BB Incorporated
1621 Grand Ave. San Diego, CA 92109
(858)-270-3003

I-5 North Coast Corridor San Elijo Lagoon Improvement Project Proposal

1. Cover Letter

BB Incorporated

BB Incorporated
1621 Grand Ave. San Diego, CA 92109
(858)-270-3003

November 16th, 2020

Dear CPP Infrastructure Developments,

We are fortunate to have the opportunity to be able to respond to your project proposal. Our team has combined our talents and expertise in creating and planning a design for a proposed new bridge, and we are thrilled to show case our ideas for this proposal. This report includes the proposed design with drawings and calculations as well as the corresponding construction phases and cost estimates.

BB Incorporated has over 50 years of experience in the industry. During the span of our time, our team has delivered numerous successful projects that were under budget and ahead of schedule. BB Incorporated has become one of the most prestigious leaders in the infrastructure community. Our commitment to the project includes the design and reconstruction of I-5 North Coast Highway bridge, overpass bridge, and a pedestrian bridge that are designed to provide decades of use for locals and aesthetic enhancements for the San Elijo Lagoon. Our professional team will exceed project expectations by delivering a final product that is cost effective, time efficient, and of superior quality.

If you have any questions, please contact Project Managers, Matthew Torosian and Jonathan Scott.

Sincerely,

(Matthew's Signature)
Matthew Torosian P.E., S.E.
Project Manager

Jonathan Scott LEED AP
Project Manager

2. Summary

Summary

Established in 1950, BB Incorporated blossomed into an award-winning firm that specializes in Design-Build projects, having worked with CPP Infrastructure Developments multiple times before. We have highly qualified staff of talented and experienced professionals with various accomplishments and relationships with high quality subcontractors. The team consists of individuals who have years of experience in both the design and construction of design-build projects, including multiple licensed professional engineers. Our team has worked together on previous projects having accumulated over 10 years of collaboration and trust building. BB Incorporated has an initiative to include environmentally sustainable methods into the design and construction of their projects. We emphasize the constructability of projects which is established by our experience working together for over a decade. BB Incorporated has the team with the experience that can provide innovative solutions for sustainability. BB Incorporated will provide design services that include drawing of the bridge, calculations of the bridge that will be in accordance with GreenRoads and will be continuously involved with the construction process. We also provide construction services that include a site utilization plan, risk mitigation, a safety plan, and quality control plan. We have not had an injury on site in over 3 years. The BB Incorporated team has a cumulative 40 years of relevant research experience in sustainable design and construction methods. We will provide our service for the I-5 North Coast Corridor San Elijo Lagoon Improvement Project for $203,211,662. BB Incorporated is a leading design build firm in the Southern California region.

3. Bonding / Insurance

CPP Infrastructure

3801 West Temple Ave

Pomona, CA 91768

RE: BB Incorporated

I-5 North Coast Corridor San Elijo Lagoon Improvement Project

Dear CPP Infrastructure:

Travelers Casualty and Surety Company of America, Liberty Mutual Insurance Company, Zurich American Insurance Company and Federal Insurance Company are proud to be associated with BB Incorporated. All four surety companies are licensed to transact surety in all fifty states, including California and are listed as acceptable sureties in the United States Department of Treasury Circular 570 dated July 1, 2020. Over the years, BB Incorporated has developed an impressive resume of completed projects and has a long history of consistent growth and profitability.

Given the level of comfort the sureties have developed with BB Incorporated technical, financial, and managerial resources, the sureties have established a surety line of credit of $900,000,000 for single projects, subject to an aggregate uncompleted backing of $9,000,000,000. The current available bonding capacity is in excess of $2,000,000,000.

It is our intent to provide performance and payment bonds for the above referenced project in the event BB Incorporated is awarded the project. Our intent is conditioned upon applicable underwriting considerations such as: contract terms, bond forms, confirmation of project financing and any other underwriting considerations at the time of project award. This letter is not an assumption of liability, nor is it a bid bond or a performance bond. It is issued as a bonding reference by us for our client. If you should need an addition information, please do not hesitate to contact our office.

Sincerely.

Travelers Casualty and Surety Company of America (AM Best Rating A++, XV)

Liberty Mutual Insurance Company (AM Best Rating A, XV)

Zurich American Insurance Company (AM Best Rating A+, XV)

Federal Insurance Company (AM Best Rating A++, XV)

Mark Andrews

Mark Andrews

Attorney-In-Fact

November 10, 2020

CPP Infrastructure

3801 W Temple Ave, Pomona, CA 91768

RE: I-5 North Coast Corridor San Elijo Lagoon Improvement Project

To Whom It May Concern,

Alliant Insurance Services, Inc. is the insurance company for BB Incorporated. BB Incorporated is able to obtain insurance coverage in the required limits and ratings required for this project. Coverage can be provided using current practice policies and/or through the utilization of project specific policies to meet the insurance requirements found in Section IV- Insurance Requirements. Insurance coverage can be issued by insurance companies licensed to conduct such business under the laws of the State of California with an AM Best rating of at least A- or better.

Please do not hesitate to contact our office should you have any questions or if we may be of additional service.

Sincerely,

Mary Nin

Account Manager

Construction Services Group

Phone: 626-660-6413

Certificate of Insurance

DATE
11/09/2020

This certificate is issued as a matter of information only and confers no rights upon certificate holder. This does not affirmatively or negatively amend, extend, or alter the coverage afforded by the policies below. This certificate of insurance does not constitute a contract between the issuing insurer(s), authorized representative or producer, and the certificate holder.

Producer Los Angeles - Alliant Insurance Services, Inc. 333 S Hope St Ste 3750 Los Angeles CA 90071	Phone 626-660-6412	
Insured BB Incoporated 1621 Grand Ave San Diego CA 92109	Insurer Affording Coverage Insurer A: Zurich American Insurance Corp Insurer B: American Zurich Insurance Comp	NAJC 18673 46362

Certificate Number: 238362910

This is to certify that the policies of insurance listed below have been issued to the insured named above for the policy period indicated. Notwithstanding any requirement, term or condition of any contract or other documents with respect to which this certificate may be issued or may pertain. The insurance afforded by the policies described here is subject to all the terms, exclusions, and conditions of such policies.

Type of insurance	Additional Insured	Policy Number	Policy Exp.	Limits			
Comercial General Liability	CPP Infrastructure	GLO727384919	11/18/2021	Occurrence	$10,000,000	Aggregate	$10,000,000
Auto Liability	CPP Infrastructure	BAP272383291	11/18/2021	Occurrence	$5,000,000	Aggregate	$1,000,000
Professional Liability		TYK172830178	11/18/2021	Occurrence	$5,000,000	Aggregate	$10,000,000
Excess Umbrella Liability	CPP Infrastructure	XOOG5647896Y224	11/18/2021	Occurrence	$5,000,000	Aggregate	$5,000,000
Workers Compensation & Employers Liability		WC567895434	11/18/2021	E.L. Each Accident	$1,000,000	E.L. Disease EA	$1,000,000

Waiver of subrogation endorsement: CPP Infrastructure is included in all policies above.

Certificate Holder	Representative Signature
BB Incoporated 1621 Grand Ave San Diego CA 92109	*Martin Tewie*

4. Safety Record, Claims, Disputes, and/or OSHA Violations

RE: Experience Modification Rating

To Whom It May Concern:

Alliant Insurance Services Inc. is the Insurance Agent for BB Incorporated. This letter serves to confirm your Experience Modification Rating for the following years.

Year	Modification Rating
2019:	.58
2018:	.57
2017:	.66
2016:	.63
2015:	.59

Please contact us if you have any further questions.

Sincerely,

Mary Nin

Account Manager

Construction Services Group

Phone: 626-660-6413

Litigation, Claims, and Disputes History

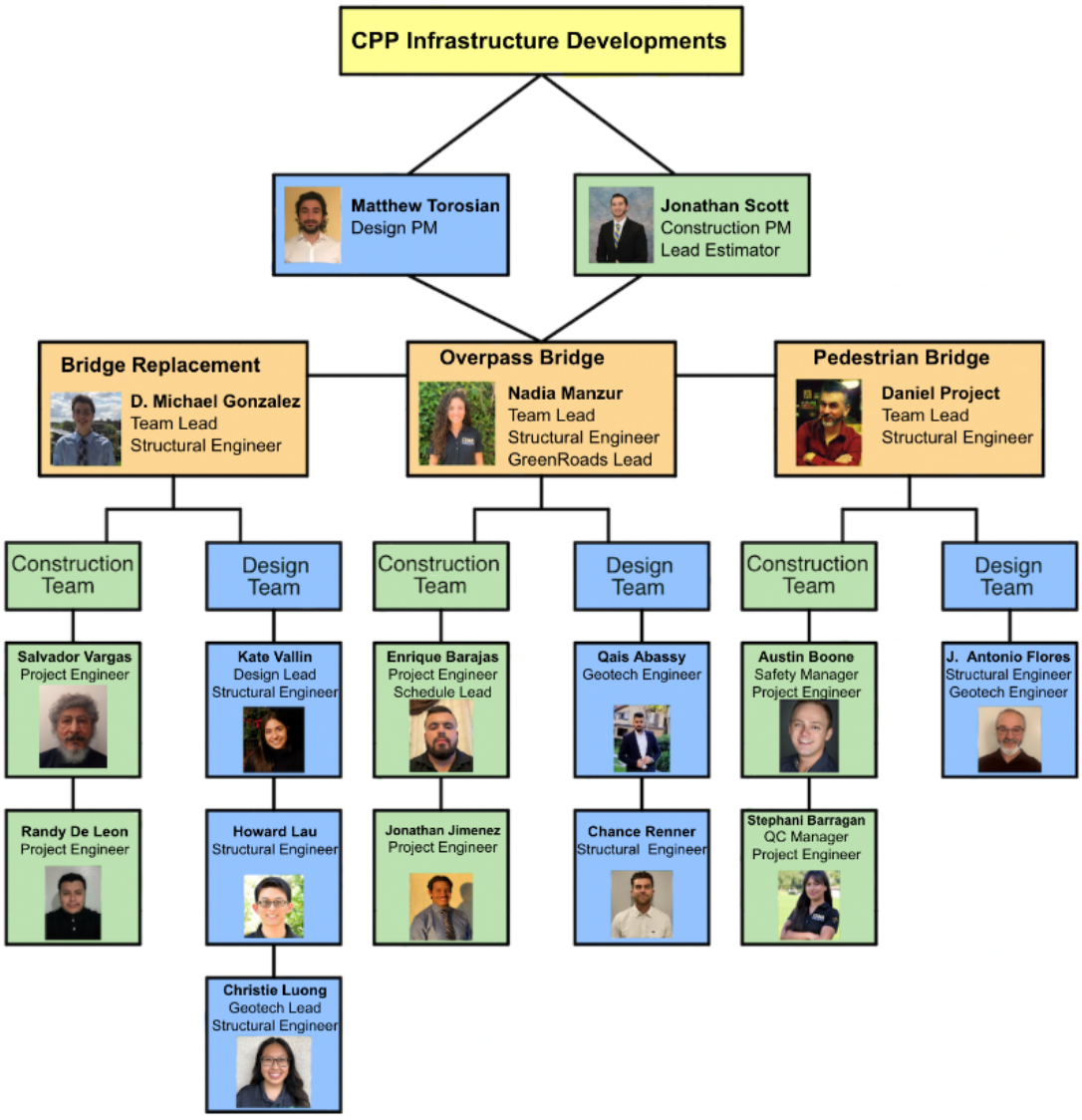
BB Incorporated has NO litigations on any projects in the past 5 years. Further BB Incorporated has had NO disputes or claims on any project in the past 5 years related to poor workmanship, incomplete performance or defective work, not honoring warranty items during contract warranty period, or unexcused delays in completion asserted by owner or bonding surety against contractors.

OSHA Violations

BB Incorporated has had no OSHA violations in the past five years.

5.Organization and Staffing

BB Incorporated
Organization Chart



Organization Chart

Our team's organization chart shows the best positions of our structural and construction engineers that makes every project seemingly flow. This organization chart shows which members have expertise in different parts of the project and we feel that this organization helps our firm work and communicate better.

Team History

At BB Incorporated, our team players have been working together for over 10 years. Every project that our company has worked on always become success stories and this project will be known as one of them as well. PMs Matthew Torosian and Jonathan Scott worked on various projects together, one being the Gerald Desmond Replacement Bridge in 2013 to 2020. Both Matthew and Jonathan worked so well together, they decided to open up their own design build firm named BB Incorporated making sure to bring along engineers that have worked with each other as well. Most engineers that are associated with this firm have also worked on the Gerald Desmond Replacement Bridge. This project showed how collaborative and creative our team is and how we can design and build in a way that is time efficient and cost effective for our clients. This project is very similar to the San Elijo Lagoon Project, therefore we believe that our team is confident in providing the best and most efficient designs possible.

Project Commitment

Our team has carefully designed and planned how to proceed with this project if the proposal is accepted. The project will need constant attention and continuous collaboration from both the design and construction members. We are committed to delivering this project on schedule and at the given budget. We will achieve this by cycling through the same pool of selected construction members to have on the job site at all times. This will help with management of the project which will help finish the project on time. We are also committed to have selected design members to have site visits at least once a week throughout the construction process. This is to address any concerns or any problems that can not be anticipated for. Doing this will assure a safe and timely delivery of the project. Safety is our number one priority and we plan to make sure that staff and engineers are safe at all times and wearing the proper field gear. Our risk manager carefully planned out on how to avoid all the risk and hazards that may occur during the construction of the project to ensure that these situations do not become fatal.

Jonathan Scott

Role on Project: Construction Project Manager / Lead Estimator

Areas of Expertise:

- Design Build Delivery Method
- Bridge Construction
- Safety
- Cost Control

Qualifications:

Jonathan Scott will be the Construction Project Manager on the project. He has over 35 years of construction industry experience, 20 of which being Project Manager. Mr. Scott is involved in all engineering decisions and is responsible for the day to day management of projects from initial planning stages to final construction support services.

Relevant Project:

- 2013 - 2020 Gerald Desmond Replacement Bridge: Construction Project Manager
  - Long Beach, California
  - Cable Stayed Bridge
  - Design Build
  - $1.5 Billion
- 2004 - 2011 Interstate 15 Managed Lanes: Construction Project Manager
  - San Diego, California
  - Managed Lanes, and Highway Widening
  - $420 Million
- 1999 - 2004 Sundial Bridge: Construction Project Manager
  - Redding, California
  - Cable Stayed Pedestrian Bridge
  - Design Build
  - $23.5 Million

Employment:

- 1990 - 2020: **BB Incorporated**
- 1985 - 1990: **Kiewit Construction**

Licenses:

- LEED AP

Education:

BS, Construction Engineering Technology
California State Polytechnic University, Pomona, 1985

Matthew Torosian P.E., S.E.

Role on Project: Design Project Manager

Areas of Expertise:

- Highway Design Build
- Structural Engineering

Qualifications:

Matthew Torosian has over 35 years of design experience with 15 years of design management experience. He has worked on various bridge designs and has managed all aspects of design from the substructure to the superstructure.

Relevant Project:

- Gerald Desmond Replacement Bridge: Design Project Manager
    - Long Beach, California
    - Cable Stayed Bridge
    - Design Build
    - $1.5 Billion
- Bayonne Bridge: Lead Designer
    - New Jersey
    - Tied-Arch Bridge
    - Bridge Inspection and Rehabilitation
    - $1.3 Billion

Employment:

- 1992 - Present **BB Incorporated**
- 1987 - 1992 **KPFF Consulting Engineers**
- 1982 - 1987 **DCI Engineers**

Registrations:

Registered Professional Engineer, California (#123456)
Registered Structural Engineer, California (#7890)

Education:

MS, Structural Engineering, University of California, San Diego
BS, Civil Engineering, California State Polytechnic University, Pomona

David Michael Gonzalez S.E, P.E.

Role on Project: Structural Engineer / Main Bridge Lead Engineer

Areas of Expertise:

- Design Build Delivery Method
- Highway Bridge Design
- Structural Engineering

Qualifications:

Michael Gonzalez will be the Main Replacement Bridge Lead on the project.

Relevant Project:

- 2011-2015 Brooklyn Bridge repair: Design Project Manager
    - New York City, New York
    - Suspension Bridge
    - Complete redesign, refurbishing and reinforcement or strength of bridge.
    - $33.5 Million

- 1998 - 2001 Bronx–Whitestone Bridge repair: Structural Engineer
    - New York City, New York
    - Suspension Bridge
    - Design Build
    - $286 Million

Employment:

- 2015 - Present: **BB Incorporated**
- 2006 - 2015: **NYCDOT**
- 1998 - 2006: **MTA Bridges and Tunnels**
- 1994 - 1998: **Kimley Horn**
- 1992 - 1994: **Transportation and Energy Solutions**

Registration:

Registered Professional Engineer, California, New York
Registered Structural Engineer, California, New York

Education:

B.S. Civil Engineering, California State Polytechnic University, Pomona, 1987
M.S. Structural Engineering, California State Polytechnic University, Pomona, 1990
PHD Structural Engineering, UC Berkeley, 1992

Howard Lau, P.E., S.E.

Role on Project: Structural Engineer

Areas of Expertise:

- Highway Bridge Design

Qualifications:

Howard Lau will be a structural engineer for the replacement bridge. From his 25 years of working in the bridge engineering industry, Howard has amassed a stellar track-record with his specialties entailing cable stayed bridge design, arch bridge design, and highway bridge expansions.

Relevant Projects:

- 2013 - 2020 Gordie Howe International Bridge: Principal Engineer
  - Detroit, Michigan
  - International Cable Stayed Bridge
  - Design Build
  - $5.7 Billion
- 2002 - 2008 I-5/I-805/SR56 Reconstruction: Design Engineer
  - San Diego, California
  - Highway Widening and New Freeway Bypasses
  - $120 Million
- 1999 - 2004 Sundial Bridge: Assistant Design Engineer
  - Redding, California
  - Cable Stayed Pedestrian Bridge
  - Design Build
  - $23.5 Million

Employment:

- 1995 - Present: **BB Incorporated**

Registration:

- Professional Engineer, CA
- Structural Engineer, CA

Education:

BS, Civil Engineering
MS, Structural Engineering
California State Polytechnic University, Pomona, 1994

Kate Vallin P.E., S.E., PhD

Role on Project: Structural Engineer, Design Lead

Areas of Expertise:

- Structural Engineering
- Seismic Engineering

Qualifications:

Kate Vallin, a structural engineer on the project contributes 25 years of experience in structural design for successful public and private projects throughout California. Her background in seismic performance of elevated bridges have proven to be vital to the firm's design team. Ms. Vallin's previous leadership roles have allowed her to display exceptional management skills and make her very sought after for design, management, and master plan development services.

Relevant Project:

- Gerald Desmond Replacement Bridge: Structural Engineer 2013-2020
    - Long Beach, California
    - Cable Stayed Bridge
    - $1.5 Billion

- Interstate 15 Managed Lanes: Structural Engineer 2004-2011
    - San Diego, CA
    - Highway Lane Expansion
    - $420 million

Employment:

- 2003-Present **BB Incorporated**
- 2002-2013 **Flatiron**
- 1981-2001 **Weldinger Associates**

Registrations:

Professional Engineer , California
Structural Engineer , California

Accomplishments:

ASCE Outstanding Civil Engineer Advocate of the Year Award- Individual 2014
ASCE Planning & Management Council Services to the Profession Award-2019

Education:

BS, Civil Engineering, 1989 California State Polytechnic University, Pomona
MS, Structural Engineering, 1994 University of California, Los Angeles
PhD, Seismic Structural Engineering 2000 University of California, San Diego

Christie Luong PE, SE, LEED AP

Role on Project: Structural Engineer/ Lead Geotech Engineer

Areas of Expertise:

- Design Build Delivery Method
- Bridge Design
- Structural Engineering
- Geotechnical Engineering

Qualifications:

Christie Luong will be the Structural Engineer and the lead Geotech Engineer on the project. She has over 27 years of experience in bridge design and projects, 17 of which is being a certified geotechnical engineer and 10 and as a licensed structural engineer. Christie is involved in all geotechnical decisions and never fails to provide the best and most efficient designs possible.

Relevant Project:

- 2013 - 2020 Gerald Desmond Replacement Bridge: Estimator
  - Long Beach, California
  - Cable Stayed Bridge
  - Design Build
  - $1.5 Billion
- 2003 - 2013 Oakland Bay Bridge
  - Oakland, California
  - Demolition and Reconstruction of old bridge
  - $6.4 Billion
- State Highway 71 Express Lanes
  - Austin, Texas
  - Improvements of a 4-mile corridor
  - New construction of overpass bridges.
  - $93 Million

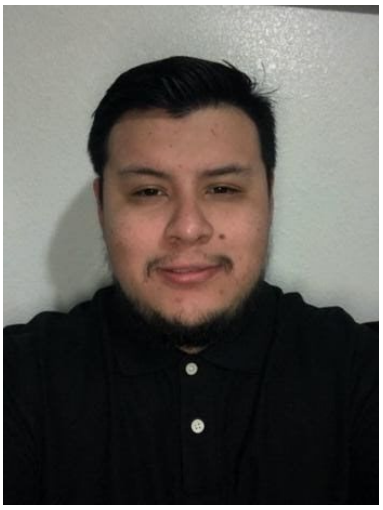
Employment:

- 2008 - Present: **BB Incorporated**
- 1998 - 2008: **McCarthy Construction Company**
- 1991 – 1997: **Dewberry**
- 1989-1991: **City of Oakland**

Education:

- B.S. General Civil Engineering Cal Poly Pomona (1991)
- M.S. Structural Engineering UC Berkeley (1993)

Randy De Leon, PE MCM



Role on Project
Project Engineer

Area(s) of Expertise:
- Estimating
- Scheduling
- Take offs
- Safety Management

Qualifications:
Randy De Leon will be the Construction Project engineer on the main bridge replacement. He has over 25 years of construction experience in the field. 15 years of being a project engineer. Mr. De Leon is involved in all Construction project engineering decisions for the bridge replacement such as estimating, traffic management, scheduling, and safety plan, Safety Coordinator.

Relevant Project:
- 2010-2017 Gerald Desmond replacement bridge: Construction Project Engineer
  - Long Beach, California
  - Cable Stayed Bridge
  - Design Build
  - 1.5 Billion
- 2000-2009 Interstate 15 Manage Lanes: Construction Project Engineer
  - San Diego
  - Manage Lanes, and Highway
  - $42 Million

Employment:
- 1985-2020: **BB Incorporated**
- 1975-1985: **Traylor Bro**

License:
- PLS, PE

Education
MCM in Construction Management, University of Southern California
B.S. in Civil Engineering, California Polytechnic University
A. A General Science, Santa Monica College

Salvador Vargas P.E., PLS, LEED AP

Role on Project: Project Engineer

Area(s) of Expertise:

- Scheduling
- Sequencing
- Estimating,
- Take offs
- Safety management

Qualifications:

Salvador Vargas will be the Construction Project Engineer on the Main Bridge Replacement, who will be the scheduler on the phase. He has over 20 years of construction experience from 5 years as a project engineer then 10 years a project manager then finally 5 years as Construction Manager. Mr. Vargas has been in projects that involved estimating, risk management, traffic management, scheduling and sequencing, and safety coordination.

Relevant Projects:

- 2010-2017 Gerald Desmond replacement bridge: Construction Project Engineer
    - Long Beach, California
    - Cable Stayed Bridge
    - Design Build
    - 1.5 Billion
- 2000-2009 Interstate 15 Manage Lanes: Construction Project Engineer
    - San Diego, California
    - Manage Lanes, and Highway Widening
    - $420 Million

Employment:

- 2010-2020: **BB Incorporated**
- 2005-2010: **PCL**
- 2000-2005: **Traylor Bros, Inc.**

Registrations:

Professional Engineer , California
LEED AP
PLS

Education:

BS in Civil Engineering, General from CPP

MS Structural Engineering & MS in Geotechnical Engineering from CPP & CSU Long Beach

Nadia Manzur P.E., T.E

Role of Project: Green Road and Structural Engineer

Areas of Expertise:

- Green Roads Engineering
- Structural Engineering

Qualifications:

Nadia Manzur is the Structural Engineer for the Overpass Bridges and Green Road Lead for the project. With her 20 years in the construction and engineering industry, she will be able to help the team achieve a successful project by going green.

Relevant Projects:

- I-15 Tech Corridor Expansion
  - Lehi, Utah
  - Adding lanes to a highway
  - Total of 6 bridge project
- Gerald Desmond Bridge: Replacement Bridge
  - Long Beach, California
  - Replacement of a bridge to improve traffic flow
- I-5/ Genesee Avenue Interchange
  - San Diego, California
  - Replace five-lanes with a 10-lane overcrossing

Employment:

- 2006-Present: **BB Incorporated**
- 1999-2006: **Ames Construction**

Registrations:

- Professional Engineer, CA
- Traffic Engineer, CA

Education:

BS, Civil Engineering

California State Polytechnic University, Pomona, 2000

Qais Abassy, P.E, LSP

Role on Project: Structural Engineer / Geotechnical Engineer

Areas of Expertise:

- Design-Build
- Structural Engineering
- Bridge Construction

Qualifications:

Qais Abassy, a structural engineer on the project, contributes. 20 years of experience in bridge construction and design for many successful projects in California. His knowledge in designing bridges and in construction has served BB Incorporated well in his 20 years of experience.

Relevant Projects:

- SR-91 Riverside Freeway
  - Riverside, California
  - Added a lane on SR-91 between SR-241 and I-15
- Gerald Desmond Bridge: Replacement Bridge
  - Long Beach, California
  - Replacement of a bridge to improve traffic flow
- SR – 57 Northbound Widening Project
  - Orange County, California
  - Added an additional northbound lane on the Orange Freeway (SR-57)
  - Widened all existing NB lanes and the NB median shoulder

Employment:

- 1997 - 2005: **Alabbasi Constructions and Engineering**
- 2005 - Present: **BB Incorporated**

Licenses:

Professional Engineer , California

Education:

BS, Civil Engineering

California State Polytechnic University, Pomona, 1997

Chance J. Renner P.E, S.E.

Role On Project: Structural Engineer

Areas of Expertise:

- Design Build Delivery Method
- Bridge Design
- Structural Engineering

Qualifications : As the structural engineer, I will be responsible for the overpass portion of the project. This includes design oversight, and structural design, etc. I will coordinate work between the production team and the client, and submit all deliverables in a timely manner. I ensure that the design, planning, and specifications produced by BB Incorporated will continue to exceed industry standards.

Relevant Projects:

- SR-91 Riverside Freeway
  - Riverside, California
  - Added a lane on SR-91 between SR-241 and I-15
- Gerald Desmond Bridge: Replacement Bridge
  - Long Beach, California
  - Replacement of a bridge to improve traffic flow
- SR – 57 Northbound Widening Project
  - Orange County, California
  - Added an additional northbound lane on the Orange Freeway (SR-57)
  - Widened all existing NB lanes and the NB median shoulder

Employment:

- 2008 - Present: **BB Incorporated**
- 1998 - 2008: **Michael Baker International**

Registration:

Structural Engineer, California
Professional Engineer, California

Education:

BS, Civil Engineering, California State Polytechnic University, Pomona, 1997

Enrique Barajas, P.E., QSP, QSD

Role on Project: Schedule Manager / Project Engineer

Areas of Expertise:

- Managing
- Design-Build
- Construction Scheduling

Qualifications:

Enrique Barajas serves as a Schedule Manager at BB Incorporated. His knowledge of construction materials, construction work, experience and operations has served BB Incorporated well in his over 30 years of construction industry experience.

Relevant Projects:

- 07-4w8204 – Camarillo, California
  - Girder Replacement on the 101 in Camarillo
- Rancho Santa Margarita, California
  - Hinge Replacement
- NewPort Beach, California
  - Bridge Work – Adding Lanes to a Bridge

Employment:

- 1996 - Present: **BB Incorporated**
- 1986 - 1996: **Beador Construction Company**

Licenses:

Professional Engineer, QSP / QSD

Education:

BS, Civil Engineering, Cal Poly Pomona, 1986
Masters, Construction Management, USC,1988

Jonathan Jimenez

Role on Project: Project Engineer

Areas of Expertise:

- Design Build Delivery Method
- Transportation Estimating
- Project Engineering
- Cost Analysis

Qualifications:

Jonathan Jimenez will be the project engineer for the overpass portion on the project. Jonathan has 19 years of construction industry experience. 4 years as a project engineer and 15 years of estimating. Mr. Jimenez has been one of our top estimators at BB incorporated. His experience with multiple transportation related projects makes Mr. Jimenez a perfect candidate for this position. Jonathan Jimenez will be a great asset to this project and will add a large amount of expertise to the team.

Relevant Project:

- 2013 - 2020 Gerald Desmond Replacement Bridge: Estimator
    - Long Beach, California
    - Cable Stayed Bridge
    - Design Build
    - $1.5 Billion
- 2005 - 2008 Surf City Replacement Bridge: Estimator
    - Surf City, North Carolina
    - Demolition and replacement bridge
    - $700 Million
- 2001 - 2004 I-15 Interstate: Project Engineer
    - Riverside, California
    - Additions to interchange; overpasses and ramps
    - Design Build
    - $300 Million

Employment:

- 2008 - 2020: **BB Incorporated**
- 2004 - 2008: **Skanska USA**
- 2001 - 2004: **Shimmick Construction**

Education:

BS, Civil Engineering
California State Polytechnic University, Pomona, 2001

Daniel Sandoval PE, SE

Role on Project: Pedestrian Bridge Team Lead

Areas of Expertise:

- Structural Design
- Bridge Design
- Seismic Design

Qualifications:

Daniel Sandoval will be the Pedestrian Bridge Team Lead

With 25 years of professional civil and structural engineering experience, our project expertise covers Structural Engineering, Reinforced concrete design, Bridge Design and Seismic Design. Sandoval will be responsible for the day to day operation of the Pedestrian Bridge team as well as work closely with the other teams to ensure efficiency and the best possible outcome..

- 2014-2019 Kosciuszko Bridge: Design Manager
    - Newton Creek , New York
    - Cable Stayed Bridge
    - Design Build
    - $555 Million
- 2005-2008 Bob Kerrey Pedestrian Bridge: Design Manager
    - Omaha, Nebraska
    - Cable Stayed Bridge
    - $22 Million
- 1999 - 2004 Sundial Bridge: Structural Design Lead
    - Redding, California
    - Cable Stayed Pedestrian Bridge
    - Design Build
    - $23.5 Million

Employment:

- 1995-2003 **Burns and Mcdonnell**
- 2003-2012 **Kiewitt**
- 2012-2019 **HNTB Cos**.
- 2019 - Present **BB Incorporated**

Licenses:

Structural Engineer, California
Professional Engineer, California

Education:

BS, Civil Engineering, California State Polytechnic University, Pomona, 1993
MS, Structural Engineering,University of California San Diego, 1995

Jose Antonio Flores Apaez P.E

Project Role: Structural Engineer and Geotechnical Engineer.

Areas of Expertise:

- Bridge Design
- Geotechnical Engineering
- Structural Engineering

Qualifications:

Jose Antonio Flores Apaez will be the Geotechnical Engineer in charge of the design of the foundation of the pedestrian bridge and retaining walls along SD-5. He has 30 years of bridge design experience with 20 of those years have been geotechnical design. He has been with BB cooperated for the past 15 years and always gets the projects done smoothly. Mr. Flores will work endlessly with the design team and construction team to compute a foundation design that is feasible, innovative and cost friendly for the proposed bridge and retaining walls.

Relevant Projects:

- Dublin Link Bridge: Bridge Designer:
  - Dublin, Ohio
  - Cable Stayed Pedestrian Bridge
  - Main Towers provide no vertical Support
  - Design Build Project
  - $23 Million
- Chesapeake Bay Bridge: Geotechnical Engineer
  - Best Project Award
  - National Honor Award from ASEC
  - Cable Design of Dehumidification system for Bay Bridge

- 1999 - 2004 Sundial Bridge: Geotechnical Engineer
  - Redding, California
  - Cable Stayed Pedestrian Bridge
  - Design Build
  - $23.5 Million

Employment:

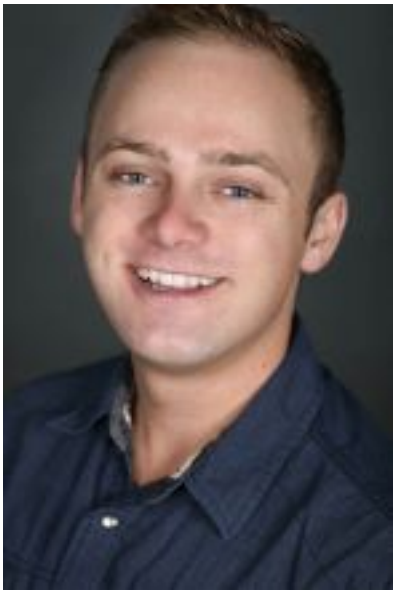
- 1995-Present **BB Incorporated**
- 1985-1995 T.Y. **International Group**
- 1980-1985 **Stantec**

Registration:

Professional Engineer, CA

Education:

BS, Civil Engineering California Polytechnic State University.
MS in Geotechnical Engineering from UCSD



Austin Boone, P.E., QSP, LSP

Role on Project: Project Safety Manager / Project Engineer

Areas of Expertise:

- Safety
- Design-Build
- Construction Cost Estimating and Tracking

Qualifications:

Austin Boone serves as a project engineer as well as a project safety manager at BB Incorporated. His knowledge of construction materials and operations, combined with his extensive emphasis and passion for safety, has served BB Incorporated well in his over 30 years of construction industry experience.

Relevant Projects:

- 2013 - 2020 Gerald Desmond Replacement Bridge: Construction Pro
  Norwalk, CA
  - I-5 Widening and HOV Project
  - $323 Million
- 2004 - 2011 Interstate 15 Managed Lanes: Construction Project Manager
  San Diego, California
  - Managed Lanes, and Highway Widening
  - $420 Million
- 1999 - 2004 Sundial Bridge: Construction Project Manager
  Redding, California
  - Cable Stayed Pedestrian Bridge
  - Design-Build
  - $23.5 Million

Employment:

- 1994 - Present: **BB Incorporated**
- 1987 - 1994: **The Walsh Group**

Licenses:

Licensed Safety Professional, P.E.

Education: BS, Civil Engineering, Cal Poly Pomona, 1987

Stephani Barragan

Project Role: Project Engineer & Quality Control Manager.

Areas of Expertise:

- Design Build Delivery Method
- Scheduling
- Quality Control
- Project Engineering

Qualifications:

Stephani Barragan has over 15 years of experience in project scheduling working on projects throughout California. Project scheduler oversees the construction of a project making sure that all deadlines are met. Her ability of creating great relationships with developers and subcontractors and collaborating with a variety of clients, engineers, designers to successfully schedule projects from beginning to end is so uniquely that has achieved awards.

Relevant Projects:

2011-2020 Gerald Desmond Replacement Bridge: Scheduler

- ○Long Beach, California
- ○ Cable Stayed Bridge
- ○ Design Build
- ○ $1.5 Billion

- 2005-2011 Interstate 15 Managed Lanes: Project Engineer
  - San Diego, California
  - Bid Build Delivery
  - $420 million
  - New 20-mile section of High Occupancy Toll (HOT) lanes stretching from State Route 163 north to State Route 78 along Interstate 15 in San Diego, Calif.

- 1998-2005 Sundial Bridge: Project Engineer
  - Redding, California
  - Cable Stayed Pedestrian Bridge
  - Design Build
  - $23.5 Million

Employment:
2011-Present: BB Incorporated
2005-2011: Flatiron
1998-2005: Burns and Mcdonnell
Licenses:
Professional Engineer, CA

Education:
BS, Civil Engineering California Polytechnic State University.

6.
Management Systems

Cost & Schedule Control

BB Incorporated will implement a number of different methods to control the cost and schedule of the project. BB Incorporated's highly certified project engineers will track costs for all trades including labor, material, and equipment. They will also review all change orders to ensure sub-contractor's costs are not inflated. The change order will then be presented to the Project Manager for final approval before being sent to the owner. BB Incorporated will also include a $200,000,000 GMP for the project. BB incorporated will be utilizing the Critical Path Method to control the schedule. With this method BB Incorporated's schedulers will be able to identify the most critical activities. Once these activities are identified they will be monitored closely and if necessary, these activities can be accelerated to meet the schedule requirements. The project will also incorporate earned value method. This method allows the Project Manager to measure actual work performed for an activity. With this he can predict the total cost of an activity and it's completion date.

7. Self-Perform Work

Self-Perform Work

BB Incorporated's own highly qualified carpenters, laborers, and cement masons can self-perform traditional general contractor work such as soft demolition, structural excavation, concrete formwork, and concrete placement and finishing. While it is not essential, the ability to self-perform work can greatly benefit the overall project. Advantages include:

Schedule: Self-performed work greatly increases BB Incorporated ability to aggressively manage and drive the schedule

Cost: Higher subcontractor mark-ups for overhead and profit are saved on self-perform work, and efficiencies can be gained with consolidated BB Incorporated crews and supervision.

Quality: BB Incorporated has direct control over the quality of work performed.

Safety: BB Incorporated knows that with self-performed work, safety is always at the forefront with our highly trained field personnel. And more BB Incorporated personnel working in the field equates a safer project – more BB Incorporated "eyes" on the project, sharing and enforcing our culture of safety with all subcontractor trades.

Project Control: With the increased levels of schedule, cost, quality, and safety management, BB Incorporated has a better ability to control the overall project.

8. Relevant Experience

Related Projects

Gerald Desmond Bridge 2013-2020

Type: Cable Stayed Highway Bridge
Size: 8,800 feet
Cost: $1.1 Billion
Scope of Work: Replacement of the Previous Gerald Desmond Bridge
Key Features

- Cable Stayed Bridge
- Constructed over a body of water

Owner Information
Phone #: (916) 654-5266

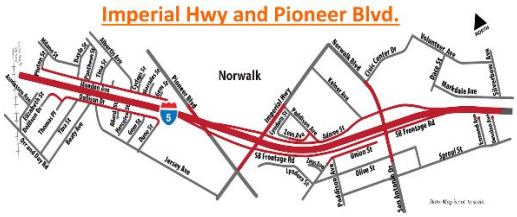
Imperial Highway / Pioneer Blvd. Project 2013-2019

Type: Highway Bridge Widening and Bridge Reconstruction
Size: 1.89 Miles
Cost: $323 Million
Scope of Work: Widened two miles of I-5 to add one High Occupancy Vehicle Lane (HOV) or carpool lane and one general purpose lane in each direction. Three bridges were reconstructed to accommodate the widened freeway. The project included shoulder widening, new ramp alignment, concrete median barriers, sound walls, and decorative tile work.
Key Features

- enhance safety
- add traffic lanes
- encourage ride sharing through new HOV lanes
- decrease surface street traffic
- help improve air quality

Owner Information:

Phone #: (916) 654-5266

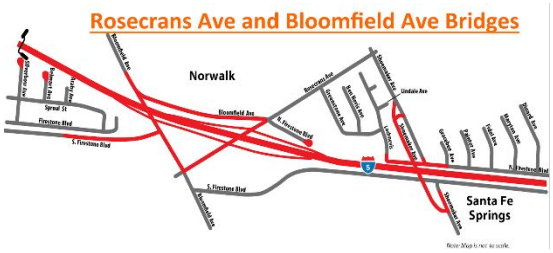


Rosecrans Ave. / Bloomfield Ave. Bridge Project 2012-2017

Type: Highway Bridge Widening and Reconstruction
Size: 1.24 Mile
Cost: $180 Million
Scope of Work: Reconstructed the Shoemaker Ave. Bridge, the Rosecrans Ave. Bridge, the Bloomfield Avenue Bridge, and the Silverbow Ave. pedestrian overcrossing. Widened one mile of I-5 from Shoemaker Ave. to Silverbow Ave. Added one High Occupancy Vehicle (HOV) lane, or carpool lane, and one general purpose lane in each direction. Widened the freeway shoulders, built concrete median barriers, reconfigured the on and off ramps, and realigned Firestone Boulevard. This project also includes the construction of an Austin Vault, which filters freeway drainage and reduces pollutants.
Key Features

- enhance safety
- add traffic lanes
- encourage ride sharing through new HOV lanes
- decrease surface street traffic
- help improve air quality

Owner Information:
Phone #: (916) 654-5266



I-5 / Genesee Avenue Interchange 2015-2018

Type: Highway Bridge Widening and Reconstruction
Size: 1.5 Mile
Cost: $117.4 million

Scope of Work: The Interstate 5 (I-5)/Genesee Avenue Interchange Project will replace the existing six lane Genesee Avenue overpass with a ten-lane bridge that will accommodate current and future traffic demands in the job intensive community
Key Features

- Environmental clearance (CEQA/NEPA) which minimizes the impact to sensitive resources
- 2019 Project of the Year, ASCE San Diego
- 2019 Outstanding Project for Structural Engineering, ASCE San Diego
- 2019 Interchange Project of the Year, California Transportation Foundation (CTF)

Owner Information:
Phone #: (916) 654-5266

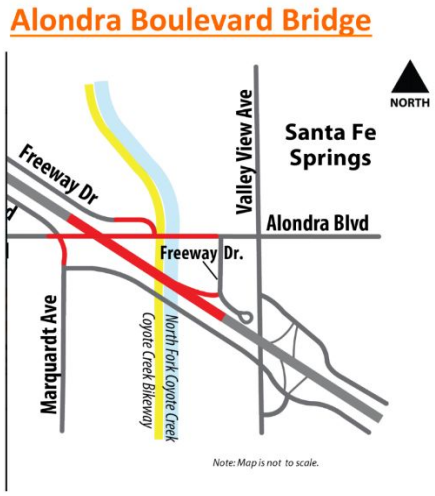
Alondra Blvd. Project 2012-2015

Type: Highway Bridge Widening and Reconstruction
Size: 0.43 Mile
Cost: $110 million
Scope of Work: Reconstructed the Alondra Blvd. Bridge overcrossing. The new bridge is longer and widened from four to six lanes, with three lanes in each direction. Widened nearly one mile of I-5 from North Fork Coyote Creek to Marquardt Avenue. Added one High Occupancy Vehicle (HOV) or carpool lane and one general purpose lane in each direction; widened shoulders; and constructed a concrete median barrier.
Key Features

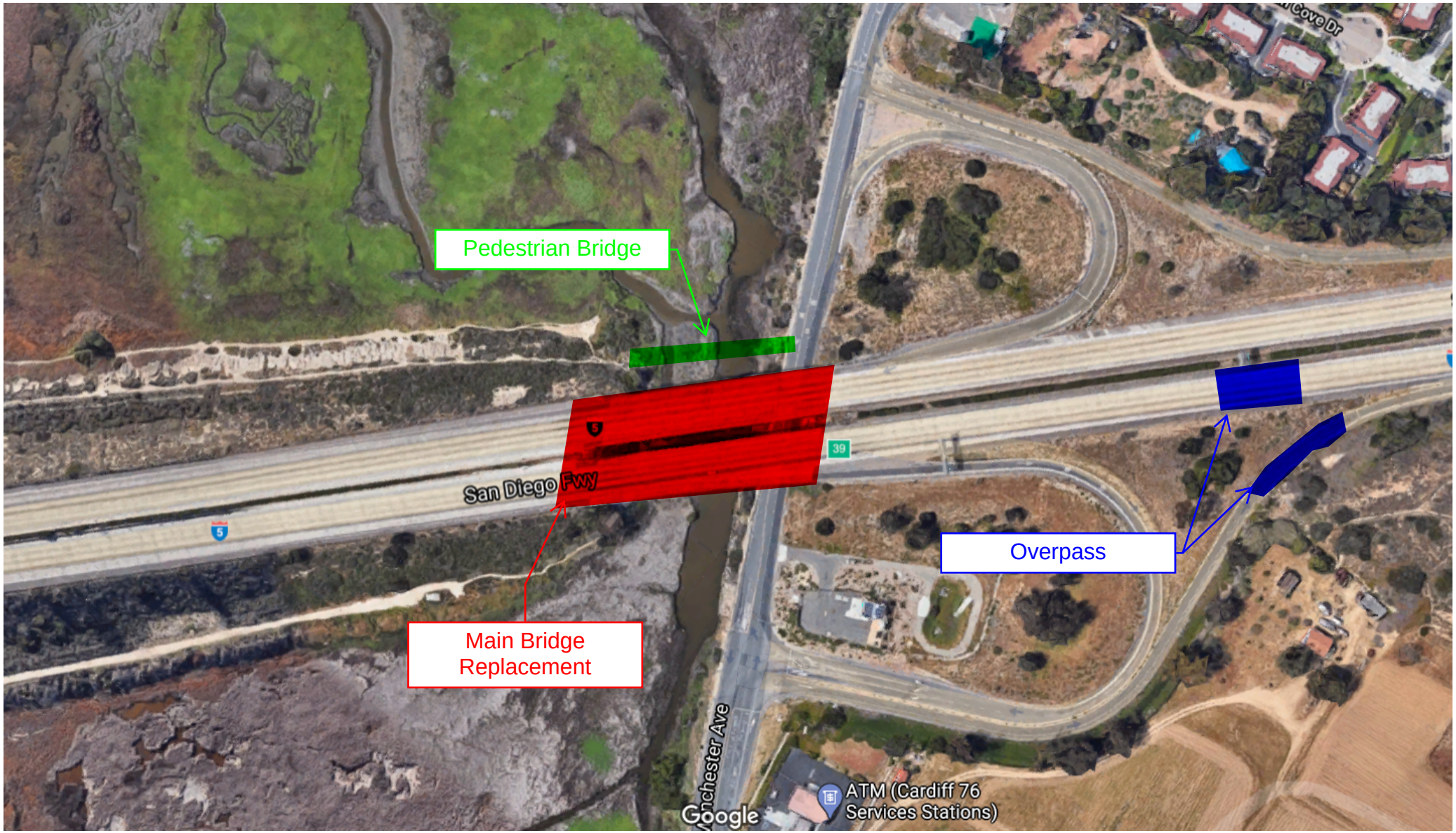
- enhance safety

- add traffic lanes
- encourage ride sharing through new HOV lanes
- decrease surface street traffic
- help improve air quality

