El Mirage Rd; 303L to Jomax Road

Initial Bridge Study Report

El Mirage Rd over Beardsley Canal Bridge

Consultant:	Burgess & Niple, Inc.
ADOT Project No:	T0428 03D
Contract No:	2024-001

Arizona Department of Transportation
February 2025

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Appendices

1.0 Project Introduction

1.1 Background

El Mirage Road: State Route 303L (SR 303L) to Jomax Road extension is a multi-agency project with the City of Peoria (COP), Maricopa Association of Governments (MAG), Arizona Department of Transportation (ADOT), and Maricopa County Department of Transportation (MCDOT). The purpose of the project is to identify gaps in the El Mirage Road alignment and recommend appropriate improvements to establish it as a key transportation facility and better connect the surrounding communities to the regional transportation system. Specifically, this project aims to establish a connection at the existing SR 303L traffic interchange (TI) between north Peoria and the rest of the City and region.

1.2 Initial Bridge Study Purpose

The purpose of the Initial Bridge Study Report is to examine bridge concepts including type, length, and depth for the crossing of El Mirage Road over the Beardsley Canal. The goal is to develop a bridge structure type that meets the project objectives for roadway capacity, safety, and Maricopa Water District requirements, while delivering a cost effective, low maintenance bridge. This Initial Bridge Study Report forms the basis for the Bridge Selection Report and provides the Geotechnical Engineer with sufficient information to obtain soil borings to be used in the Preliminary Foundation Report.

2.0 Beardsley Canal Bridge

2.1 Roadway and Bridge Geometry

The Beardsley Canal Bridge will carry vehicular, bicycle, and pedestrian traffic over the Beardsley Canal. The roadway typical section will match the City of Peoria Arterial section. Although the roadway will likely be built to an interim width, the bridge may be constructed to the ultimate width to avoid future widening of the bridge. The ultimate bridge typical section will consist of two 11'-0" lanes and one 12'-0" lane in each direction, a 6'-0" southbound bike lane, a 5'-0" northbound bike lane, a 16'-0" northbound left turn lane (12'-0" lane + 4'-0" buffer), a 12'-0" northbound right turn lane, 8'-0" sidewalks on each side, and 1'-2" wide concrete barriers with railing on each side.

The only feasible solution that meets Maricopa Water District (MWD) requirements and constructability concerns is a single span bridge. Other alternatives such as a superbox culvert, a multi-cell box culvert, or a multi-span bridge were evaluated and determined to be unfeasible due to the MWD requirements. Discussions with MWD on May 30, 2024 revealed that any structure with a bottom slab within the canal or pier columns within the canal will not be permitted. Single span bridges have been used successfully at other nearby Beardsley Canal crossings, such as Vistancia Blvd, Happy Valley Rd, and 147th Ave.

2.2 Maricopa Water District Requirements

The following MWD geometric requirements will be achieved with the new bridge. The bridge must have a minimum of 9'-0" vertical clearance from the bottom of the canal to the bottom of the bridge. The bridge must have a minimum of 2'-0" vertical clearance from the top of the canal lining to the bottom of the bridge. The bridge abutments must be placed at least 2'-0" horizontally from the top outside edge of the canal or 10'-0" from the toe of the canal, whichever is greater. The MWD O&M roads must be at least 20'-0" wide and cross El Mirage Road on reinforced concrete slabs. Roadway guardrail must be placed so as not to block the O&M roads. The O&M roads may be shifted to line up with the new crossing of El Mirage Road, but they may not be blocked by the guardrail. The canal lining will be replaced on each side of the bridge to account for any damage that may be caused during construction. Buried conduits must be installed in front of both abutments to facilitate the installation of future MWD utilities along their canal. A Bridge Construction and Access Easement must be obtained from MWD prior to construction. City of Peoria must obtain an Inter-Governmental Agreement with MWD prior to construction.

2.3 Utilities

There are existing underground utilities in the area of the proposed bridge. There is an underground water line running south/north within the limits of the bridge. The proposed abutment drilled shafts will need to be spaced to avoid this water line. There are underground steel sleeves running south/north on each side of the bridge. These sleeves should not be impacted by the proposed bridge. There is an underground gas line running west/east approximately 100 ft north of the bridge. This gas line should not be impacted by the proposed bridge.

