PRELIMINARY BRIDGE SELECTION REPORT

Sunset Road
Interstate 10 to River Rd

Sunset Rd over Union Pacific Railroad (UPRR)

Prepared For:

PIMA COUNTY
TRANSPORTATION

Prepared By:

CONSOR

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

PCDOT Project No. 4SRRIV

CONSOR Project No. 2019-023

SEPTEMBER 2020

TABLE OF CONTENTS

1.0 INTRODUCTION

The Pima County Department of Transportation (PCDOT), in coordination with the Arizona Department of Transportation (ADOT) and the City of Tucson Department of Transportation (TDOT), is investigating alternatives to extend Sunset Road from Interstate 10 (I-10) to River Road. The plan to connect Sunset Road from Silverbell Road to River Road was split into two segments.

The first segment connected Silverbell Road to the existing I-10 Eastbound Frontage Rd (EBFR). Segment I was completed in 2017 and consist of a three-lane roadway, which includes a two-way left turn lane and a 720 foot long bridge over the Santa Cruz River. The bridge has a shared-use path along the southern side and a pedestrian walkway on the northern side that ties into the Loop.

The second segment is assumed to occur in conjunction with the reconstruction of the Sunset Road Traffic Interchange (TI) as part of ADOT's widening of I-10 from Ruthrauff Road to Ina Road. The new TI will cross over I-10. Segment II will extend Sunset Road from the I-10 Westbound Frontage Road (WBFR) to River Road as well as raising the roadway from Santa Cruz River to the I-10 Eastbound Frontage Rd (EBFR) to meet the new TI. This segment includes constructing new bridges over Union Pacific Railroad (UPRR) and the Rillito Creek.

For ease of discussion, this project considers the Segment II portion of Sunset Road to run North-South, with I-10 running East-West.

1.1 PROJECT LOCATION

The project is located in the City of Tucson, Pima County, AZ (See Figure 1).

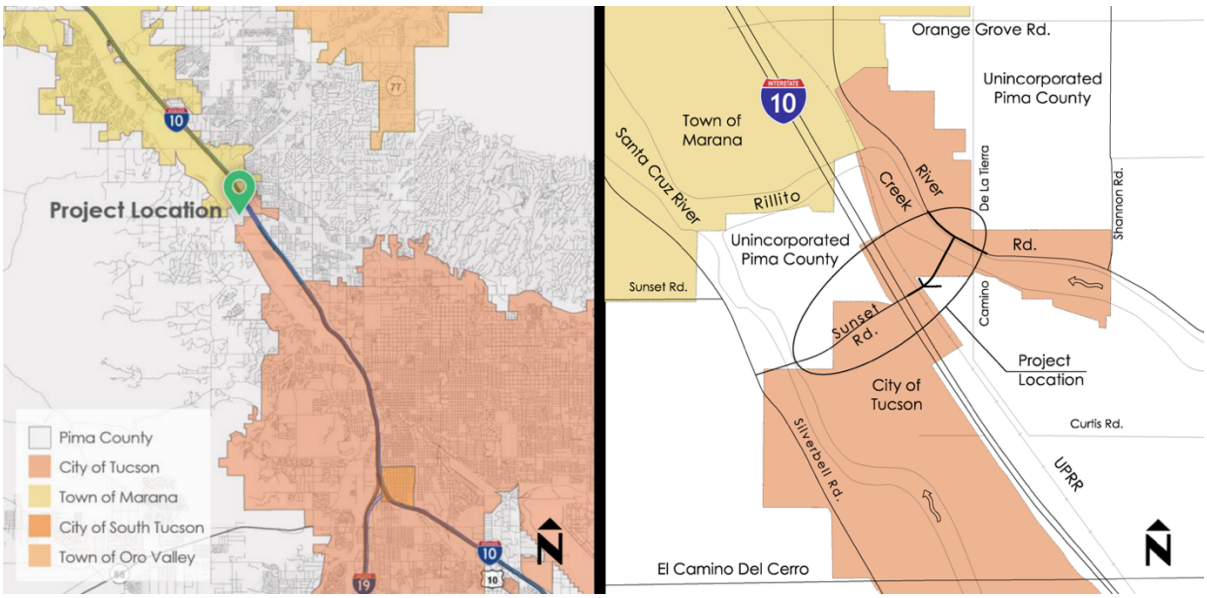


Figure 1 – Location & Vicinity Map

1.2 CURRENT PROJECT PROGRAMMING STATUS

The project is one of the 35 roadway projects included in the 2006 Regional Transportation Authority (RTA) 20 year multimodal plan.

1.3 ROADWAY CLASSIFICATION

Sunset Road is classified as a Rural Principal Arterial.

2.0 EXISTING UTILITIES

A 54" diameter storm-drain, an underground TEP power line and a FMS line present potential conflicts with the new bridge. They will need to be verified and accurately located prior to final design. The storm drain, underground power line and the FMS run east/west on the south side of Sunset Rd just north of WBFR. They will likely need to be relocated due to conflict with the proposed bridge foundations. The Fiber Optic Telephone line present a potential conflict with the pier for Alternative 3, this line also runs east/west and will need to be verified and accurately located prior to final design. No other utility conflicts are anticipated.

3.0 UNION PACIFIC RAILROAD

The UPRR's current guidelines, *BNSF Railway & Union Pacific Railroad, Guidelines for Railroad Grade Separation Projects, (Reference 4*) specifies that new overpasses must span the entire UPRR ROW and maintain a minimum vertical clearance of 23'-4" above top of rail throughout their ROW. Variations from these guidelines will require a variance from UPRR. Per direction from Pima County DOT we looked at one alternative that will put a pier within the UPRR ROW (Alternative 3) and hence this alternative will require a variance from UPRR. The use of a PC/PS girder option (Alternative 2), required a hinge on the superstructure inside the Railroad ROW, hence this alternative will also require a variance from UPRR.

4.0 EXISTING RIGHT-OF-WAY (ROW).

Two of the three proposed bridge alternatives are located outside the existing UPRR right of way and the third alternative places a pier in UPRR ROW. The south abutment for all alternatives is located within ADOT right-of-way. An easement with ADOT will be required for this abutment. The remainder of the bridge is located within Pima County ROW. No additional right-of-way acquisition will be required for the construction of the new bridge.

5.0 PROPOSED ROADWAY GEOMETRY

The roadway will be on a crest vertical curve to pass over UPRR ROW. The horizontal alignment will be tangent as it crosses the bridge with a skew angle of 0 degrees. The northbound lanes will consist of a 13'-0" inside through lane a 12'-0" through lane, and a

6'-0" outside shoulder, for a clear roadway width of 31'-0". The southbound lanes will consist of a 14'-0" right turn lane, a 5'-0" bike lane, and two 12'-0" through lanes and a 13'-0" left turn lane for a clear roadway width of 56'-0". The northbound and southbound lanes will be separated by a 15'-0" median. Right hand turns from the I-10 Westbound Frontage Road (WBFR) onto the bridge and from the bridge onto the WBFR requires a varying width near the south abutment that flares from 117'-9" to 177' -3" at the abutment.

6.0 PROPOSED BRIDGE GEOMETRY

The proposed bridge for two alternatives will be a two-span bridge with the abutments and pier located outside the UPRR ROW. The third alternative will also be a two-span bridge with pier located inside the UPRR ROW and the abutments located outside the UPRR ROW. The clear roadway width will be 31'-0" on the northbound side and 56'-0" on the southbound side, separated by a 15'-0" median. The bridge will utilize 6'-8½" sidewalk and a 1'-2" combination pedestrian -traffic bridge railing on the outside edges of the bridge resulting in an overall width of 117'-9" with the exception of a varying width near the south abutment where the width widens to 177'-3". The bridge deck will be crowned with a 2% cross slopes. The Sunset Road profile will provide at least 23'-5" minimum vertical clearance over the UPRR ROW and will also need to span the maintenance road and open channel for conveying the offsite drainage and provide 23 feet minimum clearance for the new Pima County maintenance road that will be utilized by TEP to access their overhead power lines west of the new Sunset Road extension. The bridge length and superstructure depth will vary for each bridge alternative considered. All alternatives will include approach slabs.

7.0 DESIGN SPECIFICATIONS AND LOADINGS

The proposed bridge will be designed per the AASHTO LRFD Bridge Design Specifications, 8th Edition, 2017 and the ADOT Bridge Design Guidelines. The design live load will be HL-93. It is not anticipated that the bridge will be designed for a special permit loading. Seismic design criteria will be determined as part of the geotechnical investigation and will be included in the Final Geotechnical Report. In addition, the *BNSF Railway & Union Pacific Railroad, Guidelines for Railroad Grade Separation Projects* will be followed with the need for a variance for Alternative 2 and 3.

8.0 BRIDGE FOUNDATION INVESTIGATION

A Geotechnical Evaluation report was prepared by Golder and Associates, dated September 2020. The report recommends drilled shaft foundations at the abutments and piers to minimize utility conflicts and disturbance within the UPRR ROW. However, the report also recommends that shallow foundations be investigated during final design, as they may be feasible. Drilled shafts may require temporary casing to prevent caving in of the drilled holes. Spread footings may require over-excavation of the subgrade soils to reduce the potential for excessive settlement and footprint of spread footings may impede into UPRR's ROW. This report assumes that drilled shafts will be used for all bridge alternatives at the abutments and pier.

9.0 PROPOSED BRIDGE HYDRAULICS

The proposed bridge is not over a waterway.

10.0 PROPOSED UTILITIES

The existing underground power line and storm-drain line will likely need to be relocated due to conflict with the proposed bridge foundations as well as fiber optic lines for Alternative 3. Conduits can be installed in the bridge barriers to carry the power for the new lighting along Sunset Road. No other utilities are expected to be supported on the proposed bridge.

11.0 PROPOSED RIGHT-OF-WAY

The proposed bridge is not contained completely within the existing Pima County right-of-way. Therefore, an easement from ADOT is anticipated for the south abutment as well as an easement from UPRR for Pier 1 of Alternative 3. Temporary construction easements will also be needed from ADOT and UPRR for substructure construction, girder erection as well as falsework for the cast-in-place portion of Alternative 2.

12.0 AESTHETICS

The Sunset Rd, Segment I project utilized a public artist to provide bridge aesthetics for the bridge over the Santa Cruz River. It is anticipated that public art will also be incorporated into the bridges for this segment of Sunset Rd from I-10 to River Rd. At a minimum for the UPRR Bridge selected paint colors and/or rustication patterns that provide a unified theme among the project corridor can be made during final design.

13.0 CONSTRUCTABILITY

Minimizing disruptions to the UPRR operations is paramount in determining the structure types to consider. Therefore, only Prefabricated Bridge Element Systems (PBES) are investigated for the portion of the structure over the UPRR ROW. These include:

- Precast prestressed concrete bulb tee girders.
    - These girders are more efficient than traditional AASHTO girders and are used for span lengths that traditional AASHTO girders are unable to span. In addition, their use may eliminate girder lines, reducing the disruption to UPRR operations during girder erection.
- Precast prestressed AASHTO girders
    - These girders are used for standard span lengths, as these girder types are more readily available in AZ than BT girders and possibly provide a more competitive market.
- SIP deck form system.

The three alternatives use precast prestressed bulb tee, AASHTO girders or steel plate girders over the UPRR active tracks. These girders can be easily transported to the site by truck. There is sufficient room on site to set cranes and lift the girder into place. Concrete for cast-in-place portions of the substructure and superstructure can be easily transported to the site. The I-10 corridor makes all equipment and materials delivery fairly standard for this project. In addition, this report assumes that construction of Sunset Rd will occur in conjunction with the reconstruction of the Sunset Road Traffic Interchange (TI) as part of ADOT's widening of I-10 from Ruthrauff Road to Ina Road. If ADOT's widening of I-10 precedes PCDOT's Sunset Rd Project, the MSE retaining walls at Abutment 1 will need to be built with the ADOT widening project.

14.0 CONSTRUCTION ACCESS AND STAGING AREA

Access to the construction site can be from I-10. The contractor will likely set up multiple safe access points. There is ample space within the PCDOT right-of-way for materials stockpiling, laydown areas, and equipment storage. This area is located west of the former Pima County Parks and Recreation maintenance yard.

15.0 TRAFFIC CONTROL

No traffic control is needed since this bridge is on a new alignment.

16.0 BRIDGE ALTERNATIVES

The bridge type selection process evaluates the structural, functional, and aesthetic requirements of a bridge with respect to constructability, cost, and schedule constraints. The constraints imposed by existing and final conditions include, but are not limited to, cultural/environmental, drainage, geotechnical, right-of-way, roadway geometry, UPRR guidelines, topography, traffic, utilities, and combinations thereof.

