LAGUNITAS CREEK BRIDGE PROJECT

WELCOME

to

the Lagunitas Creek Bridge Seismic Upgrade Project Update and Informational Meeting

Please come in to review updated information gathered to date on issues that concern you. Caltrans staff representatives are available to discuss and answer questions on the information gathered to date.

The meeting is open from 6:30 pm to 8:30 pm.

A brief presentation followed by the opportunity to comment will begin at 7:00 pm.

Please pick up a comment card to speak and you will be called in the order that is marked on your card.

Or you can submit your comments on a comment card at the welcome desk, and/or sign up to receive subsequent project updates.

CALIFORNIA 1

LAGUNITAS CREEK BRIDGE PROJECT

LAGUNITAS CREEK BRIDGE & THE COMMUNITY

The existing Lagunitas Creek Bridge is a 3-span structure, with a total length of 152 feet. It has two 26 ft. long reinforced concrete approach spans, and a 100 ft. long riveted steel pony truss center span.

The bridge was constructed in 1929 and serves both local residents and visitors. It has been the southern gateway to and from Point Reyes Station along Highway 1 for the past 86 years.

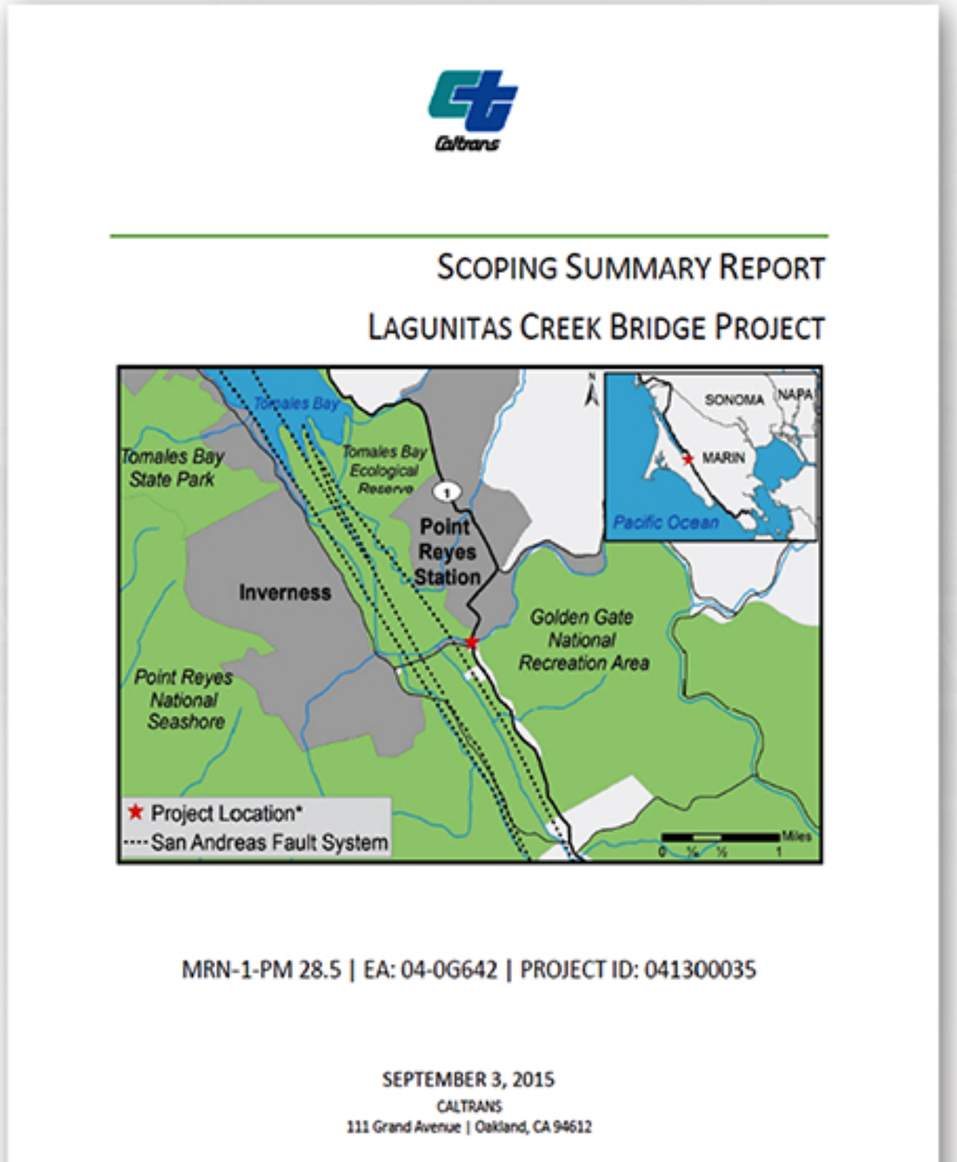
LAGUNITAS CREEK BRIDGE PROJECT

RESULTS OF SCOPING INPUT

During the scoping period, Caltrans received 78 comment submittals at the scoping meeting, by mail, or by email. Comments were received from regulatory agencies, businesses, private organizations, and/or non-profit groups and members of the public. The results of the public scoping comment period are documented in a report titled Scoping Summary Report: Lagunitas Creek Bridge Project. The report is available on the following website:
http://www.dot.ca.gov/dist4/lagunitascreekbridge/

The most commonly heard themes included:

- Keep the construction period short to minimize impacts on traffic, and associated impacts on the local community, businesses, and tourist activities.
- Provide additional information on the existing Lagunitas Creek Bridge's structural vulnerabilities and investigate a retrofit alternative rather than a bridge replacement project.
- Maintain the current character (e.g., color and "aged" look) and footprint of the Lagunitas Creek Bridge.
- Minimize how construction and bridge design impacts sensitive wetland and riparian habitats surrounding Lagunitas Creek and the species they support.
- Minimize project impacts on adjacent property owners.
- Conduct a traffic safety analysis of the intersection of State Route 1 with Sir Francis Drake Boulevard, and the intersection of Sir Francis Drake Boulevard with Bear Valley Road.
- Plan for any changes associated with sea level rise over time.



LAGUNITAS CREEK BRIDGE PROJECT

THE PURPOSE IS TO PROVIDE A SAFE, SEISMICALLY-STABLE CROSSING OVER LAGUNITAS CREEK ON ROUTE 1 IN MARIN COUNTY

Project Need

1. The Lagunitas Creek Bridge is a Vital Connection in Marin County Which Must be Maintained.

- The bridge is a major connector for northern Marin County access, including emergency service, residents, goods and services, and tourism.
- The bridge has weight limitations that restrict the type of trucks that can cross, which limits movement of goods and services to the communities.
- The bridge's proximity to the San Andreas Fault means high potential for strong seismic events and high potential for bridge collapse.

2. The Lagunitas Creek Bridge does not Meet Design Standards for Safety, Seismic Resistance, and Current Vehicle Load Weights.

The bridge is considered inadequate to withstand seismic risk because:

- Piles are of unknown depth, which may have insufficient lateral and vertical support under earthquake loading;
- Pier to super-structure connections are inadequate for large seismic displacements;
- There are no redundant structural elements, and therefore if any key connection is compromised, then the bridge may fail during an earthquake event or under heavy traffic loads; and
- Possible large horizontal displacements of the steel trusses under earthquake loads could lead to their failure from lateral buckling.

Safety inadequacies of the bridge include:

- Travel lanes width and lack of shoulders are not consistent with safety standards.
- Safety barrier rail does not provide adequate safety but upgrading the railing would reduce the lanes to 9 feet, which would be functionally inadequate.
- Bridge cannot carry all modern truck traffic loads.

3. The Lagunitas Creek Bridge Shows Incremental Signs of Wear and Deterioration.

Recent maintenance inspections have found problems that will undermine the bridge's strength, such as:

- Significant amounts of corrosion on steel truss members and connections.
- Extensive cracking and surface deterioration of the concrete deck on all three spans.
- Deteriorated truss support bearings and under-reinforced concrete piers and abutments.

Each of these conditions reduce the life of the structure and weaken the bridge, which could lead to its failure under earthquake loading and even everyday use.

Design Criteria For Bridges

Seismic standards address the survivability of the structure during a significant earthquake. An earthquake event can impart large forces into the structure, which can cause components of the bridge to buckle or rupture, undermining the stability or support of the bridge and potentially causing it to collapse. The ability of a bridge to withstand an earthquake depends on the structural strength and ductility of all bridge components: abutments, T-beam Span, steel truss, piers, and piles. The seismic standards used in 1929 are obsolete because our understanding of seismic events and behavior of structures under large displacements has improved significantly since 1929. Under current seismic design standards, lateral loads on Lagunitas Creek Bridge would probably exceed the weight of the structure, whereas seismic loading in the original design was probably more on the order of 10% to 20% of the weight of the structure.

