION ALTERNATIVE ANALYSIS ALTERNATIVE 1A - CONVENTIONAL BRIDGE WITH RETAINING WALLS PROJECT NO. SC03B

NO CONFLICT SIGNATURE BLOCK

Utility	Utility Company	Name of Company Representative	Telephone Number	Date Signed
Electric				
Telephone				
Natural Gas				
Cable TV				
Water				
Sewer				

Engineer's Certification

I _____, as the Engineer of Record for this development, hereby certify that all utility companies listed above have been provided final improvement plans for review, and that all conflicts identified by the utilities have been resolved. In addition, "No Conflict" forms have been obtained from each utility company and are included in this submittal.

Signature _____ Date _____

Certificate of Approval to Construct — Maricopa County Environmental Services Department, Water and Waste Management Division

MCESD # _____

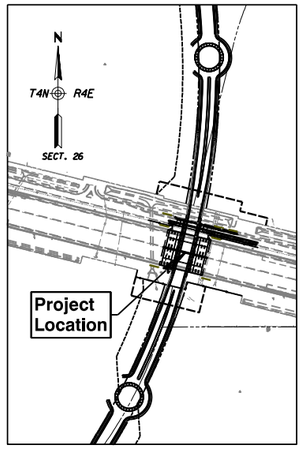
Public Water System ID Number 0407- (and/or) Waste Water System ID Number 0437-
Project Description:

Project Location:
Project Owner:

Pursuant to AAC Title 18: Chapter 4, Article 5: or AAC Title 18: Chapter 9, Article 8: and/or Maricopa County Environmental Health Code Chapters II or V. This certificate of Approval To Construct the above described facilities as represented in the attached plan is valid upon review and signature by a Maricopa County Environmental Services Department's representative given the following provisions.
1.) A Request for Certificate of Approval of Construction, together with an Engineer's Certificate of Completion, and sealed engineered as-built plans, shall be submitted to this Department prior to Approval of Construction and startup.
2.) The Approval to Construct is void if major modifications occur to the plans without the knowledge and consent of the department.
If Construction has not started within one year of the approval date, this certificate will be void. An extension of time may be available upon written request.

Approved By: _____ Date Approved: _____

CC: MCESD FILE: ADEQ
Engineer: AZ. Corp. Commission



Vicinity Map
N.T.S.

ALTERNATIVES ANALYSIS OCTOBER 2017

SHEET INDEX

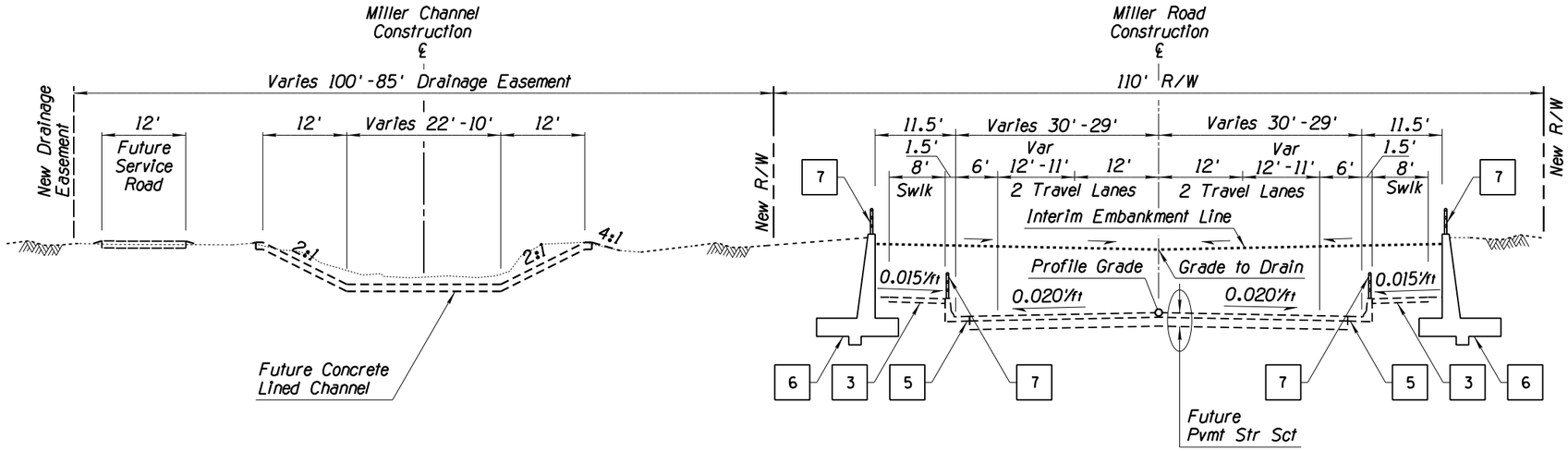
City of Scottsdale approved plans shall be kept on the job site at all times during the course of constuction.

ALTERNATIVE 1A - CONVENTIONAL BRIDGE W/ RETAINIG WALLS
PROJECT NO. SC03B

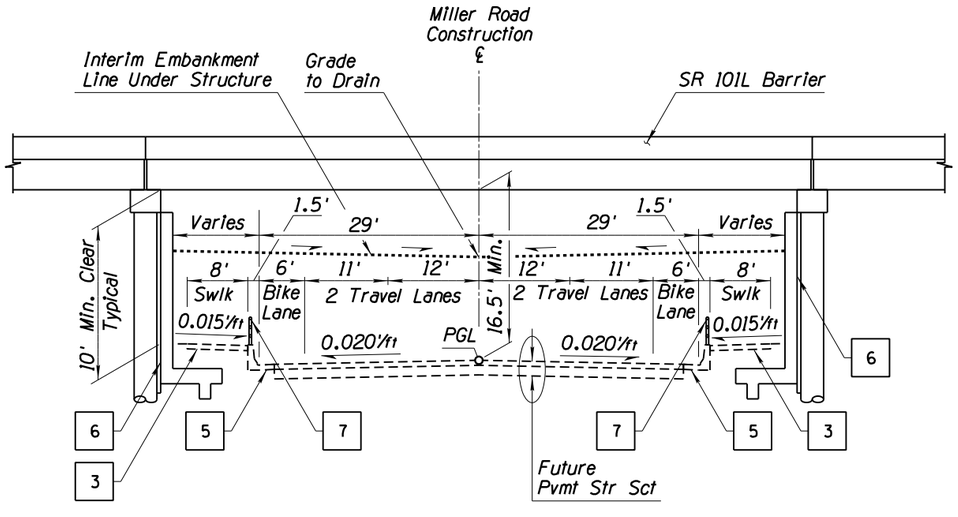
DR/STAFF APPROVAL NO. _____

PLAN REVIEW NO. _____

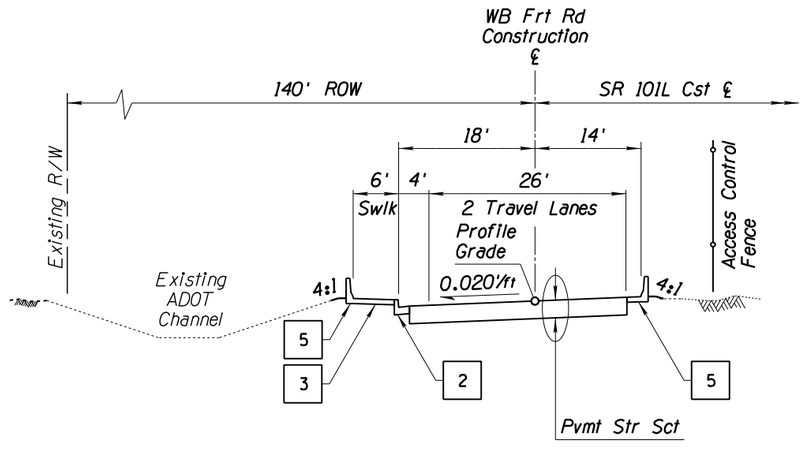
SHT. 1



TYPICAL SECTION
NORTH AND SOUTH OF SR 101L



TYPICAL SECTION
AT SR 101L AND WB FRONTAGE RD



TYPICAL SECTION
WB FRONTAGE RD

1. New Concrete Single Curb (See Plans for Type & Location)
2. New Concrete Curb & Gutter (See Plans for Type & Location)
3. New Concrete Sidewalk (See Plans for Type and Location)
4. New Median Treatment (See Plans for Type and Location)
5. New Concrete Half Barrier with Gutter (See Plans for Type and Location)
6. New Retaining Wall (See Plans for Location)
7. New Safety Rail (See Plans for Location)

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1-800-STAKE-IT
(OUTSIDE MARICOPA COUNTY)

DATE	REVISION	BY
ENGINEER: PRELIMINARY NOT FOR CONSTRUCTION OR RECORDING	PUBLIC WORKS CAPITAL PROJECT MANAGEMENT 7447 E. INDIAN SCHOOL RD. SCOTTSDALE, ARIZONA 85251	

