Meeting of the Central Valley Flood Protection Board
April 24, 2015

Staff Report

California High Speed Rail Authority
High-Speed Rail Bridge across Fresno River, Madera County

1.0 – REQUESTED ITEM

Consider approval to construct a high-speed rail bridge across the Fresno River (Attachment A) by Draft Permit No. 18956-1 (Attachment B) and Resolution 2015-05 (Attachment C).

2.0 – APPLICANT

California High-Speed Rail Authority (HSRA) located at 1401 Fulton Street, Suite 300, Fresno CA 93721

3.0 – PROJECT LOCATION

The proposed bridge will cross the Fresno River, Madera Main Canal, and State Route 145 parallel to the existing BNSF railroad bridge, northeast of the City of Madera, CA (Attachment A).

4.0 – PROJECT DESCRIPTION

HSRA proposes to construct an elevated viaduct (long bridge) structure to support high speed train use across the Fresno River. The viaduct is 1,583 feet long with 460 feet of structure spanning the Fresno River. The river structure will be supported on three bents in the floodplain, each 12 feet diameter at the base, and two bents on each end of the crossing, both 8 feet diameter at the base. The bridge is a component of Construction Package 1 of the California High Speed Train (HST) Project, which entails developing approximately 29 miles of track along an alignment extending from Avenue 17 in Madera County to American Avenue in Fresno County.

5.0 – AUTHORITY OF THE BOARD

California Water Code § 8534, 8590 – 8610.5, and 8700 – 8710

California Code of Regulations (CCR), Title 23 (Title 23):

- § 6, Need for a Permit
- § 112, Streams Regulated and Nonpermissible Work Periods
- § 116, Borrow and Excavation Activities – Land and Channel
- § 120, Levees
- § 121, Erosion Control
- § 128, Bridges

6.0 – AGENCY COMMENTS AND ENDORSEMENTS

The comments and endorsements associated with the project are as follows:

- The U.S. Army Corps of Engineers (USACE) Sacramento District decision letter was received on April XX, 2015 for this application. The letter indicates that the USACE District Engineer has no objections to the project, subject to conditions. The letter is incorporated into the permit as Exhibit A.
- Madera County Flood Control and Water Conservation Agency (MCFCWCA) endorsed the project without conditions on May 22, 2014 (Attachment D)

7.0 – PROJECT ANALYSIS

The California High-Speed Rail Authority proposes to construct, operate, and maintain an electric-powered High Speed Train (HST) system in California. When completed the nearly 800-mile long system would provide new passenger rail service to more than 90% of California's population. The system would connect and serve major metropolitan areas of California, extending from San Francisco and Sacramento in the north to San Diego in the south.

Summaries of project background, hydraulic and geotechnical reviews, and adjacent property owners are presented below.

7.1– Project Background

The High Speed Train Design-Build Project, Construction Package 1 (Project) is part of the Initial Construction Segment of the California High Speed Train System. The Project plans to construct approximately 29 miles of new high speed rail from south of Avenue 17 in Madera to south of Santa Clara Street in Fresno. The Project alignment will include at-grade sections, aerial structures, trench sections, and a short tunnel. The Project will also include a number of grade separations to mitigate the rail alignment's crossing of existing roads. Within the northern segment of the Project, three bridges will be constructed over established creeks or rivers. The northernmost river is the Fresno River which generally flows in a westerly direction starting east of the City of Madera and continues west beyond the city limits. The location of the HST crossing of the Fresno River is approximately 2.6 miles east of State Route 99. The Project is being designed and constructed as a Design-Build contract (see Attachment E).

7.2– Hydraulic Review

Based on the HSRA revised hydraulic analysis report, dated March 2015, the proposed HST bridge would result in an insignificant localized increase in water surface elevation in the vicinity of the proposed structure relative to the existing conditions.

The proposed bridge structure will have 18.4 ft of freeboard with the 500-year return period for flow discharge of 29,000 cfs (See Figure 1). Average channel flow velocities for the existing and proposed conditions cause no increases in average channel velocities at cross sections upstream and downstream of the bridge. Scour calculations for the proposed HST bridge shows a maximum scour depth of 7.3 ft. The foundations of the piers and abutments are proposed to be installed below the scour depths. The details of hydraulic review summary are presented in Attachment F. Based on the HSRA hydraulic modeling Board staff concludes that the proposed project is expected to result in no adverse hydraulic impacts to the Fresno River floodway.

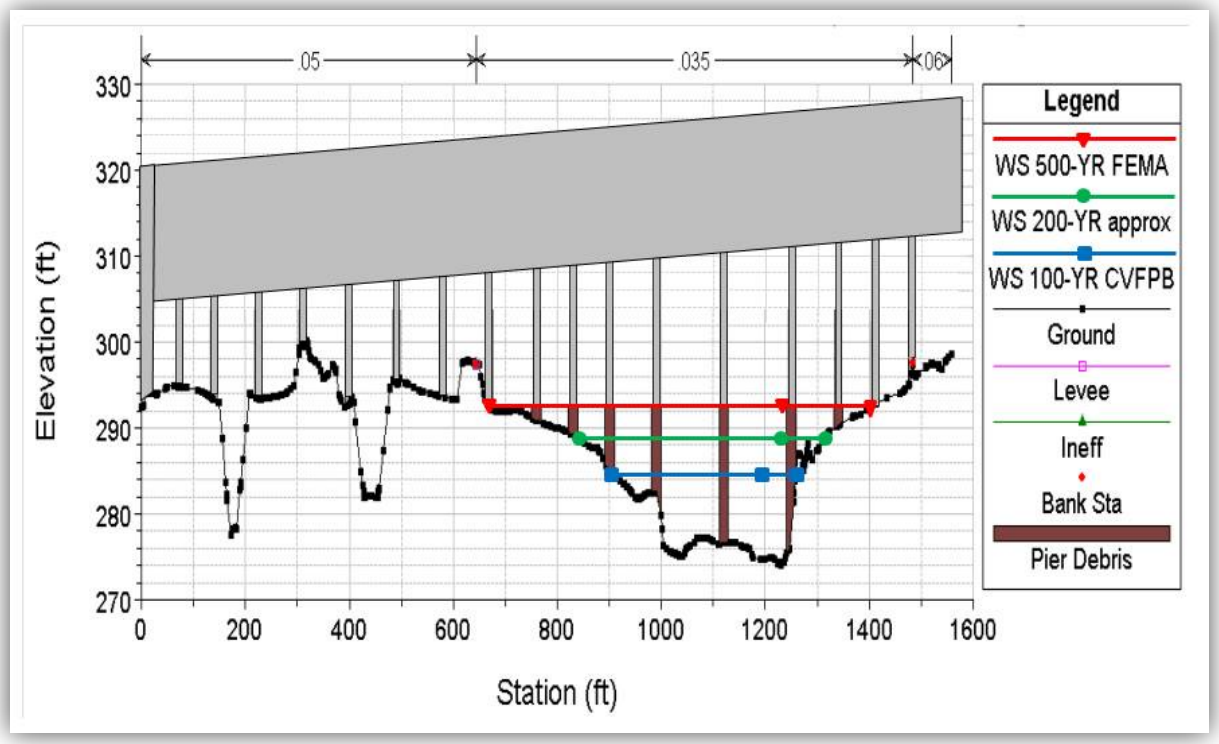


Figure 1: Upstream Face of Proposed HST Bridge
(Reference: HSRA hydraulic report, March 2015, page 22)

7.3– Geotechnical Review

Board staff has reviewed geotechnical information provided by HSRA. The details of technical review summary are presented in Attachment G. Based on the HSRA geotechnical data and analyses Board staff concludes that the proposed project is expected to result in no adverse geotechnical impacts to the Fresno River.

7.4 – Adjacent Property Owners

Board staff notified all adjacent property owners of the proposed project on January 29, 2015 and subsequently on March 3, 2015, and to date no objections or protests have been received.

8.0 – CEQA ANALYSIS

Board staff has prepared the following CEQA Findings:

The Central Valley Flood Protection Board, acting as a responsible agency under CEQA, has independently reviewed the California High-Speed Train (HST) Project Merced to Fresno Section Draft Environmental Impact Statement/Draft Environmental Impact Report (DEIS/DEIR) (SCH No. 2009091125, August 2011) and Final Environmental Impact Report/Environmental Impact Statement (Final EIR/EIS) (SCH No. 2009091125, April 2012) and Mitigation Monitoring and Reporting Plan (MMRP) submitted by the Authority.

The Authority as lead agency determined the project would have a significant effect on the environment and adopted Resolution HSRA 12-20 on May 3, 2012 (including Statement of Facts, Findings, Impacts and Mitigation Measures, Statement of Overriding Considerations and Mitigation Monitoring and Reporting Program) and subsequently filed a Notice of Determination with the State Clearinghouse on May 3, 2012.

These documents including project design and may be viewed or downloaded from the Central Valley Flood Protection Board website at http://www.cvfpb.ca.gov/meetings/2015/4-24-2015.cfm under a link for this agenda item. The documents and other materials which constitute the record of the Central Valley Flood Board's proceedings in this matter are in the custody of the Board's Acting Executive Officer, Central Valley Flood Protection Board, 3310 El Camino Ave., Room 151, Sacramento, California 95821. The documents are also available for review in hard copy at the Authority office.

8.1 - Impacts that can be Mitigated

The FEIR identified certain potentially significant environmental impacts that can be reduced to less than significant with the implementation of identified mitigation measures. The significant impacts and the mitigation measures to reduce them to less than significant are adopted in the Authority Resolution HSRA 12-20 dated May 3, 2012 (which includes a Statement of Facts, Findings, Impacts and Mitigation Measures, Statement of Overriding Considerations and Mitigation Monitoring and Reporting Program). Based on its independent review of the DEIR, FEIR and Authority Resolution HSRA 12-20, the Board finds that for each of the significant impacts described, changes or alterations have been required in, or incorporated into, the project which avoid or substantially lessen the significant environmental

effects as identified in the FEIR. Moreover, such changes or alterations are within the responsibility and jurisdiction of another public agency or the Authority, and such changes have been adopted by that agency.