Based on discussions with the Arizona State Land Department, City of Peoria, and MWD, there may be new utilities that will need to cross the canal. Conduits can be placed within the concrete sidewalks on the bridge to provide a path for future dry utilities. A typical conduit arrangement would be 2-3" diameter conduits and 4-5" diameter conduits. These conduits could carry electrical, phone, cable, or other communication wires. They would not cause any additional weight and would not affect the design of the bridge. The bridge is not currently designed to carry any utilities hanging under the deck. However, if the project evolves and hanging utilities such as a small diameter water line or sewer line are needed, the design could be modified to provide hangers between the girders. Larger diameter utilities that cannot fit between the girders would need to be bored under the canal. It is usually not desirable to hang gas lines under a bridge due to the possibility that gas would be trapped under the bridge in the event of a leak. Therefore, gas lines would also need to be bored under the canal.

2.4 Bridge Configuration

In order to meet the MWD requirements, the bridge is planned to be a single span, precast prestressed concrete girder bridge. The span length will be 67'-0". The total out-to-out width of the bridge will be 125'-4" based on the roadway geometry described above. The structure depth will be approximately 4'-8", which includes 3'-9" deep girders, an 8" thick deck, and a variable depth concrete buildup on the girder top flanges. The roadway profile will be set high enough to accommodate the structure depth and the required vertical clearances listed above. The bridge typical section will consist of 16 AASHTO Type III girders, spaced at 7'-11". This will provide an Inventory Rating of at least 1.0 and an Operating Rating of at least 2.0, which will allow all legal highway loads to safely cross the canal while providing additional structural capacity for overweight permit loads.

The abutments will be cast-in-place concrete stub abutments. Based on the anticipated geotechnical conditions in the area, the abutments are anticipated to be supported on drilled shafts. By supporting the abutments on drilled shafts, construction impacts to the Beardsley Canal will be minimized. The approaches will consist of a 15' long reinforced concrete approach slab and an additional 20' long reinforced concrete slab for the O&M road crossings. Construction of the bridge can take place throughout the year. However, any work that would block the canal or require dry-up of the canal flow will be done during the planned Beardsley Canal dry-up period. This is expected to be mid-November to mid-February, subject to change by MWD.

It is not anticipated that there will be streetlights or traffic signals mounted on the bridge. Those elements should be located beyond the limits of the bridge. There are no current plans for aesthetic treatments on the bridge. However, aesthetics could be added during final design if desired by the stakeholders.

The bridge configuration will be investigated in more detail during the final design to evaluate possible options to construct the bridge in phases. This would allow the bridge to be constructed to the interim roadway width during the first phase and then widened in the future to the ultimate roadway width.