The recommended alternative is that which offers the best structural, functional, and aesthetic solution and satisfies current UPRR guidelines and applicable constraints to the maximum practicable extent. Constructability and maintenance of UPRR operations are two major challenges associated with the construction of the Sunset Rd over UPRR Bridge. A two-span option is considered best for spanning the UPRR ROW and the new PCDOT Maintenance Rd and open channel for conveying the offsite drainage.

A precast prestressed (PC/PS) concrete girder or steel plate girder superstructure is considered best suited for maintenance of UPRR operations during bridge construction.

All alternatives will have underdeck lighting, in accordance with the UPRR guidelines (Reference 4), that require overhead structures which cover 80 lineal feet of track or more shall provide a lighting system to illuminate the track.

Storm water runoff will be contained by the superstructure and barriers shall be designed to keep the bridge deck's storm water runoff from being deposited onto UPRR ROW.

16.1 ALTERNATIVE 1 – STEEL GIRDER

Superstructure:

Alternative 1 utilizes span 1 of 206'-0" to clear the UPRR ROW and span 2 of 44'-6" to span the maintenance road and open channel with a total bridge length of 255'-0". For span 1 the superstructure consists of 15 girder lines of built-up Steel Plate Girders (86" deep) spaced at 7'-10-1/2" with 3'-9" overhangs, resulting in an out-to-out deck width of 117'-9" except in the vicinity of the south abutment due to the roadway flare. Here the deck width widens to approximately 177'-3", with an overhang width that varies to approximately 30 feet requiring a cast -in-place beam deck framing system. The deck is 8" thick resulting in an overall depth of 8'-0". For span 2 the superstructure consist of 15 girder lines of WF 24x 117 rolled steel beams spaced at 7'-10-1/2" with 3'-9" overhangs, resulting in an out-to-out deck width of 117'-9". The deck is 8" thick, and the overall structure depth is 2'-10".

Substructure:

The abutments are exposed (pier style) abutments approximately 177'-3" at abutment 1 and 120-0" long at abutment 2. The abutments consist of a drop cap beam supported on 7 columns at abutment 1 and 5 columns at abutment 2. Each column is assumed to be supported on a single drilled shaft. MSE retaining walls support the approach roadway behind the abutments.

Wingwalls can be either cast-in-place retaining walls (SD 7.01) or mechanically stabilized earth (MSE) retaining walls. The wingwalls of abutment 1 are part of the retaining walls for the WBFR.

The pier is an expansion pier and is approximately 120'-0" long and consists of a drop cap beam supported on 5 columns. Each column is assumed to be supported on a single drilled shaft.

Cost Estimate:

- Total Structure Cost: $8,384,198
- Cost per SF: $269.57
- Cost estimate does not include UPRR flagging cost
- Cost estimate includes 30% contingency

16.2 ALTERNATIVE 2 – PC/PS GIRDER WITH CIP BACK SPAN

Superstructure:

Alternative 2 utilizes span 1 of 205'-4" to clear the UPRR ROW and span 2 of 58'-0" to span the maintenance road and open channel and additional length to offset any uplift due to superstructure configuration, with a total bridge length of 268'-10". For span 1 the superstructure consists of 15 girder lines of BT82 (82" deep) 180 ft long, spaced at 6'-11" supported on a hinge seat from the 25'-4" long cantilever cast-in-place 7'-9" deep box section. The hinge is located within the UPRR ROW and therefore would require a variance from UPRR. The cast-in-place box section

is post-tensioned with 15 webs spaced at 6'-11" with 3'-6 1/2" overhangs, resulting in an out-to-out deck width of 117'-9" except in the vicinity of the south abutment due to the roadway flare. Here the deck width widens to approximately 177'-3", with an overhang width that varies to approximately 30 ft requiring a cast -in-place beam deck framing system. For span 2 the superstructure consist of a 7'-9" deep cast-in-place post tensioned box with 15 webs spaced at 6'-11" and 3'-6 1/2" overhangs, resulting in an out-to-out deck width of 117'-9".

Substructure:

The abutments are exposed (pier style) abutments approximately 177'-3" at abutment 1 and 120-0" long at abutment 2. The abutments consist of a drop cap beam supported on 7 columns at abutment 1 and 5 columns at abutment 2. Each column is assumed to be supported on a single drilled shaft. MSE retaining walls support the approach roadway behind the abutments.

Wingwalls can be either cast-in-place retaining walls (SD 7.01) or mechanically stabilized earth (MSE) retaining walls. The wingwalls of abutment 1 are part of the retaining walls for the WBFR.

The pier is a fixed pier and is approximately 120'-0" long and consists of an integral diaphragm supported on 5 columns. Each column is assumed to be supported on a single drilled shaft.

Cost Estimate:

- Total Structure Cost: $7,154,688
- Cost per SF: $218.59
- Cost estimate does not include UPRR flagging cost
- Cost estimate includes 30% contingency

16.3 ALTERNATIVE 3 – AASHTO GIRDER SUPERSTRUCTURE WITH PIER LOCATED WITHIN UPRR ROW

Superstructure:

Alternative 3 utilizes span 1 of 152'-0" requiring the pier to be located within UPRR ROW but has a minimum horizontal clearance greater than 25 feet from the future lines. Span 2 is 97 ft and spans the maintenance road and open channel. The total bridge length is 255'-0". For span 1 the superstructure consists of 17 girder lines of AASHTO Type Super VI Modified girders, spaced at 6'-11 with 3'-6 1/2" overhangs, resulting in an out-to-out deck width of 117'-9" except in the vicinity of the south abutment due to the roadway flare. Here the deck width widens to approximately 177'-3", with an overhang width that varies to approximately 30 ft requiring a cast -in-place beam deck framing system. For span 2 the superstructure consist of a 17 girder lines of AASHTO Type Super 6 Modified girders spaced at 6'-11" and 3'-6 1/2" overhangs, resulting in an out-to-out deck width of 117'-9".

If UPRR allows this variance (construction of a pier in their ROW), the final design can further refine this alternative to either reduce the number of Type Super VI Modified girders in span 2 or utilize a smaller girder type (such as a Type IV or Modified V). The intent of studying this alternative is to provide an estimate of the probable cost savings when smaller spans can be utilized.

Substructure:

The abutments are exposed (pier style) abutments approximately 177'-3" at abutment 1 and 120-0" long at abutment 2. The abutments consist of a drop cap beam supported on 7 columns at abutment 1 and 5 columns at abutment 2. Each column is assumed to be supported on a single drilled shaft. MSE retaining walls support the approach roadway behind the abutments. Wingwalls can be either cast-in-place retaining walls (SD 7.01) or mechanically stabilized earth (MSE) retaining walls. The wingwalls of abutment 1 are part of the retaining walls for the WBFR.

The pier is an expansion pier and is approximately 120'-0" long and consists of a drop cap beam supported on 5 columns. Each column is assumed to be supported on a single drilled shaft.

Cost Estimate:

- Total Structure Cost: $6,176,415
- Cost per SF: $198.59
- Cost estimate does not include UPRR flagging cost
- Cost estimate includes 30% contingency

17.0 RECOMMENDED ALTERNATIVE

Based on the Union Pacific Railroad's rejection of a variance for Alternatives 2 and 3 (see Appendix C) the recommended alternative is Alternative 1 at a cost of $8.38 million.

Subsequent studies could evaluate continuous post tensioning of Alternative 2 between the CIP Box and PC/PS Girder, thus eliminating the hinge.

All three alternatives utilize precast or prefabricated superstructure elements over the UPRR ROW.

Preliminary phasing plan for the recommended alternative includes:

1. relocating all conflicting utilities as specified in the elevation drawing
2. construction of MSE walls
3. construction of abutment and pier drilled shafts
4. construction of abutment and piers
5. erection of span 1 girders over Railroad ROW
6. erection of span 1 SIP forms over Railroad ROW
7. placement of concrete for Span 1 top deck over Railroad ROW
8. construction of span 2 girders and decking*
9. placement of barrier and fencing

*construction of span 2 is independent of span 1 and can be performed anywhere from step 5 to step 7

18.0 REFERENCES

1. *Initial Geotechnical Report: Sunset Rd: I-10 to River Road, Golder & Associates, September 2020.*

2. *AASHTO LRFD Bridge Design Specifications, 8th Edition, 2017, American Association of State Highway and Transportation Officials (AASHTO).*

3. *Arizona Department of Transportation (ADOT) Bridge Design Guidelines*

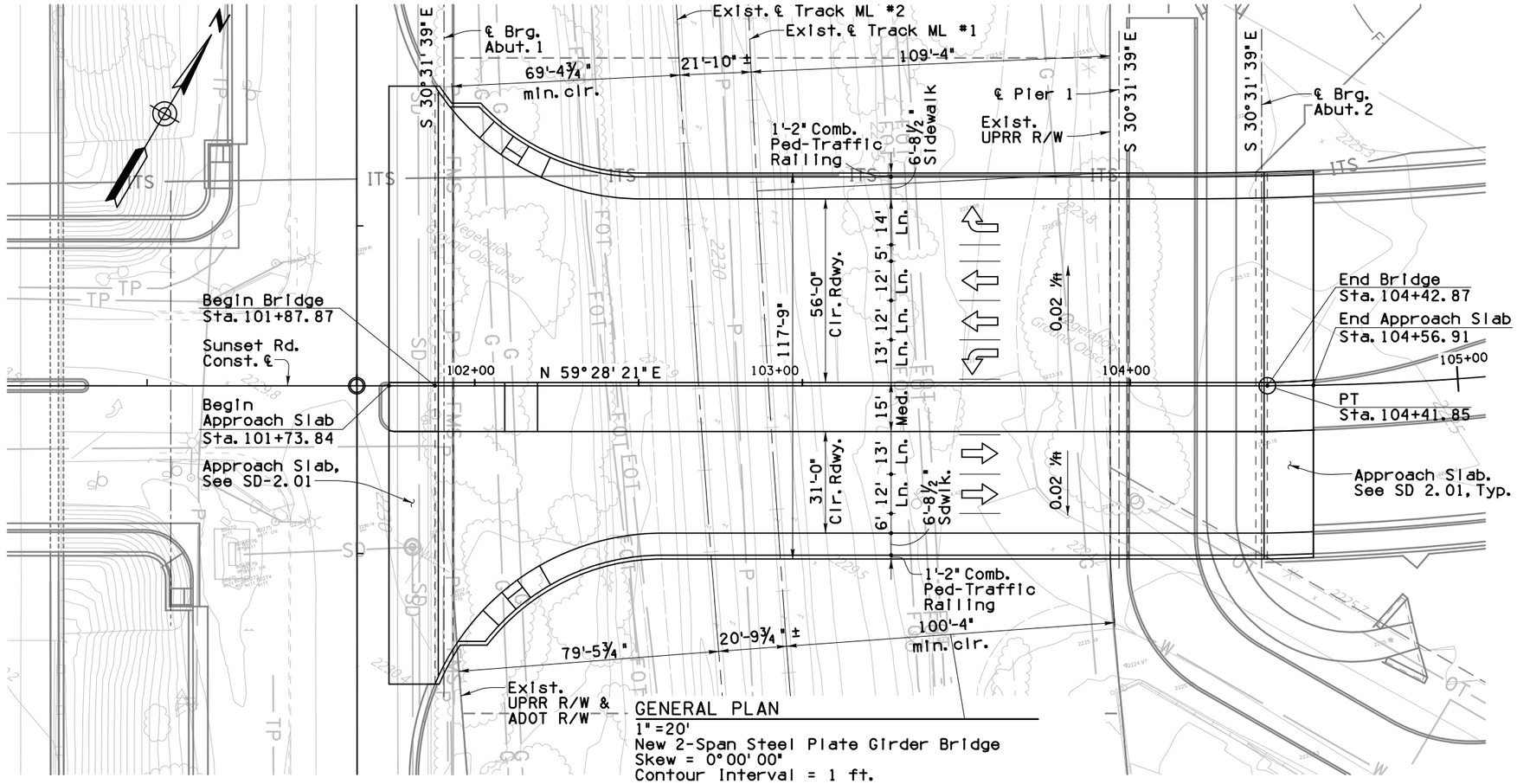
4. *BNSF Railway & Union Pacific Railroad, Guidelines for Railroad Grade Separation Projects, Rev 2016*

APPENDIX A - PLANS, ELEVATIONS AND TYPICAL SECTIONS

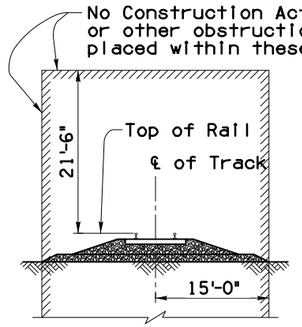
F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	RECORD DRAWING
9	ARIZ.				