Live load is the ability of the structure to carry heavy truck loads. Present day trucks (HS20–3-axle, 36-ton tractor-trailer trucks) are substantially larger than when the Lagunitas Creek Bridge was designed in 1929 (H15 – 2-axle, 15-ton trucks). Today's bridge designs must meet the carrying capacity for much larger and heavier trucks. Similarly, **dead load** is the ability of the bridge to carry its own weight and **wind load** is the ability of the bridge to withstand high wind pressures.

Roadway safety standards are governed by American Association of State Highway Transportation Officials and Caltrans design requirements for roadways, which consider speed, mode of transportation, and land use. The standards take into account the size of current vehicles, and the required safe distances between motorized and non-motorized traffic. The standard lane width is 12 feet with 8-foot wide shoulders for bicycle travel and emergency staging, and pedestrian sidewalks are typically 5-6 feet on both sides.

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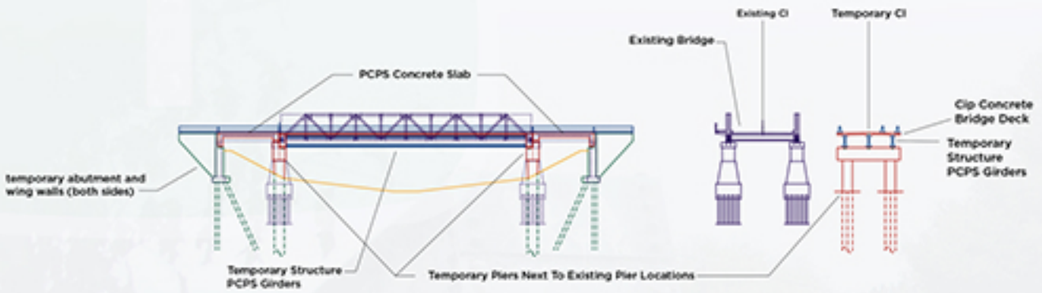
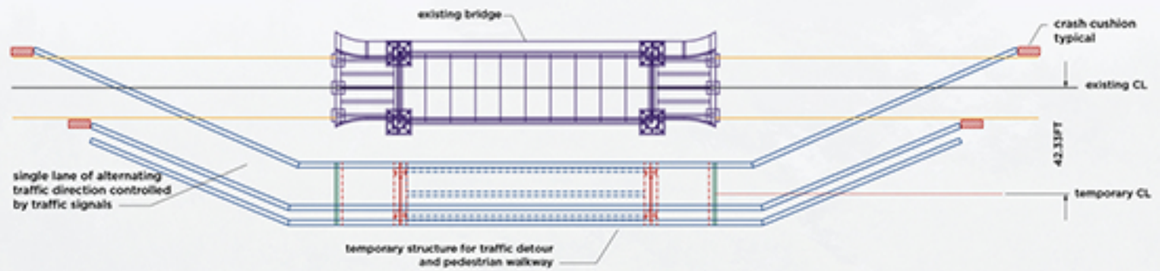
LAGUNITAS CREEK BRIDGE PROJECT

DETOUR ALTERNATIVE 1: TEMPORARY ONE-LANE BRIDGE



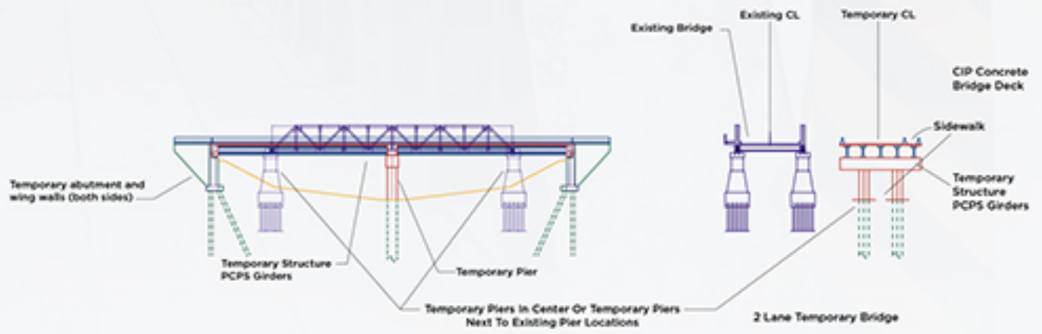


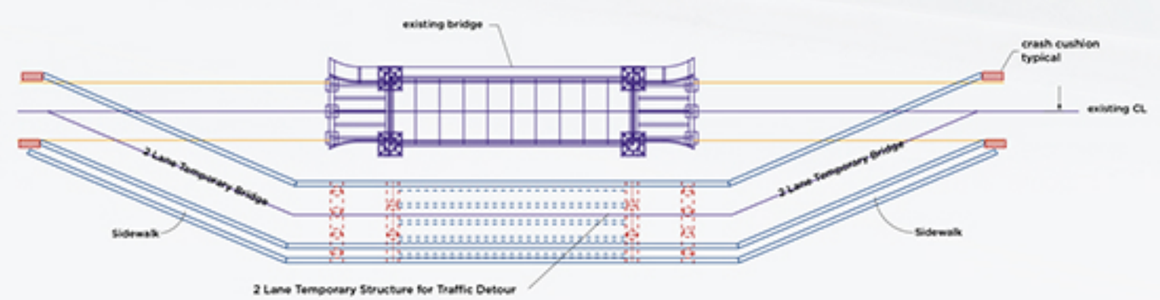
Features
- The temporary structure will have two or three spans
- One or two support piers in creek channel
- One walkway for pedestrians and bicycles

Pros
- Narrow bridge footprint.
- Pedestrians and bicycle traffic would be allowed
- Less impact than 2-lane bridge on property and habitat areas.

Cons
- Only one directional flow on bridge at a time
- Potential long delays (up to 30 minutes in peak weekend traffic)
- May affect circulation through Olema and Pt Reyes Station

DETOUR ALTERNATIVE 2: TEMPORARY TWO-LANE BRIDGE





Features
- The temporary structure will have two or three spans
- One or two support piers in creek channel
- One walkway for pedestrians and bicycles

Pros
- Traffic circulation and delay would be similar to current bridge crossing
- Pedestrians and bicycle traffic would be allowed

Cons
- Construction footprint would be larger than single lane bridge
- May result in more temporary use of private property

LAGUNITAS CREEK BRIDGE PROJECT

ENDANGERED SPECIES

Photo Credit: US Fish & Wildlife Service, public domain

Photo Credit: Ken Davis

Photo Credit: US Fish & Wildlife Service, public domain

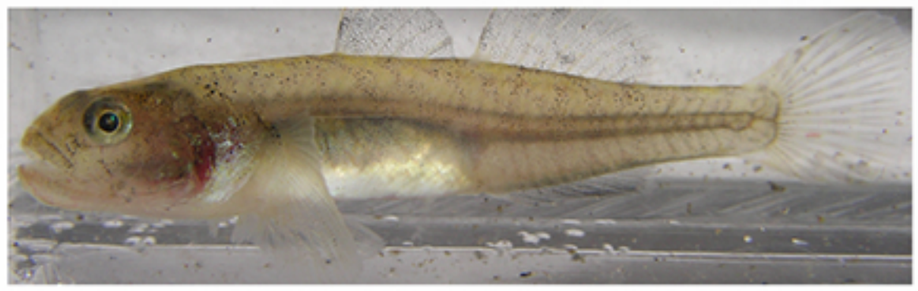


Photo Credit: US Fish & Wildlife Service, public domain

California freshwater shrimp *(Syncaris pacifica):* The small, translucent crustaceans are found only in streams within Marin, Sonoma, and Napa counties. They grow to be 1-2 inches long during their 3-year lifespan. They occupy in-stream habitat in the project area that may be impacted by construction activity.

Coho salmon *(Oncorhynchus kisutch):* Lagunitas Creek is home to one of the strongest remaining runs of federally endangered California Central Coast coho salmon. Coho typically have a three-year life history with life-stages in Lagunitas Creek, Tomales Bay, and the Pacific Ocean. Mature coho migrate back to their natal stream each fall and winter to spawn, expiring soon after spawning is complete. The project will take place immediately above, and possibly within, aquatic critical habitat for this species.