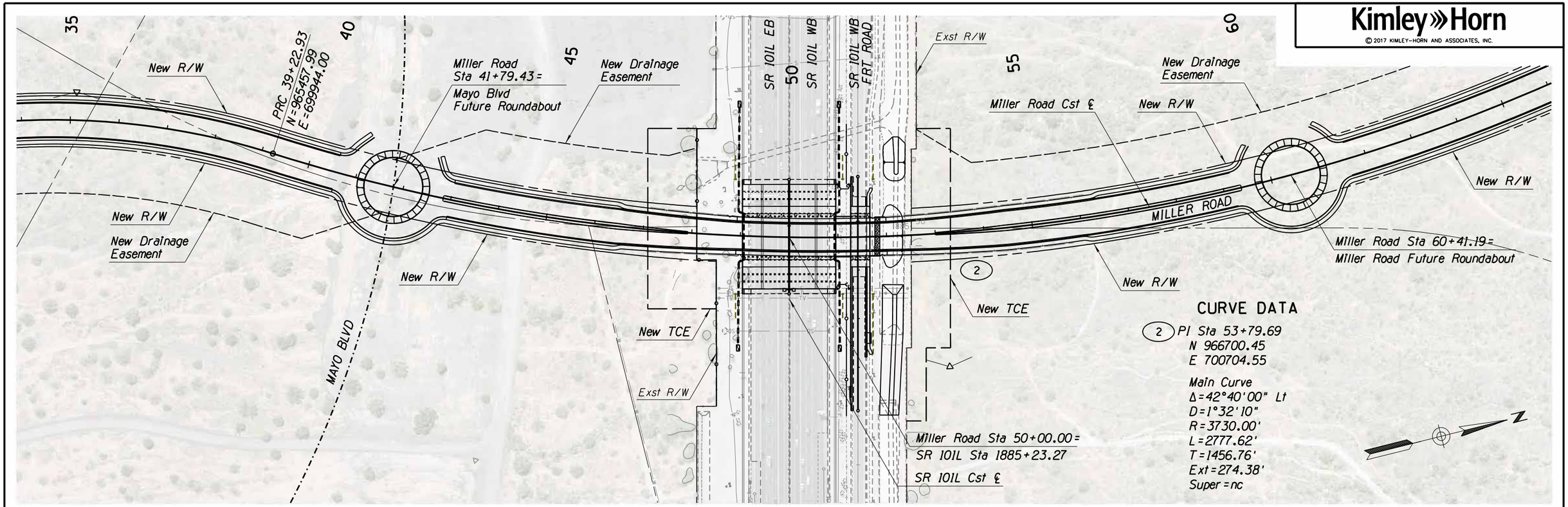
SHEET TITLE: TYPICAL SECTIONS

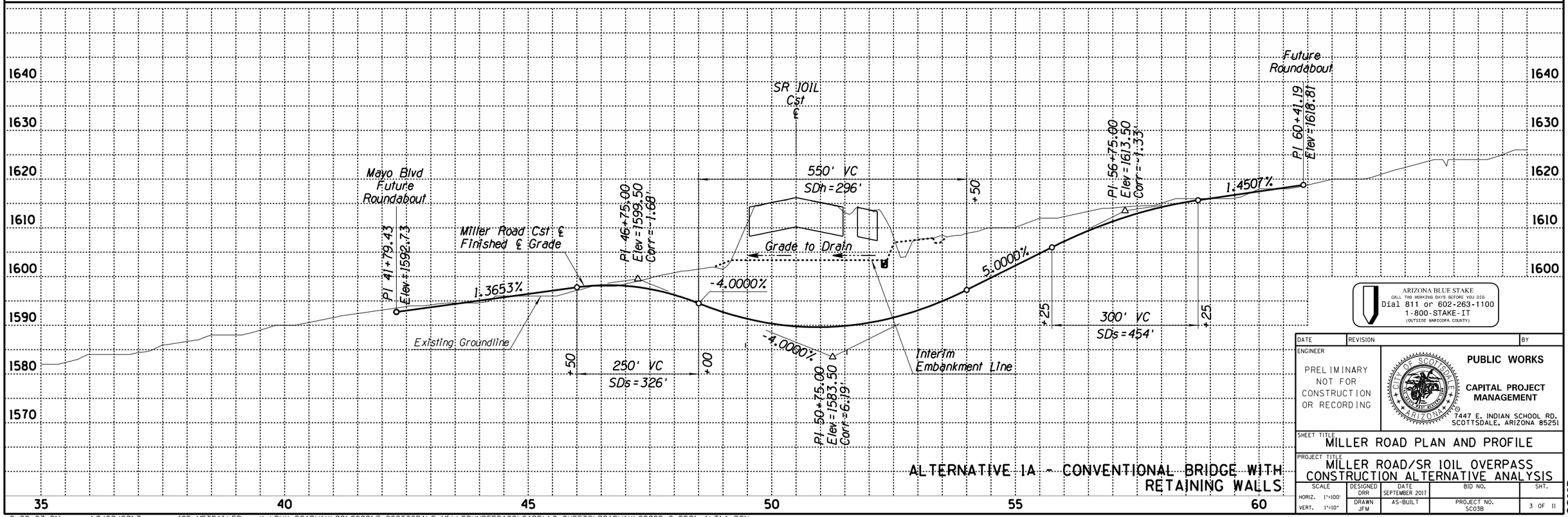
PROJECT TITLE: MILLER ROAD/SR 101L OVERPASS CONSTRUCTION ALTERNATIVE ANALYSIS

SCALE	DESIGNED	DATE	BID NO.	SHT.
HORIZ.	DRR	OCTOBER 2017		
VERT.	DRAWN JFM	AS-BUILT	PROJECT NO. SC03B	2 OF 11

ALTERNATIVE 1A - CONVENTIONAL BRIDGE WITH RETAINING WALLS

SC03B





ALTERNATIVE 1A - CONVENTIONAL BRIDGE WITH RETAINING WALLS

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DATE	REVISION	BY

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SCOTTSDALE, ARIZONA 85251

SHEET TITLE
MILLER ROAD PLAN AND PROFILE

PROJECT TITLE
MILLER ROAD/SR 101L OVERPASS
CONSTRUCTION ALTERNATIVE ANALYSIS

SCALE	DESIGNED	DATE	BID NO.	SHT.
HORIZ. 1"=100'	DRR	SEPTEMBER 2017		
VERT. 1"=10'	DRAWN JFM	AS-BUILT	PROJECT NO. SC03B	3 OF 11

SC03B

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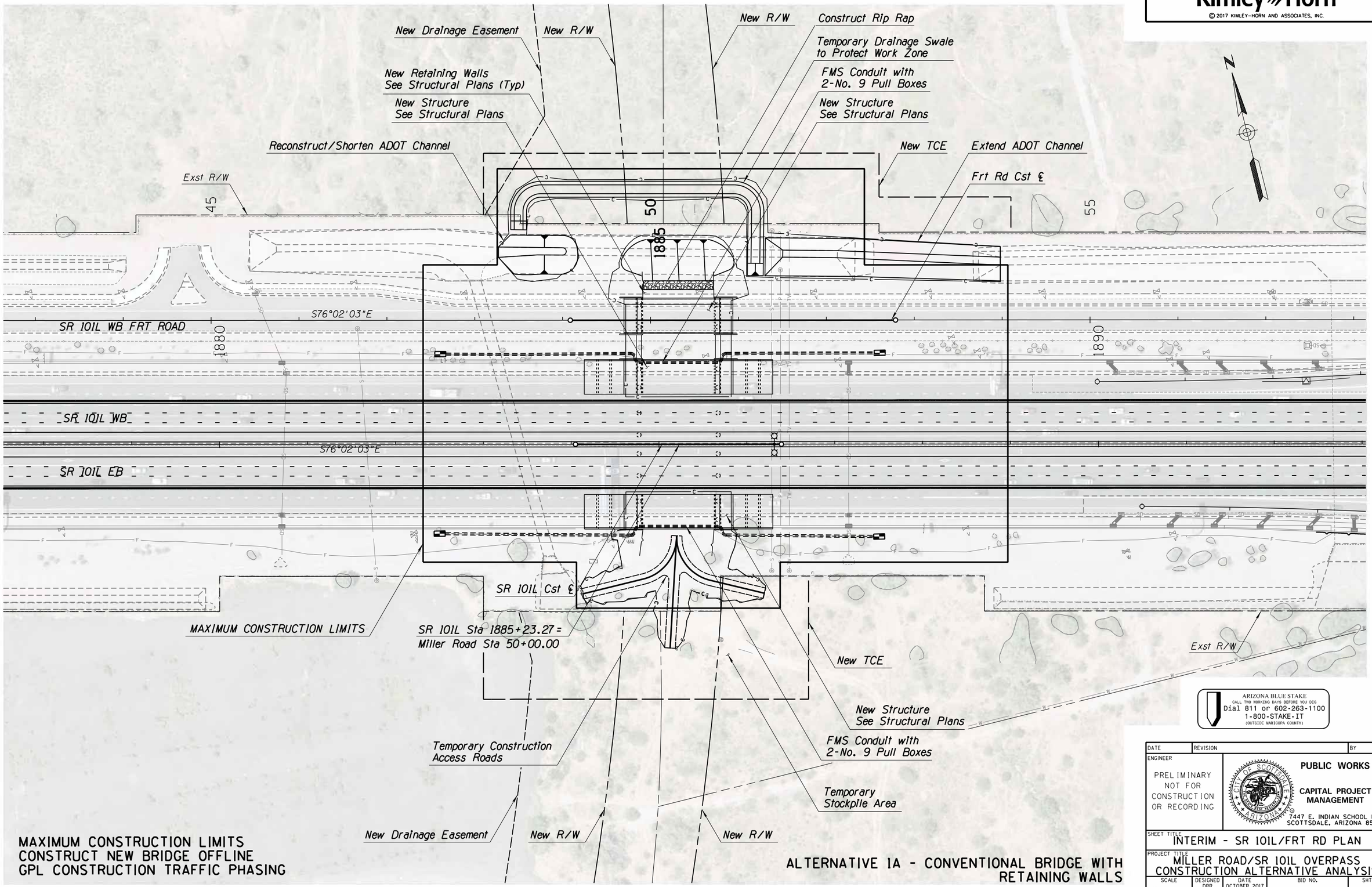

MAXIMUM CONSTRUCTION LIMITS
CONSTRUCT NEW BRIDGE OFFLINE
GPL CONSTRUCTION TRAFFIC PHASING

ALTERNATIVE 1A - CONVENTIONAL BRIDGE WITH RETAINING WALLS

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SHEET TITLE
INTERIM - SR 101L/FRT RD PLAN

PROJECT TITLE
MILLER ROAD/SR 101L OVERPASS
CONSTRUCTION ALTERNATIVE ANALYSIS

SCALE	DESIGNED	DATE	BID NO.	SHT.
HORIZ.	DRR	OCTOBER 2017		
VERT.	DRAWN JFM	AS-BUILT	PROJECT NO. SC03B	4 OF 11

SC03B

Construct Rip Rap
Conc Curb & Gutter Type D, Std C-05.10
Sta 49+49.72 to 49+69.72 New Asphalt Pvmt
6' Conc Sidewalk Std C-05.20
Conc Half Barrier Std C-10.52, Gutter=2.5'
New Drainage Easement
Exst R/W
Reconstruct/Shorten ADOT Channel
Conc Curb & Gutter Type D, Std C-05.10
Cable Barrier Std C-12.30
55 Miller Road Cst ℄
New R/W
MILLER ROAD
New R/W
New Structure See Structural Plans
FMS Conduit with 2-No. 9 Pull Boxes
New TCE
6' Conc Sidewalk with Parapet Special Detail
Sta 50+93.72 to 51+13.72 New Asphalt Pvmt
Conc Curb & Gutter Type D, Std C-05.10
Crash Cushion Special Detail
6' Conc Sidewalk Std C-05.20
Frt Rd Cst ℄
Extend ADOT Channel
Conc Curb & Gutter Type D, Std C-05.10
Sta 1886+37 to 1889+00 263 Lin Ft New 48" Chain Link Fence
Sawcut (Typ)
45
50
55
1885
1880
1890
S76°02'03"E
SR 101L WB FRT ROAD
SR 101L WB
SR 101L EB
Sta 1883+00 to 1884+24 124 Lin Ft New 48" Chain Link Fence
Cable Barrier Std C-12.30
Crash Cushion Special Detail
Conc Half Barrier Std C-10.52, Gutter=2.5'
Conc Half Barrier Std C-10.52, Gutter=2.5'
Sta 1886+29.29 to 1886+39.29, Lt New PCCP Pvmt
Conc Med Barrier Type F, Std C-10.41
SR 101L Cst ℄
Conc Half Barrier Std C-10.52, Gutter=2.5'
Sta 1884+04.95 to 1884+14.95, Lt New PCCP Pvmt
Conc Med Barrier Type F, Std C-10.41
Sta 1884+04.95 to 1884+14.95, Rt New PCCP Pvmt
Conc Half Barrier Std C-10.52, Gutter=2.5'
SR 101L Sta 1885+23.27 = Miller Road Sta 50+00.00
New Retaining Walls See Structural Plans (Typ)
New Drainage Easement
New Median Light Pole with Foundation
Sta 1886+29.29 to 1886+39.29, Rt New PCCP Pvmt
Conc Half Barrier Std C-10.52, Gutter=2.5'
New Structure See Structural Plans
FMS Conduit with 2-No. 9 Pull Boxes
New TCE
Sta 1883+00 to 1888+70 650 Lin Ft New 72" Chain Link Fence
New R/W
New R/W
Exst R/W
Conc Med Barrier Type F, Std C-10.41
N

COMPLETED SR 101L BRIDGE & FRONTAGE ROAD BRIDGE OVER MILLER ROAD

ALTERNATIVE 1A - CONVENTIONAL BRIDGE WITH RETAINING WALLS

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SHEET TITLE: ULTIMATE - SR 101L/FRT RD PLAN