Notes:

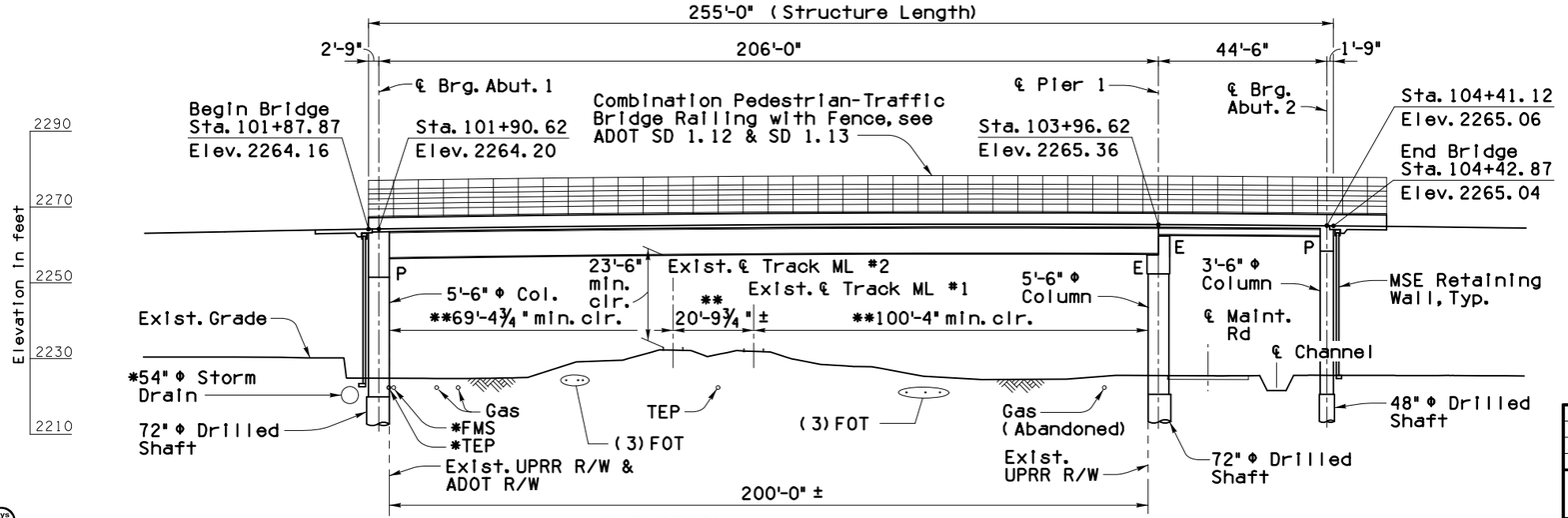
1. All Stations, Elevations & Dimensions are at Sunset Road Const. ℄.
2. Contractor to verify utility line locations.



GENERAL PLAN
1" = 20'
New 2-Span Steel Plate Girder Bridge
Skew = 0° 00' 00"
Contour Interval = 1 ft.

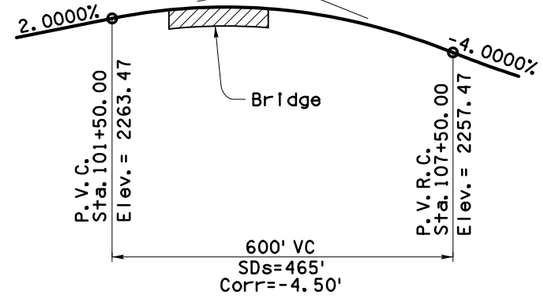


MIN. CONSTR. CLEARANCE ENVELOPE
(NORMAL TO RAILROAD)



ELEVATION
1" = 20'

* To be relocated
** Measured perpendicular to Track



PROFILE GRADE
No Scale

	NAME	DATE
DESIGN	KGR, KRH	08-20
DRAWN	JHS, MJL	08-20
CHECKED	CGP	08-20

CONSOR
1430 E. Fort Lowell Rd., Suite 200, Tucson, AZ 85719 (520) 325-6105

PIMA COUNTY DEPARTMENT OF TRANSPORTATION

BRIDGE OVER UPRR
PLAN & ELEVATION

ROUTE: I-10
LOCATION: SUNSET ROAD: I-10 TO RIVER ROAD

TRACS NO.

PRELIMINARY
STAGE I
Review
NOT FOR CONSTRUCTION OR RECORDING

SHEET S01 OF S02
47 OF 50

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

PLOTTED BY: mlichtenstein Date Plotted: 9/15/2020 Time Plotted: 3:32:45 PM W:\Jobs\2019\1923_Sunset_2\1923_Working\1923_UPRR_Alt 1_GP1.dgn

DATE- LOCATION- REVISIONS- FINISHED PLANS- SURVEY NO.

F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	RECORD DRAWING
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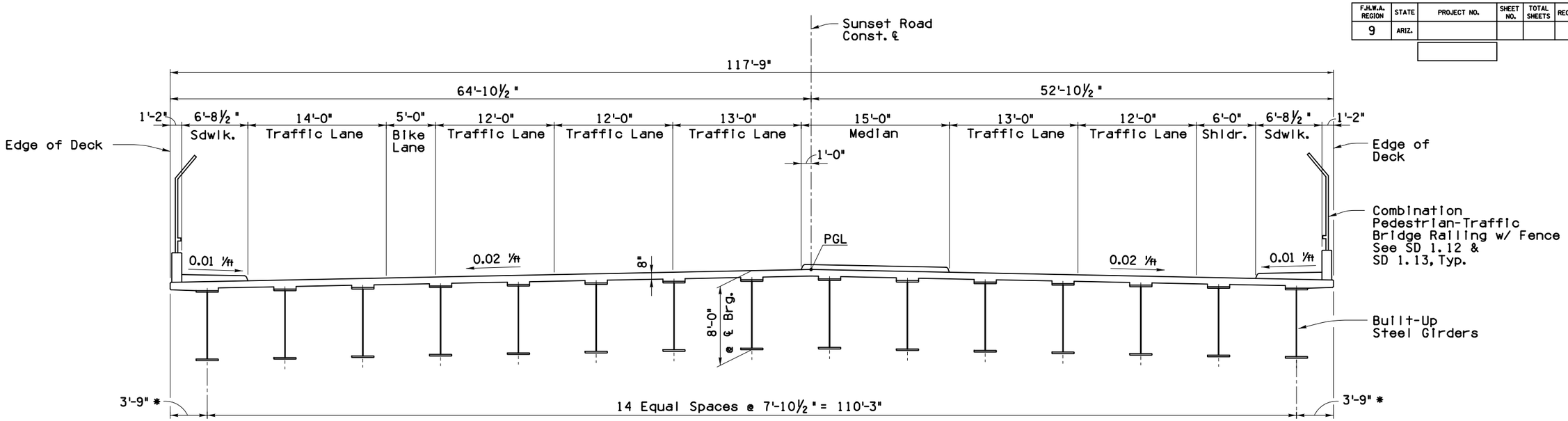
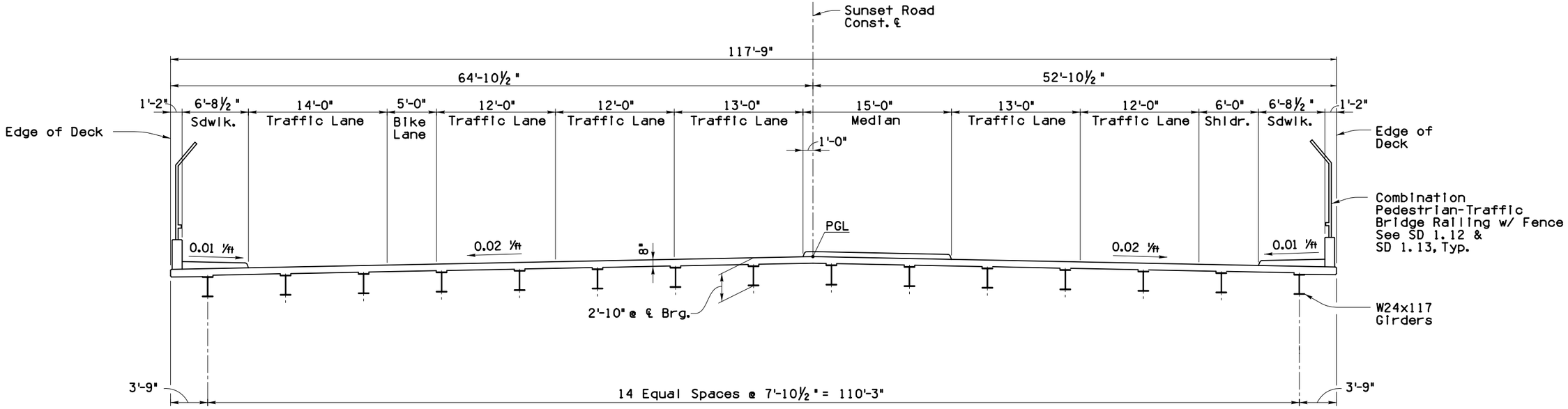


TYPICAL SECTION - SPAN 1
3/16" = 1'-0"

* Dimension varies at deck flare at Abutment 1.



TYPICAL SECTION - SPAN 2
3/16" = 1'-0"

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DRAWN	JHS, MJL	08-20
CHECKED	CGP	08-20

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PIMA COUNTY DEPARTMENT OF TRANSPORTATION

BRIDGE OVER UPRR
TYPICAL SECTIONS

ROUTE: I-10
LOCATION: SUNSET ROAD: I-10 TO RIVER ROAD

TRACS NO.

PRELIMINARY
STAGE I
Review
NOT FOR CONSTRUCTION OR RECORDING

SHEET S02 OF S04

48 OF 50

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PLOTTED BY:- JSmitley Date Plotted: 7/29/2020 Time Plotted: -. 3:48:23 PM W:\Jobs\2019\1923_Sunset_2\1923_Working\1923_UPRR_Alt 1_XS1.dgn