Myrtle's silverspot butterfly *(Speyeria zerene myrtleae):* A medium sized butterfly with a wingspan 2.1 to 2.3 inches, the Myrtle's silverspot relies on its larval host plant, Viola adunca (western dog violet), and coastal prairie, coastal scrub, and coastal dune ecosystems. This beautiful butterfly only occurs in West Marin and Southern Sonoma counties along the coast. The project site is within their dispersal range, putting them at risk during construction.

Tidewater goby *(Eucyclogobius newberryi):* These small, bottom-dwelling fish reach a maximum size of 2 inches during their 1-year lifespan. Tidewater goby prefer brackish, tidally influenced habitat within channels and along sandbars in Lagunitas Creek and the adjacent Giacomoni wetlands. The area under Lagunitas Bridge is populated by these fish. Construction activity within the creek could impact this species.

LAGUNITAS CREEK BRIDGE PROJECT

THREATENED SPECIES

Photo Credit: US Fish & Wildlife Service, public domain

Photo Credit: Madeline Cooper

Photo Credit: US Fish & Wildlife Service, public domain

Photo Credit: Eric Ettlinger

California red-legged frog *(Rana draytonii):* The largest of all native frog species, the California red-legged frog requires standing freshwater such as ponds and wetlands for breeding during winter. They can disperse 2 miles or more during wet periods to establish in new habitat, often moving at night. The project may impact freshwater wetlands habitat used by this species.

Chinook salmon *(Oncorhynchus tshawytscha):* The California coastal Evolutionary Significant Unit (ESU) migrates up Lagunitas Creek through the project area to spawn in the middle reaches of the watershed. Coastal Chinook only occur in central and northern California creeks and rivers. The project will take place immediately above, and possibly within aquatic critical habitat for this species. The project will take place immediately above, and possibly within, aquatic habitat for this species.

Northern spotted owl *(Strix occidentalis caurina):* A medium-sized, chocolate brown owl, the northern spotted owl nests in the tops of or in cavities of mature trees and will mate for life during its lifespan of up to 20 years. There are mature forest stands nearby that are populated by this species. Normal foraging, roosting, and breeding behaviors of this species can be impacted by construction noise.

Steelhead *(Oncorhynchus mykiss):* The Central California Coastal ESU of steelhead migrates up Lagunitas Creek through the project area to spawn in the upper reaches of the watershed. Central Coast steelhead only occur in creeks and rivers with unimpeded access to the ocean. Juveniles migrate to the ocean where they grow large and obtain a steel-grey color and can return to spawn several times throughout their life. The project will take place immediately above, and possibly within, aquatic critical habitat for this species.

LAGUNITAS CREEK BRIDGE PROJECT

WHO WE PLAN TO WORK WITH

GOVERNMENT AGENCIES

- US Fish and Wildlife Service
- National Marine Fisheries Service
- California Department of Fish and Wildlife
- US Army Corps of Engineers
- San Francisco Regional Water Quality Control Board
- National Park Service
- State Lands Commission
- County of Marin
- Marin County Parks and Open Space
- Coastal Commission

STAKEHOLDER GROUPS TO BE INVITED

- Point Reyes National Seashore Association
- Environmental Action Committee of West Marin
- Marin Resource Conservation District
- Marin Conservation League
- Turtle Island Restoration Network – SPAWN
- Tomales Bay Watershed Council
- Audubon Canyon Ranch, Cypress Grove
- Sierra Club, Marin Group
- Marin Agricultural Land Trust

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LAGUNITAS CREEK BRIDGE PROJECT

AN OVERVIEW OF LAGUNITAS BRIDGE DEFICIENCIES

T-BEAMS SPANS

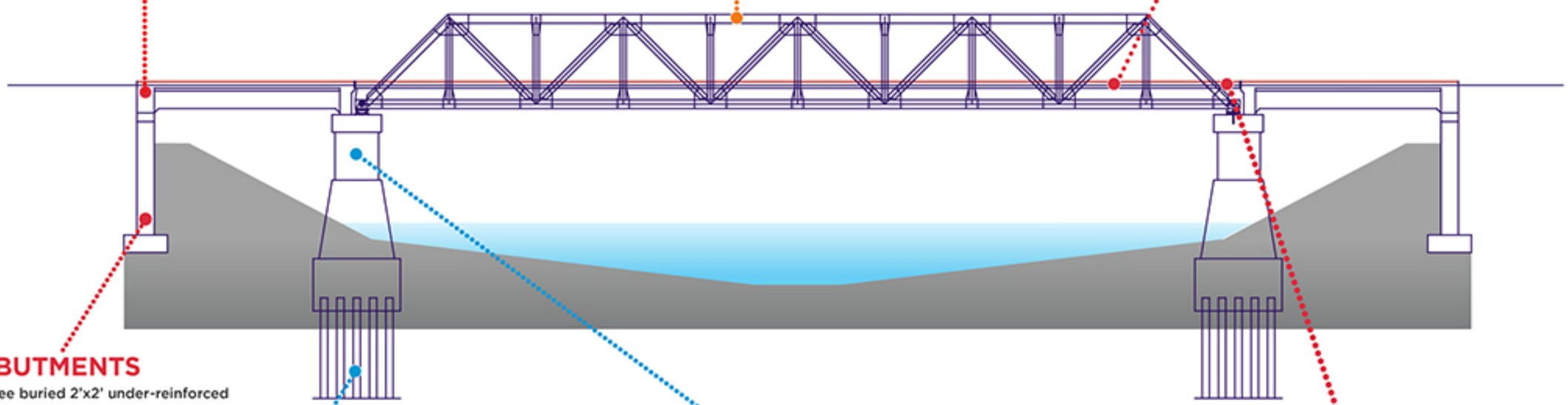
- Under-reinforced girders
- Outdated railing
- Under-reinforced end diaphragms

STEEL PONY TRUSS

- Observed corrosion between gusset plates, channel flanges, and truss member plates
- Corroded rivets
- Possible steel fatigue damage from years of repetitive traffic loading
- Existing bridge railing does not protect truss members from traffic impact

DECK SLAB

- Cracks in concrete deck may be allowing water through to steel floor beams
- Rust build-up between the top flanges of the floor beams and concrete deck



ABUTMENTS

- Three buried 2'x2' under-reinforced columns supported on 5'x5' spread footings

PIER PILINGS

- Unkown depth, type and load capacity

PIERS

- No steel reinforcement within concrete mass
- Piers' position constrain flow of debris during high flows

ROADWAY

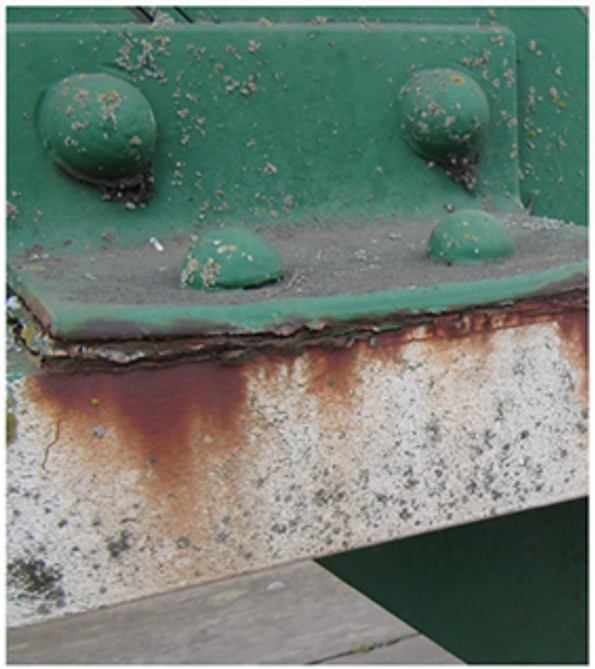
- Inadequate site distance
- Roadway must narrow sharply to meet bridge width
- Inconsistent shoulders between roadway and bridge deck

LAGUNITAS CREEK BRIDGE PROJECT

THE BRIDGE IS WEARING OUT

Caltrans engineers performed a structural assessment of the existing bridge and found the following:

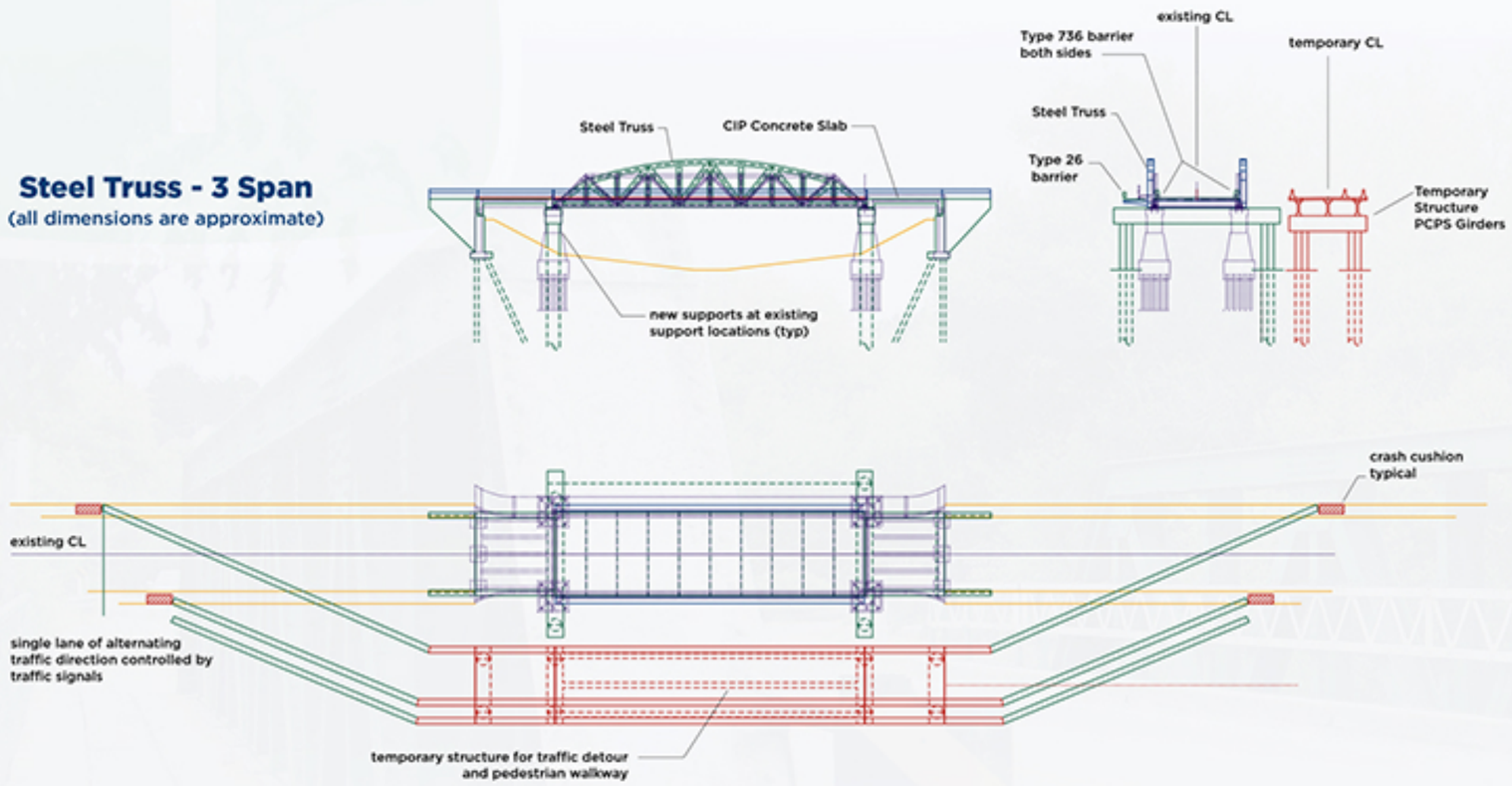
- The steel portions of the bridge are deteriorating. This reduces original design strength of the bridge.
- The bridge was not originally designed to meet current standards for earthquake resistance.



LAGUNITAS CREEK BRIDGE PROJECT

WHY NOT KEEP THE SAME BRIDGE DESIGN?

Steel Truss - 3 Span
(all dimensions are approximate)



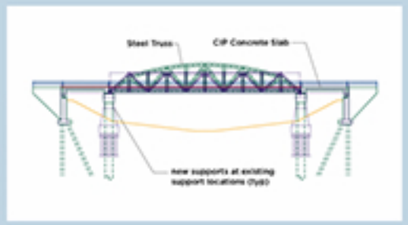
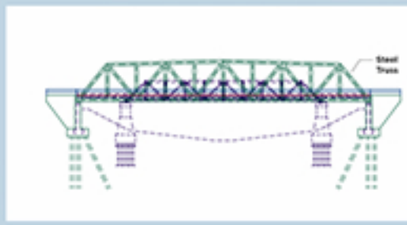
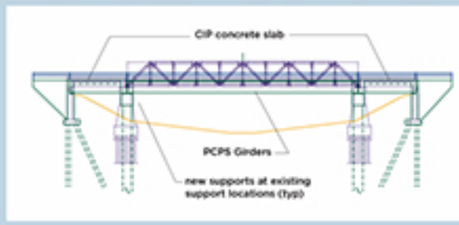
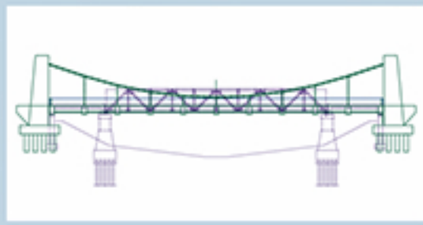
The current bridge width does not meet modern design standards. These standards are set by the Caltrans Division of Design (DOD). These standards are based on criteria that meet DOD's approval for safety and intended level of service.

Caltrans has identified the Lagunitas Creek Bridge as providing service to both traditional and alternative transportation users. The new bridge will have the following features to meet current design standards for safety and intended use:

Existing Bridge Features	Current Design Standards
Two lanes – 11 ft each.	Two Lanes – 12 ft each.
No shoulders.	A minimum of 4 ft wide shoulders on both sides.
One 4 ft wide sidewalk on the West side of the bridge.	Sidewalks on bridges should be provided wherever there are sidewalks or other pedestrian facilities along the highway. The minimum width of a bridge sidewalk is 6 feet.
There are no ADA-accessible ramps at bridge sidewalk access locations.	ADA-accessible ramps at each sidewalk access location.

LAGUNITAS CREEK BRIDGE PROJECT

BRIDGE REPLACEMENT ALTERNATIVES COMPARISON

	ALTERNATIVE 1 Steel Truss – Short	ALTERNATIVE 2 Steel Truss – Long	ALTERNATIVE 3 Pre-cast Concrete Girder	ALTERNATIVE 4 Suspension Cable
Bridge Design (All dimensions are approximate)				
Pier Location in Stream Channel (May increase environmental impacts)	The piers will be in the outer edge of the stream channel.	No piers will be in the creek channel.	The piers will be in the outer edge of the stream channel.	No piers will be in the creek channel.
Impacts to Roadway Alignment	No change to current roadway alignment.	Minimum change to road elevation with minor impacts to adjacent properties.	The bridge deck will be 2 ft thicker, and thus higher, which will require a larger footprint for the bridge approach. This may result in moderate impacts to adjacent properties.	No change to current roadway alignment.
Notable Features	• This is a very similar type of bridge to the current bridge.	• This bridge will be taller than Alternative 1. • It will have an overhead bracing which will put a height limit on vehicles.	• This alternative is a simple and common type of structure used for California highways. • It will have a deeper bridge deck than the other alternatives.	• This bridge will have towers at both ends. • Suspension cables will be anchored to the towers and will support the bridge deck.

What are project alternatives and why do we have them?

Project alternatives are used to develop a reasonable range of options that can be evaluated based on the positive and negative effects that each would have on the natural and human environments. These alternatives can then be compared to each other based on the types and severity of impacts that would result from each alternative. Project alternatives are the different strategies that Caltrans uses to meet the purpose and need for the project.