Owner Information:
Phone #: (916) 654-5266



10. Site Plan


Pedestrian Bridge
San Diego Fwy
Main Bridge Replacement
Overpass
Google
ATM (Cardiff 76 Services Stations)

11. Structural Plans

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
11	SD	5	R37.4/R46.5	1	20

Kate Vallin 10-28-2020
REGISTERED CIVIL ENGINEER DATE

11-11-2020
PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER KATE VALLIN No. 60853 Exp. 6-17-2020 CIVIL STATE OF CALIFORNIA

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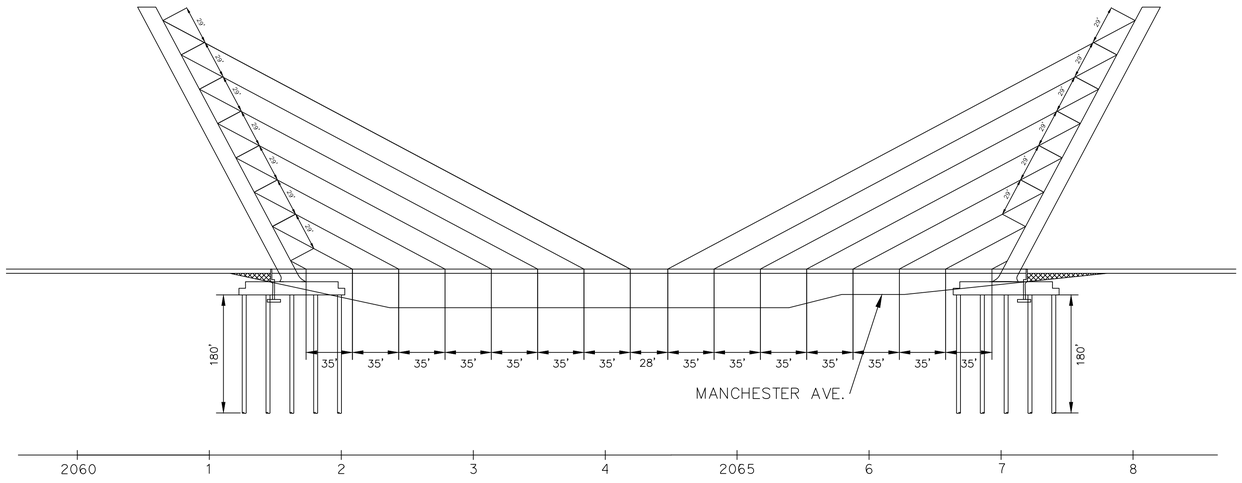
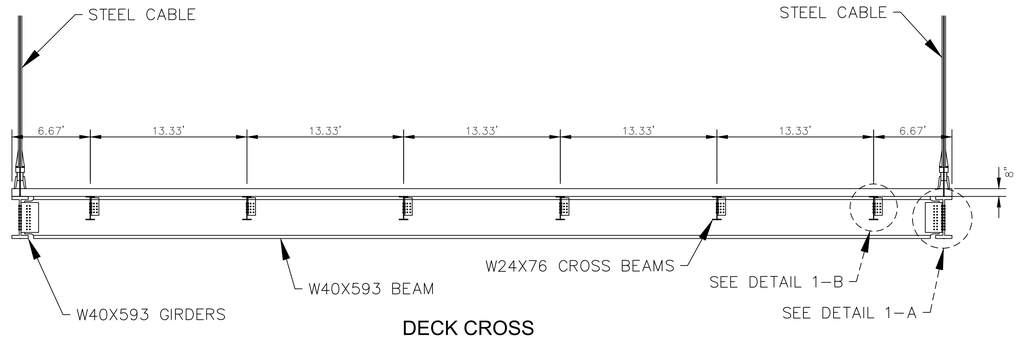
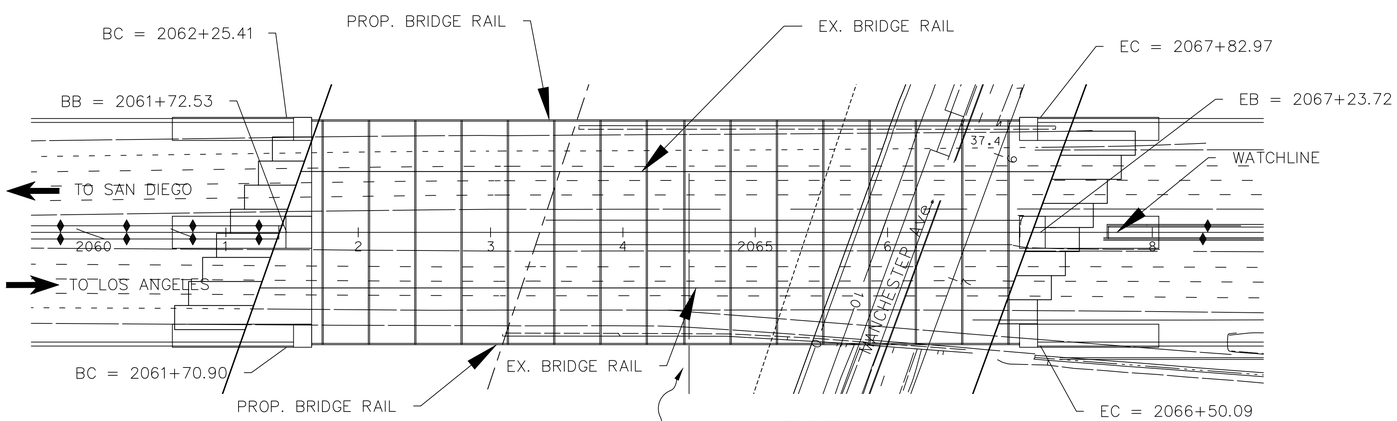


ELEVATION
1"=50'



DECK CROSS SECTION
1"=6'



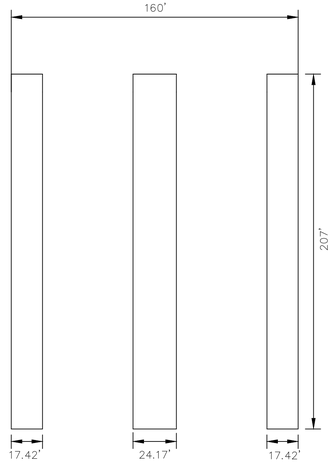
PLAN
1"=50'

Plan Symbols

SECTION IDENTIFICATION

STANDARD PLAN (2010) SHEET NO.

DETAIL



TOWER CROSS SECTION
1"=40'

DESIGN OVERSIGHT	DESIGN	BY KATE VALLIN	CHECKED	LOAD & RESISTANCE FACTOR DESIGN			
	DETAILS	BY	CHECKED	LAYOUT	BY	CHECKED	
SIGN OFF DATE	QUANTITIES	BY	CHECKED	SPECIFICATIONS	BY	PLANS AND SPECS COMPARED	

DESIGN GENERAL PLAN SHEET (ENGLISH) REV. 11/16/20

PREPARED FOR THE STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION

0 1 2 3

PROJECT ENGINEER MICHAEL GONZALEZ

UNDT:

PROJECT NUMBER & PHASE: CONTRACT NO.:

BRIDGE NO.

POST

SAN ELIJO LAGOON & UC

GENERAL PLAN-1

REVISION DATES				SHEET	OF
				1	20

Senior Project Cable Stayed alternative.dwg - Nov/ 16/ 2020 - 3:01PM

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
11	SD	5	R37.4/R46.5	2	20

Kate Vallin 10-28-2020
REGISTERED CIVIL ENGINEER DATE

11-11-2020
PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER
KATE VALLIN
No. 60853
Exp. 6-17-2020
CIVIL
STATE OF CALIFORNIA

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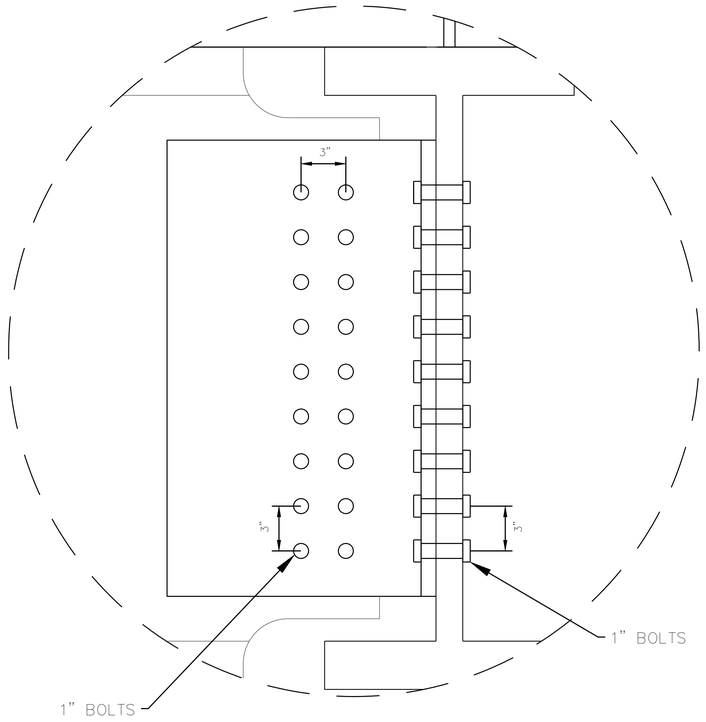
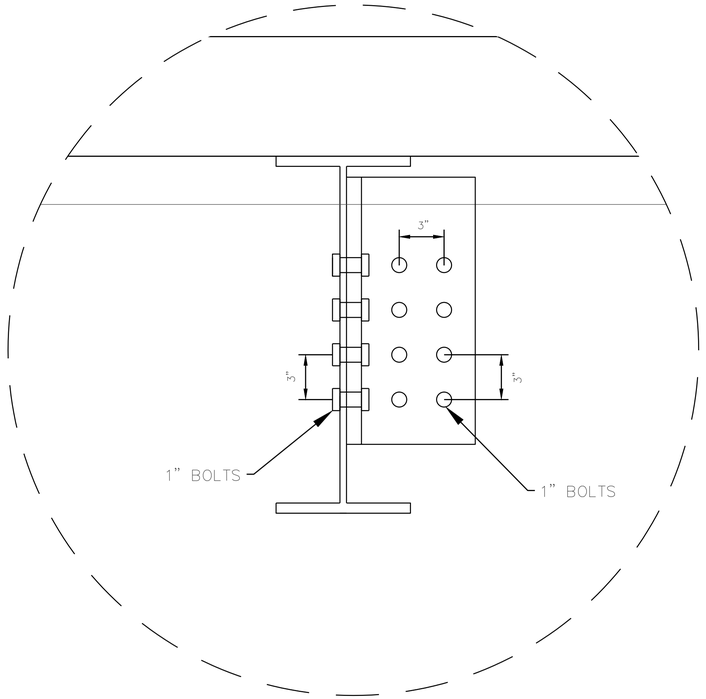


DETAIL 1-A
1"=5"



DETAIL 1-B
1"=5"

DESIGN OVERSIGHT	DESIGN	BY KATE VALLIN	CHECKED	LOAD & RESISTANCE FACTOR DESIGN			PREPARED FOR THE STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION
	DETAILS	BY	CHECKED	LAYOUT	BY	CHECKED	
SIGN OFF DATE	QUANTITIES	BY	CHECKED	SPECIFICATIONS	BY	PLANS AND SPECS COMPARED	

PROJECT ENGINEER
MICHAEL GONZALEZ

BRIDGE NO.

POST

SAN ELIJO LAGOON & UC

GENERAL PLAN-1

DESIGN GENERAL PLAN SHEET (ENGLISH) REV. 11/16/20

0 1 2 3

UNDT:
PROJECT NUMBER & PHASE:
CONTRACT NO.:

REVISION DATES				SHEET	OF
				2	20

Senior Project Cable Stayed alternative.dwg - Nov/ 16/ 2020 - 3:01PM

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
11	SD	5	R37.4/R46.5	5	20

Kate Vallin 10-28-2020
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11-11-2020
PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER KATE VALLIN No. 60853 Exp. 6-17-2020 CIVIL STATE OF CALIFORNIA

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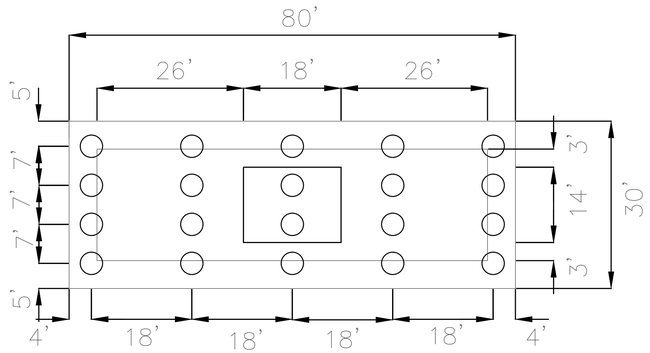


OUTER FOUNDATION
PLAN VIEW

1"=8'

GENERAL NOTES
LOAD AND RESISTANCE FACTOR DESIGN

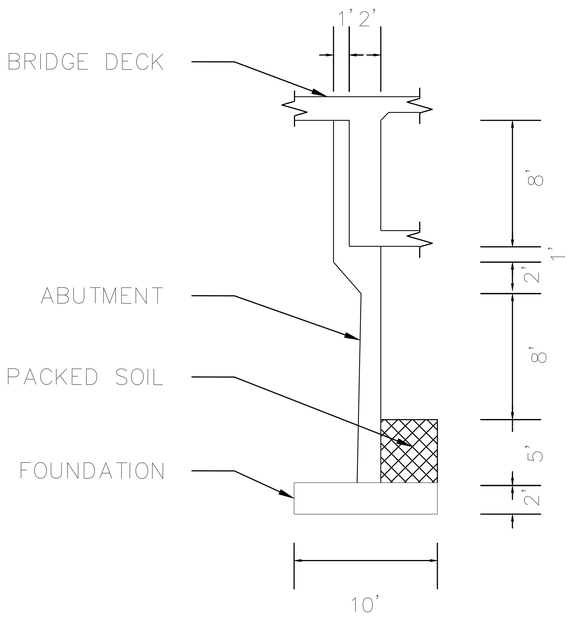
DESIGN: AASHTO LRFD Bridge Design Specification 8th Edition and the Caltrans Amendments dated 2017

DEAD LOAD: Includes 35 psf for a future wearing surface

LIVE LOADING: HL93 with "LOWBOY" AND Permit Design Load

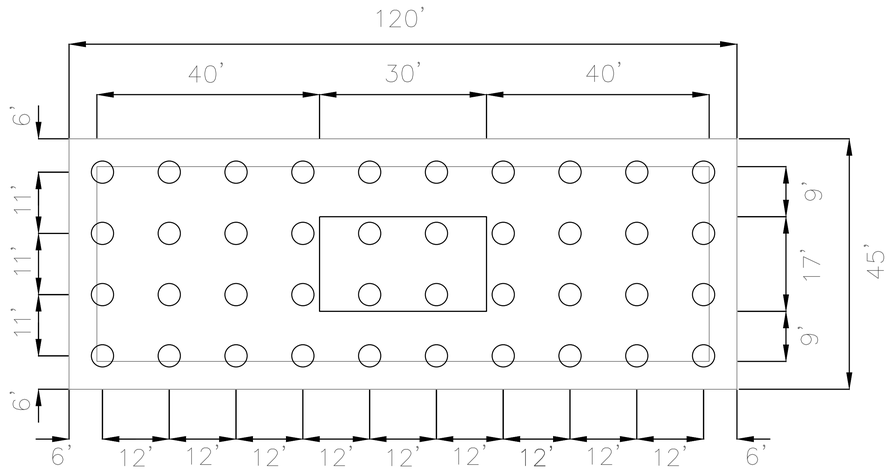
SEISMIC LOADING: SDC ARS Online 10.5.20
Soil Profile: Vs=760m/s

Moment Magnitude:
Peak Ground Acceleration: 0.5g



SIDE VIEW

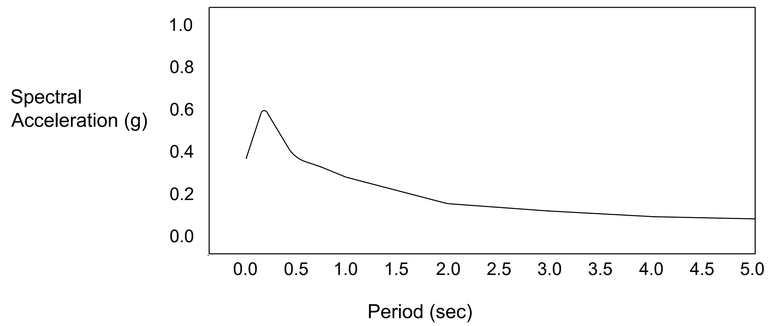
1"=5'



INNER FOUNDATION
PLAN VIEW

1"=8'

ARS CURVE



Reinforced Concrete:

ASTM A706
fy= 60 ksi
f'c= 4ksi
n = 8

Plan Symbols

DESIGN OVERSIGHT	DESIGN	BY CHRISTIE LUONG	CHECKED	LOAD & RESISTANCE FACTOR DESIGN			PREPARED FOR THE STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION
SIGN OFF DATE	DETAILS	BY	CHECKED	LAYOUT	BY	CHECKED	
	QUANTITIES	BY	CHECKED	SPECIFICATIONS	BY	PLANS AND SPECS COMPARED	

PROJECT ENGINEER: MICHAEL GONZALEZ

BRIDGE NO.

POST

SAN ELIJO LAGOON & UC

GENERAL PLAN-1

DESIGN GENERAL PLAN SHEET (ENGLISH) REV. 11/16/20

0 1 2 3

UNDT:
PROJECT NUMBER & PHASE: CONTRACT NO.:

REVISION DATES	SHEET	OF
	5	20

Senior Project Abutment & Wingwall.dwg — Nov/ 16/ 2020 — 3:01PM

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
11	SD	5	R37.4/R46.5	6	20

Kate Vallin 10-28-2020
REGISTERED CIVIL ENGINEER DATE

11-11-2020
PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER
KATE VALLIN
No. 60853
Exp. 6-17-2020
CIVIL
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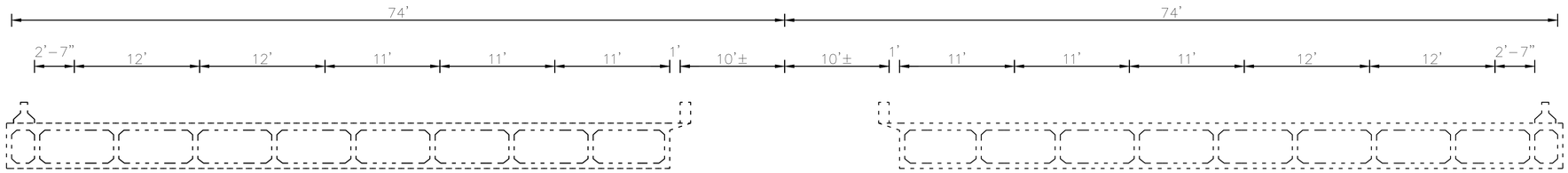
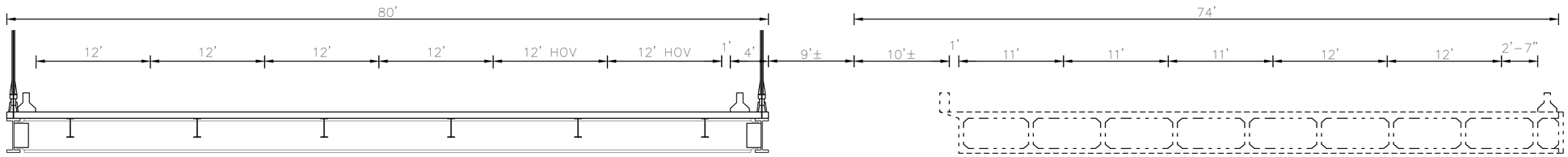


CONSTRUCTION
PHASE 1

1"=5'



CONSTRUCTION
PHASE 2

1"=5'

DESIGN OVERSIGHT	DESIGN	BY MICHAEL GONZALEZ	CHECKED	LOAD & RESISTANCE FACTOR DESIGN			PREPARED FOR THE STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION	BRIDGE NO.	SAN ELIJO LAGOON & UC
	DETAILS	BY	CHECKED	LAYOUT	BY	CHECKED	PROJECT ENGINEER MICHAEL GONZALEZ	POST	GENERAL PLAN-1
SIGN OFF DATE	QUANTITIES	BY	CHECKED	SPECIFICATIONS	BY	PLANS AND SPECS COMPARED			

DESIGN GENERAL PLAN SHEET (ENGLISH) REV. 11/16/20

0 1 2 3

UNDT:
PROJECT NUMBER & PHASE: CONTRACT NO.:

REVISION DATES | SHEET 6 | OF 20

Senior Project Construction Phasing.dwg - Nov/ 16/ 2020 - 3:01PM

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
11	SD	5	R37.4/R46.5	7	20

Kate Vallin 10-28-2020
REGISTERED CIVIL ENGINEER DATE

11-11-2020
PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER
KATE VALLIN
No. 60853
Exp. 6-17-2020
CIVIL
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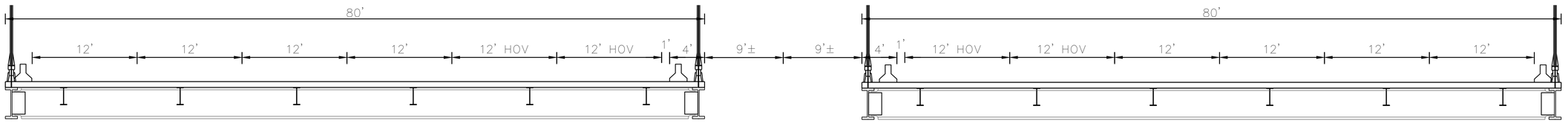


CONSTRUCTION
PHASE 3

1"=5'

DESIGN OVERSIGHT	DESIGN	BY MICHAEL GONZALEZ	CHECKED	LOAD & RESISTANCE FACTOR DESIGN			PREPARED FOR THE STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION	BRIDGE NO.	SAN ELIJO LAGOON & UC
	DETAILS	BY	CHECKED	LAYOUT	BY	CHECKED			
SIGN OFF DATE	QUANTITIES	BY	CHECKED	SPECIFICATIONS	BY	PLANS AND SPECS COMPARED	PROJECT ENGINEER MICHAEL GONZALEZ	POST	GENERAL PLAN-1

DESIGN GENERAL PLAN SHEET (ENGLISH) REV. 11/16/20

0 1 2 3

UNDT:
PROJECT NUMBER & PHASE: CONTRACT NO.:

REVISION DATES	SHEET	OF
	7	20

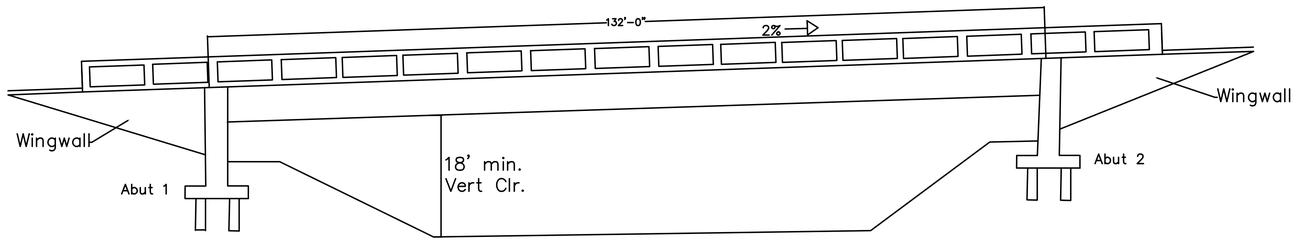
Senior Project Construction Phasing.dwg — Nov/ 16/ 2020 — 3:01PM

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
11	SD	5	R37.4/R46.5	7	20

Kate Vallin
REGISTERED CIVIL ENGINEER — 10-28-2020 DATE

11-11-2020
PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER · KATE VALLIN · No. 60853 Exp. 6-17-2020 · CIVIL · STATE OF CALIFORNIA



Elevation Plan
Scale
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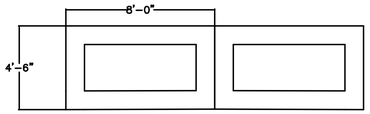
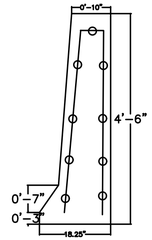
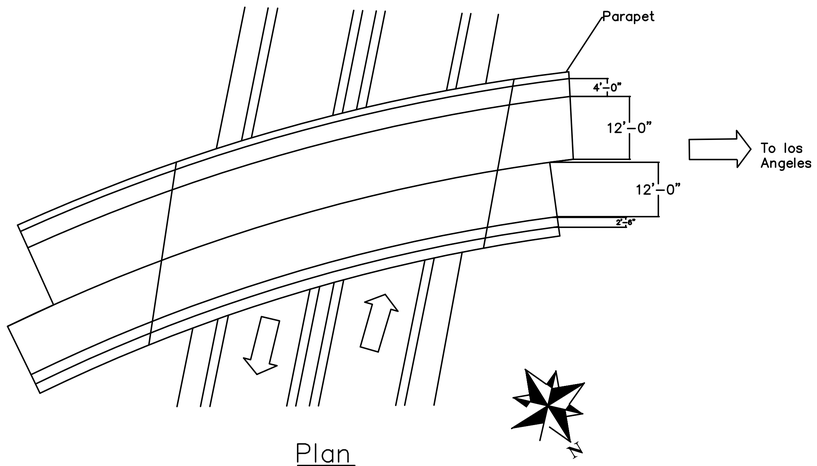


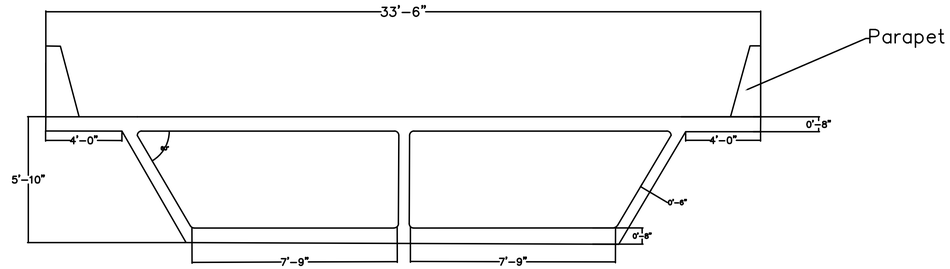
Parapet Window
Scale
1"= 8'



Parapet Details



Plan
Scale
1"=12'



Typical Section

GENERAL NOTES
LOAD AND RESISTANCE FACTOR DESIGN

DESIGN: AASHTO LRFD Bridge Design Specification 8th Edition and the Caltrans Amendments dated 2017

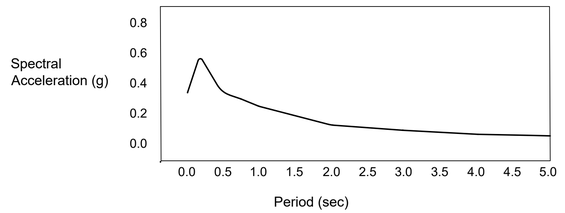
DEAD LOAD: Includes 35 psf for a future wearing surface

LIVE LOADING: HL93 with "LOWBOY" AND Permit Design Load

SEISMIC LOADING: SDC ARS Online 10.5.20
Soil Profile: Vs=760m/s

Moment Magnitude:
Peak Ground Acceleration: 0.5g

ARS CURVE



Reinforced Concrete:

ASTM A706
fy= 60 ksi
f'c= 6 ksi

Plan Symbols

- Section Identification
- Standard Plan (2010) sheet No
- Detail

DESIGN OVERSIGHT	DESIGN	BY Nadia Manzur	CHECKED	LOAD & RESISTANCE FACTOR DESIGN			PREPARED FOR THE STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION
	DETAILS	BY Nadia Manzur	CHECKED	LAYOUT	BY	CHECKED	
SIGN OFF DATE	QUANTITIES	BY	CHECKED	SPECIFICATIONS	BY	PLANS AND SPECS COMPARED	

DESIGN GENERAL PLAN SHEET (ENGLISH) REV. 11/15/20

0 1 2 3

PROJECT ENGINEER: Nadia Manzur

UNDT:
PROJECT NUMBER & PHASE:
CONTRACT NO.:

BRIDGE NO.
POST ????

SAN ELIJO LAGOON & UC

Curve Overpass Structure-1

REVISION DATES | SHEET | OF

Senior Project Deliverable 11 - Curver Overpass_recover.dwg - Nov/ 16/ 2020 - 2:52PM

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
11	SD	5	R37.4/R46.5	8	20

Kate Vallin

10-28-2020

REGISTERED CIVIL ENGINEER DATE

11-11-2020

PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER
KATE VALLIN
No. 60853
Exp. 6-17-2020
CIVIL
STATE OF CALIFORNIA

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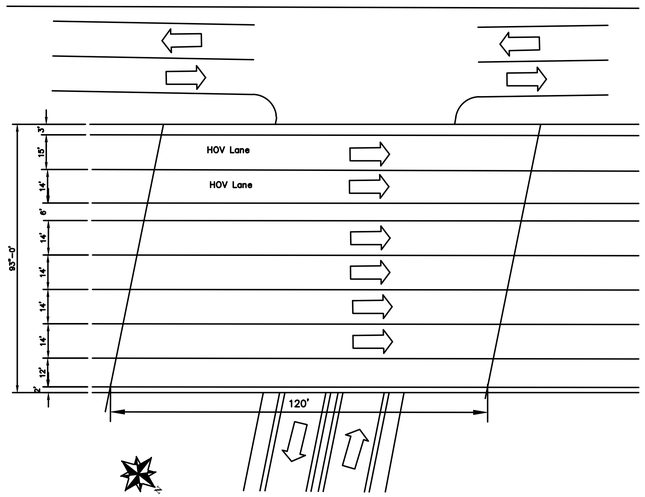
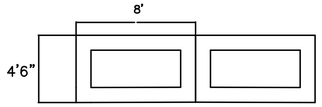


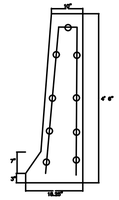
Plan

1" = 16'



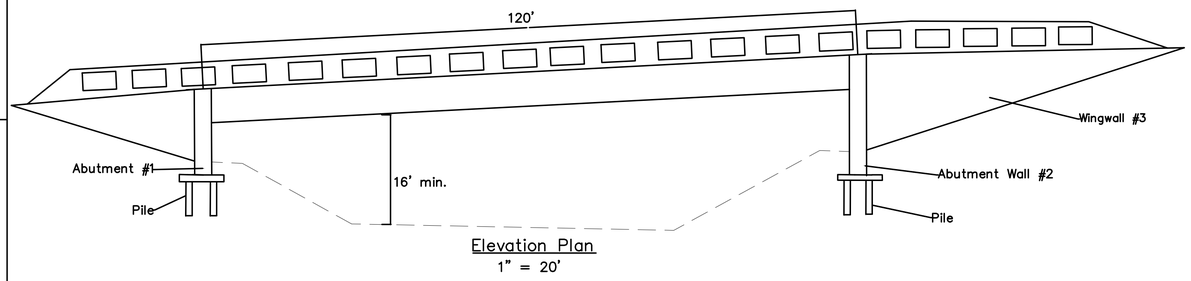
Parapet Window

Scale
1"= 8'



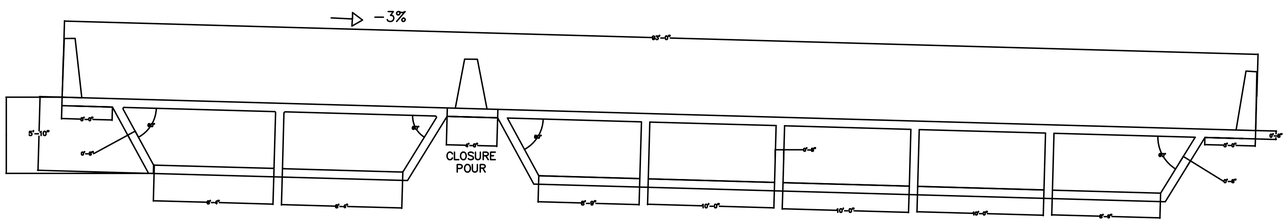
Parapet Details

No scale



Elevation Plan

1" = 20'



Typical Section

1" = 10'

GENERAL NOTES
LOAD AND RESISTANCE FACTOR DESIGN

DESIGN: AASHTO LRFD Bridge Design Specification 8th Edition and the Caltrans Amendments dated 2017

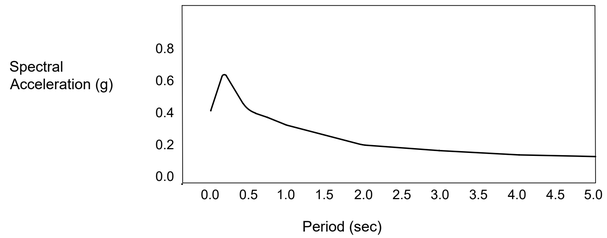
DEAD LOAD: Includes 35 psf for a future wearing surface

LIVE LOADING: HL93 with "LOWBOY" AND Permit Design Load

SEISMIC LOADING: SDC ARS Online 10.5.20
Soil Profile: Vs=760m/s

Moment Magnitude:
Peak Ground Acceleration: 0.5g

ARS CURVE



Reinforced Concrete:

ASTM A706
fy= 60 ksi
f'c= 6 ksi
n =

Plan Symbols

- Section Identification

Standard Plan (2010) sheet No

Detail

DESIGN OVERSIGHT	DESIGN	BY NADIA MANZUR	CHECKED	LOAD & RESISTANCE FACTOR DESIGN			PREPARED FOR THE STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION
	DETAILS	BY NADIA MANZUR	CHECKED	LAYOUT	BY	CHECKED	
SIGN OFF DATE	QUANTITIES	BY	CHECKED	SPECIFICATIONS	BY	PLANS AND SPECS COMPARED	

DESIGN GENERAL PLAN SHEET (ENGLISH) REV. 11/16/20

0 1 2 3

PROJECT ENGINEER
Nadia Manzur

UNDT:
PROJECT NUMBER & PHASE: CONTRACT NO.:

BRIDGE NO.

POST ????

SAN ELIJO LAGOON & UC

Straight Overpass Structure- 1

REVISION DATES				SHEET	OF

Senior Project Deliverable 10 - Overpass Straight Box Girder.dwg - Nov/ 16/ 2020 - 2:39PM

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
11	SD	5	R37.4/R46.5	9	20

Kate Vallin
REGISTERED CIVIL ENGINEER — 10-28-2020 DATE

11-11-2020
PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER · KATE VALLIN · No. 60853 · Exp. 6-17-2020 · CIVIL · STATE OF CALIFORNIA

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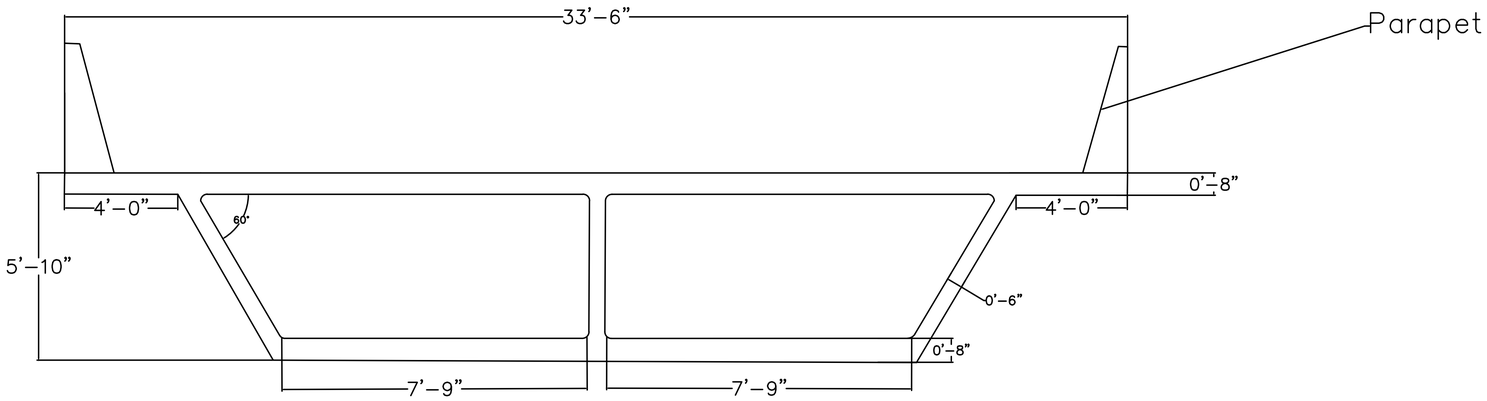
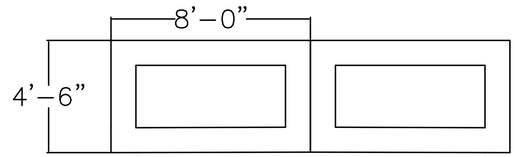
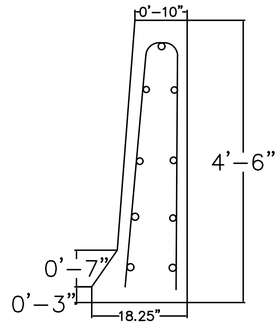


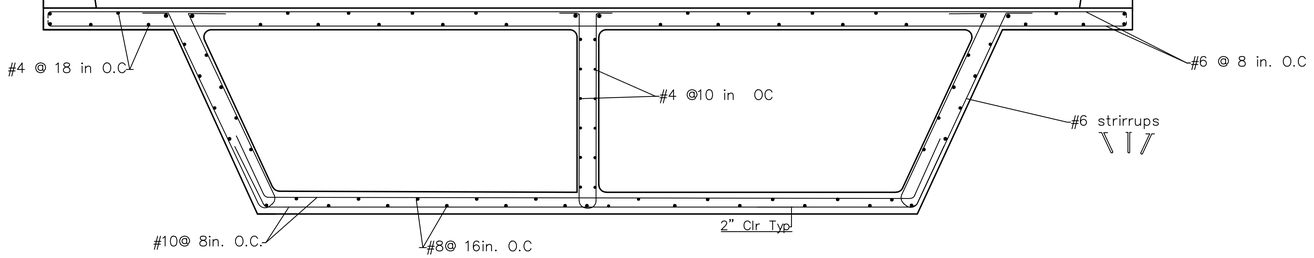
Typical Section
1"=8'



Parapet Window
1"=4'



Parapet Details
1"=18"



Reinforcement Detail
1"=8'

DESIGN OVERSIGHT	DESIGN	BY NADIA MANZUR	CHECKED	LOAD & RESISTANCE FACTOR DESIGN			PREPARED FOR THE STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION	PROJECT ENGINEER Nadia Manzur	BRIDGE NO.
	DETAILS	BY NADIA MANZUR	CHECKED	LAYOUT	BY	CHECKED			POST ????
SIGN OFF DATE	QUANTITIES	BY	CHECKED	SPECIFICATIONS	BY	PLANS AND SPECS COMPARED			

SAN ELIJO LAGOON & UC

REINFORCEMENT DESIGN- Curve Overpass

DESIGN GENERAL PLAN SHEET (ENGLISH) REV. 11/16/20

0 1 2 3

UNDT:
PROJECT NUMBER & PHASE: CONTRACT NO.:

REVISION DATES				SHEET	OF

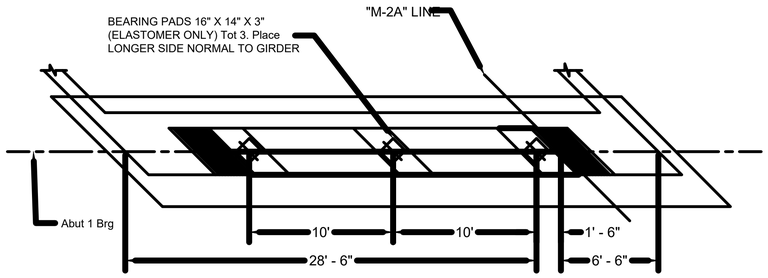
Senior Project Reinforcement structure for Curve Overpass.dwg - Nov/ 16/ 2020 - 2:45PM

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
11	SD	5	R37.4/R46.5	10	20

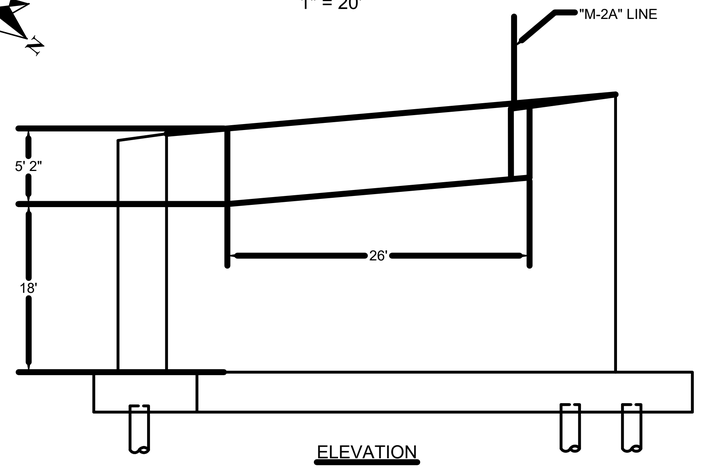
Kate Vallin
10-28-2020
REGISTERED CIVIL ENGINEER DATE

11-11-2020
PLANS APPROVAL DATE

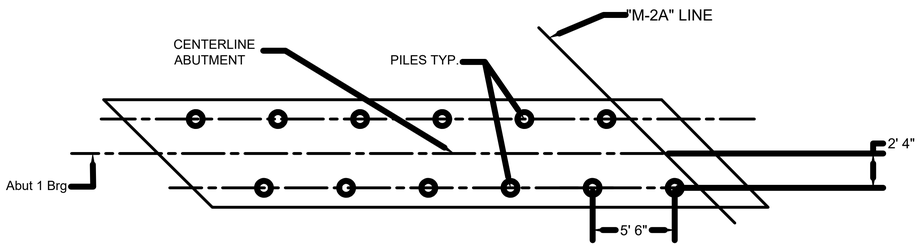
REGISTERED PROFESSIONAL ENGINEER
KATE VALLIN
No. 60853
Exp. 6-17-2020
CIVIL
STATE OF CALIFORNIA



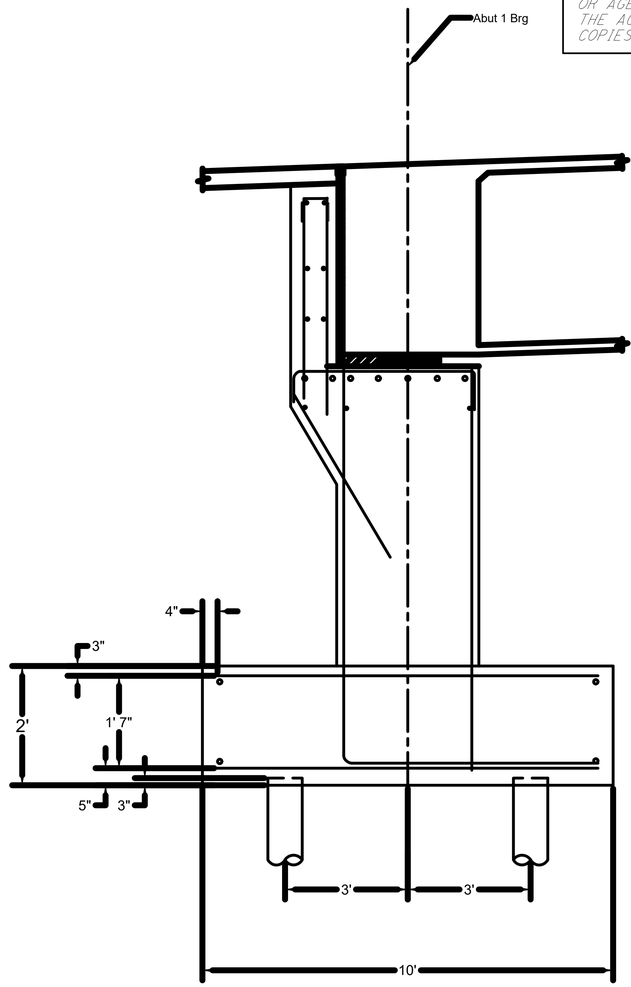
PLAN
Scale
1" = 20'