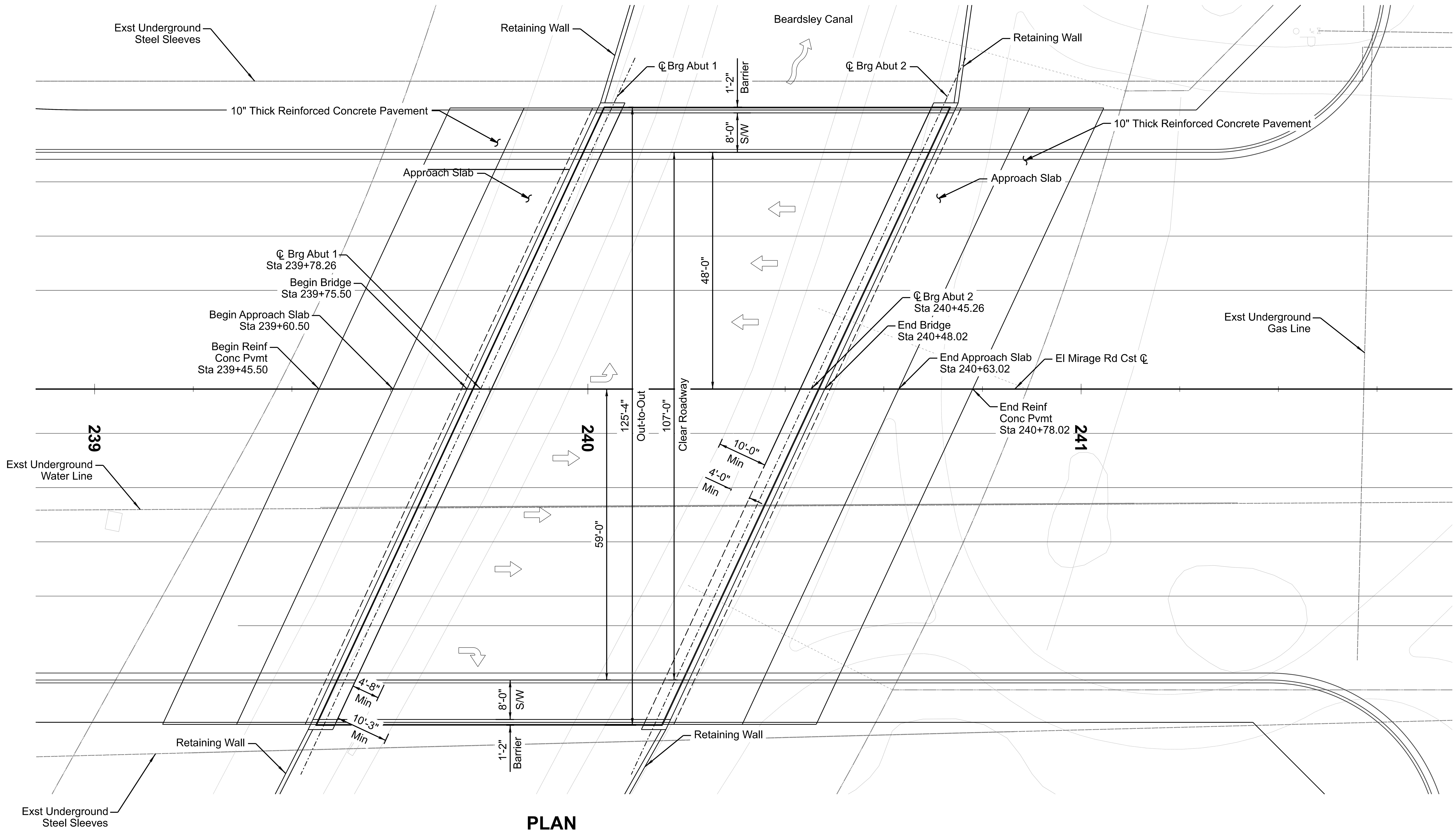
2.5 Estimated Cost

Recent ADOT bid prices were investigated for similar precast prestressed concrete girder bridges to develop an estimated cost for this bridge. The cost of the drilled shaft foundations, cast-in-place concrete abutments, precast concrete girders, and cast-in-place concrete deck were considered, as well as the cost implications of working over the canal and within the canal dry-up period. The cost of the bridge is estimated to be $320 per square foot, for a total cost of $2,907,733. This cost is based on constructing the bridge to its ultimate width in a single construction phase. This cost does not include a contingency percentage.

Appendix A – 15% Bridge Plan Sheets

INDEX OF DRAWINGS

DRAWING NO.	TITLE
S-2.01	PLAN & INDEX OF DRAWINGS
S-2.02	ELEVATION & TYPICAL SECTION



PLAN

NEW SINGLE SPAN PRECAST PRESTRESSED AASHTO TYPE III GIRDER BRIDGE
SKEW: 25° 00'00" RT
Scale: 1" = 10'-0"

NOTES:

1. Stations and Elevations are Along El Mirage Rd Cst C

ethos ENGINEERING, LLC.
9180 S Kyrene Rd
Suite #104
Tempe, AZ 85284

REVISONS:	DATE:

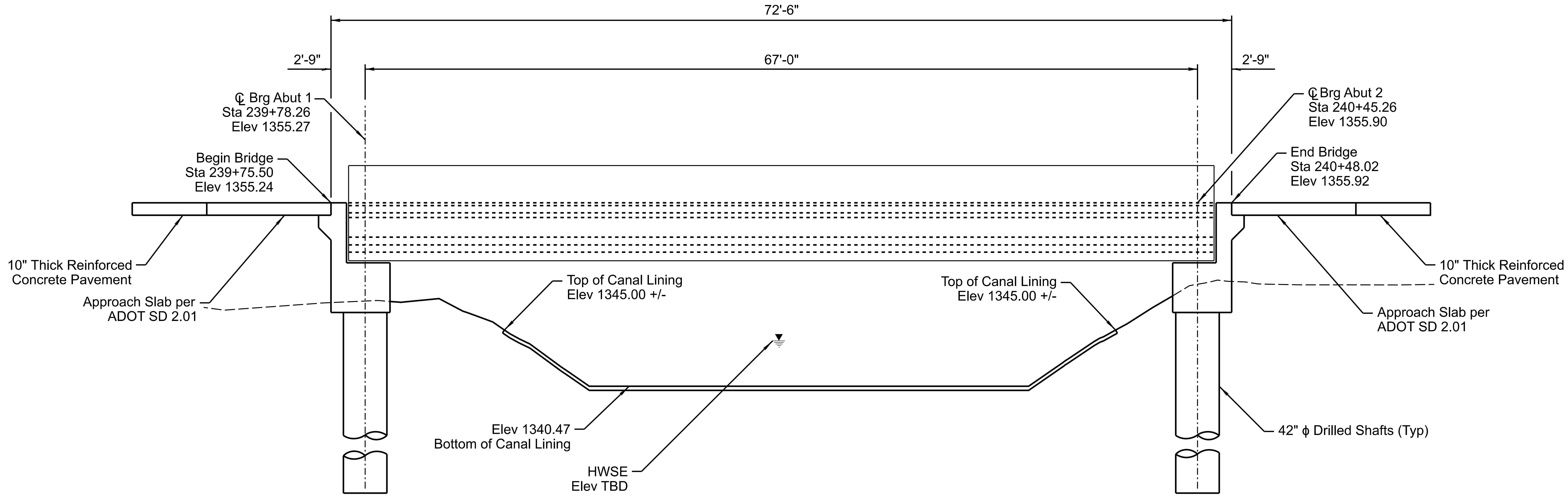
DESCRIPTION: GENERAL PLAN

PROJECT: EL MIRAGE ROAD BRIDGE OVER BEARDSLEY CANAL

SEAL:

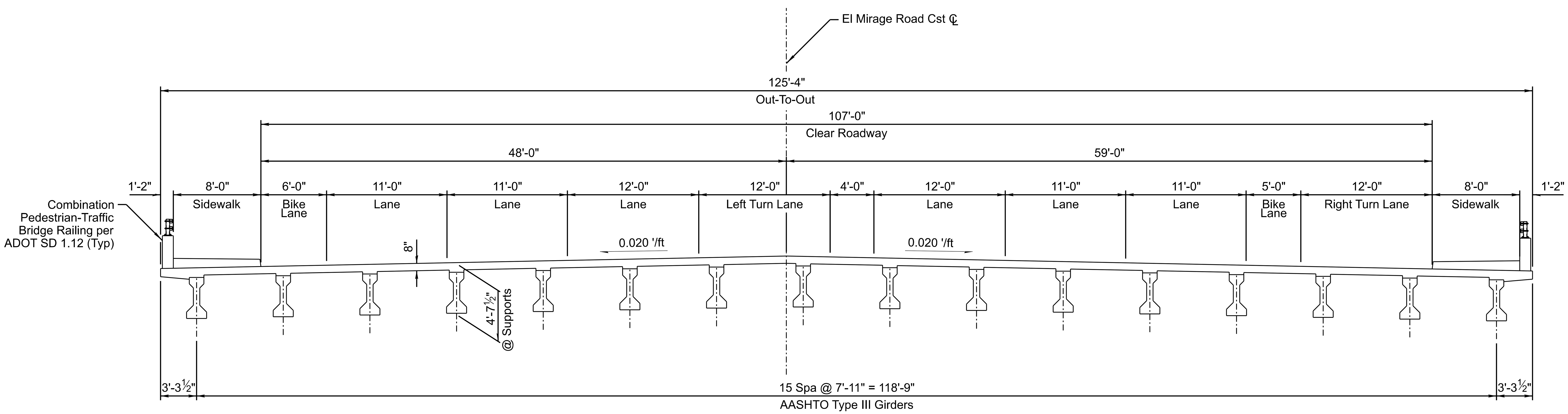
DESIGNED: BAG
DRAWN: PAO
CHECKED: BAG
DATE: FEBRUARY 2025
PROJECT NO. 2024029
SCALE: AS NOTED
SHEET NO.

S-2.01
OF



ELEVATION

Scale: 1" = 5'-0"



TYPICAL SECTION

Scale: 1" = 5'-0"

9180 S Kyrene Rd
Suite #104
Tempe, AZ 85284

ethos ENGINEERING, LLC.

REVISONS: | DATE:

Contact Arizona 811 at least two full working days before you begin excavation
ARIZONA811
Call 811 or click Arizona811.com

DESCRIPTION: ELEVATION & TYPICAL SECTION

PROJECT: EL MIRAGE ROAD BRIDGE OVER BEARDSLEY CANAL

SEAL:

DESIGNED: BAG
DRAWN: PAO
CHECKED: BAG
DATE: FEBRUARY 2025
PROJECT NO. 2024029
SCALE: AS NOTED
SHEET NO.

S-2.02

OF