PROJECT TITLE: MILLER ROAD/SR 101L OVERPASS CONSTRUCTION ALTERNATIVE ANALYSIS

SCALE	DESIGNED	DATE	BID NO.	SHT.
HORIZ.	DRR	OCTOBER 2017		
VERT.	DRAWN JFM	AS-BUILT	PROJECT NO. SC03B	5 OF 11

SC03B

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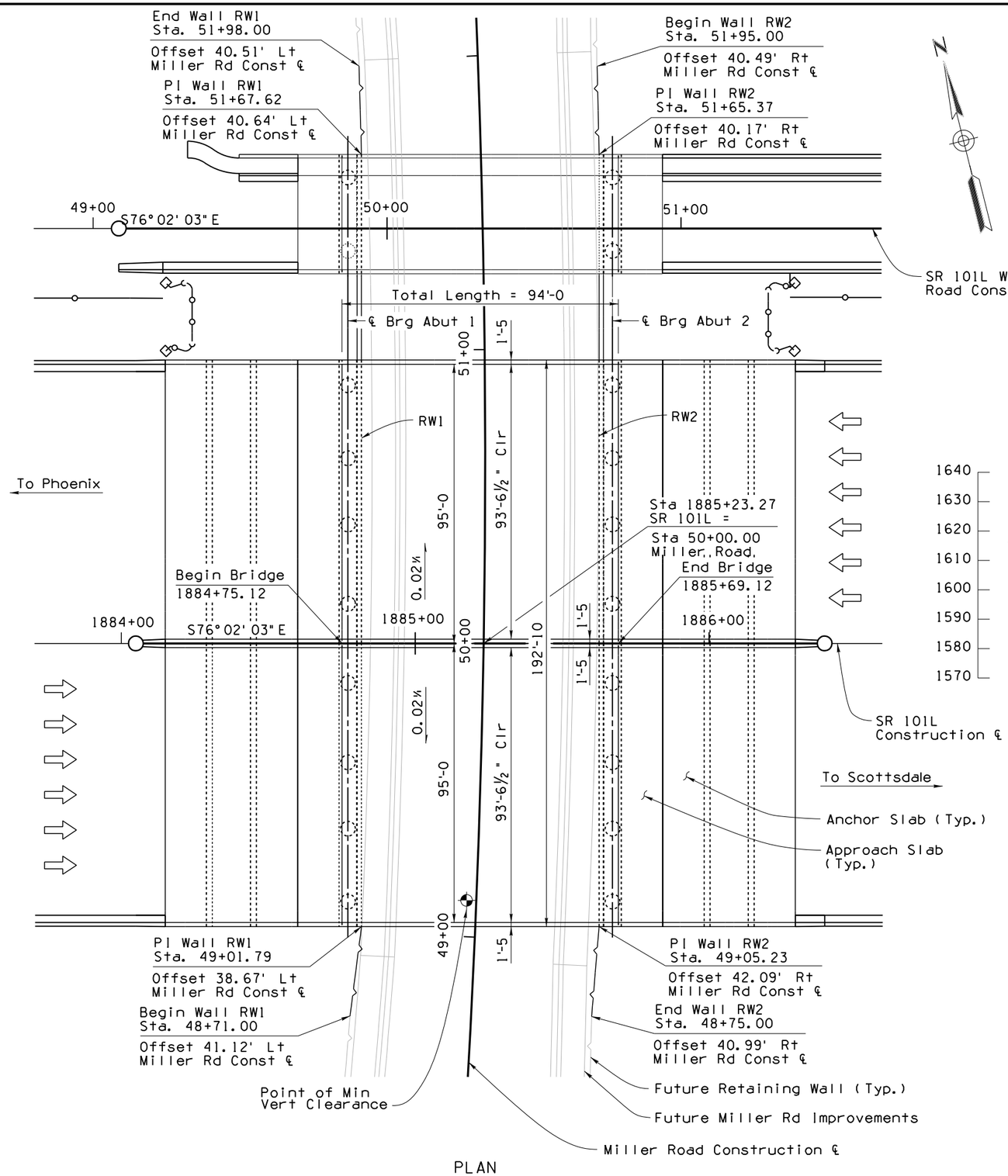
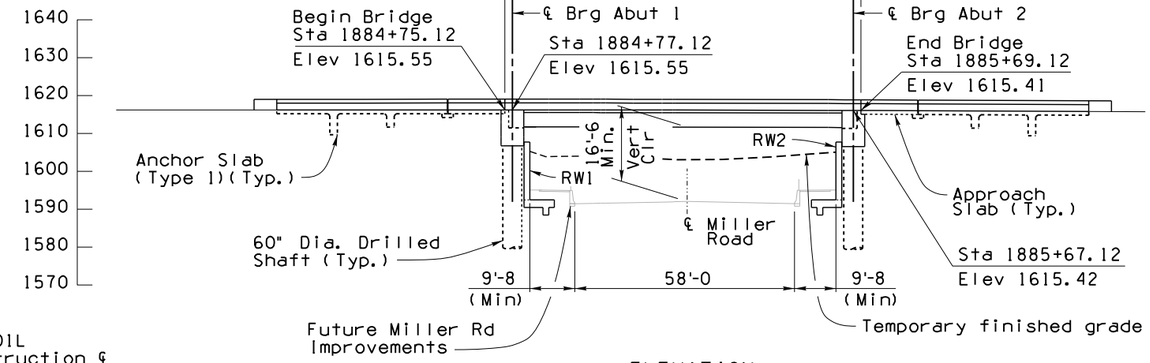


PLAN

Single Span Cast-In-Place Post-Tensioned Concrete Bridge
Skew=0°
Scale: 1'-0= 20'-0



ELEVATION

Scale: 1'-0= 20'-0
(Elevations shown along Profile Grade Line)

NOTES:

1. Bridge Stations provided along SR 101L Const. ℄. Elevations provided along SR 101L Profile Grade Line.
2. Retaining Wall layout base on Miller Road Const. ℄.

ALTERNATIVE 1A - CONVENTIONAL BRIDGE WITH RETAINING WALLS

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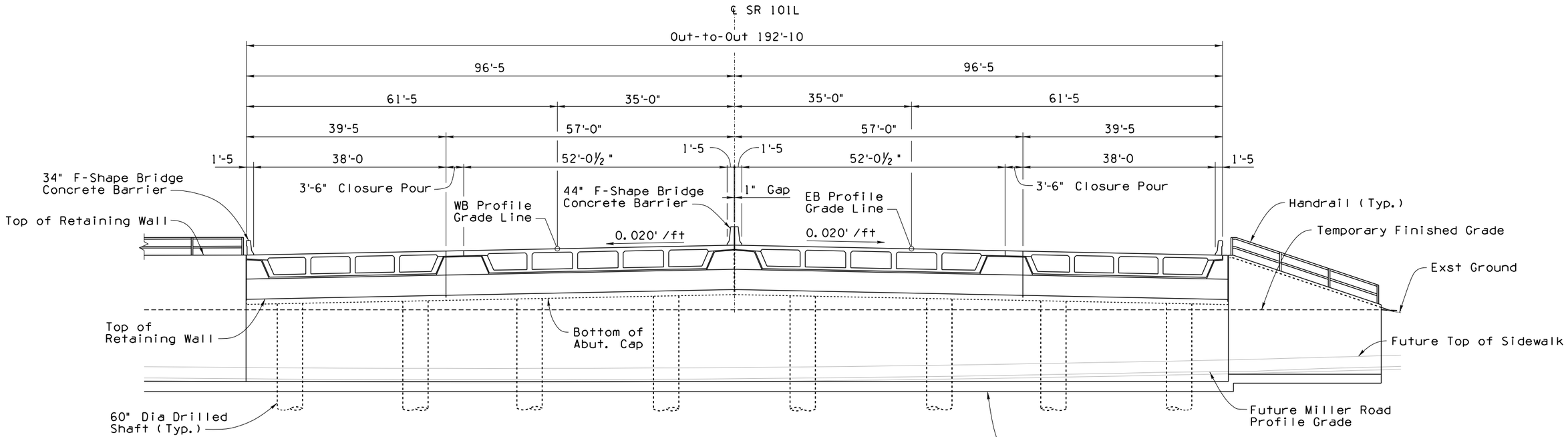
SCOTTSDALE, ARIZONA 85251

SHEET TITLE: GENERAL PLAN & ELEVATION

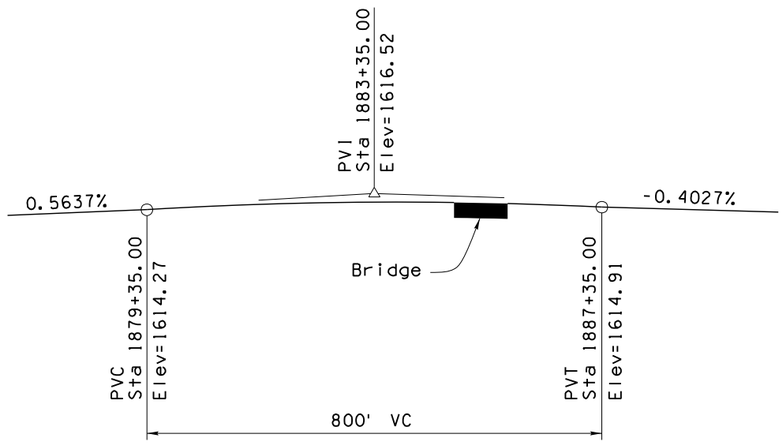
PROJECT TITLE: MILLER ROAD/SR 101L OVERPASS CONSTRUCTION ALTERNATIVE ANALYSIS

SCALE	DESIGNED KJK	DATE AUGUST 2017	BID NO.	SHT.
HORIZ.	DRAWN MSK	AS-BUILT	PROJECT NO. SC03B	6 OF 11
VERT.				

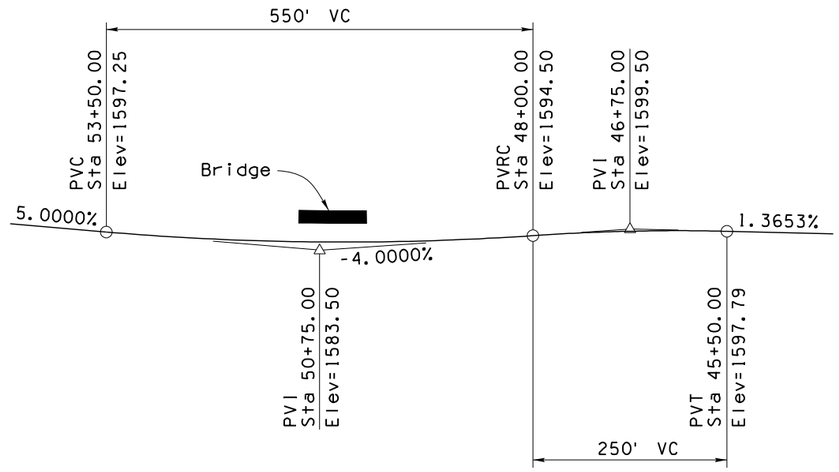
SC03B



TYPICAL SECTION
Scale: 1'-0= 10'-0



SR 101L PROFILE GRADE
No Scale



MILLER ROAD PROFILE GRADE
No Scale

ALTERNATIVE 1A - CONVENTIONAL BRIDGE WITH RETAINING WALLS

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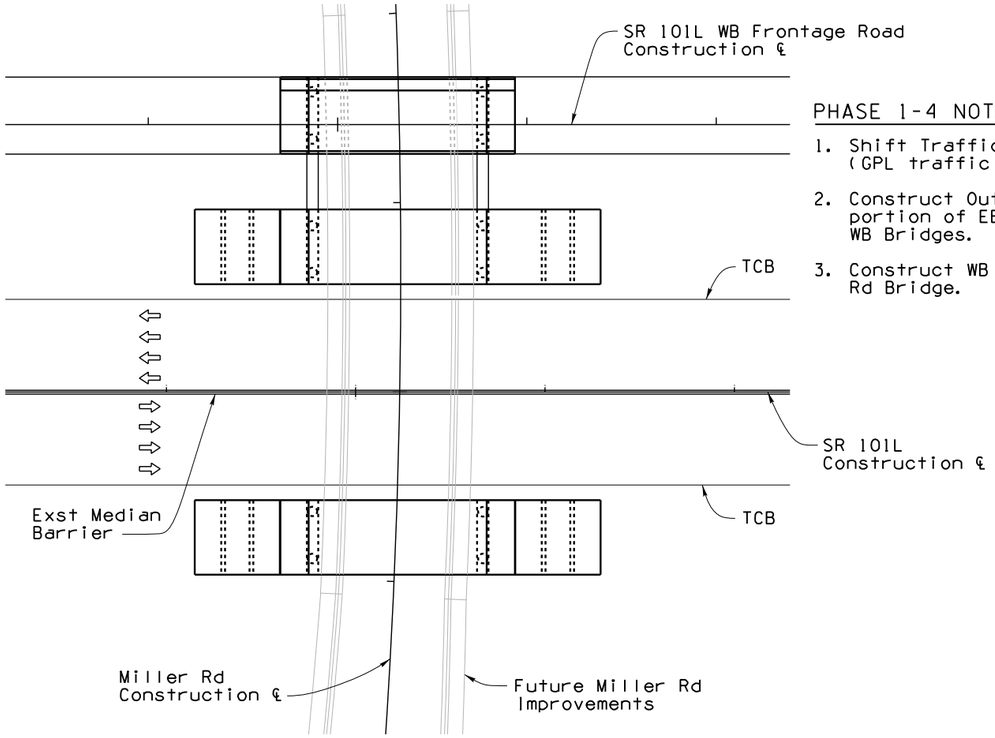
SHEET TITLE
TYPICAL SECTION - TRADITIONAL