ELEVATION
1" = 20'



FOOTING PLAN



SECTION A-A
1" = 20'

DESIGN OVERSIGHT	DESIGN	BY Qais Abassy	CHECKED	LOAD & RESISTANCE FACTOR DESIGN			PREPARED FOR THE STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION	BRIDGE NO.
	DETAILS	BY Qais Abassy	CHECKED	LAYOUT	BY	CHECKED	PROJECT ENGINEER NADIA MANZUR	POST ????
SIGN OFF DATE	QUANTITIES	BY	CHECKED	SPECIFICATIONS	BY	PLANS AND SPECS COMPARED		
DESIGN GENERAL PLAN SHEET (ENGLISH) REV. 11/15/20							0 1 2 3	UNDT: PROJECT NUMBER & PHASE: CONTRACT NO.:

SAN ELIJO LAGOON & UC

Curve Overpass- Abutment 1

REVISION DATES				SHEET	OF

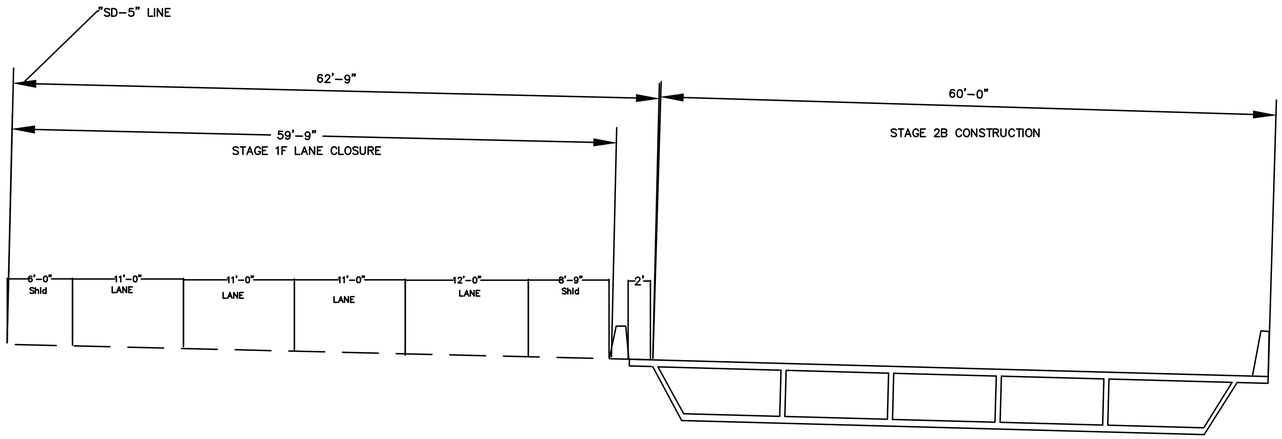
Senior Project Overpass Curved Abutment DET10.dwg - Nov/ 16/ 2020 - 2:50PM

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
11	SD	5	R37.4/R46.5	12	20

Kate Vallin
10-28-2020
REGISTERED CIVIL ENGINEER DATE

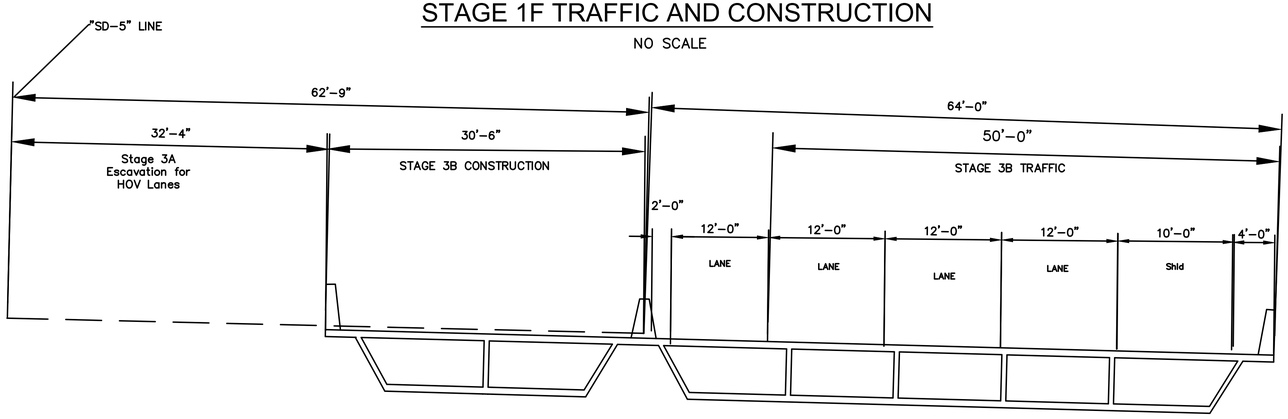
11-11-2020
PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER
KATE VALLIN
No. 60853
Exp. 6-17-2020
CIVIL
STATE OF CALIFORNIA



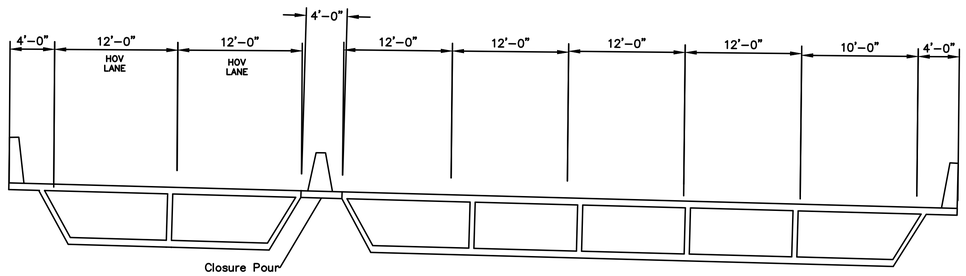
STAGE 1F TRAFFIC AND CONSTRUCTION

NO SCALE



STAGE 2A TRAFFIC AND CONSTRUCTION

NO SCALE



STAGE 3B TRAFFIC AND CONSTRUCTION

NO SCALE

GENERAL NOTES
LOAD AND RESISTANCE FACTOR DESIGN

DESIGN: AASHTO LRFD Bridge Design Specification 8th Edition and the Caltrans Amendments dated 20

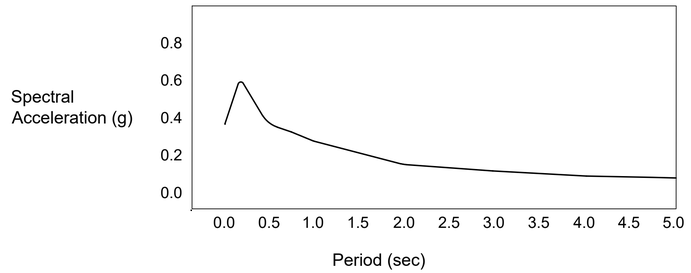
DEAD LOAD: Includes 35 psf for a future wearing surface

LIVE LOADING: HL93 with "LOWBOY" AND Permit Design Load

SEISMIC LOADING: SDC ARS Online 10.5.20
Soil Profile: Vs=760m/s

Moment Magnitude:
Peak Ground Acceleration: 0.5g

ARS CURVE



Reinforced Concrete:

ASTM A706
fy= 60 ksi
f'c= 6ksi

Plan Symbols

- Section Identification
- Standard Plan (2010) sheet No
- Detail

DESIGN OVERSIGHT	DESIGN	BY NADIA MANZUR	CHECKED	LOAD & RESISTANCE FACTOR DESIGN			PREPARED FOR THE STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION
	DETAILS	BY NADIA MANZUR	CHECKED	LAYOUT	BY	CHECKED	
SIGN OFF DATE	QUANTITIES	BY	CHECKED	SPECIFICATIONS	BY	PLANS AND SPECS COMPARED	

DESIGN GENERAL PLAN SHEET (ENGLISH) REV. 11/16/20

0 1 2 3

PROJECT ENGINEER
Nadia Manzur

UNDT:
PROJECT NUMBER & PHASE: CONTRACT NO.:

BRIDGE NO.
POST ????

SAN ELIJO LAGOON & UC

Construction Phase- Straight Overpass

REVISION DATES				SHEET	OF

Senior Project Construction Phase- Deliverable 10.dwg - Nov/ 16/ 2020 - 2:47PM

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
11	SD	5	R37.4/R46.5	15	20

Kate Vallin 10-28-2020
REGISTERED CIVIL ENGINEER DATE

11-11-2020
PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER KATE VALLIN No. 60853 Exp. 6-17-2020 CIVIL STATE OF CALIFORNIA

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GENERAL NOTES
LOAD AND RESISTANCE FACTOR DESIGN

DESIGN: AASHTO LRFD Bridge Design Specification 8th Edition and the Caltrans Amendments dated 2017

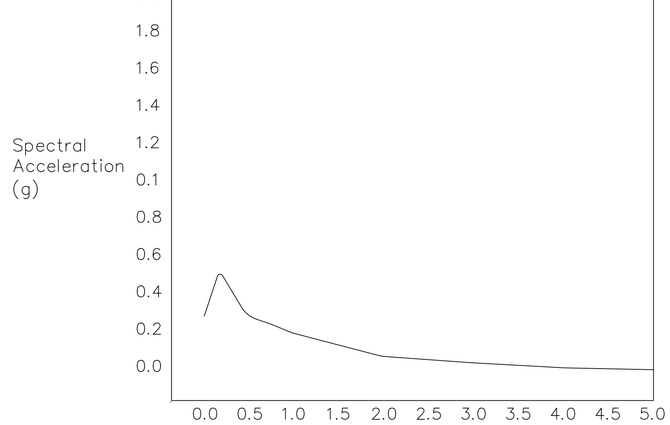
DEAD LOAD: Includes 35 psf for a future wearing surface

LIVE LOADING: HL93 with "LOWBOY" AND Permit Design Load

SEISMIC LOADING: SDC ARS Online 10.5.20
Soil Profile: Vs=760m/s

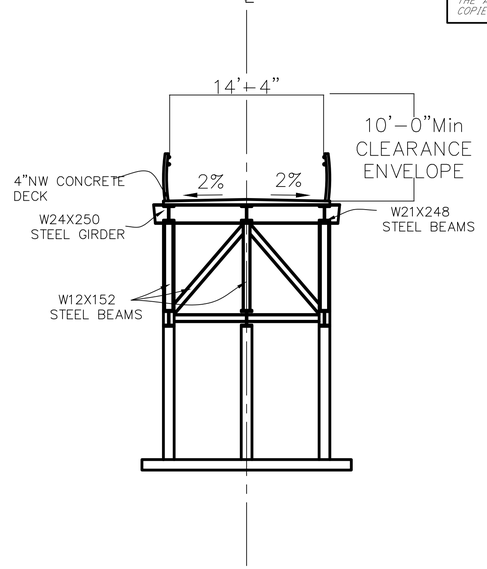
Moment Magnitude:
Peak Ground Acceleration: 0.5g

ARS CURVE



Reinforced Concrete:

ASTM A706
fy= 60 ksi
f'c= 4ksi
n = 8



TYPICAL SECTION A-A
NTS

DESIGN OVERSIGHT	DESIGN	BY DANIEL SANDOVAL	CHECKED	LOAD & RESISTANCE FACTOR DESIGN				PREPARED FOR THE STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION	BRIDGE NO.
	DETAILS	BY	CHECKED	LAYOUT	BY		CHECKED		POST ????
SIGN OFF DATE	QUANTITIES	BY	CHECKED	SPECIFICATIONS	BY		PLANS AND SPECS COMPARED	PROJECT ENGINEER DANIEL SANDOVAL	

SAN ELIJO LAGOON PEDESTRIAN BRIDGE

GENERAL PLAN-1

DESIGN GENERAL PLAN SHEET (ENGLISH) REV. 11/16/20

0 1 2 3

UNDT:
PROJECT NUMBER & PHASE: CONTRACT NO.:

REVISION DATES				SHEET	OF
				15	20

PRODUCED BY AN AUTODESK STUDENT VERSION
PRODUCED BY AN AUTODESK STUDENT VERSION

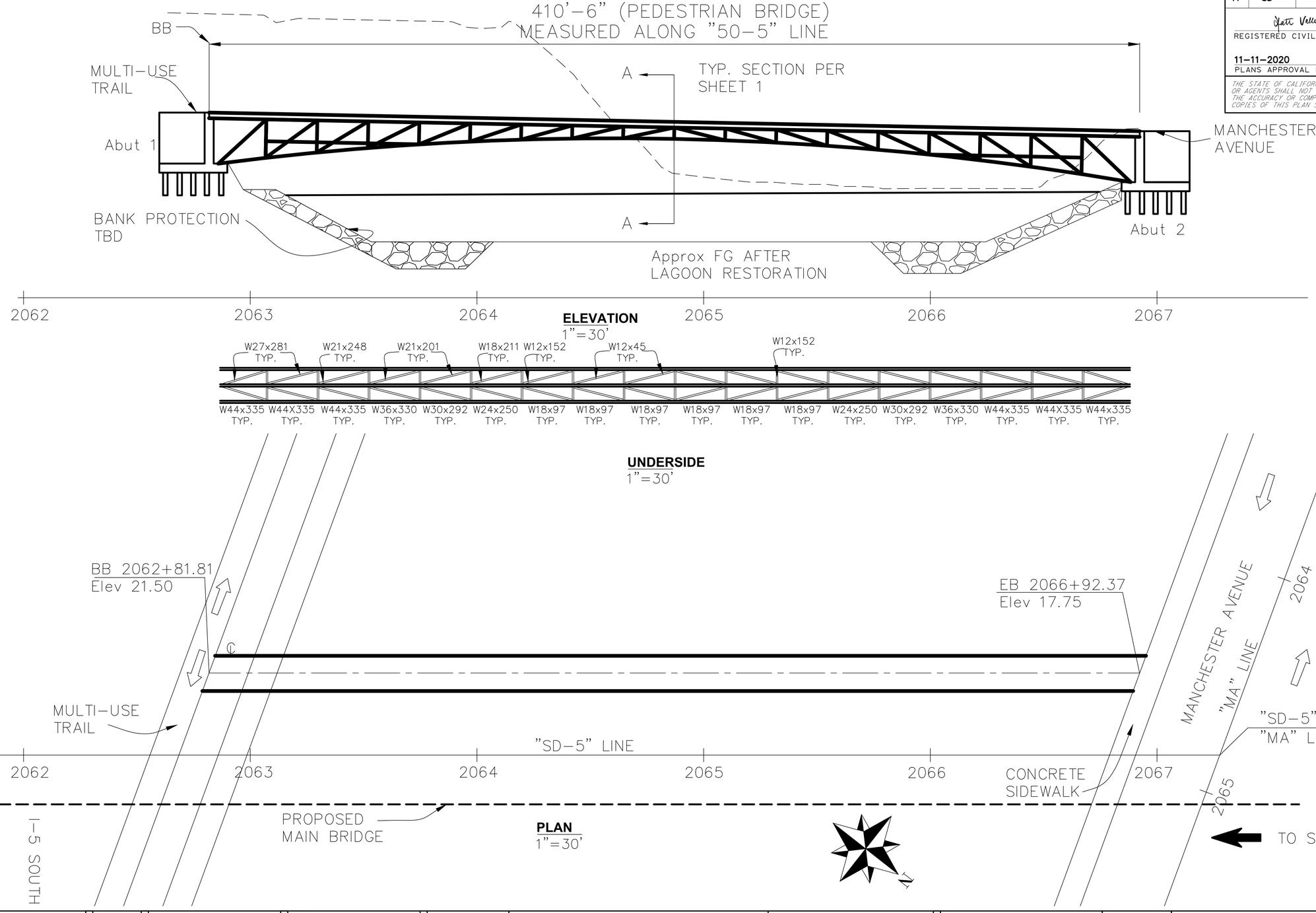
Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
11	SD	5	R37.4/R46.5	16	20

Kate Vallin 10-28-2020
REGISTERED CIVIL ENGINEER DATE

11-11-2020
PLANS APPROVAL DATE

THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS, SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.

REGISTERED PROFESSIONAL ENGINEER
KATE VALLIN
No. 60853
Exp. 6-17-2020
CIVIL
STATE OF CALIFORNIA



DESIGN OVERSIGHT	DESIGN	BY DANIEL SANDOVAL	CHECKED	LOAD & RESISTANCE FACTOR DESIGN			PREPARED FOR THE STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION
SIGN OFF DATE	DETAILS	BY	CHECKED	LAYOUT	BY	CHECKED	
	QUANTITIES	BY	CHECKED	SPECIFICATIONS	BY	PLANS AND SPECS COMPARED	

DESIGN GENERAL PLAN SHEET (ENGLISH) REV. 11/16/20

0 1 2 3

PROJECT ENGINEER DANIEL SANDOVAL	BRIDGE NO.	SAN ELIJO LAGOON PEDESTRIAN BRIDGE
	POST ????	GENERAL PLAN-1

UNDT:
PROJECT NUMBER & PHASE: CONTRACT NO.:

REVISION DATES	SHEET	OF
	16	20

PRODUCED BY AN AUTODESK STUDENT VERSION
PRODUCED BY AN AUTODESK STUDENT VERSION

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
11	SD	5	R37.4/R46.5	17	20

Kate Vallin 10-28-2020
REGISTERED CIVIL ENGINEER DATE

11-11-2020
PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER KATE VALLIN No. 60853 Exp. 6-17-2020 CIVIL STATE OF CALIFORNIA

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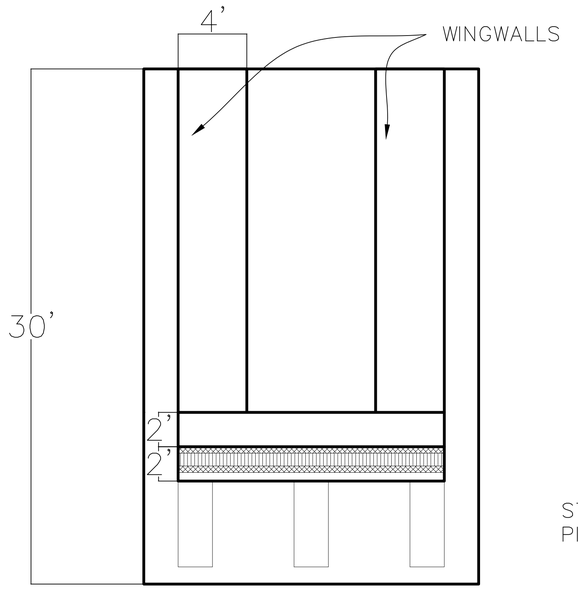
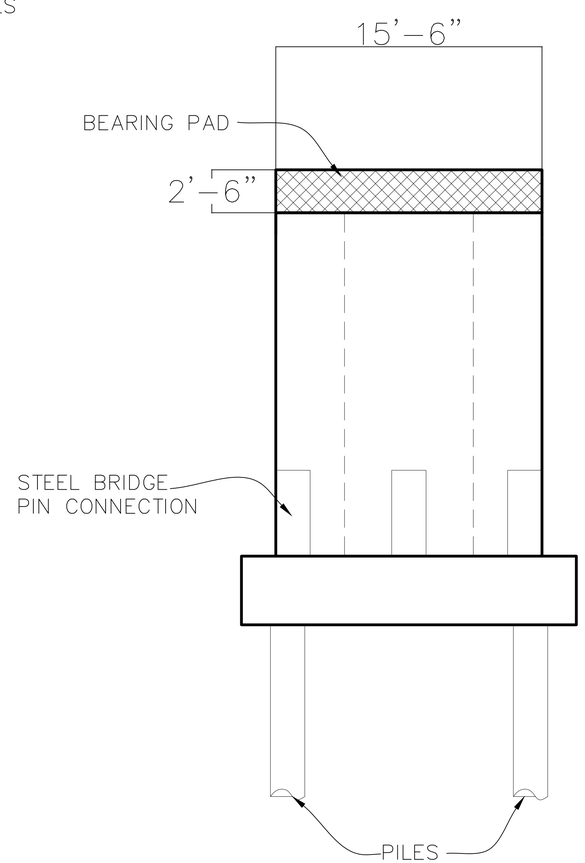
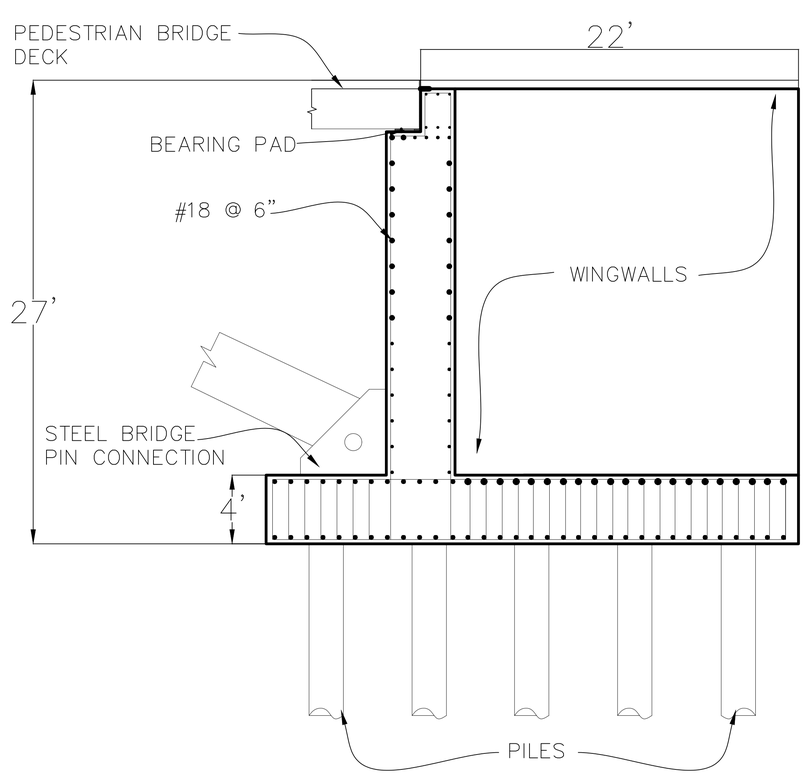


TOP VIEW



FRONT VIEW



CROSS-SECTIONAL VIEW

DESIGN OVERSIGHT	DESIGN	BY DANIEL SANDOVAL	CHECKED	LOAD & RESISTANCE FACTOR DESIGN			PREPARED FOR THE STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION	BRIDGE NO.	SAN ELIJO LAGOON PEDESTRIAN BRIDGE
	DETAILS	BY	CHECKED	LAYOUT	BY	CHECKED			
SIGN OFF DATE	QUANTITIES	BY	CHECKED	SPECIFICATIONS	BY	PLANS AND SPECS COMPARED	PROJECT ENGINEER DANIEL SANDOVAL	POST ????	TYPICAL ABUTMENT
DESIGN GENERAL PLAN SHEET (ENGLISH) REV. 11/16/20							0 1 2 3	UNDT: PROJECT NUMBER & PHASE: CONTRACT NO.:	REVISION DATES / SHEET 17 OF 20

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
11	SD	5	R37.4/R46.5	18	20

Kate Valli 10-28-2020
REGISTERED CIVIL ENGINEER DATE

11-11-2020
PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER KATE VALLI No. 60853 Exp. 6-17-2020 CIVIL STATE OF CALIFORNIA

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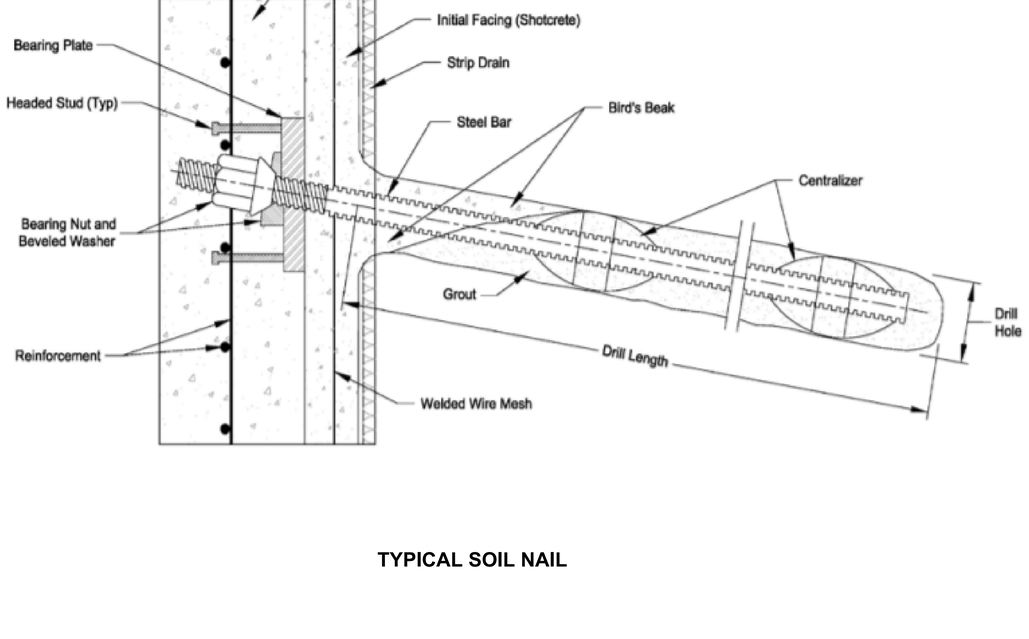
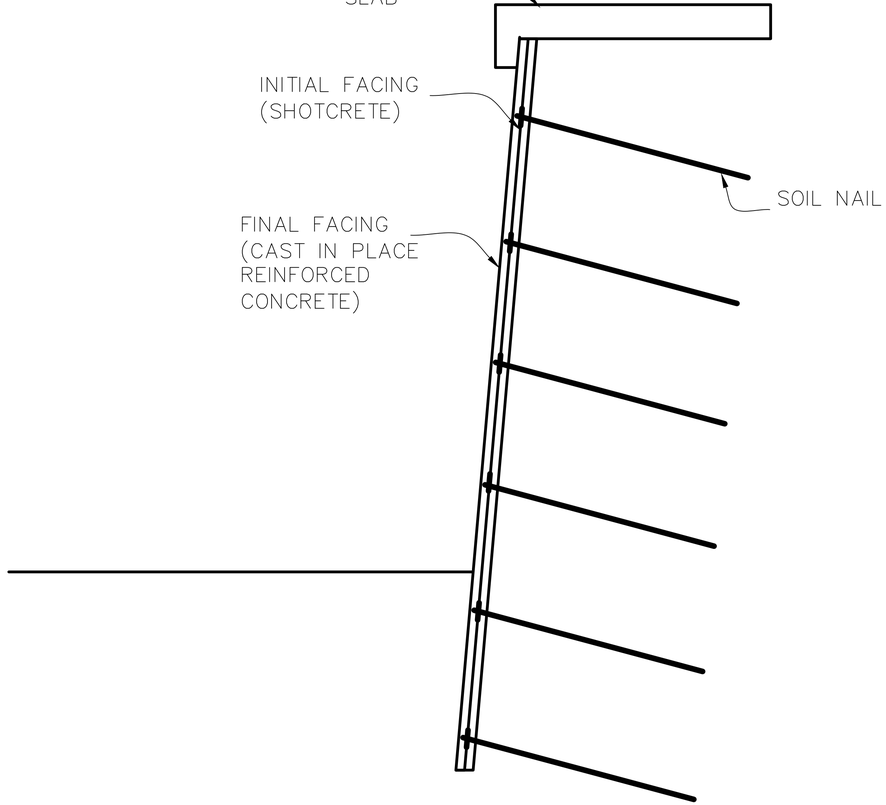
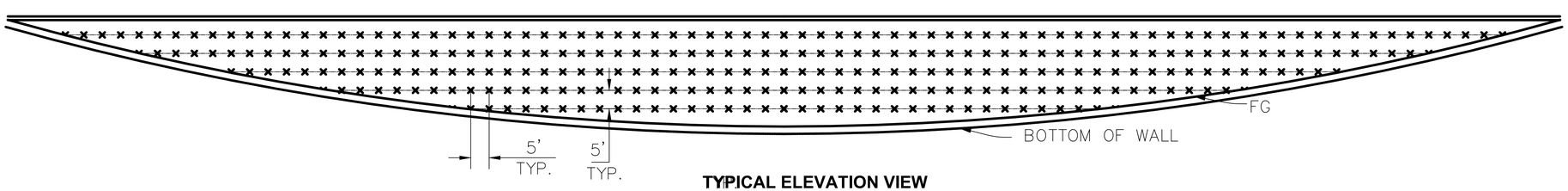


TYPICAL SOIL NAIL



TYPICAL SOIL NAIL RETAINING WALL CROSS SECTION



TYPICAL ELEVATION VIEW

DESIGN OVERSIGHT	DESIGN	BY DANIEL SANDOVAL	CHECKED	LOAD & RESISTANCE FACTOR DESIGN			PREPARED FOR THE STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION	BRIDGE NO.	SAN ELIJO LAGOON PEDESTRIAN BRIDGE
	DETAILS	BY	CHECKED	LAYOUT	BY	CHECKED		POST ????	TYPICAL RETAINING WALL
SIGN OFF DATE	QUANTITIES	BY	CHECKED	SPECIFICATIONS	BY	PLANS AND SPECS COMPARED			
DESIGN GENERAL PLAN SHEET (ENGLISH) REV. 11/16/20							0 1 2 3	PROJECT ENGINEER DANIEL SANDOVAL	UNDT: PROJECT NUMBER & PHASE: CONTRACT NO.:

REVISION DATES | SHEET 18 | OF 20

PRODUCED BY AN AUTODESK STUDENT VERSION
PRODUCED BY AN AUTODESK STUDENT VERSION

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
11	SD	5	R37.4/R46.5	19	20

Kate Vallin
10-28-2020
REGISTERED CIVIL ENGINEER DATE

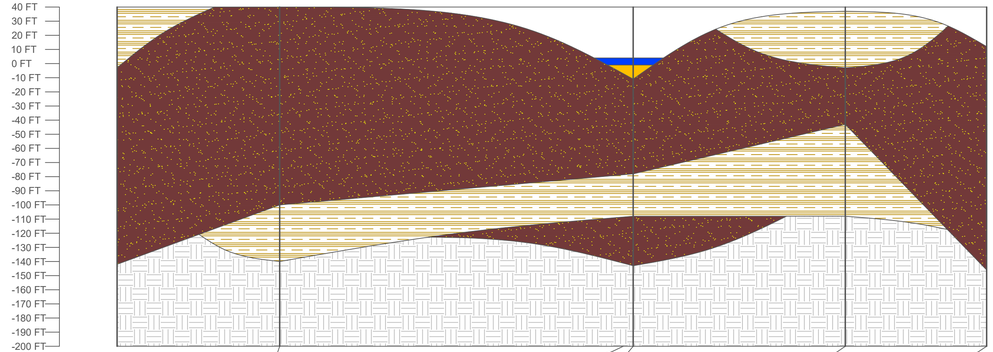
11-11-2020
PLANS APPROVAL DATE

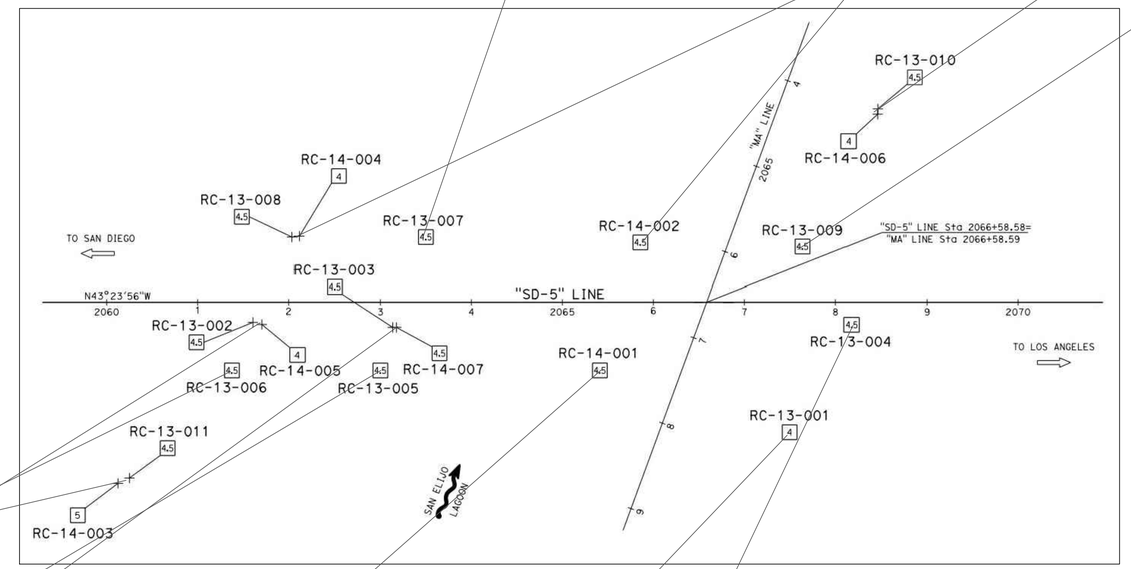
REGISTERED PROFESSIONAL ENGINEER
KATE VALLIN
No. 60853
Exp. 6-17-2020
CIVIL
STATE OF CALIFORNIA

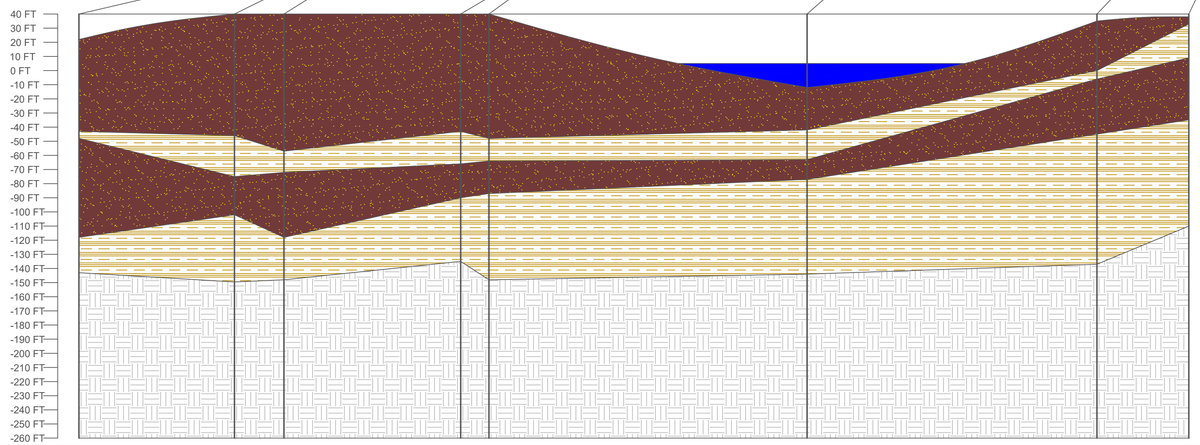
THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.

LEGEND

- SILTY SAND
- CLAY/ CLAYEY SAND
- BEDROCK
- LAGOON
- ALLUVIUM







DESIGN OVERSIGHT	DESIGN	BY MATTHEW TOROSIAN	CHECKED	LOAD & RESISTANCE FACTOR DESIGN			
	DETAILS	BY MATTHEW TOROSIAN	CHECKED	LAYOUT	BY	CHECKED	
SIGN OFF DATE	QUANTITIES	BY	CHECKED	SPECIFICATIONS	BY	PLANS AND SPECS COMPARED	

DESIGN GENERAL PLAN SHEET (ENGLISH) REV. 11/13/20

PREPARED FOR THE
STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

0 1 2 3

PROJECT ENGINEER
MATTHEW TOROSIAN

UNDT:
PROJECT NUMBER & PHASE: CONTRACT NO.:

BRIDGE NO.

POST ????

SOIL PROFILE

MAIN BRIDGE/OVERPASS

REVISION DATES | SHEET | OF

Senior Project Main Bridge Overpass using Space with stations - Senior Project 2020.dwg - Nov/ 16/ 2020 - 3:00PM

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
11	SD	5	R37.4/R46.5	20	20

Kate Vallin
REGISTERED CIVIL ENGINEER — 10-28-2020 DATE

11-11-2020
PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER — KATE VALLIN — No. 60853 Exp. 6-17-2020 — CIVIL — STATE OF CALIFORNIA

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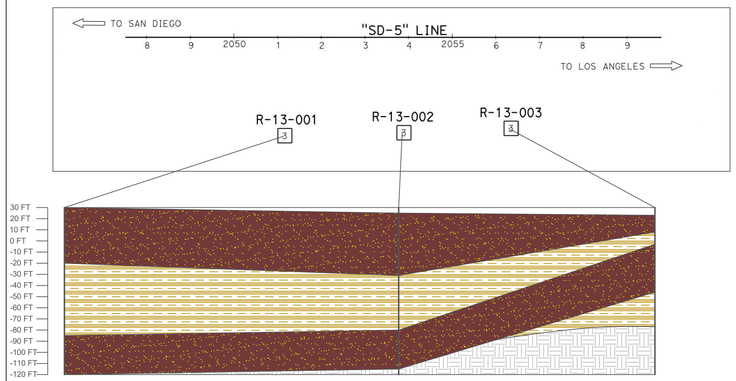
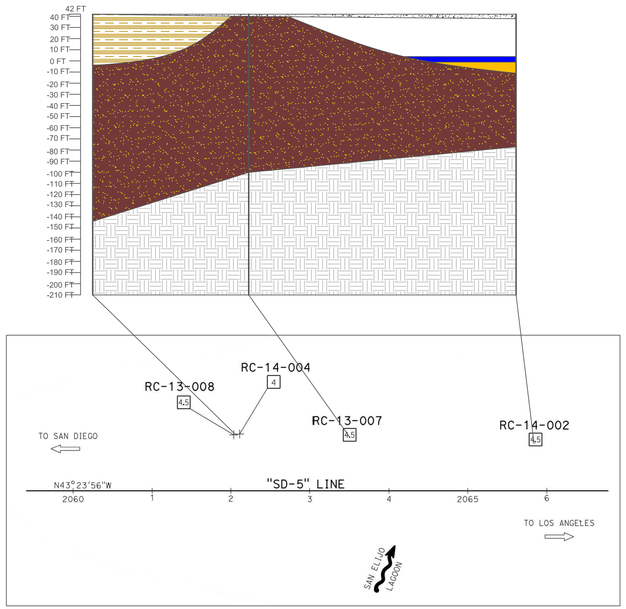
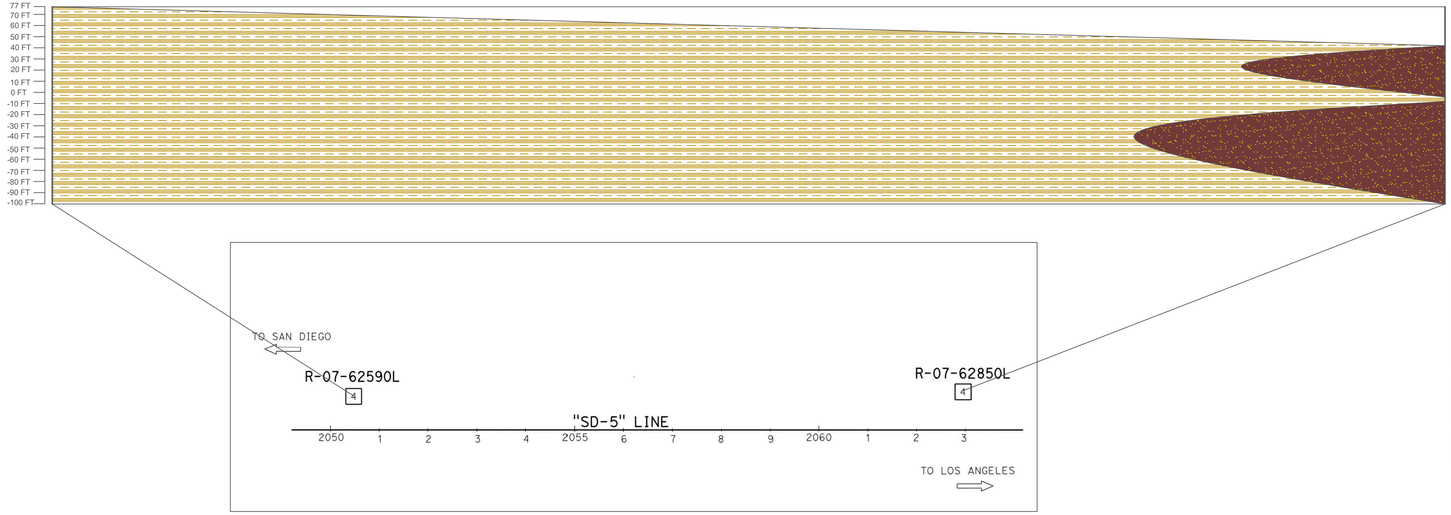
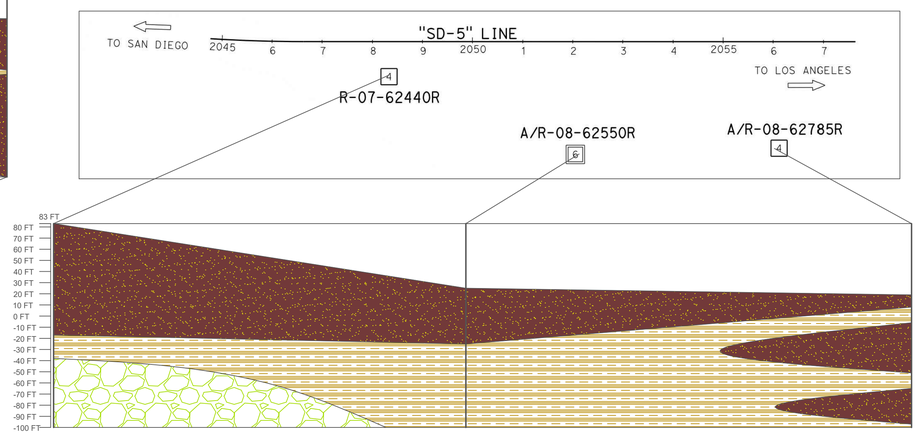




LEGEND

- SILTY SAND
- CLAY/ CLAYEY SAND
- BEDROCK
- GRAVEL
- LAGOON
- ALLUVIUM





DESIGN OVERSIGHT	DESIGN	BY MATTHEW TOROSIAN	CHECKED	LOAD & RESISTANCE FACTOR DESIGN			PREPARED FOR THE STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION
SIGN OFF DATE	DETAILS	BY MATTHEW TOROSIAN	CHECKED	LAYOUT	BY	CHECKED	
DESIGN GENERAL PLAN SHEET (ENGLISH) REV. 11/13/20	QUANTITIES	BY	CHECKED	SPECIFICATIONS	BY	PLANS AND SPECS COMPARED	0 1 2 3

PROJECT ENGINEER
MATTHEW TOROSIAN

UNDT:
PROJECT NUMBER & PHASE: CONTRACT NO.:

BRIDGE NO.
POST ????

