

**California High-Speed Rail Authority**



**RFP No.: HSR 13-57**

**Request for Proposals for Design-Build  
Services for Construction Package 2-3**

**Book I, Part C - Scope of Work**

**RFP No.: 13-57 – Addendum No. 2 - 06/30/2014**

<b>Revision No.</b>	<b>Date</b>	<b>Description</b>
0	04/02/2014	Initial Release
1	06/10/2014	Addendum No. 1
2	06/30/2014	Addendum No. 2



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## Part C - Scope of Work

This Scope of Work covers the technical aspects of the Project. Other requirements are delineated elsewhere in the Contract Documents. Contractor shall refer to the General Provisions for a list of general terms, acronyms and definitions.

### 1.0 California High-Speed Rail Project Standards and Manuals

Technical documents are provided to the Contractor for direction and assistance during the Project's final design and construction, including but not limited to the following documents.

- a. Design Criteria Manual – Mandatory design criteria requirements the Contractor shall follow and apply in the development of final design and construction documents, inclusive of any updates that may be issued via RFP addendum. (Book III, Part A)
- b. Directive Drawings – Directive Drawings provide mandatory design criteria in a graphical format the Contractor shall follow and apply to ensure consistency during design for system-wide elements and features, inclusive of any updates that may be issued via RFP addendum. (Book III, Part A)
- c. CADD Manual – Mandatory drawing standards and format that the Contractor shall follow and apply in the preparation of design, construction and as-built drawings. (Book IV, Part F.1)
- d. Plans Preparation Manual – Mandatory plans format that the Contractor shall follow and apply in the preparation of design and construction submittals and as-built drawings. (Book IV, Part F.2)
- e. Aesthetics Manual for Non-Station Structures – Mandatory aesthetic principles that the Contractor shall follow and apply to the design of non-station structures. (Book IV, Part C.5)
- f. Design Variance Request Procedure – Mandatory procedure that the Contractor shall follow and apply in the identification, preparation and submittal of Design Variance requests, as necessary to achieve approval. (Book IV, Part E.2)
- g. Design Variance Report – Detailed reports included in Book IV that includes Design Variances approved by the Authority that may be considered by the Contractor. (Book IV, Part G.1)
- h. Geotechnical Baseline Report for Bid (GBR-B) – Mandatory document(s) that the Contractor shall use as the basis of its Proposal. The GBR-B shall not be used for final design. The GBR-B is representative of the preliminary geotechnical investigations and interpretations performed to date by the Authority. The GBR-B covers Fresno and Tulare Counties. (Book IV, Part G.2)



- i. Ground Assumptions for Procurement (GAP) – Mandatory document that the Proposer shall use as the basis of its Proposal. The GAP shall not be used for final design and will describe preliminary geotechnical parameters for use by the Proposer in preparing its Price Proposal. The GAP covers Kings County. (Book IV, Part G.3)
- j. Preliminary Ground Motion Guidelines – Preliminary ground motion data that the Authority has prepared and Contractor shall use in seismic and structural design included in the Proposal. (Book IV, Part C.4)
- k. Cost and Scheduling Controls Program – Describes the schedules to be prepared by the Contractor and the software to be utilized to generate Project Schedules in CPM format (the “CPM schedule”) using Primavera P6, Version 8.2, or as otherwise specified by the Authority. (Book IV, Part D.1)
- l. Safety and Security Management Plan – Defines the process for identifying, evaluating and resolving safety hazards and security vulnerabilities associated with the Project prior to the start of revenue service and includes construction safety and security requirements. Requires the contractor to be responsible for safety and security certification activities during the final design and construction phases of the Project, compile and submit a Safety and Security Certification Package, update and expand a Certifiable Elements and Hazards log. (Book IV, Part D.5)
- m. Master Quality Plan – Defines the Contractor’s responsibilities for developing and implementing a Quality Management System. (Book IV, Part D.2)
- n. Mitigation Monitoring and Enforcement Plan (MMEP) – Defines the Contractor’s responsibilities for implementing or monitoring and reporting mitigation measures as specified in the MMEP. Contractor is responsible for overseeing Project mitigations and verifying that mitigation measures are properly carried out. (Book II, Part A.2)
- o. Reliability, Availability, and Maintainability Requirements – Defines the Contractor’s responsibility to design, build and document the Project to achieve the required reliability, availability, maintainability and accessibility of the Work. (Book IV, Part D.6)
- p. Verification, Validation and Self-Certification Procedures – Procedures to guide the Contractor in developing and implementing a verification and validation (V&V) process to confirm to the Authority that by examination and provision of objective evidence the technical contract requirements (verification) and the particular requirements for specific intended use (validation) have been fulfilled. (Book IV, Part E.1)
- q. Basis of Design Policy – Policy document prepared by the Authority that defines the major components and performance objective of the CHSR System, as defined in the Basis for Design Guidelines. Contractor shall use this document in the preparation of designs to ensure consistency with the components, objectives, processes, requirements and assumptions governed by Authority policy. (Book IV, Part C.3)



- r. Record of Survey and Control Monument Data – Survey control data that the Authority has completed to date and Contractor shall use in its topographic survey and mapping for its design. (Book IV, Part G.4)
- s. Primavera Settings – Contractor’s Schedule CP 2-3 – Establishes Primavera schedule settings required by the Contractor to establish common settings between the Master Project Schedule and the submission for integration by the Contractor.
- t. Construction Specifications Preparation Manual – Establishes mandatory standards that Contractor shall follow and apply to promote consistency in the preparation of Construction Specifications and as-built Construction Specifications throughout the California High-Speed Rail System. (Book IV, Part F.3)
- u. Standard Specifications – Technical specifications for use in Authority construction contracts which establish general as well as minimum requirements. The Standard Specifications are located in the Reference Materials.
- v. Standard Drawings – Standard project elements for use in the construction of the California High-Speed Rail System, as determined applicable by the Contractor. Standard Drawings are not considered mandatory for this project. However, if the Contractor chooses to use a Standard Drawing, the design as shown on that drawing shall be followed. The Standard Drawings are located in the Reference Materials.
- w. Environmental Compliance Manual – Requirements issued by the Authority and FRA and binding on the Contractor, which explain in greater detail what is required to comply with the Environmental Requirements, including without limitation, those associated with the Final Environmental Documents, the Governmental Approvals, and the Environmental Re-Examination Processes. (Book II, Part A.1)

## 2.0 Preliminary Engineering Documents

Preliminary Engineering Documents have been prepared to support environmental assessment and approval and demonstrate technical feasibility and constructability. To the extent Contractor makes use of the Preliminary Engineering Documents in any manner, Contractor shall review and validate that the documents meet the Design Criteria, Directive Drawings, local jurisdictional authorities’ design criteria, the Final Environmental Documents, Governmental Approvals, any subsequent or supplemental CEQA/NEPA documentation and/or Supplemental or Amended Governmental Approvals, and/or other requirements before advancing design to a baseline level (refer to the “Design Services” clause ([Section 4.2](#))).

The following Preliminary Engineering Documents are provided to the Contractor for reference:

- a. PE4E Design – Preliminary design prepared by the Authority with the intent of supporting state and federal environmental review and approval.
- b. PE4P Design – Proposed preliminary design prepared by the Authority with the intent of demonstrating technical feasibility and constructability:



- i. Existing Composite Utility Plans
- ii. Non-Standard and Complex Structures Plans
- c. Preliminary Technical Reports – Technical reports prepared by the Authority to document data collection efforts completed to date and document the basis of the design for the proposed preliminary design and environmental documents:
  - i. Floodplain Impacts Assessment
  - ii. Hydraulics and Hydrology Report
  - iii. Stormwater Management Report
  - iv. Geotechnical Data Report
  - v. Geologic and Seismic Hazards Report
  - vi. Utility Impacts Report
  - vii. Advance Planning Study
  - viii. Preliminary Right-of-Way Requirements Report
  - ix. PE4P Constructability Assessment Report
  - x. PE4E Design Baseline Report
  - xi. PE4P Structures Report

The above-identified Preliminary Technical Reports can be found in the Reference Materials. The Preliminary Engineering Documents are based on preliminary design efforts and investigations and are provided for reference, unless otherwise specified for specific elements in the Contract Documents.

- d. Electronic Files – Available electronic files used in the preparation of the preliminary design documents:
  - i. ALG Design Files
  - ii. Digital Terrain Model (DTM) Files
  - iii. Cross Sections
  - iv. Existing Utility Data
  - v. Topographic Mapping
  - vi. Photogrammetric Data
  - vii. PE4E Preliminary Design Plan DGNs
  - viii. PE4P Existing Utility Relocation Plans DGNs
  - ix. Non-Standard and Complex Structures Plans DGNs



### 3.0 Project Description and Limits

CP 2-3 is located within the counties of Fresno, Tulare and Kings and the cities of Hanford, Corcoran and Allensworth. It is composed of seven alignment subsections:

- Fresno (F1)
- Monmouth (M)
- Hanford East (H)
- Kaweah (K4)
- Corcoran Bypass (C2)
- Pixley (P)
- Allensworth Bypass (A1)

The recommended Preferred Alternative Routes and Stations are shown in Figure 1 and are subject to the Fresno-Bakersfield FEIR/FEIS and NOD/ROD.

CP 2-3 is bounded by East American Avenue to the North and one mile north of the Tulare-Kern County line to the South.

Major work elements include construction of at-grade, retained fill and aerial sections of high-speed rail, relocation of existing BNSF tracks for approximately 5.5 miles, crossings of existing BNSF railroad tracks, construction of waterway and wildlife crossings, utility relocations and roadway reconstructions, relocations and closures.

Refer to Attachment 1 (Limits and Extents of Work Table) and Attachment 2 (Limits of Work Map) for additional information. General Project limits, from north to south, are described below:

- F1: South of East American Avenue to North of East Lincoln Avenue
- M: North of East Lincoln Avenue to South of East Kamm Avenue
- H: South of East Kamm Avenue to South of Iona Avenue
- K4: South of Iona Avenue to North of Nevada Avenue
- C2: North of Nevada Avenue to North of Avenue 128
- P: North of Avenue 128 to South of Avenue 84
- A1: South of Avenue 84 to one mile North of the Tulare-Kern County Line

Description and major elements of each segment are described in the following sections.