PROJECT TITLE
MILLER ROAD/SR 101L OVERPASS
CONSTRUCTION ALTERNATIVE ANALYSIS

SCALE	DESIGNED	DATE	BID NO.	SHT.
HORIZ.	KJK	AUGUST 2017		
VERT.	DRAWN MSK	AS-BUILT	PROJECT NO. SC03B	7 OF 11

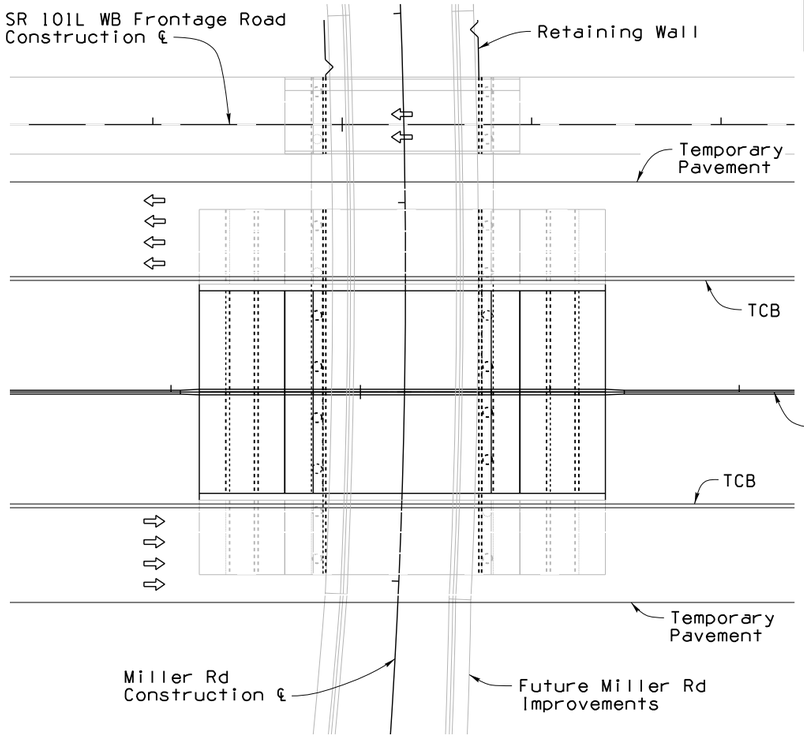
SC03B



PHASE 1-4

PHASE 1-4 NOTES:

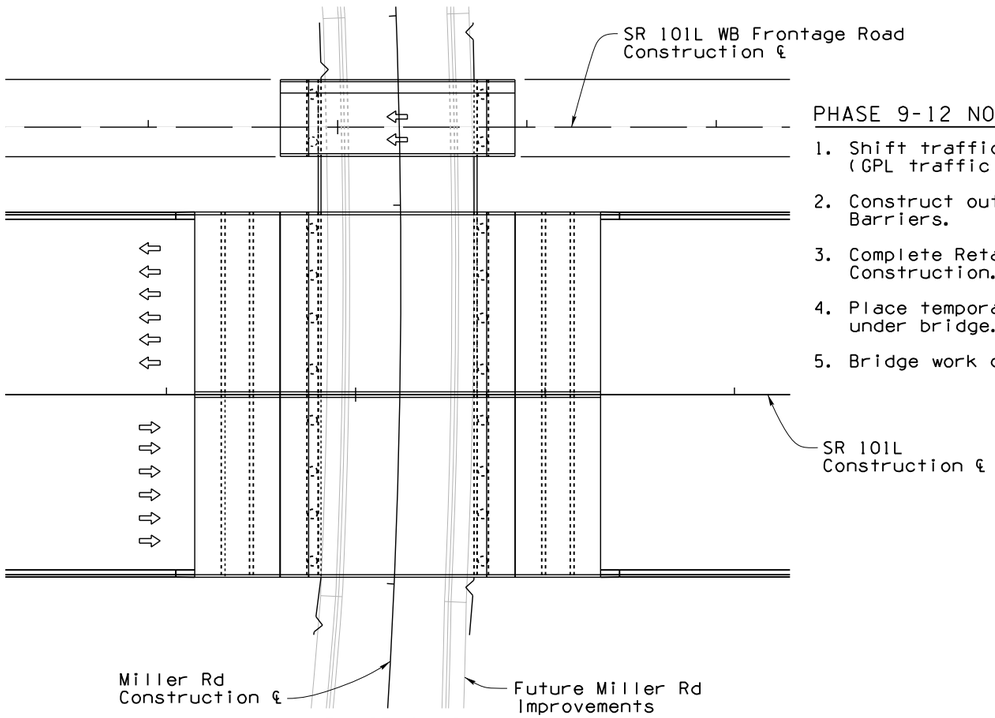
1. Shift Traffic to inside. (GPL traffic location)
2. Construct Outside portion of EB & WB Bridges.
3. Construct WB Frontage Rd Bridge.



PHASE 5-8

PHASE 5-8 NOTES:

1. Place Temporary Pavement for Outside Traffic Shift.
2. Shift traffic to Outside Open WB Frontage Rd to traffic.
3. Construct inside portion of EB & WB Bridges.
4. Construct Closure pours.
5. Begin Retaining Wall Construction.



PHASE 9-12

PHASE 9-12 NOTES:

1. Shift traffic back to inside. (GPL traffic location).
2. Construct outside Bridge Barriers.
3. Complete Retaining Wall Construction.
4. Place temporary grading under bridge.
5. Bridge work complete.

(Note: Ultimate lane configuration shown)

ALTERNATIVE 1A - CONVENTIONAL BRIDGE WITH RETAINING WALLS

Kimley»Horn

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SHEET TITLE
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PROJECT TITLE
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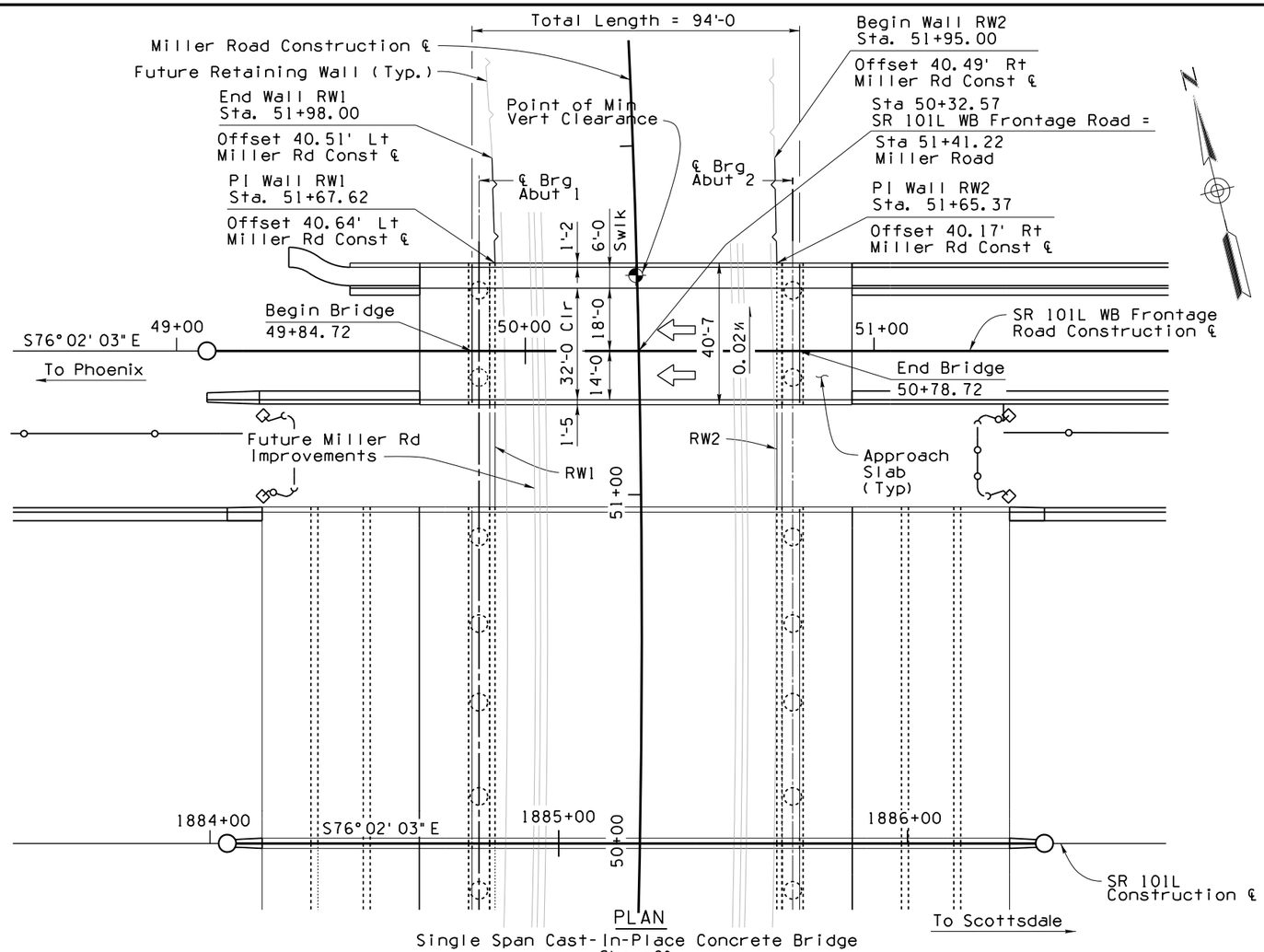
CONSTRUCTION ALTERNATIVE ANALYSIS

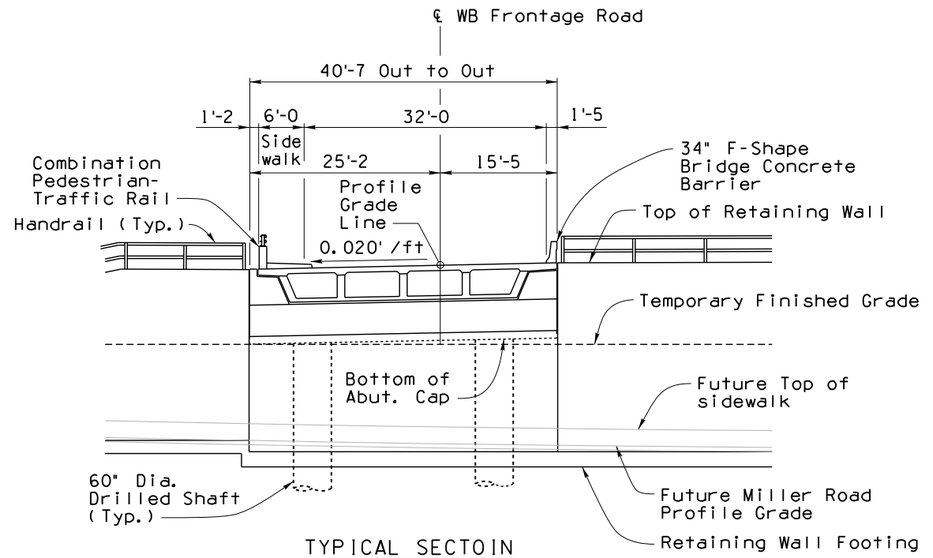
SCALE	DESIGNED	DATE	BID NO.	SHT.
HORIZ.	KJK	AUGUST 2017		
VERT.	DRAWN MSK	AS-BUILT	PROJECT NO. SC03B	8 OF 11