SOIL PROFILE

PEDESTRIAN BRIDGE & RETAINING WALLS

REVISION DATES				SHEET	OF

Senior Project Ped Bridge Retain Wall all except name - Senior Project 2020.dwg - Nov/ 16/ 2020 - 3:05PM

13. Project Schedule, Construction Site Phasing, and Logistics Plan

Admin		Phase 1		Phase 3	
Phase		Phase 2		Phase 4	

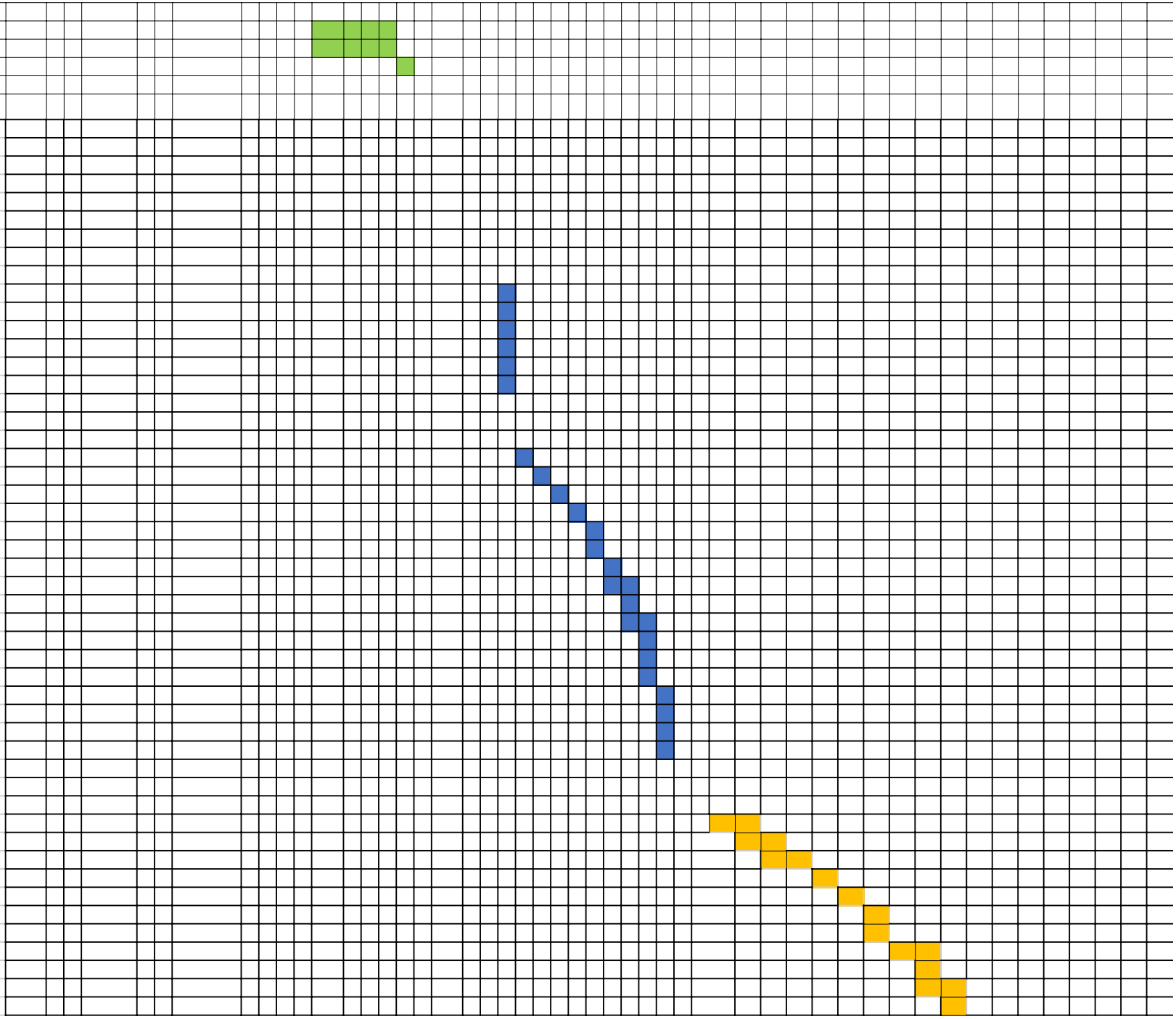
BB Incorporated Schedule

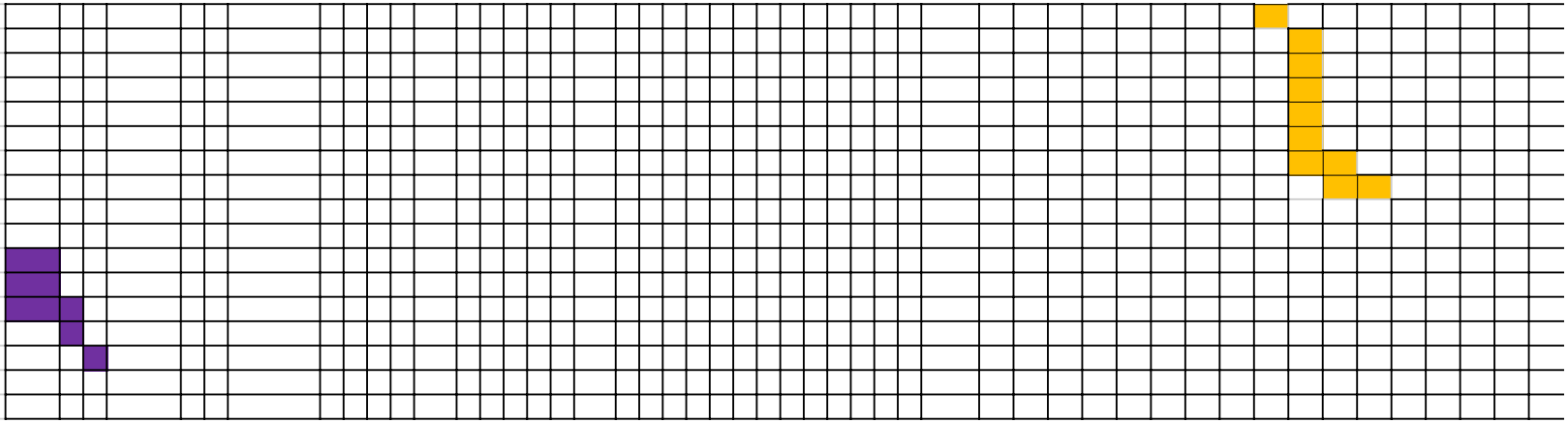
Task Name:	Duration	Month 1	Month 2	Month 3	Month 4	Month 5	Month 6	Month 7	Month 8	Month 9	Month 10	Month 11	Month 12	Month 13	Month 14	Month 15	Month 16	Month 17	Month 18	Month 19	Month 20	Month 21	Month 22	Month 23	Month 24	Month 25	Month 26	Month 27	Month 28	Month 29	Month 30	Month 31	Month 32	Month 33	Month 34	Month 35	Month 36	Month 37	Month 38	Month 39	Month 40	Month 41	Month 42	Month 43	Month 44	Month 45	Month 46	Month 47	Month 48	Month 49	Month 50
Bridge Replacement																																																			
Preconstruction Activities																																																			
Prepare Construction Drawing Submittals	4 Weeks																																																		
Final Construction Drawing Submittals	4 Weeks																																																		
Construction Document Development																																																			
Prepare Construction Drawing Submittals	8 Weeks																																																		
Final Construction Drawing Submittals	8 Weeks																																																		
Provide Project Specifications																																																			
Prepare Technical Specifications (30%, 65%)	20 Weeks				30%								65%																																							
Update Project specifcations (95%, 100%)	12 Weeks																		100%																																	
Construction Estimate																																																			
Prepare Construction Budget estimate with phasing (65%	10 Weeks																																																		
Prepare final construction budget estimate	4 Weeks																																																		
Permits																																																			
Submit Final Plans for Permitting	6 Weeks																																																		
Clear Permitting and Send Plans for Bidding	6 Weeks																																																		
Construction Support Services																																																			
Award of Contract	2 Weeks																																																		
Project Bidding (subcontractor bidding)	2 Weeks																																																		
Excavation/ Geotech Work																																																			
Earthwork	8 Weeks																																																		
Foundation Excavation	8 Weeks																																																		
Excavation for Pile Caps and Abutments	8 Weeks																																																		
Drilling for Piles	8 Weeks																																																		
Demolition																																																			
Electrical - Cut power & install temp service	4 Weeks																																																		
Safety Fence Delivery set up	4 Weeks																																																		
Install Site Cameras	4 Weeks																																																		
Scrap the right side of bridge	4 Weeks																																																		
Segmented bridge demo	4 Weeks																																																		
Foundation																																																			
Reinforce Steel Layout	32 Weeks																																																		
Piles - Caisson pouring	32 Weeks																																																		
Abutment Layout	32 Weeks																																																		
Abutment Pouring	32 Weeks																																																		
Tower Foundation (Pile Caps) layout	32 Weeks																																																		
Tower Foundation (Pile Caps) Pouring	32 Weeks																																																		
Superstructure																																																		
Scaffold Erection	16 Weeks																																																		
Shore Forms	36 Weeks																																																		
Steel Formwork Layout	36 Weeks																																																		
Welding Metals	36 Weeks																																																		
28' Reinforced Steel Casing Layout	36 Weeks																																																		
28' Concrete Tower Pouring	36 Weeks																																																		
Cable system assembly	12 Weeks																																																		
Layout and Construct 2 Outside Griders	32 Weeks																																																		
Deck Assembly - 35' sections	32 Weeks																																																		

Asphalt pour on entirety of bridge once it is all constructed	4 Weeks
Lighting Poles(LED)**	2 Weeks
Clean Up	8 Weeks
Pedestrian Bridge	
Administrative & Submittal*	
Notice of Intent To Award Contract	0
Executed Contract	0
Submit Concrete Mix Designs	1 Week
Review & Approve Concrete Mix Designs	3 Weeks
Submit Falsework Plan	1 Week
Review & Approve Falsework Plan	1 Week
Construction*	
General	
First Working Day	
Preconstruction Services	
Complete Job	
Preconstruction Selection	
Preconstruction Job Walk	1 Week
Weather Allowance	6 Weeks
Notice to Proceed*	
Mobilization*	
Establish Office	
Transportation of Personnel/Overhead	1 Week
Office Set Up	1 Week
Establish Site	
Portable Potties	1 Week
Temporary Road/Fence/Power	1 Week
Equipment Transportation	2 Weeks
Clear & Grub Site	2 Weeks
Construction (North)*	
Foundation/Substructure	
Phase 1	
Earthwork	2 Weeks
Foundation Excavation	1 Week
Drill Piles	2 Weeks
Concrete Reinforcement	2 Weeks
Pour Slurry & Concrete Piles	1 Week
Phase 2	
Pile Cap Reinforcement	2 Weeks
Form/Pour Pile Cap	2 Weeks
Cure/Strip Pile Cap	5 Weeks
Abutment & Wing Wall Reinforcement	2 Weeks
Form/Pour Wing Wall & Abutment	2 Weeks
Cure/Strip Wing Wall & Abutment	5 Weeks
Superstructure	
Erect Scaffold	5 Weeks
Steel Beams Assembly	8 Weeks
Lower Steel Beams	1 Week
Steel Beams & Abutment Attachment	1 Week
Cross Beam Sections Assembly	8 Weeks
Remove Scaffold	2 Weeks
Reinforce Concrete Slab	3 Weeks
Form/Pour Concrete Slab	2 Weeks
Cure/Strip Concrete Slab	5 Weeks
Attach Handrails	1 Week

Construction (South)*	
Foundation/Substructure	
Phase 1	
Earthwork	2 Weeks
Foundation Excavation	1 Week
Drill Piles	2 Weeks
Concrete Reinforcement	2 Weeks
Pour Slurry & Concrete Piles	1 Week
Phase 2	
Pile Cap Reinforcement	2 Weeks
Form/Pour Pile Cap	2 Weeks
Cure/Strip Pile Cap	5 Weeks
Abutment & Wing Wall Reinforcement	2 Weeks
Form/Pour Wing Wall & Abutment	2 Weeks
Cure/Strip Wing Wall & Abutment	5 Weeks
Superstructure	
Erect Scaffold	5 Weeks
Steel Beams Assembly	8 Weeks
Lower Steel Beams	1 Week
Steel Beams & Abutment Attachment	1 Week
Cross Beam Sections Assembly	8 Weeks
Remove Scaffold	2 Weeks
Reinforce Concrete Slab	3 Weeks
Form/Pour Concrete Slab	2 Weeks
Cure/Strip Concrete Slab	5 Weeks
Attach Handrails	1 Week
Demobilization*	1 Week
Design Phases*	
Permits	
Plan Check	1 Week
City Review & Correction	2 Weeks
Resubmittal Back - Check	2 Weeks
Planning Review & Additional Time	2 Weeks
Utility Permits	2 Weeks
Structure Inspection*	
Finishes*	
Handrails	2 Weeks
Procurement*	
Finish Items Delivery	2 Weeks
Substantial Completion*	1 Week
Final Inspections*	1 Week
Retaining Wall	
Retaining Wall 1	
Foundation	
Excavation	12 Weeks
Drilling Nail Holes	15 Weeks
Nail Installation and Grouting	17 weeks
Construction	
Construction of Initial Facing	12 Weeks
Construction of Subsequent Levels	12 Weeks
Construction of Final Facing	13 Weeks
Retaining Wall 2	
Foundation	
Excavation	12 Weeks
Drilling Nail Holes	15 Weeks
Nail Installation and Grouting	17 Weeks

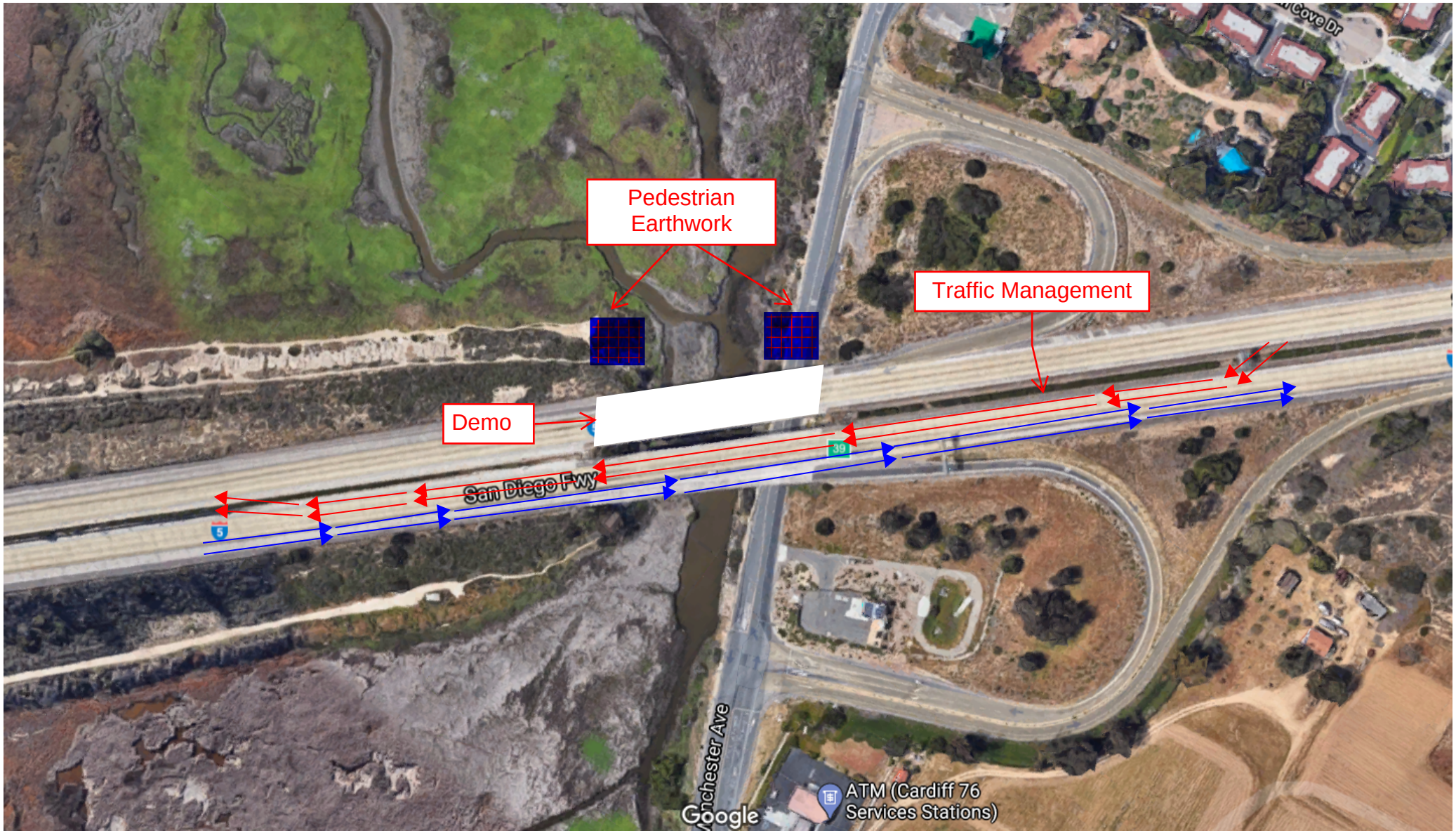
Construction	
Construction of Initial Facing	12 Weeks
Construction of Subsequent Levels	12 Weeks
Construction of Final Facing	13 Weeks
Overpass	
Admin Phase	
Pre Admin Work	9 Weeks
Design Phase	
Complete Design	9 Weeks
Contract Execution*	
Award Project	1 Week
Weather Allowance	5 Weeks
Notice to Proceed*	
Mobilization*	
Install Construction Area Yard	1 Week
Install Construction Area Signs	1 Week
Install BMP's	1 Week
Temporary Stripe	1 Day
Install k-Rail	1 Day
Clear & Grub Site	2 Weeks
Start Construction	
Straight Overpass	
Foundation	
Earthwork	3 Weeks
Structure Excavation	4 Weeks
Drill Pipes	4 Weeks
Form and Pour Piles	4 Weeks
Form and Pour Bridge Foundation	2 Weeks
Form and Pour Abutments	2 Weeks
Form and Pour Wing Walls	2 Weeks
Install Falsework	4 Weeks
Install Box Girders	1 Week
Install Deck Form with Falsework	2 Weeks
Form and Pour Diaphragm	1 Week
Form and Pour Barrier	1 Week
Form and Pour Deck	1 Week
Form and Pour HOV Lanes	2 Weeks
Install Railing	1 Day
Stripe	1 Day
Remove k-Rail	1 Day
Start Construction	
Curved Overpass	
Foundation	
Earthwork - Clear and Grub - Ground Prep	6 Weeks
Structure Excavation	5 Weeks
Drill Pipes	5 Weeks
Form and Pour Piles	4 Weeks
Form and Pour Bridge Foundation	4 Weeks
Form and Pour Abutments	2 Weeks
Form and Pour Wing Walls	2 Weeks
Install Falsework	5 Weeks
Install Box Girders	2 Weeks
Install Deck Form with Falsework	2 Weeks
Form and Pour Diaphragm	1 Week



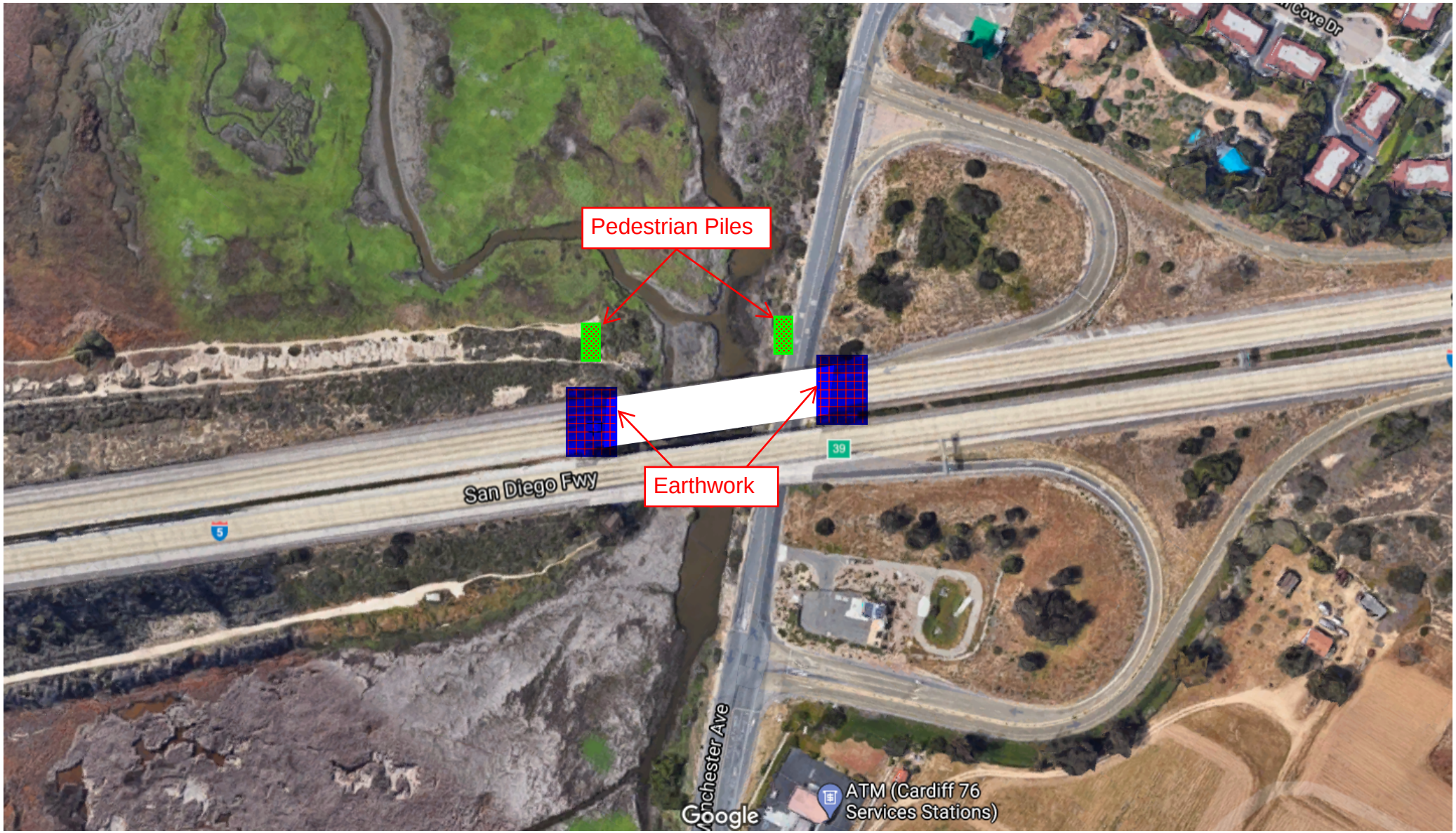
Form and Pour Barrier	2 Weeks	
Form and Pour Deck	1 Week	
Form and Pour Approach and Detour Slabs	2 Weeks	
Install Railing	1 Day	
Stripe	1 Day	
Remove k-Rail	1 Day	
Punch List	4 Weeks	
Demobilization	1 Week	
Design Phases*		
Permits		
Plan Check	1 Week	
City Review & Correction	2 Weeks	
Resubmittal Back - Check	2 Weeks	
Planning Review & Additional Time	2 Weeks	
Utility Permits	2 Weeks	
Structure Inspection*		
Finishes*		

BB Incorporated Site
Phasing Plan

Phase 1



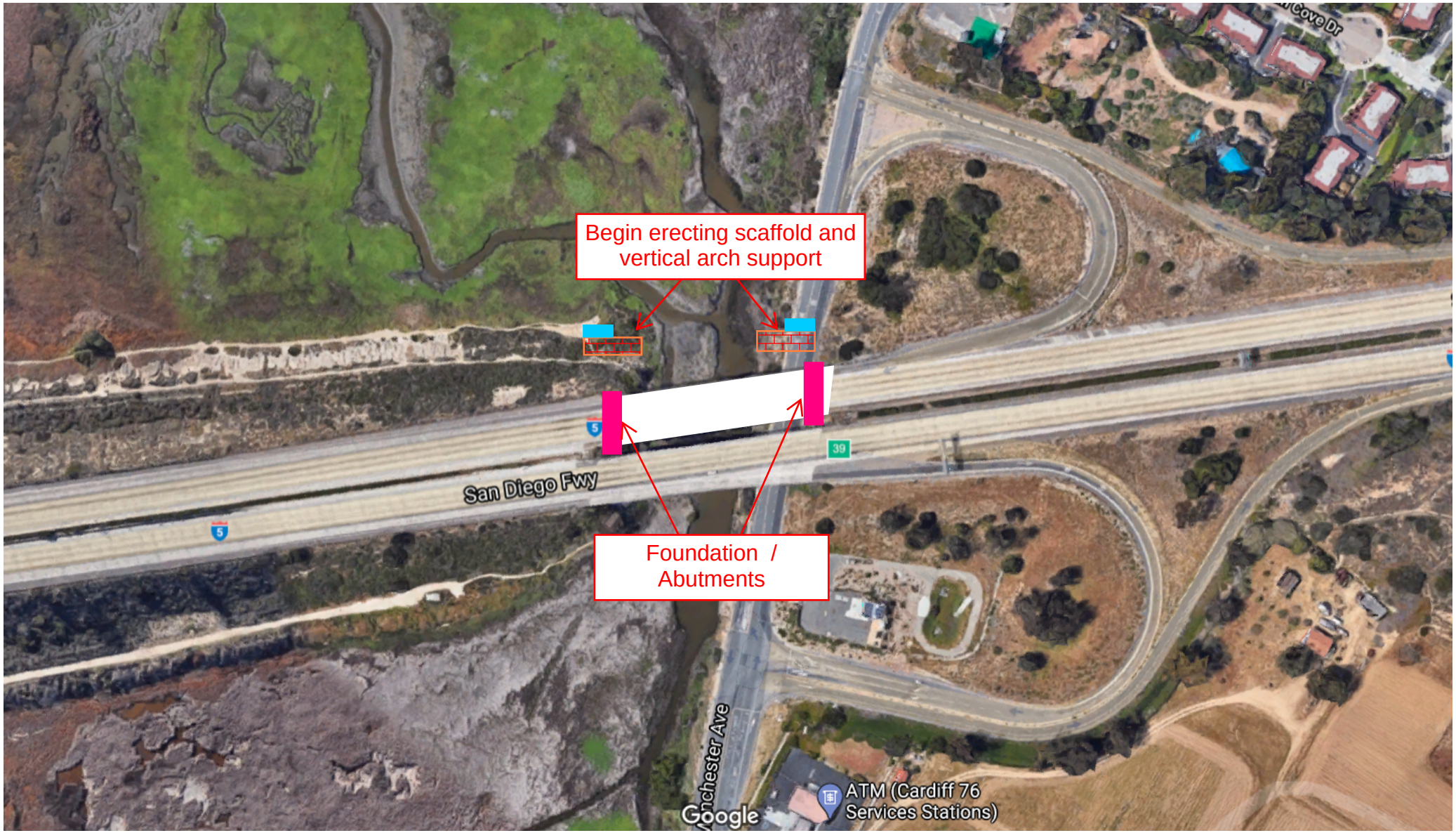
Phase 1


Pedestrian Piles
Earthwork
San Diego Fwy
5
39
ATM (Cardiff 76
Services Stations)
Google

Phase 2


Pedestrian Foundation / Abutments
Begin Drilling Piles
San Diego Fwy
5
39
Google
ATM (Cardiff 76 Services Stations)

Phase 2


Begin erecting scaffold and vertical arch support
Foundation / Abutments
San Diego Fwy
5
39
ATM (Cardiff 76 Services Stations)
Google

Phase 2


Begin constructing arch vertically connecting to winch system
Begin Construction Towers 1, 2, 3, and 4
San Diego Fwy
5
39
ATM (Cardiff 76 Services Stations)
Google

Phase 2


Complete arch & lower into place
Begin laying beams/girder working from both sides towards middle while tying into towers
Cove Dr
39
Fwy
ATM (Cardiff 76 Services Stations)
Google

Phase 2


Remove scaffold and begin erecting truss cross sections
Complete towers, beams/girders, and cables
San Diego Fwy
5
39
ATM (Cardiff 76 Services Stations)
Google

Phase 2


Pour deck concrete
Pour deck concrete on both sides working in
San Diego Fwy
5
39
Google
ATM (Cardiff 76 Services Stations)

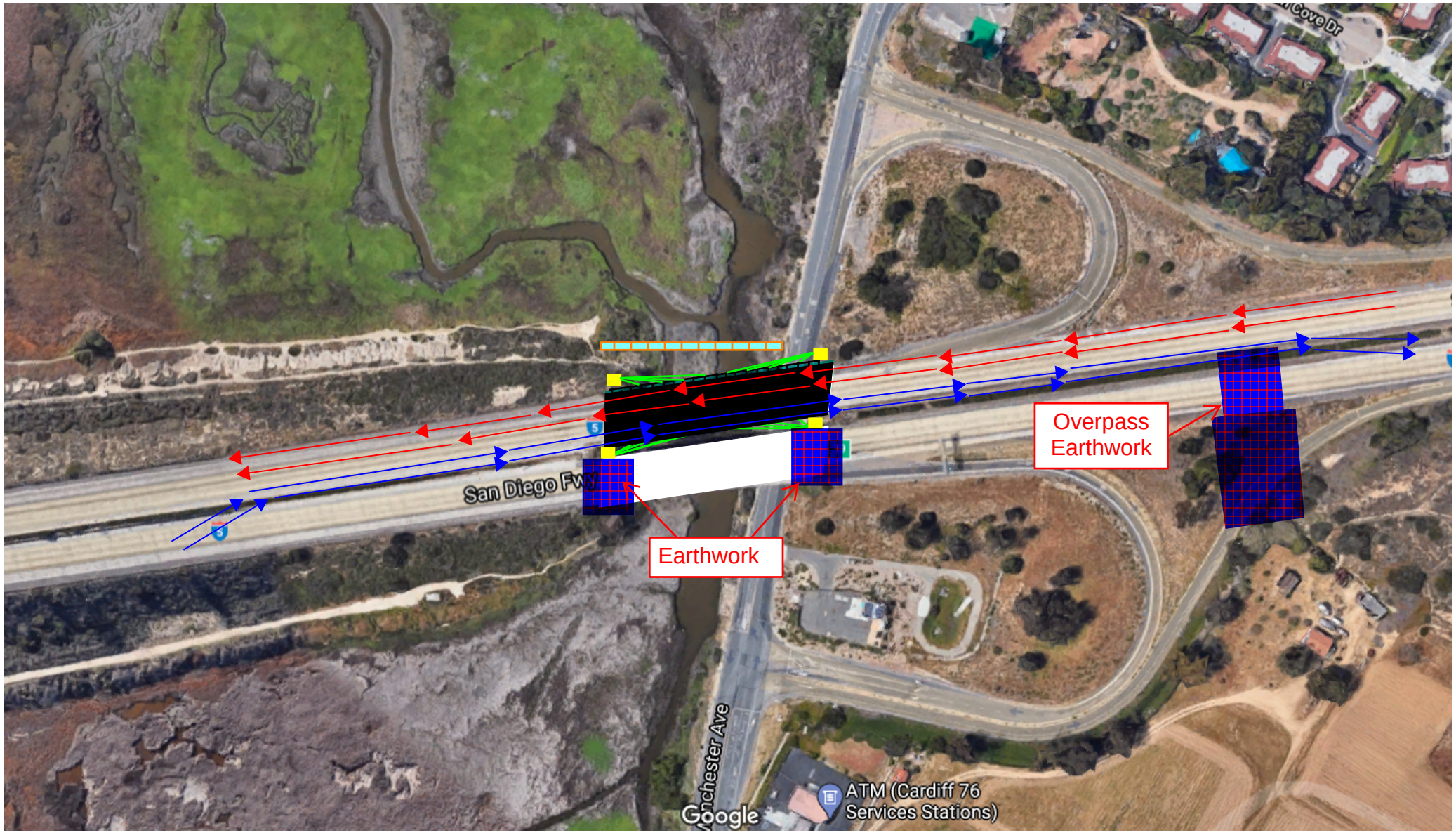
Phase 2


Place Asphalt and
open to traffic.
San Diego Fwy
5
39
Google
ATM (Cardiff 76
Services Stations)

Phase 3


Demo
Overpass
Demo
ATM (Cardiff 76
Services Stations)
Google

Phase 3


Overpass
Earthwork
Earthwork
San Diego Fwy
ATM (Cardiff 76
Services Stations)
Google

Phase 4


Complete Overpass Earthwork
Begin Drilling Piles
Curved Overpass Piles
San Diego Fwy
5
39
ATM (Cardiff 76 Services Stations)
Google

Phase 4


Straight Overpass Piles
Foundation / Abutment
Foundation / Abutment
San Diego Fwy
5
39
ATM (Cardiff 76 Services Stations)
Google

Phase 4


Straight Overpass
Foundation / Abutment
Towers 5 & 6
Precast Box Girder
Erection
San Diego Fwy
5
39
ATM (Cardiff 76
Services Stations)
Google

Phase 4


Straight Overpass Precast Box Girder Erection
Asphalt
Begin laying beams/girder working from both sides towards middle while tying into towers
San Diego Fwy
5
39
Google
ATM (Cardiff 76 Services Stations)

Phase 4


Asphalt
Complete towers, beams/girders, and cables
San Diego Fwy
5
39
ATM (Cardiff 76 Services Stations)
Google

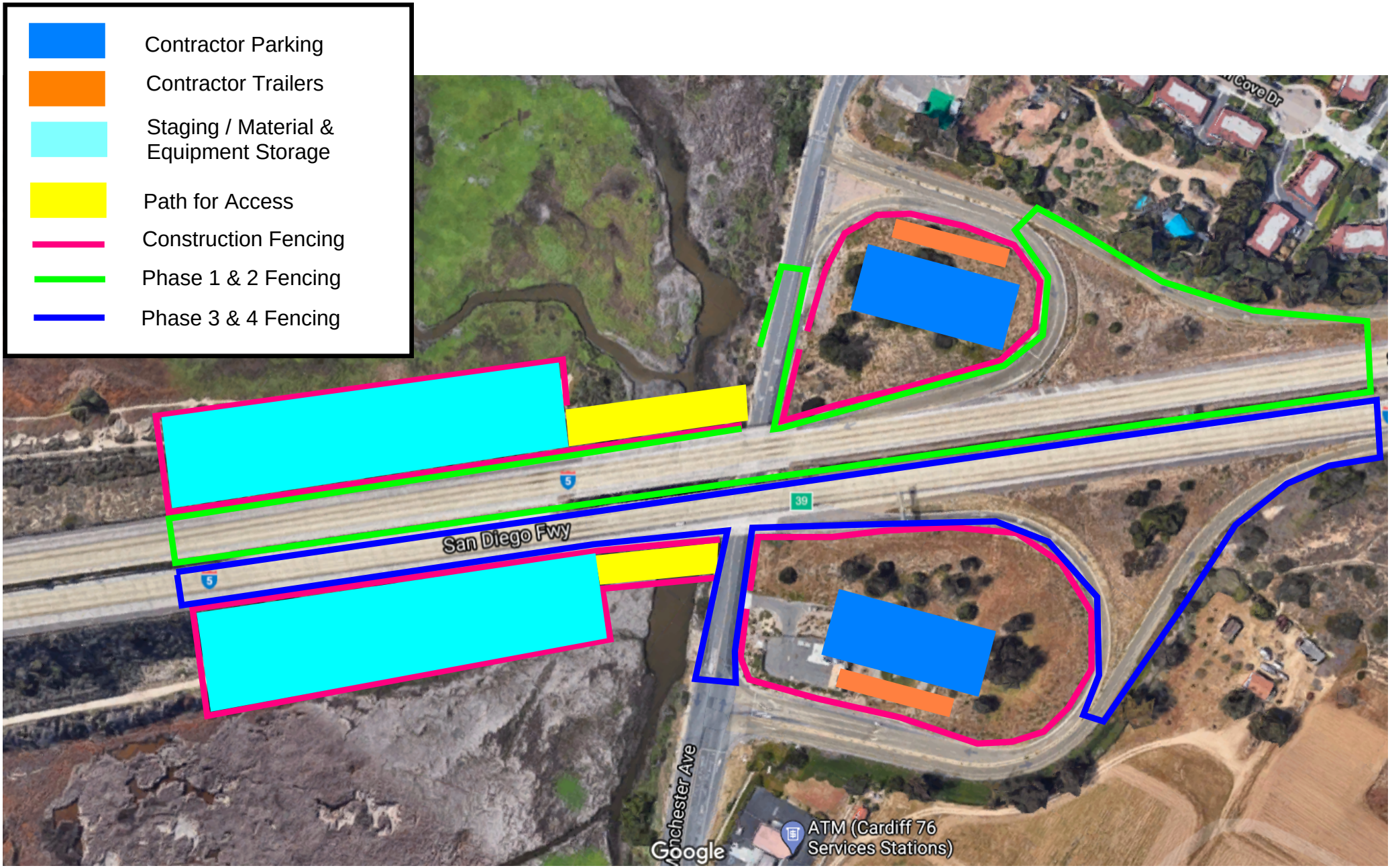
Phase 4


San Diego Fwy
5
39
Pour Deck
Concrete both side
working in
Google
ATM (Cardiff 76
Services Stations)

Phase 4


San Diego Fwy
5
39
Place Asphalt &
open to traffic
Google
ATM (Cardiff 76
Services Stations)

BB Incorporated Site Logistics Plan



14. Technical Report

Design Report

General Description

The innovative design for the Main Bridge Replacement was conjured up in the hopes to build an efficient and sustainable structure. The idea for a cable-stayed bridge was devised in order to keep the San Elijo Lagoon untouched in efforts to preserve the current ecosystem.

Materials

The bridge design is made possible through the use of inclined pylons. They consist of steel caissons that are erected and filled with concrete. For the bridge deck, it consists of steel W shape members that are connected with steel bolts. The slab that sits above the deck is made of concrete and asphalt pavement.

Description of Structural Members

The structural elements of the main bridge replacement are made up of a series of parts that work together to maintain an efficient design. Without one of these elements the design would not be possible. The deck of this bridge is made up of steel W shape members which will be held up by steel cables connected to 3 pylons on each side of the bridge. These cables transfer the dead and live load from the deck to the towers. To avoid installing anchors, the towers were tilted to 62 degrees from horizontal to utilize the towers' self counteract the weight experienced on the deck. These towers then take all the compression and tension forces and transfer then down into the foundations. The foundations then transfer the loads through the piles that are drilled into bedrock.

Loads Analysis

Utilizing the loads described in Table A, and specifications in the ACI 318 Building Code, the following elements were determined to be the most efficient for the loads being experienced and and the overall cable stayed design. A model of this bridge was created using SAP which computed the maximum positive and negative moments of the bridge and those values were utilized to optimize the design. Images of the SAP model can be seen in Figures 1-4.

Load Type	Description	Load psf
Dead Load	Self-weight of the structures permanent elements Unit weight of concrete= 150 pcf Pavement weight = 40 pcf Barriers (line load) = 250 plf	**152.92**
Design Lane Load	Live load produced by a lane on the bridge superstructure due to vehicular traffic = 0.64 k/ft	**53.33**

Table A: Loads applied in preliminary design calculations of deck

Preliminary Design

In designing the deck for the cable-stayed bridge, it was determined that the thickness of the deck to be 8". This parameter allowed the calculation of the box girder's flange spacing using ACI Table 7.3.1.1. The outer flanges of the box girder were determined to be 6'8" from the edge of the slab edges utilizing $h_{min} = \frac{l}{10}$ for a one way slab with a cantilever end. The middle four flanges were then determined to be spaced at 13'4" on center through multiplying 6'8" by two. The use of 13'4" was checked with $h_{min} = \frac{l}{28}$, or the minimum slab thickness equation for a one way slab with continuous ends. *l* was found to be 18.67'. Thus, as 13'4" is less than 18.67' then the middle four flanges spaced at 13'4" on center is acceptable. A series of checks were executed based on ACI compliance for our slab design. These checks include minimum height of section, minimum width of section, minimum steel reinforcement, Ductility check and DCR check. As can be seen in Tables C and D, the slab passes all checks for both positive bending and negative bending.

The bridge replacement team has incorporated a series of Cable- Stayed ideas and arrived at an innovative yet efficient design for this project. The design of the pylons is inspired by the Alamillo Bridge in Seville, Spain whose idea was devised by Santiago Cavaltrava. The bridge features three towers that will each support the loads experienced on the deck and carried by the steel cables. These towers are tilted 62 degrees from horizontal and are made of steel caissons and concrete to counterbalance the weight from the deck. The cables are pin connected to the tower and anchored to the deck each at 28 degrees from horizontal. The total height of the pylons was determined to be 207 feet as was calculated to be the most efficient height for this preliminary design.

Preliminary Deck Design Summary Table
Design Factors f'c: 5000 psi Es : 29000ksi
Dead Load: Concrete Unit weight: 150 pcf Pavement Unit Weight: 140 pcf Barrier: 250 pcf **Live Load:** HL-93 & Permit Design Load (point loads): 1.44 k/ft
Element
Pavement Thickness : 4 in. Acceptable Design
Slab Thickness : 8 in. Acceptable Design :
Girder - W40X593 Depth : 43 in. Flange Width : 16.7 in. Flange Thickness : 3.23 in. Web Thickness : 1.79 in.
Cross-Beam - W24X76 Depth : 23.9 Flange Width : 8.99 Flange Thickness : 0.68 Web Thickness : 0.44
Beam- W40X593 Depth : 43 in. Flange Width : 16.7 in. Flange Thickness : 3.23 in. Web Thickness : 1.79 in.

Table B: Deck Design Summary Table

Design of Abutment

The process of the abutment calculations were made up of a series of iterations because checks needed to be done in order to get a reasonable factor of safety (FS) according to CalTrans standards. The overturning moment calculation resulted with a factor of safety of 2.74 which is greater than 1.5 the minimum, therefore the abutment dimensions are good to resist overturning. For sliding calculations, we found that the factor of safety resulted in 2.64 which is greater than 1.5, therefore, it met safety factory requirements. However, the bearing capacity was calculated and it resulted in a safety factor of 2.639 which is less than the safety factor of 3 needed in the bearing capacity calculation, therefore showing that piles are needed for this bridge. Each variable that goes into the bearing capacity was taken from the soil report that was tabulated in the soil parameters taken from the RFP.

This bridge will have a total of 4 abutments with two on each end of the bridge. Per the design calcs shown in table B, the bridge load that will be acting on one abutment is 339.64k. This load along with the self weight of the abutment, the weight of the pylons, and the weight of the foundations will be acting on the piles. Doing these calculations results in about 19.378 piles which tells us that we need 20 piles for each abutment. However, the weight of 339.64k acting on the abutment is lower than the bearing capacity of one pile which is 1660.74k. Therefore, taking this into consideration, the abutment itself will not have any piles.

Design of Footings

The design of the footings were determined based on the load of the bridge deck and the load of each pylon that needs to be supported. The design for the footing had to be large enough to resist those loads. There are three footings in which the middle footing is twice as large as the two footings on the sides. This is due to the fact that the middle foundation carries half of one bridge and half of the other. The footing that goes below the middle antenna is 120’ by 45’ with 40 piles and the two side footings that accommodate the two smaller antennas will have dimensions of 80’ by 30’ with 20 piles. This totals to 160 piles for the entire bridge. The foundations for the middle pylon will be 20 feet in depth with a step of 10 feet. For the foundations of the two smaller pylons will be half the middle foundation which will be 10 feet in depth with a 5 feet step. The piles will be distributed along all three footings, in which there will be 40 in the middle footing and 20 on the two smaller footings. The piles on the South side of the bridge, going towards San Diego, will have a length of 180 feet in depth and the

piles on the North side of the bridge, going towards Los Angeles, will have a length of 160 feet in depth.

Settlement and Lateral Calculations

The first step was to obtain the initial soil layer thickness. Then the dimensionless bearing capacity index variable was obtained from the AASHTO federal highway manual. Then the soil unit weight and the length of the abutment was used to compute the values of effective vertical stress and the average change in vertical stress. Once all of the parameters were determined the settlement was calculated. For the lateral loads, the stress on the pile was computed to be 10.98 ksf.

Geotechnical Design Calculations
Overturning Calculation on Abutment Σ Wi = 30340.5 lb/ft Σ Mo (Resultant Moment) = 240348.5535 lb-ft/ft Overturning Moment = 87750 lb-ft/ft FS = 2.739 > 1.5 **GOOD**
Bearing Capacity qu = 23700.61 e = 0.5 qtoe = 8802.32 *governs qheel = 4721.73 FS = qu/qtoe = 2.693 < 3 **FAIL** need piles
Sliding Calculation of Abutment Kp = 4.2 Pp = 12287.27 D = 6 ft B = 10ft FS = 2.46 > 1.5 **GOOD**
Piles Weight on abutment = 339.64 k Total loads on piles = 41904.k # of piles needed = 160 piles D = 4 ft Ls (length on south side) = 180ft into bedrock Ln (length on the north side) = 160ft into bedrock

Settlement and Lateral Load
Stress on piles = 10.8 ksf, 10.93 ksf
Settlement differential = 0.43 in

Table B: Deck Design Summary Table

ACI Compliance Checks (Positive Bending)				
Geometry				
Top Base	bt	960	in	
Base Web	bw	72	in	
Height	h	75	in	
Effective depth	d	72	in	
Length	L	80	ft	
Dead Load	WD	32.05	k/ft	
Live Load	WL	13.84	k/ft	
Materials				
Compressive Strength	f'c	5	ksi	
Yield Strength	fy	60	ksi	
Type of Concrete				Normal Weight or Light Weight
Structural Analysis				
Load Combination 1	Wu1	44.87	k/ft	1.4WD
Load Combination 2	Wu2	60.604	k/ft	1.2WD+1.6WL
Governing Load Combination		60.604	k/ft	
Moment	Mu	4240.37	k-ft	
	ϕ	0.9		
Nominal Moment	Mn	4711.5222	k-ft	Mu/ϕ
	Z	64.8	in	=0.9*d
	T	872.50412	kip	Mn/Z
Area of Steel Required	As,req	14.5	in^2	
Checks and Drawings				
Select Steel Reinforcement Check				
Number of rebars	n	12		
Rebar cross-sectional area	A	1.56	in^2	
Area of Steel	As	18.72	in^2	
Reinforcement Check		PASS		
Minimum Section Width Check				
Minimum width	bmin	36.62	in	From Table 5
Section Width Check		PASS		
Minimum Section Height Check				
rebar diameter	db	1.128	in	from Table 5
strirrup diameter	ds	0.375	in	
minimum clear cover	Cc	1.5	in	
Minimum Height	hmin	74.439	in	hmin=d+db/2+ds+Cc
Minimum Height Check		PASS		
Minimum Reinforcement Check				
Percent of Steel	ρ	0.0036111		As/bd
Minimum Percent of Steel	ρmin	0.0035		from Table A.7
Reinforcement Check		PASS		
Ductility Check				
Yield Strain of Steel	εcu	0.003	in/in	
	a	3.6705882	in	As*fy/0.85*f'c*b
	β	0.8		From Table A.7
	c	4.5882353	in	a/β
	εs	0.0440769	in/in	εcu*((d-c)/c)
Ductility Check		PASS		
DCR				
Reduced Nominal Moment	φMn	5910.6748	k-ft	φAsfy(d-a/2)
DCR	DCR	0.7174088		Mu/φMn
DCR Check		PASS		DCR<1 (typ values between 0.9 and 1

Table C: ACI Compliance Checks for Box Girder experiencing positive bending.