8.2 - Significant Unavoidable Adverse Impacts of the Project

The FEIR also identified potentially significant environmental impacts that were deemed to remain significant even after the adoption of mitigation measures. The following impacts of the proposed project remain significant following adoption and implementation of the mitigation measures described in the FEIR:

- Noise and Vibration - The Authority finds that uncertainty about the effectiveness of noise mitigation measures remains because of the important role that local jurisdictions and communities will play in determining the use of sound barriers. Out of an abundance of caution, the Authority therefore finds that operational noise impacts from the HST are significant and unavoidable under CEQA, even though in many instances mitigation measures will effectively reduce the impact to a less than significant level.

- Agricultural Lands - The Authority will fund the California Farmland Conservancy Program's work to identify suitable agricultural land for mitigation of impacts and to fund the purchase of agricultural conservation easements from willing sellers. The permanent conversion of agricultural land to nonagricultural use for the project is considered a significant and unavoidable impact under CEQA.

- Parks, Recreation, and Open Space - Parks, Recreation, and Open Space - The multiple planned projects in and around Roeding Park, including the HST would result in permanent closure of a portion of the park and result in noise, dust, and visual impacts.

- Aesthetics and Visual Resources – The proposed project includes elevated guideways that run parallel to the boulevard and nearby residences. Sound barriers and retaining walls would block views. The alteration of the overall cohesion in the view would substantially alter the visual character and reduce the visual quality of the West of SR 99 Landscape Unit.

- Cultural and Paleontological Resources – Construction will impact historically significant built environmental resources including Roeding Park.

8.3 - Statement of Overriding Considerations

On May 3, 2012, the Authority adopted Resolution HSRA 12-20 including the Statement of Overriding Considerations. The Board concurs with this Statement.

The Board has independently considered the significant and unavoidable environmental impacts of the proposed project. The Board has also considered the benefits of the project and finds the HST system would meet the need for a safe and reliable mode of travel that would link the major metropolitan areas of the state and deliver predictable, consistent travel times sustainable over time. The HST system also would provide quick, competitive travel times between California's major intercity markets. For intermediate intercity trips such as Fresno to Los Angeles, the HST system would provide considerably quicker travel times than either air or automobile transportation, and would bring frequent HST service to portions of the state such as the Central Valley that are not well served by air transportation. In addition, the passenger cost for travel via the HST service would be lower than for travel by air for the same intercity markets. The Merced to Fresno section is the backbone of the HST system and the preferred Hybrid Alternative would provide comparable travel times to the UPRR/SR 99 Alternative, but would avoid the higher cost of additional elevated construction and the greater community impacts associated with other alternatives.

9.0 – CALIFORNIA WATER CODE § 8610.5 CONSIDERATIONS

- Evidence that the Board admits into its record from any party, State or local public agency, or nongovernmental organization with expertise in flood or flood plain management:

  The Board has considered all the evidence presented in this matter, including the original application for Permit No. 18956-1 and technical documentation provided by the Authority on the California High-Speed Train Project, Staff Report and attachments, the original Environmental Impact Report on the California High-Speed Train Project, Merced to Fresno Section (Draft and Final Versions), Authority Resolution HSRA 12-20 including findings, Statement of Overriding Considerations, and the MMRP.

- The best available science that related to the scientific issues presented by the executive officer, legal counsel, the Department or other parties that raise credible scientific issues.

  The accepted industry standards for the work proposed as regulated by Title 23 have been applied to the review of this project. In making its findings, the

Board has used the best available science relating to the issues presented by all parties and the design is in compliance with the standards.

- Effects of the decision on the facilities of the State Plan of Flood Control, and consistency of the proposed project with the Central Valley Flood Protection Plan as adopted by Board Resolution 2012-25 on June 29, 2012.

  This project has no adverse effect on facilities of the State Plan of Flood Control and is consistent with the adopted 2012 Central Valley Flood Protection Plan and Title 23 standards because there is no significant increase in water surface elevation or velocities anticipated for the proposed project.

- Effects of reasonable projected future events, including, but not limited to, changes in hydrology, climate, and development within the applicable watershed:

  There will be no effects to the proposed project from reasonable projected future events due to excessive freeboard available for potential changes as a result of climate change, hydrology and development within the existing watershed.

10.0 – STAFF RECOMMENDATION

Board staff recommends that the Board:

- adopt Board Resolution 2015-05 which includes the CEQA findings;
- approve Draft Encroachment Permit No. 18956-1 (in substantially the form provided); and
- direct the Executive Officer to take the necessary actions to execute the permit and file a Notice of Determination with the State Clearinghouse.

11.0 – LIST OF ATTACHMENTS

A – Project Vicinity and Location Maps

B – Draft Permit No. 18956-1

Exhibit A – USACE Decision Letter

C – Board Resolution 2015-05

D – Madera County Flood Control and Water Conservation Agency (MCFCWCA) Endorsement Letter (dated May 22, 2014)

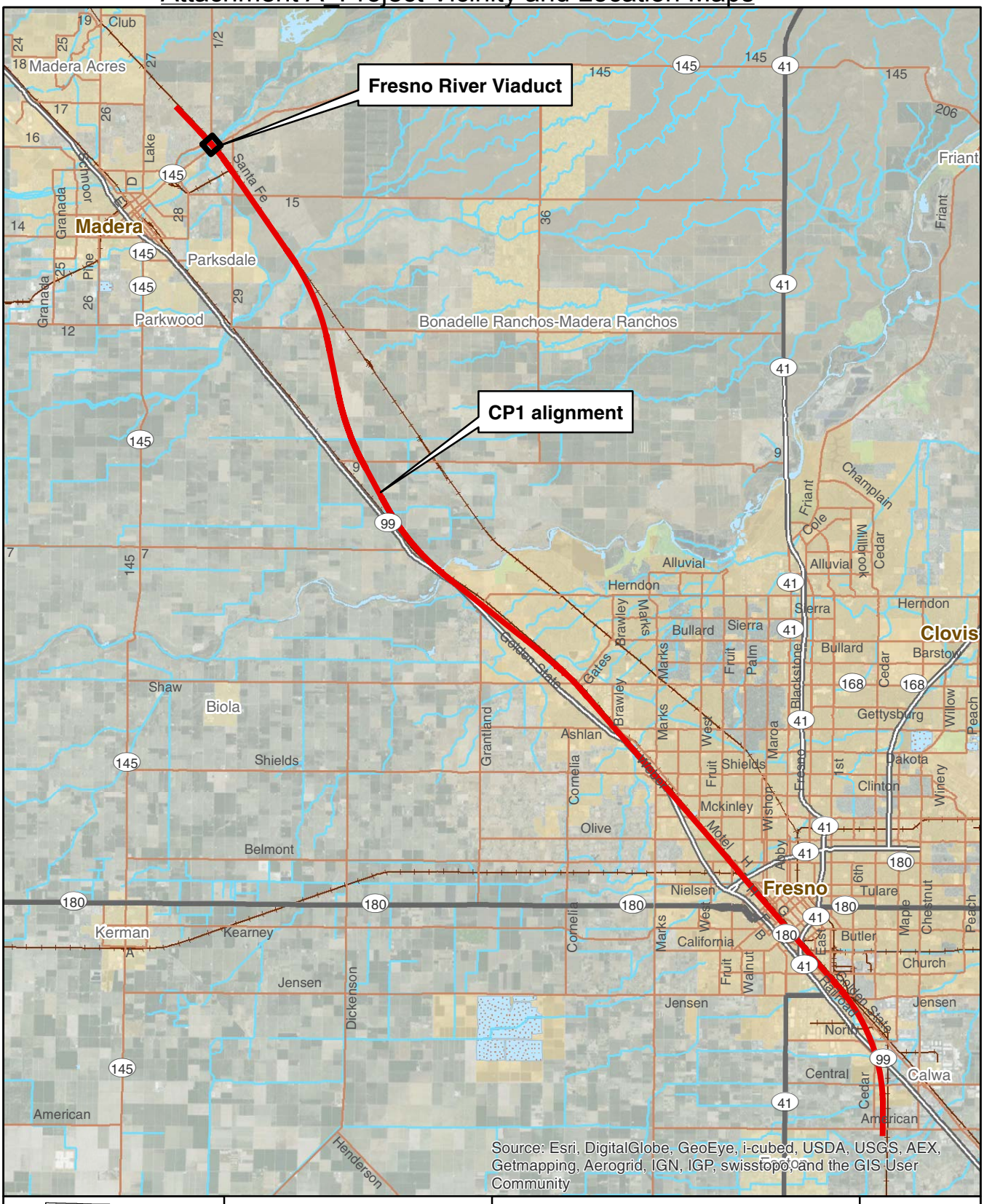
E – Typical Project Design Cross Sections

F – Hydraulic Review Summary

G – Geotechnical Review Summary

Prepared by:	Ali Porbaha
Environmental Review:	James Herota, Senior Environmental Scientist (Specialist)
Document Review:	Eric Butler P.E., Projects and Environmental Branch Chief
	Len Marino P.E., Chief Engineer
	Nicole Rinke, Board Counsel

