



TECHNICAL MEMORANDUM

DATE: October 19, 2018 Project No.: 693-20-16-01
SENT VIA: EMAIL

TO: SRWA Technical Advisory Committee

FROM: Brad Friederichs, PE, RSE #2780

REVIEWED BY: Andy Smith, PE, RCE #74673

SUBJECT: Preliminary Design of Replacement Bridge at Aldrich Road and Turlock
Irrigation District Ceres Main Canal

INTRODUCTION

The Stanislaus Regional Water Authority (SRWA) is preparing to construct a Surface Water Supply Project (Project) to provide a new, supplemental drinking water supply to the Cities of Ceres and Turlock (Cities). The sole drinking water supply for both Cities has historically been groundwater. The source water for SRWA's new water treatment plant (WTP) will be the Tuolumne River, at a location near the City of Hughson. Treated water from the new WTP will be pumped to the Cities in new finished water transmission mains. Together, these facilities will comprise the Project's "regional facilities" operated by SRWA. SRWA intends to design and construct the regional facilities utilizing a Design-Build (DB) procurement method.

The main entrance to the new WTP will be via Aldrich Road, which travels north-south, entering the WTP site near its southeast corner. To the south of the WTP entrance, along Aldrich Road and in the immediate vicinity of several Raw and Finished Water Transmission Main facilities, is the Turlock Irrigation District (TID) Ceres Main Canal, which generally travels east-west. An existing bridge crosses the Ceres Main Canal at this location and is the subject of this technical memorandum (TM). The existing bridge is expected to be replaced as part of the Project.

The purpose of this TM is to establish preliminary design criteria for a "Reference" replacement bridge at Aldrich Road and the TID Ceres Main Canal, and to highlight important issues that must be considered and parameters which must be developed during final design. The Reference replacement bridge is intended to be one example of how the bridge could be designed that would meet the requirements of the DB contract. Design criteria and other information presented in this TM are expected to inform the development of technical requirements for the DB contract that will govern the design and construction of the new bridge.

This TM is organized as follows:

- Introduction
- Background
- Preliminary Design of Replacement Bridge
- Design and Construction Constraints
- Use of Existing Bridge During Construction
- Demolition of Existing Bridge

BACKGROUND

According to Caltrans bridge inspection records, the existing Stanislaus County Bridge (Bridge No. 38C0252) on Aldrich Road over the TID Ceres Main Canal is rated for an H-15 highway loading. To provide sufficient capacity to support the various loads anticipated during and after construction of the WTP and the Raw and Finished Water Transmission Mains, SRWA has recommended construction of a new bridge to replace the existing bridge. The replacement bridge shall be located adjacent to, and to the west of, the existing bridge, facilitating a straightening of the existing road alignment.

PRELIMINARY DESIGN OF REPLACEMENT BRIDGE

The Reference replacement bridge will support HS-20 to HS-44/HL-93 live loads and California Permit loads in conformance with California Amendments to the American Association of State Highway and Transportation Officials (AASHTO) load and resistance factor design (LRFD) Bridge Design Specifications – Sixth Edition. The AASHTO LRFD Bridge Design Specifications, 2012 (Sixth Edition) with California Amendments (AASHTO-CA BDS-6), constitutes the primary design specification for bridges and ancillary structures. The design shall also allow the replacement bridge to be incorporated in the National Bridge Inventory and the available maintenance, rehabilitation and replacement funding provided by the Federal Highway Administration (FHWA) Highway Bridge Program (HBP). Compliance with the current Caltrans Local Assistance Procedures Manual (LAPM) and Local Assistance Program Guidelines (LAPG) as published by the Caltrans Division of Local Assistance is mandatory in order for the completed structure to be incorporated into the HBP.

The Reference replacement bridge includes the features described below. Conceptual drawings of the Reference replacement bridge are included in Attachment A to this TM.

- A single span, cast-in-place concrete superstructure supported on reinforced concrete abutments.
- Vertical abutment faces matching the current canal configuration at the existing bridge.
- Channel wall transitions from the new structure to the existing canal features that are in conformance with TID standards and minimize turbulence within the modified channel.
- Two (2) travel lanes with widths of 12 feet.
- Shoulders with widths of 2 feet each.