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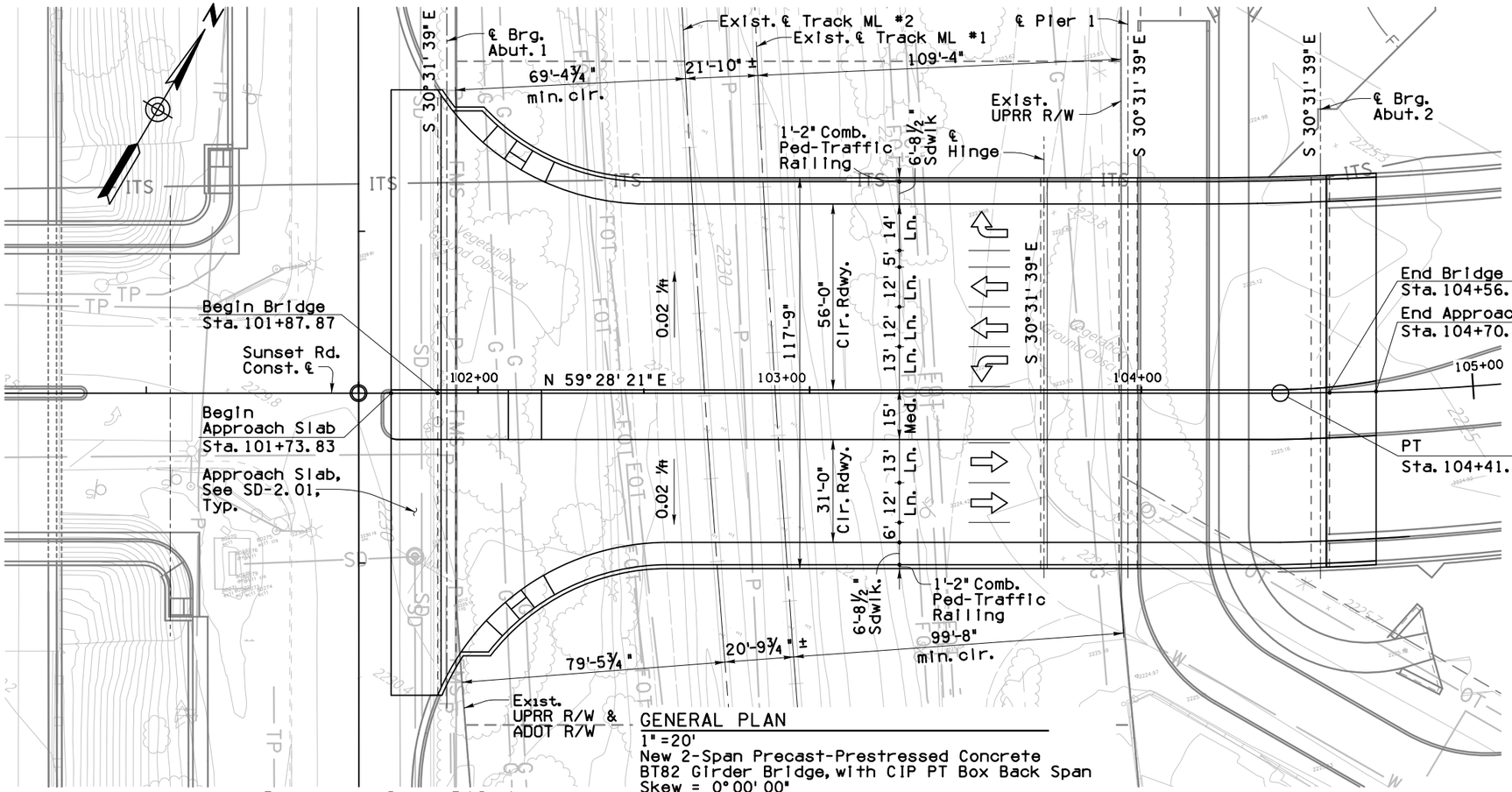
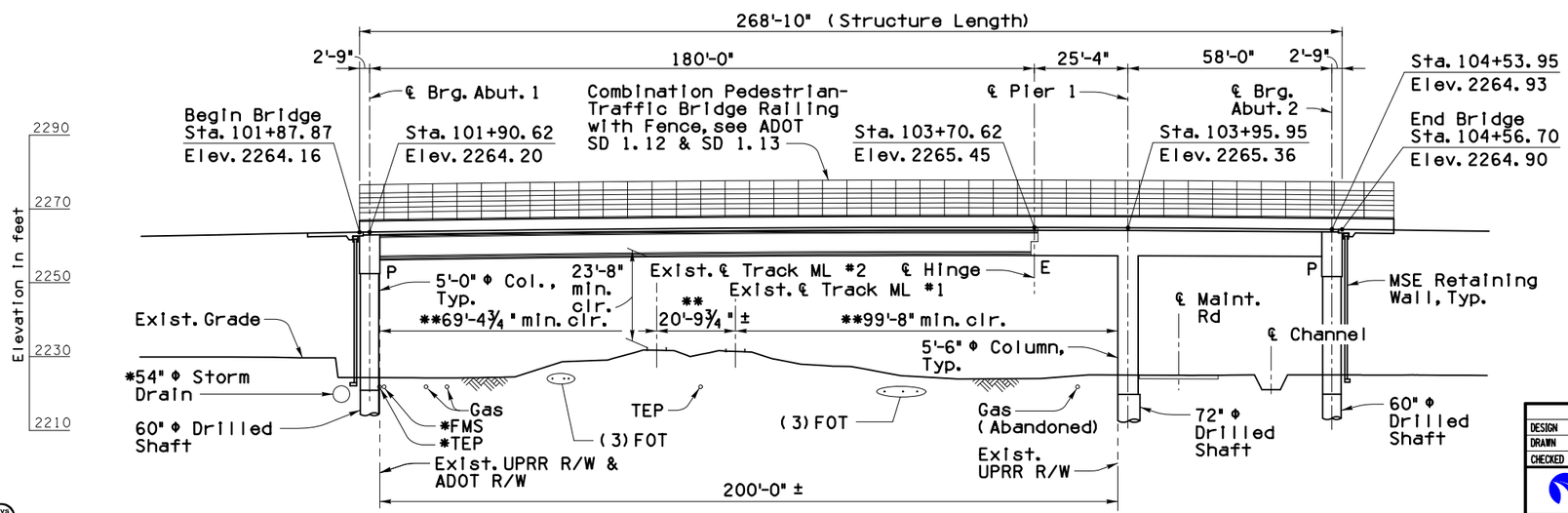


GENERAL PLAN

1" = 20'
New 2-Span Precast-Prestressed Concrete BT82 Girder Bridge, with CIP PT Box Back Span
Skew = 0° 00' 00"
Contour Interval = 1 ft.

* Dimension at Sunset Rd.Cst.\



ELEVATION

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* To be relocated
** Measured perpendicular to Track

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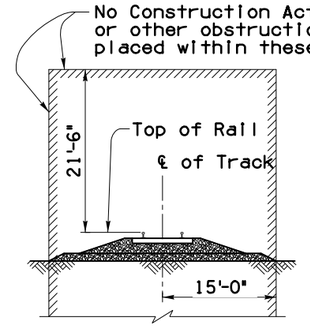

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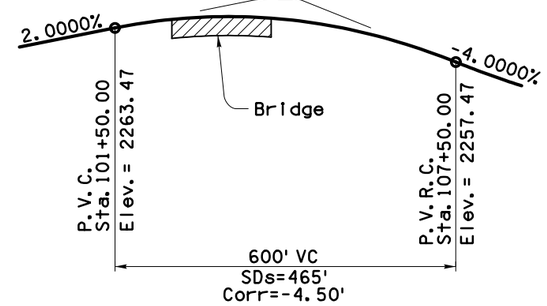

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PIMA COUNTY DEPARTMENT OF TRANSPORTATION

BRIDGE OVER UPRR
PLAN & ELEVATION
ALT. 2 (CAST-IN-PLACE, BT GIRDER)

ROUTE: I-10
LOCATION: SUNSET ROAD: I-10 TO RIVER ROAD

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STAGE I
Review
NOT FOR CONSTRUCTION OR RECORDING

SHEET S01 OF S02

___ OF ___

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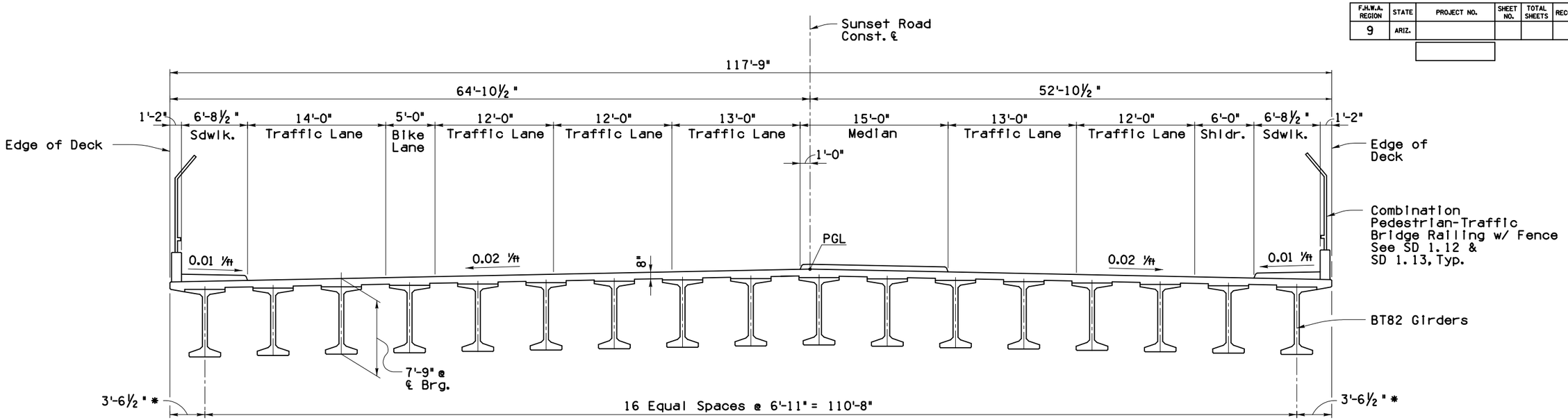
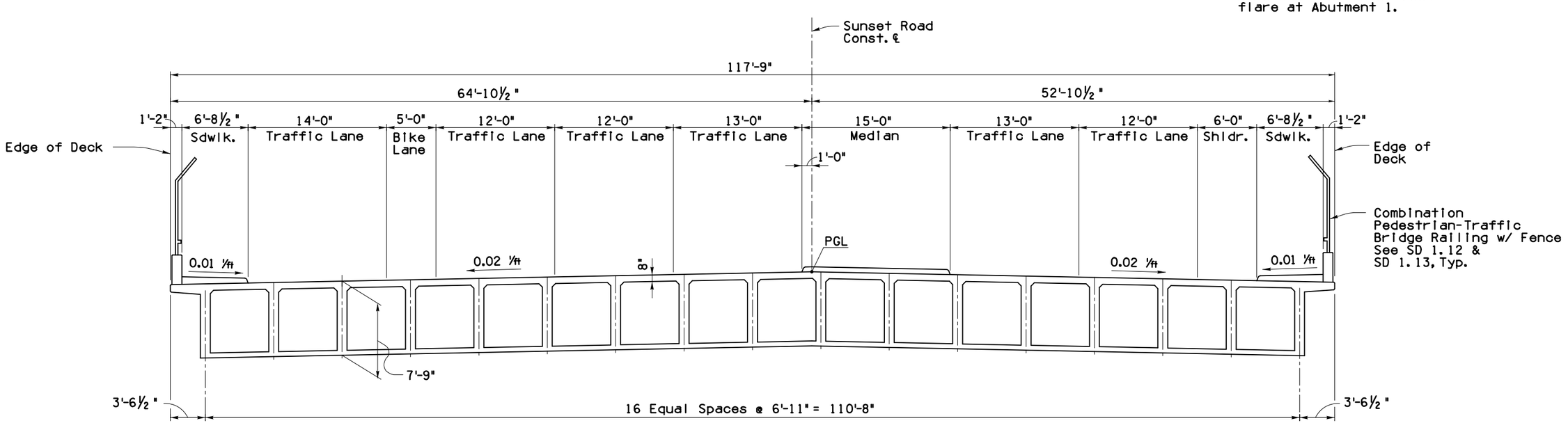
F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	RECORD DRAWING
9	ARIZ.				



TYPICAL SECTION AT MIDSPAN OF SPAN 1 (DROP-IN SECTION)
3/16" = 1'-0"

* Dimension varies at deck flare at Abutment 1.



TYPICAL SECTION AT CANTILEVER, PIER AND SPAN 2 (C.I.P. SECTION)
3/16" = 1'-0"

	NAME	DATE
DESIGN	KGR, KRH	08-20
DRAWN	JHS, MJL	08-20
CHECKED	CGP	08-20

CONSOR
1420 E. Northern Blvd., Suite 200, Tucson, AZ 85719 (520) 575-8700

PIMA COUNTY DEPARTMENT OF TRANSPORTATION

BRIDGE OVER UPRR
TYPICAL SECTIONS
ALT. 2 (CAST-IN-PLACE, BT GIRDER)

ROUTE: I-10
LOCATION: SUNSET ROAD: I-10 TO RIVER ROAD

TRACS NO.