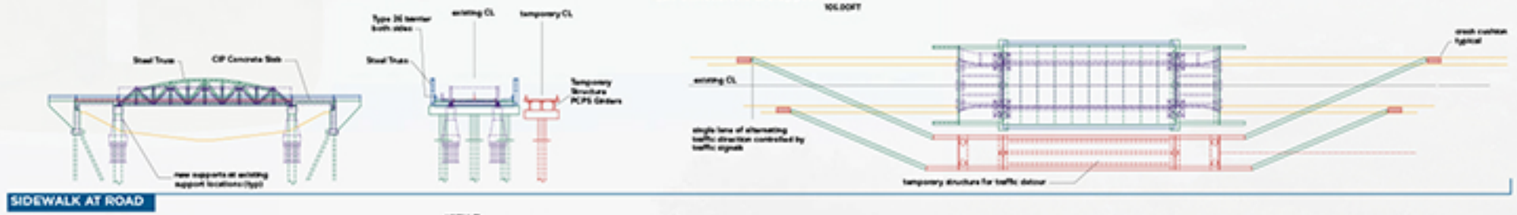
LAGUNITAS CREEK BRIDGE PROJECT

ALTERNATIVE 1: STEEL TRUSS — SHORT

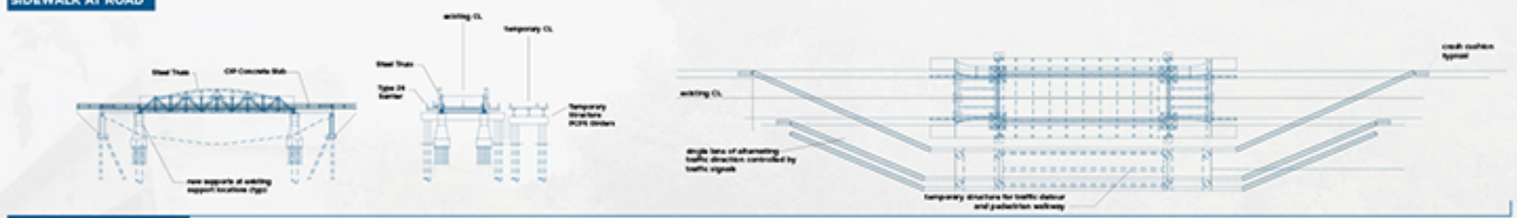
ELEVATION AND PLAN

(all dimensions are approximate)

STEEL TRUSS – 3 SPANS



SIDEWALK AT ROAD



CANTILEVER SIDEWALKS

EXISTING CONDITIONS

ALTERNATIVE 1A: CANTILEVER SIDEWALK

ALTERNATIVE 1B: SIDEWALK ADJACENT TO STREET

ALTERNATIVE 1C: SIDEWALK ADJACENT TO STREET WITH GUARDRAIL

Features

- The new brige will have three spans.
- Abutments will be 50 ft wide and 25 ft tall.
- Wing Wall will be 15 ft long and 20 ft tall.
- Piers will be 50 ft wide and 25 ft tall.
- The bridge will have a vertical steel truss panel 101 feet long and approximately 12 ft high on each side of the bridge.

Pros

- This alternative will not significantly change the visual appearance of the bridge.
- There will be no change in the road profile. This will reduce the impacts to the private properties adjacent to the bridge.

Cons

- Erecting the trusses will require falsework in the stream channel. This will cause temporary and permanent in-stream effects from construction.
- The new piers will be located in the outer edge of the creek channel, in the same location as the current bridge piers. This will cause both temporary and permanent in-stream impacts.

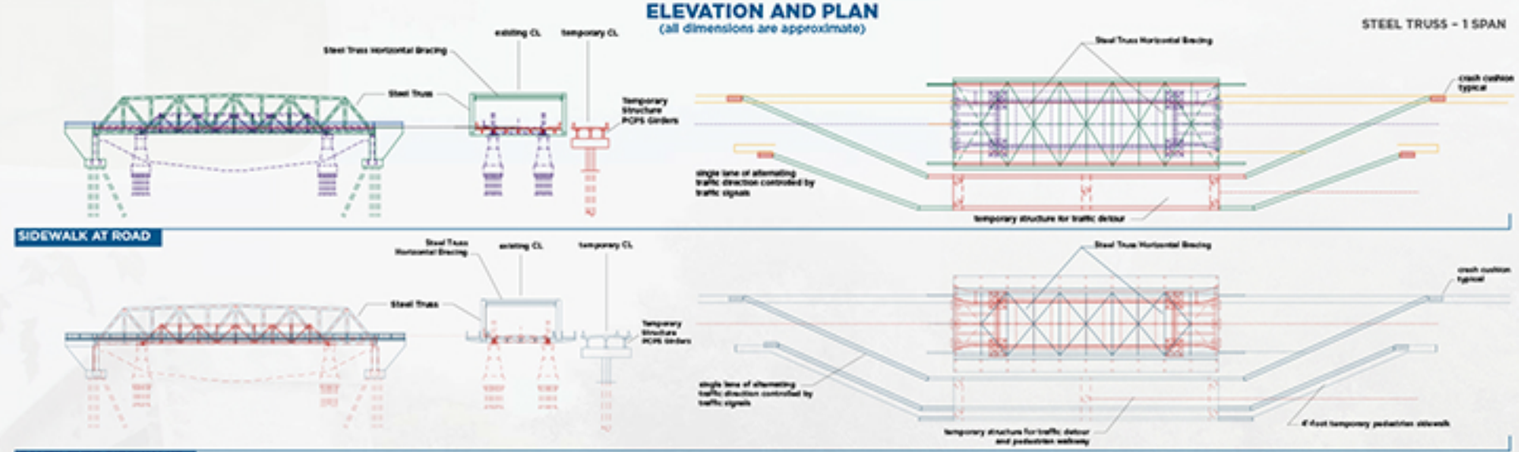
LAGUNITAS CREEK BRIDGE PROJECT

ALTERNATIVE 2: STEEL TRUSS — LONG

ELEVATION AND PLAN

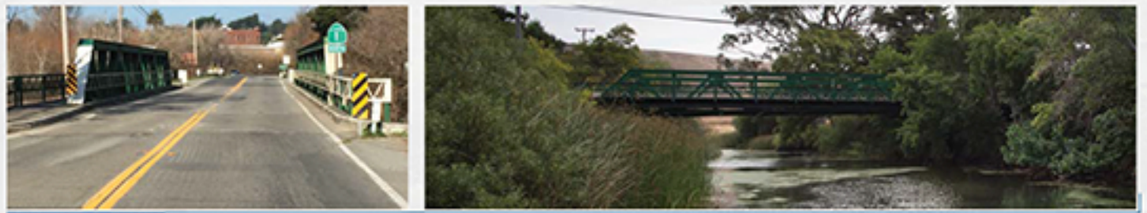
(all dimensions are approximate)

STEEL TRUSS – 1 SPAN



SIDEWALK AT ROAD

CANTILEVER SIDEWALKS



EXISTING CONDITIONS

ALTERNATIVE 2A: CANTILEVER SIDEWALK

ALTERNATIVE 2B: SIDEWALK ADJACENT TO STREET

ALTERNATIVE 2C: SIDEWALK ADJACENT TO STREET WITH GUARDRAIL

Features

- The new bridge will be a single span structure.
- Abutments will be 50 ft wide and 25 ft tall.
- Wing Walls will be 15 ft long and 20 ft tall.
- Two 150 ft long vertical stee truss panels that are approximately 20 ft tall on each side of the bridge.
- Overhead lateral bracing for the vertical steel truss panels.

Pros

- There will be no piers in the creek channel.
- The type of bridge is similar to the current bridge.

Cons

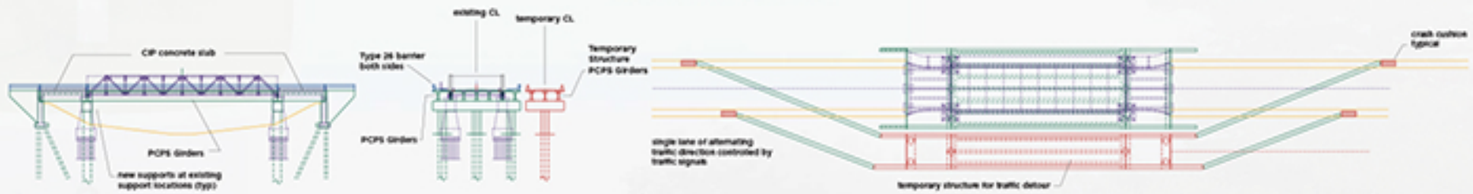
- Erecting the trusses will require falsework supports in the creek. This will cause temporary and permanent in-stream effects from construction.
- There may be a slight change to road profile that would cause minor impacts to nearby intersections, driveways, and right of way.
- There will be a height clearance limit for traffic on this bridge.

LAGUNITAS CREEK BRIDGE PROJECT

ALTERNATIVE 3: PRE-CAST CONCRETE GIRDER

ELEVATION AND PLAN

(all dimensions areapproximate)



SIDEWALK AT ROAD

EXISTING CONDITIONS

ALTERNATIVE 3A: CANTILEVER SIDEWALK

ALTERNATIVE 3B: SIDEWALK ADJACENT TO STREET

Features

- The new bridge will have three spans.
- Abutments will be 50 ft wide and 25 ft tall.
- Wing Walls will be 15 ft long and 20 ft tall.