#### 3.1 Alignment Subsection F1

This alignment subsection is immediately south of Construction Package 1 (HSR 13-06). It is approximately one mile in length and runs nominally at-grade adjacent to the west side of BNSF from south of East American Avenue to north of East Lincoln Avenue. It includes the future



CHSR Maintenance of Infrastructure facilities, which consist of the seven siding tracks, fenced storage area, work equipment area and warehouse necessary to maintain CHSR infrastructure.

Major construction elements to be constructed by the Contractor for this alignment subsection include civil works for at-grade track sections. Additional construction efforts will include site clearing, utility relocations, compliance with the applicable Environmental Requirements and any applicable agreements between the Authority and Third Parties.

### **3.2 Alignment Subsection M**

This alignment subsection is approximately eight miles in length and runs nominally at-grade adjacent to the west side of BNSF, from north of East Lincoln Avenue to south of East Kamm Avenue.

Major construction elements to be constructed by the Contractor include civil works for the at-grade track sections, seven grade separations at East Lincoln, East Adams, East South, East Manning, East Floral, East Nebraska and East Mountain View Avenues, realignment of local roads including South Chestnut Avenue, realignment of BNSF main and siding tracks between East Summer Avenue and East Huntsman Avenue and realignment of BNSF tracks between East Rose Avenue and East Kamm Avenue. Additional construction efforts will include site clearing, utility relocations, compliance with the applicable Environmental Requirements and any applicable agreements between the Authority and Third Parties.

### **3.3 Alignment Subsection H**

This alignment subsection is approximately 20 miles in length. It includes the future High-Speed Rail Kings/Tulare Regional Station and must accommodate the future four-track and five-track sections, which includes storage tracks immediately north and south of the station. The alignment runs parallel to the west side of the BNSF railroad for about one mile before diverging away to the east side of the BNSF railroad. From south of East Kamm Avenue to approximately South Willow Avenue, the alignment runs nominally at-grade. In the vicinity of South Willow Avenue, the alignment begins its transition from an at-grade section to a one-mile elevated section and crosses over BNSF railroad.

North of East Clarkson Avenue, the alignment begins its transition from an elevated section back to an at-grade section where it continues at-grade for approximately the next 5.1 miles, ending north of the SR 43. In the vicinity of SR 43, the alignment begins its transition from an at-grade configuration to approximately 2.2 miles of elevated section spanning over major facilities such as SR 43, Cole Slough, Dutch John Cut and Kings River before returning to grade north of South 8th Avenue. The alignment continues at-grade for about five miles before it begins to transition to a two-mile elevated section south of Fargo Avenue. The elevated section passes through the Kings/Tulare Regional Station and State Highway 198 before it transitions back to an approximately 2.3-mile at-grade section ending south of Iona Ave.

Major construction elements to be constructed by the Contractor for this alignment subsection include civil works for the at-grade and elevated track sections, 12 grade separations at South Clovis Avenue, East Elkhorn Avenue, South Fowler Avenue, East Davis Avenue, Dover



Avenue, Excelsior Avenue, Elder Avenue, Flint Avenue, Fargo Avenue, Hanford Armona Road, Houston Avenue and Iona Avenue, realignment of local roads including East Clarkson Avenue at South Minnewawa Avenue and 8<sup>th</sup> Avenue and realignment of BNSF siding tracks between East Conejo Avenue and South Peach Avenue. In addition, major structural elements include five non-standard structures at SR 43 Underpass, Cole Slough, Dutch John Cut, Kings River and Kings/Tulare Regional Station. The work will be subject to seasonal construction constraints.

Additional construction efforts will include site clearing, utility relocations, compliance with the applicable Environmental Requirements and any applicable agreements between the Authority and Third Parties.

### **3.4 Alignment Subsection K4**

This alignment subsection is approximately 10 miles in length. The alignment transitions from an at-grade section to an approximate 1.7-mile elevated section passing over Cross Creek and SR 43, before returning to grade and following the east side of SR 43 and BNSF railroad.

Major construction elements to be constructed by the Contractor for this subsection include civil works for the at-grade and elevated track sections, relocation of Kaweah Berm, steel truss structure at Cross Creek and five grade separations at Idaho, Jackson, SR43, Kent and Kansas Avenues. Additional construction efforts will include site clearing, utility relocations, compliance with the applicable Environmental Requirements and any applicable agreements between the Authority and Third Parties.

### **3.5 Alignment Subsection C2**

This alignment subsection is approximately nine miles in length. The alignment runs nominally at-grade from north of Nevada Avenue to SR 43. Approaching SR 43, the alignment begins to ascend into an elevated section for approximately 1.1 miles, passing over Poplar Avenue, SR 43 and BNSF railroad. As it approaches Avenue 136, the alignment transitions back to grade, running parallel on the west side of BNSF railroad through the end of the subsection.

Major construction elements to be constructed by the Contractor include civil works for the at-grade and elevated track sections, three grade separations at Nevada Avenue, Corcoran Highway and Whitley Avenue and realignment of local roads including Niles and 5 1/2 Avenues. Additional construction efforts will include site clearing, utility relocations, compliance with the applicable Environmental Requirements and any applicable agreements between the Authority and Third Parties.

### **3.6 Alignment Subsection P**

This alignment subsection is approximately seven miles in length and runs nominally at-grade following the west side of BNSF railroad from north of Avenue 128 to south of Avenue 84.

Major construction elements to be constructed by the Contractor for this subsection include civil works for the at-grade track sections, and four grade separations at Avenue 128, Hesse



Avenue, Avenue 112 and Avenue 88. Additional construction efforts will include site clearing, utility relocations, compliance with the applicable Environmental Requirements and any applicable agreements between the Authority and Third Parties.

### **3.7 Alignment Subsection A1**

This alignment subsection is approximately 10 miles in length. The alignment runs at-grade adjacent to the west side of the BNSF railroad to approximately Deer Creek. Approaching Deer Creek, the alignment transitions to an elevated section for approximately 1.2 miles, diverging away from BNSF railroad, it crosses over Deer Creek and Stoil Spur, before returning to grade for approximately 6.9 miles through to approximately one mile north of Tulare-Kern County line.

Major construction elements to be constructed by the Contractor include civil works for the at-grade and elevated track sections and one grade separation at County Road J22. Additional construction efforts will include site clearing, utility relocations, compliance with the applicable Environmental Requirements and any applicable agreements between the Authority and Third Parties.

### **3.8 Limits of Work for Enabling Facilities**

As described above, the Contractor's Scope of Work includes a number of grade separations and associated roadway reconstructions, railroad relocations and utility works owned by Third Party Entities. These include, but are not limited to, California Department of Transportation (Caltrans), County of Fresno, Kings County, City of Hanford, City of Corcoran, City of Allensworth, Tulare County, San Joaquin Valley Railroad (SJVRR), Burlington Northern Santa Fe (BNSF) Railway, irrigation districts, utility companies, Central Valley Regional Water Quality Control Board, State Water Resources Control Board, United States Army Corps of Engineers, flood control districts and other permitting agencies.

The Contractor shall be responsible for coordinating and confirming the limits of work described above to ensure conformance with the Final Environmental Documents, Governmental Approvals, subsequent or supplemental CEQA/NEPA documentation, Supplemental or Amended Governmental Approvals, Environmental Footprint, Environmental Constrained Footprint, local jurisdictional entity requirements, Third Party Agreements, direct coordination with the impacted third parties and other works required to support future CHSR elements through Interface Coordination and Design Integration Workshops with the Authority as described in the "Integration Coordination and Design Integration" clause (Section 55.0) of the General Provisions.

Based on preliminary engineering and Third Party coordination efforts achieved to date, the Contractor shall be aware of the following local conditions that have informed the preliminary design included in the Reference Materials. As delineated in this Scope of Work, Contractor shall be responsible for confirming these and all other design and location issues with the impacted Third Parties through the course of final design and construction. These include but are not limited to the following items:



- i. Maintenance and access provisions as required by the local irrigation, flood control districts and local agencies and other Third Parties whose facilities are adjacent to CHSR facilities;
- ii. Compliance with the most recent and adopted general and/or long-range plans for/by Caltrans and the cities and counties of Fresno, Tulare and Kings and the cities of Hanford, Corcoran and Allensworth; and
- iii. Compliance with local, state and federal regulations with regard to impacts to sensitive areas, such as campgrounds and schools.