PRELIMINARY
STAGE I
Review
NOT FOR CONSTRUCTION OR RECORDING

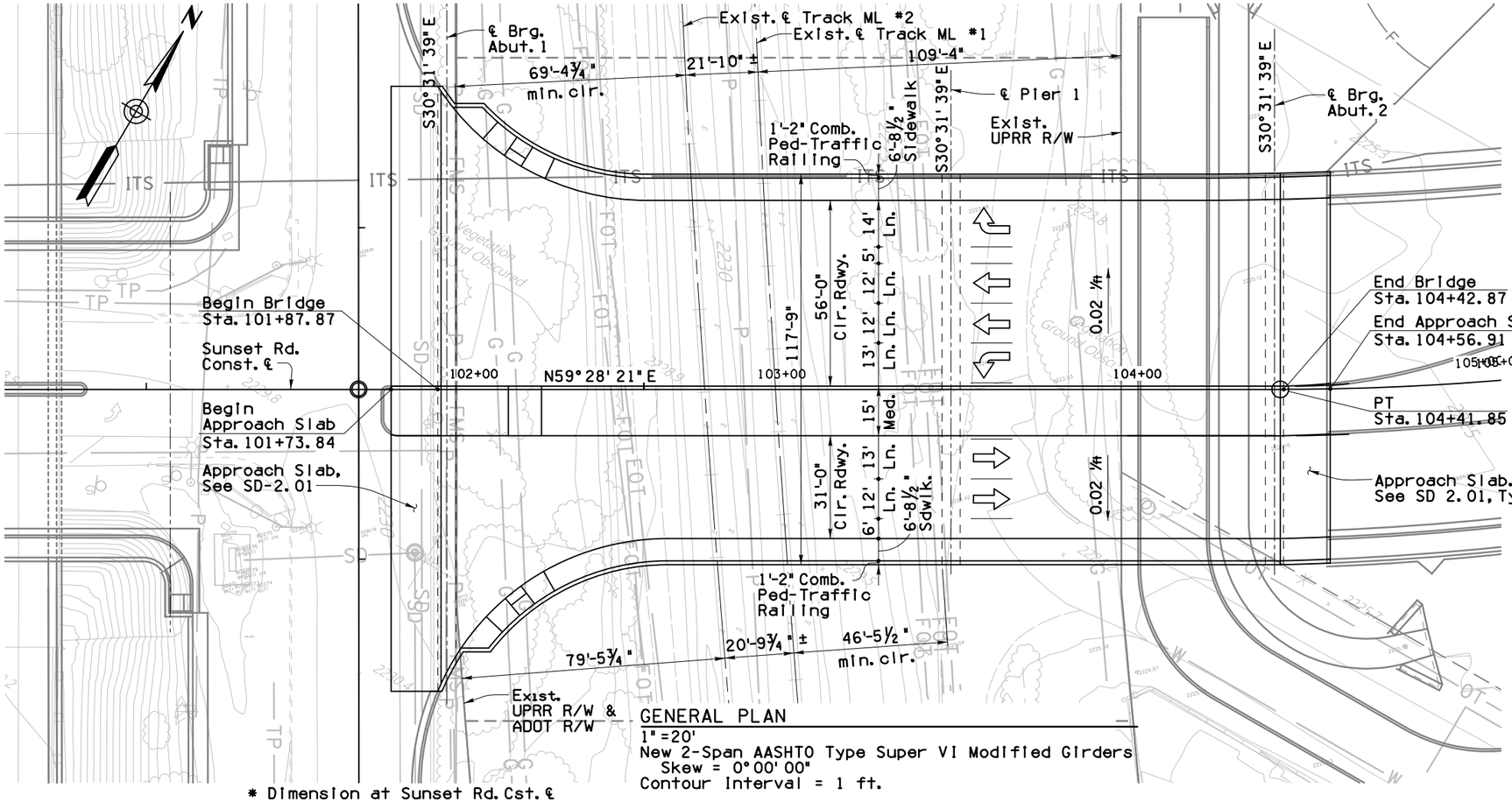
SHEET S02 OF S02

___ OF ___

SURVEY NO. | FINISHED PLANS | REVISIONS | LOCATION | DATE

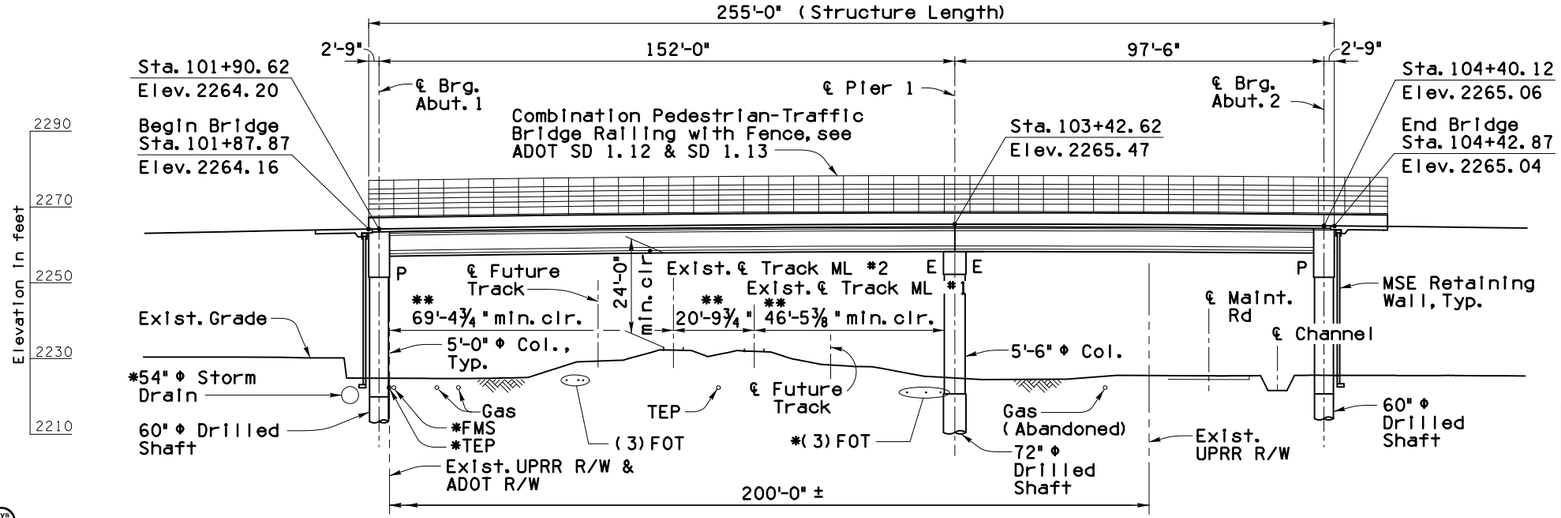
PLOTTED BY:- JSmitley Date Plotted: 7/29/2020 Time Plotted: -. 3:50:03 PM W:\Jobs\2019\1923_Sunset_2\1923_Working\1923_UPRR_Alt 2_XS1.dgn

F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	RECORD DRAWING
9	ARIZ.				



GENERAL PLAN
1" = 20'
New 2-Span AASHTO Type Super VI Modified Girders
Skew = 0° 00' 00"
Contour Interval = 1 ft.

* Dimension at Sunset Rd. Cst. ℄

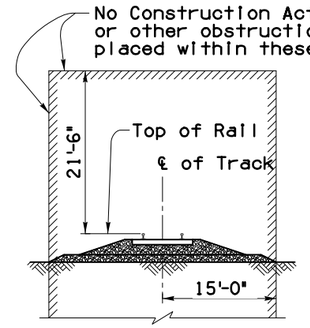


ELEVATION
1" = 20'

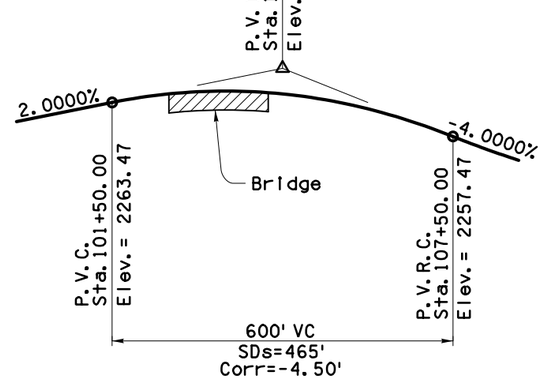
* To be relocated
** Measured perpendicular to Track

Notes:

1. All Stations, Elevations & Dimensions are at Sunset Road Const. ℄.
2. Contractor to verify utility line locations.



MIN. CONSTR. CLEARANCE ENVELOPE
(NORMAL TO RAILROAD)



PROFILE GRADE
No Scale

	NAME	DATE
DESIGN	KGR, KRH	08-20
DRAWN	JHS, MJL	08-20
CHECKED	CGP	08-20

CONSOR
1430 E. Ft. Lowell Rd., Suite 200, Tucson, AZ 85719 (520) 325-6616

PIMA COUNTY DEPARTMENT OF TRANSPORTATION

BRIDGE OVER UPRR
PLAN & ELEVATION
ALT. 3 (AASHTO GIRDER)

ROUTE: I-10
LOCATION: SUNSET ROAD: I-10 TO RIVER ROAD

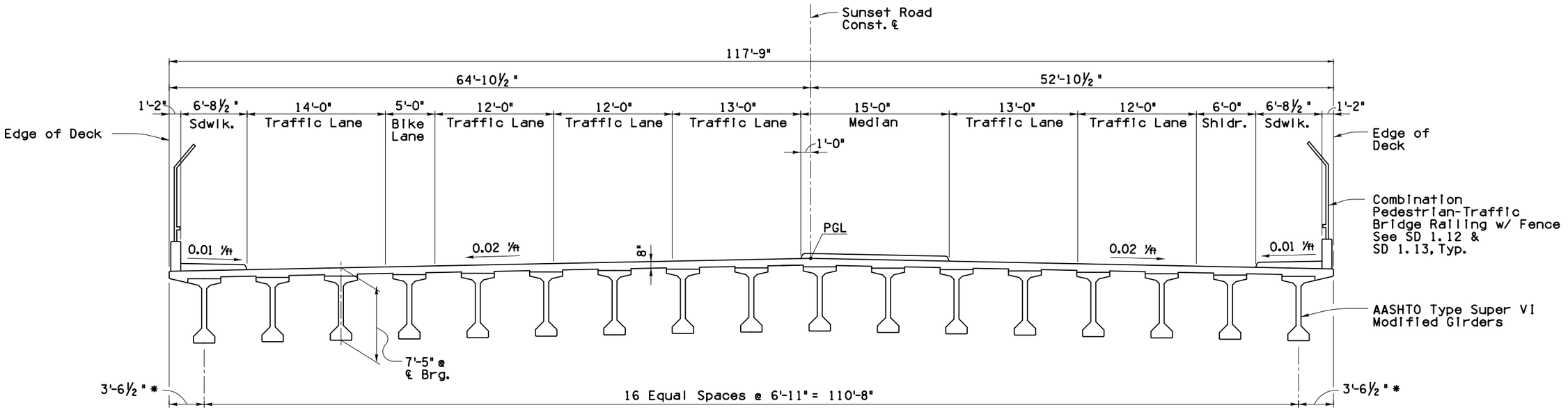
TRACS NO.

PRELIMINARY
STAGE I
Review
NOT FOR CONSTRUCTION OR RECORDING

SHEET ___ OF ___

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

F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	RECORD DRAWING
9	ARIZ.				



TYPICAL SECTION
3/16" = 1'-0"

* Dimension varies at deck flare at Abutment 1.

	NAME	DATE
DESIGN	KGR, KRH	08-20
DRAWN	JHS, MJL	08-20
CHECKED	CGP	08-20

CONSOR
1430 E. Northland Rd., Suite 200, Tucson, AZ 85715 (520) 209-8134

PIMA COUNTY DEPARTMENT OF TRANSPORTATION

BRIDGE OVER UPRR
TYPICAL SECTION
ALT. 3 (AASHTO GIRDER)

ROUTE: I-10
LOCATION: SUNSET ROAD: I-10 TO RIVER ROAD

TRACS NO.

PRELIMINARY
STAGE I
Review
NOT FOR CONSTRUCTION OR RECORDING

SHEET S02 OF S02

____ OF ____

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

SURVEY NO. | FINISHED PLANS | REVISIONS | LOCATION | DATE

PLOTTED BY:- JSmitley | Date Plotted: 7/29/2020 | Time Plotted: -. 3:51:46 PM | W:\Jobs\2019\1923_Sunset_2\1923_Working\1923_UPRR_Alt 3_XS1.dgn

APPENDIX B - COST ESTIMATES

Sunset Road over UPRR Bridge - Alternative 3

(Two Span Bridge 255' long with AASHTO Girders)

LUMP SUM STRUCTURE ITEMS					
ITEM NUMBER	**DESCRIPTION**	**UNIT**	**UNIT COST**	**QUANTITY**	**COST**
2030501	STRUCTURAL EXCAVATION	CU.YD.	$45.00	171	$7,695
6010005	STRUCTURAL CONCRETE (CLASS S) (F'C = 4,500)	CU.YD.	$500.00	1771	$885,500
6011132	COMBINATION PEDESTRIAN-TRAFFIC BRIDGE RAILING	L.FT.	$125.00	530	$66,250
6011133	PEDESTRIAN FENCE FOR BRIDGE RAILING	L.FT.	$50.00	530	$26,500
6011347	DECK JOINT ASSEMBLY (3X3 COMPRESSION SEAL)	L.FT.	$175.00	116	$20,300
6011371	APPROACH SLAB (SD 2.01)	SQ.FT.	$20.00	4520	$90,400
6014956	PRECAST, P/S MEMBER (AASHTO TYPE 6 MOD. GR.)	L.FT.	$400.00	4242	$1,696,800
6015101	RESTRAINERS, VERTICAL EARTHQUAKE (FIXED)	EACH	$200.00	32	$6,400
6015102	RESTRAINERS, VERTICAL EARTHQUAKE (EXPANSION)	EACH	$300.00	32	$9,600
6050002	REINFORCING STEEL	LB.	$1.00	347180	$347,180
			SUBTOTAL:		$3,156,625
			CONTINGENCY:	30%	$946,988
			TOTAL COST:		$4,103,613
			BRIDGE COST/SF (WITHOUT OTHER ITEMS):		$131.94
OTHER ITEMS					
6090060	DRILLED SHAFT FOUNDATION (60")	L.FT.	$650.00	600	$390,000
6090072	DRILLED SHAFT FOUNDATION (72")	L.FT.	$800.00	300	$240,000
9080150	CONCRETE MEDIAN PAVEMENT	SQ.FT.	$7.50	4275	$32,063
9140153	RETAINING WALL (MSE WALL 3)	SQ.FT.	$60.00	12950	$777,000
7320770	FIBER OPTIC CABLE (RELOCATE)	L.FT.	$12.00	12950	$155,400
			SUBTOTAL:		$1,594,463
			CONTINGENCY:	30%	$478,339
			TOTAL COST:		$2,072,802
			BRIDGE COST/SF (OTHER ITEMS):		$66.65
TOTAL					
			SUBTOTAL:		**$4,751,088**
			CONTINGENCY:	**30%**	**$1,425,327**
			TOTAL COST:		**$6,176,415**
			BRIDGE COST/SF (WITH OTHER ITEMS):		**$198.59**

