2020 OUTSTANDING LOCAL STREETS AND ROADS PROJECT
AWARD NOMINATION CATEGORY – EFFICIENT AND SUSTAINABLE BRIDGE

Marsh Creek ROAD BRIDGE REPLACEMENT PROJECT

CONTRA COSTA COUNTY
DEPARTMENT OF PUBLIC WORKS

DECEMBER 3, 2019
EXECUTIVE SUMMARY

The $4.9 Million Dollar Marsh Creek Road Bridge Replacement Project replaced an existing 29.5 ft wide by 44.5 ft long steel girder bridge that spans Marsh Creek five miles east of Clayton, California with a new, wider, two-stage precast/pre-stressed wide-flange California Bulb Tee girder bridge. Each bridge abutment had either wingwall or retaining walls constructed in each corner of the bridge.

In addition to the new bridge construction, the project involved the removal of the existing steel girder bridge, installation of rock slope protection under the new bridge, realigning and reconstructing AC pavement, installing a soldier pile retaining wall, relocating an 8” water main attached to the bridge, and constructing new private driveways. The project was located in the unincorporated area of East Contra Costa County between Clayton and Brentwood. There were several environmental restrictions for work in Marsh Creek including a critical May 15 to October 31 work window with a wide variety of federal, state, and local protected species to work around. The objective of this project was to replace an existing structurally deficient and geometrically obsolete bridge with a new, wider, 100 year flood compliant, bridge built to current safety standards, all while accommodating through traffic (6,000 vehicles/day) and minimizing the impacts to the local stakeholders.

The most important objective of this project was to construct this two-season project in one construction season and several Accelerated Bridge Construction (ABC) techniques were utilized. The most critical milestone was to meet the environmental permit restriction deadline of October 31, 2018 for work inside Marsh Creek. Given, the late start of the project on April 30th, 2018, completion of this project to satisfactory quality on schedule was the critical driver of this project. Four stages of construction and traffic handling were required to build the new roadway section, retaining walls, bridge, and driveways. The end result was a bridge that has two - 12’0” lanes and two 8’0” shoulders. In order to construct, the bridge substructures, a temporary wildlife-proof work area had to be created by utilizing manmade stream diversion within the creek. The team was posed with the challenge of building two independent bridges from the ground up, in the creek, from June 15th to October 31st, which they successfully completed.
The major elements of work for this project was the following:

- Construct new two-stage bridge – Precast/Pre-stressed California Bulb Tee Girders, supported on concrete seat-type abutments. And remove existing steel girder bridge.
- Construct 22’0” tall temporary soil-nail shoring walls.
- Realign and Reconstruct HMA bridge approach pavement. And construct new driveways.
- Construct a Soldier Pile Wall with concrete facing.
- Construct Temporary Waterline Bypass and permanent 8” water main.
- Install Rock Slope Protection under bridge in creek.
- Install Coir Block Mechanically Stabilized Embankment wall for bank stabilization.
- Maintain 2 lanes of through traffic (6,000 ADT) including Construction Zone Enhanced Enforcement Program (COZEESP) coordination throughout the project.

Contra Costa County, in cooperation with the California Department of Transportation and the Federal Highway Administration, replaced the existing bridge and constructed the approach roadway improvements necessary to accommodate the bridge replacement. Mark Thomas was the project designer addressing PA&ED, PS&E, and construction bidding and support phases. Mark Thomas assisted the County with preparation of the programming and authorizing paperwork to secure HBP funds. Bridgeway Civil Constructors, Inc was the Prime Construction Contractor for bridge and roadway construction. Substrate, Inc was the Prime Consultant Construction Manager on this project providing the Resident Engineer/Structure Representative. Hill International was the Sub-Consultant providing a full-time inspector and part-time office engineer. Contra Costa Water District (CCWD), played a significant role in coordination for the temporary and permanent waterline relocation.