ACI Compliance Checks (Negative Bending)				
Geometry				
Top Base	bt	72	in	
Base Web	bw	72	in	
Height	h	75	in	
Effective depth	d	72	in	
Length	L	80	ft	
Dead Load	WD	32.05	k/ft	
Live Load	WL	13.84	k/ft	
Materials				
Compressive Strength	f'c	5	ksi	
Yield Strength	fy	60	ksi	
Type of Concrete				Normal Weight or Light Weight
Structural Analysis				
Load Combination 1	Wu1	44.87	k/ft	1.4WD
Load Combination 2	Wu2	60.604	k/ft	1.2WD+1.6WL
Governing Load Combination		60.604	k/ft	
Moment	Mu	4240.37	k-ft	
	ϕ	0.9		
Nominal Moment	Mn	4711.5222	k-ft	Mu/ϕ
	Z	64.8	in	=0.9*d
	T	872.50412	kip	Mn/Z
Area of Steel Required	As,req	14.5	in^2	
Checks and Drawings				
Select Steel Reinforcement Check				
Number of rebars	n	12		
Rebar cross-sectional area	A	1.56	in^2	
Area of Steel	As	18.72	in^2	
Reinforcement Check		PASS		
Minimum Section Width Check				
Minimum width	bmin	36.62	in	From Table 5
Section Width Check		PASS		
Minimum Section Height Check				
rebar diameter	db	1.128	in	from Table 5
stirrup diameter	ds	0.375	in	
minimum clear cover	Cc	1.5	in	
Minimum Height	hmin	74.439	in	hmin=d+db/2+ds+Cc
Minimum Height Check		PASS		
Minimum Reinforcement Check				
Percent of Steel	ρ	0.0036111		As/bd
Minimum Percent of Steel	ρmin	0.0035		from Table A.7
Reinforcement Check		PASS		
Ductility Check				
Yield Strain of Steel	εcu	0.003	in/in	
	a	3.6705882	in	As*fy/0.85*f'c*b
	β	0.8		From Table A.7
	c	4.5882353	in	a/β
	εs	0.0440769	in/in	εcu*((d-c)/c)
Ductility Check		PASS		
DCR				
Reduced Nominal Moment	φMn	5910.6748	k-ft	φAsfy(d-a/2)
DCR	DCR	0.7174088		Mu/φMn
DCR Check		PASS		DCR<1 (typ values between 0.9 and 1

Table D: ACI Compliance Checks for Box Girder experiencing negative bending.

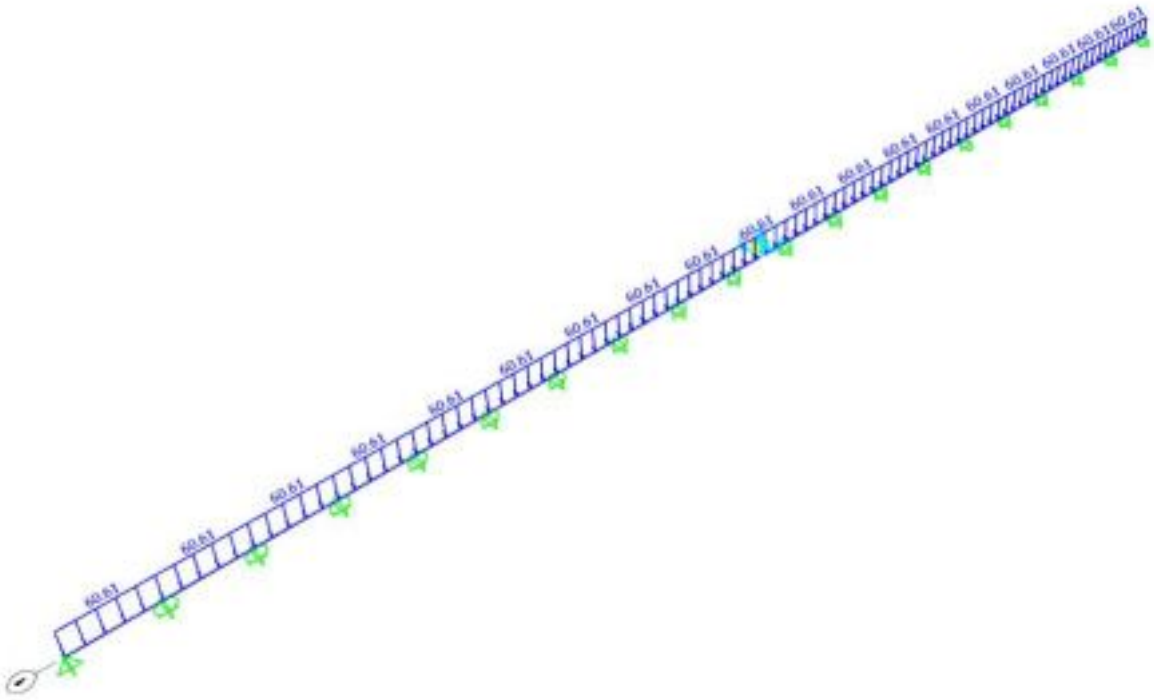


Figure 1 - SAP Model with Loading in k/feet

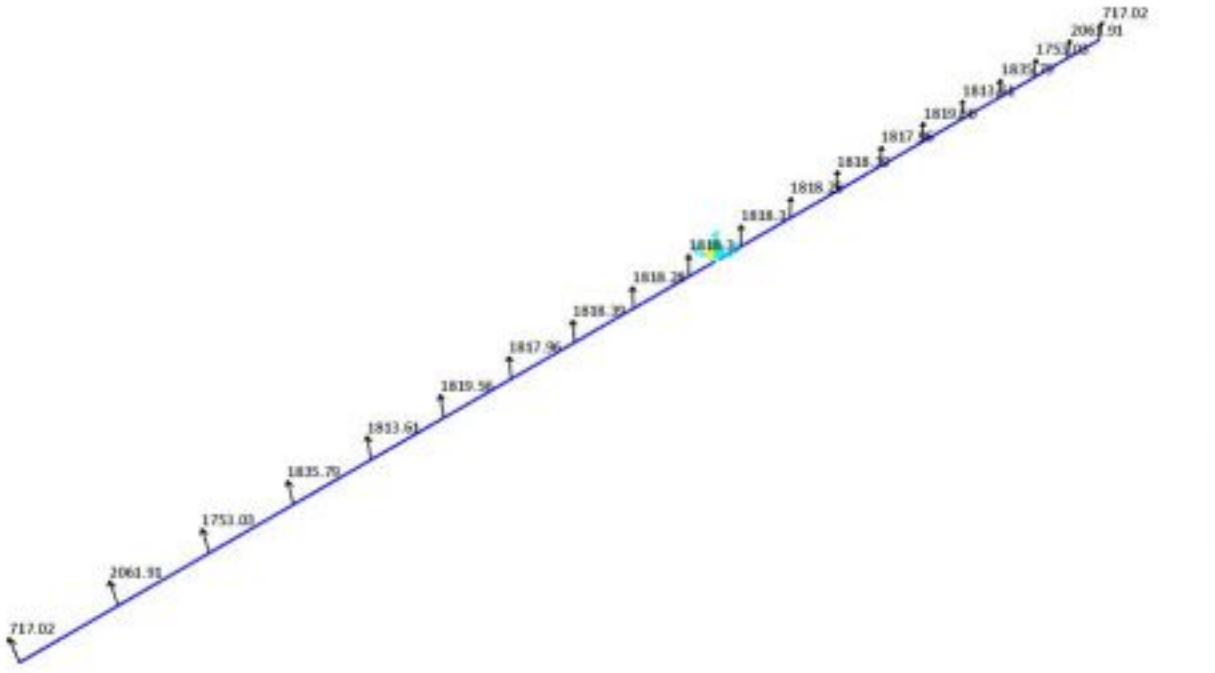


Figure 2 - Reactions Per Bridge Span in kips

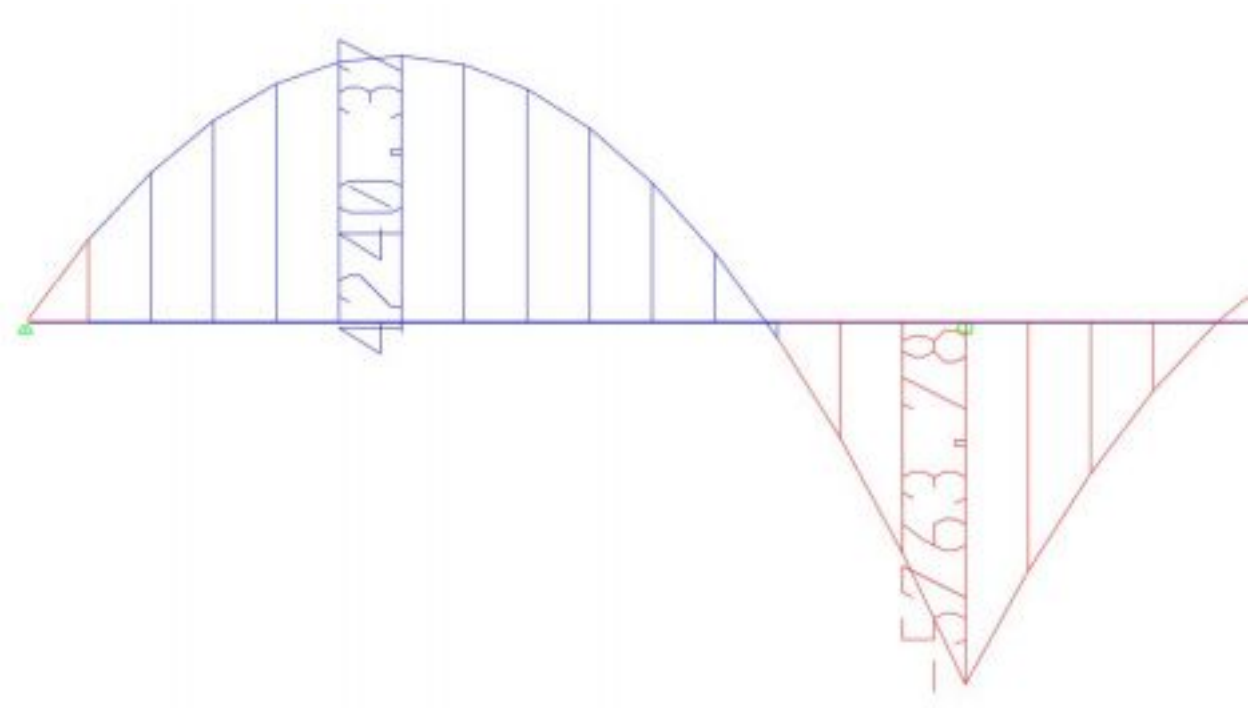


Figure 3 - Maximum Positive and Negative Bending Moments in kip-feet

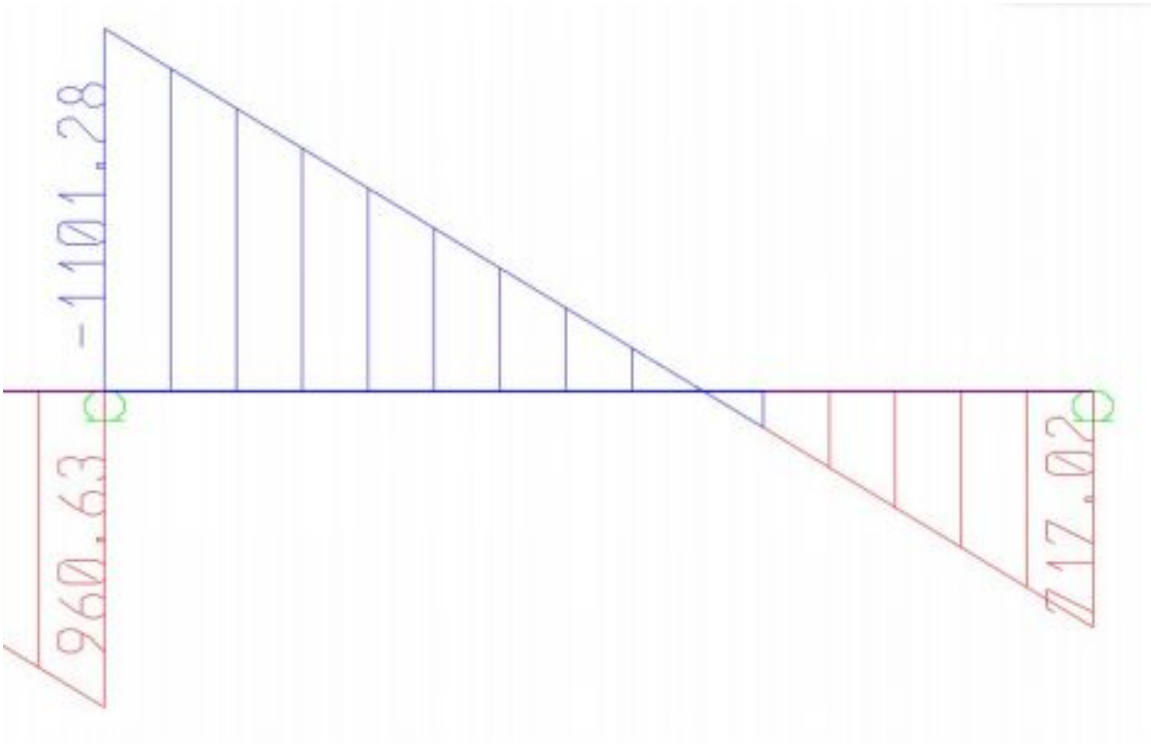


Figure 4 - Maximum Shear in kips

Design Report - Overpass

All design and analysis will be based on AASHTO LRFD highway specifications and the ACI code to have the best strength design limits for this structure. LRFD load combinations will be used to help determine loads of worst-case scenarios so that the design can avoid and mitigate around those extreme events. Below in table (1-10) and figures 1-8, illustrates and calculates the different scenarios for dead, live and ACI calculations for rebar. In another document, I will discuss the other loading that is needed to take notice as well for constructing the abutments and needed number of piles.

The Overpass structure is built to reduce the traffic flow and allow vehicles to have a smooth transition on and off the highway in San Elijo. Based on the preliminary design, it was decided to use a box girder structure for the two different overpass bridges based on the length, curvature and time efficiency. One bridge is estimated to have 120 feet long with 93 feet span width. This overpass bridge consists of two different box bridges connected with a closure pour. The curved bridge has a superelevation of 2 degrees due to a wide curve of 132 feet long and 33 and a half feet for the span width. The Box girder design allows the two bridges to hold their own dead and live load when traffic presumes. This method of construction for the box girder will be prefabricated by another contractor to create a more time efficiency in focusing on the platforms and abutments that will be the foundation for the overpass bridges.

Construction

To start the project as a whole, there will be an excavation process to allow a road to follow underneath both overpasses. This road will allow drivers to have direct access to the two HOV lanes. The soil that will be lifted up to have a gradual decline underneath the overpass will be used as the elevation foundation for both bridges to execute a higher elevation. After the settlement of the soil, the piles will be drilled into the ground, once it hits the bedrock. There will be 12 of piles at each abutment at a length of 150 feet for the curved abutment. For the Straight abutment, there will be 14 piles at a length of 150 feet. There will be two layers of piling to help with overcoming the torsion and moment that the bridges will have due to the dead and live loading.

The abutments will be constructed before the box girders arrive to ensure a solid foundation that will carry the vertical and horizontal loads. During the first construction phase of the straight overpass bridge there will not be a lane closure, due to this box girder will only be expanding the highway and not have any interference with the traffic. As soon as the right box girder has been placed, the traffic will be moved to the right side to allow the construction of the HOV lanes (left side) to begin. There will be a lane closure pour to connect both box girders together along with a barrier to separate the

two sides. As for the curve overpass bridge, the box girder will be in place in one piece as soon as the abutments have been constructed. The wingwalls will be also worked on as a finished phase of the two bridges. This will allow a smooth transition from road to bridge.

Load Analysis

Dead load is the constant loading caused by the weight and density of the materials used, such as concrete, and steel. To find the dead load of a structure, or slab, the density of the material needs to be multiplied by the depth of the slab. Now to find the UDL (uniformly distributed load) of the slab, it's taking the dead load and multiplying by the area of the slab. Both overpass bridges have a concrete slab of 8 inches. This will allow the bridges to have greater durability and longer life cycle since it is near the ocean. The calculations are shown in Tables 1, 2, 4 and 5.

Just like the dead load, the live load takes the loading caused by the weight and area, but this time in motion. For bridges, and roadways, the moving object would be the vehicles and the amount of traffic expected to travel. Now, pedestrian bridges take into account vehicles, but as well as people. In the overpass structure, there are no sidewalks, therefore no people. When calculating the live load, it is always best to consider the worst scenario for a bridge. This would be to measure the weight of a Semi-truck of 20,000 pound or even more for each lane to see if it still passes. The calculations for these two overpasses are in Table 3 and Table 6.

Curve Overpass	
Dead Load	97.53 lb/ft
Live Load	1280 lb/ft
Straight Overpass	
Dead Load	25592 lb/ft
Live Load	3840 lb/ft

Table 1: Dead load and Live Loading for Overpass

ACI Compliance Checks

In the ACI Compliance Check, it calculates everything that the design is shown in the AutoCAD to ensure that it works for the dead loads. This also allows to figure out the required amount of rebar for the additional reinforcements. All calculations for the two overpass bridges

are in Table 7 and Table 8. For the Curve and Straight Overpass, there is accountability for the length, base of the flanges and walls, dead load and live load. With the chosen load combination, W(u), the moment can be found for the walls and slabs. Area of steel required will be based on the moment found. The area of steel required is only the minimum requirement for the reinforcement needed. When calculating the number of rebar needed to reach the required area of steel, it's recommended to get as close to the value of the required. Therefore, there will not be an excess of rebar, that could potentially harm the structure. For the Clear cover of the bottom flange of both overpass bridges, it will have a minimum of 4 inches, due to the environment the cement is constantly exposed to.

Wind Loads

When calculating wind loads, it's important to know the locations of the project. The two overpasses are in San Elijo, close to the coastlines. WIth that notice, it puts it in a higher risk category due to possible earthquakes, hurricanes and coastal storms that could potentially damage the bridges and put citizens at risk. This put the overpass bridges at a Risk Category 3 due to the potential lives that could be effected. The Basic wind speed for this location is 100 mph, given by the ASCE Standard in Figure 26.5-1C.

SAP Modeling

The Sap modeling provided in this design report, represents the dead and live loading on the bridge. It allows us to visualize how the bridge will be affected with the loading applied to it and calculate the moment and shear of the bridges. as well as, combine and ensure that the moment of the bridges are the same or similar to the ACI Compliance Checks. The illustration is shown in Figure 1 through 8.

	Job No.		Sheet:	Rev:	
	Job Title	San Elijo Lagoon Replacement Bridge			
	Subject	Curve Overpass			
	Client	Made By:	Nadia Manzur	Date:	10/18/2020
		Check By:		Date:	

Calculation Sheet for Dead Loads

Dead load = Density * Volume

Top Slab		
Desity of Concrete	150	pcf
Slab Thickness	8	inches
Width	33.5	feet
Length	132	Feet
Area	4422	f^2
Volume	2948	f^3
Dead Load	442200	lb

Bottom Slab		
Desity of Concrete	150	pcf
Slab Thickness	8	inches
Width	20.7	feet
Length	132	Feet
Area	2732.4	f^2
Volume	1821.6	f^3
Dead Load	273240	lb

Walls (3)		
Desity of Concrete	150	pcf
Slab Thickness	54	inches
Width	0.67	feet
Length	132	Feet
Area	88	f^2
Volume	396	f^3
Dead Load	59400	lb
#of Coumns	3	
Column Dead Load	178200	lb

Table 1: Dead Load of Curve Over Pass

	Job No.		Sheet:		Rev:	
	Job Title	San Elijo Lagoon Replacement Bridge				
	Subject	Curve Overpass				
	Client		Made By:	Nadia Manzur	Date:	10/18/2020
			Check By:		Date:	

Calculation Sheet for Dead Loads

Dead load = Density * Volume		
Ashphalt		
Depth	3	in
length	132	ft
width	29.5	ft
weight of asphaly	130	pcf
Volume	973.5	
Dead load of Aspalt	126555	lb
Parapets		
Depth	4.5	ft
Length	132	ft
Width	1.5	ft
Density	150	pcf
quanity	2	
Volume	891	
Total Dead load for Pa	267300	lb
	267.3	kips
Total Dead Load		
	1287495	lb
	1287.50	kips
	0.291	
w (d)	9753.75	lb/ft

Table 2: Continue of Dead Load Calculations of Curve Overpass

	Job No.		Sheet:		Rev:	
	Job Title	San Elijo Lagoon Replacement Bridge			
	Subject	Curve Overpass			
	Client	Made By:	Nadia Manzur	Date:	10/18/2020
		Check By:		Date:	

Calculation Sheet for Live Loads

Live Load = Area * Live loading traffic

AA	H-20	
Number of Lanes	2	
Mutiple Presense Fact	1	
Total Vehicle weight	72	kips
Design lane Load	0.64	Klf
Loading Cases		
Loaded Length	132	ft
Loaded Width	24	ft
Live Load Factor	640	plf
Live Load of Slab	168960	Lb
	168.96	Kf
w(l)	1280	lb/ft

Table 3: Live Load Calculations for Curve Overpass

	Job No.		Sheet:		Rev:	
	Job Title	San Elijo Lagoon Replacement Bridge				
	Subject	Straight Overpass				
	Client		Made By:	Nadia Manzur	Date:	10/26/2020
			Check By:		Date:	

Calculation Sheet for Dead Loads

Dead load = Density * Volume

Top Slab #1			**Top Slab #2**		
Desity of Concrete	150	pcf	Desity of Concrete	150	pcf
Slab Thickness	8	in	Slab Thickness	8	in
Width	62	ft	Width	30	ft
Length	120	ft	Length	120	ft
Area	7440	ft^2	Area	3600	ft^2
Volume	4960	ft^3	Volume	2400	ft^3
Dead Load	744000	lb	Dead Load	360000	lb

Bottom Slab#1			**Bottom Slab#2**		
Desity of Concrete	150	pcf	Desity of Concrete	150	pcf
Slab Thickness	8	in	Slab Thickness	8	in
Width	51	ft	Width	18	ft
Length	120	ft	Length	120	ft
Area	6120	ft^2	Area	2160	ft^2
Volume	4080	ft^3	Volume	1440	ft^3
Dead Load	612000	lb	Dead Load	216000	lb

Walls Abutment #1			**Walls Abutment #2**		
Desity of Concrete	150	pcf	Desity of Concrete	150	pcf
Slab Thickness	54	in	Slab Thickness	54	in
Width	0.67	ft	Width	0.67	ft
Length	120	ft	Length	120	ft
Area	80	f^2	Area	80	f^2
Volume	360	f^3	Volume	360	f^3
Dead Load	54000	lb	Dead Load	54000	lb
# of Walls	6		# of Walls	3	
Column Dead Load	324000	lb	Column Dead Load	162000	lb

Table 4: Dead Load Calculations for Straight Overpass

	Job No.		Sheet:		Rev:	
	Job Title	San Elijo Lagoon Replacement Bridge				
	Subject	Straight Overpass				
	Client		Made By:	Nadia Manzur	Date:	10/26/2020
			Check By:		Date:	

Calculation Sheet for Dead Loads

Ashphalt #1			**Ashphalt #2**		
Depth	3	in	Depth	3	in
length	120	ft	length	120	ft
width	48	ft	width	26	ft
weight of asphaly	130	pcf	weight of asphaly	130	pcf
Volume	1440		Volume	780	
Dead load of Aspalt	187200	lb	Dead load of Aspalt	101400	lb

Parapets			**Parapets**		
Depth	4.5	ft	Depth	4.5	ft
Length	120	ft	Length	120	ft
Width	1.5	ft	Width	1.5	ft
Density	150	pcf	Density	150	pcf
quanity	1.5		quanity	1.5	
Volume	810		Volume	810	
Total Dead load for Para	182250	lb	Total Dead load for Parap	182250	lb
	182.25	kips		182.25	kips

Total Dead Load	2049450	lb	**Total Dead Load**	1021650	lb
	2049.45	kips		2049.45	kips
	0.275464			0.559959	
w (d)	17078.75	lb/ft	**w (d)**	8513.75	lb/ft

Total Dead Load	3071100	lb
	3071.1	kips
	0.276676	
w (d)	25592.5	lb/ft

Table 5: Continue of Dead Load Calculations for Straight Overpass

	Job No.		Sheet:		Rev:	
	Job Title	San Elijo Lagoon Replacement Bridge			
	Subject	Straight Overpass			
	Client	Made By:	Nadia Manzur	Date:	10/26/2020
		Check By:		Date:	

Calculation Sheet for Live Loads

Live Load = Area * Live loading traffic

Live Load for Abutment #1		
AA	H-20	
Number of Lanes	4	
Loaded Length	120	ft
Loaded Width	48	ft
Live Load Factor	640	plf
Live Load of Slab	307200	Lb
	307.2	Kf
w(l)	2560	lb/ft

Live Load for Abutment #2		
AA	H-20	
Number of Lanes	2	
Loaded Length	120	ft
Loaded Width	24	ft
Live Load Factor	640	plf
Live Load of Slab	153600	Lb
	153.6	Kf
w(l)	1280	lb/ft

Total Live Load	460800	lb
	460.8	kf
W(l)	3840	lb/ft

Table 6: Live Load Calculations for Straight Overpass

ACI Compliance Checks For Curve Overpass				
Geometry				
Base of walls	b(w)	24	in	
base of Bottom Flange	b	248.4	in	
Base of Flange	b(e)	402	in	
Height	h	70	in	
Effective depth	d	66	in	
Length	L	132	ft	
Self Dead Load	WSDL	9.75	K/ft	
Live Load	WL	1.28	K/ft	
Materials				
Compressive Strength	f'c	6	psi	
Yield Strength	fy	60	ksi	
Type of Concrete		150	pcf	Normal Weight or Light Weight
Structural Analysis				
Dead Load due to Self Weight	WSW	1.75	k/ft	((b * h)/144) *150pcf
	WD	11.50	k/ft	wsw + wsdl
Load Combination 1	Wu1	16.10	k/ft	1.4WD
Load Combination 2	Wu2	15.85	k/ft	1.2WD+1.6WL
Governing Load Combination		16.10	k/ft	
Moment	Mu	35065.80	k-ft	((Wu)(L^2))/8 (simply supported)
	ϕ	0.90		
Nominal Moment	Mn	38962.00	k-ft	Mu/ϕ
	Z	4.95	ft	=0.9*d
	T	7871.11	kip	Mn/Z
Area of Steel Required	As,req	131.19	in^2	
Checks and Drawings				
Select Steel Reinforcement Check				
Number of rebars	n	105		
Rebar cross-sectional area	A	1.27	in^2	
Area of Steel	As	133.35	in^2	
Reinforcement Check		PASS		
Minimum Section Width Check				
Minimum width	bmin	213.25	in	From Table 5
Section Width Check		PASS		
Minimum Section Height Check				
rebar diameter	db	1.27	in	from Table 5
strirrup diameter	ds	0.375	in	
minimum clear cover	Cc	2.5	in	
Minimum Height	hmin	69.51	in	hmin=d+db/2+ds+Cc
Minimum Height Check		PASS		
Minimum Reinforcement Check				
	ρ	0.0842		ρ/bd
	ρmin	0.0285		from Table A.7
Reinforcement Check		PASS		
Ductility Check				
Yield Strain of Steel	εcu	0.003	in/in	
	a	6.32	in	As*fy/0.85*f'c*b
	β	0.75		Fromt Table A.7
	c	8.42	in	a/β
	εs	0.02	in/in	εcu*((d-c)/c)
Ductility Check		PASS		
DCR				
Reduced Nominal Moment	φMn	37710.0		φAsfy(d-a/2)
DCR	DCR	0.930		Mu/φMn
DCR Check		PASS		DCR<1 (typ values between 0.9 and 1

Table 7: ACI Compliance Calculation Check for Curve Overpass

ACI Compliance Checks				
Geometry				
Base of walls	b(w)	72	in	
base of Bottom Flange	b	828	in	
Base of Top Flange	b(e)	1116	in	
Height	h	70	in	
Effective depth	d	66	in	
Length	L	120	ft	
Self Dead Load	WSDL	25.6	K/ft	
Live Load	WL	3.84	K/ft	
Materials				
Compressive Strength	f'c	6	psi	
Yield Strength	fy	60	ksi	
Type of Concrete		150	pcf	Normal Weight or Light Weight
Structural Analysis				
Dead Load due to Self Weight	WSW	5.25	k/ft	((b * h)/144) *150pcf
	WD	30.84	k/ft	wsw + wsdl
Load Combination 1	Wu1	43.18	k/ft	1.4WD
Load Combination 2	Wu2	43.16	k/ft	1.2WD+1.6WL
Governing Load Combination		43.18	k/ft	
Moment	Mu	77723.10	k-ft	((Wu)(L^2))/8 (simply supported)
	ϕ	0.9		
Nominal Moment	Mn	86359.00	k-ft	Mu/ϕ
	Z	4.95	ft	=0.9*d
	T	17446.26	kip	Mn/Z
Area of Steel Required	As,req	290.77	in^2	
Checks and Drawings				
Select Steel Reinforcement Check				
Number of rebars	n	235		
Rebar cross-sectional area	A	1.27	in^2	
Area of Steel	As	298.45	in^2	
Reinforcement Check		PASS		
Minimum Section Width Check				
Minimum width	bmin	599.61	in	From Table 5
Section Width Check		PASS		
Minimum Section Height Check				
rebar diameter	db	1.27	in	from Table 5
strirrup diameter	ds	0.375	in	
minimum clear cover	Cc	2.5	in	
Minimum Height	hmin	69.51	in	hmin=d+db/2+ds+Cc
Minimum Height Check		PASS		
Minimum Reinforcement Check				
	ρ	0.063		ρ/bd
	ρmin	0.0285		from Table A.7
Reinforcement Check		PASS		
Ductility Check				
Yield Strain of Steel	εcu	0.003	in/in	
	a	4.24	in	As*fy/0.85*f'c*b
	β	0.75		Fromt Table A.7
	c	5.65	in	a/β
	εs	0.03	in/in	εcu*((d-c)/c)
Ductility Check		PASS		
DCR				
Reduced Nominal Moment	φMn	85792.1		φAsfy(d-a/2)
DCR	DCR	0.906		Mu/φMn
DCR Check		PASS		DCR<1 (typ values between 0.9 and 1

Table 8: ACI Compliance Calculation Check for Straight Overpass

ACI Compliance Checks For Curve Top Slab				
Material and Loading				
Type of Concrete		150	pcf	
	L	10	ft	
	f'c	6	ksi	
	fy	60	ksi	
	h(min)	8	in	one way- simply supported slab
assumed	b	12	in	
Actual	b	402	in	
Primiary reinforcement		#6		
	db	0.75	in	
	Ab	0.44	in^2	
	d	6.875		h- (3/4) - (db/2)
Self-weight dead load	Swslab	100	lb/ft	
	WSD	189		
	WD	189	lb/ft	
	WL	38.21	lb/ft	
Structural Analysis				
Loading Combination	Wu1	264.6	lb/ft	1.4 *WD
	Wu2	325.736	lb/ft	1.2*WD + 1.6WL
Governing Moment	Wu	325.736	lb/ft	
Moment	Mu	4.07	k-ft/ft	Wu * L^2 / 8
	ϕ	0.90		
	R	0.008		Mu/ phi *b* d^2
required *	As >=	0.011		(.85*f'c*b*d)/fy)*(1-sqrt(1- (2*R/.85f'c))
#6 spacing	Ab	0.44	in^2	
	S	8.00	in	(Ab*12)/ A(required)
	As(min)	0.1728		.0018 (b*h)
	As/ft	0.660		Ab*12/ spacing
Reinforcement Check		Pass		
Select Steel Reinforcement Check				
	Rebar	#6		
	As	0.660	in^2	
	Diameter	0.75		
Spacing	s	8.00	in	
	n	46		
	Total length	395	in	
Total Width of Span	B	402	in	
Percent Error		1.9	%	
Max Steel Reinforcement		Pass		0%-5% error
Check and Drawings				
Moment	Mu	4.07	k-ft	((Wu)(L^2))/8 (simply supported)
	ϕ	0.90		
Nominal Moment	Mn	4.52	k-ft	Mu/ϕ
	Z	0.52	ft	=0.9*d
	T	8.77	kip	Mn/Z
Area of Steel Required	As,req	0.15	in^2	
Number of rebars	n	46		
Rebar cross-sectional area	A	0.44	in^2	
Area of Steel	As	20.24	in^2	
Reinforcement Check		PASS		
Minimum Section Width Check				
Minimum width	bmin	84	in	From Table 5
Section Width Check		PASS		
Minimum Section Height Check				
rebar diameter	db	0.75	in	from Table 5
strirrup diameter	ds	0.375	in	
minimum clear cover	Cc	2.5	in	
Minimum Height	hmin	3.69	in	hmin=d+db/2+ds+Cc
Minimum Height Check		PASS		
Minimum Reinforcement Check				
	ρ	11.2975		ρ/bd
	ρmin	0.0285		from Table A.7
Reinforcement Check		PASS		
Ductility Check				
Yield Strain of Steel	εcu	0.003	in/in	
	a	0.59	in	As*fy/0.85*f'c*b
	β	0.75		Fromt Table A.7
	c	0.79	in	a/β
	εs	0.02	in/in	εcu*((d-c)/c)
Ductility Check		PASS		
φMn> Mu				
Moment	Mu	4.07	k-ft	
Reduced Nominal Moment	φMn	599.2		φAsfy(d-a/2)
		PASS		

Table 9: ACI Requirement for Curve Top Slab

ACI Compliance Checks For Curve Overpass				
Material and Loading				
Type of Concrete		150	pcf	
Estimate	L	10	ft	
	f'c	6	ksi	
	fy	60	ksi	
	h(min)	6	in	one way- simply supported slab
assumed	b	12	in	
Actual	b	1116	in	
Primiary reinforcement		#6		
	db	0.75	in	
	Ab	0.44	in^2	
Estimate	d	4.9		h-1.1
Self-weight dead load	Swslab	75	lb/ft	
	WSD	159.15		
	WD	159.15	lb/ft	
	WL	41.73	lb/ft	
Structural Analysis				
Loading Combination	Wu1	222.81	lb/ft	1.4 *WD
	Wu2	289.578	lb/ft	1.2*WD + 1.6WL
Governing Moment	Wu	289.578	lb/ft	
Moment	Mu	3.62	k-ft/ft	Wu * L^2 / 8
	ϕ	0.90		
	R	0.014		Mu/ phi *b* d^2
required *	As >=	0.014		(.85*f'c*b*d)/fy)*(1-sqrt(1- (2*R/.85f'c))
#6 spacing	Ab	0.44	in^2	
	S	8.00	in	(Ab*12)/ A(required)
	As(min)	0.1296		.0018 (b*h)
	As/ft	0.660		Ab*12/ spacing
Reinforcement Check		Pass		
Select Steel Reinforcement Check				
	Rebar	#6		
	A	0.660	in^2	
	Diameter	0.44		
Spacing	s	8.00	in	
	n	130		
	Total length	1089.2		
Total Width of Span	B	1116	in	
Percent Error		2.5	%	
Max Steel Reinforcement		Pass		0%-3% error
Check and Drawings				
Moment	Mu	3.62	k-ft	((Wu)(L^2))/8 (simply supported)
	ϕ	0.90		
Nominal Moment	Mn	4.02	k-ft	Mu/ϕ
	Z	0.37	ft	=0.9*d
	T	10.94	kip	Mn/Z
Area of Steel Required	As,req	0.18	in^2	
Number of rebars	n	130		
Rebar cross-sectional area	A	0.44	in^2	
Area of Steel	As	57.2	in^2	
Reinforcement Check		PASS		
Minimum Section Width Check				
Minimum width	bmin	231	in	From Table 5
Section Width Check		PASS		
Minimum Section Height Check				
rebar diameter	db	0.75	in	from Table 5
strirrup diameter	ds	0.375	in	
minimum clear cover	Cc	2.5	in	
Minimum Height	hmin	3.69	in	hmin=d+db/2+ds+Cc
Minimum Height Check		PASS		
Minimum Reinforcement Check				
	ρ	35.9143		ρ/bd
	ρmin	0.0285		from Table A.7
Reinforcement Check		PASS		
Ductility Check				
Yield Strain of Steel	εcu	0.003	in/in	
	a	0.60	in	As*fy/0.85*f'c*b
	β	0.75		Fromt Table A.7
	c	0.80	in	a/β
	εs	0.02	in/in	εcu*((d-c)/c)
Ductility Check		PASS		
φMn> Mu				
Moment	Mu	3.62	k-ft	
Reduced Nominal Moment	φMn	1183.7		φAsfy(d-a/2)
		PASS		

Table 10: ACI Reinforcements for Straight Overpass Slab

Figure1: Deformation of Right Side of Straight Slab

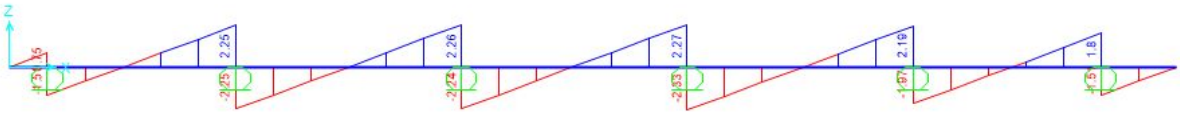


Figure 2: Shear of Right Side of Straight Slab

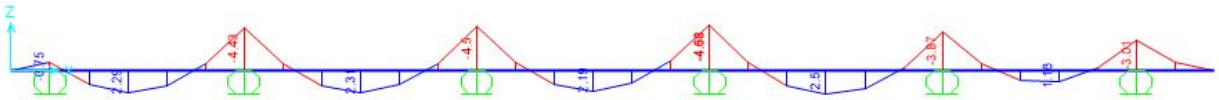


Figure 3: Moment of Right Side of Straight Slab

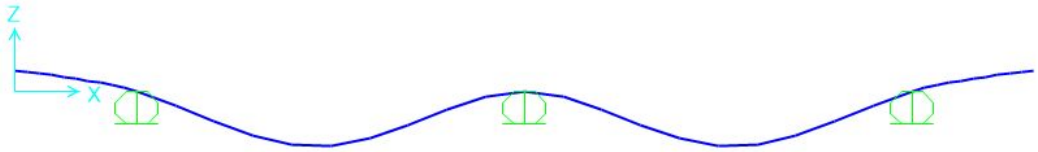


Figure 4:Deflection shape of Curve Slab

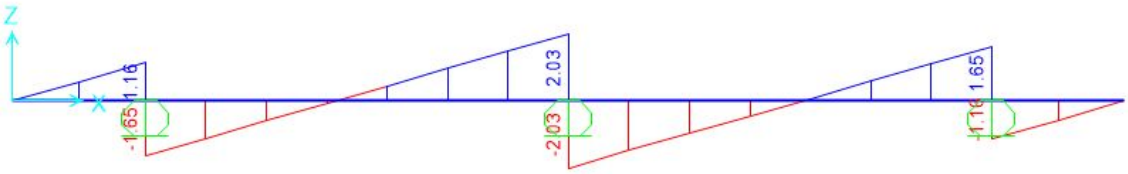


Figure 5: Shear of Curve Slab

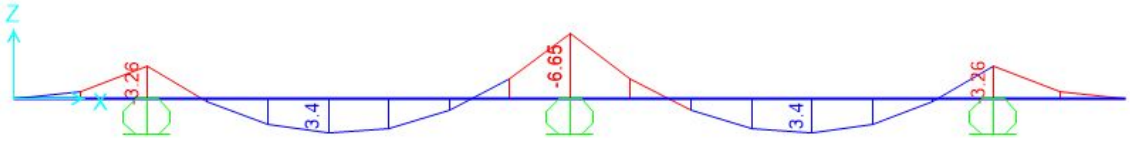


Figure 6: Moment of Curve Slab

Design Report - Pedestrian Bridge

General Description:
The design of the Pedestrian Bridge steel spandrel arch bridge was heavily influenced by the idea of preserving the ecosystem of the San Elijo Lagoon. The steel spandrel arch will span over the lagoon and sit on an abutment on either side of the lagoon. As a design build firm, we believed that a bigger foundation under the bridge was a proper trade off for preserving the ecosystem of the lagoon.

Materials:
The bridge design is made possible through the use of wide-flange steel beams and braces. For the bridge deck, it consists of steel W shape members that are connected with steel bolts. The slab that sits above the deck is made of concrete pavement.

Description of Structural Members:
The Pedestrian bridge is to be built to provide pedestrians and cyclists with a convenient and safe crossing area connecting Manchester avenue and the Solana Hills trail .The spandrel braced system will be below the bridge deck and the bridge design will be using a fixed arch system. With the two hinged arch system temperature fluctuations will be controlled and shrinkage will be minimized. The fixed arch system creates a very stiff structure which reduces the most amount of deflection in comparison to other arch bridges allowing there to be one singular span. There are no rotations allowed at the foundations which are created by fixing the arch at the abutments. The bridge is 15.5’ in width and spans a total of 410.5’ .

<u>Load Analysis:</u>
For the design of the pedestrian bridge the calculations shall be in accordance with the AASHTO LRFD guide specifications for the design of pedestrian bridges, the Code of Standard Practice for Steel Buildings and Bridges, and the ACI 318 code. For the analysis of dead loads, live loads, gravity loads, seismic and wind loading, the LRFD methodology will be used to determine the load combinations. With the deck arch design, the bridge will be able to support longer spans for structures due to their ability

to reduce bending moments within the structure while carrying mostly compression loads. The driving failure to be calculated within the structure will be to ensure that the members supporting the arch deck will not buckle under compression forces. To ensure that the arch members supporting the superstructure do not buckle, we have decided to use structural members that have large moments of inertia, as seen in hollow structural sections.

The dead load is the constant loading caused by the weight and density of the materials used composed of the Spandrel Steel arch and the composite steel concrete deck. To find the dead load of a structure. The density of the material needs to be multiplied by the depth of the slab. Now to find the UDL (uniformly distributed load) of the slab, we take the dead load and multiply the dead load by the area of the slab. The pedestrian bridge will have a voided concrete slab of 16 inches. This will allow the bridges to have a longer life cycle since it is right above the lagoon which can lead to erosion .The uniformly distributed load of the other components of the bridge will also be calculated and added to the total dead load of the I beam structures connecting the HSS circular arch beams and the guard rails above the superstructure.

The live load considered is the loading caused by the weight and area, in motion. For pedestrian bridges, the expected pedestrian traffic to be considered will be cyclists and moving pedestrians. In the pedestrian bridge superstructure the only moving force would be the pedestrians.. When designing for live load, it is best to consider the worst scenario for a bridge i.e. the most filled the bridge could ever get. For pedestrian bridges the worst casinario that could be considered would be a live load of 150 pounds per square foot. While the pedestrian bridge will not be expecting this type of loading frequently, it will be designed, with an additional factor of safety, to be able to sustain a live load of 150 pounds per square foot.