Structure Name: **Sunset over UPRR-Alternative 3**
Superstructure Type: **AASHTO Girder**
Substructure Type: **Multi Column Piers & Seat Type Abutments**
Foundation Type: **Drilled Shafts**
No. of Spans: **2**
Span Lengths (ft): **152-97.5**
Skew (deg): **0°**

Total Length (ft): **255.00**
Width (Out to Out) (ft): **121.97**
Area (sq ft): **31,101.87**

Sunset Rd over UPRR Bridge - Alternative 2

(Two Span Bridge 268'-10" long with Precast Prestressed BT82 Drop in Girders and CIP Box)

LUMP SUM STRUCTURE ITEMS					
ITEM NUMBER	DESCRIPTION	UNIT	UNIT COST	QUANTITY	COST
2030501	STRUCTURAL EXCAVATION	CU.YD.	$45.00	201	$9,045
6010005	STRUCTURAL CONCRETE (CLASS S) (F'C = 4,500)	CU.YD.	$500.00	1706	$853,000
6010009	STRUCTURAL CONCRETE (CLASS S) (F'C = 6,000)	CU.YD.	$700.00	1089	$762,300
6011132	COMBINATION PEDESTRIAN-TRAFFIC BRIDGE RAILING	L.FT.	$125.00	530	$66,250
6011133	PEDESTRIAN FENCE FOR BRIDGE RAILING	L.FT.	$50.00	530	$26,500
6011347	DECK JOINT ASSEMBLY (3X3 COMPRESSION SEAL)	L.FT.	$175.00	116	$20,300
6011371	APPROACH SLAB (SD 2.01)	SQ.FT.	$20.00	4503	$90,060
6014974	PRECAST, P/S MEMBER (BULB-TEE TYPE BT82)	L.FT.	$500.00	3086	$1,543,000
6015101	RESTRAINERS, VERTICAL EARTHQUAKE (FIXED)	L.FT.	$200.00	16	$3,200
6015102	RESTRAINERS, VERTICAL EARTHQUAKE (EXPANSION)	L.FT.	$300.00	16	$4,800
6020001	PRESTRESSING CAST-IN-PLACE CONCRETE- STA (	L.SUM	$2.00	70118	$140,235
6050002	REINFORCING STEEL	LB.	$1.00	532025	$532,025
			SUBTOTAL:		$4,050,715
			CONTINGENCY:	30%	$1,215,215
			TOTAL COST:		$5,265,930
			BRIDGE COST/SF (WITHOUT OTHER ITEMS):		$160.89
OTHER ITEMS					
6090060	DRILLED SHAFT FOUNDATION (60")	L.FT.	$650.00	564	$366,600
6090072	DRILLED SHAFT FOUNDATION (72")	L.FT.	$800.00	350	$280,000
9080150	CONCRETE MEDIAN PAVEMENT	SQ.FT.	$7.50	4483	$33,623
9140153	RETAINING WALL (MSE WALL 3)	SQ.FT.	$60.00	12878	$772,668
			SUBTOTAL:		$1,452,891
			CONTINGENCY:	30%	$435,867
			TOTAL COST:		$1,888,758
			BRIDGE COST/SF (OTHER ITEMS):		$57.71
TOTAL					
			SUBTOTAL:		**$5,503,606**
			CONTINGENCY:	**30%**	**$1,651,082**
			TOTAL COST:		**$7,154,688**
			BRIDGE COST/SF (WITH OTHER ITEMS):		**$218.59**

Structure Name:	**Sunset over UPRR - Alternative 2**		
Superstructure Type:	**BT82 Girder and CIP Box Superstructure**		
Substructure Type:	**Multi Column Piers & Seat Type Abutments**		
Foundation Type:	**Drilled Shafts**		
No. of Spans:	**2**	Total Length (ft):	**268.83**
Span Lengths (ft):	**205.33, 58**	Width (Out to Out) (ft):	**121.75**
Skew (deg):	**0°**	Area (sq ft):	**32,730.35**

Sunset Road over UPRR Bridge - Alternative 1

(Two Span Bridge 255' long with Steel Plate Girders/Wide Flange Girders)

LUMP SUM STRUCTURE ITEMS					
ITEM NUMBER	**DESCRIPTION**	**UNIT**	**UNIT COST**	**QUANTITY**	**COST**
2030501	STRUCTURAL EXCAVATION	CU.YD.	$45.00	180	$8,100
6010005	STRUCTURAL CONCRETE (CLASS S) (F'C = 4,500)	CU.YD.	$500.00	1665	$832,500
6011132	COMBINATION PEDESTRIAN-TRAFFIC BRIDGE RAILING	L.FT.	$125.00	530	$66,250
6011133	PEDESTRIAN FENCE FOR BRIDGE RAILING	L.FT.	$50.00	530	$26,500
6011347	DECK JOINT ASSEMBLY (3X3 COMPRESSION SEAL)	L.FT.	$175.00	116	$20,300
6011371	APPROACH SLAB (SD 2.01)	SQ.FT.	$20.00	4520	$90,400
6040001	STRUCTURAL STEEL	LB.	$2.20	1763000	$3,878,600
6050002	REINFORCING STEEL	LB.	$1.00	327670	$327,670
			SUBTOTAL:		$5,250,320
			CONTINGENCY:	30%	$1,575,096
			TOTAL COST:		$6,825,416
			BRIDGE COST/SF (WITHOUT OTHER ITEMS):		$219.45
OTHER ITEMS					
6090048	DRILLED SHAFT FOUNDATION (48")	L.FT.	$500.00	100	$50,000
6090072	DRILLED SHAFT FOUNDATION (72")	L.FT.	$800.00	425	$340,000
9080150	CONCRETE MEDIAN PAVEMENT	SQ.FT.	$7.50	4275	$32,063
9140153	RETAINING WALL (MSE WALL 3)	SQ.FT.	$60.00	12950	$777,000
			SUBTOTAL:		$1,199,063
			CONTINGENCY:	30%	$359,719
			TOTAL COST:		$1,558,782
			BRIDGE COST/SF (OTHER ITEMS):		$50.12
TOTAL					
			SUBTOTAL:		**$6,449,383**
			CONTINGENCY:	**30%**	**$1,934,815**
			TOTAL COST:		**$8,384,198**
			BRIDGE COST/SF (WITH OTHER ITEMS):		**$269.57**

Structure Name:	**Sunset over UPRR - Alternative 1**		
Superstructure Type:	**Steel Plate Girder/ Wide Flange Girder**		
Substructure Type:	**Multi Column Piers & Seat Type Abutments**		
Foundation Type:	**Drilled Shafts**		
No. of Spans:	**2**	Total Length (ft):	**255.00**
Span Lengths (ft):	**206 - 44.5**	Width (Out to Out) (ft):	**121.97**
Skew (deg):	**0°**	Area (sq ft):	**31,101.87**

APPENDIX C – UPRR COMMENTS

DESIGN & PLAN REVIEW COMMENTS

Check for compliance with current AREMA and UPRR guidelines

It should be noted that this review of the construction documents does not relieve the sponsoring agency or their consultant from ultimate responsibility and liability for the construction documents as the Engineer-of-Record nor from liability for damages to UPRR property during and after construction of the project.

Project Name:	**Sunset Road Overhead**	**Submittal Description:**	**Concept Plans Submittal – AWO 54914**	**Status:**	**Not Approved**

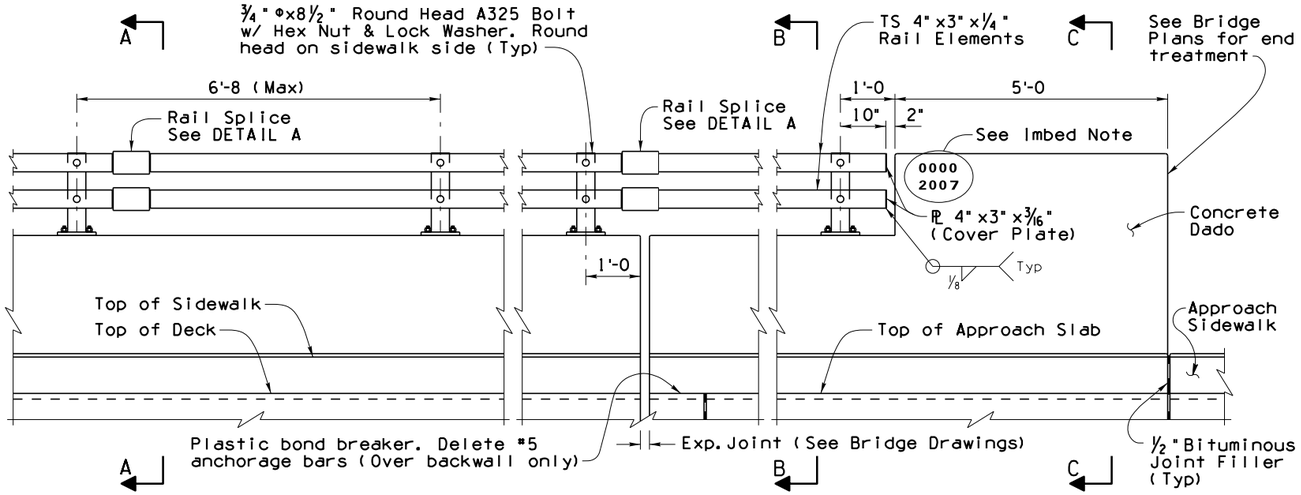
UPRR Milepost:	**976.40**	**Subdivision:**	**Gila**	**City:**	**Tucson**	**State:**	**AZ**	**Roadway:**	**Sunset Road**
Agency/Owner:	**PCDOT**	**Contact:**		**Designer:**	**CONSOR**			**Contact:**	
UPRR/ Consultant:	**Benesch**	**Reviewer 1:**	**Thomas Meyers (TGM)**	**Reviewer 2:**				**Reviewer 3:**	

Item No.	Sheet No.	Reviewer's Comment Date: 07/22/20	Initial	Designer's Response Date: 07/27/20	Reviewer's Comment Date: 09/14/20	Initial	Designer's Response Date:	Status (Open or Closed)
1.	Status	Current review status is **'REJECTED'**. Modify the concept based upon the detailed comments below. Provide a written agency response to each comment with the resubmittal.	TGM	Will modify	Current review status is **'NOT APPROVED'**. Modify the concept based upon the detailed comments below. Provide a written agency response to each comment with the resubmittal.	TGM	See response to # 6 & # 8	Submittal Status
2.	Status	Alternative 1 proposes a steel plate girder superstructure spanning UPRR Right-of-Way. This option was not listed on p. 11 of 22 of the Preliminary Bridge Selection Report as a recommended alternative. However, it is the only alternative that UPRR Structures will currently consider for this proposed grade separation as it is the only one that meets Art. 5.1c of the UPRR/BNSF Guidelines for Railroad Grade Separation Projects. Variances to these guidelines are not being considered since an alternative that meets these requirements is feasible. Revise the concept submittal package as required for Alternative 1 or provide another option meeting all requirements of the UPRR/BNSF Guidelines for Railroad Grade Separation Projects. Coordinate with Comments 3 & 4. Note, cost shall not be the determining factor as outlined in Section 3.2 and 4.1 of the UPRR/BNSF Guidelines for Railroad Grade Separation Projects.	TGM	Will modify	No further comment at this time.	TGM		Submittal Status
3.	Status	Alternative 2 proposes a superstructure consisting of precast concrete girders that transition to cast-in-place boxes using a hinge within UPRR Right-of-Way. The use of expansion or hinge joints for the Overhead Structure over Railroad tracks or inside Railroad Right-of-Way are not permitted per Art. 5.5.a of the UPRR/BNSF Guidelines for Railroad Grade Separation Projects. Consequently, current review status of Alternative 2 is '**REJECTED'**.	TGM	Will modify	No further comment at this time.	TGM		Submittal Status
4.	Status	Alternative 3 proposes a substructure consisting of a pier located within UPRR Right-of-Way. Justification for such variance appears to be primarily economic in this case, which shall not be the determining factor as outlined in Section 3.2 and 4.1 of the UPRR/BNSF Guidelines for Railroad Grade Separation Projects. Since there is a feasible alternative that meets Art. 5.1c of the UPRR/BNSF Guidelines for Railroad Grade Separation Projects, the requested variance is not being considered. Consequently, current review status of Alternative 3 is '**REJECTED'**.	TGM	Will modify	No further comment at this time.	TGM		Submittal Status
5.	General	Provide a preliminary phasing plan as outlined in Art. 3.10A of the UPRR/BNSF Guidelines for Railroad Grade	TGM	Will add preliminary phasing to report	No further comment at this time.	TGM		Closed