1. **Schedule Performance**

Originally, the County anticipated a schedule of 155 working days. The most important aspect of this project was to be able to finish the in-creek work by October 31, 2018 and finishing the major components of this project in one construction season to avoid costly winterization. In order to be successful, the Contractor had to hit the ground running on the first working day of April 30, 2018. Shortly after the award of the project, Substrate and BCCI discussed various strategies to help deliver this project in one season. The entire project team (Substrate, BCCI, Mark Thomas, and the County) sat together and brainstormed ideas to streamline the project. Based on that preliminary meeting and later meetings, the team was able to shave off valuable days off the project schedule. And despite the fact that there were several project challenges and setbacks, the team was able to deliver the project in one season. According to the approved baseline schedule the contract would be “substantially complete” December 27, 2018. The actual “substantial complete” is projected as January 8th, 2018. The following is a list things that were done to meet schedule and time saved:

- Deleted the entire Stage 3 Construction (10 days).
- Used High Early Strength Concrete & Concrete Accelerants (several days).
- Worked Premium Time and Saturdays.
- Used Soil-Cement Backfill with Geogrid to eliminate a stage of shoring (1 week).
- Deferred final driveway construction to the end of the project (a few days).
- Reduced Closure Pour Settlement time from 60 days to 15 days (45 days).
These innovative methods saved us critical weeks off the schedule, which were all required to help the team account for various setbacks on the project. These were the following:

- **Late start** (first working day April 30, 2018).
- **Inefficiencies (May 8th to May 23rd)** - Early on in the project, the Contractor was unsure on how proceed with the staged construction work. The contractor’s shoring sub-consultant AVAR came up with complex, though innovative shoring. The shoring ambitiously proposed to support the existing Transite Water Line behind it, but this proved to be beyond the comfort factor of CCWD (pipe agency-owner). This back and forth between the agency (CCWD) and the County and Contractor was a 2 week delay.
- **Oil Lines (6/12/18)** - Unknown and unforeseen, abandoned and quit-claimed, Shell Oil Lines were discovered just slightly prior to construction activities and the Contractor was able work around these lines through a multiple coordination effort – between the Contractor, Construction Manager, and the Design Team (no measurable delay).
- **Shoring Construction (June 13th to July 13th)** - As mentioned previously, the shoring for this project was complex due to the unique construction of the existing Marsh Creek Bridge. The existing bridge had a non-standard Abutment, which contained very little bar reinforcing. For this reason, additional measures had to take place, such as creating a steel strut frame installed inside the existing bridge portal to ensure stability, as the bridge was still a lifeline structure. The impact of this is estimated to be a 1 week delay, as it took 4 weeks to build the shoring, where 3 weeks was anticipated.
- **Nesting Bird (from June 4th to July 6th)** - A Black Phoebe nested and laid eggs on the existing Marsh Creek Bridge causing a few days of construction impact as the Contractor was not able to work at full efficiency. The Contractor was allowed to continue to work within a protective buffer and full-time Biological Monitoring (provided by Gallaway Enterprises), a procedure that was approved by the California Department of Fish and Wildlife (CDFW). Estimated impact (4-5 working days).
- **Marsh Fire** – On July 25, 2018 a brush fire occur near the jobsite burned 250 acres of the surrounding area. Fortunately, the fire was just outside project limits and did not impact the jobsite. However, one working day impact occurred as Marsh Creek Rd was completely shut down on July 26, 2018. (1 day impact).
- **COIR Block Mechanically Stabilized Embankment (MSE) Wall (10/12/18 – 10/19/18 and 10/24/18 - 10/26/18)** – Additional Work: In order to construct the deep bridge abutment foundations, temporary excavations extended beyond the planned creek disturbance area into private property. This disturbance required an extension of the creek bank stabilization work. In coordination with the property owner, the agreement reached on the method of bank stabilization was to install COIR Block MSE walls, rather than Rock Slope Protection. (This additional work was approximately 6 working days).
- **Arundo-Donax (Bamboo) Stalk and Root Removal (October 24, 2018)** - As part of an agreement with CDFW and the property owner in order to remediate the area, Arundo-Donax mitigation was required to be performed on the North-Western creek bank – This work impacted the Contractor 1 working day.
- **Rain Days** – Although the weather was generally cooperative for the duration of the project, 2 rain days were given to the Contractor in November around Thanksgiving.

In the end, considering the late, almost May 2018 start and a Jan 8, 2018 “substantial complete,” this is considered a successful project, as the Contractor met the deadline for in-creek work and completion in one construction season.
2. **Construction Management**

The Marsh Creek Road Bridge Replacement Project required a construction management team that was extremely technical, had relevant experience working on complicated bridge projects within environmentally sensitive areas, and was able to coordinate with various stakeholders. As such, The Substrate/Hill team was selected to administer this project on the behalf of Contra Costa County.