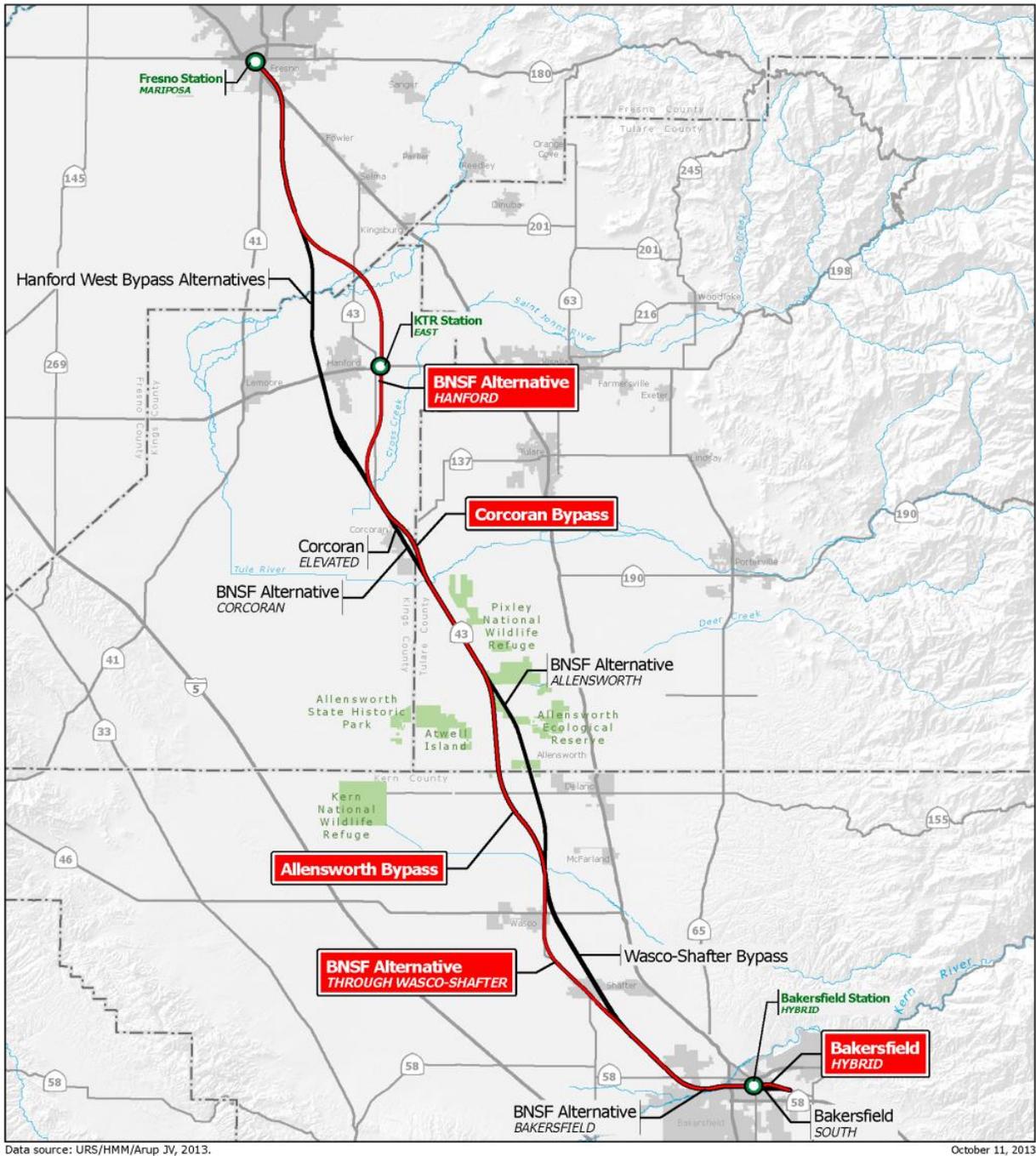


Figure 1: Preferred Alternative Routes and Stations



RFP No.: 13-57 – Addendum No. 2 - 06/30/2014

## 4.0 Project Scope of Work

### 4.1 General

Contractor's Work is defined as all services, labor, materials, equipment, facilities and other efforts to be provided and performed by the Contractor including the following general categories:

- a. Scheduling;
- b. Utility Investigation, Coordination, Protection and Relocation;
- c. Demolition and Clearing of ROW;
- d. Code Assessment;
- e. Completing, Coordinating, Securing Approval and Executing Final Permitting and Utility Agreements;
- f. Survey and Mapping;
- g. Subsurface Investigations;
- h. Geotechnical Engineering and Seismology;
- i. Land subsidence studies including data collection, assessment and implementation of post construction instrumentation and monitoring;
- j. Final Design;
- k. Estimating;
- l. Value Engineering;
- m. Environmental Requirements, as applicable within the limits of CP 2-3;
- n. Construction;
- o. Quality Control and Quality Assurance for Design and Construction;
- p. Community Relations;
- q. Quality Inspection and Testing;
- r. Construction Safety and Security Program;
- s. Preparation of CADD As-Builts, inclusive of Consolidated Service Drawings;
- t. Interface Coordination for In-Scope Works as well as future Works by Others;
- u. Coordination with Jurisdictional Authorities (governments, public and private entities such as utility companies, CPUC, FRA, Caltrans, etc.);
- v. Coordination with Adjacent Railroads (i.e., BNSF, SJVRR);
- w. Coordination with Local Communities; Coordination with Adjacent CHSR works; and



- x. Provision of other related services associated with the design and construction of the Project and necessary to ensure the Project's ultimate readiness for high-speed passenger rail operations.
- y. Coordination with all applicable Third Party agreements
- z. Verification, Validation and Self-Certification procedures

The exceptions to this list include those efforts that the Contract specifies will be performed by the Authority or other Persons.

Contractor shall provide design and construction for CHSR trackway and civil infrastructure, complete in place.

Contractor shall identify, design, install and maintain a temporary protective layer over the trackway subgrade to protect the subgrade from degradation through the warranty period. Degradation refers not only to erosion of fill/existing soils as a result of rainfall and wind, but also to potential damage caused by animal burrowing, vandalism and other environmental factors (such as flooding) not evident at the time of construction.

Contractor shall design and install structural embedments such as anchor bolts, embeds, grounding and bonding, foundations, additional reinforcing steel, etc., as needed, in structures, walls and subsurface infrastructure to accommodate future CHSR systems components not in the Project scope.

Contractor shall design and construct enabling works, such as grade separations and intrusion protection, complete in place. The enabling work shall be coordinated, designed and constructed in accordance with the local jurisdictional entity (i.e., cities of Corcoran and Hanford, counties of Fresno, Tulare and Kings, Caltrans, railroads, etc.) but shall not undermine the design standards for the CHSR alignment located above or below said facility.

The Scope of Work does not include construction of CHSR trackwork (i.e., ballasted and non-ballasted section); passenger stations; new building construction; ROW engineering, negotiations and acquisition; soundwalls; and systems work (i.e., OCS poles, foundations and wires; Traction Power Facilities; Automatic Train Control; etc.).

The Scope of Work excludes civil/site works for future CHSR systems facilities and ancillary sites, except access sites, which are in scope as described above (i.e., civil preparatory works are generally limited to the improvements required for the CHSR trackway).

Note that ROW engineering, negotiations and acquisition services are excluded from the Scope of Work. More definitive right-of-way availability and access information will be provided to the Contractor prior to NTP.

Contractor is further responsible for the following:

- a. Design and construction of the civil infrastructure elements as generally described above and identified in further detail in Attachment 3 (Scoping Typical Sections) and Attachment 4



(Scope Elements Matrix). The Work shall be performed and completed in accordance with the documents defined in Sections 1.0 and 2.0 of this Scope of Work, as well as agreements, design criteria, standards and permits by Third Parties for facilities within their jurisdictions. Contractor shall refer to the Project Work Elements (Section 5.0);

- b. Contractor's design and construction shall be completed such as to ensure the Project's ultimate readiness for high-speed rail passenger operations (Section 4.2.1.1);
- c. Accommodation of future CHSR elements and facilities to be designed and constructed by others that affect the civil infrastructure as identified in this Scope of Work and through the Interface Coordination and Design Integration Workshops, including but not limited to trackwork, traction power facilities, overhead contact system, automatic train controls facilities, communications, rolling stock, operations, maintenance access/emergency access/egress from trackway (ladders and stairs), future CHSR passenger stations and soundwalls;
- d. Preparation of design and construction submittals in accordance with this Scope of Work;
- e. Preparation of Construction Specifications in accordance with this Scope of Work; and
- f. Coordination with Third Parties, including but not limited to, local, regional, state and federal agencies, railroads, utility companies and other permitting and regulatory agencies.

## **4.2 Design Services**

### **4.2.1 Review of Design Criteria, Drawings, Reports and Specifications**

Contractor is responsible for review of the Design Criteria, Preliminary Engineering Documents, including Drawings and Reports, Standard Drawings, Directive Drawings and Standard Specifications, for completion of design and construction of the Project.

#### **4.2.1.1 Design Criteria**

Design Criteria has been prepared to direct the development of Contractor's final design, construction drawings and construction specifications for the Project. Contractor shall develop the alignment using the Design Criteria to achieve a desired design speed of 250 mph.

Contractor shall document the applicability assessment in the RVTM, including identification of each criterion that is determined by the Contractor to not be applicable to the Project. RVTM is described in more detail in VV&SC Procedures in Book IV, Part E1.

Contractor shall review the Design Criteria and determine applicability of each criterion. If a local jurisdiction's design criterion for its facilities or other work within its jurisdiction differs from the Design Criteria, the Contractor is responsible for resolving these differences and providing the local jurisdiction the necessary documentation to satisfy its criteria, while remaining in compliance with the Design Criteria in the Contract.

Contractor shall refer to the Design Criteria Manual and the Design Variance Request Procedure in Book III, Part A and IV, Part E.2, respectively for definition on and criteria thresholds and the Design Variance process, respectively. Design Variance Requests are



location-specific. Design Variance Requests are subject to Configuration Management and Change Control. Contractor shall not assume that additional Design Variance Requests, beyond those included in the preliminary Design Variance Report provided in Book IV, Part G.1, will be approved. Refer to Design Variances (Section 4.14).

#### **4.2.1.2 Preliminary Engineering Documents: Drawings and Reports**

The Preliminary Engineering Documents are at various design levels and are provided for Contractor's reference.

Contractor shall review the Preliminary Engineering Documents and Technical Reports and confirm technical feasibility and constructability consistent with any Environmental Requirements and the applicable Design Criteria and Directive Drawings as described in this Scope of Work.

Contractor shall substantiate the technical feasibility and constructability of the design in the Baseline Design Report. This report will serve as a baseline document for configuration management and will be subject to change control.

Contractor shall be responsible for the preparation of Construction Drawings and Reports.

#### **4.2.1.3 Construction Specifications**

Contractor shall be responsible for the preparation of Construction Specifications.

Standard Specifications were developed to support design and construction and are provided for Contractor's use in preparing its Construction Specifications. The Standard Specifications shall be understood to establish general as well as minimum requirements.

Contractor shall review Standard Specifications and determine applicability of each specification section to Contractor's final design and construction methods and determine what additional specifications are required. This review shall include the reference standards as referenced/included in the Standard Specifications. Contractor shall implement changes to the Standard Specifications as necessary to suit the specifications to the Contractor's design and construction methodology.