Attachment A_Project Vicinity and Location Maps



0 2 4 Miles

SITE VICINITY MAP
Fresno River Viaduct
CHSTP, CP1
Madera County, California

amec foster wheeler

Date: 01/08/2015 | Project No. OD13165180.01.14

Figure 1

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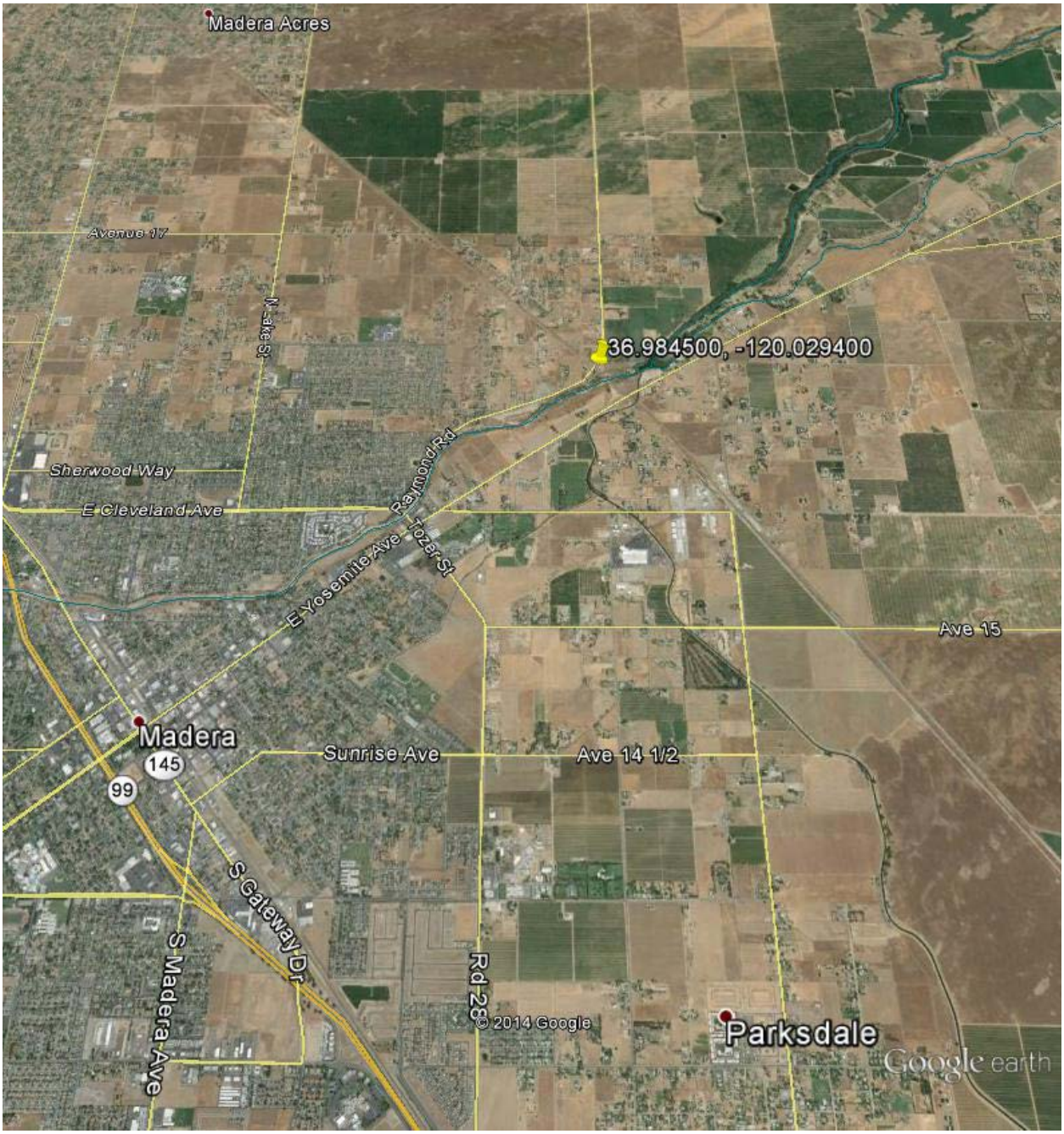
Attachment A_Project Vicinity and Location Maps

Project Location

Attachment A_Project Vicinity and Location Maps



Project Vicinity

DRAFT

STATE OF CALIFORNIA
THE RESOURCES AGENCY

THE CENTRAL VALLEY FLOOD PROTECTION BOARD

PERMIT NO. 18956-1 BD

This Permit is issued to:

High Speed Rail Authority
1401 Fulton Street
Suite 300
Fresno, California 93721

To construct an elevated viaduct (long bridge) structure to support high speed train use across the Fresno River parallel to the existing BNSF railroad bridge just northeast of the City of Madera, California. The viaduct structure is 1,583 feet long, with 460 feet of structure spanning the Fresno River. The structure at the river will be supported on three bents in the floodplain, each 12 feet diameter at the base, and two bents on each end of the crossing, both 8 feet diameter at the base. The bridge is a component of Construction Package 1 of the California High Speed Train (HST) Project, which entails developing approximately 29 miles of track along an alignment extending from Avenue 17 in Madera County to American Avenue in Fresno County.

The bridge will cross the Fresno River, Madera Main Canal, and State Route 145, parallel to the existing BNSF railroad bridge, northeast of the City of Madera, CA (Section 8, T11S, R18E, MDB&M, Madera County Flood Control and Water Conservation District, Fresno River, Madera County).

NOTE: Special Conditions have been incorporated herein which may place limitations on and/or require modification of your proposed project as described above.

(SEAL)

Dated: _____

_____
Executive Officer

GENERAL CONDITIONS:

ONE: This permit is issued under the provisions of Sections 8700 – 8723 of the Water Code.

TWO: Only work described in the subject application is authorized hereby.

THREE: This permit does not grant a right to use or construct works on land owned by the Sacramento and San Joaquin Drainage District or on any other land.

FOUR: The approved work shall be accomplished under the direction and supervision of the State Department of Water Resources, and the permittee shall conform to all requirements of the Department and The Central Valley Flood Protection Board.

FIVE: Unless the work herein contemplated shall have been commenced within one year after issuance of this permit, the Board reserves the right to change any conditions in this permit as may be consistent with current flood control standards and policies of The Central Valley Flood Protection Board.

SIX: This permit shall remain in effect until revoked. In the event any conditions in this permit are not complied with, it may be revoked on 15 days' notice.

SEVEN: It is understood and agreed to by the permittee that the start of any work under this permit shall constitute an acceptance of the conditions in this permit and an agreement to perform work in accordance therewith.

EIGHT: This permit does not establish any precedent with respect to any other application received by The Central Valley Flood Protection Board.

NINE: The permittee shall, when required by law, secure the written order or consent from all other public agencies having jurisdiction.

TEN: The permittee is responsible for all personal liability and property damage which may arise out of failure on the permittee's part to perform the obligations under this permit. If any claim of liability is made against the State of California, or any departments thereof, the United States of America, a local district or other maintaining agencies and the officers, agents or employees thereof, the permittee shall defend and shall hold each of them harmless from each claim.

ELEVEN: The permittee shall exercise reasonable care to operate and maintain any work authorized herein to preclude injury to or damage to any works necessary to any plan of flood control adopted by the Board or the Legislature, or interfere with the successful execution, functioning or operation of any plan of flood control adopted by the Board or the Legislature.

TWELVE: Should any of the work not conform to the conditions of this permit, the permittee, upon order of The Central Valley Flood Protection Board, shall in the manner prescribed by the Board be responsible for the cost and expense to remove, alter, relocate, or reconstruct all or any part of the work herein approved.

SPECIAL CONDITIONS FOR PERMIT NO. 18956-1 BD

THIRTEEN: All work completed under this permit, as directed by the general and special conditions herein, shall be accomplished to ensure that the work is not injurious to adopted plans of flood control, regulated streams, and designated floodways under Central Valley Flood Protection Board (Board) jurisdiction, as defined in California Code of Regulations, Title 23. This permit only applies to the completion of work in the project description located within, or adjacent to and having bearing on Board jurisdiction, and which directly or indirectly affects the Board's jurisdiction. This special condition shall apply to all subsequent conditions herein.

LIABILITY AND INDEMNIFICATION

FOURTEEN: The permittee is responsible for all personal liability and property damage which may arise out of failure on the permittee's part to perform the obligations under this permit. If any claim of liability is made against the Central Valley Flood Protection Board, the Department of Water Resources, the United States of America, a local district or other maintaining agencies and the

officers, agents or employees thereof, arising out of failure on the permittee's part to perform the obligations under this permit, the permittee shall defend and shall hold each of them harmless from each claim. This condition shall supersede condition TEN.

FIFTEEN: The permittee shall defend, indemnify, and hold the Board, the Department of Water Resources, and their respective officers, agents, employees, successors and assigns, safe and harmless, of and from all claims and damages related to the Board's approval of this permit, including but not limited to claims filed pursuant to the California Environmental Quality Act. The Board and the Department of Water Resources expressly reserve the right to supplement or take over their defense, in their sole discretion.

SIXTEEN: The permittee is responsible for all liability associated with construction, operation, and maintenance of the permitted facilities and shall defend, indemnify, and hold the Board, the Department of Water Resources, and their respective officers, agents, employees, successors and assigns, safe and harmless, of and from all claims and damages arising from the project undertaken pursuant to this permit, all to the extent allowed by law. The Board and the Department of Water Resources expressly reserve the right to supplement or take over their defense, in their sole discretion.

SEVENTEEN: The Board, Department of Water Resources, and Madera County Flood Control and Water Conservation Agency shall not be held liable for damages to the permitted encroachment(s) resulting from releases of water from reservoirs, flood fight, operation, maintenance, inspection, or emergency repair.

BOARD CONTACTS

EIGHTEEN: The permittee shall contact the Central Valley Flood Protection Board by telephone at (916) 574-0609 to schedule a preconstruction conference. Failure to do so at least 20 working days prior to start of work may result in delay of the project.

AGENCY CONDITIONS

NINETEEN: The permittee shall comply with all conditions set forth in the letter from the U.S. Army Corps of Engineers District Engineer dated April XX, 2015, which is attached to this permit as Exhibit A and is incorporated by reference.

TWENTY: The permittee agrees to incur all costs for compliance with local, State, and federal permitting, and to resolve conflicts between any of the terms and conditions that agencies might impose under the laws and regulations they administer and enforce.

TWENTY-ONE: If the permittee does not comply with the conditions of this permit and enforcement by the Board is required, the permittee shall be responsible for bearing all costs associated with the enforcement action, including reasonable attorney's fees. Permittee acknowledges that State law allows the imposition of fines in enforcement matters.

PRE-CONSTRUCTION

TWENTY-TWO: The permittee shall provide construction supervision and inspection services acceptable to the Board.

TWENTY-THREE: Prior to commencement of work, the permittee shall create a photo record, including associated descriptions of the existing project site conditions. The photo record shall be certified (signed and stamped) by a licensed land surveyor or licensed civil engineer registered in the State of California and submitted to the Board within thirty (30) calendar days of beginning the project.