The Construction Management team applied basic partnering philosophy as an element to the successful delivery of this project with the Contractor. As a result, The CM staff took part in delivering a successful project for the Contra Costa County. Throughout the construction of the project, it was the intent to be open with the Contractor and work alongside with them helping to minimize any unforeseen tribulations. The overall goal was to avoid unnecessary costs and delays in order to assure forward progress is always maintained. With the various challenges and obstacles faced throughout the duration of the project, the project team managed to overcome all issues and delivered the project on schedule.

Project elements of included: precast bulb-tee girder construction, CIDH soldier pile wall construction, bridge demolition, complex temporary shoring, utility relocation, stream diversion, detailed traffic handling, SWPPP implementation and monitoring, multiple agency coordination, and coordination with the local residents.

Due to the unique features of this bridge replacement project, specialized construction expertise was necessary to successfully deliver this project. The project required expertise in particular construction methods such as CIDH, in creek work, dewatering operations, familiarity with bridge deck widening, and experience with technical construction stages and extensive coordination with various permitting agencies and stakeholders. One of the main challenges for the project was environmental protection and environmental agency coordination. Had these challenges not been handled properly, the likelihood of delays, additional costs, and schedule disruption would have increased significantly.

Another significant challenge was to ensure the safety of the travelling public. Approximately, 6,000 vehicle/day that travel along Marsh Creek Road were safely maneuvered around 4 stages of traffic control, which required extensive coordination with CHP for COZEEP, public notification via numerous press releases, and the use of the four portable changeable message boards that would communicate project changes to the commuters on a daily basis. Significant enhancements were made to safety on regular basis to ensure line of sight, adequate stopping sight distance, visibility and general traffic safety, including adding traffic devices or signs.

Finally, since this project was schedule driven, Accelerated Bridge Construction (ABC) techniques were applied throughout the duration of the project. This project was primarily paid for by Federal Highway Bridge Replacement funding, Local Road funds, and SB-1 funds.

**Construction Cost:** $4,560,410 (no claims)
3. **Safety Performance**

The Contractor, Bridgeway Civil Constructors, Inc. and the Construction Manager, Substrate, Inc emphasized safety through communication, responsibility, accountability, safety procedures, training and education. Additionally, the Contractor and Construction Management Team continually strive to improve the quality of existing safety programs, such as using hazard analyses, work plans and risk assessments, including mandatory subcontractor safety orientation.

**Public Safety** – As mentioned previously, safety of the travelling public was of Number 1 importance to the project team, especially related to the 4 stages of traffic control, which required ensuring traffic safety devices were installed per plan and per manufacturer’s recommendations. Additional safety measures included: site security fencing, fall protection, and requiring additional shoring measures to ensure the existing bridge was safely shored during Stage 2 construction.

**Worker Safety – Construction Safety and Illness Prevention Programs** The project team established measurable goals for safety programs and safety training for this project. Health and Safety standards and initiatives in the overall Construction Safety Plan included:

- Providing a workplace free from serious recognized hazards and compliant with standards, rules and regulations issued under the OSH Act.
- Examine workplace conditions to make sure they conform to applicable OSHA standards
- Make sure employees have and use safe tools and equipment and properly maintain equipment.
- Use color codes, posters, labels or signs to warn employees of potential hazards.
- Enforce operating procedures and communicate them so that employees follow safety and health requirements through tailgate safety meetings.

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<tr>
<td>Near Misses Recorded on Site</td>
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4. **Environmental Considerations**

With the in-creek activities, regulated species protection, nesting birds, and storm water quality, full consideration was given to this environmentally sensitive work area during construction while at the same time maintaining project progress. Defining timelines for work being performed (working days), implementation of pertinent requirements (exclusion fences, jobsite surveys, and employee training, etc.) had to be considered prior to the execution of the work.

**Part A - Environmental Protection/Compliance**

With extensive environmental requirements, extensive work went into complying with permit requirements, and coordinating with permitting agencies, such as the US Army Corps of Engineers (USACE), California Department of Fish & Wildlife (CDFW), United States Fish and Wildlife Service (USFWS), State Regional Water Quality Control Board (RWQCB), National Marine Fisheries Service (NMFS), East Contra Costa Habitat Conservancy (HCP/NCCP), FHWA, and Caltrans.
Species Protection
The following endangered or special-status species were located in the area: California Red-Legged Frog, California Tiger Salamander, Alameda Whipsnake, Giant Garter Snake, San Joaquin Kit Fox, Vernal Pool Fairy Shrimp, Longhorn Fairy Shrimp, Vernal Pool Tadpole Shrimp, Western Pond Turtle, Townsend Big-eared Bat, Western Burrowing Owl, and Golden Eagle. This includes the following local special status species which include: Coast Horned Lizard, Pallid Bat, Whietailed kite, Ringtail, and American Badger.