The registered professional engineers who prepare the Construction Specifications, in signing and sealing the Construction Specifications, shall be responsible for the Construction Specifications suitability to the design and construction and compliance with all Contract provisions. Their responsibility shall encompass the Standard Specifications provisions incorporated in the Construction Specifications.

Construction Specifications shall be prepared in accordance with the Construction Specifications Preparation Manual. Contractor's submittals of the Construction Specifications, including the RFC submittal, shall include tracked changes versions of Standard Specifications sections for the Authority's use to determine whether the minimum and general requirements found in the Standard Specifications are met. Additionally, the RFC submittal shall include a version with all changes accepted.



The Contractor shall require construction-phase submittals in its Construction Specifications sections similar to those listed in the Standard Specifications.

#### **4.3 Additional Data**

Contractor shall be responsible for obtaining additional data, including:

- a. Final identification, confirmation and potholing for existing utilities.
- b. Survey and topographic mapping for final design, including site surveys as required. Available photogrammetric data used for preliminary design is provided for Contractor's reference.
- c. Collecting additional geotechnical information to complete the Project; support the finalization of ground motions work and fault rupture data; and prepare technical reports, including the GBR-C, construction drawings and construction specifications. Contractor shall store, maintain and make available its acquired geotechnical core samples until final acceptance and close out of Contract.

#### **4.4 Design and Code Analysis**

Contractor shall review and analyze current design, industry and regulatory design and construction codes, including those referenced in the Governmental Approvals and Final Environmental Documents and Third Parties' requirements for applicability to its design and construction of the Project.

Contractor shall identify applicable design, industry and regulatory construction codes by resource from the Governmental Approvals, Final Environmental Documents and by affected Third Party Entities in a Design and Code Analysis Report, which shall be submitted to the Authority. Upon review, the Authority will issue one of the three dispositions as described in the VV&SC Procedures.

#### **4.5 Certification Program**

Contractor shall be responsible for safety and security certification activities during the Final Design and Construction phases of the Project. Contractor shall develop and submit a Safety and Security Certification Plan that describes in detail how Contractor will identify, mitigate, verify and validate and certify safety and security requirements. The Safety and Security Certification Plan requirements are described in detail in the Authority's Safety and Security Management Plan in the Contract Documents. Upon review, the Authority will issue one of the three dispositions as described in the VV&SC Procedures.

#### **4.6 Interface Coordination and Design Integration**

Contractor shall be responsible for coordinating the interfaces and performing design integration with adjacent contractors, Third Parties and the Authority, as specified in the "Interface Coordination and Design Integration" clause (Section 55.0) of the General Provisions.



#### **4.7 Verification and Validation and Self Certification**

Contractor shall develop and implement a V&V process to confirm to the Authority that by examination and provision of objective evidence the Technical Contract requirements and the particular requirements for specific intended use have been fulfilled. With every Contract submittal to the Authority, Contractor shall provide a V&V submittal self-certifying compliance with the Contract requirements and fitness for purpose.

Refer to Book IV for the VV&SC Procedures.

#### **4.8 Value Engineering**

Contractor shall initiate, conduct, complete and implement Value Engineering (also referred to as Value Analysis) upon approval of its Design Baseline Report. Upon review, the Authority will issue one of the three dispositions as described in the VV&SC Procedures. Value engineering shall comply with the methodologies and procedures adopted by Caltrans, including but not limited to Project Development Procedures Manual, Chapter 19 – Value Analysis, Value Analysis Report Guide and Value Analysis Team Guide and shall be performed in coordination with the Authority. Contractor shall refer to the value engineering process requirements specified in the General Provisions.

Further Contractor-initiated value engineering opportunities can be initiated, conducted and implemented through final design and construction efforts.

#### **4.9 Design Reports**

Contractor shall provide Design Reports to the Authority as specified in this Scope of Work, the Design Criteria and other mandatory documents included in the Contract Documents. Contractor shall include hard copies and an electronic file posted in accordance with the direction provided in the General Provisions.

Unless otherwise noted, for Design Reports, the Authority will issue one of the three dispositions as described in the VV&SC Procedures.

Contractor shall include in the baseline schedule each Design Report and Authority review period, including breakdown structure.

##### **4.9.1 Design Baseline Report**

The purpose of the Design Baseline Report is to demonstrate the Contractor's compliance with the requirements of the Contract and demonstrate the intent and boundaries to advance the Work through final design. The Contractor shall prepare a Design Baseline Report that defines the major design elements to be progressed to design and construction and confirms technical feasibility, constructability and compliance with the approved Final Environmental Documents including the following:



- a. Final Track Alignment and Limits of Construction Activities
- i. Plan and profile for the CHSR track alignment for the entire limits of the Project and location of all special trackwork. The limits of track alignment shall extend beyond Contractor's construction limits to the nearest point of tangency in plan and profile to ensure consistency, interface and integration requirements with future work and in full support of CHSR operations.
  - ii. Proposed design of the track bed shall not preclude the eventual design and installation of the ballasted or non-ballasted track sections listed in Table 1, unless local conditions or proposed changes warrant a more specific determination. All changes to proposed track sections are subject to the approval of the Authority.
  - iii. Typical sections for CHSR trackway for at-grade, grade separated structures and trenches, third party facilities, as well as facilities constructed by others that affect Contractor's design. Typical sections shall identify and address future traction power, overhead contact system, communications, train controls, operations and maintenance equipment. CHSR facilities by others shall be confirmed during the Interface Coordination and Design Integration Workshops. CHSR facilities by others shall be identified as "NIC" (Not in Contract) on the drawings.
  - iv. Embankment or alternative structure type may be provided subject to confirmation by the Authority of no change in ROW requirements for the Environmental Footprint or creation of additional environmental impacts. The costs of third party approvals and additional permitting requirements shall be the responsibility of the Contractor.
- b. Trackside access - Trackside access driving gates shall be provided at Authority facility locations. If this cannot be provided due to site constraints, an alternative method of providing vehicular access to the trackside from the Authority facility shall be submitted to the Authority for review and approval as part of this Design Baseline Report.
- c. Clearances at Structures and Restricted Locations – Proper clearances in conformance with Design Criteria at all grade separations and future CHSR facilities by others that affect the design, including substation locations, radio antenna sites, special trackwork, signal houses, access and egress and location of the system's undertrack ductbank and manholes.
- d. Structure Plans, Elevations and Typical Sections – For grade separated structures, viaducts, bridges, trenches, tunnels and retaining walls. Drawings shall include preliminary nominal dimensions of the structures subject to final design calculations.
- e. Railroads - For relocation of, or modification to, existing railroad trackways and other facilities per agreements with such entities.
- f. Utilities – Relocation of utilities within Authority's and state and local jurisdictions' right-of-way in accordance with applicable state and federal regulations.
- g. Geometric Approval Drawings – For relocation of, or modification to, state highway facilities and local roadways, as agreed with the affected third party agency.
- h. Stormwater Pollution and Protection Plan (SWPPP) and Best Management Practices (BMP).



- i. Consistency with Final Environmental Documents and Governmental Approvals – describing whether and to what extent the Baseline Design remains consistent with the Project described in the Governmental Approvals and Final Environmental Documents, including any environmental analysis provided therein.
- j. Aesthetic Design and Review for Non-Station Structures – Refer to Aesthetic Design and Review for Non-Station Structures Report requirements as delineated elsewhere in this Scope of Work.
- k. Future systems works – Contractor shall demonstrate provisions for future NIC systems elements such as traction power system (TPS), overhead contact system (OCS), communications, train control, operations and maintenance facilities and elements as specified in this Scope of Work. Contractor shall include within these demonstrated provisions a layout plan and sections, inclusive of foundations, to validate the future installation of these systems per the requirements established in the Design Criteria and as communicated to the Contractor during the Interface Coordination and Design Integration Workshops. The 30'-0" nominal distance for future OCS pole foundations on aerial structures shall also apply to proposed retained fill sections. Further coordination shall take place during the Interface Coordination and Design Integration Workshops;
- l. Other information that establishes the baseline for the Project.

Design variances and VECs that have not been approved shall not be included in the Design Baseline Report.

Contractor shall prepare a Design Baseline Report, submit for review, coordinate comment resolution and ensure approval of the Design Baseline Report by the Authority within 180 days of NTP. The Authority's review period for the Design Baseline Report is 20 working days.

Drawings shall include dimensions that demonstrate the intent and boundaries of the design to be advanced into final design. Design assumptions for elements identified as future CHSR facilities by others will be provided by the Authority for incorporation into the Design Baseline Report documents and reviewed with Contractor during the Interface Coordination and Design Integration Workshops.

Upon receipt of approval, the Design Baseline Report will be subject to the Authority's configuration management and change control process.

#### **4.9.2 Hydrology and Hydraulics Reports**

Contractor shall prepare Hydrology and Hydraulics Reports to support the drainage design of the full build-out of the CHSR trackway, as well as the temporary drainage system for the interim condition.

Contractor shall contact and coordinate with State and local jurisdictions to obtain necessary information for preparation of its reports.



### 4.9.3 Geotechnical Reports

The Contractor shall perform geotechnical investigations, perform analysis and interpret all geotechnical data to finalize its design and prepare a GBR-C. The GBR-C is a mandatory document and shall be submitted to and approved by the Authority prior to beginning of construction. The Contractor shall prepare the GBR-C based on information contained in the Geotechnical Data Report and additional soil borings and other data prepared by the Contractor. The Contractor may prepare and submit its GBR-C report(s) in a phased fashion. Along with the associated final design plans and specifications, the GBR-C shall serve as the basis for design and construction of the Project elements. Refer to the Design Criteria for additional information.

Upon approval, the GBR-C and associated final design plans and specifications shall serve as the basis for design and construction of the Project elements. The Contractor may prepare and submit its GBR-C report(s) in a phased fashion in accordance with the Contractor's design approach and construction means and methods. Authority's review period for the GBR-C is 20 working days.