	Job No.		Sheet:		Rev:	
	Job Title	San Elijo Lagoon Replacement Bridge				
	Subject	Pedestrian Bridge				
	Client		Made By:	Daniel Sandoval	Date:	11/11/2020
			Check By:		Date:	

Design Data

General

Span: 410.5 ft

Carriageway:

Bracing: Steel

Surfacing: Concrete

Location: San Elijo Lagoon

Type: Pedestran Bridge

Loading

Unit weight

Steel	W12x45	45	lb/ft
	W12x152	152	lb/ft
	W18x97	97	lb/ft
	W18x211	211	lb/ft
	w21x201	201	lb/ft
	w21x248	248	lb/ft
	w24x250	250	lb/ft
	w27x281	281	lb/ft
	w30x292	292	lb/ft
	w36x330	330	lb/ft
	w40x655	655	lb/ft
	w44x335	335	lb/ft
Concrete		150	pcf

Live Loads:

150 psf

	Job No.		Sheet:		Rev:	
	Job Title	San Elijo Lagoon Replacement Bridge				
	Subject	Pedestrian Bridge				
	Client		Made By:	Daniel Sandoval	Date:	11/11/2020
			Check By:		Date:	

Calculation Sheet

Steel Dead Load

W12x45	45	lb/ft	
Length	361.2	ft	
	16254		lbs
W12x152	152	lb/ft	
Length	1893.6	ft	
	287827.2		lbs
W18x97	97	lb/ft	
Length	405.2	ft	
	39304.4		lbs
W21x201	201	lb/ft	
Length	96	ft	
	19296		lbs
W21x248	248	lb/ft	
Length	1279.5	ft	
	317316		lbs
W24x250	250	lb/ft	
Length	708.7	ft	
	177175		lbs
W27x281	281	lb/ft	
Length	97.5	ft	
	27397.5		lbs
W30x292	292	lb/ft	
Length	135.5	ft	
	39566		lbs
W36x330	330	lb/ft	
Length	135.5	ft	
	44715		lbs
W40x655	655	lb/ft	
Length	87.5	ft	
	57312.5		lbs

Job No.		Sheet:		Rev:	
Job Title	San Elijo Lagoon Replacement Bridge				
Subject	Pedestrian Bridge				
Client		Made By:	Daniel Sandoval	Date:	11/11/2020
		Check By:		Date:	

Calculation Sheet

W44x335	335	lb/ft			
Length	264.9166	ft			
	88747.061	lbs			
W18x211	211	lb/ft			
Length	48	ft			
	10128	lbs			
Concrete Dead Load					
Initial Design					
Width of deck:	15.5	ft			
Slab Thickness:	4	in.			
Concrete Dead Load					
Density of Concrete	150	pcf			
Top Slab Thickness	4	in	0.33	ft	
Area of Top Slab	410.5' x 15.5'		=	6362.75	ft²
Dead Load Concrete	3817650	lb			
Dead Load Steel	1125038.7	lb			
Total Dead Load	4942688.7	lb			
Effective Span Length	15.5	ft			
UDL=	4942688.7/15.5		=	318883.14	lb/ft
Live Load					
Loaded Length	410.5	ft			
Loaded Width	14	ft			
Live Load	150	psf			
Total Live Load	862050	lb			

Table A: Pedestrian Bridge Design Loads Summary

Slab Information				
Base	b	93	in	
Height	h	5	in	
Effective depth	d	1	in	
Length	L	11.25	ft	
Self Dead Load	WSDL	4.54	K/ft	
Live Load	WL	13.08	K/ft	
Materials				
Compressive Strength	f'c	4	psi	
Yield Strength	fy	60	ksi	
Type of Concrete		150	pcf	NW
Structural Analysis				
Load Combination	Wu	26.376	k/ft	1.2Wd+1.6Wl
		15.38	k/ft	
Max Moment	Mu	417.2765625	k-ft	((Wu)(L^2))/8
	φ	0.9		
Nominal Moment		463.640625		
	ρ	0.85	ft	0.9(d)
Area of Steel Required	As,req	79.05	in^2	ρ(b)(d)
Checks and Drawings				
Reinforcement Check				
Number of rebars	n	79		
Rebar cross-sectional area	A	1	in^2	
Area of Steel	As	79	in^2	OK
Check				
Minimum width	bmin	93	in	OK
Check				
rebar diameter	db	1.128	in	from Table 5
strirrup diameter	ds	0.375	in	
minimum clear cover	Cc	3	in	
Minimum Height	hmin	4.939	in	hmin=d+db/2+ds+Cc
				OK
Check				
	ρ	0.753546099		ρ/bd
	ρmin	0.0285		OK
Ductility Check				
Yield Strain of Steel	εcu	0.003	in/in	
	a	14.99051233	in	As*fy/0.85*f'c*b
	β	0.85		Fromt Table A.7
	c	17.63589686	in	a/β

	εs	0.02	in/in	εcu*((d-c)/c)
				OK
DCR				
Reduced Nominal Moment	φMn	2310.525		φAsfy(d-a/2)
DCR	DCR	0.81		Mu/φMn
				OK

Table B: Concrete Deck Design Summary

Bridge SAP 2000 Analysis

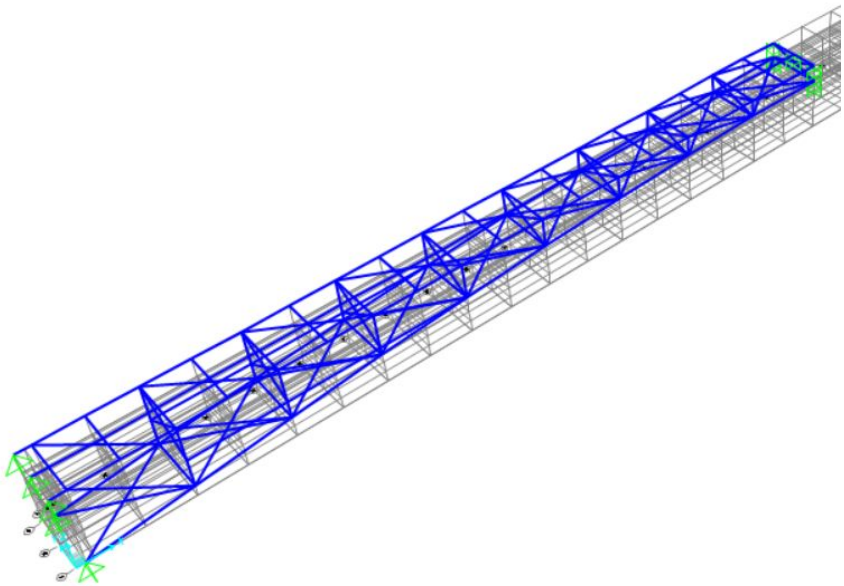


Figure1: SAP2000 Model

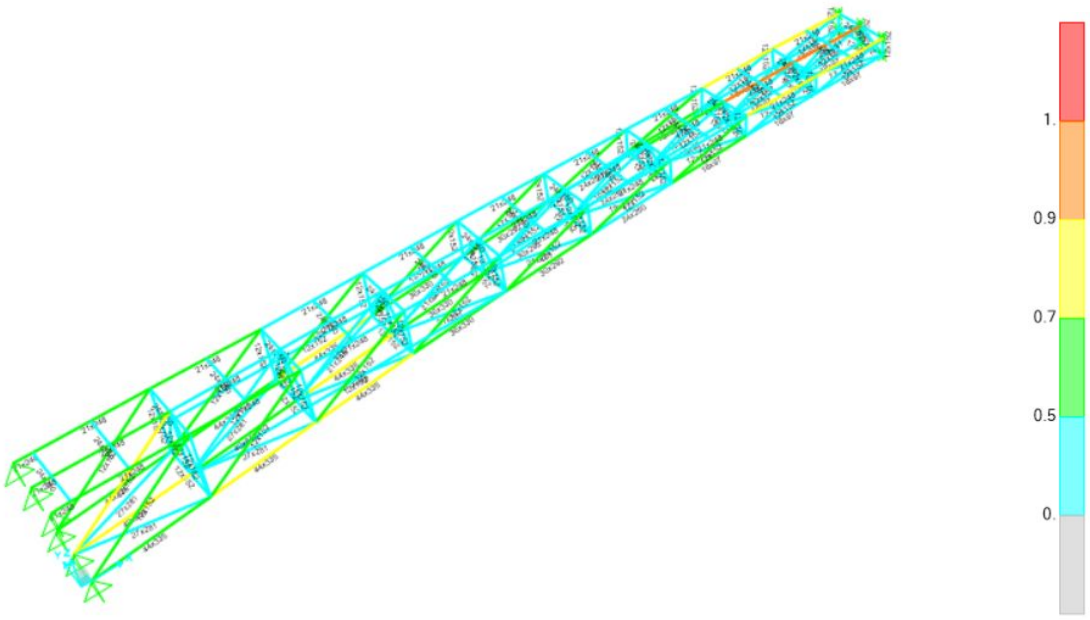


Figure 2: SAP2000 Model

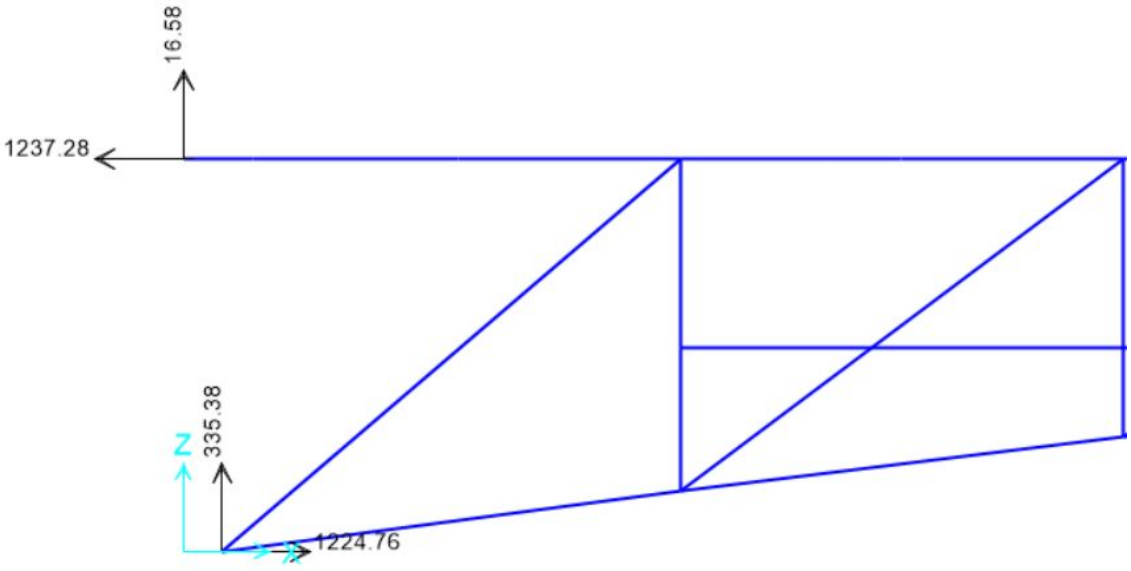


Figure 3 - Reactions Per Bridge Span in kips

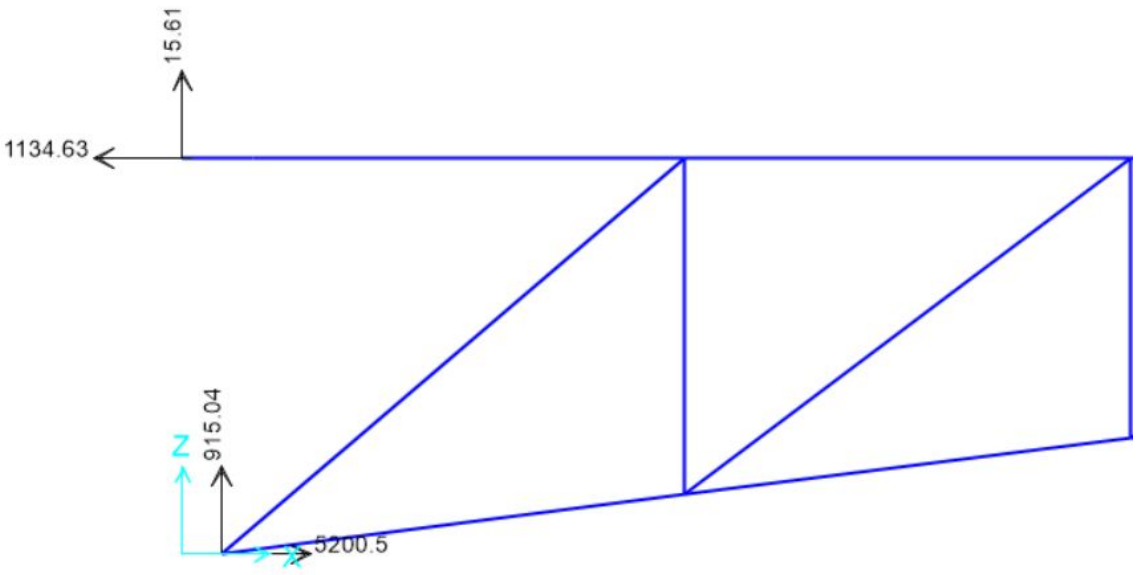


Figure 4 - Reactions Per Bridge Span in kips

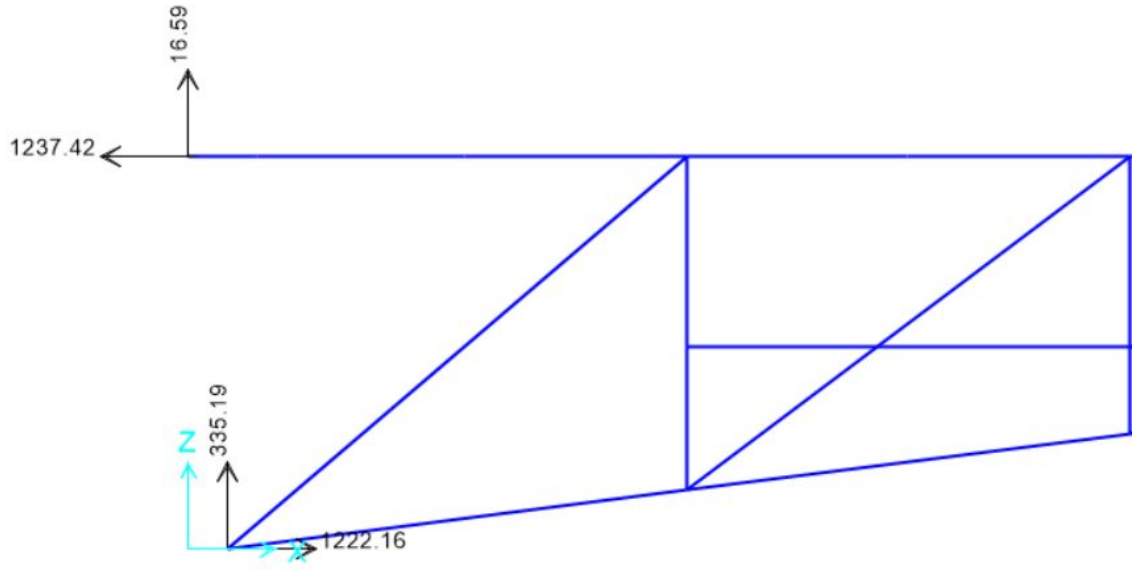


Figure 5 - Reactions Per Bridge Span in kips

Design of Abutment:

The pedestrian bridge will have two abutments on either end of the bridge to sustain the vertical and horizontal loads from the bridge. Due to the nature of the arch bridge, there are lateral thrust forces from the bridge itself that are transferred to the abutments. For this reason, there were parallel wing walls attached to the abutment in order to resist the lateral forces and internal moments. These wing walls were 6 feet long and 4 feet thick. A deep pile foundation was also considered in order to sustain the bearing load on the abutment. There are two points of contact on the abutment one with a bearing pad and the other with a pin like connection to the I beam of the bridge. The overall height of the abutment is 26.5 feet which will allow the deck of the bridge to have enough clearance from the possible 100 year storm event.

Design Calculations:

For the abutment on either end of the pedestrian bridge upholding the deck of the pedestrian bridge. Preliminary dimensions for the reinforced concrete abutment were determined and then calculations were done in order to check the stability of the abutment. Three forms of failure were considered when testing the design of the deep pile abutment. The overturning of the abutment, sliding failure and bearing capacity were considered. These calculations were repeated until a reasonable factor of safety was obtained that complied with CalTrans Standards.

The overturning moment applied to the abutment must be resisted by the opposite moment produced by the vertical and lateral forces. The lateral thrust of the bridge and the pressure of the soil on the abutment were considered when calculating the overturning moment. The overturning moment and the compression lateral force was considered as the overturning moment. The resisting moment was calculated using the total weight of the abutment, the weight of the footing and the applied loading from the pedestrian arch bridge on a single abutment times the respective distance to the abutment toe. To be in accordance with CalTrans standards, the Factor of safety for the overturning of the abutment must be more than 2.0 for shallow foundation. The calculated factor of safety of our abutment design came out to be 0.80 which is less than 1.5. This caused the need for deep pile foundations to resist the overturning moment caused by the lateral thrust of the bridge.

The second method of failure considered was the sliding failure. To comply with CalTrans standards the factor of safety for the abutment must be greater than 1.5. The sliding force is the resultant of the soil pressure acting on the back wall of the abutment. The resitisting sliding force is the self weight of the abutment multiplied by the angle of friction between the soil and the abutment. With the given parameters from the boring logs, the factor of safety for the sliding failure is 2.77 which is greater than the required 1.5.

The third method of failure considered was the bearing capacity failure. The bearing capacity has to be above 3.0 however the bearing capacity calculated for the pedestrian bridge abutment was -0.03 which meant that the foundation would fail due to bearing loads. To counteract this bearing failure piles were added to the foundation to strengthen it. After various rounds of calculations a total of 4 piles (20 inches in diameter and 52 feet deep) are needed on each abutment , 2 rows of 8 piles on each abutment.

Abutment Design Calculations Summary

Overturning Calculation on Abutment
ΣWi = 207069.51 lb/ft
ΣMo (Resultant Moment) = 4554242.20 lb-ft/ft
Overturning Moment: 5677966.20 lb-ft/ft
FS= 0.80 > 1.5 Fail need piles

Bearing Capacity
qu: 358594.50
e: 21
qtoe: 33734.61 governs
qheel: -20375
FS = qu/qtoe = 10.63 > 3 **GOOD**

Sliding Calculation of Abutment
Kp: 4.1
Pp: 13,842
D: 6 ft
B: 14 ft
FS: 2.77 > 1.5 Ok

Piles
Bridge load on abutment: 4356 k
Total loads on piles: 4356 k
# of Piles needed: 20 piles
D = 2 ft
L = 140 ft into bedrock

ACI Compliance Checks For Pedestrain Bridge Abutments				
Geometry				
Base	b	270	in	
Height	h	60	in	
Effective depth	d	58	in	
Length	L	15.5	ft	
Applied Load	P	3609.33	K	
Materials				
Compressive Strength	f'c	6	psi	
Yield Strength	fy	60	ksi	
Type of Concrete		150	pcf	Normal Weight or Light Weight
Structural Analysis				
Moment	Mu	81209.93	k-ft	Cantilever Mu=P(b)
	ϕ	0.90		
Nominal Moment	Mn	90233.25	k-ft	Mu/ϕ
	Z	4.35	ft	=0.9*d
	T	20743.28	kip	Mn/Z
Area of Steel Required	As,req	345.72	in^2	
Checks and Drawings				
Select Steel Reinforcement Check				
Number of rebars	n	114		
Rebar cross-sectional area	A	4	in^2	
Area of Steel	As	456	in^2	
Reinforcement Check		PASS		
Minimum Section Width Check				
Minimum width	bmin	209	in	From Table 5
Section Width Check		PASS		
Minimum Section Height Check				
rebar diameter	db	2.257	in	from Table 5
strirrup diameter	ds	0.5	in	
minimum clear cover	Cc	2	in	
Minimum Height	hmin	47.00	in	hmin=d+db/2+ds+Cc
Minimum Height Check		PASS		
Minimum Reinforcement Check				
	ρ	0.0291		ρ/bd
	ρmin	0.0285		from Table A.7
Reinforcement Check		PASS		
Ductility Check				
Yield Strain of Steel	εcu	0.003	in/in	
	a	19.87	in	As*fy/0.85*f'c*b
	β	0.75		Fromt Table A.7
	c	26.49	in	a/β
	εs	0.01	in/in	εcu*((d-c)/c)
Ductility Check		PASS		
DCR				
Reduced Nominal Moment	φMn	98630.1		φAsfy(d-a/2)
DCR	DCR	0.823		Mu/φMn
DCR Check		PASS		DCR<1 (typ values between 0.9 and 1

Table C: ACI Compliance Checks for Pedestrian Bridge Abutment

Retaining Wall Design:

For the retaining wall design, there will be two different retaining walls varying in height with a max height of 30 feet and a span of over 200 feet long, approximately 240 feet long/. For all the retaining walls we have decided to have them anchored to the soil to provide reinforcement against the soil pressures. There will be nails spaced 5 feet apart from each other with the nails closest to the top and bottom of the wall being 2.5 feet away from the edges of the wall. These anchor nails will be #9 & #10 sized nails at approximately 21 feet long. The nails will be anchored in at 15 degrees from the horizontal. For one wall there will be a total of 288 nails, based off the 240 feet long wall. Fourteen inches of 4000 psi shotcrete will be used to cover the anchored nails and the soil.

In order to determine the total load that the nails are receiving, the total earth pressure load was taken and distributed to the nails based on the assumption that the load is distributed based on the tributary area. A total of 6 nails were considered throughout the wall and their forces were calculated by first obtaining the total load felt on the wall. This would be computed by multiplying the active pressure of the soil by the density of the soil times the Height of the wall squared, times a factor of 0.65. $F = 0.65K_a\gamma H^2$. The earth pressure load on the anchored retaining wall has a force diagram of a trapezoid. In order to evaluate the loads sustained by the anchored nails, the load diagram is treated as a rectangle and the missing “triangles” at the outer edges of the trapezoid are subtracted from the overall soil pressure diagram. After this, the load is distributed based off the tributary area of each nail and the loads that they hold.

Due to the limitations of this project, no Factors of safety were able to be computed for the anchored retaining wall however the anchored nails, thickness of shotcrete are an overdesign for the loads the retaining wall is experiencing. The length of the nails were taken from the Anchored retaining wall design manual which suggested preliminary design of the length of the nail shall be 0.7 * Height of the retaining wall, in our case 30 feet tall.

A square pattern was used when considering the construction of the anchored retaining walls due to the feasibility of the construction of these walls when compared to the triangular distribution of the anchored retaining walls. Although, a bit of strength

is lost, the construction team believed that this method was the better option due to the reduction in schedule and reduction in error during the placement of the nails.

For a 30 ft wall with 6 different anchored nails, spaced 5 feet from each other. At the bottom of the wall will be ***R,*** the resisting force at the bottom of the retaining wall. These nails are in tension and will be anchored in on the right side of the wall at a 15 degree angle from the horizontal. The force resisted by each nail was computed by assuming that each nail will take the earth pressure load based off the tributary area it holds.

Total Load	22815 psf
Soil Pressure on Retaining Wall	806 pcf
Surcharge	0
Length of Nails	21 ft
Angle of Nail	15 Degrees
Nail Spacing	5ft
Total # of Nails per wall	288
Thickness of Shotcrete	14”
Strength of Shotcrete	4000 psi

Table A: Summary of Typical Retaining Wall Details

The Load distributed on the nails based off T.A.	
Total Earth Pressure	**806 pcf**
Tension Nail 1	**15649 lbs**
Tension Nail 2	**20861 lbs**
Tension Nail 3	**20862 lbs**
Tension Nail 4	**20863 lbs**
Tension Nail 5	**20864 lbs**
Tension Nail 6	**15649 lbs**
Resistance at Bottom of Wall	**2519 lbs**

Table B: Forces experienced on Nails:

15. Green Roads Certification

Green Roads Plan

I-5 North Coast Corridor San Elijo Lagoon Improvement Project

Main Bridge

Greenroads certification is a ranking system that includes a checklist of categories that include multiple sustainable options that projects can follow in order to deem itself as environmentally safe projects. Greenroad requirements go beyond state and federal rules and regulations. The Greenroads certification is compiled up with mandatory project requirements and subcategories that projects can follow in order to achieve the best score possible. In this proposal, it is listed and will be followed through the requirements needed to receive a bronze certification with the Green Road Rating System Version 2.

Mandatory Project Requirements in Green Roads must be completed for every project that wants to apply for a Greenroads certification. The main aspects of these requirements is to ensure that every project meets the minimum qualifications in order to be considered to receive a Greenroads certification. The main bridge replacement part of this project will have all necessary project requirements for green roads shown in table 1-1 below.

Greenroad Project Requirements	Does Project Satisfy Requirements?
PR-1 Ecological Impact Analysis	Yes
PR-2 Energy & Carbon Footprint	Yes
PR-3 Low Impact Development	Yes
PR-4 Social Impact Analysis	Yes
PR-5 Community Engagement	Yes
PR-6 Lifecycle Cost Analysis	Yes
PR-7 Quality Control	Yes
PR-8 Pollution Prevention	Yes
PR-9 Waste Management	Yes
PR-10 Noise & Glare Control	Yes
PR-11 Utility Conflict Analysis	Yes
PR-12 Asset Management	Yes

Table 1-1: Project requirements needed to obtain Greenroads Certification. Information taken from greenroads.org. Accessed 11/3/20.

Environment and Water	Pts
EW-1 Preferred Alignment - REQUIRED: Will show that project will not be catastrophically impacted by natural and environmental hazards due to climate change and show that project will stay at acceptable limits if events shall occur per Greenroads spec. - PLAN: We will provide maps and outlines of potential natural hazards that could occur in the project proximity and plan accordingly to insure that the project will not be affected by costly damages.	**1**
EW-3 Habitat Conservation - REQUIRED: Will compute the total area disturbed during construction and the total area of project boundaries that use man made hardscape materials and prepare ecological monitoring plans. Will achieve 100% MRA preserved, created, and restored off site per Greenroad spec. - PLAN: The construction plan will be carefully prepared to avoid as much environmental impacts as possible.	**2**
EW-4 Land Use Enhancements - REQUIRED: Will compute total impervious area with run off number of 98 before and after construction. Will find total permeable areas and remove hardscape areas and replace them with permeable surfaces and achieve a 5% decrease in impervious area. - PLAN: Areas of this project will be carefully planned and split up by areas in order to achieve the 10% decrease in impervious areas.	**2**
EW-8 Runoff Flow Control - REQUIRED: Will reduce or eliminate stormwater flow to receiving bodies of water due to construction per Greenroads spec. - PLAN: The construction plan will be carefully prepared to insure that all stormwater flow will have a directional path that leads to larger bodies of water.	**1**
EW-10 Oil and Contaminant Treatment - REQUIRED: Will improve water quality and stormwater runoff beyond basic treatment to reduce oils and nonmetal contaminants per Greenroads spec. - PLAN: Construction plans will consider the system of ensuring clean quality water that will be treated to avoid contaminates.	**3**

Total Points	**9**

Table 1-2: Environment and Water for Main Bridge Replacement

Construction Activities	PT
CA-1 Environmental Excellence - REQUIRED: Will encourage environmental practices beyond the minimum requirements by selecting a certified contractor or manager with ISO 14001 environmental system per Greenroads spec - PLAN: For our project. Such environmental excellence that can be implemented would be porous pavement and also take in consideration wildlife crossing.	**2**
CA-2 Work Zone Health and Safety - REQUIRED: Will minimize the amount of safety and health hazards at site during construction by designating a safety officer per Greenroads spec. - PLAN: We will have a safety officer/ safety inspector on the site near the bridge, who will have a separate on site safety plan/ manual. This would be implemented from beginning to end of the project, which would require training for workers and subcontractors involved.	**2**
CA-3 Quality Process - REQUIRED: Will improve accountability for construction quality by selecting a qualified design builder with ISO 9001 quality management system per Greenroads spec. - PLAN: - Monitoring and measuring equipment calibration records - good - Records of training, skills, experience, and qualifications - good - Product/service requirements review records - good - Record about design and development outputs review - good - Record about design and development input review - good - Records of design and development control - Design and development changes records - Characteristics of product to be produced and service to be provided - Production/service provision change control records - Record of conformity of product/service with acceptance criteria - Record of nonconforming outputs - Monitoring measurement results - Results of the management review - Results of corrective actions	**2**

CA-6 Work Zone Water Use - REQUIRED: Will encourage responsible use of water during construction and keeping track and recording amount of water use per Greenroads spec. - PLAN: For this aspect of the bridge replacement we will not use any water during the construction so recording an amount of water usage is not necessary. **CA-9 Communications and Outreach** - REQUIRED: Will encourage engagement with surrounding communities and media per Greenroad spec. - PLAN: Regarding the aspect of the project we will have to communicate with the communities that are near the project in order to notify them of potential construction activities that will take place and inform them that it can possibly affect them. The local city will be in coordination with our team to discuss permits and traffic management. **CA-10 Fair and Skilled Labor** - REQUIRED: Will provide fair labor practices and training opportunities for projects but provide necessary records of payroll per Greenroads spec. - PLAN: Work tasks will be distributed to subcontractors and will monitor fair practice and training. We will use union based salary if subcontractors are willing to do the job. **CA-11 Local Economic Development** - REQUIRED: Will stimulate economic development by providing opportunities for local business and local employment per Greenroads spec. - PLAN: Based on the project development this will boost the economic development by promoting local employment for workers.	**2** **1** **1** **1**
Total Points	**11**

Table 1-3: Construction Activities for Main Bridge Replacement

Materials and Design Requirements	pts
MD-1 Preservation and Reuse - REQUIRED: Will preserve and reuse 70% of existing material within project boundaries and include necessary reports and calculations per Greenroads spec. - PLAN: Based on the project we will use recycled asphalt pavement, recycle cement, and recycle steel. **MD-5 Local Materials** - REQUIRED: Will make an itemized list of materials and products used and compute the total cost, the percentage of cost being distributed to	**2**

suppliers. Will achieve 70% of cost sourced locally and prepare necessary maps and records that show materials bought and used are within 50 miles radius per Greenroads spec. - PLAN: Asphalt, cement, steel, reinforced concrete, and other materials needed for construction will be taken from local sources.	**3**
MD-6 Long-Life Design - REQUIRED: Will design 60% of trafficked areas to meet lifelong criteria per Greenroads spec. - PLAN: Shows on specification drawing and details the construction techniques, materials utilized on projects that follow the criteria the green road specs.	**3**
Total points	**8**

Table 1-4: Materials and Design Requirements for for Main Bridge Replacement

Utilities and Controls	Pts
UC-2 Maintenance & Emergency Access - REQUIRED: Will improve the safety and mobility for routine maintenance and emergency vehicles on project site per Greenroads spec. (1 point) - PLAN: On site we will hold safety meetings on a monthly basis to improve our safety. Traffic management will be implemented by the safety engineer to coordinate mobility.	**1**
UC-7 Traffic Emissions Reduction - REQUIRED: Will reduce operational mobile source emissions and achieve 40% reduction in all air emissions or vehicle miles traveled per Greenroads spec. - PLAN: We can reduce traffic emission due to the location of the manufacturing facility for the construction of the prefabrication. The facility is located near the project site speeding up the delivery system.	**2**
UC-8 Travel Time Reduction - Computing a reduction travel time in the as-built condition and providing a report of time expected. - PLANSince we have a set of precast elements we can efficiently provide a travel system to work for the project. Precast elements include portions of the tower and bridge.	**1**
Total Points	**4**

Table 1-5: Utilities and Controls for Main Bridge Replacement

Access & Livability	Pts
AL-2 Safety Enhancements - REQUIRED: Will plan to reduce existing and potential safety hazards with the use of quantitative safety analysis per Greenroads spec. - PLAN: When construction is in process of elevating material/ equipment we will create a zone where pedestrians will not be allowed as an additive source as a factor of safety. Also, secluding areas of drop of delivery of equipment and materials will also serve as a safety factor	**2**
AL-4 Equity and Accessibility - REQUIRED: Will select alignment alternatives to minimize adverse social, economic development, community, and cultural impacts to impacted communities per Greenroads spec. - PLAN: When the project proceeds with building and construction, plans to minimize the disturbance of local communities such as safety and quality assurance will be implemented.	**1**
AL-5 Active Transportation - REQUIRED: Will plan to improve project facilities for pedestrians and cyclists and other active modes of transportation by designating priority or dedicated access per Greenroads spec. - PLAN: The project will have a new pedestrian bridge design and built to give cyclists and pedestrians access to move from one end of the bridge to the other. This ensures locals and the community that this project is designating a part that is safe and for their use only.	**1**
AL-8 Culture and Recreation - REQUIRED: Will raise awareness of project's culture and recreational resources by providing budget, wayfinding, information, and photo documents per Greenroads spec. - PLAN: Once construction is done and the project is finished, signs and photo documents with the project's information and goals will be provided on site.	**1**
AL-10 Scenery and Aesthetics - REQUIRED: Will enhance user's visual experience through beautiful views and aesthetic improvements per Greenroads spec. - PLAN: The design of our project is unique and aesthetically pleasing bringing in locals and tourists and will urge them to come back to the facility.	**2**
Total Points	**7**

Table 1-6: Access and Liability for Main Bridge Replacement

Creativity & Effort	Pts
CE-1 Educated Team - REQUIRED: Will reward educated project teams and show that project has at least one STP Project Associate per Greenroads spec. - PLAN: At the end of the project, awards would be given to people that expressed their excellence in their expertise and made sure every project member was educated in the project and their designs.	**1**
CE-2 Innovative Ideas - REQUIRED: Will reward developments of new and innovative ideas associated with design and construction for the project per Greenroad spec. - PLAN: At the end of the project, awards would be given to people that expressed great, innovative ideas in design and construction.	**2**
CE-3 Enhanced Performance - REQUIRED: Will reward performance achievements and projects that go beyond specs and requirements achieving 3 increments per Greenroads spec. - PLAN: At the end of the project, awards would be given to people that expressed extra performance with work that went beyond just the required specifications.	**2**
Total Points	**5**

Table 1-8: Creativity and Effort for Main Bridge Replacement

Overpass

Project

The overpass consists of two bridges that overlap one another to allow transportation to flow freely above and underneath. The Green Road certification is strictly mandating the sustainability of all structures and ensuring the safety of all humans and all of the environment around. In this proposal, the firms, myself and the team, have to list and follow through some requirements to receive a bronze certification with the Green Road Rating System Version 2.

Requirements

Mandatory Project Requirements in Green Roads must be completed for every project that wants to apply for a Greenroads certification. The main aspects of these requirements is to ensure that every project meets the minimum qualifications in order to be considered to receive a Greenroads certification. The two Overpass bridges will satisfy all the project requirements for green roads shown in table 1-1 below and different sections from each category for Green Road Certification.

Greenroad Project Requirements	Does Project Satisfy Requirements?
PR-1 Ecological Impact Analysis	Yes
PR-2 Energy & Carbon Footprint	Yes
PR-3 Low Impact Development	Yes
PR-4 Social Impact Analysis	Yes
PR-5 Community Engagement	Yes
PR-6 Lifecycle Cost Analysis	Yes
PR-7 Quality Control	Yes
PR-8 Pollution Prevention	Yes
PR-9 Waste Management	Yes
PR-10 Noise & Glare Control	Yes
PR-11 Utility Conflict Analysis	Yes
PR-12 Asset Management	Yes

Table 2-1: Project requirements needed to obtain Greenroads Certification. Information taken from greenroads.org. Accessed 11/3/20.

Environment and Water	PTS
EW-1 : Preferred Alignment - REQUIRED: Will show the minimized and avoided loss, degradation, fragmentation, and climate change hazards on the project. - PLAN:Ensuring the project does not fall within any farmland or "sensitive" habitat, or within a 100-year floodplan.Look over the Climate Change Vulnerability Assessment to look at any wildfire hazards, extreme weather conditions, and sea level rise hazards.	**2**
EW-2: Ecological Connectivity - REQUIRE: Will show the reduced habitat fragmentation impacts that would possibly have any improvement on the biodiversity and the different species of plants and animals. - PLAN: There will be a complete survey to know the surrounding conditions to consider the current and historical migratory behaviors and evaluate all species impacts, threatened and endangered. This is going to be based on the changed area and perimeter after the completion of the project. After the completion, there will be a net gain of 5% of connective space dedicated for wildlife at ground level.	**2**
EW-4 Land Use Enhancements - REQUIRE: Will reduce the use of hardscape areas and increase greenspace within the project boundary. - PLAN: Hardscape will be used minimally by only providing for traffic, and no additional paths or walkway. The increased greenspace will be implemented on the side of the abutment walls to give a more architectural feel. This will lead to a 10% decrease in impervious areas.	**2**
Total Points	**6**

Table 2-2: Environment and Water for Overpass Bridge

Construction Activities	Pts

CA-2 : Workzone Health and Safety - REQUIRE: To ensure the safety of the workers and citizens of the city to be protected and minimize the health hazards and dangers during the project construction - PLAN: There will be a certified prime construction management firm that follows the OHSAS 18001 Health and Safety Management System. There will also be a safety Officer/ Engineer that will oversee the project everyday and take notice of any safety performances that need to be improved weekly. All injuries and illness will be recorded to records.	**2**
CA-6: Workzone Water Use - REQUIRE: To encourage the use of the water resources provided responsible during the duration of the project. - PLAN: Will create a spreadsheet that records total water use during Project construction. This spreadsheet will keep records of when, where and how much of water was used and reason of usage. This will allow us to calculate the total cost of water used at the end of the project. Lastly, show that 100% of the water sources are non-potable.	**3**
CA-7: Accelerated Construction - REQUIRED: Will implement an organized plan to reduce the time of a project to be delivered, in order to reduce construction congestion - PLAN: One way we will minimize traffic congestion is to report what is the peak hours of traffic and will work before and after those times. By collecting this traffic data, it will allow us to organize a schedule before construction begins, reducing the cost by 10%. This cost will be based on the Federal Highway Administration's Work Zone Road User Costs.	**2**
CA-9: Communications and Outreach - REQUIRED: Will be in constant communications with local communities and media during construction to keep citizens updated for road updates. - PLAN: We will create a resource for communication and outreach activities for social media to constantly update any changes on lane closures. We will also be providing adequate sides located throughout the construction showing dates that there will be changes in the future plans. All of this will have a monitor of how effective the communication is and how it can improve for the citizens.	**1** **2**
CA-10: Fair and Skilled Labor - REQUIRED: Will measure the cost of labor OR to account for the total number of full-time equivalent (FTE) hours worked by paid employees	

- PLAN: Will investigate the local construction industry's median wages, benefits, and other allowances paid for all required trades and construction staff on the project and develop a system that will track the hours and productivity of our workforce.	
Total Points	**10**

Table 2-3 : Construction Activities for Overpass Bridge

Materials and Design	**Pts**
MD-1: Preservation and Reuse - REQUIRED: Will encourage the practice of preserving and resume existing materials during the duration of the construction. - PLAN: For the bridges, asphalt pavement, cement, steel, and dirt will be recycled throughout the duration of the project. This can lead to a minimum 60% of the materials used by volume size will be reused or recycled.	**2**
MD-5: Local Materials - REQUIRED: Will encourage the use of materials in the surrounding areas to minimize long transportations - PLANS: The two overpass bridges are being prefabricated by local concrete companies to reduce any long haul. For asphalt, cement, steel and dirt will all be bought from local companies to minimize any additional cost and shipping/ transport for the materials.	**4**
MD-6: Long- Life Design - REQUIRED: To design a long-lasting project to reduce any additional maintenance that is needed for the future. - PLAN: We will create a spreadsheet indicating the total trafficked area, the structural condition data, and the lifetime equivalent single axle loads. This will provide a more defined design on the structure that will be approved by the Owner before construction begins. It will then be computed for a 40, 75 and 100 year minimum expected service life for any maintenance that may be needed.	**3**
Total Points	**9**

Table 2-4 : Materials and Design for Overpass Bridge

Utilities and Controls	Pts
UC-2: Maintenance and Emergency Access - REQUIRED: To provide an adequate mobility for routine maintenance and emergency activities on the project. - PLAN: The bridges are designed to allow additional room on the sides or any last minute maintenance that are needed. They will also be constructed with appropriate signage designating maintenance and emergency access. A site map will be updated weekly to provide up to date information on traffic flow.	**1**
UC-6: Lighting and Controls - REQUIRED: Utilizing controlled systems and technologies to improve the environmental quality within the surrounding areas of the project. - PLAN: The use and installation of fixed lighting systems and controls that result in zero upright above the nadir (BUG Rating UL = 0 and UH = 0), lighting systems mounted at 0 degrees with no tilt, and correlated color temperatures (CCT) approximately moonlight. Also, we may seek to acquire lighting features that have the Fixture Seal of Approval (FSA) by the International Dark-Sky Association. The goal for this section would be to improve the environmental quality by reducing light pollution.	**3**
UC-8: Travel Time Reduction - REQUIRED: The goal is to reduce operational delays on the Project to improve mobility and user satisfaction. - PLAN: A spreadsheet will be designed to compare the baseline travel times for existing, added to existing projects, and new projects, to compute the total person hours required to travel from one end of a project to the other. During the construction, there will be an increase, so then a construction phase will be designed to show where the expected travel lane will occur at different given times.	**2**
Total Points	**6**

Table 2-5: Utilities and Controls for Overpass Bridge

Access and Livability	Pts
AL-1: Safety Audit - REQUIRED: Will encourage systematic and Transparent evaluation of existing and potential operational safety hazards on the project. - PLAN: A formal safety audit will be illustrated with document exchange, several field visits, and recommendations from the project team. This will be completed before construction begins and another during construction.	**2**
AL-4: Equity and Accessibility - REQUIRED: Provide a net social benefit, and the universal accessibility to help the project construction and future usage. - PLAN- For the socially preferred alignment, values of benefit and cost will be developed to understand the best alternatives that minimize the adverse social, economic development, community and cultural impacts. Large vehicles will be a common occurrence for this project and after the project. The design of both bridges are constructed to provide appropriate spacing and turning for large vehicles. All be able to be seen in the structural loading calculations, geometric calculations and design, and the stop structural improvements.	**2**
AL-8: Culture and Recreation - REQUIRED: Understanding the local cultural and recreational resources that can be implemented into the design and construction - PLAN: This project is located in Southern California in the Coastal line, meaning that the design will be designed more for a flow and represent the ocean waves onto the bridge. The budget will be dedicated to enhance significant cultural, community and recreational sites to help with funding ideas. Resources about the local community will be used to compute the actual true value designated by the project upon completion.	**2**
AL-10: Scenery and Aesthetics - REQUIRED: Improve the visual experience throughout the project completion by implementing aesthetic improvements. - PLAN: The bridges will be constructed with a nice flow of a curve while turning. On the edges of the bridge will be parapets that will give a more	**2**

finished work, than a simple railing. The abutments walls will as well be provided with a scenery form that will represent the beaches of that local community.	
Total Points	**8**

Table 2-6: Access and Livability for Overpass Bridge

Creativity & Effort	Pt
CE-1 Educated Team - REQUIRED: Will reward educated project teams and show that project has at least one STP Project Associate per Greenroads spec. (1 point) - PLAN: At the end of the project, awards would be given to people that expressed their excellence in their expertise and made sure every project member was educated in the project and their designs.	**1**
CE-2 Innovative Ideas - REQUIRED: Will reward developments of new and innovative ideas associated with design and construction for the project per Greenroad spec. - PLAN: At the end of the project, awards would be given to people that expressed great, innovative ideas in design and construction.	**2** **2**
CE-3 Enhanced Performance - REQUIRED: Will reward performance achievements and projects that go beyond specs and requirements achieving 3 increments per Greenroads spec. - PLAN: The performance of each individual on the project is working to achieve the Greenroad specification to provide a better construction and design of the whole project.	
Total Points	**5**

Table 2-7: Creativity and Effort for Overpass Bridge

Conclusion

Both Projects are dedicated to make the most of this project to receive a bronze certification with Green roads, and may not even stop there. For right now, the main bridge provided a report of 45 points that are due to increase. For the Overpass Bridges, it provided a report of 46 points. There are many opportunities to better the design and construction to better the life span of the structures and the environment around. All of this will be done by looking at the materials, the land that it will use, and the whole transportation around to construct this great main bridge replacement and overpass bridges with connection to the other structures.

16. Bidders Questionnaire

Appendix A

Safety Plan

Workplace Safety Program

Introduction

The enclosed workplace safety program for BB Incorporated is to comply with taking measurements of safety within the site of the Project. This workplace safety plan is to ensure a safe free workplace within the environment. These standards should be sent to the jobsite on request.