SC03B



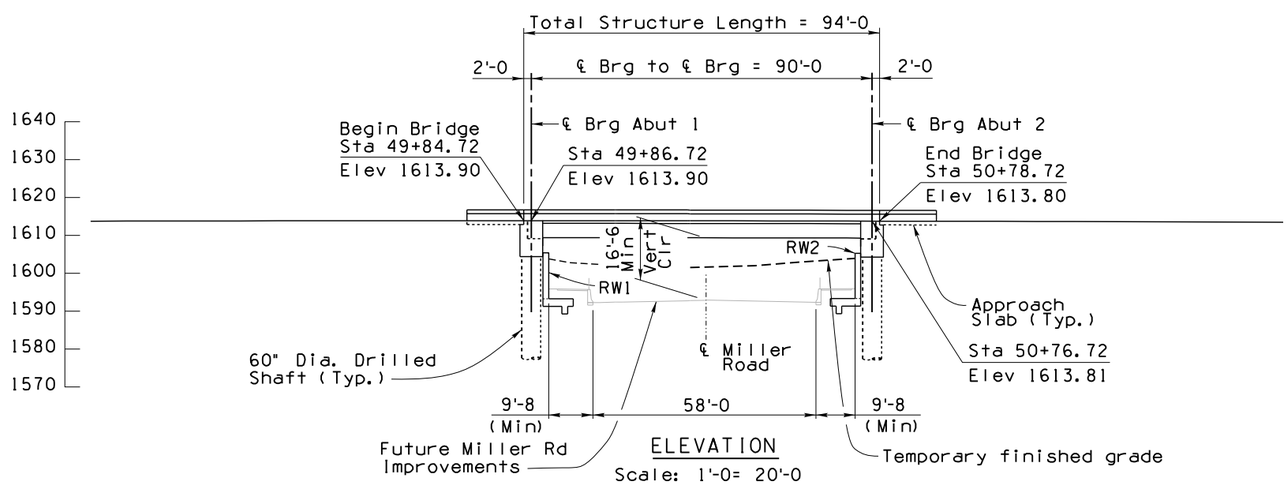
PLAN

Single Span Cast-In-Place Concrete Bridge
Skew=0°
Scale: 1'-0= 20'-0



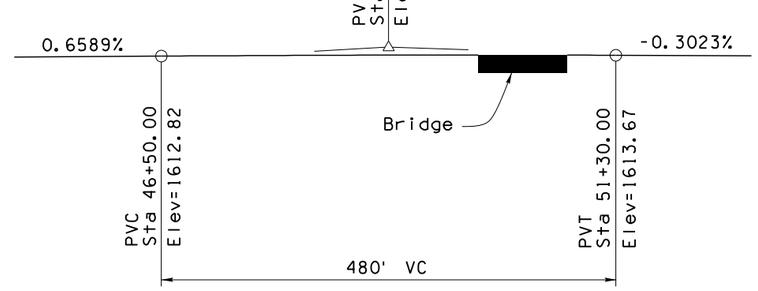
TYPICAL SECTOIN

Scale: 1'-0= 10'-0



ELEVATION

Scale: 1'-0= 20'-0



FRONTAGE ROAD PROFILE GRADE

No Scale

NOTES:

1. Bridge Stations provided along SR 101L Const. ℄. Elevations provided along SR 101L Profile Grade Line.
2. Retaining Wall layout base on Miller Road Const. ℄.

ALTERNATIVE 1A - CONVENTIONAL BRIDGE WITH RETAINING WALLS

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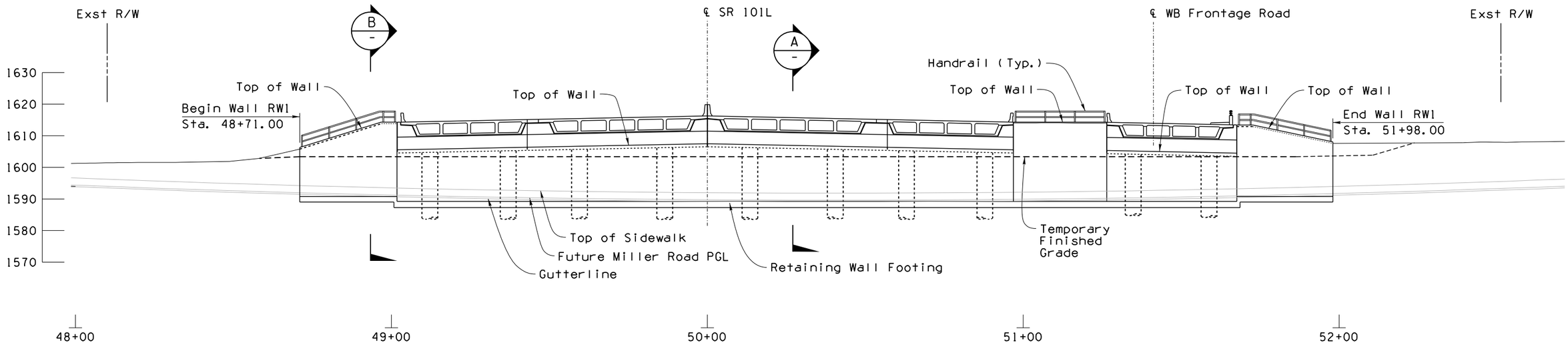
7447 E. INDIAN SCHOOL RD.
SCOTTSDALE, ARIZONA 85251

SHEET TITLE
GENERAL PLAN / ELEVATION & TYP SEC

PROJECT TITLE
MILLER ROAD/SR 101L OVERPASS
CONSTRUCTION ALTERNATIVE ANALYSIS

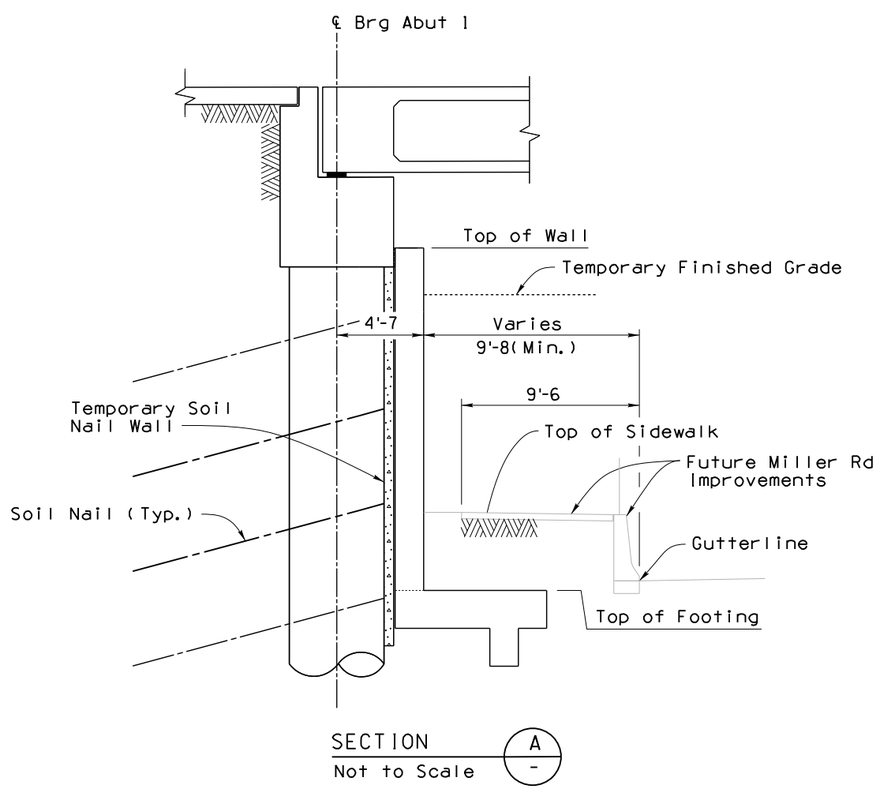
SCALE	DESIGNED	DATE	BID NO.	SHT.
HORIZ.	KJK	AUGUST 2017		
VERT.	DRAWN	AS-BUILT	PROJECT NO.	9 OF 11
	MSK		SC03B	

SC03B



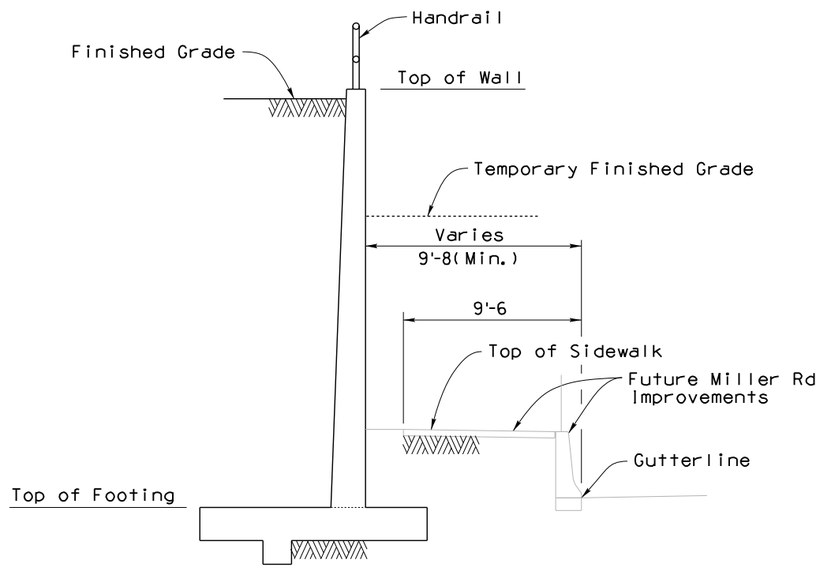
RW1 WALL ELEVATION

Scale: 1/16" = 1'-0



SECTION A

Not to Scale



SECTION B

Not to Scale

NOTES:

1. Retaining Wall Stationing based on Miller Road Construction℄.

ALTERNATIVE 1A - CONVENTIONAL BRIDGE WITH RETAINING WALLS

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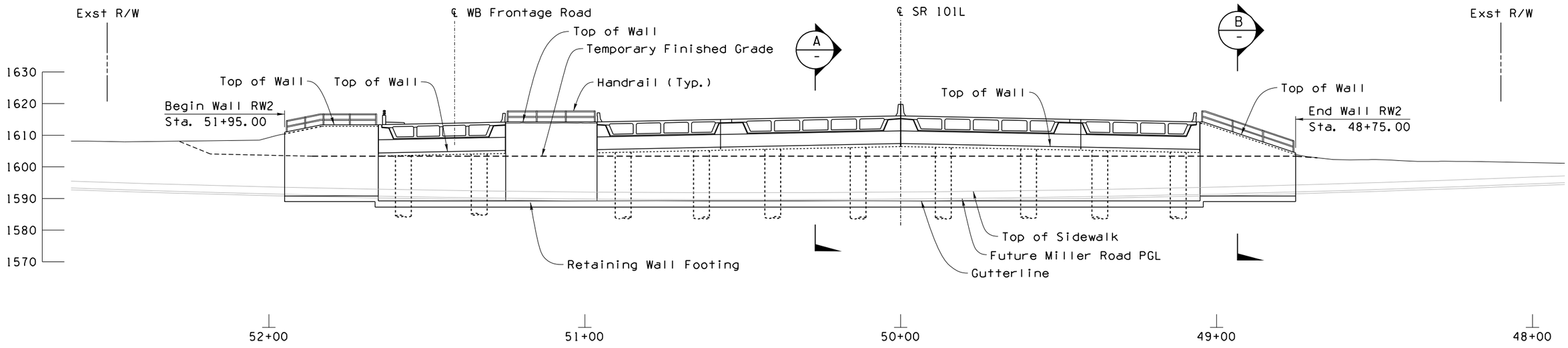
SHEET TITLE
RETAINING WALL RW1 ELEVATION