- Traffic barriers in accordance with the more stringent of Stanislaus County, Standard Caltrans Type 732, or approved NCHRP compliant barriers.
- Other features, including bridge approaches and safety features, in conformance with the more stringent of criteria set forth by Stanislaus County and the Caltrans Highway Design Manual (HDM) as revised with the 6th Edition HDM Change 07/02/18.
- Removal and replacement of two existing irrigation distribution pipelines within the realigned roadway areas.
- Modification of two existing pump discharges at the locations of new downstream transition walls.

The Reference replacement bridge will be located within existing County right-of-way.

DESIGN AND CONSTRUCTION CONSTRAINTS

Design and construction of the replacement bridge by the DB contractor will require careful coordination with TID and Stanislaus County, and must abide by any constraints identified by either agency, including, but not limited to, the following categories of constraints:

- **Seasonal access to the Ceres Main Canal:** The canal is typically in service (i.e., conveying water) and cannot be accessed for construction between March 1 and November 1 of each year. Other time constraints exist during certain years and construction scheduling must be coordinated with TID. When the canal is out of service, the DB contractor should still expect to encounter and manage stormwater flows in order to prosecute work within the canal limits.
- **Geometry of canal obstructions:**
 - All transitions shall meet the requirements of TID specification ES101.
 - Transitions from the new bridge structure to the existing canal cross-section shall be designed in such a manner as to not constrict the flow cross-section or result in increases to water velocity or turbulence as determined by TID's Engineer.
 - Other components of the bridge must not adversely impact the hydraulic conveyance capacity or characteristics of the canal upstream or downstream of the location of the new facilities.
- **Canal freeboard:** TID has the right to operate its canals to the top of the canal lining. With the exception of the vertical bridge abutments, no portion of the new bridge shall extend below the highest adjacent canal lining or vertical side wall.
- **Radial clearance around overhead power transmission and distribution lines:** A number of overhead power lines exist in close proximity to both the existing and new bridges, including lines with voltages of 12, 69, and 115 kilovolts. TID has established mandatory minimum radial clearances around overhead lines at these voltages of 20 feet. Construction activities must not infringe on these radial clearance areas at any time. The construction contractor shall also comply with relevant requirements of California Public Utilities Commission General Order 95 (Rules for Overhead Electric Line Construction) and the California Occupational Safety and Health Administration.

- **Bridge safety features:** Features such as crash protection must not impede vehicle and equipment ingress/egress for canal bank maintenance roads.

Other constraints may include traffic control, environmental permit constraints, coordination with and maintenance of access for local property owners, and coordination with other construction activities related to the Project's WTP, Raw Water Transmission Main and associated structures, and the Ceres and Turlock Finished Water Transmission Mains.

USE OF EXISTING BRIDGE DURING CONSTRUCTION

Due to the current load rating of the existing bridge, the DB contractor will be prohibited from utilizing the existing bridge during construction activities for the WTP or the Raw and Finished Water Transmission Mains in a manner that would impose loads that exceed the existing H-15 rating, unless the DB contractor first installs temporary shoring to provide the capacity to support all loads anticipated during the term of the work. If the DB contractor elects to temporarily shore the existing bridge, the design, construction, and maintenance of all temporary shoring system elements must be reviewed and approved by both TID and Stanislaus County prior to implementation. TID constraints on the temporary shoring system are expected to include, but may not be limited to, the following:

- Seasonal constraints for access to the Ceres Main Canal for the installation of the shoring system
- Maintenance of local traffic and TID service vehicle access
- Temporary shoring will not be allowed to remain in the canal during the irrigation season
- Requirements for the repair of any damage done to the canal lining from the temporary shoring, bracing, anchorage, or other components of the temporary shoring system