TWENTY-FOUR: Thirty (30) calendar days prior to the start of any demolition and / or construction activities within the floodway the permittee shall submit to the Board's Chief Engineer two sets of detailed plans and specifications and supporting geotechnical and / or hydraulic impact analyses, for any and all temporary in channel work that may have an impact during the flood season from November 1 through April 15. The Board shall acknowledge receipt of this submittal in writing within ten (10) working days of receipt, and shall work with the permittee to review and respond to the request as quickly as possible. Time is of the essence. The Board may request additional information as needed and will seek comment from the U.S. Army Corps of Engineers and / or the local maintaining agency when necessary. The Board will provide written notification to the permittee if the review period is likely to exceed thirty (30) working days.

CONSTRUCTION

TWENTY-FIVE: All work approved by this permit shall be in accordance with the submitted drawings and specifications except as modified by special permit conditions herein. No work, other than that approved by this permit, shall be done in the project area without prior approval of the Board.

TWENTY-SIX: All addenda and contract change orders made to the approved plans and / or specifications by the permittee after Board approval of this permit shall be submitted to the Board's Chief Engineer for review and approval prior to incorporation into the permitted project. The submittal shall include all supplemental plans, specifications, and necessary supporting geotechnical, hydrology and hydraulics, or other technical analyses. The Board shall acknowledge receipt of the addendum or change submittal in writing within ten (10) working days of receipt, and shall work with the permittee to review and respond to the request as quickly as possible. Time is of the essence. The Board may request additional information as needed and will seek comment from the U.S. Army Corps of Engineers and / or local maintaining agencies when necessary. The Board will provide written notification to the permittee if the review period is likely to exceed thirty (30) calendar days. Upon approval of submitted documents the permit shall be revised, if needed, prior to construction related to the proposed changes.

TWENTY-SEVEN: No construction work of any kind shall be done during the flood season from November 1st to April 15th without prior approval of the Central Valley Flood Protection Board.

TWENTY-EIGHT: All debris generated by this project shall be disposed outside of the Fresno River floodway.

TWENTY-NINE: No material stockpiles, temporary buildings, access ramps or equipment shall remain in the floodway during the flood season from November 1 to April 15, and shall be removed after completion of the project.

THIRTY: Backfill material for excavations within 10 feet of bridge supports within the floodway shall be placed in 4- to 6-inch layers and compacted to a minimum of 90 percent relative compaction per ASTM Method D1557-91 or 97 percent per ASTM D 698-91 and above optimum moisture content or as directed by the U.S. Army Corps of Engineers (Exhibit A). Field density tests shall be taken by a certified soils laboratory to verify compaction of the fill.

THIRTY-ONE: Except with respect to the activities expressly allowed under this permit, the work area shall be restored to the condition that existed prior to start of work.

THIRTY-TWO: The permittee shall be responsible for all damages due to settlement, consolidation, or heave from any construction-induced activities.

THIRTY-THREE: Any temporary ramps that will be constructed for access to this project shall be promptly modified to the ground condition that existed prior to this project.

VEGETATION / ENVIRONMENTAL MITIGATION

THIRTY-FOUR: Cleared trees and brush shall be completely burned or removed from the floodway, and downed trees or brush shall not remain in the floodway during the flood season from November 1 to April 15.

THIRTY-FIVE: In the event that bank erosion injurious to facilities of the State Plan of Flood Control occurs at or adjacent to and as a result of the project, the permittee shall repair the eroded area and propose measures, to be approved by the Board, to prevent further erosion.

POST-CONSTRUCTION

THIRTY-SIX: Within 120 days of completion of the project, the permittee shall submit to the Board as-built drawings and a certification report, stamped and signed by a licensed civil engineer registered in the State of California, certifying the work was performed and inspected in accordance with the Board permit conditions and submitted drawings and specifications.

OPERATIONS AND MAINTENANCE

THIRTY-SEVEN: The permittee shall be responsible for repair of any damages to the Fresno River floodway due to construction, operation, or maintenance of the proposed project.

THIRTY-EIGHT: The permittee shall maintain the permitted encroachment(s) and the project works within the utilized area in the manner required and as requested by the authorized representative of the Board, Department of Water Resources, or any other agency responsible for maintenance.

THIRTY-NINE: If the bridge is damaged to the extent that it may impair the channel or floodway capacity, it shall be repaired or removed prior to the next flood season.

FORTY: Drainage from the bridge shall not be discharged directly into the Fresno River floodway without proper erosion control measures in-place.

FORTY-ONE: If the permitted encroachment(s) results in any adverse hydraulic impact or scouring the permittee shall provide appropriate mitigation measures subject to review and approval of the Board.

FORTY-TWO: All debris that may accumulate around the bridge piers and abutments within the Fresno River floodway shall be completely removed from the floodway following each flood season.

FORTY-THREE: The permitted encroachment(s) shall not interfere with the flood conveyance capability of Fresno River. If the permitted encroachment(s) are determined by any agency responsible for operation or maintenance of the flood control project to interfere, the permittee shall be required, at permittee's cost and expense, to modify or remove the permitted encroachment(s) under direction of the Central Valley Flood Protection Board or Department of Water Resources. If the permittee does not comply, the Central Valley Flood Protection Board may modify or remove the encroachment(s) at the permittee's expense.

PROJECT ABANDONMENT, CHANGE IN PLAN OF FLOOD CONTROL

FORTY-FOUR: If the project, or any portion thereof, is to be abandoned in the future, the permittee shall abandon the project under direction of the Board at the permittee's cost and expense.

FORTY-FIVE: The permittee may be required, at permittee's cost and expense, to remove, alter, relocate, or reconstruct all or any part of the permitted project works if removal, alteration, relocation, or reconstruction is necessary as part of or in conjunction with implementation of the Central Valley Flood Protection Plan or other future flood control plan or project, or if damaged by any cause. If the permittee does not comply, the Central Valley Flood Protection Board may perform this work at the permittee's expense.

END OF CONDITIONS

STATE OF CALIFORNIA
THE RESOURCES AGENCY
CENTRAL VALLEY FLOOD PROTECTION BOARD

RESOLUTION NO. 2015-05

FINDINGS AND DECISION AUTHORIZING ISSUANCE OF
ENCROACHMENT PERMIT NO. 18956-1
CALIFORNIA HIGH SPEED RAIL AUTHORITY
BRIDGE TO SUPPORT HIGH SPEED TRAIN USE ACROSS THE FRESNO RIVER
MADERA COUNTY

WHEREAS, The California High-Speed Rail Authority (Authority) proposes to construct the California High-Speed Train Project, Merced to Fresno Section consisting of an 80-mile portion of a larger high-speed train (HST) system which is intended to connect to sections traveling west to San Francisco, south to Los Angeles, and later north to Sacramento; and

WHEREAS, The Authority submitted Application No. 18956-1 to the Central Valley Flood Protection Board on May, 12, 2014 to construct an elevated viaduct (long bridge) structure to support high speed train use across the Fresno River parallel to the existing BNSF railroad bridge just northeast of the City of Madera, California; and

WHEREAS, The Authority released a Notice of Preparation initiating a 30-day public comment period on September 29, 2009 and ending on October 29, 2009; and

WHEREAS, The Authority as lead agency under the California Environmental Quality Act, Public Resources Code sections 21000 *et seq*. ("CEQA") prepared a Draft Environmental Impact Statement/Draft Environmental Impact Report (DEIS/DEIR) (SCH No. 2009091125, August 2011) and Final Environmental Impact Report/Environmental Impact Statement (Final EIR/EIS) (SCH No. 2009091125, April 2012) and Mitigation Monitoring and Reporting Plan (MMRP) on the California High-Speed Train (HST) Project Merced to Fresno Section (incorporated herein by reference and available at the Central Valley Flood Protection Board offices or Authority office); and

WHEREAS, The Authority approved the California High-Speed Train (HST) Project Merced to Fresno Section (Authority Resolution HSRA 12-20); FEIS/EIR, MMRP, approved findings and a statement of overriding considerations pursuant to the CEQA Guidelines (incorporated herein by reference), and filed a Notice of Determination with the State Clearinghouse on May 3, 2012; and

WHEREAS, The U.S. Army Corps of Engineers (USACE) decision letter was received on April XX, 2015 for this application. The USACE District Engineer has no objection to the project, subject to conditions which have been incorporated into the permit as Exhibit A; and

WHEREAS, Board staff completed a technical review of Permit Application No. 18956-1; and

WHEREAS, The Board has conducted a public hearing on Permit Application No. 18956-1 and has reviewed the Reports of its staff, the documents and correspondence in its file, and the environmental documents prepared by the Authority;

NOW, THEREFORE, BE IT RESOLVED THAT,

Findings of Fact.

1. The Board hereby adopts as findings the facts set forth in the Staff Report.

2. The Board has reviewed all Attachments, Exhibits, Figures, and References listed in the Staff Report

CEQA Findings.

3. The Board, as a responsible agency, has independently reviewed the analyses in the DEIS/DEIR (SCH No. SCH No. 2009091125, August 2011) and the FEIS/EIR (April 2012) which includes the MMEP, and Authority Lead Agency findings, and has reached its own conclusions.

4. The Board, after consideration of the DEIS/DEIR (SCH No. SCH No. 2009091125, August 2011) and the FEIS/EIR (April 2012) on the HST Project Merced to Fresno Section, submitted by the Authority, and the Authority Lead Agency findings, adopts the project description, analysis and findings which are relevant to the project.

5. **Findings regarding Significant Impacts**. Pursuant to CEQA Guidelines sections 15096(h) and 15091, the Board determines that the Authority findings, attached to the Staff Report, and incorporated herein by reference, summarize the FEIS/EIR determinations regarding impacts of the HST Project Merced to Fresno Section, before and after mitigation. Having reviewed the FEIS/EIR, the Authority findings, the Board makes its findings as follows:

   a. Findings Regarding Significant and Unavoidable Impacts.