Contractor shall also prepare a Geotechnical Data Report and Geotechnical Engineering Design Reports to support its design calculations and requirements for design and construction of the full build-out of trackway and trackwork, embankment, excavation, soundwalls, retaining walls, trenches, tunnel structures, grade separations, roadways and all other facilities constructed by the Contractor or to be constructed by others per the requirements of the Design Criteria as well as the requirements of State and local jurisdictions. These Geotechnical Reports shall include and address additional geotechnical explorations performed by the Contractor through its design and construction phases.

Contractor shall prepare and submit a Geotechnical Investigation Plan to the Authority prior to commencement of the field work, which shall be subject to VV&SC in accordance with the VV&SC Procedures. Upon review, the Authority will issue one of the three dispositions as described in the VV&SC Procedures. If Contractor proposes to use investigation methods and/or frequencies that differ from the guidelines set forth in the Design Criteria, a variance for the proposed alternate investigation plan(s) shall be submitted to the Authority for approval prior to commencement of the field work. Contractor's attention is further directed to [Section 4.14](#) concerning Design Variance Requests, as well as [Sections 4.3, 4.9.4](#) and [5.9](#) for related design efforts.

Contractor shall contact and coordinate with State and local jurisdictions to obtain all necessary information for preparation of its reports.

### 4.9.4 Land Subsidence Analysis

The Contractor shall develop and perform a desk study, field reconnaissance, survey and mapping and field studies in the vicinity of the proposed CHSR alignment and within the areas of known subsidence that could impact the proposed alignment and facilities.



The Contractor shall conduct geotechnical explorations, inclusive of borings, cone penetrometer tests, test pits, borehole instrumentation, piezometers and observation wells and geophysical testing such as acoustic emission surveys for predicting fissures as recommended by USGS, and other methods as necessary to fully understand the geotechnical and groundwater interaction within the Project area. The limits of the study area shall be no smaller than the area of known subsidence as bisected by the CHSR alignment.

Based on the collected data, the Contractor shall develop design parameters and perform numerical analyses to evaluate impacts of groundwater drawdown and land subsidence within the limits of the CHSR ROW. A full build out of CHSR facilities shall be assumed, including track structures, embankment, stations, traction power facilities, overhead contact system, poles and gantries, etc. The input data for both groundwater input and extraction shall be bound on both the upper and lower bound and shall be confirmed by an independent hydrogeologist familiar with land subsidence in the San Joaquin Valley. The hydrogeologist shall be licensed in the State of California and shall be the Contractor's subcontractor. Software program types, boundary conditions and geotechnical input data shall be found acceptable to the Authority. The analyses shall take into account the full design life of each proposed CHSR facility impacted by subsidence.

Results of the subsidence analyses and proposed design and implementation shall be approved by the Authority no later than the Baseline Design submittal. The Authority may request changes to the design or additional studies to be performed.

Upon completion of the subsidence design through Final Acceptance, Contractor shall develop and implement an instrumentation and monitoring program to record the occurrence and distribution of subsidence and to document impacts to CHSR tracks and facilities as a result of subsidence for future use by the Authority. The program shall consist of monitoring of fluctuation of groundwater level through observation, wells/piezometers and real time monitoring using Interferometric Synthetic Aperture Radar (InSAR) and Global Positioning System (GPS) as well as conventional surveying. Vertical extensometers shall be placed beneath the ground in the bottom of wells in areas along the CHSR alignment where geologic conditions (both past and future predictions) show the likelihood of land subsidence. Ground subsidence and structure movement shall be recorded and stored in a computer network. The system shall include analysis reporting with built in alarm module that is capable of sending emails and SMS text messages when sensor data exceeds user defined criteria for threshold values such as levels; green, blue, amber, red. The system shall be capable of functioning as a stand-alone system or capable of being integrated with other systems and/or networked products. The system shall be in operation and provide data to the Authority for a period of at least 15 years. Contractor is responsible for all costs for operation and maintenance for the duration of the Contract. Hand-over of a fully operational system to the Authority shall be completed prior to Final Acceptance.

All work identified in this Section 4.9.4 shall be submitted to the Authority for approval. Results of geotechnical investigation, geotechnical design analyses, numerical modeling, instrumentation and monitoring program shall be summarized and presented in the following deliverables:



- a. Geotechnical Investigation Data Report;
- b. Geotechnical Design Report; and
- c. Instrumentation and Monitoring Program/Data Report.

#### 4.9.5 Structures Reports

Contractor shall prepare Structures Reports providing the basis for the design of CHSR structures and structures not directly supporting CHSR track.

Contractor shall also prepare and submit a Type Selection Report for each CHSR structure and structure not directly supporting CHSR track but having the potential to affect CHSR track or service. The Type Selection Report(s) will be subject to Authority approval. Authority's review period for the Type Selection Report(s) is 20 working days. As part of the Type Selection Report(s), Contractor shall include the following reports:

- a. Type Selection Memo (Type Selection Memo shall be subject to approval as part of the Type Selection Report Submittal) – Any unique design features or future maintenance requirements should be covered within the memo.
- b. Major Reports (Major Reports, as listed below, shall be subject to approval as part of the Type Selection Report Submittal)
  - i. Seismic Analysis and Design Plan (Design Criteria, Section 11.3)
  - ii. Track-Structure Interaction Design and Analysis Plan (Design Criteria, Section 12.6.1)
  - iii. Complex and Non-Standard Aerial Structures Load Path Report (Design Criteria, Section 12.8.7)
- c. Supporting Reports (Contractor shall have secured Authority concurrence on the applicable sections of the Supporting Reports listed below prior to inclusion in the Type Selection Report Submittal):
  - i. Hydrology and Hydraulics Reports (Section 4.9.2)
  - ii. Geotechnical Reports (Section 4.9.3)
  - iii. Aesthetic Design and Review for Non-Station Structures Report (Section 4.9.6)

Structures Reports for structures not directly supporting CHSR track and not having the potential to affect CHSR track or service will be considered as standard Structures Reports. Upon review of these Structures Reports, the Authority will issue one of the three dispositions as described in the VV&SC Procedures (Book IV, Part E.1).

Structures Reports for other jurisdictional authorities such as Caltrans, cities, counties, and railroads shall comply with requirements of that jurisdiction. Contractor shall coordinate with these jurisdictional authorities and obtain their written approval prior to the design and construction of these structures. Contractor's attention is directed to Sections 4.10 (Preparing Construction Drawings and Construction Specifications for Third Party Facilities) and Section 4.12 (Third Party Design Submittals).



At the conclusion of the Authority's review period for the Type Selection Report, the Contractor shall schedule a Type Selection meeting with the Authority. The Type Selection meeting will provide a forum to discuss potential issues related to the Type Selection Report and to provide a consensus on the Contractor's design solutions.

#### 4.9.6 Aesthetic Design and Review for Non-Station Structures Report

As the Project takes form, a consistent system-wide image is expected through the introduction of common elements by the Contractor associated with selected bridges and overpasses. Curvilinear forms are to be adopted for the following reasons:

- a. Image: Recognizable, consistent bridge and overpass forms can contribute toward establishing an aesthetic image for the CHSR;
- b. Structural Precedents: Curvilinear forms such as arches and trusses have been successfully implemented for medium-span high-speed rail bridges internationally;
- c. Materials: Either concrete or steel would be appropriate materials. Designers have the latitude to propose materials, details, connections, abutments, etc.

Interfaces between major bridges, overpasses and adjacent aerial structures shall be carefully and systemically coordinated by the Contractor to ensure smooth and appropriate transitions in accordance with the aesthetic design guidance (Aesthetics Manual for Non-Station Structures), as well as any Environmental Requirements pertaining to aesthetics.

Contractor shall adhere to such aesthetic design guidance to implement aesthetic design and visual resource mitigations and enhancements to structures. The Aesthetic Design and Review for Non-Station Structures Report shall describe Contractor's approach to implementing these mandatory guidelines.

Structures and other elements included in CP 2-3 for aesthetic design and review preliminarily include (subject to confirmation by the Contractor in its coordination as required herein) CHSR aerial structures, CHSR bridges, roadway overpasses, retaining walls, local street lighting, access control fence and intrusion protection barrier. At a minimum, basic aesthetic improvements shall include, but not be limited to the following requirements:

- a. There shall be consistency and unity between the HSR bridges throughout the construction section.
- b. Box girder shapes shall have smooth soffits and angling or curved exterior girder sides that portray smooth and softened appearance, regardless of the selected method of construction.
- c. The profile of spans between the support columns shall have a positive, upward camber, or slight arching for long spans.
- d. Where structurally feasible, the number of structure elements, such as visually distinctive column caps, shall be minimized within the aerial structure. Where structurally necessary, these elements shall be integrated to achieve proper proportions and balance between the



- elements, including the aesthetic integration between single and multiple column bents used within a specific aerial structure or structures.
- e. Column profiles shall include aesthetic features such as flares or shapes that are coordinated with the box girder superstructure.
  - f. In urban areas, exposed wall surfaces and columns shall be finished with approved finishes that include cast-in-patterns and textures based on local preferences and/or historical characteristics.
  - g. Exposed pipes, ducts, cables, etc. shall not be permitted. Where these elements are required, they shall be concealed inside the structure, in recesses or with coordinated covers.
  - h. Aesthetic character should be an integral element of structural design, rendering surface finish treatments unnecessary. Finishes shall be applied only where structural material requires protection, i.e., steel structures.
  - i. Where steel is selected as the primary structural material, coating colors shall harmonize with adjacent structures and with the surrounding physical setting. Colors are aesthetic features and will be subject to final approval by the Authority.

#### **4.9.7 Certifiable Elements and Hazards Log**

Contractor shall update, expand and submit in-progress submittals of the Certifiable Elements and Hazards Log on a quarterly basis through the Design and Construction phases of the Project. Upon review, the Authority will issue one of the three dispositions as described in the VV&SC Procedures. Hazards associated with each certifiable element that can reasonably be expected to occur within the Contractor's Scope of Work shall be identified by the Contractor on the Certifiable Elements and Hazards Log as defined in the Authority's Safety and Security Management Plan.