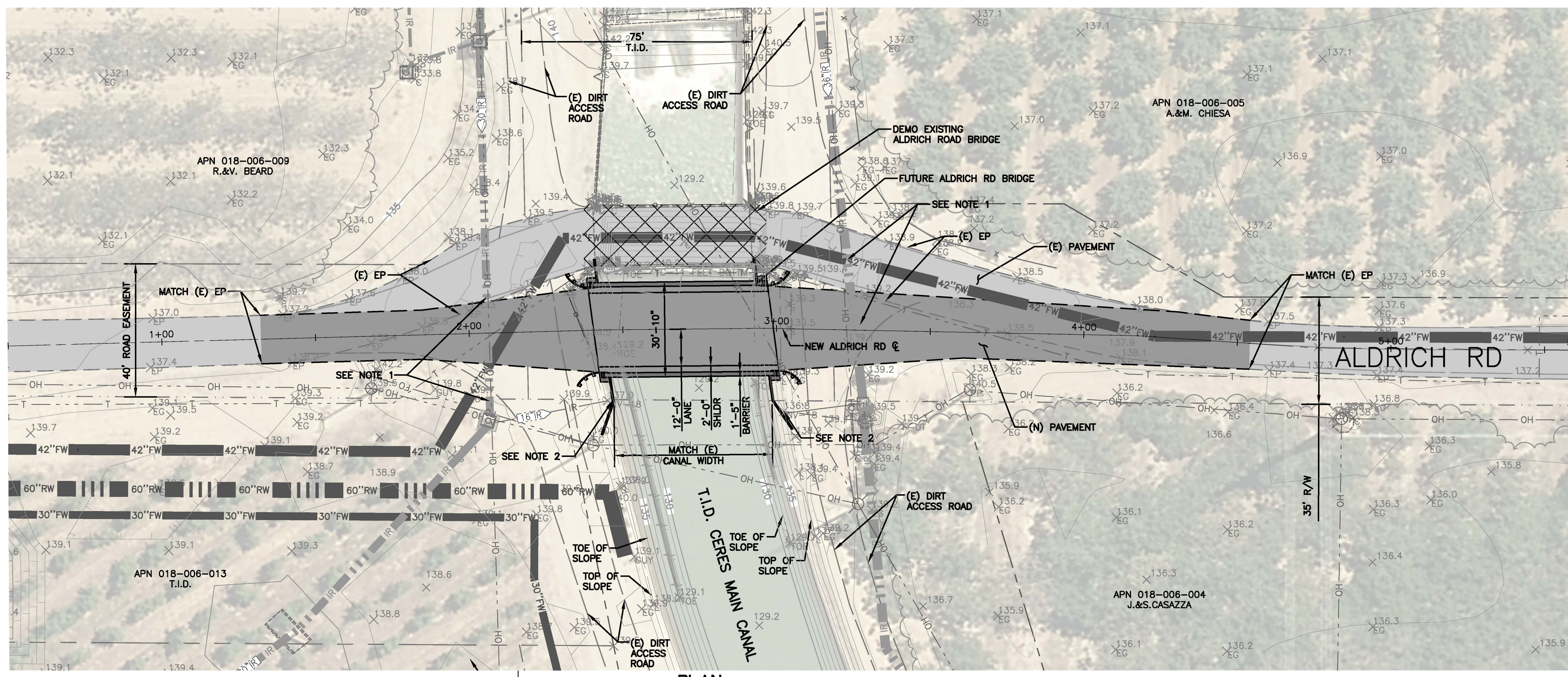
DEMOLITION OF EXISTING BRIDGE

Upon completion of the replacement bridge, and in compliance with all constraints identified by TID and Stanislaus County, the DB contractor will be required to demolish the existing bridge in conformance with the current version of Caltrans Standard Specifications and repair the existing canal lining in accordance with TID standards. Any damage to existing TID facilities during bridge demolition or replacement shall be repaired or replaced in accordance with TID standards and specifications.