Item No.	Sheet No.	Reviewer's Comment Date: 07/22/20	Initial	Designer's Response Date: 07/27/20	Reviewer's Comment Date: 09/14/20	Initial	Designer's Response Date:	Status (Open or Closed)
		Separation Projects.						
6.	General	Review proposed location and geometry of all substructures. Verify there are no above-ground encroachments (piers, bents, columns) or below-ground encroachments (piles, foundations/footings) on UPRR Right-of-Way.	TGM	verified	It appears that UPRR's 07/22/20 comment has not been addressed. The proposed 72" diameter drilled shafts provided on the General Plan & Elevation, p. 13 of 27 of the submittal package, appear to encroach on UPRR Right-of-Way. Review and revise as required to comply. Coordinate with comment 8.	TGM	The proposed 72" diam drilled shaft(s) is intended to line up with the front face of pier/abutment and does not encroach into UPRR Right-of-Way.	Open
7.	General	Provide dimension strings in plan view to define limits of Railroad Right-of-Way with respect to centerlines of mainline tracks per UPRR STD Plan No. 711100 Sheet 2. Refer to p. 38 of the UPRR/BNSF Guidelines for Railroad Grade Separation Projects.	TGM	Will add	No further comment at this time.	TGM		Closed
8.	General	Provide dimension strings in plan and elevation views to define horizontal clearances measured perpendicularly from centerline of the nearest track to the face of obstruction (i.e. substructure above grade, foundation below grade, etc.) per UPRR STD Plan No. 711100 Sheet 2. Refer to p. 38 of the UPRR/BNSF Guidelines for Railroad Grade Separation Projects.	TGM	Will add	It appears that UPRR's 07/22/20 comment has not been fully addressed. Provide dimensions showing all substructure components, including the proposed 72" diameter drilled shafts, do not encroach on UPRR Right-of-Way. Review and revise as required to comply. Coordinate with comment 6.	TGM	The proposed 72" diam drilled shaft(s) is intended to line up with the front face of pier/abutment and does not encroach into UPRR Right-of-Way.	Open
9.	General	Provide dimension strings in plan and elevation views to define horizontal spacing measured perpendicularly between track centerlines per UPRR STD Plan No. 711100 Sheet 2. Call out each track by name (e.g. UPRR Mainline No. 1, UPRR Mainline No. 2, etc.). Refer to p. 38 of the UPRR/BNSF Guidelines for Railroad Grade Separation Projects.	TGM	Will add	No further comment at this time.	TGM		Closed
10.	General	Provide on the concept plans the Construction Clearance Envelope per UPRR STD Plan No. 711000. Refer to p. 36 of the UPRR/BNSF Guidelines for Railroad Grade Separation Projects.	TGM	Will add	No further comment at this time.	TGM		Closed
11.	General	In all profile views, define the width and height of the Construction Clearance Envelope per UPRR STD Plan No. 711000. Refer to p. 36 of the UPRR/BNSF Guidelines for Railroad Grade Separation Projects. Show the clearance envelope on all tracks, existing and future.	TGM	Will add	Please provide on future submittals. This comment will remain open for review at the next milestone submittal.	TGM		Open
12.	General	Barriers and fencing shall be designed to meet the criteria of UPRR STD Plan No. 711100 Sheet 3 and Section 5.4 of the UPRR/BNSF Guidelines for Railroad Grade Separation Projects. Note, barriers shall be designed to keep the bridge deck's storm water runoff from being deposited onto UPRR ROW, as outlined in Art. 5.4b(1) of the UPRR/BNSF Guidelines for Railroad Grade Separation Projects.	TGM	Barriers and fencing called out meet the UPRR criteria	The "Combination Pedestrian-Traffic Bridge Railing w/ Fence" callouts on p. 14 of 27 reference SD 1.12 & SD 1.13, which do not appear to be included with this submittal. Please provide dimensions and details showing compliance with the 07/22/20 comment. This comment will remain open for review at the next milestone submittal.	TGM	SD 1.12 and SD 1.13 are attached.	Open
13.	General	No lighting system appears to be shown on the plans or referenced in the Preliminary Bridge Selection Report. Overhead Structures which cover 80 linear feet of track or more shall provide a lighting system to illuminate the track area per Section 5.7 of the UPRR/BNSF Guidelines for Railroad Grade Separation Projects. Revise as required to comply.	TGM	Will add text about required lighting	Reviewer is aware language has been added to Section 16.0 Bridge Alternatives on p. 7 of 27 of the submittal package specifying underdeck lighting shall be provided in accordance with the UPRR guidelines for overhead structures which cover 80 linear feet of track or more. Note, future milestone submittals shall include a lighting design with details on the plans. This comment will remain open for review at the next milestone submittal.	TGM	Noted.	Open
14.	General	This overpass must comply with Section 5.8 of the UPRR Guidelines for Railroad Grade Separation Projects. Storm water runoff shall be contained by the superstructure and directed to a closed system or away from UPRR ROW.	TGM	Yes	No further comment at this time.	TGM		Closed

Item No.	Sheet No.	Reviewer's Comment Date: 07/22/20	Initial	Designer's Response Date: 07/27/20	Reviewer's Comment Date: 09/14/20	Initial	Designer's Response Date:	Status (Open or Closed)
15.	General	Note, UPRR Structures does not have the authority to approve track curfews. Any track curfews that may be necessary for the construction of this overpass shall be coordinated with and approved by the Local UPRR Service Unit. UPRR Structures review of these design plans does not in any way imply acceptance of track curfews required for construction. Please confirm this is understood.	TGM	understood	No further comment at this time.	TGM		Closed
16.	General	Existing utilities are briefly noted on p. 4 of 22 of the Preliminary Bridge Selection Report. However, it is unclear to what extent they have been investigated. Has a SUE (Subsurface Utility Engineering) investigation been completed? Verify all proposed construction is clear of existing utilities. All new or relocated utilities within the Railroad Right-of-Way will require Railroads prior review and approval per Section 4.10 of the UPRR/BNSF Guidelines for Railroad Grade Separation Projects. Any utility installations or relocations on UPRR ROW should be applied for separately though the UPRR utilities group: https://www.up.com/real_estate/utilities/index.htm. Please confirm this is understood.	TGM	A SUE has not been completed for this project. We anticipate that the SUE will be completed between the 30% and 60% Stage of the final design. We have horizontal survey based on bluestake and utility maps at this time. understood	No further comment at this time. This comment will remain open for review at the next milestone submittal.	TGM	Noted	Open
17.	General	NEW COMMENT		NEW COMMENT	In the future 30% Submittal, incorporate construction phasing plans into the plan sheets as outlined in Art. 3.10B of the UPRR/BNSF Guidelines for Railroad Grade Separation Projects.	TGM	Noted	Open

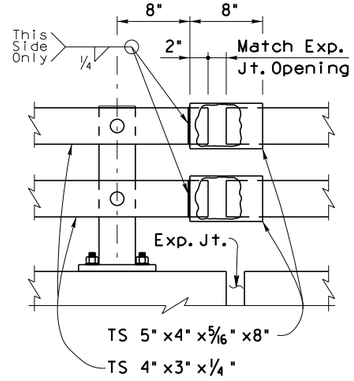
Add Row | Delete Last Row



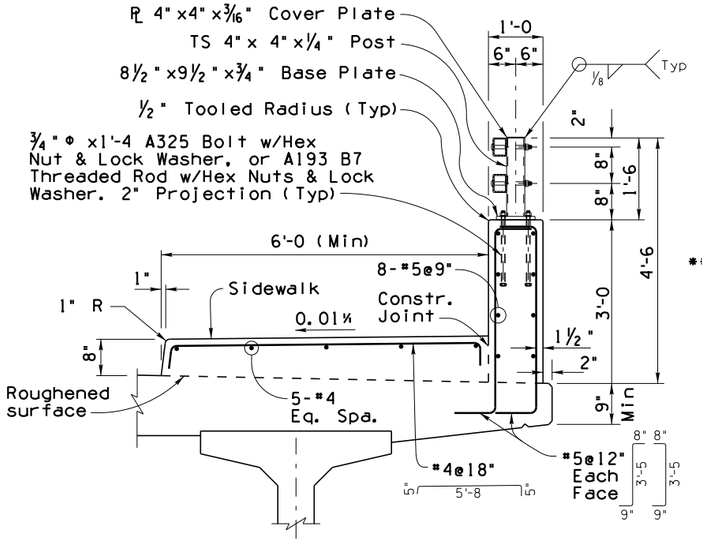
TYPICAL PANEL ELEVATION | ELEVATION AT EXP. JT. | ELEVATION AT END POST

NOTE:

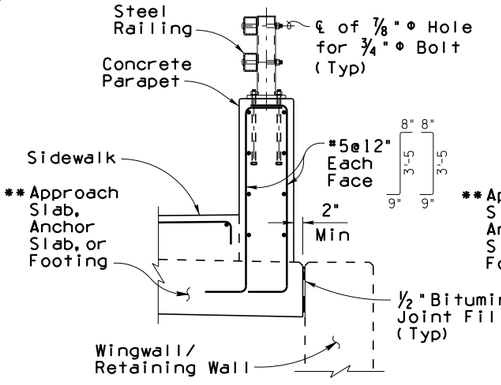
For rail splices not at expansion joints, provide 1 inch gap and weld both ends of splice tube



DETAIL A
(Exp. Splice Shown)

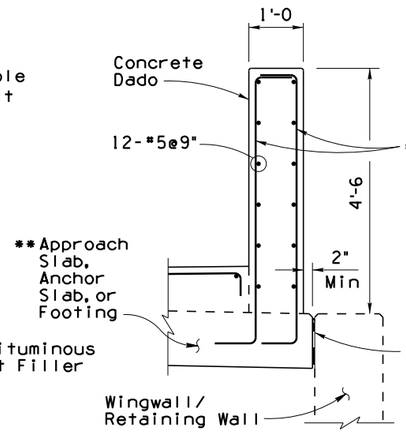


SECTION A-A



SECTION B-B

** See SD 1.10 for footing details



SECTION C-C

GENERAL NOTES:

Construction Specification - Arizona Department of Transportation Standard Specifications for Road and Bridge Construction, latest Edition.

Design Specifications - AASHTO LRFD Bridge Design Specifications, 8th Edition 2017.

This barrier has been evaluated and approved to be of equal strength to barriers with like geometry, which were successfully crash tested to meet MASH 16 requirements for Test Level 4.

Design Loads:

Dynamic Load (For barrier Design) = 80^{k}

Dynamic load is based on NCHRP 20-07(395) MASH Equivalency of NCHRP Report 350 - Approved Bridge Railings.

Equivalent Static Load (For footing design) = 28^{k}

Footing design is based on NCHRP Report 663.

All Concrete shall be Class "S" (f'c = 4000 psi).

Reinforcing steel shall conform to ASTM Specification A615. All reinforcing shall be furnished as Grade 60. All reinforcing shall be epoxy coated at locations above EL. 4000 ft.

All bends and hooks shall meet the requirements of AASHTO LRFD Article 5.10. All bend dimensions for reinforcing steel shall be out-to-out of bars. All placement dimensions for reinforcing steel shall be to center of bars unless noted otherwise.

All reinforcing steel shall have 1½ inch clear cover unless noted otherwise.

Structural tubing (TS) shall be ASTM A500 Grade B. All other structural steel shall conform to ASTM A36 unless noted otherwise.

All welding shall conform to the requirements of the American Welding Society, ANSI/AASHTO/ AWS D1.5 Bridge Welding Code, latest Edition.

Concrete parapets on continuous superstructures shall have ½" bituminous joint filler in open joints over piers.

Imbed ½", Bridge Number and Year Built, using 1½"w x 2"h number impressions in concrete, located as shown at the approach end of the outside lane.