   The Board finds that the HST Project Merced to Fresno Section, may have the following significant, unavoidable impacts, as more fully described in the Authority findings. Mitigation has been adopted for each of these impacts, although it does not reduce the impact to less than significant. The impacts and mitigation measures are set forth in more detail in the Authority findings.

   Noise and Vibration - The Authority finds that uncertainty about the effectiveness of noise mitigation measures remains because of the important role that local jurisdictions and communities will play in determining the use of sound barriers. Out of an abundance of caution, the Authority therefore finds that operational noise impacts from the HST are significant and unavoidable under CEQA, even though in many instances mitigation measures will effectively reduce the impact to a less than significant level.

Agricultural Lands - The Authority will fund the California Farmland Conservancy Program's work to identify suitable agricultural land for mitigation of impacts and to fund the purchase of agricultural conservation easements from willing sellers. The permanent conversion of agricultural land to nonagricultural use for the project is considered a significant and unavoidable impact under CEQA.

Parks, Recreation, and Open Space - The multiple planned projects in and around Roeding Park, including the HST would result in permanent closure of a portion of the park and result in noise, dust, and visual impacts.

Aesthetics and Visual Resources – The proposed project includes elevated guideways that run parallel to the boulevard and nearby residences. Sound barriers and retaining walls would block views. The alteration of the overall cohesion in the view would substantially alter the visual character and reduce the visual quality of the West of SR 99 Landscape Unit.

Cultural and Paleontological Resources – Construction will impact historically significant built environmental resources including Roeding Park.

Finding: The Board finds that changes or alterations have been required in, or incorporated into, the project which substantially lessen such impacts, as set forth more fully in the Authority findings, but that each of the above impacts remains significant after mitigation. Such mitigation measures are within the responsibility of another agency, or the Authority, and should implement the described mitigation measures. Specific economic, legal, social, technological or other considerations, rendered infeasible mitigation or alternatives that would have reduced these impacts to less than significant.

b. Findings regarding Significant Impacts that can be Reduced to Less Than Significant.

The significant impacts and the mitigation measures to reduce them to less than significant are described in the FEIR and in the Authority Adopted Resolution HSRA 12-20, dated May 3, 2012. This Resolution includes a Statement of Facts, Findings, Impacts and Mitigation Measures, Statement of Overriding Considerations, and Mitigation Monitoring and Reporting Program. Based on its independent review of the FEIR and Authority Resolution HSRA 12-20, the Board finds that for each of the significant impacts described, changes or alterations have been required in, or incorporated into, the project which avoid or substantially lessen the significant environmental effects as identified in the FEIR. Moreover, such changes or alterations are within the responsibility and jurisdiction of another public agency (Authority) and such changes have been adopted by that agency. It is hereby determined that the impacts addressed by these mitigation measures will be mitigated to a less-than-significant level or avoided by incorporation of these mitigation measures into the project.

As a responsible agency, the Board has responsibility for mitigating or avoiding only the direct or indirect environmental effects of those parts of the Project which it decides to

carry out, finance, or approve. The Board confirms that it has reviewed the MMRP, and confirmed that the Authority has adopted and committed to implementation of the measures identified therein. The Board agrees with the analysis in the MMRP and confirms that there are no feasible mitigation measures within its powers that would substantially lessen or avoid any significant effect the project would have on the environment. None of the mitigation measures in the MMRP require implementation by the Board directly, although continued implementation of the MMRP shall be made a condition of issuance of the Permit. However, the measures in the MMRP may be modified to accommodate changed circumstances or new information not triggering the need for subsequent or supplemental analysis under CEQA Guidelines sections 15062 or 15063.

6. **Statement of Overriding Considerations.** Pursuant to CEQA Guidelines sections 15096(h) and 15093, the Board has balanced the economic, social, technological and other benefits of the Project described in Permit Application No. 18956-1, against its significant and unavoidable impacts, listed in paragraph 5(a) above, and finds that the benefits of the Project outweigh these impacts and they may, therefore, be considered "acceptable".

   The Central Valley Flood Protection Board finds the HST system would meet the need for a safe and reliable mode of travel that would link the major metropolitan areas of the state and deliver predictable, consistent travel times sustainable over time. The HST system also would provide quick, competitive travel times between California's major intercity markets. For intermediate intercity trips such as Fresno to Los Angeles, the HST system would provide considerably quicker travel times than either air or automobile transportation, and would bring frequent HST service to portions of the state such as the Central Valley that are not well served by air transportation. In addition, the passenger cost for travel via the HST service would be lower than for travel by air for the same intercity markets. The Merced to Fresno section is the backbone of the HST system and the preferred Hybrid Alternative would provide comparable travel times to the UPRR/SR 99 Alternative, but would avoid the higher cost of additional elevated construction and the greater community impacts associated with other alternatives.

7. **Custodian of Record.** The custodian of the CEQA record for the Board is its Acting Executive Officer, Leslie Gallagher, at the Central Valley Flood Protection Board Offices at 3310 El Camino Avenue, Room 151, Sacramento, California 95821.

Considerations pursuant to Water Code section 8610.5.

8. **Evidence Admitted into the Record**. The Board has considered all the evidence presented in this matter, including the original application for Permit No. 18956-1 and technical documentation provided by the Authority on the California High-Speed Train Project, Staff Report and attachments, the original Environmental Impact Report on the California High-Speed Train Project, Merced to Fresno Section (Draft and Final Versions), Authority Resolution HSRA 12-20 including findings, Statement of Overriding Considerations, and the MMRP.

9. **Best Available Science**. The accepted industry standards for the work proposed as regulated by Title 23 have been applied to the review of this project. In making its findings, the Board has used the best available science relating to the issues presented by all parties and the design is in compliance with the standards.

10. **Effects on State Plan of Flood Control**. This project has no adverse effect on facilities of the State Plan of Flood Control and is consistent with the adopted 2012 Central Valley Flood Protection Plan and Title 23 standards because there is no significant increase in water surface elevation or velocities anticipated for the proposed project.

11. **Effects of Reasonably Projected Future Events**. There will be no effects to the proposed project from reasonable projected future events due to excessive freeboard available for potential changes as a result of climate change, hydrology and development within the existing watershed.

Other Findings/Conclusions regarding Issuance of the Permit.

12. This resolution shall constitute the written decision of the Board in the matter of Permit No. 18956-1.

Approval of Encroachment Permit No. 18956-1.

15. The Board adopts the CEQA findings and Resolution 2015-05, and

16. Based on the foregoing, the Board hereby approves issuance of Permit No. 18956-1 in substantially the form provided in the Staff Report for Permit 18956-1.

17. The Board directs the Executive Officer to take the necessary actions to prepare and execute Permit No. 18956-1 and all related documents and to prepare and file a Notice of Determination under the California Environmental Quality Act for the California High-Speed Train Project, Merced to Fresno Section.

PASSED AND ADOPTED by vote of the Board on _____, 2015

_____
William H. Edgar
President

_____
Jane Dolan
Secretary

Attachment D: MCFCWCA Endorsement Letter

RESOURCE MANAGEMENT AGENCY
ENGINEERING DEPARTMENT

2037 W. Cleveland Avenue
Madera, CA 93637-8720
(559) 675-7817
FAX (559) 675-7639
Kheng.Vang@co.madera.ca.gov

Ken Vang PE, County Engineer

May 22, 2014

Nancy C. Moricz, P.E.
Central Valley Flood Protection Board
3310 El Camino Avenue, Room 151
Sacramento, CA 95821

Subject: Approval Letter for the Encroachment Permit Application for High Speed Rail Bridge Across Fresno River, SE ¼ and SW ¼ of Section 8, Township 11S, Range 18E, Madera County, California

Dear Ms. Moricz:

With this letter, the Madera County Flood Control and Water Conservation Agency (MCFCWCA) is approving the construction of the High Speed Rail Project "Fresno River Bridge" as described and modeled in the "Bridge Design Hydraulics Report for the Fresno River Bridge" (BDHR - WRECO, 2014) and as identified in the encroachment permit application described above. On February 5, 2014, the MCFCWCA met with the High Speed Rail Authority and their consultant team to discuss the project and initiate the approval process. A draft BDHR was provided at that time which included hydrologic, hydraulic, and scour information about the project. Water surface elevations were modeled for existing and proposed conditions. The analysis showed that the new structure will result in a localized water surface elevation increase during both a 100- and 200-year storm event of only 0.09 ft. and 0.14 ft., respectively. The modeled clearance between the projected 200-year water surface elevation and the HST bridge soffit is determined to be 19.2 ft; which exceeds the CVFPB-required freeboard of 3 ft. The analysis also determined a potential scour depth range of between 5.7 and 6.1 ft. Based on these results, the project bridge footings have been conservatively designed to be below the total scour line.

On March 18, 2014 we provided comments on the draft BDHR, which were subsequently addressed in the final BDHR submitted in April 3, 2014. A thorough review of the finalized study report indicates that all comments were addressed to our satisfaction. We are therefore accepting and approving the project.

Sincerely,

Ken Vang, P.E.
County Engineer

cc: Johannes Hoevertsz, P.E.
Director

Attachment D: MCFCWCA Endorsement Letter

State of California | DEPARTMENT OF WATER RESOURCES
CENTRAL VALLEY FLOOD PROTECTION BOARD | California Natural Resources Agency

APPLICATION FOR A CENTRAL VALLEY FLOOD PROTECTION BOARD
ENCROACHMENT PERMIT

Application No. _____
(For Office Use Only)

1. Description of proposed work being specific to include all items that will be covered under the issued permit.

The work involves construction of an elevated structure to support high speed train use across the Fresno River parallel to the existing BNSF RR bridge, and just northeast of the City of Madera, CA. The 460 ft-long structure at the river will be supported on 3 bents in the floodplain, each 12 ft diameter at the base, on 36'6" sq. footings, and spaced 130 ft. apart, plus 2 bents on each end of the crossing. See application cover letter for more details.