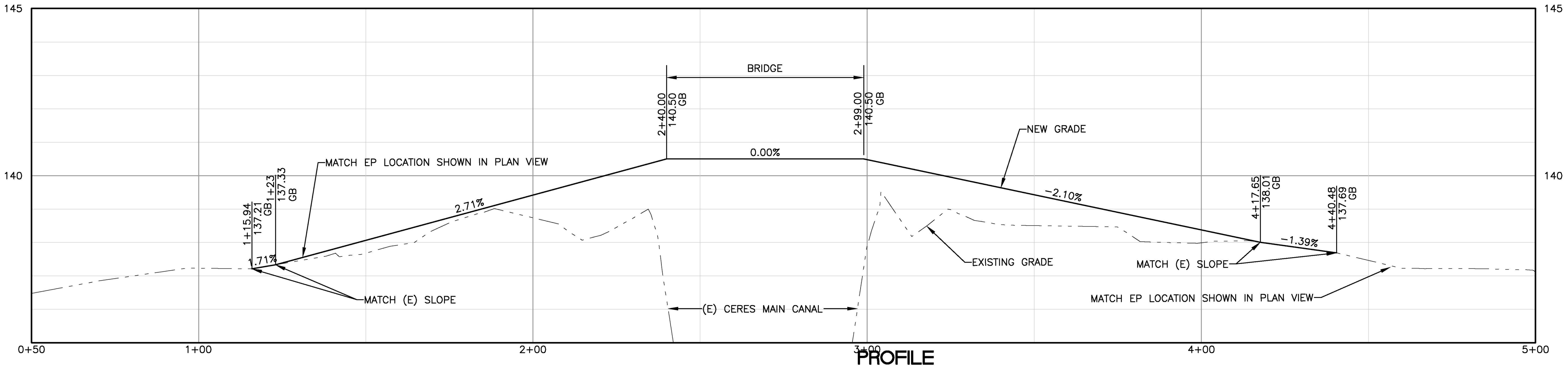
ATTACHMENT A

Conceptual Drawings for Reference
Replacement Bridge at Aldrich Road and Ceres Main Canal

N:\Clients\693 SRWA\20-16-01 PM WTP\CAD\Production\Pipeline\69320-1601-AldrichRdBridge.dwg 10/15/2018 5:42 PM dpezini



- NOTES:**
- REMOVE AND REPLACE IRRIGATION PIPELINES UNDERNEATH THE ROADWAY AND WITHIN THE LIMITS OF EXCAVATION FOR THE FINISHED WATER TRANSMISSION MAIN. IRRIGATION PIPELINES SHALL BE INSTALLED PER TID STANDARD CS099 AND/OR CS100C.
 - THE PUMP DISCHARGE PIPELINE SHALL BE MODIFIED AS NEEDED IN ORDER TO PASS THROUGH THE NEW BRIDGE TRANSITION WALL. THE PIPELINE SHALL BE MODIFIED AND INSTALLED PER TID STANDARD CS099 AND/OR CS100C.



DESIGN SPEED 35 MPH
PER CALTRANS STANDARDS (FIGURES 201.4 AND 201.5) BOTH SAG AND CREST VERTICAL CURVES CAN HAVE 0 LENGTH (A GRADE BREAK) WITH GRADE CHANGE OF LESS THAN 2.7%±

PROFILE
SCALE: H:1"=20', V:1"=2'

PRELIMINARY
NOT FOR
CONSTRUCTION

QC REVIEW: _____
DATE: _____

THIS LINE IS 1 INCH
AT FULL SCALE
IF NOT SCALE ACCORDINGLY

SCALE: AS SHOWN
DRAWN BY: SMG/ERG
DESIGNED BY: DAP
PROJ. MGR.: GSN

No.	ZONE	REVISIONS	BY	DATE

WEST YOST ASSOCIATES

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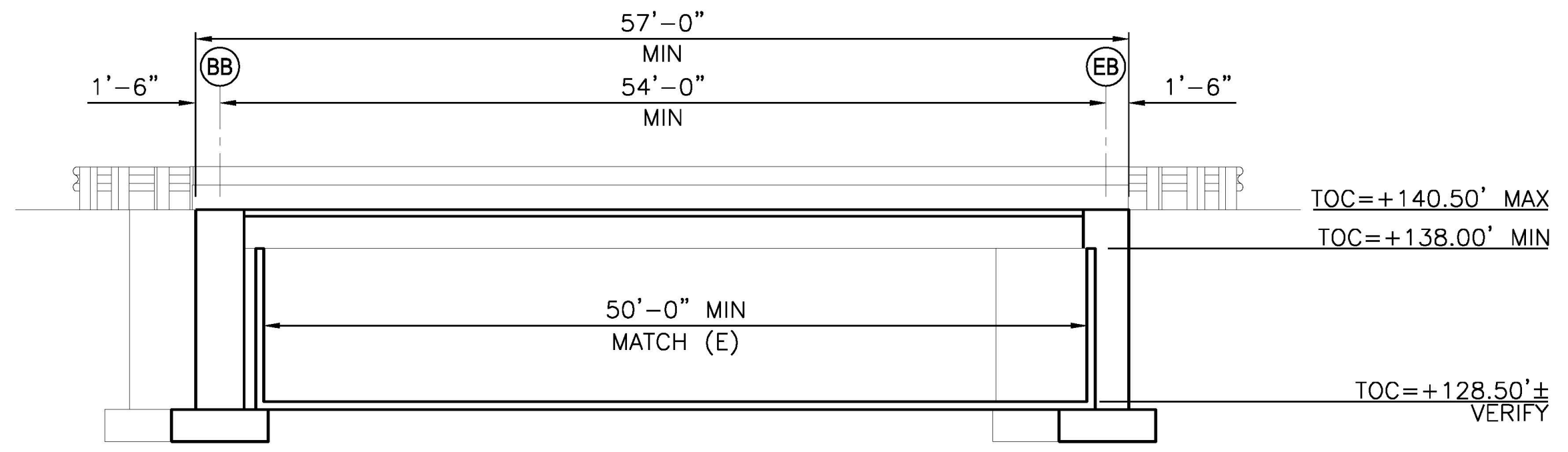
SRWA
STANISLAUS REGIONAL
WATER AUTHORITY