Pros

- The bridge can be built relatively quickly. This would reduce the duration of traffic delays and temporary environmental impacts.

Cons

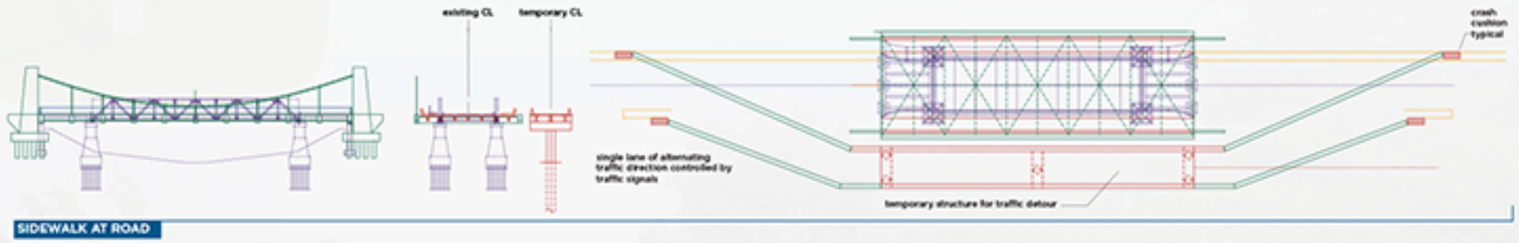
- Falsework not required in creek channel.
- The piers will be located in the creek channel, at the outer edge.
- This bridge would require 2 ft increase in roadway profile elevation, which would cause moderate impacts to nearby intersections, driveways, and right of way.

LAGUNITAS CREEK BRIDGE PROJECT

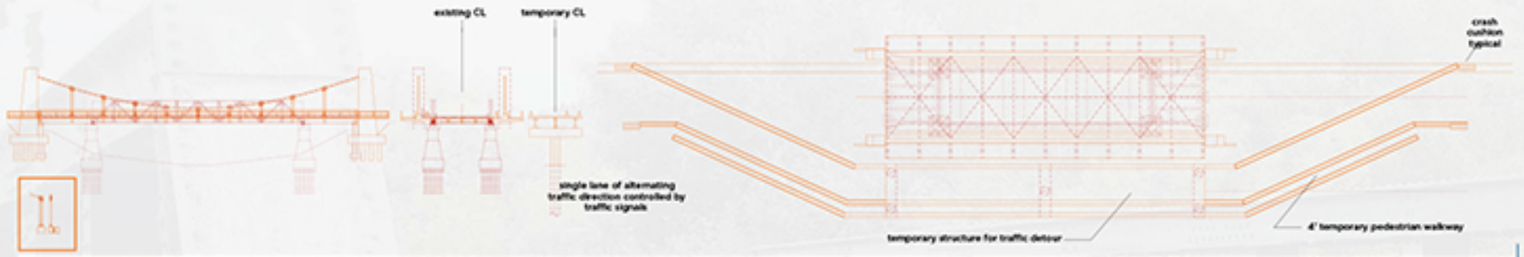
ALTERNATIVE 4: SUSPENSION CABLE

ELEVATION AND PLAN

(all dimensions areapproximate)



SIDEWALK AT ROAD



CANTILEVER SIDEWALKS

EXISTING CONDITIONS

ALTERNATIVE 4A: CANTILEVER SIDEWALK

ALTERNATIVE 4B: SIDEWALK ADJACENT TO STREET

Features

- The new bridge will be a single span structure.
- Abutments will be 50 ft wide and 25 ft tall.
- Wing Walls will be 15 ft long and 20 ft tall.
- The towers on either corner of the bridge will require further study to determine their approximate dimensions.

Pros

- No piers will be located in the creek.
- This type of bridge will be a unique feature in this region.
- There will be no changes to the road profile.

Cons

- There will be large towers on both ends of the bridge that may not fit the character of the surrounding community.

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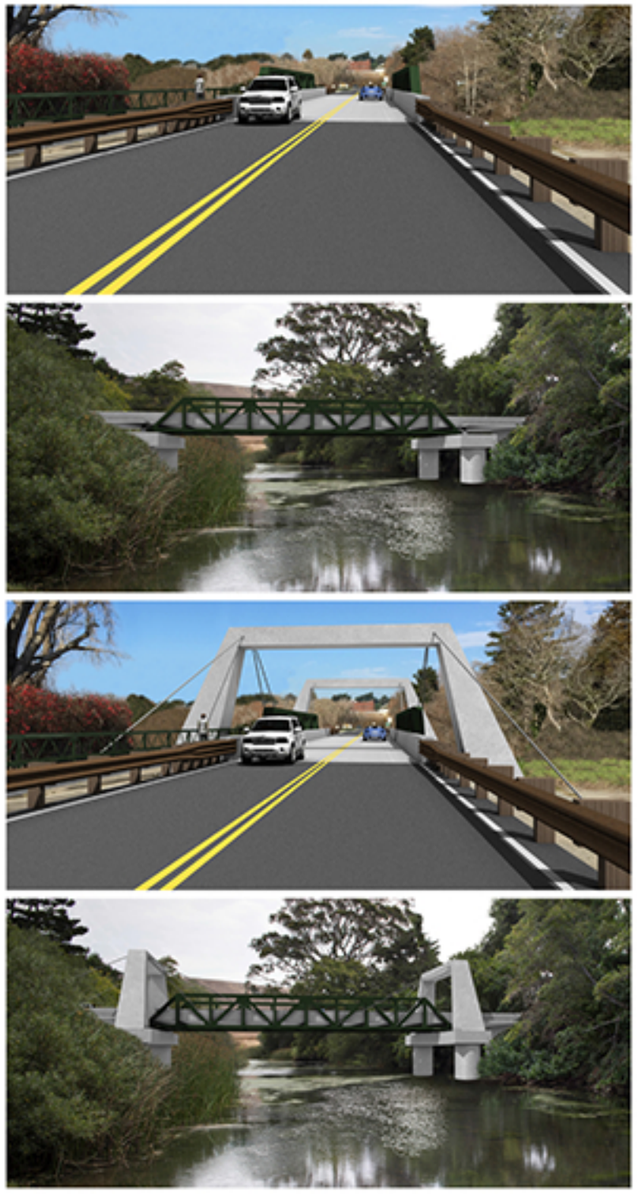
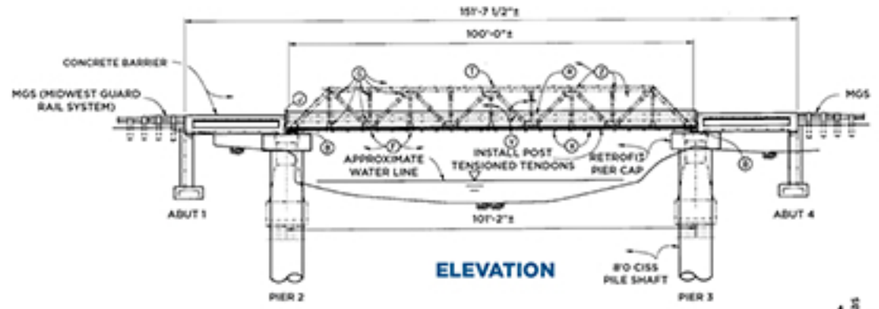
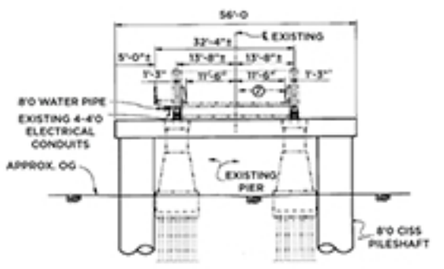
LAGUNITAS CREEK BRIDGE PROJECT