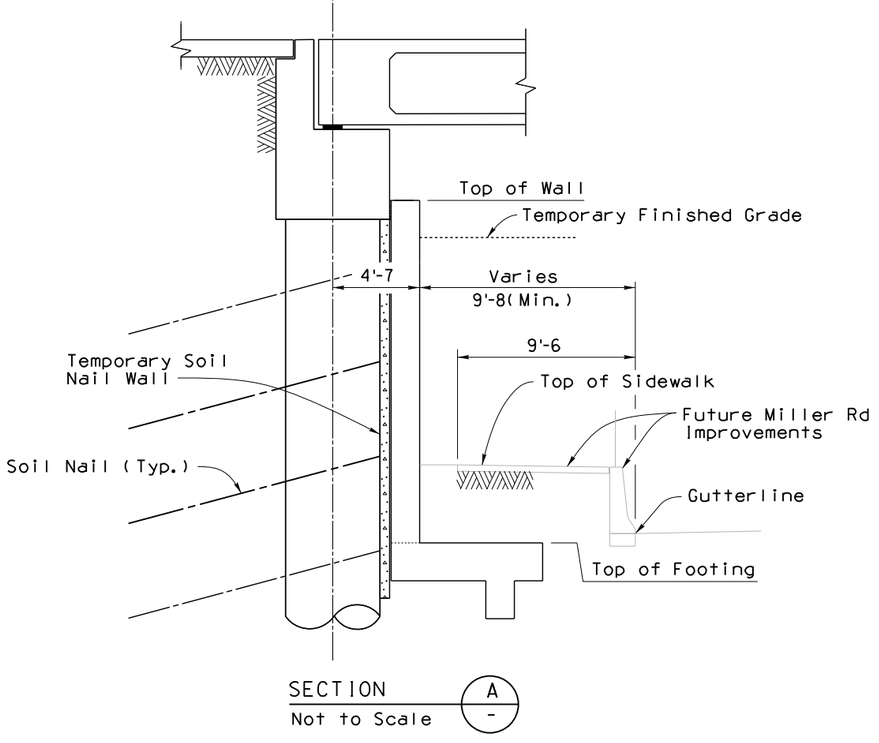
PROJECT TITLE
MILLER ROAD/SR 101L OVERPASS
CONSTRUCTION ALTERNATIVE ANALYSIS

SCALE	DESIGNED	DATE	BID NO.	SHT.
HORIZ.	KJK	AUGUST 2017		
VERT.	DRAWN MSK	AS-BUILT	PROJECT NO. SC03B	10 OF 11

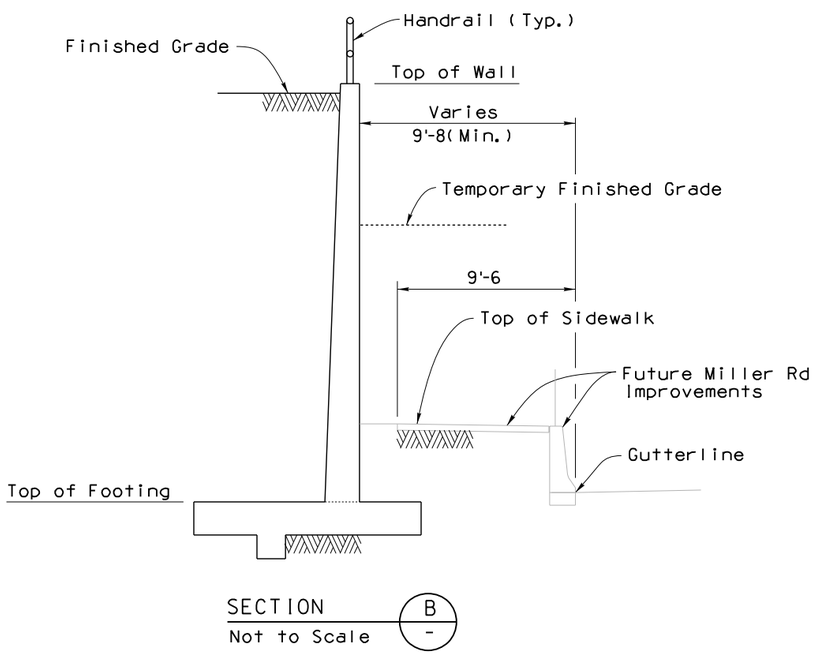
SC03B



RW2 WALL ELEVATION
Scale: 1/16" = 1'-0



SECTION A
Not to Scale



SECTION B
Not to Scale

NOTES:

1. Retaining Wall Stationing based on Miller Road Construction℄.

ALTERNATIVE 1A - CONVENTIONAL BRIDGE WITH RETAINING WALLS

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SHEET TITLE: RETAINING WALL RW2 ELEVATION

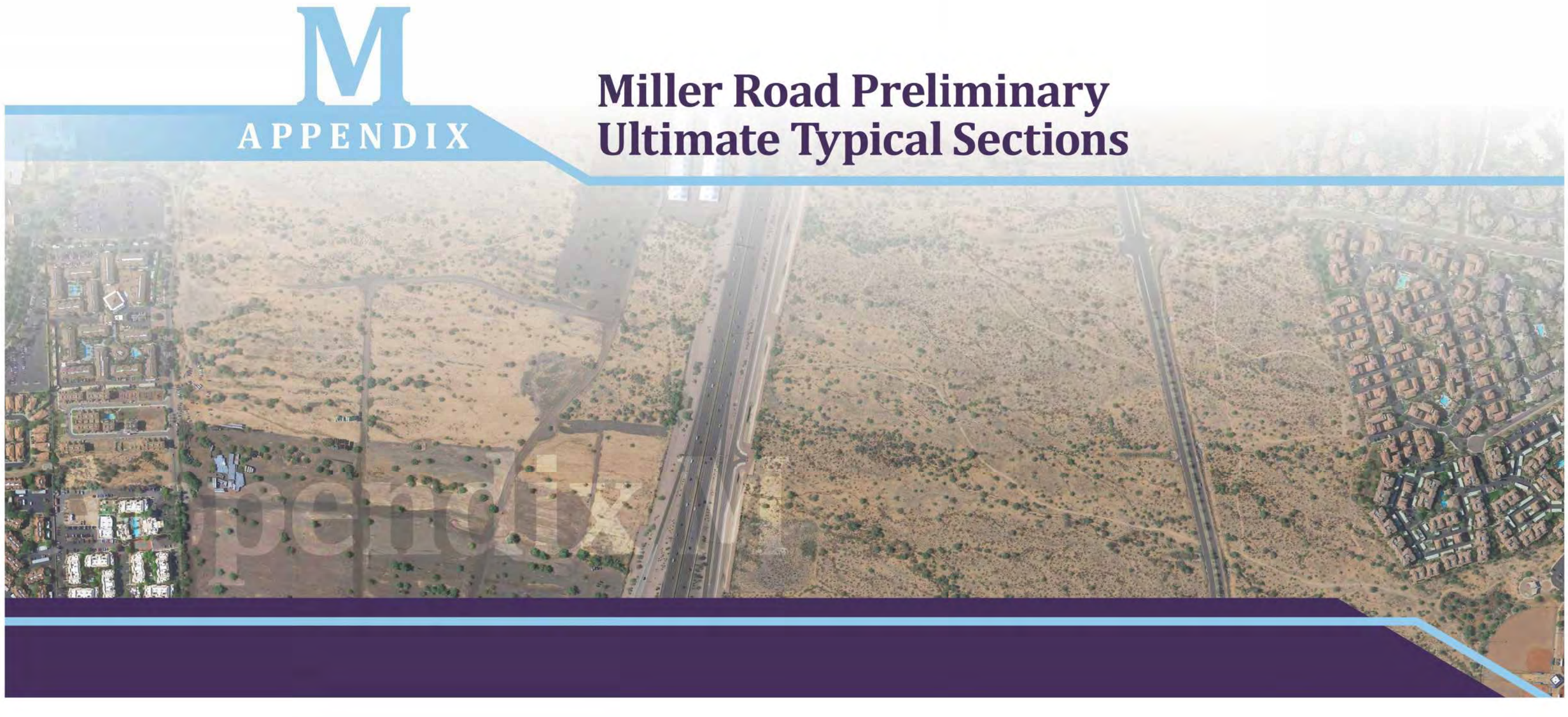
PROJECT TITLE: MILLER ROAD/SR 101L OVERPASS CONSTRUCTION ALTERNATIVE ANALYSIS

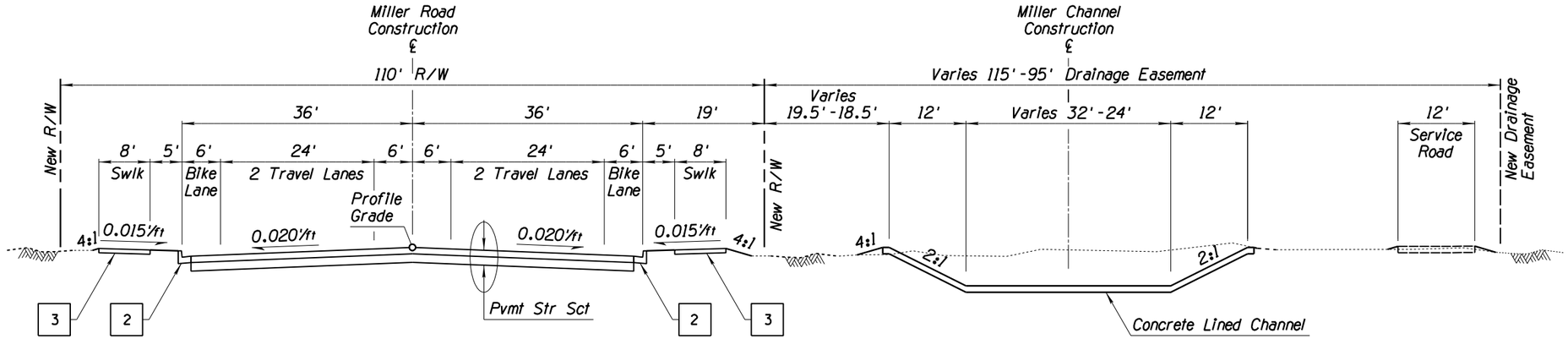
SCALE	DESIGNED	DATE	BID NO.	SHT.
HORIZ.	KJK	AUGUST 2017		
VERT.	DRAWN MSK	AS-BUILT	PROJECT NO. SC03B	11 OF 11

SC03B

APPENDIX M

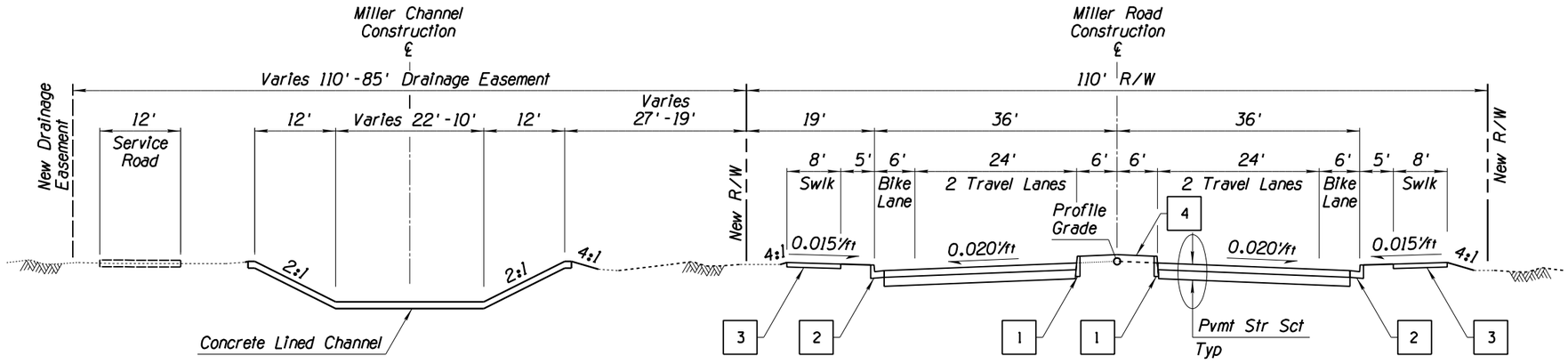
Miller Road Preliminary Ultimate Typical Sections