#### **4.9.8 Safety and Security Certification Package**

Contractor shall compile and submit a Safety and Security Certification Package when all Certifiable Items Lists for a particular element or infrastructure component are completed for the applicable Quality Milestone payment. Upon review, the Authority will issue one of the three dispositions as described in the VV&SC Procedures. The Safety and Security Certification Package shall consist of a signed Certificate of Conformance for the Project element, all completed Certifiable Items Lists, a completed Certifiable Elements and Hazards Log (Refer to [Section 4.9.7](#)) and all supporting documentation such as hazard analysis, drawings and design element descriptions.

#### **4.9.9 Final Design Report**

Contractor shall prepare and submit a Final Design Report that includes all changes and revisions made to the Design Baseline Report. This report shall be supported by all variances and design exceptions including VECPs approved by the Authority or third parties that support



the changes to the Design Baseline Report. The Final Design Report shall represent a conformed configuration of the design. Upon review, the Authority will issue one of the three dispositions as described in the VV&SC Procedures.

#### **4.10 Preparing Construction Drawings and Construction Specifications for Third Party Facilities**

Contractor shall be responsible for preparation of the complete design, and certification that construction drawings, construction specifications, reports and calculations meet the requirements of the Authority and Third Parties.

The Project includes modification of facilities owned by Third Parties and construction in and around facilities owned by Third Parties.

The Contractor shall identify the design and construction requirements and codes of affected Third Parties, and document the requirements and codes in the Design and Code Analysis Report. The Contractor shall perform this assessment taking into account all executed agreements, draft agreements, or agreement language in process, as provided by the Authority. If a Third Party prepares the design for its facilities, Contractor shall be responsible for coordinating and reviewing such design to ensure conformance with Contractor's design and construction efforts per the Contract requirements.

#### **4.11 Design Submittals**

Contractor shall provide design submittals to the Authority as specified in this Scope of Work, the Design Criteria and other mandatory documents included in the Contract Documents.

Unless otherwise noted, for design submittals, the Authority will issue one of the three dispositions as described in the VV&SC Procedures.

Contractor shall include in the Baseline Schedule each design submittal and Authority review period, including breakdown by structure.

Contractor shall include hard copies and an electronic file posted in accordance with the direction provided in the General Provisions, Plans Preparation Manual and the CADD Manual.

At minimum, submittals shall identify the following:

- a. Location (CP 2-3);
- b. Preparer and date;
- c. Checker and date;
- d. Signature and seal of the Engineer of Record, in accordance with State regulation;
- e. Issue date and revision number; and
- f. Main point of contact, phone number and company contact details.
- g. Facilities Identification Number



Contractor shall provide the following submittals to the Authority:

1. Design Reports:

- Design Baseline Report (subject to Authority approval as noted in Section 4.9.1);
- Design and Code Analysis Report;
- Aesthetic Design and Review for Non-Station Structure Report (as part of Design Baseline Report);
- Value Engineering Report;
- Hydrology and Hydraulics Reports;
- Geotechnical Reports;
- Structures Reports including Type Selection Reports;
- Certifiable Elements and Hazards Log (quarterly, in-progress submittals);
- Final Design Report;
- Safety and Security Certification Package; and
- Other technical reports as delineated in the Design Criteria and this Scope of Work.

2. Construction Drawings:

- Nominal 60 percent design, all sheets represented;
- Nominal 90 percent design, all sheets included;

Civil and Structure Construction Drawings may be submitted in segments or by structure and shall include identification of future facilities by others for reference as determined in the Interface Coordination and Design Integration Workshops. These include facilities for traction power, overhead contact system, communications, train controls, location of special trackwork and CHSR facilities by others, and shall be identified as NIC.

3. Construction Specifications:

- Nominal 60 percent: an outline of Construction Specifications shall be submitted.
- Nominal 90 percent: all applicable Construction Specifications shall be submitted. Construction Specifications Submittal tracked changes versions shall be in Microsoft Word format. All other electronic design files shall be in PDF format.

4. RFC Submittals (subject to Authority approval as noted in Section 4.13);

- Electronic Submittal Files (certified as representing the designs in the Construction Packages). Drawing Submittals shall be in accordance with the CADD Manual and Plans Preparation Manual. Construction Specifications Submittal tracked changes versions shall be in Microsoft Word format. All other electronic design files shall be in PDF format.
- Engineering Calculations (certified as representing the designs in the Construction Packages).



5. Survey Reports (signed and sealed) as defined in the Design Criteria and Standard Specifications.
6. Technical Contract Submittal List identifying Technical Contract Submittal requirements per the Contract Documents. Contractor shall submit the Technical Contract Submittal List to the Authority for SONO within 30 days following issuance of NTP. Contractor shall submit an updated Technical Contract Submittal List to the Authority for SONO with the nominal 90 percent Construction Specifications and RFC Construction Specifications. An updated list shall include Construction-Phase Submittals that are proposed for SONO or approval.

#### **4.12 Third Party Design Submittals**

Contractor shall provide Third Party submittals to the respective Third Party and a copy to the Authority unless otherwise noted. Contractor shall be responsible for determining and providing submittal quantities required by Third Parties.

Submittals shall identify the following information:

- a. Location (CP 2-3);
- b. Preparer and date;
- c. Checker and date;
- d. Signature and seal of the Engineer of Record, in accordance with State regulation;
- e. Issue date and revision number; and
- f. Main point of contact, phone number and company contact details.

Contractor shall include in the baseline schedule each Third Party submittal and review period. Contractor shall apply VV&SC as described in the VV&SC Procedures. Upon review, the Authority will issue one of the three dispositions as described in the VV&SC Procedures.

Upon Third Party approval of Third Party Submittals, Contractor shall forward a copy of the approval to the Authority for information.

#### **4.13 Ready for Construction (RFC) Submittals**

Contractor shall provide Ready for Construction Submittals to the Authority and receive the Authority's approval prior to constructing any portion of the Project. Authority's review period for RFC submittals is twenty working days. Contractor's attention is directed to the "Prerequisites for Start of Construction" clause (Section 3.2) and the "Effect of Oversight, Reviews, Tests, Acceptances and Approvals" clause (Section 61.2) of the General Provisions.

Submittals shall include hard copies and an electronic file posted in accordance with the direction provided in the General Provisions and the CADD Manual.

Submittals shall identify the following information:



- a. Location (CP 2-3);
- b. Preparer and date;
- c. Checker and date;
- d. Signature and seal of the Engineer of Record, in accordance with State regulation;
- e. Issue date and revision number; and
- f. Main point of contact, phone number and company contact details.

Contractor shall provide the following submittals to the Authority:

1. Construction Drawings;
2. Construction Specifications;
3. Engineering Calculations (certified as representing the designs in the Construction Package);
4. Electronic Submittal Files;
5. Testing and Acceptance Plans;
6. Safety and Security Certification Package;
7. Construction Phase Submittal List identifying all construction phase submittal requirements per the Contract Documents.

Contractor shall include in its Baseline Schedule each submittal, including breakdown by section or structure.

#### **4.13.1 Ready for Construction Submittals Prior to Final Design**

This section sets forth the requirements under which certain portions or elements of the Project may be packaged by the Contractor to initiate construction for certain discrete portions or elements of the Project prior to final design. These requirements shall apply to any Work that is performed by the Contractor prior to completing the overall final design. All such Work is performed at the sole risk of the Contractor.

The Contractor, as the designer and builder of the Project, is the party at risk and shall be responsible for design errors, inconsistencies, omissions and conflicts within the design that may cause the Work to be interrupted or changed during the course of construction.

The Contractor may at any time propose a procedure to initiate the start of construction prior to final design at Contractor's sole risk for selected structures or structural element(s) that are critical to the timely completion of the Project. This procedure shall be coordinated with and subject to Authority's concurrence.

If the final design documents for the Project require changes to the Work performed by the Contractor as described herein, the Contractor shall make such changes to the Work, including



removal and replacement if necessary, at its sole cost and expense and shall not be entitled to any extension of Completion Deadlines or adjustment in the Contract Price.

#### **4.14 Design Variances**

Design Variances may be included for specific conditions and locations based on preliminary engineering studies. No Design Variances have been approved by the Authority. Design Variances approved by the Authority will be identified in the Design Variance Report, which will be issued via an addendum to the RFP, when and if they are approved by the Authority. Final approval of any Design Variances included in the Design Variance Report will occur upon Contractor's Design Variance Request submittal(s) during final design, if still applicable.

Contractor shall review the Design Variance Report and determine if design modifications can be incorporated into the Design Baseline Report to achieve the Design Criteria and not require a Design Variance. Regardless of previous approvals during preliminary engineering studies, Contractor shall submit a request for each preliminary and/or new Design Variance needed to support design and construction. Contractor shall obtain final approval of Design Variances prior to incorporation of a Design Variance into the Project. Design Variance Requests are subject to the Authority's change control process. Authority's review period for the Design Variance Request is 20 working days.

Contractor shall not assume that additional Design Variance Requests will be approved beyond those included in the Design Variance Report or those additional Design Variances that may be submitted and approved by the Authority as part of an ATC.

Contractor shall refer to the Design Criteria and the Authority's Design Variance Procedures for definition on Design Variance process and criteria thresholds, respectively.

All Design Variances are subject to the provisions of Section 4.15.6.

#### **4.15 Construction Services**

Contractor shall provide construction services including but not limited to those described below.

##### **4.15.1 Safety and Security**

Contractor shall be responsible for all work-site safety and security activities. Contractor shall prepare and submit a Site-Specific Health and Safety Plan and Site-Specific Security Plan as described in the Authority's Safety and Security Management Plan. Upon review, the Authority will issue one of the three dispositions as described in the VV&SC Procedures.

##### **4.15.2 Hazardous Material Handling**

Contractor shall remove and dispose of all Hazardous Material in accordance with the General Provisions.