The safety program is intended to serve as a basis for the employer safety program. The safety program consists of several essential elements/sections:

1. Management's commitment and involvement
2. Safety committee operation
3. Provisions for safety and health training
4. Safety checklist
5. Preventive Maintenance
6. First aid plan
7. Accident investigations
8. Recordkeeping of injuries
9. Job specific safety rules and procedures

Table of Contents

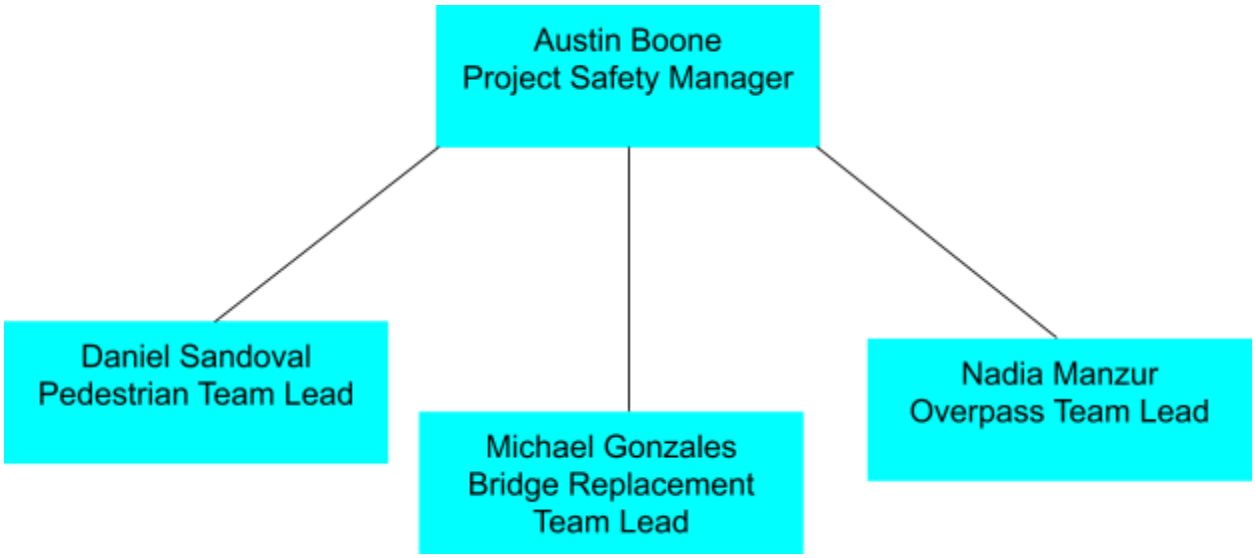
1. Management's Commitment and Involvement

The management at BB Incorporated will be committed to preserving life and wellness on this project with the utmost intensity. Some of the main values and themes we will adhere to throughout this planning and execution can be found below:

- Implementing a safety procedure of the type of work
- ensuring that the incidents that happen on site are being reported.
- Takes in consideration of employee opinions and also taking them in consideration when it comes to decision
- Providing a safe and effective tool for support to achieve the desired outcome

2. Safety Committee

This project will have a safety committee dedicated to ensuring the well-being and prosperity of everyone on site. We at BB Incorporated believe that everyone returning safely to their families is of highest priority. Because of this, the following organization of people will be developed to uphold the safety of the project:



Each team lead will work with the safety manager to ensure safety for their specific scope. The safety manager oversees safety efforts for the entire project. Meetings will be held monthly and meeting minutes will be well-documented and

3. Safety and Health Training

3-1 Safety and Health Orientation

Before starting work on site, every new employee and existing employee are required to undergo a safety and health orientation. Upon attending the Orientation the employees will be informed about the different types of job training, and retraining of employees. Upon completion of the orientation the employee will be given a copy of

the safety rules to use as a reference and also would be given a safety plan pertaining to their job.

All job training should be documented and recorded too comply with company safety and health regulation

3-2 Job specific training

- Supervisor training employee and teaching the employee how to perform their task
- Provide online course on job training to illustrate what is acceptable on site and what is not
- Show new and current employees the use of equipment and also vice versa the use of new equipment
- Supervisor should shadow the new employees to get hands-on experience and correct the employees as needed when not doing a task correctly.

3-3 Retraining Employees

All employees will undergo recurring training on a monthly basis when the workspace safety manual gets updated or when new equipment is being brought in on the site.

3-4 Safety training documentation SAMPLE

Employee: Jerry Sienfeld

Date: 10/14/2020

Supervisor: Peter Parker

Trainer: Clark Kent

Rules and Regulation Reviewed	Date
General review of old and new safety plans	☐
General Maintenance	☐
First Aid	☐
PPE Reviewed	☐
Machinery Certification	☐
Equipment Used	☐
Sanitation/Health	☐

All categories have been reviewed with the employee.
Supervisor name, Printed:
Signature:_____

I have been advise of all safety and health regulations and will adhere to them to the best of my ability
Employee name and printed:
Signature:_____

4. Safety Inspection Checklist

Protective Equipment

Item	yes	no	n/a
Visibility Vest Present on site?			
Hearing protection equipment Present?			
Are workboots Present on site?			
Are safety Glasses present on site?			

Fall Protection

Item	yes	no	n/a
Are parameter edges secured for any falling debris?			
Are construction tools tethered?			
Are workers safely properly tied off			
Are the exterior area working area netted?			
Are their warning			

signs in dangerous areas?			
Is there a 100% fall protection?			

5. Preventive Maintenance

For small machinery equipment used on site, the BB incorporate would make sure that regular maintenance is provided frequently to insure the safety of the workers and also would make sure that the small machinery at risk of malfunctioning does not create a hazard danger for the employees

For the purpose of this project, it will be best to use the usage-based maintenance. This would be a good preventive maintenance technique to use for this project since we would have to use heavy equipment for a long period of time. Hence, by using this technique BB incorporate would be keeping track of the heavy machinery that are used frequently.

6. First-Aid Plan

The first aid plan will be reviewed periodically to determine if it continues to address the needs of the workplace. The first-aid plan will be adjusted based on the changes on the workplace safety and the health hazards, worksite locations, and worker schedules.

6-1 Emergency Personnel Contact Information

Contact information	**Phone Numbers**
Safety Coordinator	Austin Boone Cell
First-Aid Responders	Call 911 in case of emergency
Police	**San Diego County Sheriff's Department**
Fire department	**San Diego FD**
Hospital/Medical clinic	

6-2 Medical Services

For the medical services that would be provided by BB incorporated we would have two options. The first option would be emergency services being provided on site. The second option would be calling the nearest hospital/medical clinic near our jobsite.

Option 1

- Will provide medical attention in case of injury or illness to employees. The proper equipment for prompt transportation of the injured person to a medical clinic or hospital.

Option 2

- The nearest medical treatment facility to the worksite will respond to all the emergencies or injuries that have been sustained by the employee. A contact sheet with several telephone numbers have been created in case 911 does not happen to work. BB incorporate will post telephone numbers in conspicuous locations on site.

6-3 First-Aid Training

All employees will receive First-Aid and CPR training through BB Incorporated. Upon completion of the training, the employee will be able to administer first aid on site.

6-4 First-Aid Instruction

Wounds:

Minor Wounds:

- Clean the wound with water and soap to avoid infection
- When handling the wound, it should be taken care of with a clean cloth

Major Wounds:

- For major wound, it is best to apply pressure to the wound to stop bleeding with a clean cloth
- Designate someone SPECIFICALLY to call 911

- Should apply pressure to wound until emergency personnel arrives on scene

Burns:

Thermal (Heat)

- Rinse the burn area by scrubbing it, and immerse in cold water

Eye Injury

Small particles:

- If small particles gets in the eye, do not rub your eyes
- Can rinse eye with water till particles are out of the eye

Large or Stuck Particles:

- If a particle is stuck on your eye, do not attempt to remove it
- Cover injured eye with a bandage

7. Accident Reporting

7-1 Accident Investigation Procedures

In the event of an accident, however minor, an investigation will be conducted to learn the following:

- The who, what, where, when
- The cause of the accident
- Who is responsible
- How we can learn to prevent the accident in the future

OSHA requires reporting within 8 hours for accidents involving fatalities or the hospitalization of 3 or more employees

OSHA CENTRAL TELEPHONE NUMBER: 1-800-321-6742

7-2 Sample Accident Report

Report No.: _____
Company:
Address: _____

1. Name of injured: _____ S.S. No.: _____
2. Sex: ☐ M☐ F Age: _____ Date of accident: _____
3. Time of accident: _____a.m. _____p.m. Day of accident: _____
4. Employee's job title: _____
5. Length of experience on job: _____years: _____months
6. Address of location where the accident occurred: _____
7. Nature of injury, injury type, and part of the body affected: _____
8. Describe the accident and how it occurred: _____
9. Cause of the accident: _____
10. Was personal protective equipment required? ☐yes ☐no
    Was it provided? ☐yes ☐no
    Was it being used? ☐yes ☐no

If “no,” explain: _____

Was it being used as trained by a supervisor or designated trainer? ☐yes ☐no

If “no,” explain: _____

11. Witness(es): _____
12. Was safety training provided to the injured? ☐yes ☐no

If “no,” explain: _____

13. Interim corrective actions taken to prevent recurrence: _____
14. Permanent corrective action recommended to prevent recurrence: _____
15. Date of report: _____ , _____ 20_____

Prepared by: _____

Supervisor **(Signature**): Date:

16. Status and follow-up action taken by safety coordinator: _____

Safety Coordinator **(Signature**) Date:

8. Recordkeeping

The Project Safety Manager will be responsible for maintaining and filing all safety and accident reports with a backlog of a 5-year minimum. Records kept will include

- Investigation reports
- Worker's compensation claims
- Summary of occupational injuries
- All other forms required by OSHA: 300, 300A, 301, etc.

9. Daily Safety Rules and Policies

9-1 Field Employees:

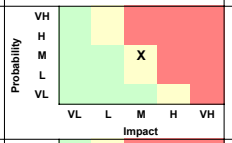
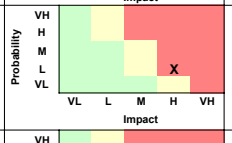
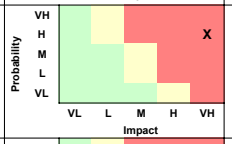
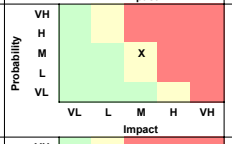
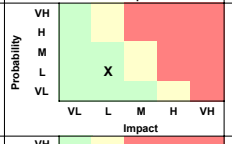
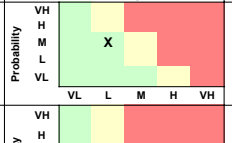
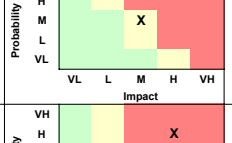
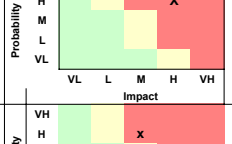
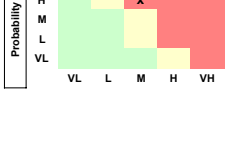
1) Use caution signage for slippery or hazardous areas
2) Do not leave or store items in paths of travel
3) Use appropriate tools and products for field work
4) Always lift with the legs and never with the back
5) Always test an object's weight before exerting
6) Team-lift when necessary to avoid strains
7) Face the load directly when lifting
8) Set down objects in the same manner they are picked up
9) Use ladders that are in good working order
10) Always follow the instructions printed on the ladder
11) Do not “walk” ladders by rocking them
12) Be cognizant of heavy equipment in our area
13) Check behind you constantly when operating in known paths of travel

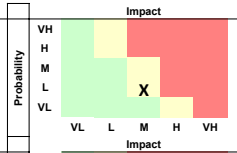
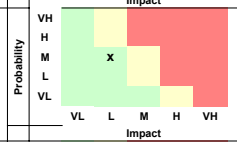
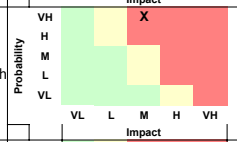
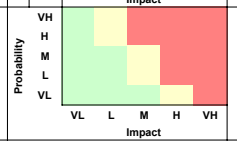
9-2 Office Employees

1) Leave hallways and passages clear of chairs, trash cans, etc.
2) Do not throw matches or other burning materials directly into trash cans without first wetting them
3) Carry and store sharp objects such as pencils and scissors with points facing down

4) Obey all posted signage regarding safety in the office
5) Do not use electrical appliances with frayed cords or ones that are in otherwise non-working order
6) Do not overload electrical circuits by using too many appliances at once.

RISK MANAGEMENT PLAN REV.1 - SAN ELIJO LAGOON

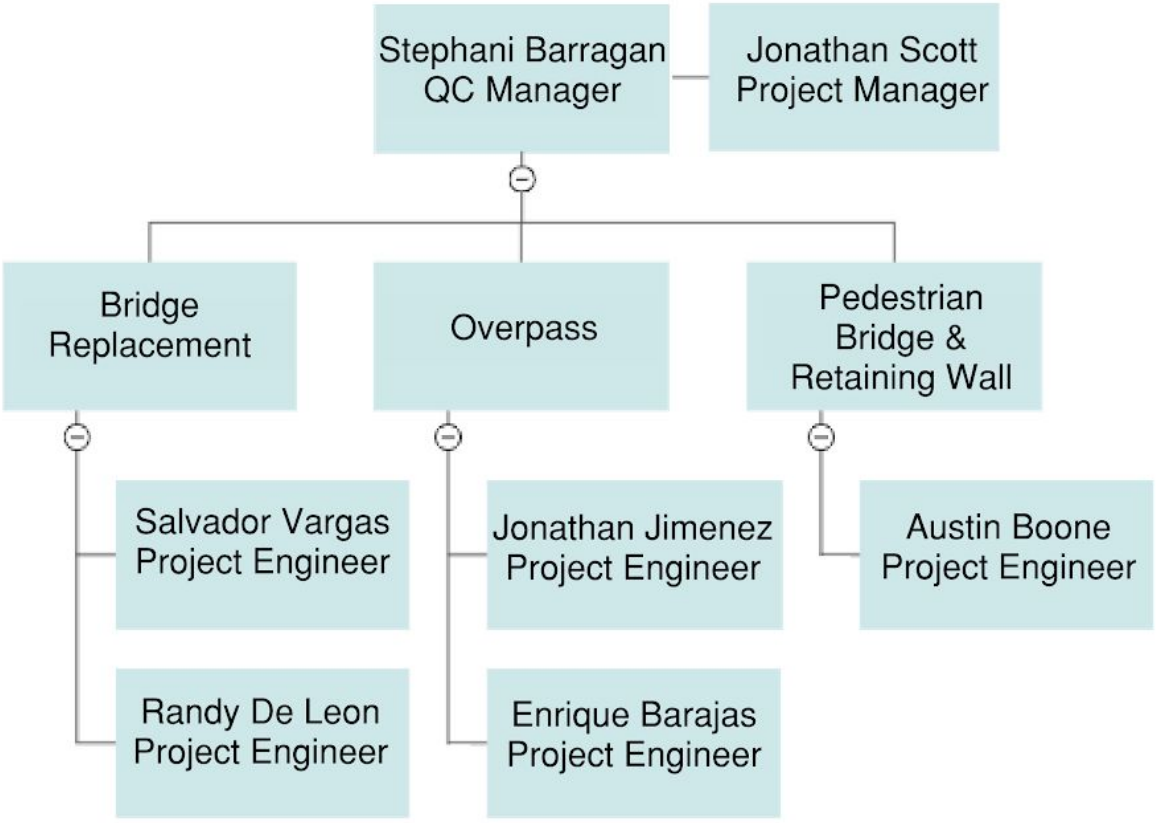
Risk Identification							Qualitative Risk Assessment			Risk Response Plan	
#	Status	Risk Category	Risk Event	Cause	Effect	[redacted]	Probability	Impact	Risk Matrix	Response Strategy	Response Actions
1	Active	Construction	Construction confilict between pedestrian and main bridge	Working in close proximity and time between the two scopes	Project delay, schedule re-work, logistical issues		Medium	Medium		Avoid	Extensive planning and forethought into the locgistics of phasing, equipment, assembly, safety, etc.
2	Active	Environment	Pedestrian Bridge Flood	100-year Storm Event	Excessive wear, possible structural damage		Low	High		Mitigate	Monitor Storm and surf activity closely,
4	Active	External	Project not fully funded	budget constraints - allocation in doubt or subject to change	Project delayed		High	Very High		Mitigate	Project may be divided into 2 or 3 phases with options in the contract
5	Active	Design	Inaccurate Cost Estimate	Unit pricing affected by rick excavation and disposal issues	EE is underestimated		Medium	Medium		Mitigate	Increased unit price to match rock excavation price
6	Active	Construction	Unidentified Utility Impacts	Unidentified Utilities	Project Cost Increases		Low	Low		Transfer	Contingency plan. Contractor is responsible for coordination
7	Active	External	Permit Delays	Permits expire, permits or agency actions are delayed or take longer than expected	Fines, penalties, project delays		Medium	Low		Transfer	Consultant responsible for coordinating permits and identifying permit requirements
8	Active	Construction	Differing site conditions	Unexpected geotech issues, natural or man-made obstructions	Increased project costs		Medium	Medium		Mitigate	Thorough geotechnical investigations performed
9	Active	Project Management	Marketing Opportunities	Public esposure of a high-profile FLH project	Improves viability of FLH		High	High		Accept	Future marketing of this successful project by the division
10	Active	Safe	Working in elevated heights	On site injuries	gal process, insurance, loss of lif		Medium	High		Mitigate	Extensive planning and forethought into the assembly of overpass and develop a strict safety protocal to aviod accidents

		ty										
11	Active	Project Management	Causing major impacts to traffic	Building near/around I-5 freeway and city streets	Heavy traffic congestion, pressure from public	[redacted]	Medium	Low		Mitigate	Plan an effecient schedule and traffic management plan. Increase communication to public to avoid public issues
12	Active	Construction	Noise control	Construction near residental housing	Public issues with local residents, cause delays		Medium	Low		Mitigate	Commnicate with public and surrounding communities. Attempt to stay on schedule and stay within agreed operating hours.
13	Active	Safety	Covid-19	One case can turn into multiple. Put workers/staff in danger	May cause job delay. Potential for heavy media attention. Health of personnel at risk.		Medium	Very High		Mitigate	Social distancing, required masks, required gloves, and other safety procedures. Will supply site with cleaning supplies and hand sanitizer.
14	Active	Construction								Mitigate	

Quality Management Protocol

BB Incorporated

Organizational Chart



This "Quality Management Protocol" (QMP) documents the necessary tasks to achieve the specific goals of the **San Elijo Lagoon Project.**

Success of this project depends on the best people fully understanding the goals as defined by the contract and working at their highest level in concert to achieve those goals. For purposes of this document the project goals are defined as "critical success factors". Communicating these factors throughout every person working on the project will assure these success factors are built into every detail of the project. Communication is the cornerstone to the success of this project.

The "Protocol" consists of two elements, "The Quality Assurance Plan (QAP)" and the "Quality Control Plan (QCP)".

The QAP is the planning and **preparation** required to assure every critical success factor is accomplished. The QCP defines the procedures to **measure, track and build** the critical success factors into the physical project.

1.1 Quality Assurance

Quality Assurance Is the preparation to achieve Quality. Its fundamental purpose is to define the people, methods and tools to achieve excellence and prevent any compromises from jeopardizing the achievement of any of the "Critical Success Factors". The key components to our "Quality Assurance Plan" are:

1. **A MUTUAL UNDERSTANDING OF QUALITY EXPECTATIONS AND CRITICAL SUCCESS FACTORS**
2. **ASSEMBLING and MAINTAINING the BEST TEAM**
3. **UNDERSTANDING THE UNIQUENESS OF THE PROJECT**
4. **COMMUNICATING: THE ALIGNMENT OF ALL TEAM MEMBERS**
5. **CLEAR DECISION MAKING PROTOCOL**
6. **BUILD BEFORE WE BUILD**
7. **UNDERSTANDING THE MATERIALS/EQUIPMENT**
8. **ADOPTING BEST PROCEDURES**
9. **SUBMITTALS AND MOCK-UPS**

1. **A MUTUAL UNDERSTANDING OF QUALITY EXPECTATIONS:** BB Incorporated will employ the following processes to establish a mutual knowledge of the critical success factors by all who work on the project for the full duration of the project.

A. CONTINUOUS DESIGN CONSTRUCTABILITY REVIEW

BB Incorporated along with all subcontractors will conduct a **Continuous Design-Constructability Review**. Our approach utilizes checklists to assist in the creation of consistent, thorough and coordinated construction documents throughout the project. This review of the contract documentation is done as preparation to the "Quality Workshops" and serves as a communicative tool to verify costs, quality and schedule are consistent with the expectations of the client and the entire project team.

1. People - **BB Incorporated** and Subcontractors Construction Project Manager(s), and Project Engineers participate in the continuous review process on an as needed basis. Open communication with clients and design during the project is required for the continuous review process. All found conflicts, omissions or clarifications must be shared regularly. "Quality Workshops" to examine and solve the above will be scheduled regularly (once a week is recommended) **with decision makers** in the workshops. Attendees for these workshops will be defined by the specific topics needing resolution.
2. All suggestions, corrections and concerns are communicated during the Quality Workshops and are fully documented.
3. All items not addressed or resolved during the Quality Workshops must be scheduled for resolution prior to the start of all affected construction. Items not able to be reconciled during the workshop must be agreed upon by all parties and must be reviewed for impact on schedule, costs and quality.

B. QUALITY WORKSHOPS

BB Incorporated (and subcontractors and consultants as needed) will attend the **Quality Workshops**. The first Quality Workshop has the singular goal to come to a full, and mutual understanding by all parties of the "Critical Success Factors" which define this project. Throughout a project the "Critical Success Factors" will not change but how they are achieved may evolve. It is the intent of the Quality Kick-off Workshop to confirm the understanding of all expectations of all parties involved in the project. It is the intent of the ongoing Quality Workshops to address and reconcile all possible obstacles to the successful completion of the project. BB Incorporated's designated quality lead will coordinate the workshops with all parties. The agenda for the Quality Workshops includes:

1. A thorough understanding of all of the lines of communication
2. Agreement to all standards of construction affiliations and references used on the job site.
3. An understanding by all of any missing information or inconsistencies within the RFP, the Response to the RFP, the instructions to bidders and the contract documents (schedule may affect the contract documents)
4. Discussion of all possible mitigating solutions
5. Discussion of all Design Review Checklist items
    1. Schedule corrections and future inclusions
    2. Anticipated bulletin dates

6. Discussion of all mock-ups defined in contract documents AND others which may be recommended
7. Discussion of all First-in-Place procedures and their associated meetings
8. Discussion of all Inspections and Testing procedures
9. Decide, as a team, the criteria to be met to achieve all quality requirements.
10. Quality expectations.
11. Acceptance criteria and accountability.
12. Verification appropriate shop drawings and material/equipment submittals have been submitted and approved prior to installation of related work and verification of receipt of approved factory test results when required.
13. Review of the Inspection and Testing plan and ensure provisions have been made to provide the required quality inspections and tests. Identification of the inspections and tests to be performed, the frequency, where required, acceptance criteria, and who is to perform the inspections and tests. Include all Special Inspections required by all governing agencies
14. Discussion of construction methods and tolerances, workmanship standards, and the approach to be used to provide quality construction by planning ahead and identifying potential issues.

2. ASSEMBLE and MAINTAIN the BEST TEAM

A. PEOPLE

BB Incorporated realizes an enthusiastic attitude, strong knowledge and excellent skills are essential to the successful and full execution of the contract. With an emphasis on quality communication and full accountability by all team members, we will only select people from our organization and will only accept people from consultants and subcontractors which possess the following criteria:

1. Excellent communication skills
2. Excellent fit with the entire Project Team
3. Proven Experience
4. Possess enthusiasm and interest in working on this project with an understanding of all factors including but not limited to the schedule and budget which define the success of the project.
5. Possess all license and certification requirements as necessary for their defined tasks
6. Eager to participate in ongoing education and training to stay current with industry standards
7. Recognize the most important quality of a successful team is its ability to communicate within and with others
8. Realize attitude will get everything done well

Each trade partner will designate a key individual as their "Quality Lead". Satisfying all criteria of 1 – 8 above this individual is responsible for all communication regarding all aspects discussed in this Quality Management Protocol. Specifically and as a minimum this

person is responsible for the preparation of all Quality submittals, reports and documentation. Further, this person will attend and actively participate in all Quality meetings, reviews, inspections, walks and all other activities as necessary or as requested by BB Incorporated to satisfy the expectations of this Quality Management Protocol.

3. **UNDERSTAND THE UNIQUENESS OF THE SPECIFIC JOB:** We understand the uniqueness of the **Project Name** project. The following constraints will be considered. This may not be a comprehensive list and other constraints must be considered. Time should be allotted within the first Quality Workshop to discuss all potential project constraints.

   A. CONSTRUCTION CONSTRAINTS

   1. **CONSTRUCTION REQUIREMENTS**
      a. Allowable working hours
      b. Traffic requirements
      c. Sound requirements
      d. Lighting requirements
      e. Public property protection requirements
      f. Adjacent property rights and regulations
      g. Utility connections and disconnections
      h. Pedestrian protection
      i. Demolition restrictions
      j. Dust control
      k. Fencing requirements

4. **COMMUNICATION: THE ALIGNMENT OF ALL TEAM MEMBERS**

   A. INITIAL COMMUNICATION: A Subcontractor Preconstruction Meeting will be conducted with every entity joining the team as part of the orientation to the project. In addition to a thorough review of the critical success factors, our team will review with every sub-contractor and consultant the following:

   1. Required "Subcontractor Quality Control Plans" (These will be collected from each subcontractor and consultant. Hardcopies will be assembled into a jobsite binder and a digital copy will be recorded.
   2. Quality expectations
   3. Project schedule (including submittals and procurement schedules)
   4. Acceptance criteria and accountability of all work
   5. All applicable specifications
   6. Verification of appropriate shop drawings
   7. Verification of sample submittals
   8. Verification of receipt of approved factory test results when required
   9. Review of the Inspection and Testing plan and ensure all required quality inspections and tests have been documented. Identify the inspections and tests that are to be performed,

the frequency, where required, acceptance criteria, and who is to perform them. Include all Special Inspections and all governing agency inspections

10. Examination of the work area to ensure that the required preliminary work has been completed
11. Examination of the required materials
12. Verification of appropriate material storage, length of storage, temperature and humidity regulations.
13. Verification that required installation equipment is present and appropriate
14. Discussion of applicable construction methods and tolerances, workmanship standards, and the approach to execute quality construction
15. Coordination with all other work
16. Review of all mockups already completed and approved for quality expectations. Meeting minutes will be taken and distributed to the project team.

B. CONTINUOUS COMMUNICATIONS: Our success on our projects is rooted in communication. Continual communication ensures all pertinent information, which could affect any aspect of the job, is thoroughly discussed with all appropriate parties. BB Incorporated and appropriate subcontractors/consultants will attend and fully participate in the Quality Workshops and use these as a communicative tool to further collaborate and to thoroughly foresee potential problems, fully vet problems which do arise and fully explore and execute all needed solutions (see Quality Control). Should a question arise which needs attention by an individual or group not represented in the Quality Workshop, it will be communicated through BB Incorporated (Quality Lead or Project Manager), from there to appropriate decision making entities. It is essential all threats to the successful completion of any of the Critical Success Factors be surfaced as early as possible to appropriate parties for resolution. AS A MINIMUM THE FOLLOWING COMMUNICATION TOOLS WILL BE IMPLEMENTED THROUGHOUT THE PROJECT:

1. **BB Incorporated Conducted Daily Huddle:** This huddle will include various subcontractors depending upon work being performed. This meeting has the following objectives:
   - **a.** Preparation and organization of work being done specific to the day
   - **b.** Discussion of communication needs surrounding the daily work
   - **c.** Assurance all coordination has been done to perform the work
   - **d.** Discussion and preparation of work coming up in the 3-week look ahead
   - **e.** Identification of weekend work (tasks, personnel, req. inspections, etc.)
   - **f.** Review the digitized model (using BIM 360) with the purpose of:
     1. Identifying construction clashes
     2. Identifying better practices in construction
     3. Resolving clashes
   - **g.** Lessons learned (as needed)

2. **BB Incorporated Internal Weekly Staff Meeting:** This weekly meeting includes a discussion of Lessons Learned AND a job walk by the entire office staff (with the possible exception of administrative personnel). Observations of site conditions MUST be photographed as incurred. A review and planning for the 3-week look-ahead schedule must be discussed.

3. **Quality Workshops:** Attended by the Owner, BB Incorporated and appropriate consultants and subcontractors as needed, this meeting is to assure communication is shared among all team members in a timely manner. As a minimum, this meeting will review Schedule, costs and outstanding issues as pertains to activities under current consideration for testing, inspections procurement, storage, installation or fabrication on the project. It further provides the vehicle for team members to communicate in person any and all concerns regarding the project.

4. **Special Communication Regarding Weekend or Extra Hour Work**
   The project schedule shows may require weekends and/or extra hour work. BB Incorporated will put in place a number of protocols to assure quality control is continuous through these times. This protocol includes:
   a. BB Incorporated submittal of a phone tree for use for each specific weekend. .
   b. All subcontractors must submit a list of activities being performed on the weekend to **BB Incorporated** by Thursday morning at 8:00am immediately prior to the weekend to be worked.
   c. All subcontractors must submit a prioritized phone tree of contacts to be called on weekends should questions arise.

5. All subcontractors must have at least one Project Manager or one foreman laborer working on the Friday prior to the weekend to be worked.

6. **Special Communication Regarding Approvals and Documentation of Changes in Scope**
   The project process includes RFIs and Submittals to align work with project intentions throughout the construction process. In some instances Engineering Judgments (EJs) will be required and associated change orders will ensue. In cases where an interpretation of any kind is required by the Fire Marshall, the following protocol must be followed:
   a. RFI prepared in collaboration with the Fire Marshall (with suggested solution as discussed with team)
   b. RFI formally submitted to all parties (Fire Marshall, design team, construction management team, appropriate affected subcontractors, etc.)
      i. With approval of Fire Marshall
      ii. Affect on schedule
      iii. Affect on budget
      iv. All affected trades

c. RFI incorporated in Change Order
d. Change Order is approved

5. **CLEAR DECISION MAKING: BB Incorporated** considers the full project schedule as an aggressive schedule. Weekends throughout the project may be necessary to be worked. Decisions must be made in a timely manner WITHOUT sacrificing quality. A clear, concise decision making tree must be established to assure appropriate, decision-making people attend meetings (effective meeting control) and decisions which must be made in "off" hours can be made.

A. Typical Decision Making Tree

1. Not included in contract documents and considered means and methods
   a. Field made decisions overseen by **BB Incorporated**
   b. Entered into Project Managers' "Daily Log"
2. Not included in contract documents and not means and methods
   a. Subcontractor raises issue to Project Manager, writes potential R.F.I.
      1. Collaborate with others to provide possible resolution to include in R.F.I.
   b. P.E. with Project Manager reviews R.F.I. for:
      1. Appropriateness
      2. Other trades which may be involved
      3. Possible effect on schedule
      4. Possible effect on budget
      5. Begins Change Order process (as needed)
      6. Further detail needed for job specificity

3. Issues affecting change in design, change in budget, change in schedule
   A. RFI issued (includes suggested resolution through collaboration)
   B. Raised in Quality Workshop for appropriate action (future change order?)
   C. Issues not able to be resolved in Quality Workshop advanced to appropriate decision maker

B. Weekend Decision Making Tree

1. Issues not included in contract documents and considered means and methods
   a. Field made decisions overseen by **BB Incorporated** Project Manager/Foreman
   b. Entered into Project Managers "Daily Log"
2. Not included in contract documents and **not** means and methods
   a. Subcontractor raises issue to Project Manager
      i. **BB Incorporated** Project Manager or Foreman reviews issue:
         a. In contract documents? (is it really an issue? If yes…)
            a. Other trades which may be involved
            b. Possible effect on schedule
            c. Possible effect on budget
            d. References Weekend Work Communication Tree

i. **BB Incorporated** Phone tree to be identified by previous Thursday

e. Project Manager confirms appropriate action with involve parties

3. Issues affecting change in design, change in budget, change in schedule

D. Project Manager/Foreman assesses urgency of situation

i. If situation prevents further weekend work

1. Uses pre-establish Weekend Work Communication Tree

Anticipation: Teaming the experience of the Owner and the entire team with BB Incorporated provides the best possibility for anticipation of potential threats to the budget, the schedule or to the success of any of the critical success factors. The Quality Workshops are essential to the collaborative resolution of inevitable, unanticipated findings and events indicative of every job site. The **BB Incorporated** team will minimize these to every extent possible. Listed below are elements of the construction process we review thoroughly prior to starting the job or any task on the job. We review these as appropriate in the 3 week look-ahead schedule and in our daily huddles. We fully expect and will demand every subcontractor review the following prior to all quality workshops.

1. Industry standards
2. Specific requirements of the job in contrast to industry standards (more demanding tolerances, security, environment, schedule, costs, etc. may all have specific needs in respect to the project.
3. BIM – Subcontractors weekly meeting agenda
4. All Contract documents (including submittals, RFIs, bulletins, etc.)
5. Posted drawings and their associated and cumulative impact on the entire project
6. Job Hazard Analysis checklist

8. UNDERSTAND THE MATERIALS/EQUIPMENT: Understanding the materials and their use is essential to their installation. We look closely at all materials used on the job and consider when they will be needed, the preservation of their quality both prior to and on the jobsite: transportation, storage, installation and in-place protection. A thorough understanding of all of these aspects is required to satisfy schedule, budget and quality. We require our subcontractors to be committed to UNDERSTANDING THE MATERIALS being used on the project.

1. PROCUREMENT: Within the overall schedule and specifically with respect to the 3-week look ahead schedule, BB Incorporated and all subcontractors must track a number of factors which assure the delivery of the correct materials at the appropriate time:

a. Manufacturing time
b. Shipping time
c. Interface with other materials

1. Engineering judgments

d. Storage Requirements
e. Specific timing for installation
f. Specific equipment needs for handling materials
g. Environmental requirements for all materials
h. Protection requirements during shipping of all materials
i. Verification of shipped materials match reviewed submittals

2. SUBSTRATE: All installations must accept the previous work upon which they are built. Factors affecting construction and/or installation are tracked diligently. These factors include:

a. Condition of materials prior to installation
b. Installed environmental requirements of all materials
c. Know the tolerances of all work on which a material is dependent (dimensional, moisture, other)
d. Know the pre-installation preparation of all materials

3. INSTALLATION:

A. Review Mock-up and Mock-up notes as appropriate
B. Specific installation equipment required
C. Understanding of protection of adjacent surfaces and environment
D. Quantity of material needed on an as-needed basis
E. Engage Manufacturer's representatives as needed
   1. Site visits
   2. Reports
   3. Updated data which may not be in original submittals

9. ADOPT BEST PROCEDURES: BB Incorporated will use the most appropriate procedures for all construction as required by the schedule, the budget and as the quality of the materials and their integrated use with one another demands. We work continuously with a "Zero Punch List". This list tracks ongoing corrections to work as required. We do this to eliminate a build-up of tasks to be performed at the end of the project and it furthers an ongoing consciousness of Quality.

1. Review all specification sections and contact all governing agencies and associations representing all aspects of the work.
2. installation, protection and maintenance of all work.

3. Include **Owner** and the entire design team and all members of the project in all decisions which are not directly defined by the contract documents and are not defined as "means and methods."
4. Maintain an ongoing consciousness of Quality
5. Understand all the tolerances of all installations and materials.
6. Utilize experts in the field
7. Mock-up complex constructions NOTE: Make all corrections to mock-ups prior to actual installation of representative work and get sign-off
8. Maintain a clean site

10. SUBMITTALS AND MOCK-UPS

The SUBMITTAL and MOCK-UP processes are key components to the overall success of the project. All subcontractors must submit and receive approval for all submittals prior to commencement of any and all work. Submittals may include, but are not limited to, the following items:

A. SUBMITTALS

1. Product Data
2. Shop Drawings
3. Samples
4. Coordination Drawing Submittals
5. Test and Inspection Reports
6. Green Roads required documentation
7. Qualification Data
8. Welding Certificates
9. Installer Certificates
10. Product Certificates
11. Material Certificates
12. Material Test Reports
13. Product Test Reports
14. Compatibility Test Report
15. Field Test Reports
16. Design Data

B. MOCK-UPS

Mockups are constructed to confirm selections made under sample submittals; to demonstrate aesthetic requirements, qualities of materials and workmanship; to review coordination, testing or operation; to show interface between dissimilar materials; and to demonstrate compliance with specified installation

tolerances. Mockups are not samples. Unless otherwise indicated, approved mockups establish the standard by which work will be judged and accepted. Mockups must be approved by the architect and client prior to installation of all related work. All mockups approved must be relayed to construction and sub-teams at an appropriate time.

MOCK-UPS may include:

1. Integrated Exterior Bridge Mockups: Mockups of the exterior envelope erected separately from the bridge, which may consist of multiple products, assemblies, and subassemblies.
2. Interior Bridge Mockups: Mockups of typical interior spaces, which may include median dividing sections, pavement, and twin towers, cable systems, specialties, equipment, and lighting.
3. Visual Mockups: Full size physical assemblies constructed with specified materials and finishes which are singularly provided for aesthetic review and not subject to any testing regime. The Visual Mockup(s) may be required before, after or during mockup evaluation.

C. QUALITY BENCHMARKS:

1. Erect complete sections of elements of the works, as described in the Specifications, for approval. Installations must not begin in other areas of that particular trade until the design team and owner have examined and approved the quality benchmark. Alterations and adjustments required by the design team and/or client must be promptly implemented.

2. Upon receipt of the design team and client approval, fully protect the Quality Benchmark. The mock-up and its associated Quality Benchmarks will be used as the standard of construction and materials for the remaining work. Coordinate observation of "Quality Benchmarks" as requested by the design team, the client and any subcontractors as necessary. Remove and replace protection as necessary to facilitate observations.

D. SUBMITTAL REGISTER

The **BB Incorporated** Project Engineer is responsible for extracting the submittal requirements from the contract documents and preparing a "**Submittal Register"** for every specification section of the work. The **BB Incorporated** Project Engineer will maintain this record of the status of all submittals. The Submittal Register must include both the Technical Specifications and the General Requirement Specifications submittals. **EVERY SUBCONTRACTOR MUST SIGN OFF ON THIS REGISTER.** The Submittal Register must include the following:

1. Scheduled data for first submittals.
2. Specification Section number and title.
3. Name of subcontractor.
4. Description of Work covered.

5. Scheduled date for design team approval.
6. Scheduled date of fabrication.
7. Scheduled dates for purchasing.
8. Scheduled dates for installation.
9. Activity or event number.

C. SUBMITTAL APPROVAL PROCESS

The progression of submittals from transmittal to approval will be as follows:

1. Enter subcontractor submittal into the Submittal Register
2. Review the submittal package for conformance with the Contract
3. Verify the subcontract or purchase order for the scope of work.
4. Coordinate shop drawings with associated trades.
5. Check for rough-in requirements of other trades including such items as: Embedment in concrete pours or additional supports required attached to the steel structure.
6. Coordinate details, sections, dimensions, and cross-referencing to other components of work.

F. SUBSTITUTION REQUEST

If the submittal deviates from the Contract Documents, the subcontractor must follow the contract documents for a full Substitution Request. The team reviews this request to ascertain the reasons and the appropriateness of the request. Only after The Team agrees the Substitution Request is necessary will this procedure be utilized.

1.2 Quality Control

Quality Control assures the planning is realized in the built environment. This includes First-In-Place reviews as these are intended to be a part of the final product. We understand the final goal of this project is the realization in the built environment of all of the critical success factors. The method employed to ensure this is accomplished is Quality Control. Armed with a clear expectation, BB Incorporated uses the following tools to progress the work to its successful conclusion:

1. FIRST IN PLACE
2. REPORTING
4. INSPECTIONS AND TESTS
5. NON CONFORMANCE AND CORRECTIVE ACTIONS
6. QUALITY AUDITS

7. RECORD AND DOCUMENT CONTROL

1. FIRST-IN-PLACE

"First-In-Place" (FIP) work is a body of work which will serve as an example of the quality expected in all subsequent, similar work. The definition of all individual "First-In-Place" work and the list of all "First-In-Place Reviews" is agreed upon in the "Quality Kick-off Workshop." Upon "completion" of construction of a "First-In-Place", BB Incorporated will observe the work to ensure conformity with the contract documents and the "Quality Kick-off Workshop" expectations. After a thorough review, including all tests and inspections as required by the contract documents, all "in-house" deficiencies are documented in a "Non-Conformance Report" form. These forms become part of the 3-week look-ahead schedule and are tracked in V-Planner and are continually reviewed until cleared at the weekly OAC meetings. All First-In-Place activities and schedules will be discussed in the Quality Workshops. Upon correction of ALL items for any defined "First-In-Place," appropriate team members will be invited to review corrected work. Again, all found deficiencies are attached to the 3-week look-ahead schedule and are tracked in subsequent OAC and Quality Workshop meetings. The client and/or the design team are then asked to conduct a final "First-In-Place Sign-off." This work then serves as the example for all subsequent, similar work.

If, in the unlikely event the "First-In-Place" work cannot meet the team's quality expectations a "Root Cause Analysis (RCA)" will be conducted. This analysis determines reasons and corrective actions to be conducted to achieve the required success on the specific "First-In-Place" work. The learned resolution is then implemented in the correction of the "First-in-place" and an additional "final inspection" is called. When this "final inspection" is approved, all further work will conform to the level achieved and finally agreed upon.

A. ROOT CAUSE ANALYSIS (RCA)

The "Root Cause Analysis" is a tool which diagnoses reasons the work was difficult to perform or reasons the work could not meet all Quality expectations. This analysis provides "lessons learned" to inform all future work.

B. NON CONFORMANCE REPORT (NCR)

A "Non Conformance Report" will document clearly nonconforming work found by test or quality inspection or review. All Non Conformance Reports will be logged and tracked through a "Continuous Improvement Plan Log". It is the first step of the "**Corrective Action Plan**". The NCR log will be maintained by **BB Incorporated** and kept in Egnyte and hardcopy.

C. CORRECTIVE ACTION PLAN (CAP)

A "Corrective Action Plan" includes all "Non Conformance Reports" and all "Root Cause Analysis" for a specific "First in Place". The CAP provides one of 2 paths forward:

1. Identify methods to achieve the agreed upon objectives (re: "Quality Kick-off Workshop")
    a. Describe in detail work methods
    b. Identify all changes in the schedule
    c. Identify all changes in the project costs
2. Clearly state why the objectives cannot be met
    a. Describe in detail alternate, equivalent objectives
    b. Describe in detail alternate methods to achieve equivalent objectives
    c. Identify all changes in schedule
    d. Identify all changes in project costs

2. REPORTING

A. DAILY REPORTING

BB Incorporated is responsible for all "Daily Reporting". This includes:

1. Tracking all Subcontractors' work
2. Tracking all activities completed
3. Observing and reporting on all work in progress
4. Documenting all problems encountered and action taken
5. Recording all tests and inspections performed; indicate any failed tests or inspections, and steps taken
6. Identification of any non-conforming work
7. Follow-up inspections on corrective work

B. MONTHLY REPORTING

BB Incorporated will submit a monthly Quality Control Report prepared by the **BB Incorporated** Quality Lead which will be included as part of an OAC meeting once a month to discuss. This report includes:

1. A summary of all work completed and in progress
2. All outstanding quality issues
3. Tracking all Subcontractors' work
4. Tracking all activities completed

5. Observing and reporting on all work in progress
6. Documenting all problems encountered and action taken
7. Recording all tests and inspections performed; indicate any failed tests or inspections, and steps taken
8. Identification of any non-conforming work
9. Follow-up inspections on corrective work

BB Incorporated holds all subcontractors responsible for their own **weekly** reports which include:

1. A summary of all work completed and in progress
2. All outstanding quality issues
3. Tracking all activities completed
4. Observing and reporting on all work in progress
5. Documenting all problems encountered and action taken
6. Recording all tests and inspections performed; indicate any failed tests or inspections, and steps taken

3. INSPECTIONS AND TESTS

Inspections and tests are necessary to verify work processes and results conform to contract requirements and to the mutual understandings as defined in the "Quality Kick-off Workshop". Parties performing inspections and testing include but are not limited to: BB Incorporated, client, design team design consultants, third-party inspection and testing agencies, governing agencies, and subcontractor's inspection and testing companies.

Each subcontractor as part of their Quality Control Plan will submit an internal Inspection and Testing Plan. This internal plan must include the following items:

1. List of items to be inspected and tested with type of test required
2. Inspections and tests to be performed
3. Testing schedule frequency
4. Specification references
5. Performing party
6. Witness parties
7. Certificates required
8. Checklists and procedures
9. Reference standards
10. Acceptance criteria
11. Witness and/or Hold for Engineer's approval

A. TYPES OF INSPECTIONS AND TESTS

1. Material Inspections and Testing

When required by the specifications, material quality inspections and tests ensure purchased materials meet quality requirements. The subcontractor Quality Control Manager inspects or ensures qualified inspectors inspect materials prior to use for conformance to project quality requirements.

The subcontractor Quality Control Manager is responsible for limiting all installed materials to those which have been documented as meeting the testing requirements of all specifications.