TYPICAL SECTION

Miller Road Sta 20+00± to 41+00±



TYPICAL SECTION

Miller Road Sta 41+00± to 46+50±
Miller Road Sta 56+00± to 59+35±

1 *New Concrete Single Curb (See Plans for Type & Location)*

2 *New Concrete Curb & Gutter (See Plans for Type & Location)*

3 *New Concrete Sidewalk (See Plans for Type and Location)*

4 *New Median Treatment (See Plans for Type and Location)*

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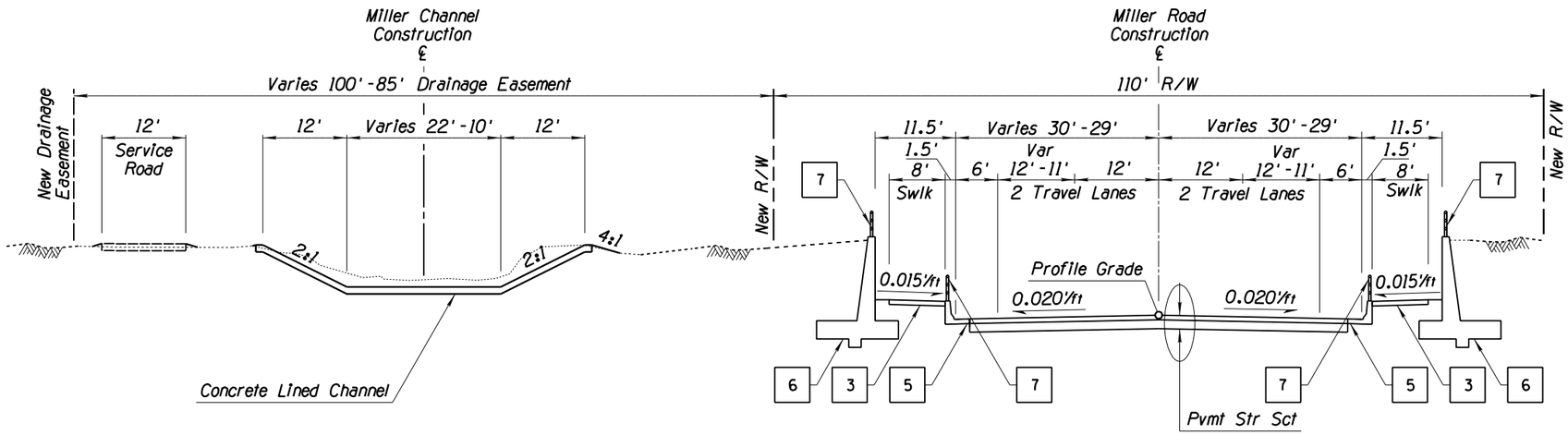
SHEET TITLE: TYPICAL SECTIONS

PROJECT TITLE: MILLER ROAD/SR 101L OVERPASS CONSTRUCTION ALTERNATIVE ANALYSIS

SCALE	DESIGNED	DATE	BID NO.	SHT.
HORIZ.	DRR	OCTOBER 2017		
VERT.	DRAWN JFM	AS-BUILT	PROJECT NO. SC03B	1 OF -

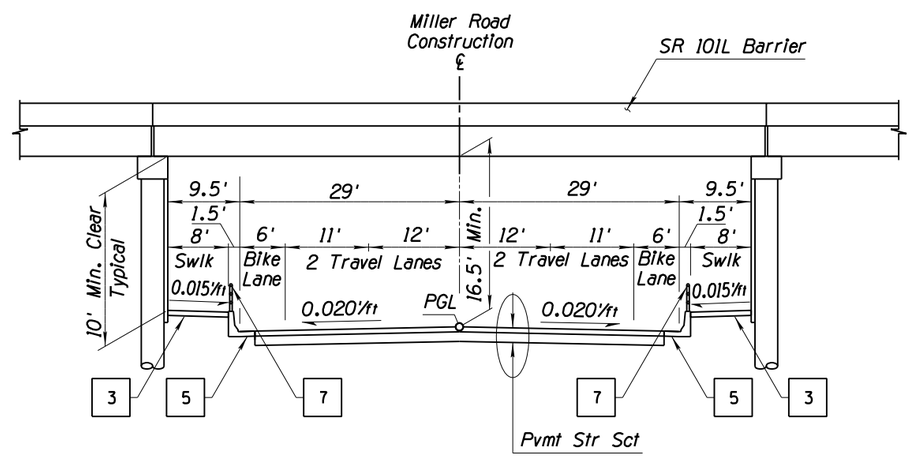
SC03B

10:00:39 AM 10/27/2017 JOE.METRAILER K:\PHX_ROADWAY\091090017-SCOTTSDALE-MILLERUNDERPASS\CADD\12-SHEETS\ROADWAY\SC03B_DS-TYP-MILLER01.DGN



TYPICAL SECTION

Miller Road Sta 46+50± to 49+00±
Miller Road Sta 51+67± to 56+00±



TYPICAL SECTION

Miller Road Sta 49+00± to 51+67±

1. New Concrete Single Curb (See Plans for Type & Location)
2. New Concrete Curb & Gutter (See Plans for Type & Location)
3. New Concrete Sidewalk (See Plans for Type and Location)
4. New Median Treatment (See Plans for Type and Location)
5. New Concrete Half Barrier with Gutter (See Plans for Type and Location)
6. New Retaining Wall (See Plans for Location)
7. New Safety Rail (See Plans for Location)

ARIZONA BLUE STAKE
CALL TWO WORKING DAYS BEFORE YOU DIG
Dial 811 or 602-263-1100
1-800-STAKE-IT
(OUTSIDE MARICOPA COUNTY)

DATE	REVISION	BY

ENGINEER

PRELIMINARY NOT FOR CONSTRUCTION OR RECORDING

CITY OF SCOTTSDALE ARIZONA

PUBLIC WORKS

CAPITAL PROJECT MANAGEMENT

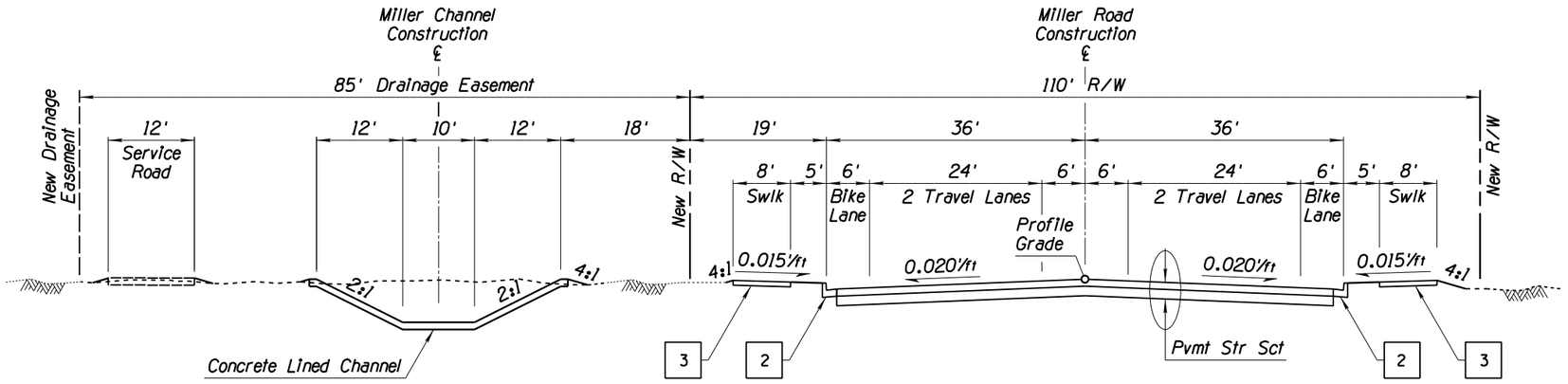
7447 E. INDIAN SCHOOL RD.
SCOTTSDALE, ARIZONA 85251

SHEET TITLE
TYPICAL SECTIONS

PROJECT TITLE
MILLER ROAD/SR 101L OVERPASS
CONSTRUCTION ALTERNATIVE ANALYSIS

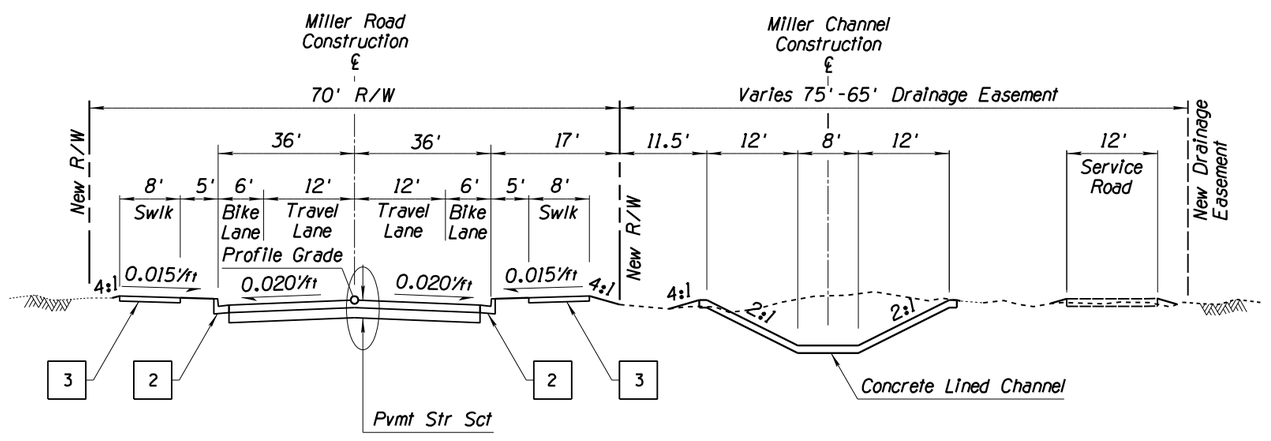
SCALE	DESIGNED	DATE	BID NO.	SHT.
HORIZ.	DRR	OCTOBER 2017		
VERT.	DRAWN	AS-BUILT	PROJECT NO.	1 OF -
	JFM		SC03B	

SC03B



TYPICAL SECTION

Miller Road Sta 59+35± to 70+25±



TYPICAL SECTION

Miller Road Sta 71+75± to 79+62±

2 *New Concrete Curb & Gutter (See Plans for Type & Location)*

3 *New Concrete Sidewalk (See Plans for Type and Location)*

ARIZONA BLUE STAKE
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1-800-STAKE-IT
(OUTSIDE MARICOPA COUNTY)