To limit exposure to wildlife within the jobsite, the Contract essentially called for Temporary Wildlife Exclusion Fencing (TWEF) to provide a buffer at the edges of the jobsite. The TWEF called for in this project was the standard Caltrans TWEF, which consisted of silt fence and orange ESA fencing. In addition to TWEF fence, dripline fencing was provided around tree driplines to ensure their roots were not damaged by heavy equipment.

Starting in February, the County removed a number of trees to remove within the project limits that could have been a deterrent to bridge construction because they could have become habitat for nest birds. This contract called for a Contractor Supplied Biologist (CSB) which was performed by Gallaway Enterprises. As a precautionary measure, the County under Contract Change Order requested Nest Management Services through LSA Associates to prevent any possibilities for Nesting Birds.
However, regardless of our efforts with Nest Management, on June 4th, 2018 two Black Phoebes successfully nested on the existing Marsh Creek Bridge and laid eggs. Through an innovative compromise between the Contractor Supplied Biologist, Gallaway Enterprise, and the California Department of Fish and Wildlife (CDFW), the Contractor was allowed to continue working with a 25’0” protective buffer and full-time Biological Monitoring (provided by Gallaway Enterprises), a procedure that was approved by the California Department of Fish and Wildlife (CDFW). The Contractor was constructing temporary shoring at that time. The full-time Biologist monitored the birds to ensure they were not showing signs of distress from the nearby construction operations. This involved frequent shutdowns to ensure the safety of birds.

The Black Phoebes and their offspring successfully fledged their nest on July 6th, 2018. Nest Management operations continued till August 31, 2018, the official end of nesting season.

Part B – Alternative Practices - Temporary Stream Diversion and Dewatering
A major feature of this project involved a temporary stream diversion to ensure the wildlife in the creek was not affected by construction activities. The contract and the CDFW permit required the stream diversion to be a closed system of two 52” diameter pipes that were sized for a 250 CFS water flow. The Temporary Stream Diversion work started in May 25, 2018 and ended on October 27, 2018.

The work entailed installing a water-tight upstream cofferdam, installing the 52” diameter HDPE pipes and a downstream cofferdam. After the cofferdams were complete, the TWEF was installed over it to create a fully closed system. All this work was performed with a full-time Biologist who ensured that no fish, amphibians, or other wildlife were harmed. Over 500 fish, several California Red Legged Frogs, and a couple of Western Pond Turtles were relocated outside the area between the cofferdams.
The cofferdams were essentially water tight, and the contractor utilized clean river run gravel (which was allowed by the CDFW permit) to fill a few low spots in the creek to create a nice, clean, and dry working surface. Plastic was placed under the gravel and this gravel was later removed from the creek bed. The creek was restored to its pre-existing condition on October 31, 2018.

The final component of the stream diversion work was the dewatering plan. This involved two separate holding tanks – one for “clean water”, and one for “dirty water”. The clean water was creek/ground water that was pumped out of footing excavations, this was pumped to a small settling tank and then returned into the creek via a turbidity curtain. The dirty water was any water that came in contact with fresh concrete. This water was pumped into a large baker tank and was treated by an active treatment system. The treated water was then used as dust control via a water truck.