RETROFIT/REHABILITATION ALTERNATIVE



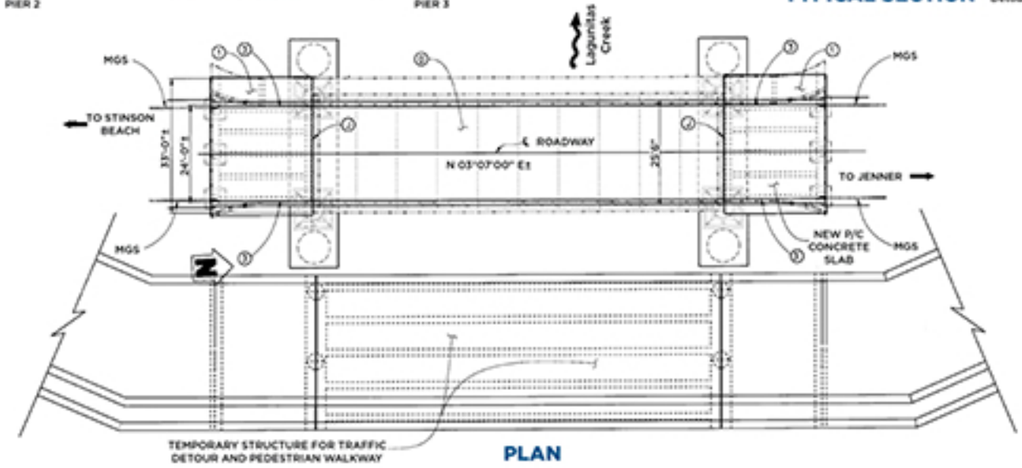


ELEVATION



TYPICAL SECTION

NOTE: Detour not shown



PLAN

Construction sequencing:

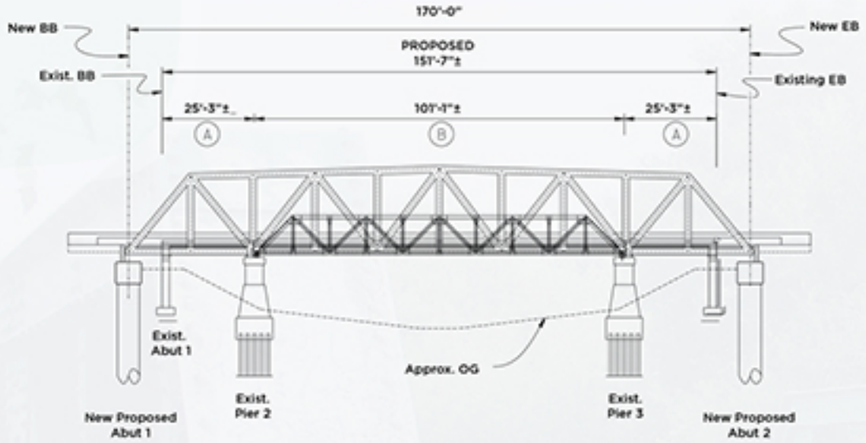
- Construct detour bridge upstream
- Construct in-water support structure under existing bridge
- Install piles and cap along existing piers
- Construct pier caps from under existing bridge
- Construct abutments
- Place pre-cast deck and concrete barrier

This construction method requires:

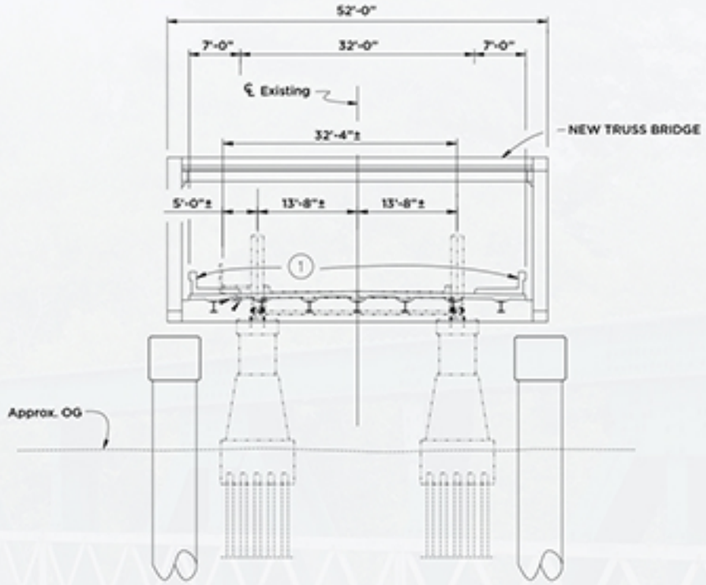
- Requires 2 to 3 construction seasons
- Requires a temporary detour bridge for traffic
- Requires extensive in-water work for temporary structural support needed and piers remain in creek
- Adding standard bridge rails will narrow travel lanes
- Results in no shoulders or bicycle lanes

LAGUNITAS CREEK BRIDGE PROJECT

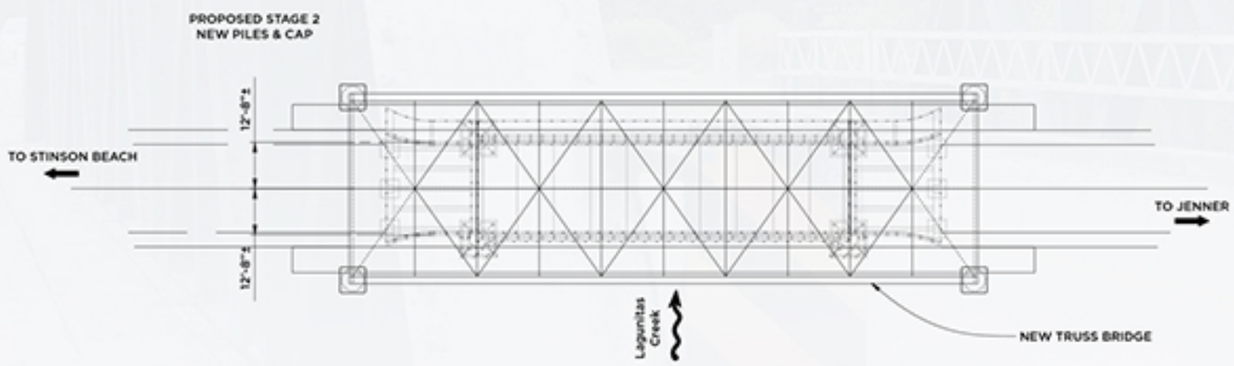
ACCELERATED BRIDGE CONSTRUCTION
LONGITUDINAL MOVE-IN PLACE



ELEVATION



TYPICAL SECTION STEEL TRUSS
STAGE 1 THRU 3 CONSTRUCTION SEQUENCE



Construction sequencing:

- Excavate trenches and construct abutment bents beyond existing bridge spans (night-time one-lane closures)
- Construct steel trusses and cross bracing (while traffic use bridge)
- Stage pre-cast deck pieces nearby
- Remove existing bridge deck and install pre-cast deck (no traffic)
- Remove remaining structure

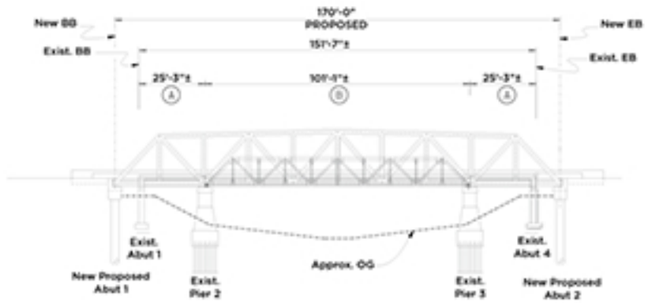
This construction method requires:

- One construction season
- Short term full closures
- Intermittent night closure for one lane of traffic
- Taller bridge truss
- Longer and wider bridge
- No required piers in creek
- Requires large offsite staging area