2. Project Location: Madera County, in Section SW 1/4 & SE 1/4 of Sec. 8
Township: 11S (N) (S), Range: 18E (E) (W), M. D. B. & M.
Latitude: 36.9845°N Longitude: 120.0294°W
Stream : Fresno River, Sta. 25048 , Levee : N/A Designated Floodway: Yes
APN: Several (see below list

3. High Speed Rail Authority, Hugo Mejia (Name of Applicant / Land *Owner*) of 1401 Fulton Street, Suite 300 (Address)

Fresno (City) California (State) 93721 (Zip Code) (559) 369-6429 (Telephone Number)

hugo.mejia@hsr.ca.gov (E-mail)

4. N/A (Name of Applicant's Representative) of _____ (Company)

_____ (City) _____ (State) _____ (Zip Code) _____ (Telephone Number)

_____ (E-mail)

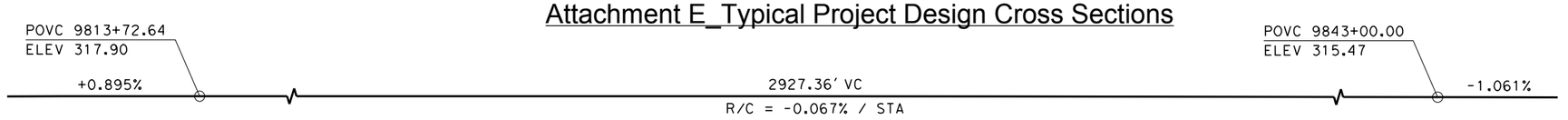
5. Endorsement of the proposed project from the Local Maintaining Agency (LMA):

We, the Trustees of Madera Co Flood Control & Water Cons. Agency (Name of LMA) approve this plan, subject to the following conditions:

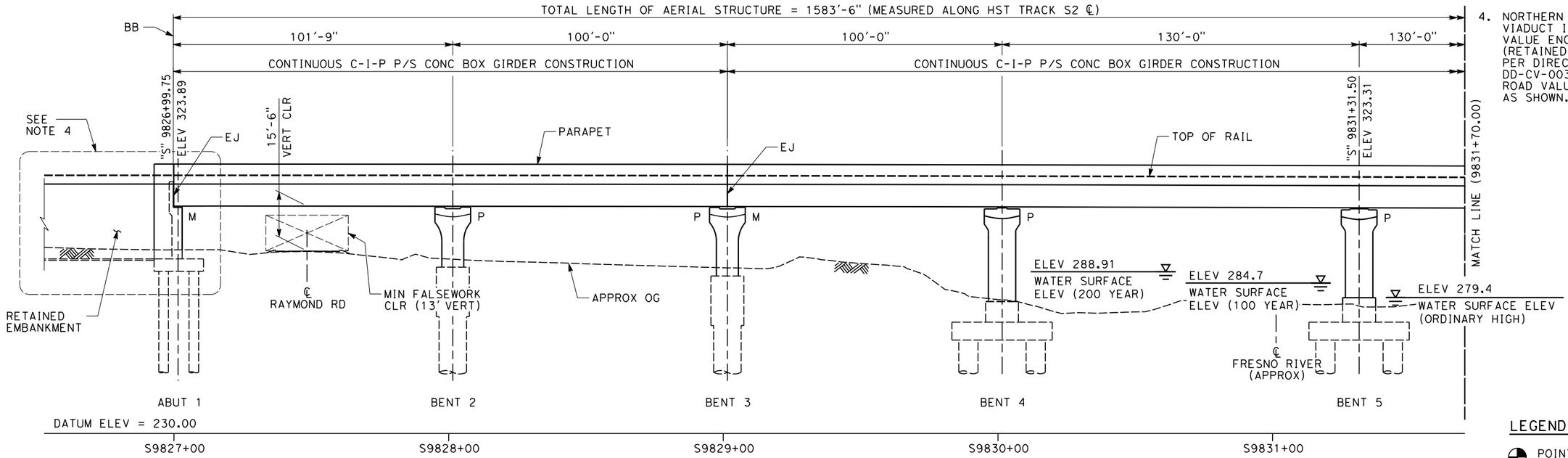
☐ Conditions listed on back of this form ☐ Conditions Attached ☒ No Conditions

[signature] Trustee	5-28-2014 Date	_____ Trustee	_____ Date
_____ Trustee	_____ Date	_____ Trustee	_____ Date

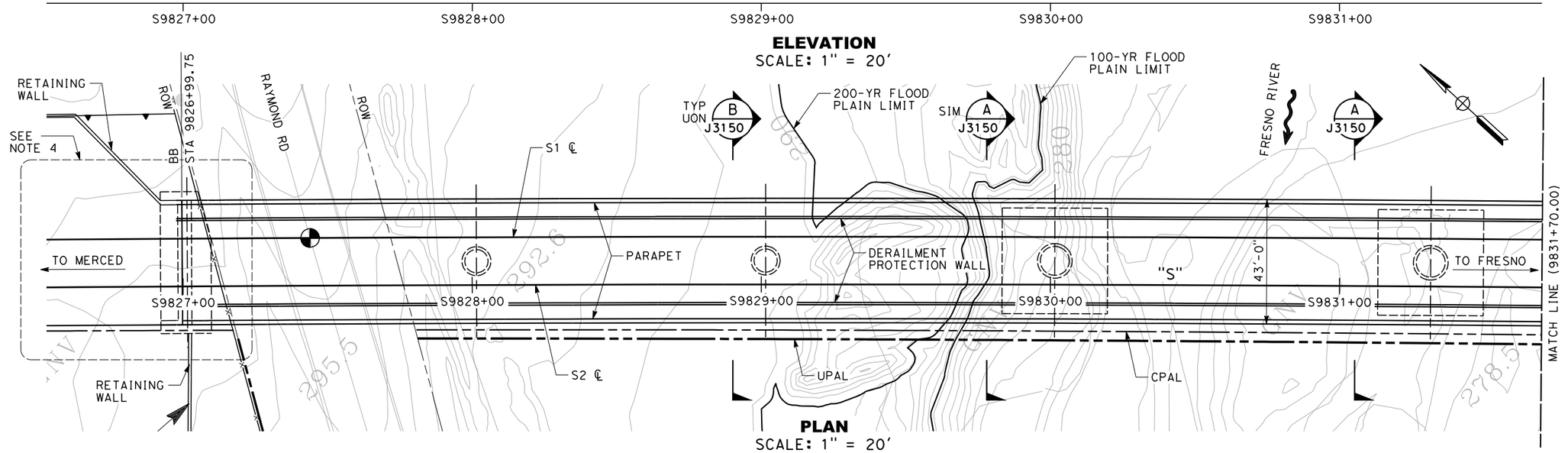
Attachment E_Typical Project Design Cross Sections



PROFILE GRADE
NO SCALE



ELEVATION
SCALE: 1" = 20'



PLAN
SCALE: 1" = 20'

NOTE:

1. THE PROFILE ELEVATIONS SHOWN ARE EQUAL TO TOP OF RAIL.
2. FOR TABLE OF BENT TYPES, SEE DRAWING NO. ST-J0051-FRV.
3. FOR TRACK ALIGNMENT DATA, SEE TRACK GUIDEWAY DRAWINGS.
4. NORTHERN SECTION OF THE VIADUCT IS CURRENTLY UNDER VALUE ENGINEERING REVIEW. (RETAINED EMBANKMENT SECTION PER DIRECTIVE DRAWING DD-CV-003 NORTH OF RAYMOND ROAD VALUE ENGINEERING OPTION AS SHOWN.)

LEGEND:

- POINT OF MINIMUM VERTICAL CLEARANCE
- P PINNED CONNECTION
- M CONNECTION IS FREE TO MOVE LONGITUDINALLY

20 0 20 40
1"=20'

REV	DATE	BY	CHK	APP	DESCRIPTION
B	11/26/14				90% - COMPLETE STRUCTURE PACKAGE
B	07/25/14				60% - COMPLETE STRUCTURE PACKAGE
A	06/23/14				DESIGN BASELINE REPORT

DESIGNED BY L. JOHNSON
DRAWN BY T. ERION
CHECKED BY R. WONG
IN CHARGE L. JOHNSON
DATE 11/26/2014

NOT FOR CONSTRUCTION

Tutor Perini
ZACHRY
PARSONS
A joint venture

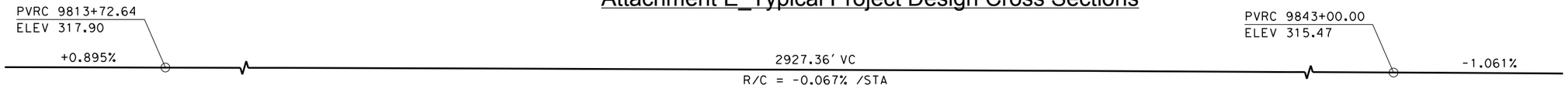
CALIFORNIA HIGH-SPEED RAIL AUTHORITY

CALIFORNIA HIGH-SPEED TRAIN PROJECT
CONSTRUCTION PACKAGE 1

FRESNO RIVER VIADUCT
GENERAL PLAN AND ELEVATION
SHEET 1 OF 3

CONTRACT NO. HSR13-06
DRAWING NO. ST-J1100-FRV
SCALE AS SHOWN
SHEET NO.