#### **4.15.3 Utility Work and Coordination with Utility Companies**

Contractor shall be responsible for utility work as delineated in the General and Special Provisions. Coordination with utility companies shall be conducted as described in the Design Criteria, agreements and other requirements specified in the Special and General Provisions.

#### **4.15.4 Construction-Phase Submittals**

Construction-phase submittals are defined as those submittals required under the Construction Specifications, such as shop drawings, product data, samples, installer qualification statements, manufacturer's instructions and source and field quality control submittals.

The Contractor shall identify all submittals required under its Construction Specifications in a list (Construction-Phase Submittals List) along with an indication of whether those submittals shall be submitted to the Authority for SONO or information. The list itself shall be submitted to the Authority for SONO.

Prior to any excavation work for trenches of five feet or more, the Contractor shall be required to submit its procedures and plans for temporary excavation support and protection for SONO. The submittal shall include a written procedure, along with detailed drawings of the proposed excavations and excavation support systems; design calculations and related documents prepared, signed and sealed by an independent civil or structural engineer currently registered in the State of California; and the certification for the professional engineer that prepared the drawings with a resume highlighting the required experience in design of shoring systems.

Contractor shall prepare construction-phase submittals, including shop drawings, in accordance with Standard Specifications, or portions thereof, as noted in this Scope of Work and in accordance with Contractor's Construction Specifications.

Construction-phase submittals shall be subject to self-certification. As part of the Contractor's self-certification, the Contractor's engineer as defined in Standard Specifications Section 02 01 00, Standard Specifications General Statements, shall confirm that the design intent is being met and that submittal is in compliance with the Contract requirements. Contractor shall comply with Attachment 5 (Procedures for Construction-Phase Submittals).

#### **4.15.5 As-Builts**

Contractor shall prepare and submit as-built drawings, signed and sealed, in accordance with CADD and Plans Preparation Manuals. Upon review, the Authority will issue one of the three dispositions as described in the VV&SC Procedures. As-built drawings shall fully reflect the final, completed, as-built condition, inclusive of works completed by others in support of the Project and verified by the Contractor. As-built plans shall include Consolidated Service Drawings that fully address utility services designed and constructed by the Contractor and/or others in support of the Project. The Contractor shall survey the installed utilities to verify the actual placement.



The Contractor shall prepare and submit as-built specifications, signed and sealed in accordance with the Construction Specifications Preparation Manual. Upon review, the Authority will issue one of the three dispositions as described in the VV&SC Procedures. As-built specifications shall fully reflect the final, completed, as-built condition, inclusive of works completed by others in support of the Project and verified by the Contractor. Contractor shall submit electronic files of As-Built Specifications (with tracked changes) and original marked up as-built specifications (hard copies).

Contractor shall prepare and submit as-built construction-phase submittals. As-built construction-phase submittals shall fully reflect the final, completed, as-built condition. Changes from such submittals shall be documented in accordance with the processes required for construction-phase submittals, including VV&SC.

#### **4.15.6 Environmental Requirements**

As set forth in and subject to the “Final Environmental Documents and Governmental Approvals” clause (Section 7.7) of the General Provisions, Contractor shall be responsible for complying with and implementing the Environmental Requirements. Contractor is expected to review Environmental Requirements, verify against the Scope of Work, and submit a list of all mitigation related measures and features as part of the Environmental Compliance Plan to allow the Authority to verify completeness and concurrence with the list.

### **5.0 Project Work Elements**

The following is a summary of major work elements of the Project. For a more comprehensive list of Work Elements refer to Attachment 3 (Scoping Typical Sections) and Attachment 4 (Scope Elements Matrix) of this Scope of Work.

#### **5.1 Demolition, Clearing and Grubbing of the Construction Site**

The Contractor shall remove all existing structures and other improvements within the limits of the ROW, and the Contractor shall clear and grub the Site, inclusive of Third Party facilities and the relocation of waterways and utilities. If a structure is partly within the limits of the ROW and partly outside of the limits of the ROW, the Contractor shall remove the entire structure and its foundation. Contractor shall prepare and submit a demolition plan to the Authority prior to its demolition activities, which shall be subject to VV&SC as described in the VV&SC Procedures. The Authority will issue one of the three dispositions as described in the VV&SC Procedures. For recycling requirements, refer to the “Sustainability” clause (Section 44) of the General Provisions.

Removal, relocation and/or purchase of existing billboards, inclusive of supporting structures (i.e. poles), will be completed by others through the ROW Appraisal/Acquisition process (not-in-scope for Contractor). Contractor shall remove any remaining billboard foundations.

#### **5.2 Railroad Relocation and Reconstruction**

The railroad relocation Work, including design and construction, with the exceptions as noted will be performed by railroad forces. The Contractor shall design the track bed, including the



sub-ballast, tracks, signaling, siding relocations and other ancillary Work such as drainage systems to accommodate the Project per the requirements of the Contract.

The Contractor shall construct the track bed, including the sub-ballast, siding relocations and other ancillary Work such as drainage systems to accommodate the Project per the requirements of the Contract. The Contractor shall be responsible for the demolition of the existing railroad, excluding removal of existing at-grade crossings (removal of warning devices, obliteration of the crossing between the rails), once new mainline construction is complete and handed over to BNSF. The Contractor shall coordinate with the railroads directly to ensure the Contractor's Work and schedule does not impact the railroad operations. The Contractor shall comply with railroad requirements when working within or adjacent to railroad ROW.

The Contractor shall coordinate a mutually acceptable construction schedule for elements of Work to be constructed by BNSF forces and request BNSF construction forces at least 12 months prior to the state of the Work required by railroad forces.

The Contractor shall assume that BNSF will only mobilize construction forces once for all of the Work, including all mainline and siding Work. The Contractor shall further assume that BNSF track and signal construction duration to be 12 months, from the day BNSF forces mobilize on site.

The Contractor shall remove sidings no longer required as a result of the Work. When relocating sidings owned by BNSF, the Contractor shall allow for BNSF to install the switch to the clearance point.

Approximate limits of the railroad relocation and reconstruction are:

- a. Realignment of Mainline and Sidings – Sta M 710+00 to Sta M 872+00
- b. Realignment of Mainline and Relocated Spur – Sta M 935+00 to Sta M 1062+00
- c. Relocated Sidings – Sta H 1135+00 to Sta H 1157+00
- d. Removal of Siding – Sta P 3244+00 to Sta P 3282+00

### **5.3 Roadway Construction**

Work within or affecting the State Highway System (SHS) or within the SHS ROW shall be coordinated with and performed per Caltrans requirements.

Work within or affecting local jurisdictions shall be coordinated with and performed per the requirements of the jurisdictional authorities.

Contractor shall employ the design speeds established by the Counties and Caltrans, as applicable.

Contractor shall design, construct and maintain temporary access roads for its needs and those that may be required by local jurisdictions and emergency response authorities. Contractor



shall also design, construct and maintain permanent CHSR access roads required by the Project per the requirements of the Design Criteria and Directive Drawings. Contractor shall coordinate with the Authority Representative and local jurisdictions for the location of permanent access roads. Permanent access roads are required as indicated in the Design Criteria and shall coincide with the location of future CHSR wayside systems/operations facilities as shown on the Preliminary Engineering Documents. Additional permanent access roads may be required by emergency response authorities. Contractor shall coordinate the design of access roads through Interface Coordination and Design Integration Workshops with the Authority.

Lighting and landscaping of roadway facilities that are within Caltrans and other jurisdictional authorities shall be coordinated with and performed per the requirements of the jurisdictional authorities. Contractor shall refer to the MMEP in the Final Environmental Documents for additional landscaping requirements.

#### **5.4 Trackway**

Final horizontal and vertical alignments for the trackway shall be designed by the Contractor for the entire Project limits, including location of all special trackwork. The limits of track alignment shall extend beyond the Contractor's construction limits to the nearest point of tangency in plan and profile to ensure consistency, interface and integration requirements with future work and in full support of ultimate CHSR operations.

The Contractor's design of the track bed shall not preclude the eventual design and installation of either a ballasted or non-ballasted track sections listed in Table 1 below, unless local conditions warrant a more specific determination.



**Table 1: Contract Track Forms Table**

Contract Track Forms Table								
Alignment Information				Track Support Type	Length		Track Form	
Subsection	Begin Station	Subsection	End Station		Feet	Miles	Track Form	Feet
F1	587+30.67	H	1086+00.00	At-Grade	49,551	9.38	Ballast	51,521
H	1086+00.00	H	1105+70.00	Retained Fill	1,970	0.37		
H	1105+70.00	H	1156+20.00	Viaduct	5,050	0.96	Slab	5,050
H	1156+20.00	H	1173+50.00	Retained Fill	1,730	0.33	Ballast	30,738
H	1173+50.00	H	1439+19.00	At-Grade	26,569	5.03		
H	1439+19.00	H	1463+58.00	Retained Fill	2,439	0.46		
H	1463+58.00	H	1596+56.00	Viaduct	13,298	2.52	Slab	13,298
H	1596+56.00	H	1622+50.00	Retained Fill	2,594	0.49	Ballast	30,701
H	1622+50.00	H	1885+40.00	At-Grade	26,290	4.98		
H	1885+40.00	H	1903+57.00	Retained Fill	1,817	0.34		
H	1903+57.00	H	2008+37.00	Viaduct	10,480	1.98	Slab	10,480
H	2008+37.00	H	2023+48.00	Retained Fill	1,511	0.29	Ballast	50,811
H	2023+48.00	K4	2240+32.00	At-Grade	28,651	5.43		
K4	2240+32.00	K4	2246+06.00	Bridge	574	0.11		
K4	2246+06.00	K4	2436+00.00	At-Grade	18,994	3.60		
K4	2436+00.00	K4	2446+81.00	Retained Fill	1,081	0.20		
K4	2446+81.00	K4	2538+71.00	Viaduct	9,190	1.74	Slab	9,190
K4	2538+71.00	K4	2583+63.00	Retained Fill	4,492	0.85	Ballast	45,444
K4	2583+63.00	C2	2966+50.00	At-Grade	38,666	7.32		
C2	2966+50.00	C2	2989+36.00	Retained Fill	2,286	0.43		
C2	2989+36.00	C2	3046+02.00	Viaduct	5,666	1.07	Slab	5,666
C2	3046+02.00	C2	3064+70.00	Retained Fill	1,868	0.35	Ballast	49,898
C2	3064+70.00	A1	3982+20.00	At-Grade	45,725	8.66		
A1	3982+20.00	A1	4005+25.00	Retained Fill	2,305	0.44		
A1	4005+25.00	A1	4067+65.00	Viaduct	6,240	1.18	Slab	6,240
A1	4067+65.00	A1	4085+95.00	Retained Fill	1,830	0.35	Ballast	37,885
A1	4085+95.00	A1	4446+50.00	At-Grade	36,055	6.83		

If the Contractor proposes to revise the track form type set forth in Table 1, a revised table with the proposed track form configuration shall be submitted to the Authority for approval as part of the Design Baseline Report.