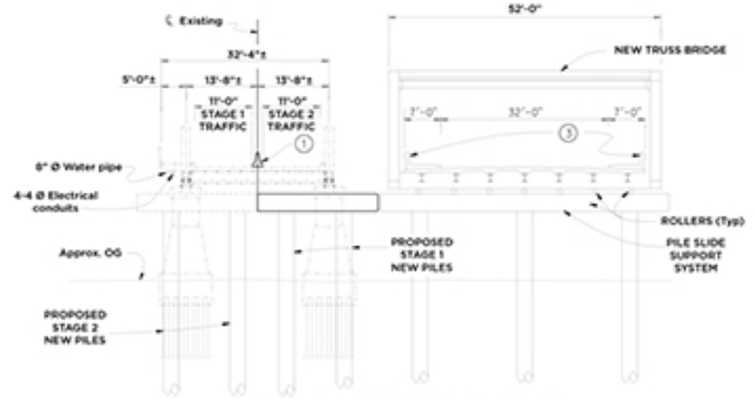
LAGUNITAS CREEK BRIDGE PROJECT

ACCELERATED BRIDGE CONSTRUCTION

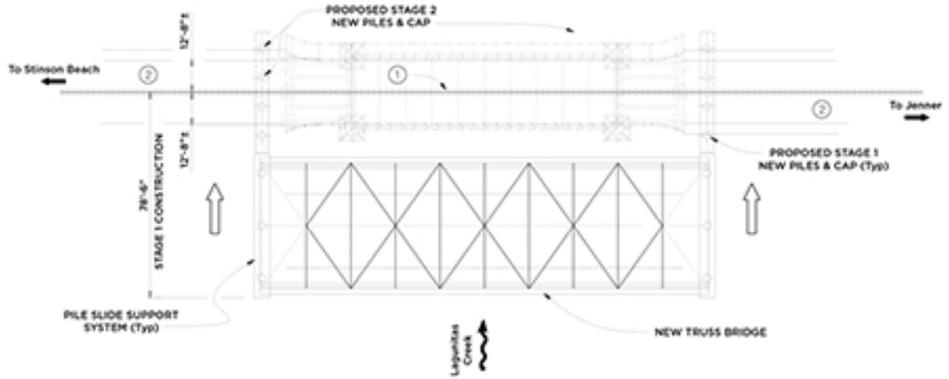
TRAVERSE- SLIDE-IN



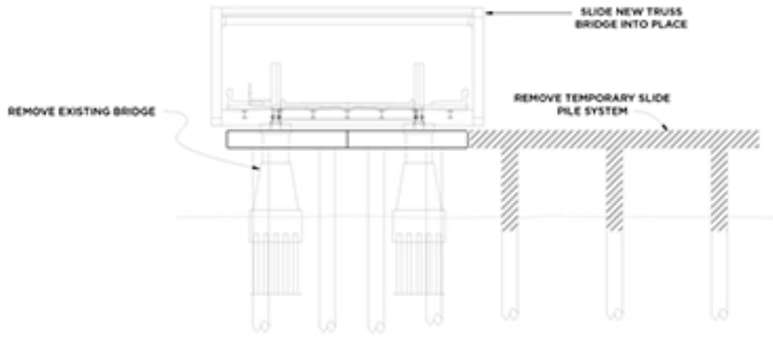
ELEVATION (NTS)



TYPICAL SECTION STEEL TRUSS
STAGE 1 THRU 3 CONSTRUCTION SEQUENCE (NTS)



PLAN (NTS)



TYPICAL SECTION
STAGE 4 & 5 CONSTRUCTION SEQUENCE (NTS)

Construction sequencing:

- Construct slide support system and first half of Abutment and cap
- Construct second half of Abutment and cap
- Remove existing bridge deck and truss
- Slide New Bridge truss into place
- Remove remaining foundation

This construction method requires:

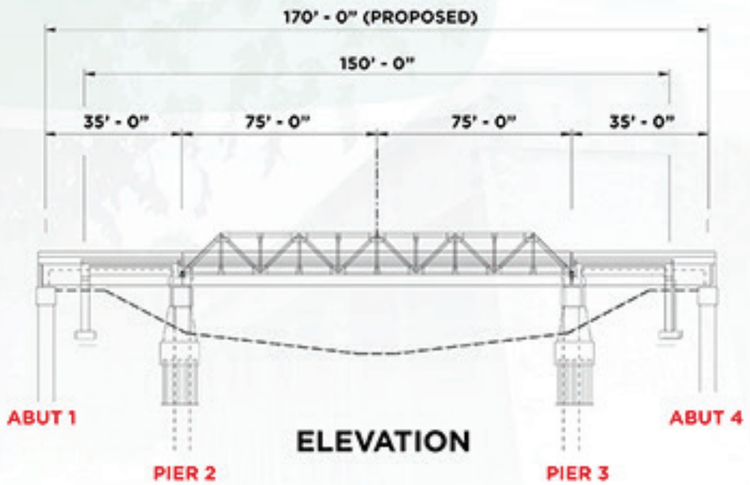
- Adjacent right-of-way required
- One construction season
- Temporary full closure required
- Intermittent night closure for one lane of traffic
- Offsite assembly area required
- No required piers in water for reduced environmental impact
- Wider and longer bridge
- No required piers

CALIFORNIA 1

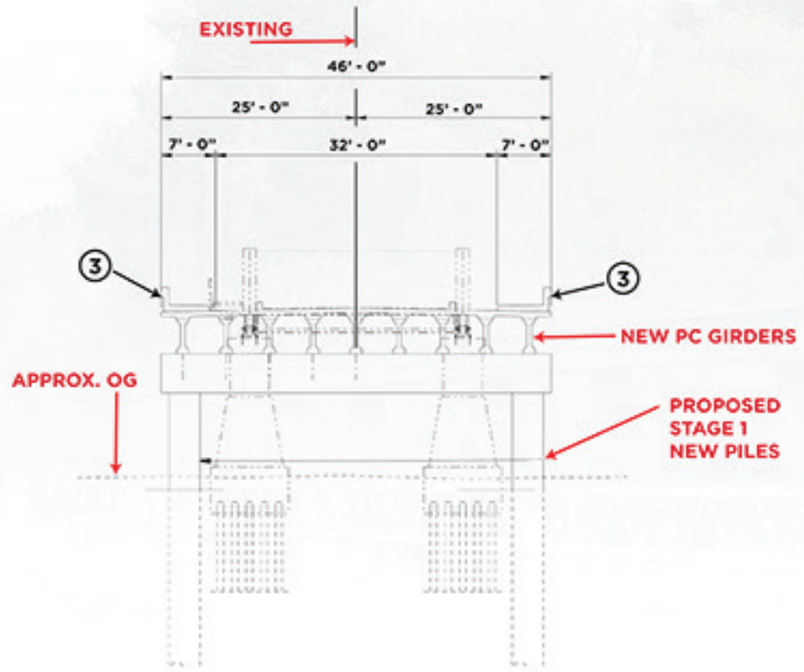
LAGUNITAS CREEK BRIDGE PROJECT

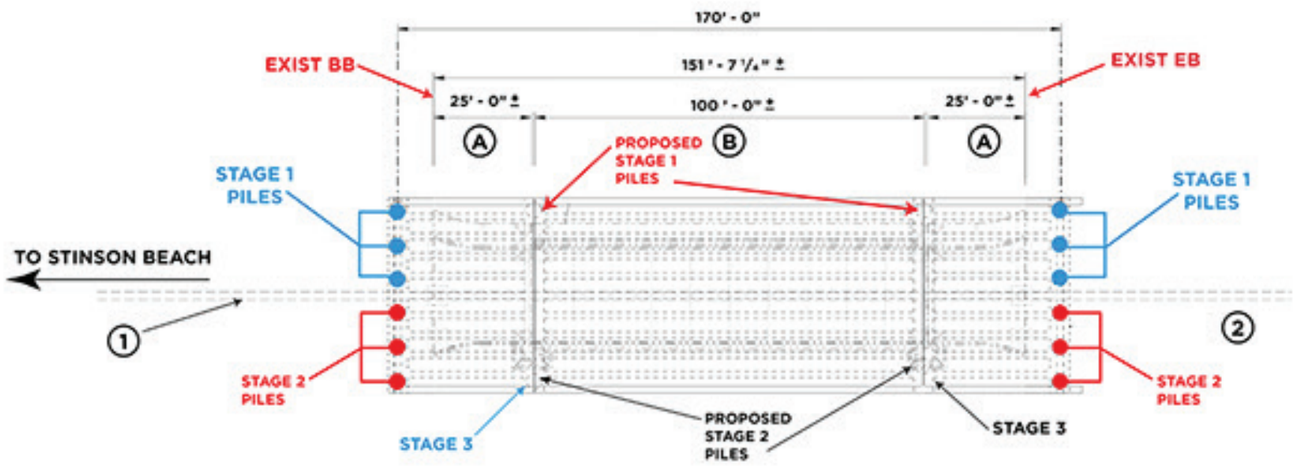
ACCELERATED BRIDGE CONSTRUCTION

PRE-CAST ASSEMBLY ON-SITE



ELEVATION





Construction sequencing:

- Install ½ piles and cap along existing piers (1 lane remains open)
- Install second ½ piles and cap along existing piers (1 lane remains open)
- Construct pier caps from under existing bridge
- Remove existing bridge and place new girders
- Place pre-cast deck and concrete barrier

This construction method requires:

- One construction season is required
- Temporary full closure required
- Intermittent night closure for one lane of traffic
- Piers in creek
- Wider and longer bridge
- Deeper structure depth