**Water Pollution Control**

The Construction Management team was assisted by sub-consultant, Thunder Mountain Enterprises, and their intricate working knowledge of the annual permit and the various requirements and time frames with which the requirements needed to be addressed. The Contractor’s SWPPP Quality Control Inspector, Verux, performed timely and detailed inspections and were critical to the success of this Risk Level 2 project. Since the project is located over Marsh Creek, SWPPP monitoring during rain events was paramount for the CM team. If not managed properly, the project could have been shut down and both the County and the Contractor could have faced fines. Through the CM team’s extensive training and experience on reviewing SWPPP’s, inspecting BMP’s, preparing required reports, and coordinating with Caltrans Storm Water Task Force and the RWQCB, the project was effectively managed.
This project had one small numerical action level exceedance, despite having excellent BMP’s. During a large storm event (1-1/4” rain in one day), a small amount of turbid water left the project site and pooled in a paved parking area adjacent to the site. It did not discharge into the creek, however, since it left the jobsite, it is technically considered an exceedance. It was tested by the QC Inspector Verux, and determined to exceed the NTU threshold. Immediately after this report, the project team installed additional BMP’s to correct and prevent another exceedance, as a storm event was on the horizon. These measures were reported to the Water Board promptly via a NAL Exceedance Report that was uploaded to SMARTs, as was the follow-up corrective action. This did not qualify a Notice of Discharge (NOD) as the water did not enter the creek.

**Utility Relocation**

This bridge replacement project required an overhead PG&E power, AT&T, Verizon, and Extanet communication lines relocation which paralleled Marsh Creek Road through the project site. Fortunately, most of this relocation work occurred prior to the start of the project. This coordination effort was mainly borne by the County, AT&T, PG&E, Verizon, and Extanet.

However, a key challenge for this project that occurring during construction was the Temporary Waterline Bypass and permanent relocation of the existing 8” diameter CCWD water pipe that serviced a considerable portion of water service along Marsh Creek Road. The CCWD bypass work consisted of first bypassing the exiting 8” diameter waterline with a 6” diameter HDPE line during Stage 2 Construction. Once the line was safely bypassed, construction of the permanent steel water pipe occurred both on the bridge and the connection points of the bridge structure. Work included a new 8” diameter water line, a 14” steel casing with bracing under the bridge, new blow-offs, new hydrants, and water service. This scope of work required significant coordination with respect to construction, inspection, testing, and service. CCWD’s role as a project partner was critical to the success of this project.

**Unknown and Unforeseen Abandoned Oil Lines**

Finally, early on in the project, it was determined than abandoned Shell Oil Lines were in direct conflict with the CIDH pile drilling at RW1. Through a rapid coordination effort with Shell Pipeline facilities, the project team was able to locate the Oil Lines and the Conflict within a few feet. After potholing with the Contract, the CM team and designer we able to quickly redesign the Soldier Pile wall to avoid the conflict without any delay to drilling operations.

### 5. Community Relations

The County and Substrate introduced themselves to the local residents and community members and provided contact for project inquiry. The team performed set up, and the County implemented and maintained a public outreach program for the project key stakeholders, which included:

- Residents and property owners adjacent to the project area
- Fire, Police, Garbage, and US Mail (Postal)
- Commuters

The project team help developed content to be hosted on the County’s website, which displayed accurate and timely updates to inform users of important project information and events throughout the duration of the project. Users were able to access project information, such as fact sheets, project maps, and schedules, as well as notifications of upcoming delays, detours and/or road closures.
Critical outreach was performed through the County Public Information Officer, Steve Padilla, who sent out information leaflets, updated the County website, and various other social media outlets. The following milestone events were relayed by the County PIO:

- Stage 2 – Girder Placement (Aug 1, 2018).
- Stage 2 to 4 Traffic Switch (Sept 11, 2018).
- Stage 4 – Girder Placement (Nov 2, 2018).

In addition to the outreach, the project had 4 Portable Changeable Message Signs (PCMS) relaying project information, two near the project site, and two several miles away, to give advanced warning to commuters from Brentwood and Concord. Finally, the County utilized the use of COZEEP to alert and warn drivers of the changed conditions on the jobsite during those milestone days, especially during traffic switches. Through the Project team and County’s public outreach efforts, their website continually provided updates as to the status of the project and the nature of the Contractor’s work which was well received by both the local and the commuters.

Adjacent Neighbor Outreach

The Resident Engineer performed a series of outreach efforts with all the neighbors and business adjacent to the project. And for the most part, there was a positive perception of the project in the vicinity and with the commuters. However, the resident immediately adjacent to the project proved to be an adamant proponent against the project from early planning and design phases to throughout the construction process.

As such, they were and became, a significant point of focus and outreach efforts during the project construction. Coordination and the management of the expectations of this owner certainly translated to project delays in the form of inefficiency, but these are difficult to quantify. However, since this neighbor was the most impacted on this project, timely communication, notification, and cooperation with this resident was critical to project success.