Labor and materials for railing, parapet, dado, anchorage bars, sidewalk and PEDESTRIAN FENCE (SD 1.13) are included in the pay item (Item No. 6011132).

Dimensions shall not be scaled from drawings.

RAILING NOTES:

See Bridge Plans for rail layout, elevation, joint locations and rail end treatments.

All exposed steel edges shall be ground smooth. All structural steel rail assembly components shall be galvanized after fabrication in accordance with ASTM A123. All galvanizing that has been damaged in handling, transportation or welding shall be repaired by the application of a paste compound of an approved zinc powder and flux.

All post bolt heads shall be on sidewalk side. All bolts, nuts and washers shall be galvanized in accordance with the requirements of ASTM A153.

For fence attachment details, see SD 1.13. (Lower rail tube is not required with fence).

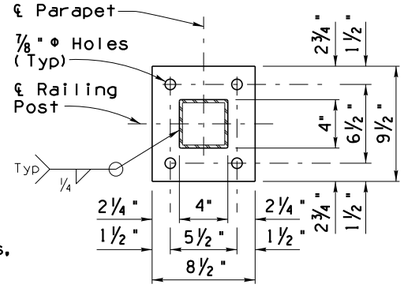
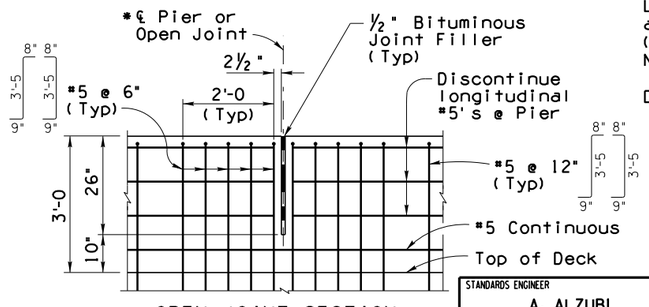


PLATE DETAIL



OPEN JOINT SECTION AT CONTINUOUS PIERS ONLY

* Parapet Stirrups Reinforcement at expansion joints is similar to stirrup reinforcement near open joints at continuous piers

Item	Combination Pedestrian-Traffic Bridge Railing
Item No.	6011132
Measurement	Linear Foot

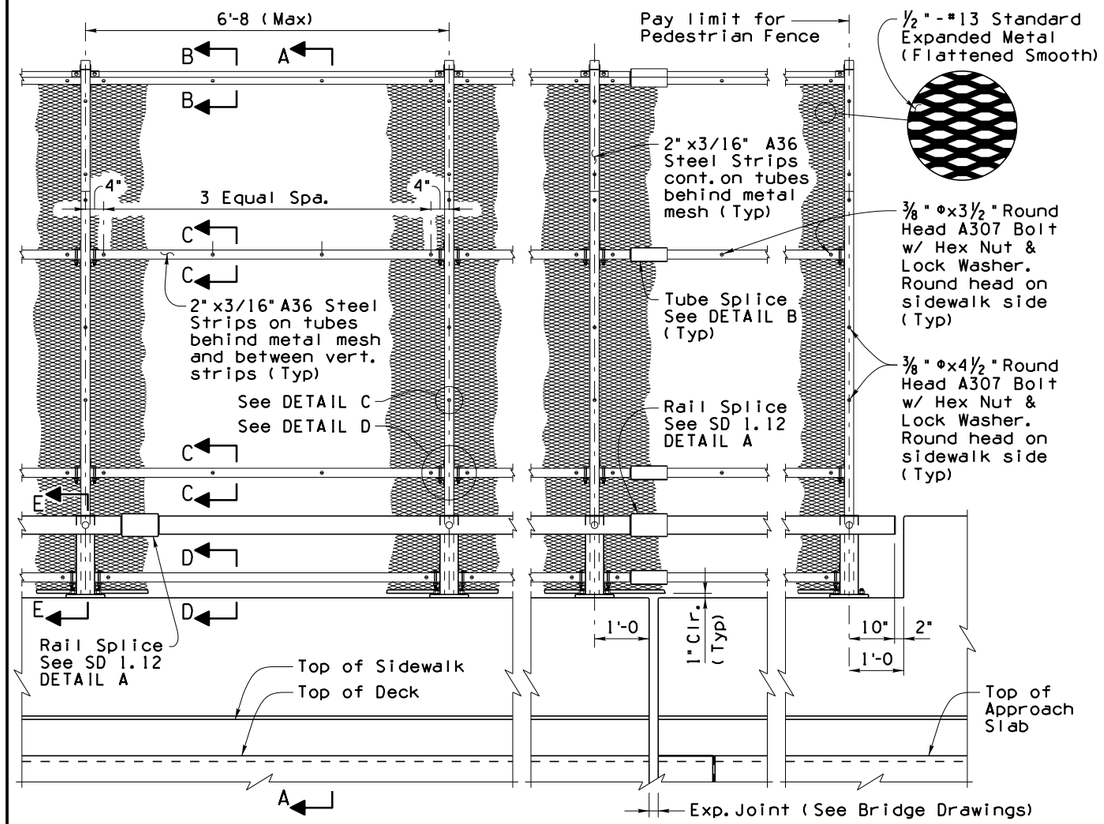
STANDARDS ENGINEER
A. ALZUBI
RECOMMENDED FOR APPROVAL
GROUP MANAGER
D. EBERHART
APPROVED
STANDARDS COMMITTEE APPROVED FOR DISTRIBUTION 01/20 DATE

ARIZONA DEPARTMENT OF TRANSPORTATION
INFRASTRUCTURE DELIVERY AND OPERATIONS DIVISION
BRIDGE GROUP STANDARD DRAWING

COMBINATION PEDESTRIAN-TRAFFIC BRIDGE RAILING

DRAWING NO.
SD 1.12

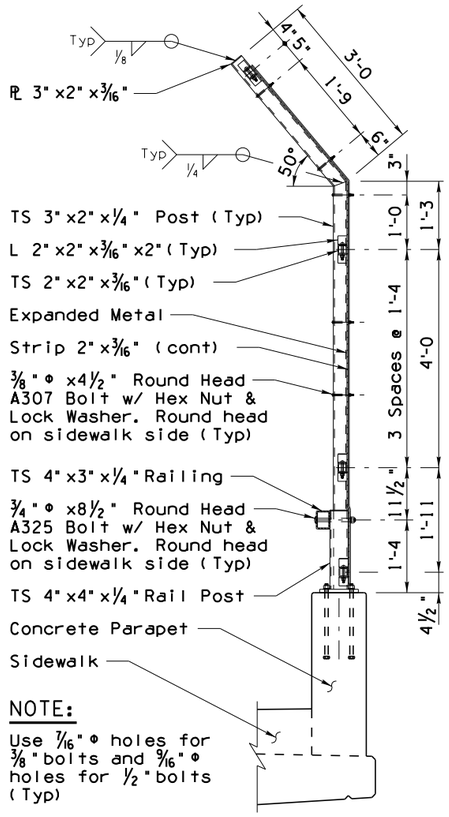
PRIOR DISTRIBUTION DATE 03/09



TYPICAL PANEL ELEVATION

ELEVATION AT EXPANSION JOINT

ELEVATION AT END POST



NOTE:
Use 7/16" Φ holes for 3/8" bolts and 9/16" Φ holes for 1/2" bolts (Typ)

SECTION A-A

GENERAL NOTES:

Construction Specification - Arizona Department of Transportation Standard Specifications for Road and Bridge Construction, latest Edition.

Design Specifications - AASHTO LRFD Bridge Design Specifications, 8th Edition 2017.

Structural tubing (TS) shall be ASTM A500 Grade B.

Expanded metal shall conform to ASTM F1267 Type II, Class 2, Grade A. Expanded metal shall be flattened smooth (No sharp edges).

All other structural steel shall conform to ASTM A36 unless noted otherwise.

All fence components and hardware shall be Galvanized.

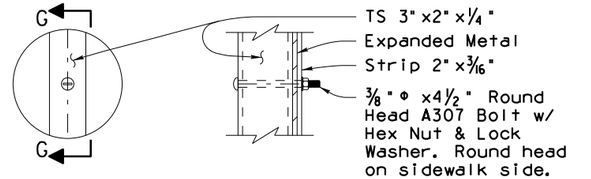
All welding shall conform to the requirements of the American Welding Society, ANSI/AASHTO/AWS D1.5 Bridge Welding Code, latest Edition.

See Bridge Drawings for location and length of pedestrian fence.

See SD 1.12 for details of concrete parapet, sidewalk, railing and applicable notes.

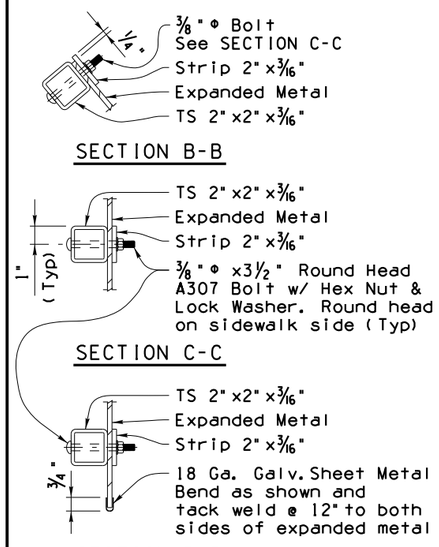
Dimensions shall not be scaled from drawings.

Payment for PEDESTRIAN FENCE is included in the pay item for COMBINATION PEDESTRIAN-TRAFFIC BRIDGE RAILING (SD 1.12) (Item No. 6011132).



DETAIL C

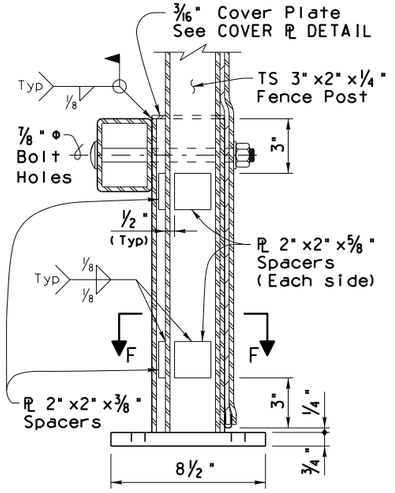
SECTION G-G



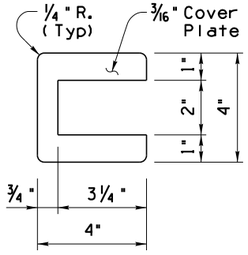
SECTION B-B

SECTION C-C

SECTION D-D

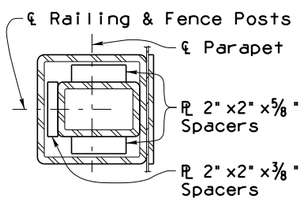


SECTION E-E

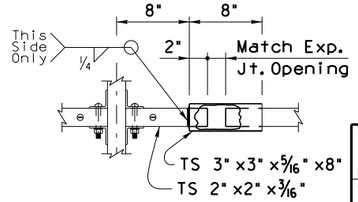


COVER PL DETAIL

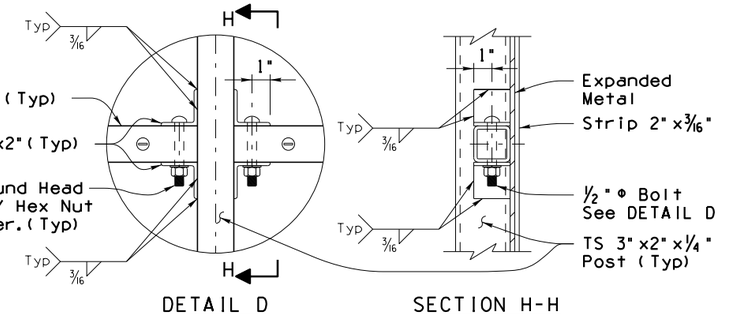
NOTE:
Weld cover plate to top of rail post after installing fence post



SECTION F-F



DETAIL B



DETAIL D

SECTION H-H

STANDARDS ENGINEER A. ALZUBI RECOMMENDED FOR APPROVAL GROUP MANAGER D. EBERHART APPROVED STANDARDS COMMITTEE APPROVED FOR DISTRIBUTION 01/20 DATE	ARIZONA DEPARTMENT OF TRANSPORTATION INFRASTRUCTURE DELIVERY AND OPERATIONS DIVISION BRIDGE GROUP STANDARD DRAWING PEDESTRIAN FENCE FOR BRIDGE RAILING SD 1.12 DRAWING NO. SD 1.13

PRIOR DISTRIBUTION DATE 03/09