SURFACE WATER SUPPLY PROJECT

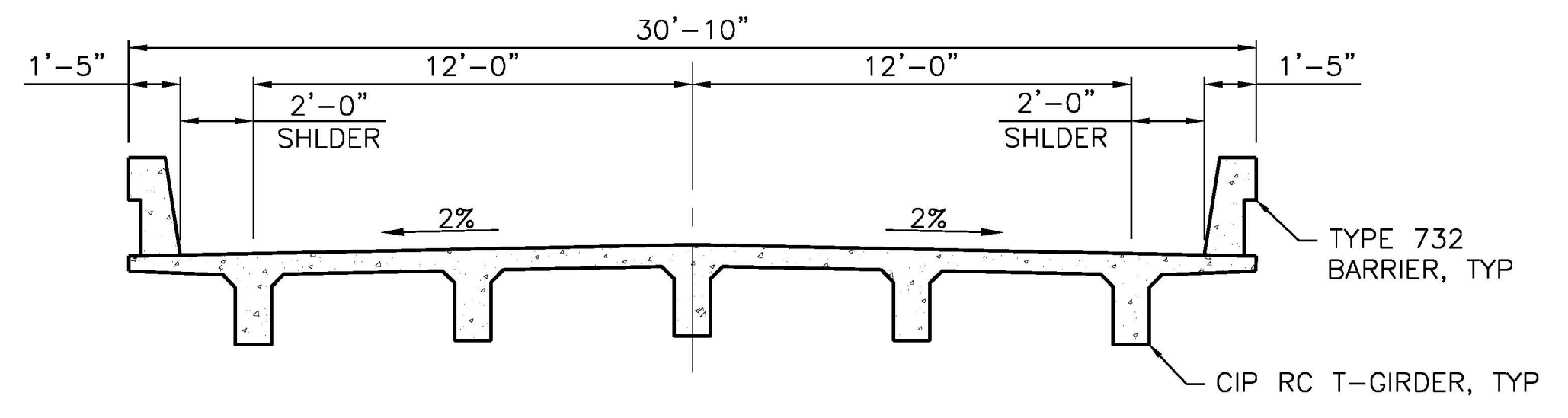
**ALDRICH ROAD BRIDGE
SITE PLAN**

JOB NUMBER 693-20-16-01
DRAWING NUMBER CXX
SHEET NUMBER X OF 49
REVISION

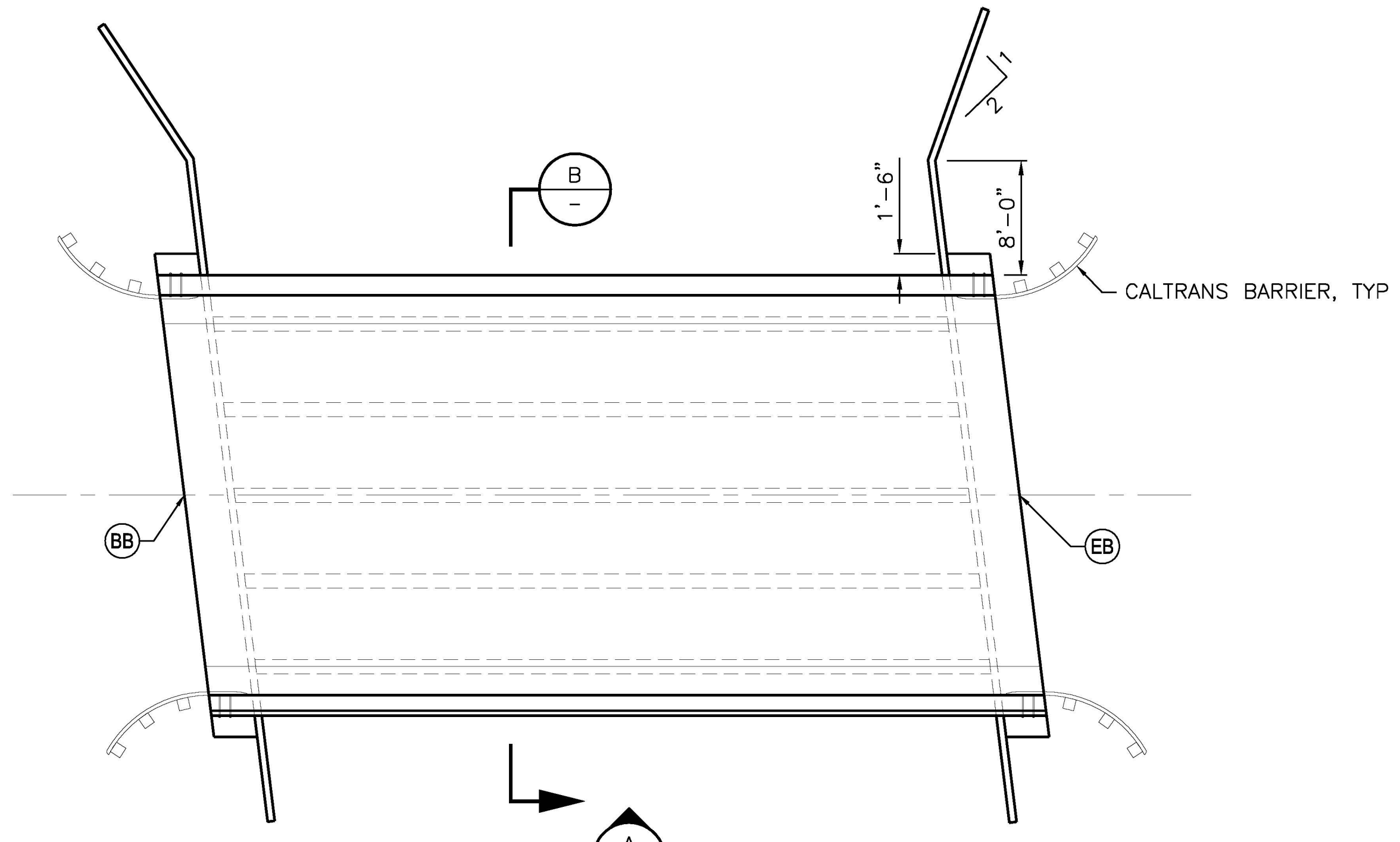
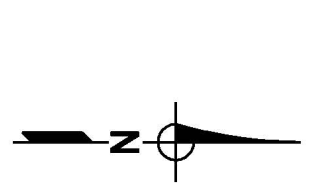
N:\Clients\693 SRWA\20-16-01 PM WTP\CAD\Production\Aldrich Bridge\16025 Aldrich Rd Bridge Crossing.dwg 9/12/2018 3:57 PM csmith



ELEVATION $\frac{A}{-}$
SCALE: 1/8"=1'-0"



SECTION $\frac{B}{-}$
SCALE: 1/4"=1'-0"



PLAN $\frac{A}{-}$
SCALE: 1/8"=1'-0"

PRELIMINARY - NOT FOR CONSTRUCTION

xx/xx/xx

THIS LINE IS 1 INCH
AT FULL SCALE
IF NOT SCALE ACCORDINGLY
SCALE: AS SHOWN
DRAWN BY : BAF
DESIGNED BY : BAF
PROJ. MGR. : CSN

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**SURFACE WATER SUPPLY PROJECT
ALDRICH RD. BRIDGE - PREDESIGN
REFERENCE REPLACEMENT BRIDGE
PLAN & SECTIONS**

JOB NUMBER 693-20-16-01
DRAWING NUMBER S10
SHEET NUMBER 2 OF 2
REVISION