Particular attention was paid towards ensuring access and safety, while keeping them informed of potential impacts including the additional creek work and driveway access. This included formal outreach meetings, sharing the Contractor’s Baseline Schedule and providing weekly 3-week look ahead schedules.
**Driveway #3 Access**

The new Marsh Creek Bridge was situated directly adjacent to the resident on the Northeast Abutment of the bridge, making this resident the focal point for construction related impacts and coordination. A critical component of the project was to maintain clear, concise, and routine coordination with the resident. The Resident Engineer engaged the resident early and timely, and provided the resident with almost a daily synopsis of the work. As the Stage construction drawings could not accurately depict the entire scope of work in the area, coordination and adjustments of the driveway were made to ensure the resident had safe access at all times, and the fire and emergency vehicles had access. The team also ensured the resident had safe access to mail and garbage. Coordination with Cal-Fire occurred and fine adjustments to the temporary driveway had to be made to ensure that the residents could access the residence.

![Image of construction site](image)

**COIR Block MSE Wall**

During construction, as a result of the deep foundation excavations required for Abutment Construction, the work led to disturbances of creek bank outside planned limits and into private property. Therefore, an agreed upon method for bank stabilization, that was also approved by CDFW, was the COIR Block MSE Wall discussed earlier. The method was preferred by the owner over the standard Rock Slope Protection that was used within project limits. The project team engaged with the owner in a pre-construction meeting to go over means and methods as well as inspection procedures. Through negotiations, the County was able to develop permanent easement agreements with the owner for future maintenance of the COIR Block.
6. **PROJECT CHALLENGES**

**CHALLENGE #1 - SCHEDULE**

As mentioned previously, this project was originally intended to be a two-season project. With that assumption, the designer did not figure the 60 Day closure pour settlement period into the working days for this project. Therefore, this 155 Working Day project, was actually a 215 Working Day project from Day one. Coupling this with a late start of April 30, 2018, this left the project team only 129 working days to finish all the work in the creek by October 31, 2018.

Starting late and experiencing several aforementioned set-backs (starting inefficiencies, nesting bird, etc), the Contractor found himself 3 week’s behind schedule come June 15th.

**INNOVATIVE SOLUTIONS**

Utilizing principles and idea discussed during the pre-job acceleration meeting, the Contractor and project team responded to the delay with the following measures:

**High-Early Strength Mix Designs** - The project team approved two special concrete mix designs, one with higher cement content and water reducers (Delvo), and another with concrete accelerant BASF MasterSet AC 534, which is pre-approved through Caltrans. By using one of these mixes in the Abutment pours, retaining walls, approach slabs, the contractor was able to shave off several days from the project. They were able to backfill sooner in the case of Abutments and retaining walls, and were also able to drive on the approach slabs sooner as strength came up in 3 days, rather than waiting 7 days. That’s over 4,200 psi concrete in 3 days!
Deleting Stage 3 - By slighting over-paving Stage 2, the project team deleted the entire Stage 3 Construction which saved 10 working days. Stage 3 was a sliver-pave widening in the center of the roadway and it would be prove to be inefficient and dangerous as the Contractor would have to work in a tight Krail configuration.

In addition, local residents would be impacted as they would have to drive past the krail and perform an unsafe U-turn to get back to their driveways, as access would be cut off. We successfully deleted Stage 3, and the Contractor was able to go from Stage 2 directly to Stage 4, which again saved us 10 working days.

Soil-Cement MSE Shoring - The Contractor proposed an innovation shoring solution in Stage 2 that would eventually facilitate Stage 4 bridge construction. This was utilizing soil-cement backfill behind the Abutment with Tensar Geogrid, which would serve as a Temporary Mechanically Stabilized Embankment (MSE) wall. This led to a shoring solution that save several days in traditional backfill and at least a week in the installation of an additional shoring.
Reduced Closure Pour Settlement Time – As mentioned previously, the designer intended this job to be completed in two seasons, and therefore, did not include a settlement period. The standard settlement period from bridge closure pours is 60 calendar days. The project team collaborated and were able to use the criteria in the new recently published Caltrans Memo’s to Designers 8-3 “Deck Closure Pour and Waiting Period for Bridge Widening or Staged Construction”.

The designer accepted the recommendation and was able to reduce the closure pour wait period from 60 days to 15 days, saving 45 calendar days from the contract.