Specifically, at-grade sections and shorter aerial structures (less than 1,000 feet) shall be designed to accommodate ballasted track section. The Contractor shall account for the eventual design and construction of a non-ballasted track section for longer aerial structures (greater than 1,000 feet) and below-grade structure. Tracks adjacent to passenger platforms shall be designed for non-ballasted track.

The Contractor shall account for the long-term settlement criteria of the constructed trackway in the design and shall monitor the settlement of the constructed trackway to ensure conformity with the Design Criteria. The Contractor shall coordinate and implement track section



homogeneity as well as operations and maintenance considerations through Interface Coordination and Design Integration workshops with the Authority.

Trackway shall include cut and fill, temporary protective layer and surface and underground drainage, with the exception of the underdrain system along the track bed. The installation of underdrain system along the track bed will be performed by follow-on contractor(s).

## **5.5 Retaining Walls**

Contractor shall design and construct retaining walls necessary for the CHSR trackway, SHS and local roadways. Design and construction of retaining walls shall include the drainage system for the walls.

## **5.6 Concrete Barriers**

Intrusion protection barriers shall be located, designed and constructed by Contractor where required to protect the CHSR Operating Infrastructure from intrusion by automotive vehicles and/or railroad locomotives and cars per Design Criteria, railroad and Caltrans requirements. Contractor shall reference Proposed Preliminary Design plans for intrusion protection barrier preliminary locations between CHSR Operating Infrastructure and existing railroads, and confirm consistency with Design Criteria. Final locations of intrusion protection barriers between CHSR Operating Infrastructure and existing railroads will be based on preliminary risk assessment and hazard analysis prepared by the Authority.

At locations where the CHSR infrastructure will be located adjacent to an existing railroad and/or highway facility and an intrusion protection barrier is required, said barrier shall be located as close as possible to the ROW line that delineates the bounds between both entities. The intrusion protection barrier shall be designed and constructed to ensure maintenance and constructability from within the Authority's ROW.

Contractor shall design and construct intrusion protection barriers that are integral with the trench walls.

For concrete barriers on grade separated structures over CHSR trackway, Contractor shall design the barriers to accommodate future protective screen with solid plate.

## **5.7 CHSR Bridges/Aerial Structures**

Contractor shall design and construct grade separated structures such as bridges, aerial structures and grade separations that are required for the Project in accordance with Design Criteria.

Grade separated structures owned by Third Parties to be built as part of the Project shall be designed and constructed in conformity with the requirements of said Third Parties. In the event of conflicting requirements between the Design Criteria and other standards and codes of practice, the more stringent requirements shall take precedence. Grade separated structures that span high-speed rail trackways and have the capability to influence operability of high-speed trains in the event of failure, shall be designed per provisions in the Design Criteria.



Contractor shall design all the CHSR grade separated structures, including the parapet walls and connection method between the parapet and soundwall, to accommodate the future installation of soundwalls by follow-on contractors.

Contractor shall design and place abutments, columns, walls and slopes of the Primary Type 2 structures outside the CHSR access-controlled ROW. Access for inspection and maintenance of the Primary Type 2 structures shall be provided. The requirements for third party maintenance access for such structures shall be obtained from the third party having jurisdiction. In absence of any established requirements, a 10-foot-wide minimum maintenance access outside of the access-restriction fence shall be provided. The maintenance access shall be connected to a public roadway. Primary Type 2 structures shall be designed such that inspection and maintenance of the structures within the CHSR access-controlled ROW, e.g. superstructure of an overhead structure, may be performed during non-operating hours of the CHSR.

Contractor shall make an independent interpretation of the geotechnical information from previous site investigations, and shall carry out such additional geotechnical and subsurface investigations and surveys as are necessary to design and construct the grade separated structures or other elements of the Project, in conformity with the Contract requirements.

The Authority will review the seismic analysis and design to ensure the successful application of said criteria, as specified in the Design Criteria. This effort shall be coordinated through the Interface Coordination and Design Integration Workshops with the Authority. Contractor's attention is directed to [Section 4.9.4](#) for related submittal requirements.

## 5.8 Drainage

Contractor is responsible for the design to accommodate the full build-out of CHSR trackway and facilities. However, in lieu of constructing CHSR track bed underdrains (closed drainage system) and the drainage system inside the CHSR trench or tunnel sections, Contractor shall design and construct a temporary drainage system for CHSR track bed and trench or tunnel sections to accommodate the drainage of these facilities until the follow-on Contractor installs the final drainage system. The temporary drainage system shall not require reconstruction of any structural elements during follow-on contracts by others. Contractor shall design and construct all other permanent drainage systems, such as drainage laterals, to ensure the successful drainage of the Project in the interim and final conditions, complete in place.

Contractor is responsible for the design and construction of permanent drainage systems for Third Party facilities being impacted by the Project.

At locations where the CHSR will be located adjacent to an existing railroad and/or highway facility, a separate drainage system shall be designed and constructed to capture the runoff from each facility independently. The drainage system for each entity (Authority or Third Party) shall be located within its ROW. Contractor shall also reference intrusion protection barrier location requirements as noted elsewhere in this Scope of Work.

In addition to the requirements of the Construction General Permit, the Project is subject but not limited to FMFCD Ordinance 96-1, "Urban Storm Water Quality Management and Discharge



Control”. Compliance with Ordinance 96-1 requires that Contractor implement the measures included in the FMFCD's “Fresno-Clovis Storm Water Quality Management Program Construction Site Storm Water Quality Management Guidelines”.

#### **5.8.1.1 Reliability of the Drainage Subsystem**

Each pump station site shall be dimensioned to accommodate a redundant set of pumps and control equipment in the full build-out condition.

### **5.9 Utilities**

Contractor shall ensure that existing and planned future utilities are not in conflict with CHSR, State, and local improvements. Contractor shall relocate and/or protect the existing utilities in accordance with the requirements specified in the Special and General Provisions, Design Criteria and the requirements of utility owners and local jurisdictions. Contractor shall coordinate with local jurisdictions and the utility owners throughout the Project and shall design and construct the relocation of utilities in conflict with the Project, including future CHSR facilities to be designed and constructed by others (i.e., relocation of existing overhead utilities that will conflict with future design and installation of CHSR overhead contact system). Contractor is responsible for protection of utilities to remain in place during and after the performance of the Work.

Agreements executed to date between the Authority and utility owners are included in Book II, Part B. Contractor shall support the Authority for utility relocation agreements that may need to be finalized and/or executed for the Project.

Contractor is responsible for providing temporary utilities required for the performance of its work.

### **5.10 Grounding and Bonding**

Contractor is responsible for design, installation and testing, which include providing the testing procedures for acceptance of all grounding and bonding for the facilities it is constructing, and shall install provisions for grounding and bonding of facilities constructed by third party or future contractors, per the requirements of Attachment 3 (Scoping Typical Sections), Attachment 4 (Scope Elements Matrix), Design Criteria and Directive Drawings.

### **5.11 Access Control**

Contractor shall design, construct and maintain permanent access control including fences, gates, walls and doorways.

### **5.12 Low Voltage Systems, Underground and Undertrack Ductbank and Manholes**

Contractor shall refer to and coordinate between Design Criteria, Preliminary Engineering Documents and Directive Drawings to locate, design and install underground and undertrack ductbanks and supporting manholes for future CHSR Systems facilities along the Authority ROW, as delineated in Attachment 4 (Scope Elements Matrix) and shown on the Preliminary



Engineering Documents. Final locations and designs for the underground and undertrack conduit ductbanks shall be coordinated with the Contractor at the Interface Coordination and Design Integration Workshops with the Authority.

### **5.13 25kV Traction Power Underground Ductbank and Manholes**

Contractor shall refer to and coordinate between the Design Criteria, Preliminary Engineering Documents and Directive Drawings to locate, design and install underground ductbanks and supporting manholes for future CHSR Traction Power Facilities that are located away from the Authority ROW (e.g., when the relocated Golden State Boulevard separates the Authority ROW from a future Traction Power facility site). Final locations and designs for the underground conduit ductbanks will be coordinated with the Contractor through the Interface Coordination and Design Integration Workshops with the Authority.

### **5.14 Temporary Lighting and Pumps**

Contractor shall be responsible for design and installation of temporary lighting and pump facilities for the Project. Contractor shall leave the temporary lighting and pump facilities for trenches and tunnels in place after completion of the Contract.

### **5.15 Durability**

Contractor shall prepare Design and Construction Specifications to meet the Design Life and Durability goals of various elements of the Project as stated in the Design Criteria. Contractor shall submit documentation indicating how Design and Construction Specifications meet the requirements of the Design Criteria to the Authority Representative for concurrence. Upon review, the Authority will issue one of the three dispositions described in the VV&SC Requirements. The documentation shall include analysis, engineering data or research and test reports, as applicable.

The documentation shall cite which Design and Construction Specifications requirements and which design details address specific Design Life and Durability issues. The documentation shall explain Design and Construction Specifications provisions that address Design Life and Durability issues for typical elements in specific locations and environments. The documentation shall demonstrate compliance with applicable industry standards and guidelines.