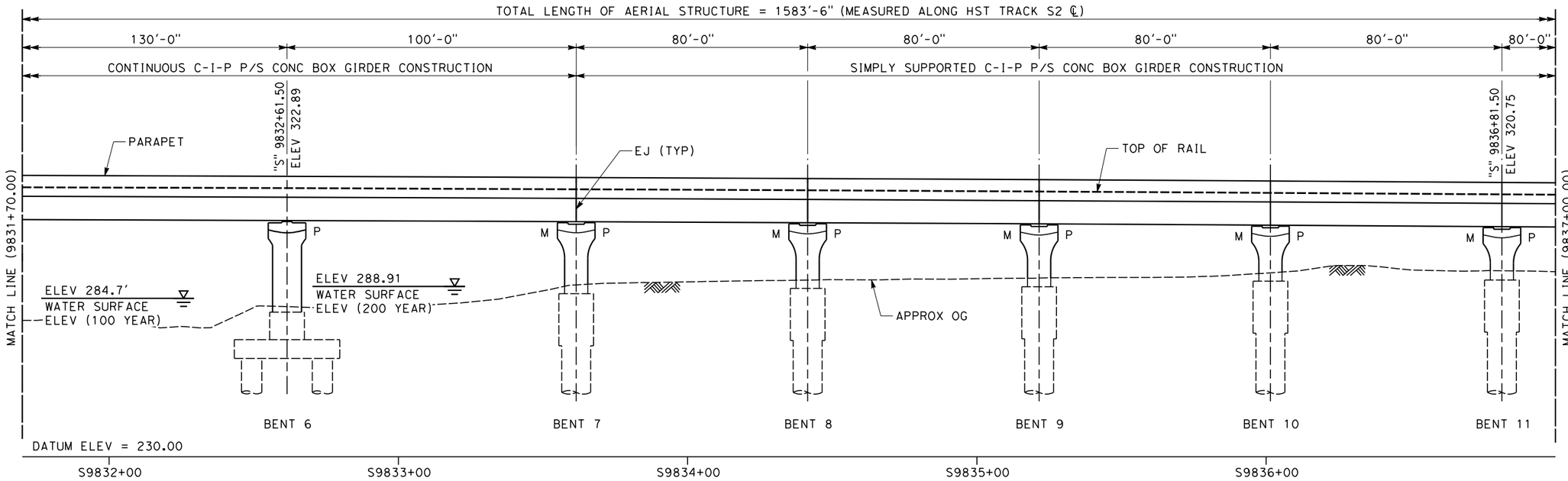
Attachment E_Typical Project Design Cross Sections



PROFILE GRADE
NO SCALE

NOTE:

1. FOR NOTES, SEE DRAWING NO. ST-J1100-FRV.

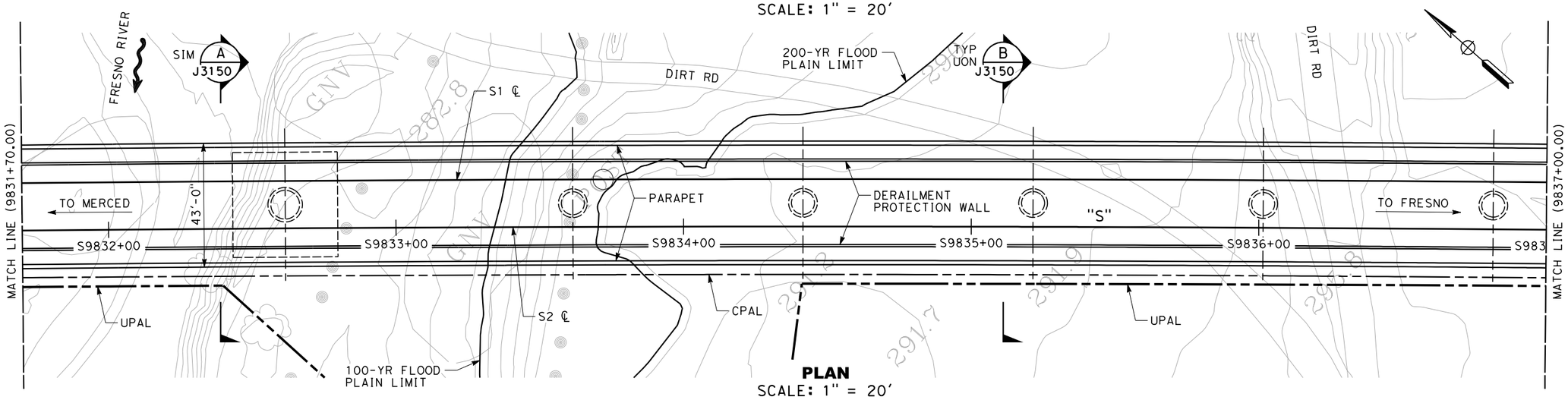


ELEVATION
SCALE: 1" = 20'

LEGEND:

P PINNED CONNECTION

M CONNECTION IS FREE TO MOVE LONGITUDINALLY



PLAN
SCALE: 1" = 20'

20 0 20 40
1"=20'

REV	DATE	BY	CHK	APP	DESCRIPTION
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B	07/25/14				60% - COMPLETE STRUCTURE PACKAGE
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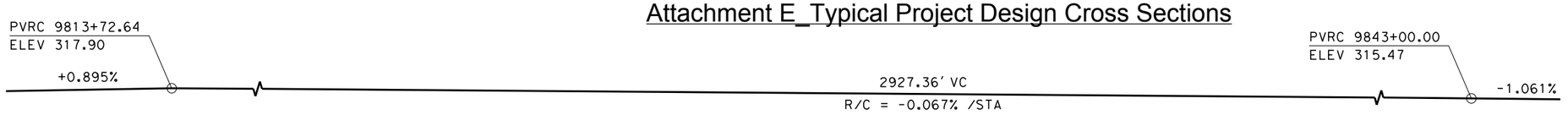
CALIFORNIA HIGH-SPEED RAIL AUTHORITY

CALIFORNIA HIGH-SPEED TRAIN PROJECT
CONSTRUCTION PACKAGE 1

FRESNO RIVER VIADUCT
GENERAL PLAN AND ELEVATION
SHEET 2 OF 3

CONTRACT NO. HSR13-06
DRAWING NO. ST-J1101-FRV
SCALE AS SHOWN
SHEET NO.

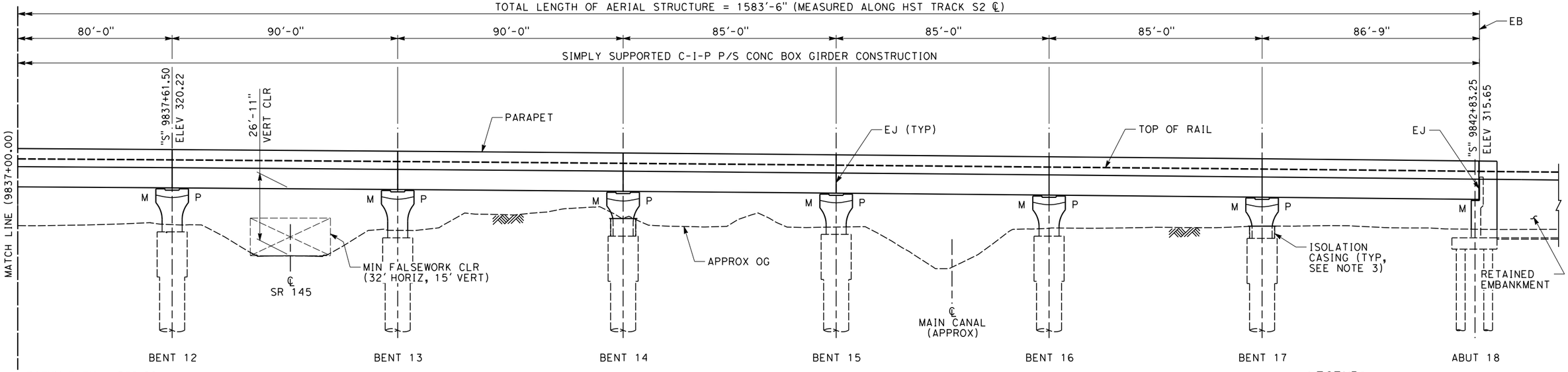
Attachment E_Typical Project Design Cross Sections



PROFILE GRADE
NO SCALE

NOTES:

1. WATSON ST TO BE CLOSED.
2. FOR NOTES, SEE DRAWING NO. ST-J1100-FRV.
3. IF DISTANCE FROM OG OR FG TO PILE CUTOFF IS 4'-6" OR LESS, AN ISOLATION CASING IS NOT REQUIRED.



ELEVATION
SCALE: 1" = 20'

LEGEND:

- ⊕ POINT OF MINIMUM VERTICAL CLEARANCE
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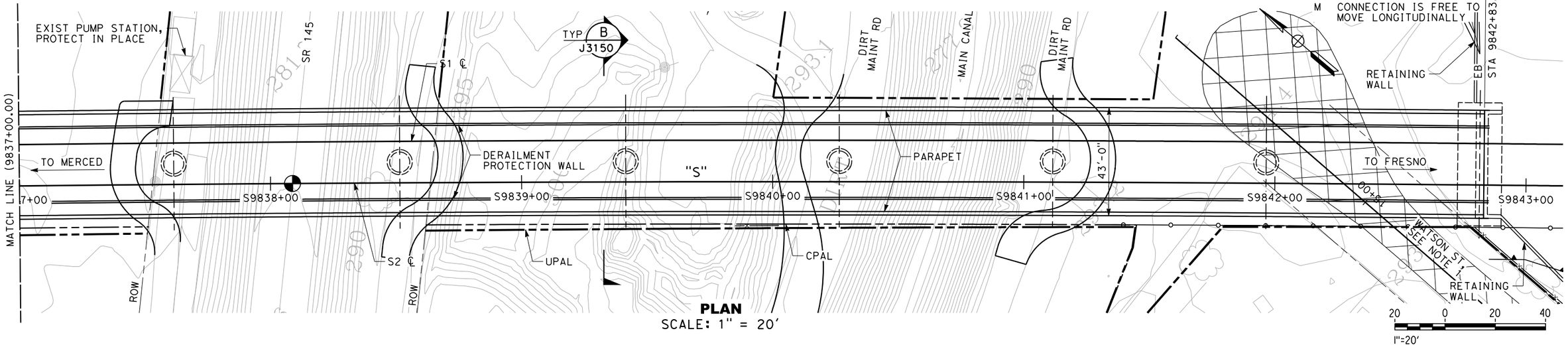

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SCALE: 1" = 20'

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CALIFORNIA
HIGH-SPEED RAIL AUTHORITY

CALIFORNIA HIGH-SPEED TRAIN PROJECT
CONSTRUCTION PACKAGE 1

FRESNO RIVER VIADUCT
GENERAL PLAN AND ELEVATION
SHEET 3 OF 3

CONTRACT NO. HSR13-06
DRAWING NO. ST-J1102-FRV
SCALE AS SHOWN
SHEET NO.

Hydraulic Review Summary

This summary includes review of the HSRA revised hydraulic report entitled "BRIDGE DESIGN HYDRAULIC STUDY REPORT FRESNO RIVER BRIDGE" dated March 2015.