2. Special Tests and Inspections

BB Incorporated will engage qualified Special Inspectors as necessary to conduct special tests and inspections. The Special Inspectors will be: **Not Yet Hired**

a. Verify manufacturers maintain detailed fabrication and quality-control procedures

b. Review the completeness and adequacy of the procedure as it relates to the Work.

c. Notify BB Incorporated promptly of irregularities and deficiencies observed in the work.

d. Submit a certified written report of each test, inspection, and similar quality control service to the BB Incorporated and authorities having jurisdiction.

e. Submit a final report of special tests and inspections at Substantial Completion, which includes a list of unresolved deficiencies.

f. Interpret tests and inspections and communicate whether tested and inspected work complies with or deviates from the Contract Documents.

g. Retest and re-inspect the corrected work.

3. Source quality inspections:

a. Required when quality characteristics cannot or will not be verified during subsequent processing.

b. Validate supplier quality before materials are delivered to the project jobsite.

c. Ensure each work task uses the source inspected materials and proceeds only after materials have been accepted by the source inspection.

d. Submit source inspection and testing reports.

4. Work In-progress Inspections

"Work in-process" quality inspections verify compliance to project quality standards as work is being conducted. Work in-progress inspections are conducted by the subcontractor

Quality Control Lead and submitted to BB Incorporated and are discussed in the OAC Weekly Meetings.

5. Initial Job-Ready Inspections

For each work task, the project team performs job-ready quality inspections to ensure that work activities begin at the appropriate time. Job-ready quality inspections verify starting conditions conform to the project quality requirements.

6. Initial Work In-Progress Inspections

For each work task, the project Team performs an initial work in process inspection when the first representative portion of a work activity is completed to assure conformance with contract documents and expectations as discussed in the "Quality Kick-off Workshop."

7. Follow-up Work In-Process Inspections

BB Incorporated performs ongoing work in process quality inspections to ensure work activities continue to conform to project quality requirements.

8. Completion Work Quality Inspections

For each work task, the project team inspects the completed work to verify work conforms to the project quality requirements. The **BB Incorporated** Project Manager, must review added requirements as requested by the owner for schedule and budget analysis and agreed upon in the "Quality Kick-off Workshop". Appropriate change orders must be processed prior to the implementation of new requirements.
"Completion Quality Inspections" must be conducted prior to other work activities which may interfere with an inspection.

9. Product Testing

All product testing will be performed in accordance with project specifications.

10. Field Quality Control Testing

This includes tests and inspections performed on-site for installation of the Work and for completed Work.

5. **NONCONFORMANCE AND CORRECTIVE ACTIONS:** A nonconformance is any item or assembly which does not meet project quality requirements. Should a nonconformance item or assembly be identified by an inspection or test, a systematic method to identify the item, correct it, and ensure project quality is not adversely impacted must be followed.

A. OBSERVATION AND MARKING OF NONCONFORMANCE WORK

When BB Incoporated, subcontractors/suppliers, inspectors, or the client identify a nonconformance item, the effected subcontractor must promptly and clearly mark by paint, tape, tag, or other easily observable signal the area, part, adjacent area, affected areas, adjacent parts, to prevent the inadvertent cover-up of all work and all work affected by the nonconforming work.

B. CONTINUATION OF WORK

After the "nonconformance" is marked, the **BB Incorporated Project Manager** determines if work can continue in the affected area. Work may continue if:

1. Continuation of work in the area does not adversely affect quality or hide the defect
2. Continuation of work does not affect the quality of adjacent or hide any and all impacts on adjacent work

Work may continue in the affected area while the disposition of the item is resolved. The BB Incorporated Project Manager, may place limitations on the continuation of work. All limitations must be communicated as quickly as possible and be followed up in writing.

Note: All work whether or not it is determined by the BB Incorporated Project Manager to be continued or not will be documented on the NCR Log. All limitations of continuing work will be included in the Non-Conformance Log.

C. STOP WORK ORDER: The **BB Incorporated Project Manager**, may stop work if ANY of the following conditions occur:

1. Continuing work may adversely affect the project quality in any way
2. Continuing work may hide defective work
3. Defective work has not been adequately documented
4. Defective work has not been clearly marked
5. The area affected by the defective work has not been clearly marked

The Project Manager identifies the limits of the affected area and quickly and clearly marks the stop work area and communicates in writing to all those affected.

D. DOCUMENTING NONCONFORMING WORK: When a nonconformance item is identified, the **BB Incorporated** Quality Lead, must notify the subcontractor's Quality Control Manager as soon as practical. This notification must be followed-up in writing. The subcontractor's Quality Control Manager must issue a Nonconformance Report and log and track the item until the nonconformance item has been corrected and approved. The **BB Incorporated** Quality Lead will document all nonconforming work.

E. DISPOSITION OF NON-CONFORMANCE: When the subcontractor's Quality Control Manager is notified of a nonconforming item, the subcontractor Quality Control Manager must complete a **"Nonconformance Report Form"** and be entered into the Non-Conformance Log. The subcontractor's Quality Control Manager must assign a disposition of one of the following:

1. **REPLACE:** The nonconformance may be brought into conformance with the original specification requirements by replacing the nonconforming product or material with a conforming product or material.
2. **REPAIR:** The nonconformance may be brought into conformance with the original requirements through re-machining, reassembly, reprocessing, reinstallation, or completion of the required operations. Major repair requires **Owner**, the design team and BB Incorporated's written approval prior to rework.
3. **REWORK:** The nonconformance may be made acceptable for its intended use, even if it is not restored to a condition meeting all specification requirements. The subcontractor Quality Control Manager may specify applicable standards for the completion of rework. Such standards and rework must be approved by **Owner**, the and BB Incorporated and all appropriate governing agencies.

The subcontractor's Quality Control Manager will complete the NCR form; identifying the non-conforming work and the recommended disposition. The NCR will be given to **Owner**, BB Incorporated and all appropriate governing agencies for a full review. If the Project Team agrees with the subcontractor Quality Control Manager's recommendation, the **BB Incorporated Project Manager** and **Owner** will approve and work may commence. **No work specifically pertaining to the non-conformance item(s) is to occur until the disposition/recommendation has been approved by the Project Team.**

F. CORRECTION OF NONCONFORMING WORK

The **BB Incorporated Project Manager** must verify corrective actions have eliminated the nonconformance to the requirements of the contract documents, or as instructed by the disposition of the nonconformance report, and only then removes the nonconformance marker. **It is the sole responsibility of the BB Incorporated Project Manager (or other BB Incorporated designee) to remove the nonconformance marker**.

G. LESSONS LEARNED - PREVENTATIVE ACTIONS

Fixing nonconforming work includes systematic prevention of recurrences. It is essential for improving the quality of the project that all Nonconformance issues undergo a Root Cause Analysis (RCA). The RCA will identify the quality expected for the item, versus the actual quality observed. For each item, a corrective action will be identified and implemented. Solutions may involve a combination of enhanced process controls, training, upgrading personnel qualifications, or improved processes. Follow-up is performed to verify the problem is resolved.

6. QUALITY AUDITS

Audits verify the BB Incorporated Quality Plan is functioning as intended. The Project Team conducts Project Quality audits every three months to verify proper operation of the Quality Plan. The Project Team will audit:

1. Project—specific quality standards
2. Process control plans
3. Inspections and tests
4. Nonconformance and corrective actions
5. Preventive actions
6. Quality records and documents

The Project Quality Team is responsible for taking appropriate corrective actions to ensure compliance with Quality Plan requirements.

7. RECORD AND DOCUMENT CONTROL

Proper document control facilitates the organized flow of documents and correspondence; promotes consistent distribution of data; promotes proper identification and storage of documents; and thus ensures that all Project participants have access to the most current information.

A. QUALITY SYSTEM DOCUMENTS

1. Quality Plan

The **BB Incorporated** Quality Lead will maintain the **BB Incorporated** Quality Plan, and ensure approved subcontractor QCPs are in place and accessible. The Quality Manager maintains, improves, and updates the Quality Plan as necessary. Every three months, the **BB Incorporated** Quality Lead evaluates the process to assess possible improvements.

2. Document Controls

Document Control maintains project-specific quality documents; ensures applicable documents are readily available; and seeks to eliminate unintended use of obsolete documents.

3. Project Controls Record

The **BB Incorporated** Quality Manager verifies the completeness, accuracy, and retention of project specific quality records including:

1. Inspection and test records
2. Quality submittals to owner and design team
3. Field reviews
4. Daily log reports
5. Incident reports
6. Subcontractor Quality Control Plans
7. Quality improvement records
8. Nonconformance reports

Alternative Technical Concpets

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
11	SD	5	R37.4/R46.5	3	20

Kate Vallin 10-28-2020
REGISTERED CIVIL ENGINEER DATE

11-11-2020
PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER KATE VALLIN No. 60853 Exp. 6-17-2020 CIVIL STATE OF CALIFORNIA

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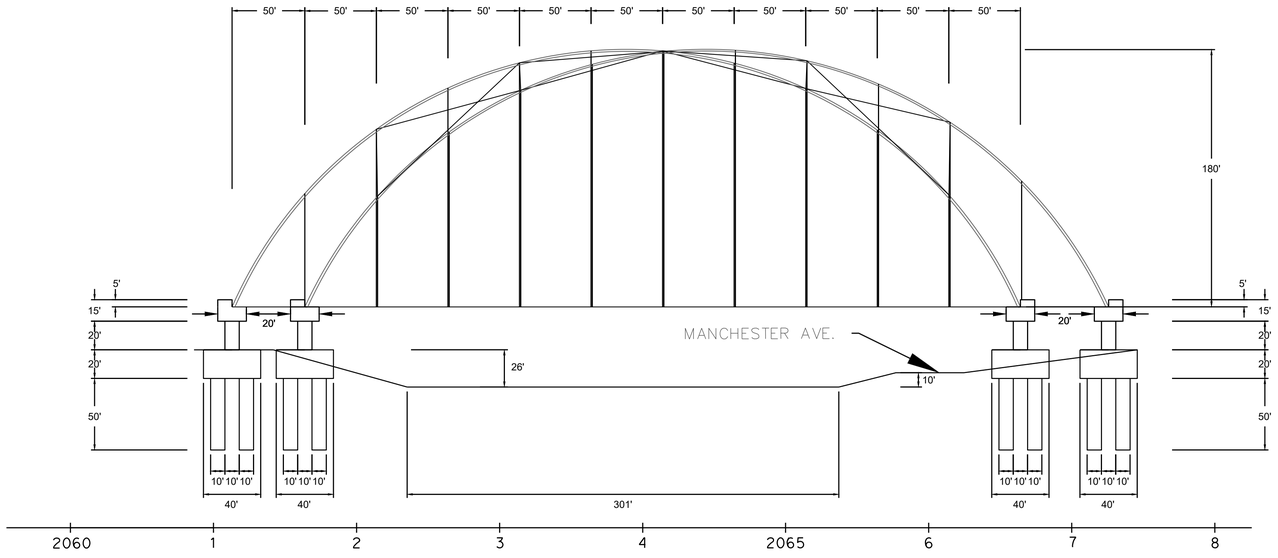

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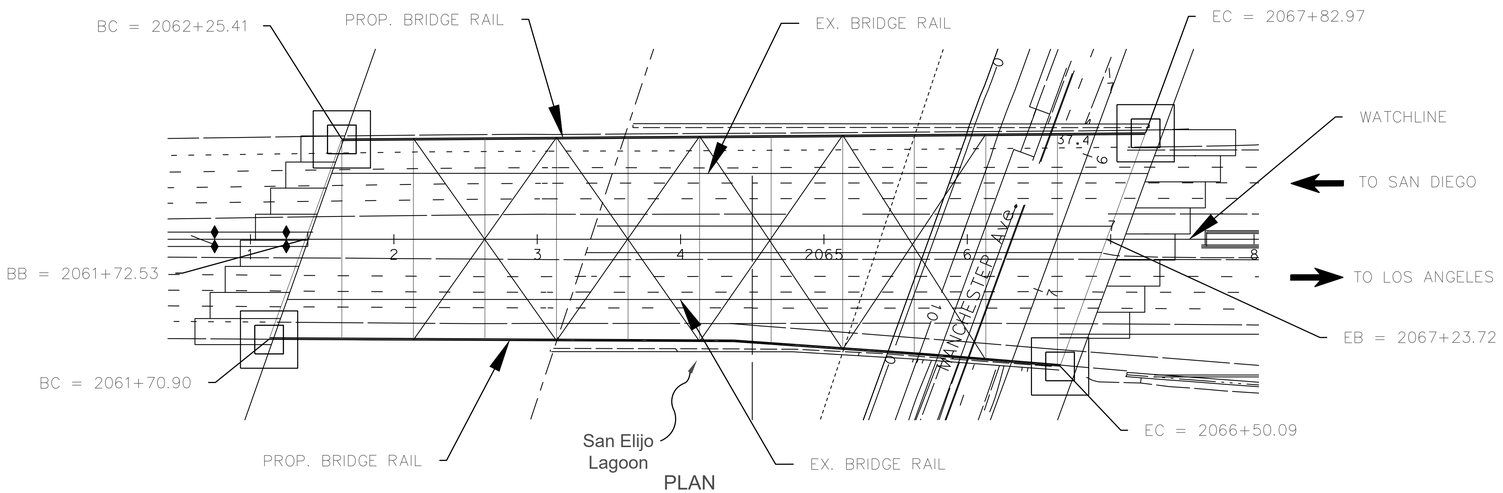

PLAN
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Plan Symbols

SECTION IDENTIFICATION

STANDARD PLAN (2010) SHEET NO.

DETAIL

GENERAL NOTES
LOAD AND RESISTANCE FACTOR DESIGN

DESIGN: AASHTO LRFD Bridge Design Specification 8th Edition and the Caltrans Amendments dated 2017

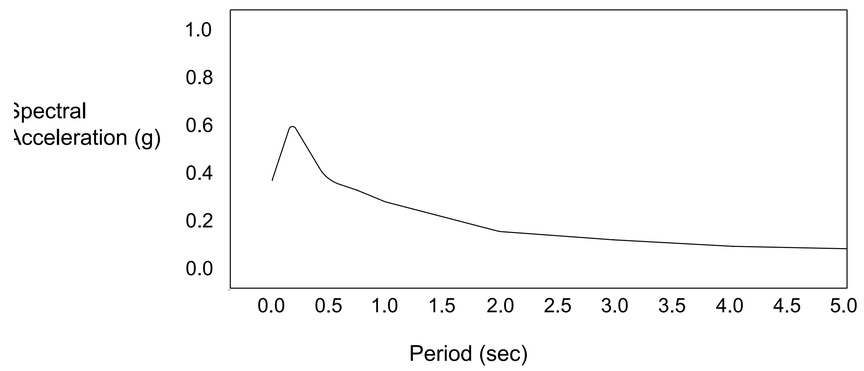
DEAD LOAD: Includes 35 psf for a future wearing surface

LIVE LOADING: HL93 with "LOWBOY" AND Permit Design Load

SEISMIC LOADING: SDC ARS Online 10.5.20
Soil Profile: Vs=760m/s

Moment Magnitude:
Peak Ground Acceleration: 0.5g

ARS CURVE



Reinforced Concrete:

ASTM A706
fy= 60 ksi
f'c= 4ksi
n = 8

DESIGN OVERSIGHT	DESIGN	BY MICHAEL GONZALEZ	CHECKED	LOAD & RESISTANCE FACTOR DESIGN			
	DETAILS	BY	CHECKED	LAYOUT	BY	CHECKED	
SIGN OFF DATE	QUANTITIES	BY	CHECKED	SPECIFICATIONS	BY	PLANS AND SPECS COMPARED	

PREPARED FOR THE STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

PROJECT ENGINEER
MICHAEL GONZALEZ

BRIDGE NO.
POST

SAN ELIJO LAGOON & UC

GENERAL PLAN-1

DESIGN GENERAL PLAN SHEET (ENGLISH) REV. 11/16/20

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UNDT:
PROJECT NUMBER & PHASE: CONTRACT NO.:

REVISION DATES	SHEET	OF
	3	20

Senior Project Alternate Design - Tied Arch.dwg - Nov/ 16/ 2020 - 3:01PM

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
11	SD	5	R37.4/R46.5	4	20

Kate Vallin 10-28-2020
REGISTERED CIVIL ENGINEER DATE

11-11-2020
PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER · KATE VALLIN · No. 60853 Exp. 6-17-2020 · CIVIL · STATE OF CALIFORNIA

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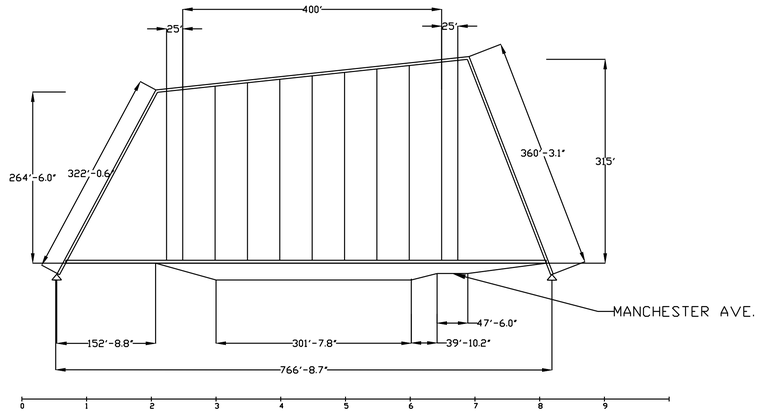

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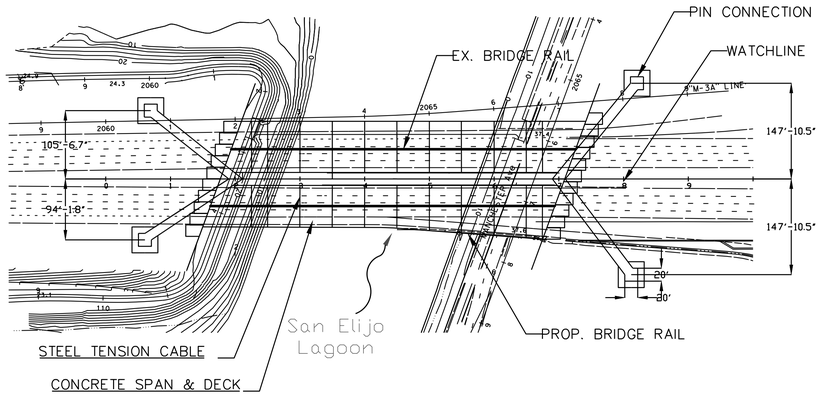

PLAN
1"=50'

Plan Symbols

SECTION IDENTIFICATION

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DETAIL

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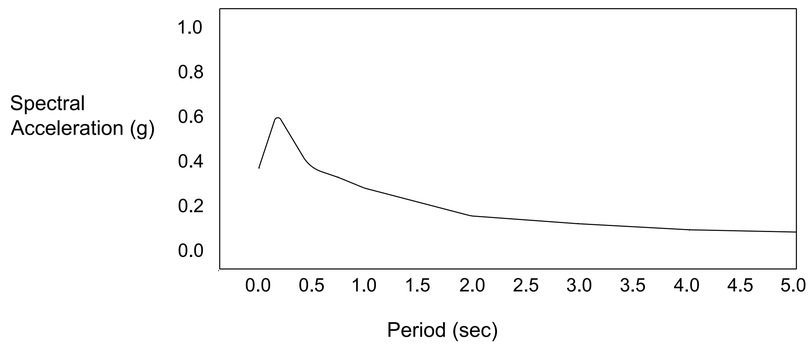
SEISMIC LOADING: SDC ARS Online 10.5.20
Soil Profile: Vs=760m/s

Moment Magnitude:
Peak Ground Acceleration: 0.5g

ARS CURVE



Reinforced Concrete:

ASTM A706
fy= 60 ksi
f'c= 4ksi
n = 8

DESIGN OVERSIGHT	DESIGN	BY HOWARD LAU	CHECKED	LOAD & RESISTANCE FACTOR DESIGN			PREPARED FOR THE STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION	BRIDGE NO.	SAN ELIJO LAGOON & UC
	DETAILS	BY	CHECKED	LAYOUT	BY	CHECKED			
SIGN OFF DATE	QUANTITIES	BY	CHECKED	SPECIFICATIONS	BY	PLANS AND SPECS COMPARED	PROJECT ENGINEER MICHAEL GONZALEZ	POST	GENERAL PLAN-1

DESIGN GENERAL PLAN SHEET (ENGLISH) REV. 11/16/20

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UNDT:
PROJECT NUMBER & PHASE: CONTRACT NO.:

REVISION DATES | SHEET 4 | OF 20

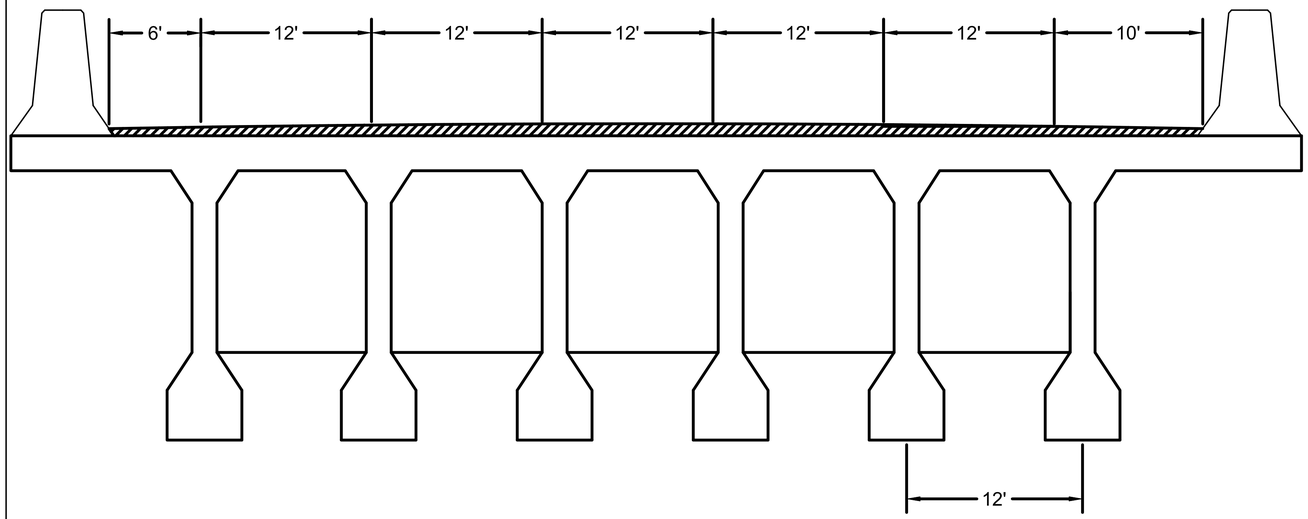
Senior Project Alternative Tied Arch Special.dwg - Nov/ 16/ 2020 - 3:01PM

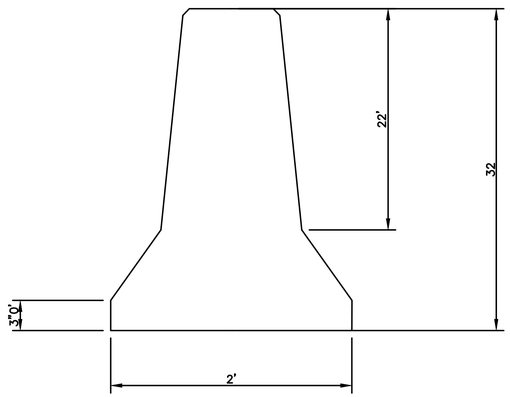
Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
		5	R37.4/R46.5		

Kate Vallin
REGISTERED CIVIL ENGINEER DATE

PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER
No. C 27036
Exp.
CIVIL
STATE OF CALIFORNIA





Type– F Barrier

PLAN

1" = 16'

GENERAL NOTES
LOAD AND RESISTANCE FACTOR DESIGN

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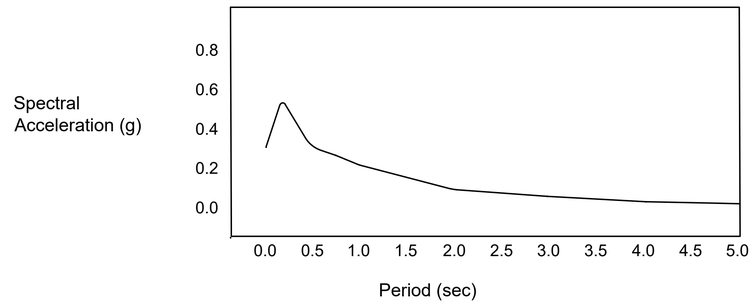
SEISMIC LOADING: SDC ARS Online 10.5.20
Soil Profile: Vs=760m/s

Moment Magnitude:
Peak Ground Acceleration: 0.5g

ARS CURVE



Reinforced Concrete:

ASTM A706
fy= 60 ksi
f'c= 6ksi
n = 8

Plan Symbols

- Section Identification

-Standard Plan (2010) sheet No

Detail

DESIGN OVERSIGHT	DESIGN	BY Qais Abassy	CHECKED	LOAD & RESISTANCE FACTOR DESIGN			PREPARED FOR THE STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION		BRIDGE NO.	SAN ELIJO LAGOON & UC
	DETAILS	BY Qais Abassy	CHECKED	LAYOUT	BY	CHECKED		PROJECT ENGINEER Nadia Manzur	POST ????	Alternative Overpass Bridge 1- I Beam
SIGN OFF DATE	QUANTITIES	BY	CHECKED	SPECIFICATIONS	BY	PLANS AND SPECS COMPARED				

DESIGN GENERAL PLAN SHEET (ENGLISH) REV. 11/15/20

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UNDT:
PROJECT NUMBER & PHASE: CONTRACT NO.:

REVISION DATES | SHEET | OF

Senior Project Overpass Curve Deliverable 6 CAD Drawing – T-BEAM .dwg – Nov/ 15/ 2020 – 10:30PM

GENERAL NOTES
LOAD AND RESISTANCE FACTOR DESIGN

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Moment Magnitude:
Peak Ground Acceleration: 0.5g

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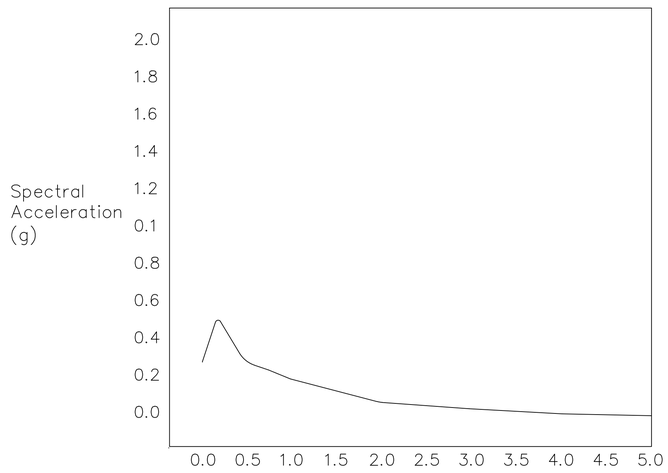

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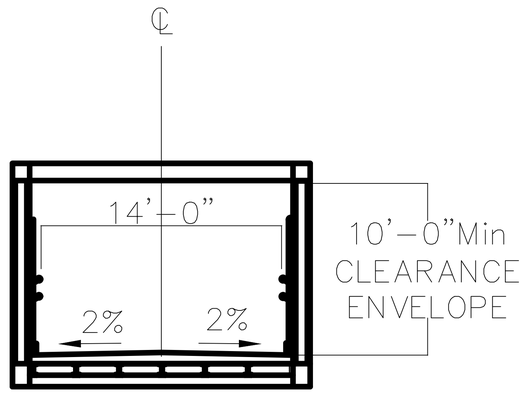

TYPICAL SECTION A–A
NTS

PRELIMINARY DESIGN

DESIGN OVERSIGHT	DESIGN	BY DANIEL SANDOVAL	CHECKED	LOAD & RESISTANCE FACTOR DESIGN			PREPARED FOR THE STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION	BRIDGE NO.	SAN ELIJO LAGOON PEDESTRIAN BRIDGE
	DETAILS	BY	CHECKED	LAYOUT	BY	CHECKED			
SIGN OFF DATE	QUANTITIES	BY	CHECKED	SPECIFICATIONS	BY	PLANS AND SPECS COMPARED	PROJECT ENGINEER DANIEL SANDOVAL	POST ????	GENERAL PLAN-1
DESIGN GENERAL PLAN SHEET (ENGLISH) REV. 10/13/20							UNDT: PROJECT NUMBER & PHASE: CONTRACT NO.:	REVISION DATES	SHEET 1 OF 2

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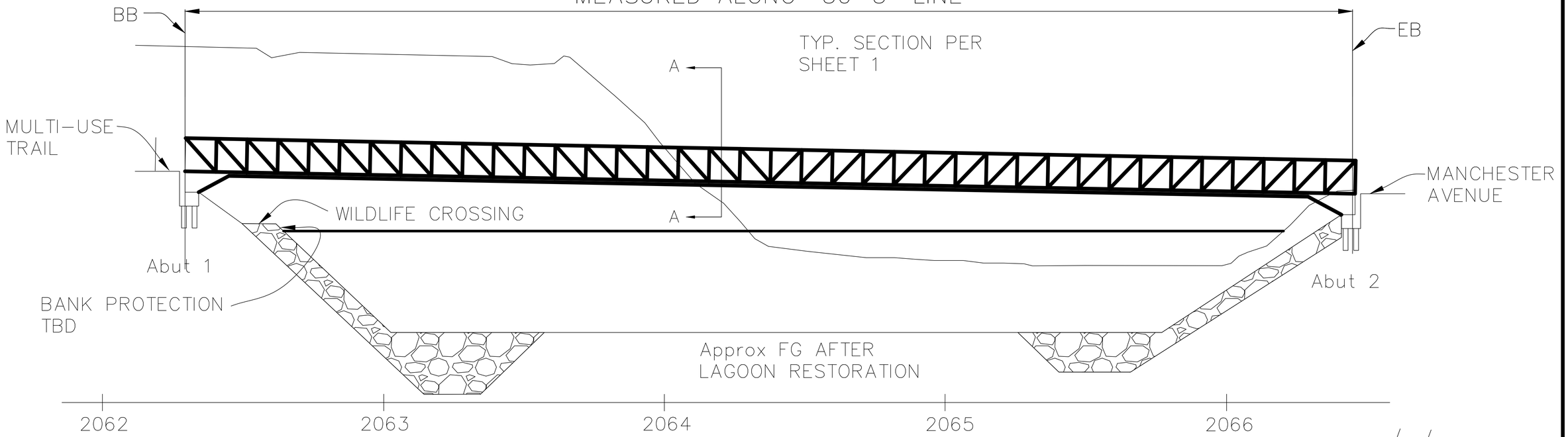
410'–6" (PEDESTRIAN BRIDGE)
MEASURED ALONG "50–5" LINE



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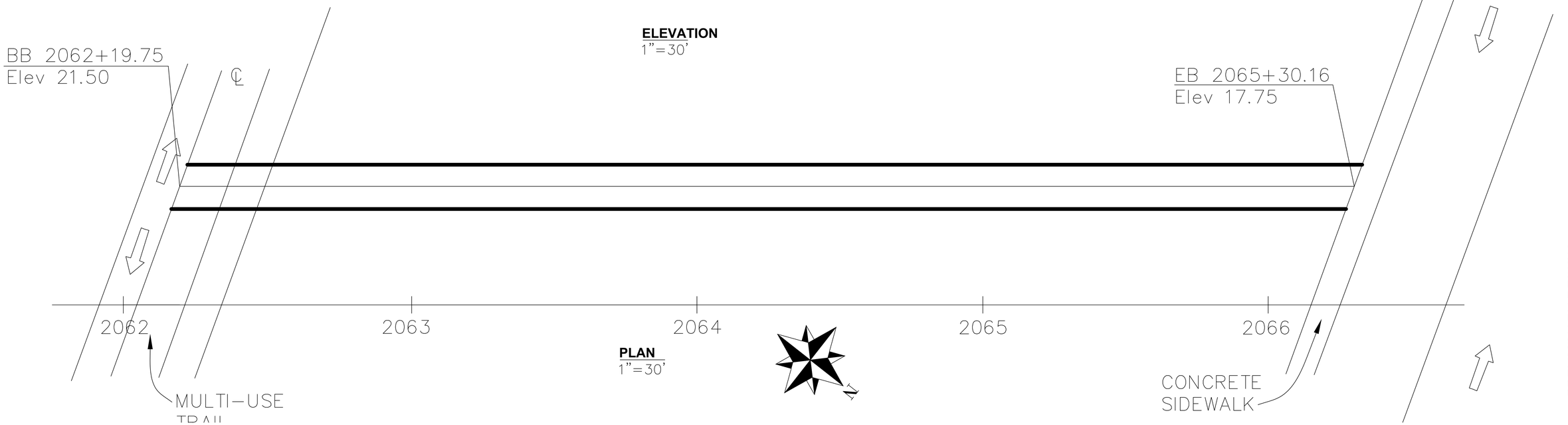


PLAN
1"=30'

PRELIMINARY DESIGN

DESIGN OVERSIGHT	DESIGN	BY DANIEL SANDOVAL	CHECKED	LOAD & RESISTANCE FACTOR DESIGN			PREPARED FOR THE STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION	BRIDGE NO.	SAN ELIJO LAGOON PEDESTRIAN BRIDGE
	DETAILS	BY	CHECKED	LAYOUT	BY	CHECKED			
SIGN OFF DATE	QUANTITIES	BY	CHECKED	SPECIFICATIONS	BY	PLANS AND SPECS COMPARED	PROJECT ENGINEER DANIEL SANDOVAL	POST ????	GENERAL PLAN-1

DESIGN GENERAL PLAN SHEET (ENGLISH) REV. 10/13/20

0 1 2 3

UNDT:
PROJECT NUMBER & PHASE: CONTRACT NO.:

REVISION DATES | SHEET 2 | OF 2

GENERAL NOTES
LOAD AND RESISTANCE FACTOR DESIGN

DESIGN: AASHTO LRFD Bridge Design Specification 8th Edition and the Caltrans Amendments dated 2017

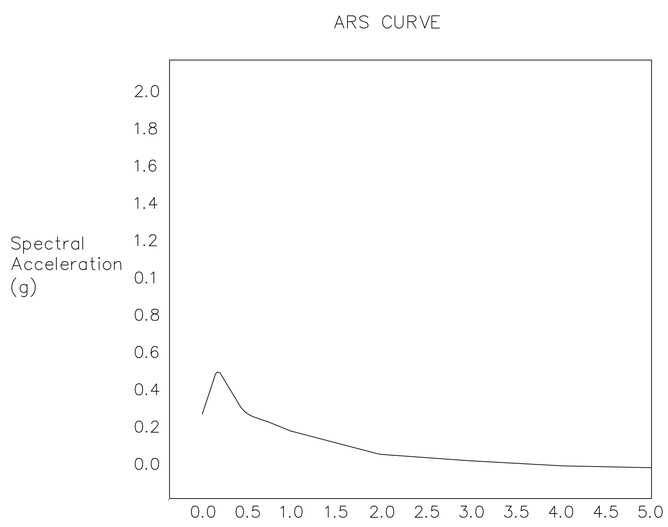
DEAD LOAD: Includes 35 psf for a future wearing surface

LIVE LOADING: HL93 with "LOWBOY" AND Permit Design Load

SEISMIC LOADING: SDC ARS Online 10.5.20
Soil Profile: Vs=760m/s

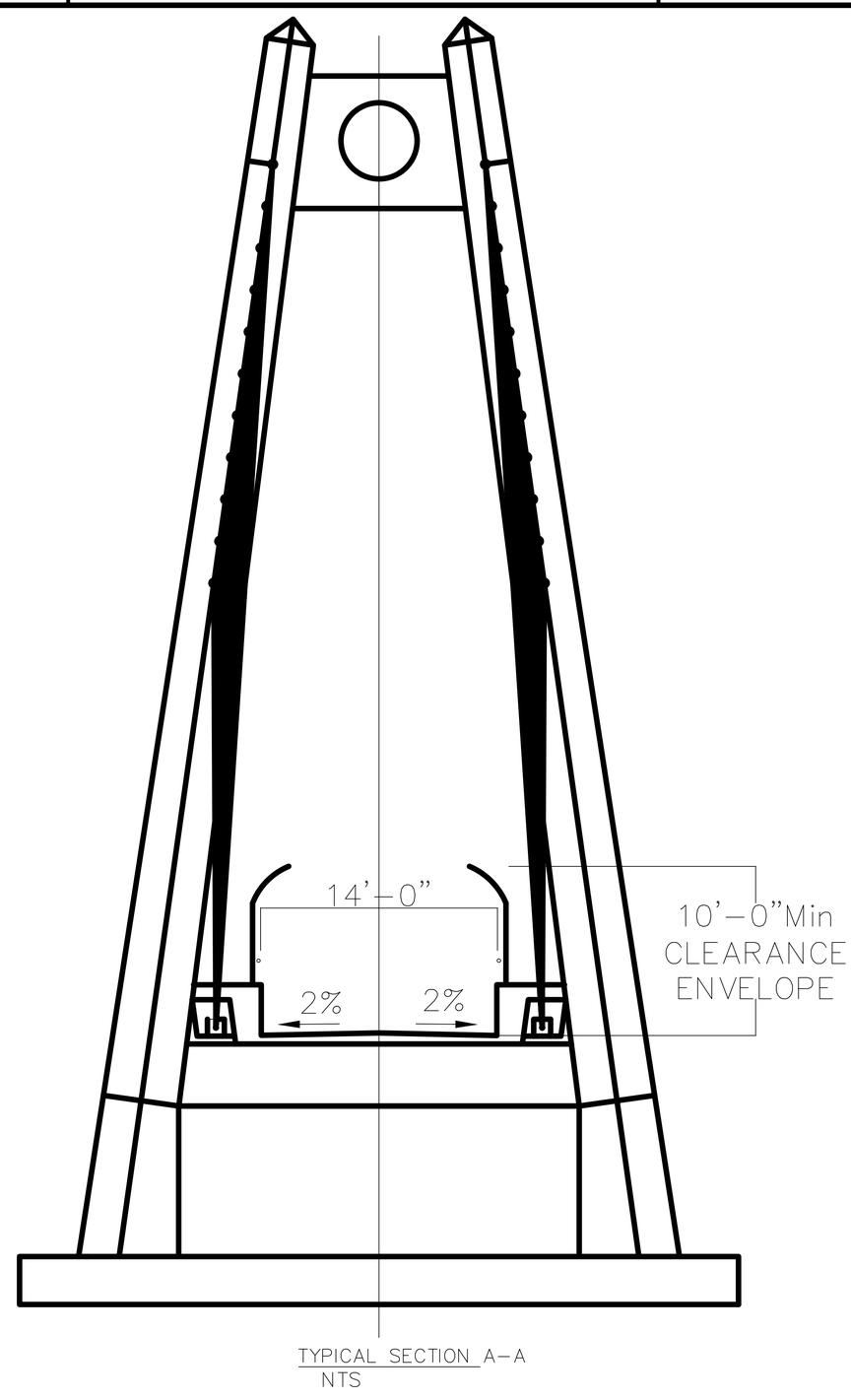
Moment Magnitude:
Peak Ground Acceleration: 0.5g

ARS CURVE



Reinforced Concrete:

ASTM A706
fy= 60 ksi
f'c= 4ksi
n = 8

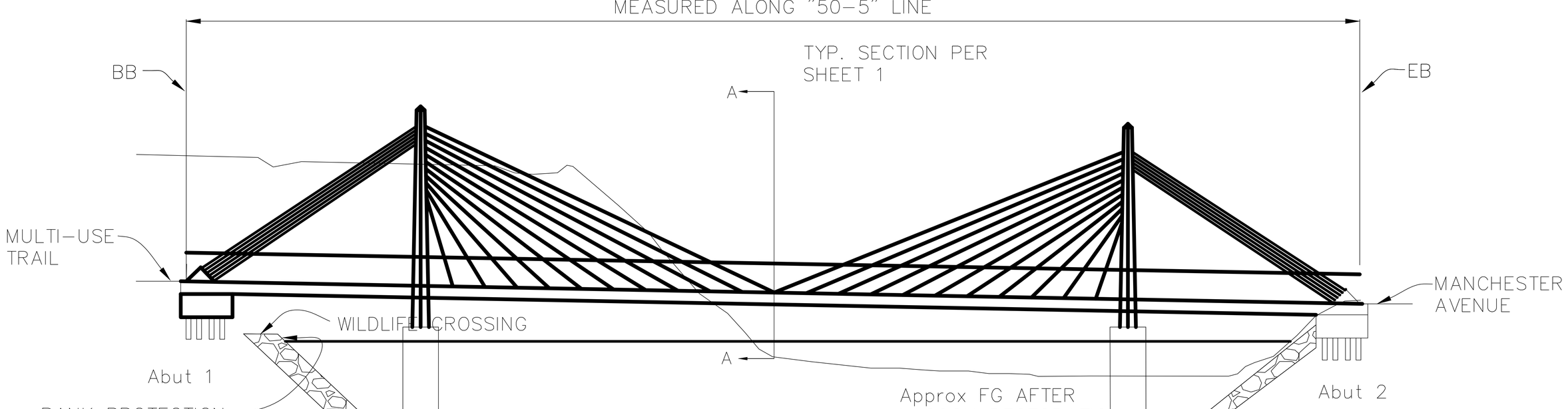


TYPICAL SECTION A-A
NTS

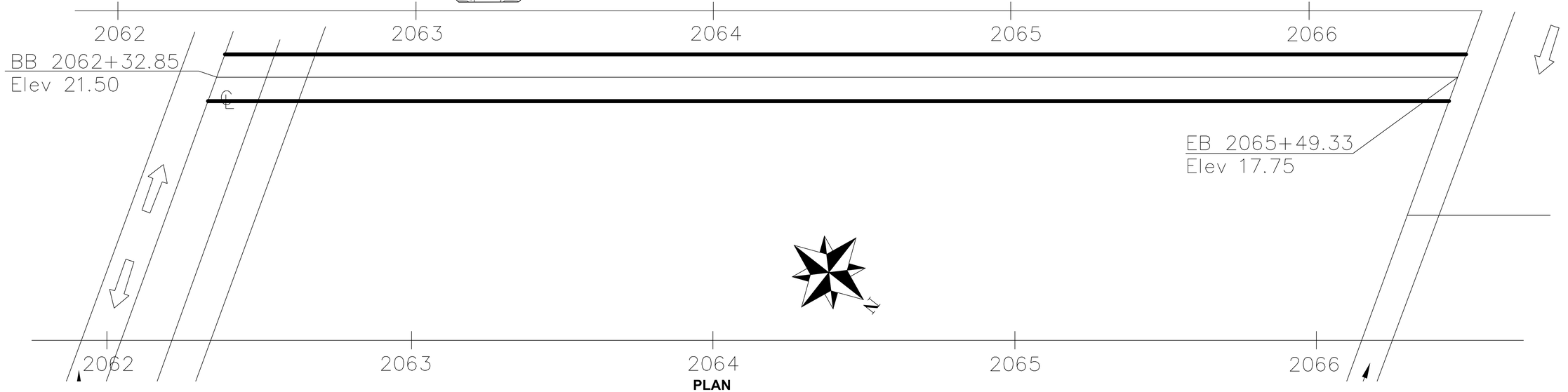
PRELIMINARY DESIGN

DESIGN OVERSIGHT	DESIGN	BY DANIEL SANDOVAL	CHECKED	LOAD & RESISTANCE FACTOR DESIGN			PREPARED FOR THE STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION	BRIDGE NO.	SAN ELIJO LAGOON PEDESTRIAN BRIDGE
	DETAILS	BY	CHECKED	LAYOUT	BY	CHECKED			
SIGN OFF DATE	QUANTITIES	BY	CHECKED	SPECIFICATIONS	BY	PLANS AND SPECS COMPARED	PROJECT ENGINEER DANIEL SANDOVAL	POST ????	GENERAL PLAN-1
DESIGN GENERAL PLAN SHEET (ENGLISH) REV. 10/13/20							0 1 2 3	UNDT: PROJECT NUMBER & PHASE: CONTRACT NO.:	REVISION DATES / SHEET 1 / OF 2

410'–6" (PEDESTRIAN BRIDGE)
MEASURED ALONG "50–5" LINE



ELEVATION
1"=30'



PLAN
1"=30'

PRELIMINARY DESIGN

DESIGN OVERSIGHT	DESIGN	BY DANIEL SANDOVAL	CHECKED	LOAD & RESISTANCE FACTOR DESIGN			PREPARED FOR THE STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION	BRIDGE NO.	SAN ELIJO LAGOON PEDESTRIAN BRIDGE
	DETAILS	BY	CHECKED	LAYOUT	BY	CHECKED	PROJECT ENGINEER DANIEL SANDOVAL	POST ????	GENERAL PLAN-1
SIGN OFF DATE	QUANTITIES	BY	CHECKED	SPECIFICATIONS	BY	PLANS AND SPECS COMPARED			

DESIGN GENERAL PLAN SHEET (ENGLISH) REV. 10/13/20

0 1 2 3

UNDT:
PROJECT NUMBER & PHASE: CONTRACT NO.:

REVISION DATES				SHEET	OF
				2	2