WAITING PERIOD CRITERIA

For cast-in-place (CIP) posttensioned concrete, CIP reinforced concrete, prestressed concrete and steel girder bridges, a deck closure pour waiting period must be selected from Figures 8.3-1 to 8.3-4 using a layer or all of the following requirements:

- The deck thickness for the closure pour layer is 8 inches or greater.
- The deck thickness and bar reinforcement specified in MTD 10-20 are used for the closure pour layer.
- The overall closure pour waiting period is equal to or more than the selected application.

For concrete slab bridges, a deck closure pour waiting period must be selected from Figure 8.3-1 to 8.3-4 using a layer equal to 3 ft.

Figures 8.3-1 to 8.3-4 must be supplemented with the following requirements and limitations:

- The closure pour waiting period must not exceed 60 days.
- The minimum waiting period for cast-in-place (CIP) prestressed concrete is 14 days.
- The minimum waiting period for slab, CIP reinforced concrete, and prestressed concrete is 8 days.

Premium Time Work – Finally, from June 15th to October 27th, the Contractor began working premium time and Saturdays, including sometimes on Sundays to get the project back on schedule.

By utilizing all these methods, the Contractor was able to restore the creek and remove the stream diversion prior to October 31, 2018, our environmental permit deadline.

CHALLENGE #2 – SHORING TO CONSTRUCT TWO-STAGE BRIDGE

One of the most critical requirements for project success was for the contractor to figure out a shoring solution that would allow for stage construction. The existing Marsh Creek bridge Abutment was unique in that it is served more as a bulkhead, rather than as an abutment. As such it was very nominally reinforced. Through a repeated review process, the Construction Manager, the County, and the Contractor were satisfied with the solution.
The final solution was a partial soil nail wall, and partial sub-horizontal ground anchor, part of which engaged the existing bridge through a waler system that spread the load to the vertical pile/columns. This solution allowed the Contractor to perform a partial demo, protect the 6” bypass water line and build the Stage 2 – Bridge Substructure and Superstructure all while stabilizing the directly adjacent roadway serving 6,000 vehicles a day. Finally, it served as a form for the Soil-Cement MSE wall that was construction in Stage 2, which facilitated Stage 4 Bridge Construction.

CHALLENGE #3 – HEAVY PRECAST GIRDER ERECTION

The girders for our project were 4’0 deep by 4’0” wide wide-flange California Bulb Tee girders, and although they were only 88’3” long, they weighed about 44 tons. As such, they required a Special P-9 truck route and a double-crane pick to successfully place these girders.

INNOVATIVE SOLUTION

The six – 88’3” long girders were fabricated in Lathrop, California at Confab LLC. The fabrication was Source Inspected and the Quality Assurance was performed by BSK Associates, who was part of the CM team.

The RE and the Contractor and his subs (including his truckers) had an early logistics meeting part of the submittal requirements. The RE asked to provide information about the truck route to ensure safe delivery on a P-9 truck route. The following truck route was used:
Stage 2 Girder Erection: Once delivered to the site, the girders were erected at two different Stages. Stage 2 Girders were placed on August 2nd, 2018.

The precast girder erection operation was a critical aspect of delivering this Accelerated Bridge Construction (ABC) project in one construction season. The four 44-ton California Bulb-Tee girders were placed in only 3 hrs by utilizing two 265-ton telescoping cranes limiting exposure and delays to the traveling public.

Stage 4 Girder Erection: On November 2, 2018, this operation was repeated for the remaining two girders, again with the two 265-ton telescoping cranes. Work was once again completed in less than 3 hrs limiting exposure and delays to the traveling public.
All six girders have been determined to have been placed within ¼” of theoretical values and no safety issues have occurred as a result of the placement activities. Significant coordination was required to ensure this success of these activities, which included: pre-erection logistics meetings (total 2), pre-erection safety meetings (total 2), precast girder erection plan with haul route, precast shop drawing review, precast quality control plan, source inspection and quality assurance. Source Inspection and Quality Assurance was provided by BSK following the Quality Assurance Program developed by Substrate, Inc.

7. ADDITIONAL CONSIDERATIONS

INTERESTING PROJECT PHOTOGRAPHS

Stage 2 – Temporary Soil Nail Shoring

Stage 2 – Temp Soil Nail Shoring

Stage 2 – Girder #2 Placement

Stage 2 - Girder #3 Placement