The High Speed Train (HST) bridge is being proposed over the Fresno River as part of the HST Design-Build Project, Construction Package 1 (Project). The purpose of this summary is to compare the hydraulics of the river channel with and without the proposed bridge for different flood events (100-year, 200-year, and 500-year), and present the estimated freeboards, scour depths at the proposed bridge, along with the flow velocities.

The 100-year peak discharge selected for the Project's hydraulic and scour analysis is 8,000 cfs, which is the value used both by the U.S. Army Corps of Engineers (USACE) and the Central Valley Flood Protection Board (CVFPB) for the reach of the Fresno River in which the Project site is located. A 500-year design discharge obtained from the Federal Emergency Management Agency's (FEMA) Flood Insurance Study (FIS) was also used to evaluate the hydraulics at the Project site.

The hydraulics at the Project site were evaluated for the existing conditions (without the proposed HST bridge) and the proposed conditions (with the proposed HST bridge) using the Hydrologic Engineering Center's River Analysis System (HEC-RAS) modeling software Version 4.1.0 developed by the USACE. Based on the hydraulic analysis, the proposed HST bridge would result in an insignificant localized increase in water surface elevation in the vicinity of the proposed structure (relative to existing conditions). A comparison of the water surface elevations immediately upstream of the proposed HST bridge are summarized in the table below.

Return Period	Flow (cfs)	Water Surface Elevation (ft NAVD 88)	
		Existing	Proposed
100-year CVFPB	8,000	284.61	284.70
200-year approximated	18,100	288.77	288.91
500-year FEMA	29,000	292.59	292.76

The water surface elevation increase for the 100-year storm would be 0.09 ft, the increase for the 200-year storm would be 0.14 ft, and the increase for the 500-year storm would be 0.17 ft. The HST piers would impede flow, which would result in the localized increase in water surface elevation. The lowest soffit elevation for the structure is 311.2 ft NAVD 88. The available freeboard distances for the proposed HST bridge are summarized in the following table.

Return Period	Flow (cfs)	Water Surface Elevation (ft NAVD 88)	Available Freeboard (ft)
100-year CVFPB	8,000	284.70	26.5
200-year approximated	18,100	288.91	22.3
500-year FEMA	29,000	292.76	18.4

Even at the FEMA-established flow rate for the 500-year storm, the proposed HST bridge will provide 18.4 ft of freeboard. The structure will adequately meet freeboard requirement of passing the 200-year design discharge with 3 ft of freeboard.

Scour calculations were performed for the proposed HST bridge, based on the Federal Highway Administration's (FHWA's) Hydraulic Engineering Circular No. 18, Evaluating Scour at Bridges (HEC-18). The hydraulic characteristics for the 100-year storm event from the hydraulic analysis and a median grain size diameter of 0.6 mm from Parikh Consultants, Inc. and Amec Foster Wheeler's Grain Size Distributions were used to calculate the potential scour depths. The three piers directly affected by the 100-year flow are bents B4, B5, and B6. Long-term bed elevation changes for the project site were approximated by assessing the long-term bed elevation changes at nearby bridges along the Fresno River. The long-term bed elevation change was approximated and found to be 0.3 ft over the 100-year lifespan of the proposed HST bridge. The contraction scour depth was calculated to be 0.9 ft. Local pier scour was calculated to be between 4.5 ft and 5 ft for the three pier bents. The total scour depths are presented in the table below.

Pier/ Bent No.	Scour Depth (ft)			
	Contraction	Local	Long-Term	Total
B4	0.9	4.8	0.3	6.0
B5	0.9	6.1	0.3	7.3
B6	0.9	5.3	0.3	6.5

The foundations of the piers and abutments should be installed below the estimated scour depths. Per the FHWA's HEC-18, the top of the pier footing should reference the thalweg of the channel and should be placed below the sum of the long-term bed elevation change and contraction scour. Based on the complex pier scour equations, in order to minimize the local scour, WRECO has determined recommended top of pile cap elevations for Bents B4, B5, and B6. The bottom of the pier footing should be below the total scour line. All piers were designed to the same elevation due to potential channel thalweg migration.

Pier/ Bent No.	Thalweg Elevation (ft NAVD 88)	Total Calculated Scour Elevation (ft NAVD 88)	Proposed Top of Pile Cap Elevation (ft NAVD 88)	Proposed Bottom of Pile Cap Elevation (ft NAVD 88)
B4	272.4	266.4	270.5	263.5
B5	272.4	265.1	270.5	263.5
B6	272.4	265.9	270.5	263.5

Average channel flow velocities were estimated for the existing and proposed conditions. The 100-year average flow velocities for the existing and proposed conditions are presented in Table 8, Table 9, and Table 10 for the evaluated flow rates. For these evaluated flow conditions, there is a decrease in average channel velocity immediately upstream of the bridge. The average channel velocities underneath the proposed HST bridge are faster than the velocities in the bounding cross sections immediately upstream and downstream of the structure. However, no increases in average channel velocities occur at cross sections upstream and downstream of the bridge.

Table 8. Comparison of 100-Year Average Channel Velocities

River Station	Distance from Proposed HST	Velocity (ft/second)	
		Existing	Proposed
25094.8	46.2 ft from upstream face	3.0	3.0
25051	2.4 ft from upstream face	3.4	3.3
25048.6	Upstream face HST	--	3.8
25005.6	Downstream face HST	--	4.2
25001.9	3.7 ft from downstream face	3.8	3.8
24785.1	220.5 ft from downstream face	4.7	4.7

Table 9. Comparison of 200-Year Average Channel Velocities

River Station	Distance from Proposed HST	Velocity (ft/second)	
		Existing	Proposed
25094.8	46.2 ft from upstream face	4.1	4.1
25051	2.4 ft from upstream face	4.5	4.4
25048.6	Upstream face HST	--	5.2
25005.6	Downstream face HST	--	5.5
25001.9	3.7 ft from downstream face	5.0	5.0
24785.1	220.5 ft from downstream face	5.5	5.5

Table 10. Comparison of 500-Year Average Channel Velocities

River Station	Distance from Proposed HST	Velocity (ft/second)	
		Existing	Proposed
25094.8	46.2 ft from upstream face	4.4	4.3
25051	2.4 ft from upstream face	4.6	4.5
25048.6	Upstream face HST	--	5.5
25005.6	Downstream face HST	--	6.1
25001.9	3.7 ft from downstream face	5.5	5.5
24785.1	220.5 ft from downstream face	5.5	5.5

Geotechnical Review Summary

This summary includes review of the HSRA revised geotechnical report entitled "Geotechnical Engineering Design Report Fresno River Viaduct" dated January 9, 2015.

The High Speed Train (HST) bridge is being proposed over the Fresno River as part of the HST Design-Build Project, Construction Package 1 (Project). The purpose of this summary is to present the review the geotechnical analyses and geotechnical recommendations for design and construction of the subject viaduct foundations.

The Fresno River Viaduct (FRV) crosses over the Fresno River and SR-145, roughly parallel to and just to the southwest of the BNSF tracks. The length of the viaduct is approximately 1584 feet, extending from station 9826+99.75 to 9842+83.25. The viaduct will include three bents, founded on pile caps supported on four 7-foot-diameter drilled shafts, located within the extents of the river channel, as well as 11 bents to the south and 2 bents to the north, with foundations consisting of single 10-foot-diameter drilled shafts, beyond which the alignment will transition to a Mechanically Stabilized Earth (MSE) embankment system at each of the abutments. The abutment foundations will consist of pile caps supported on ten 3 foot 6 inch-diameter drilled shafts. The viaduct spans will consist of concrete spans supporting the rail bed, each ranging from about 80 to 140 feet in length.

The geotechnical investigation consisted of 8 cone penetration tests (CPTs) and 6 borings, as well geophysical testing that included both seismic refraction and active and passive surface wave analysis techniques across the river channel and a deep downhole suspension log in one of the borings. Previous explorations at the site included 3 borings and 1 Seismic CPT, with one of the borings converted into a standpipe piezometer. A suspension log was completed in one of the previous borings.

Final ground motions have been developed for outside of the river channel for a Vs30 of 350 meters/sec (1148 feet/sec), which corresponds to Site Class D. Final ground motions for the portion of the viaduct within the river channel should be very similar to those issued in the RFP for the project for a Vs30 of 285 meters/sec (935 feet/s).

North of the Fresno River the soils in the upper 80 to 90 feet generally consist of interbedded medium stiff to very stiff clays and silts and medium dense silty sands. In the Fresno River channel the upper 10 to 15 feet consists of loose to medium dense poorly graded sands with medium stiff to very stiff clays and silts and medium dense silty sands below this to a depth of about 60 feet. South of the Fresno River the soils in the upper 55 to 80 feet consist of medium dense sand with silt. Below the above depths to the maximum depth explored are hard silts and clays as well as very dense silty sands. Groundwater was generally encountered at a depth of about 50 feet below the ground surface (bgs) outside of the river channel and about 45 feet bgs within the channel.

For the MCE (Maximum Considered Earthquake) level of shaking, liquefaction was evaluated to occur in isolated layers that are discontinuous at depths of 50 to 75 feet bgs. The overall likely settlement of the liquefying layers could be on the order of 1 to 3 inches outside of the river channel and 1 to 5 inches inside the river channel. This would lead to substantial downdrag of the drilled shafts which would cause up to 3 inches of settlement of the drilled shafts outside the river channel and 5 inches of settlement for the foundations inside the river channel. There were no potential liquefiable layers for the Operating Basis Earthquake (OBE) level of shaking evaluations.

The drilled shafts were evaluated to have compressive axial nominal resistances with the shaft tip at 95 feet in depth bgs of about 3,500 and 11,000 kips for 3.5 and 10 foot diameter shafts respectively for the bents outside of the river channel. The planned 7 foot diameter shafts within the river channel had compressive axial nominal resistances of 5,000 kips at a tip depth of 106 feet in depth bgs when accounting for downdrag during the MCE event. These capacities are based on the results of a load test on a sacrificial drilled shaft at the project site.