DATE	REVISION	BY

ENGINEER

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OR RECORDING

PUBLIC WORKS

CAPITAL PROJECT MANAGEMENT

7447 E. INDIAN SCHOOL RD.
SCOTTSDALE, ARIZONA 85251

SHEET TITLE: TYPICAL SECTIONS

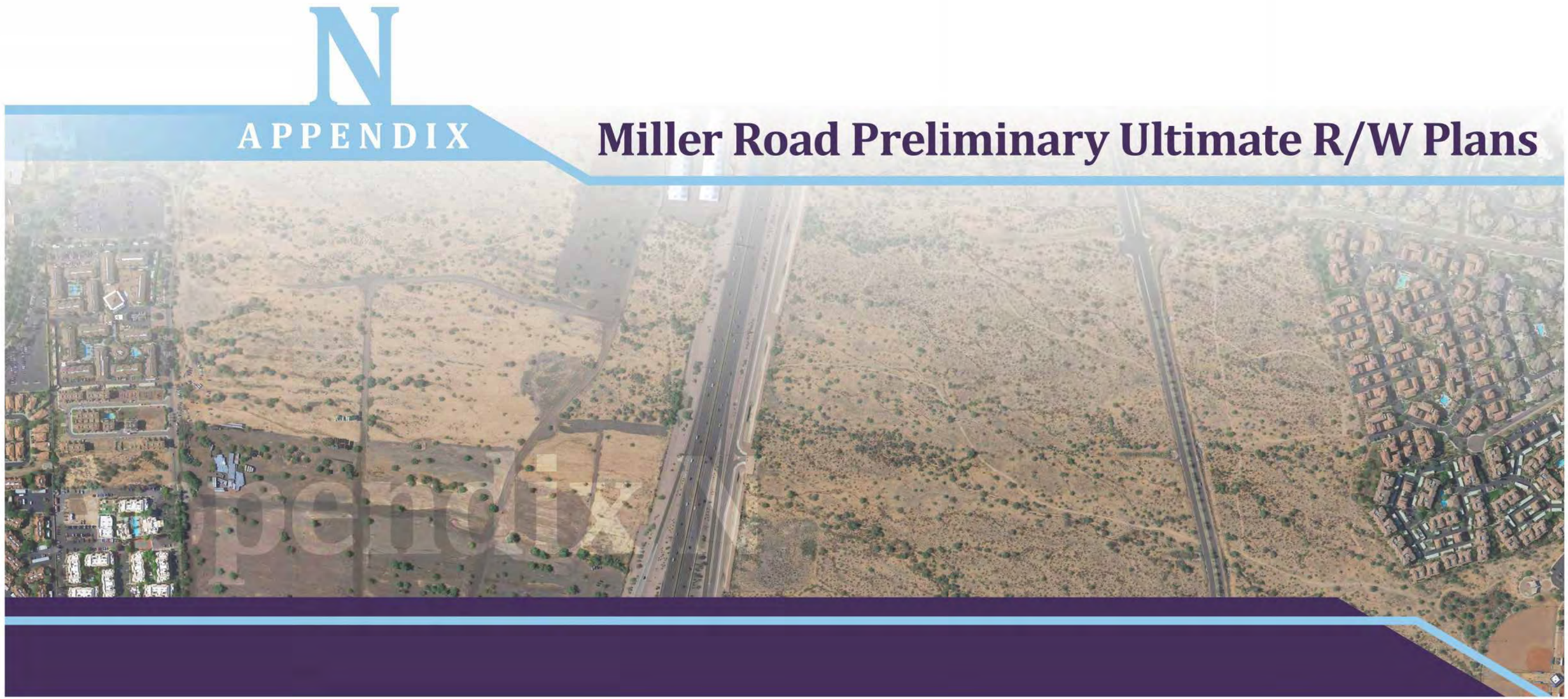
PROJECT TITLE: MILLER ROAD/SR 101L OVERPASS CONSTRUCTION ALTERNATIVE ANALYSIS

SCALE	DESIGNED	DATE	BID NO.	SHT.
HORIZ.	DRR	OCTOBER 2017		
VERT.	DRAWN JFM	AS-BUILT	PROJECT NO. SC03B	1 OF -

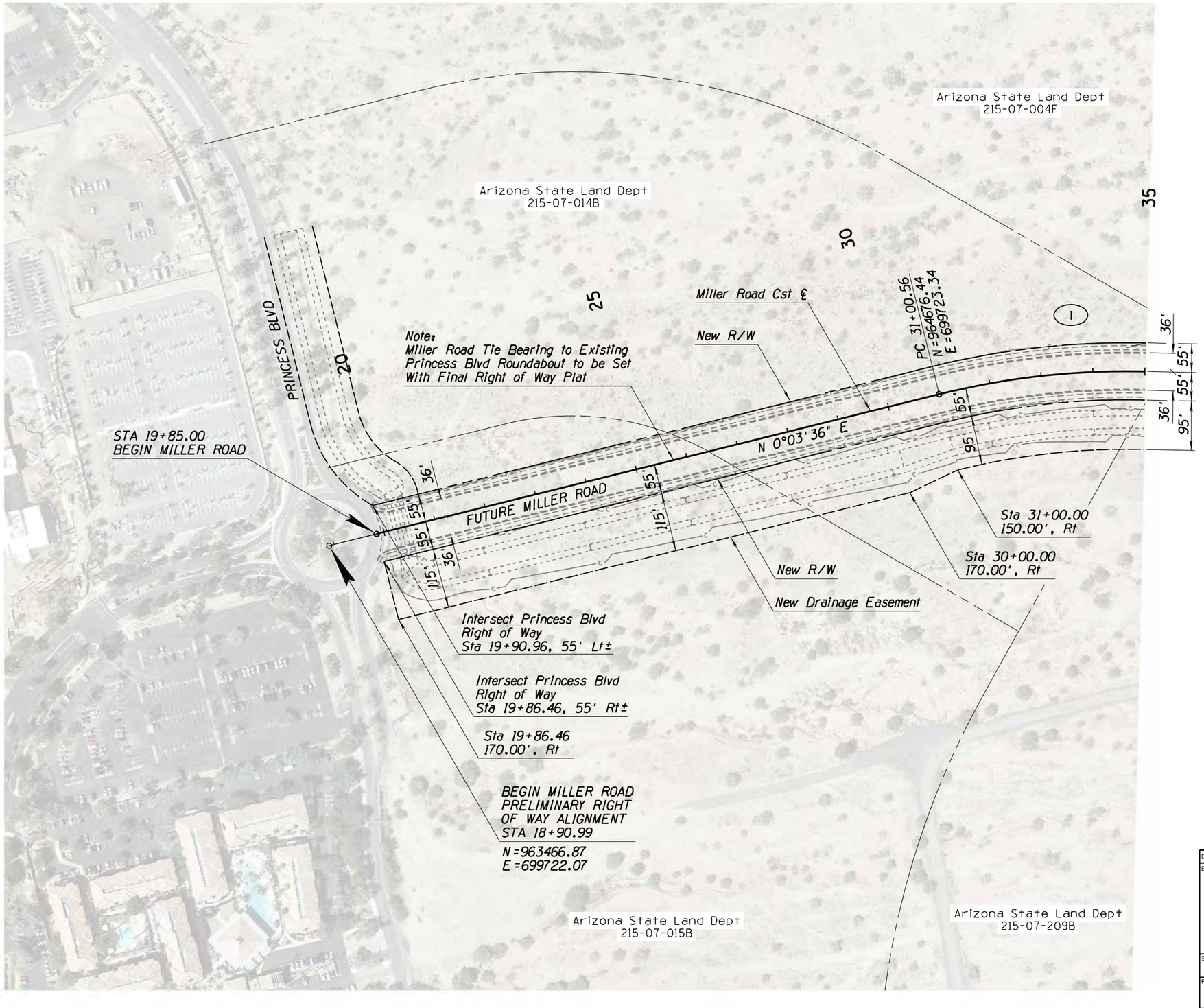
SC03B

APPENDIX N

Miller Road Preliminary Ultimate R/W Plans



Kimley»Horn



CURVE DATA

(1) PI Sta 35+22.36
N 965098.24
E 699723.78

Main Curve
Δ=31°24'44" Rt
D=3°49'11"
R=1500.00'
L=822.37'
T=421.80'
Ext=58.18'
Super=NC

NOTE

Drainage Easements are Based on the Concrete Lined Channel from the 2015 Crossroads East Infrastructure Design Concept Report.

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CAPITAL PROJECT MANAGEMENT
7447 E. INDIAN SCHOOL RD.
SCOTTSDALE, ARIZONA 85251

SHEET TITLE
MILLER ROAD RIGHT OF WAY PLAN

PROJECT TITLE
MILLER ROAD/SR 101L OVERPASS
CONSTRUCTION ALTERNATIVE ANALYSIS

SCALE	DESIGNED	DATE	BID NO.	SHT.
HORIZ. 1"=100'	DRR	SEPTEMBER 2017		
VERT. 1"=10'	DRAWN JFM	AS-BUILT	PROJECT NO. SC03B	1 OF 3

SC03B

Kimley»Horn

Arizona State Land Dept
215-07-004F

Arizona State Land Dept
215-07-006A

Arizona State Land Dept
212-36-015

Arizona State Land Dept
215-07-209B

Arizona State Land Dept
215-07-012A

Arizona State Land Dept
212-31-120

SR 101L EB

SR 101L WB

SR 101L WB FRT ROAD

Exst R/W

Miller Road
Sta 41+79.43 =
Mayo Blvd
Future Roundabout

Sta 41+68.56
55.00', Lt

Sta 47+94.34
214.71', Lt

Sta 47+97.37
174.66', Lt

Sta 47+39.36
155.00', Lt

Sta 46+88.75
206.11', Lt

Sta 52+73.64
217.78', Lt

Sta 52+73.52
215.86', Lt

Sta 53+47.77
213.13', Lt

Sta 52+54.12
55.00', Lt

Sta 53+86.58
140.00', Lt

New R/W

PRC 39+22.93
N=965457.99
E=699944.00

Sta 43+44.38
155.00, Lt

New
Drainage
Easement

New Drainage Easement

Miller Road Cst ℄

New R/W

FUTURE MILLER ROAD

FUTURE MILLER ROAD

New Drainage
Easement

New R/W

Sta 40+27.44
150.00' Rt

Sta 41+71.18
55.00', Rt

FUTURE MAYO BLVD

Miller Road Sta 60+41.19 =
Miller Road Future Roundabout

New R/W

New TCE

Sta 47+24.23
162.21', Rt

Sta 48+52.98
55.00', Rt

Sta 48+58.23
152.03', Rt

New TCE

Sta 52+48.55
55.00', Rt

Sta 53+15.44
235.71', Rt

Sta 52+68.48
232.63', Rt

Sta 52+60.98
382.41', Rt

Sta 52+24.73
380.48', Rt

Exst R/W

Miller Road Sta 50+00.00 =
SR 101L Sta 1885+23.27
N=966444.53
E=700366.83

SR 101L Cst ℄

CURVE DATA

(1) PI Sta 35+22.36
N 965098.24
E 699723.78

Main Curve
Δ=31°24'44" Rt
D=3°49'11"
R=1500.00'
L=822.37'
T=421.80'
Ext=58.18'
Super=NC

CURVE DATA

(2) PI Sta 53+79.69
N 966700.45
E 700704.55

Main Curve
Δ=42°40'00" Lt
D=1°32'10"
R=3730.00'
L=2777.62'
T=1456.76'
Ext=274.38'
Super=NC

NOTE

Drainage Easements are Based on the Concrete Lined Channel from the 2015 Crossroads East Infrastructure Design Concept Report.

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(OUTSIDE MARICOPA COUNTY)

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CAPITAL PROJECT MANAGEMENT

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SCOTTSDALE, ARIZONA 85251

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PROJECT TITLE
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CONSTRUCTION ALTERNATIVE ANALYSIS

SCALE	DESIGNED	DATE	BID NO.	SHT.
HORIZ. 1"=100'	DRR	SEPTEMBER 2017		
VERT. 1"=10'	DRAWN JFM	AS-BUILT	PROJECT NO. SC03B	2 OF 3

SC03B

Arizona State Land Dept
212-36-015

Arizona State Land Dept
212-36-009

Intersect Legacy Blvd
Right of Way
Sta 70+42.00, 150' Lt±

Sta 70+00.00
150.00', Lt

Intersect Legacy Blvd
Right of Way
Sta 70+22.00, 55' Lt±

Sta 69+00.00
140.00', Lt

65

70

75

New Drainage
Easement

New R/W

2

PT 67+00.55
N=968129.50
E=700421.74

85'
36'
55'
55'
36'
85'

FUTURE MILLER ROAD

Intersect Legacy Blvd
Right of Way
Sta 70+34.00, 55' Rt±

New R/W

Miller Road Cst ℄

Intersect Legacy Blvd
Right of Way
Sta 71+74.00, 35' Lt±

Note:
Miller Road Tie to Existing
76th Street to be Set with
Final Right of Way Plat

New R/W

N 11°11'39" W

PC 76+40.49
N=969051.56
E=700239.27

3

PT 79+61.57
N=969370.64
E=700208.85

35'
35'
35'
35'
75'
75'
65'
65'

New Drainage
Easement

+40.49

New R/W

Intersect 76th Street
Right of Way
Sta 79+61.57, 35' Lt±

76TH STREET

Intersect Legacy Blvd
Right of Way
Sta 71+86.00, 35' Rt±

Sta 79+61.57
100.00', Rt

END MILLER ROAD
PRELIMINARY RIGHT
OF WAY ALIGNMENT
STA 79+61.57

N=969370.64
E=700208.85

Intersect 76th Street
Right of Way
Sta 79+61.57, 35' Rt±

Intersect Legacy Blvd
Right of Way
Sta 71+66.00, 110' Rt±

Arizona State Land Dept
212-36-015

Arizona State Land Dept
212-31-120

Arizona State
Land Dept
212-36-014

LEGACY BLVD

Arizona State Land Dept
212-36-010

Arizona State Land Dept
212-36-008

CURVE DATA

(2) PI Sta 53+79.69
N 966700.45
E 700704.55

Main Curve
Δ=42°40'00" Lt
D=1°32'10"
R=3730.00'
L=2777.62'
T=1456.76'
Ext=274.38'
Super=NC

CURVE DATA

(3) PI Sta 78+01.57
N 969209.57 (TBD)
E 700208.00 (TBD)

Main Curve
Δ=11°29'51" Lt
D=3°34'52"
R=1600.00'
L=321.07'
T=161.08'
Ext=8.09'
Super=NC

NOTE

Drainage Easements are Based on the Concrete Lined Channel from the 2015 Crossroads East Infrastructure Design Concept Report.

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SCOTTSDALE, ARIZONA 85251

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SCALE	DESIGNED	DATE	BID NO.	SHT.
HORIZ. 1"=100'	DRR	SEPTEMBER 2017		
VERT. 1"=10'	DRAWN JFM	AS-BUILT	PROJECT NO. SC03B	3 OF 3

SC03B

4:07:12 PM 10/27/2017 JOE.METRAILER K:\PHX_ROADWAY\091090017-SCOTTSDALE-MILLERUNDERPASS\CADD\12-SHEETS\ROADWAY\SC03B_C-PL03.DGN