STATE OF CALIFORNIA

DEPARTMENT OF TRANSPORTATION

REQUEST FOR PROPOSALS

FOR DESIGN AND CONSTRUCTION ON STATE HIGHWAY IN

LOS ANGELES COUNTY IN THE CITY OF BALDWIN PARK AT ROUTE 10/605 INTERCHANGE

CONTRACT NO. 07-245404

PROJECT ID 0700000431

07-LA-10-PM 31.1/32.3
07-LA-605-PM R20.2/20.6

Federal Aid Project

NHI-X037(154)N

Addendum No. 2 Issued September 26, 2011

The Department issues this Addendum No. 2 to inform Proposers of the following changes and corrections to the RFP.

BOOK 2 PROJECT REQUIREMENTS

The Book 2, Project Requirements, is modified as indicated by the deletions and additions set forth below.

Section 1.3.3 – "General Description" is modified as indicated.

1.3.3 General Description

The Design-Builder shall not rely on the physical description contained in this Section 1 to identify all Project components. The Design-Builder shall determine the full scope of the Project through thorough examination of the RFP and the Project Site, or as may be reasonably inferred from such examination.

The Project generally consists of the interchange connector bridge, concrete paving, storm drain, sanitary sewer, water lines, oil/fuel lines and wells, minor grading, curb and gutter, concrete barrier, signals, lighting, and signage. Additional major responsibilities will be environmental management, public relations, and utility coordination, among other things. The Design-Builder will need to get a City permit to perform work on city streets including a sewer permit, if sewer work is necessary.

The Project will include:

- Construct a 12~~-~~-foot lane bridge structure with 5~~-~~-~~feet~~ foot left shoulder and ~~10~~ 10-~~feet~~ foot right shoulder, branching off the southbound I-605 to westbound I-10 directional connector, going over I-605 and I-10 freeways, and joining back into eastbound I-10.
- Construct retaining walls along the southbound I-605 right of way, and at the beginning and end of the bridge abutments.
- Remove and reconstruct a portion of the existing ~~soundwall~~ safety barrier and pile foundations in conflict with the proposed bridge column/footing locations.
- Remove portions of the existing soundwall that conflict with the project work~~-~~ ~~and~~ where the connector roadway merges with I-10 eastbound main line traffic and reconstruct soundwall from the end bridge abutment to the existing soundwall along Dalewood Street~~joins the freeway along eastbound I-10 traffic~~.
- Re-stripe the joint segment of the westbound I-10 to southbound I-605 connector.
- Remove the southbound I-605 to eastbound I-10 connector.
- Landscape the disturbed area after the removal of the existing southbound I-605 to eastbound I-10 connector.
- Reconstruct southbound I-605 to westbound I-10 connector.
- Reconstruct Dalewood Street for approximately 1300 feet.
- Environmental compliance and mitigation
- Replacement, relocation, and new construction of water lines and sanitary sewers
- Drainage systems, including stormwater treatment systems

- Signing, striping, and lighting
- Business development and public information activities
- Erosion control including slope stabilization and stormwater pollution prevention.

This project requires right of way acquisition along Dalewood Street.

Section 8.3.4 – “Geotechnical Reports” is modified as indicated.

8.3.4 Geotechnical Reports

Prepare Geotechnical Design Reports (GDRs) and Foundation Reports (FRs). Prepare separate Foundation Reports for each bridge when replacement, retrofit, or modifications to existing bridges are to be constructed.

Submit Geotechnical Design Reports, Foundation Reports, addenda, and revisions under requirements in Section 8.5. Sign and seal the reports by the Geotechnical Engineer who performed the work on the reports, who must be a licensed Geotechnical Engineer in the State of California.

Reports shall include the following geotechnical analysis and design topics, at a minimum:

- Evaluate and interpret geotechnical subsurface information
- Derive engineering properties of subsurface materials for geotechnical analysis and design
- Evaluate geological and seismic hazards, including fault rupture hazards and design ground motion
- Evaluate seismic effects on the Project elements from soil liquefaction potential. Soil liquefaction potential for structures shall extend at least 10 feet below the bottom of the lowest potentially liquefiable soil layer
- Evaluate potential effects on the Project elements associated with soil liquefaction, including loss of soil strength and stiffness, ground motion modifications, ground deformation, lateral spreading, slope instability, overall or global stability of foundations, loss of foundation capacity, imposed downdrag on deep foundations, and resulting foundation settlement, kinematic lateral loads on foundations due to soil movements, and seismically induced lateral earth pressure on earth retaining structures. Provide design recommendations, including remedial measures. The Design-Builder shall meet the requirements of AASHTO *LRFD Bridge Design Specifications, 5th Edition, Section 10.5.4.2.*
    - For roadways, liquefaction shall be evaluated to a depth of at least:
        - 50 feet below the existing ground surface
        - 50 feet below the bottom of the roadway subgrade
        - 2H feet below the bottom of embankments and earth structures or cuts of height H (feet).
    - Liquefaction for roadway structure elements including retaining walls, shall be evaluated to a depth of at least:
        - 50 feet below existing ground surface
        - 4B feet below the bottom of shallow foundations of width or diameter B (feet)

        - 4B feet below the tip elevation of individual deep foundations of width or diameter B (feet)
        - 2B feet below the bottom of pile groups of width or diameter B (feet)
    - The Design-Builder shall use the depths above as required that result in the deepest evaluation of liquefaction for the area being investigated.
- Perform static and pseudo-static slope stability analysis, and provide design and construction recommendations. Perform deformation analyses where factor of safety for pseudo-static analyses is less than the value specified in the Standards.
- Perform a fault rupture study, if appropriate.
- Provide earthquake ground motion parameters
- Provide characterizations of foundation stiffness
- Evaluate potential settlements due to applied loads, and provide mitigation measures.
- Evaluate potential for ground heave or lateral movement, if applicable, and provide mitigation measures.
- Perform bearing capacity analyses for proposed structures and embankment fills.
- Analyze axial and lateral capacities of bridge foundations.
- Evaluate lateral stability of bridge abutments and earth retaining structures for both static and dynamic loads. The evaluation must also include future stability of bridge abutments and earth retaining structures if the immediate site conditions are changed due to work on a Utility that is in place at the time of Final Acceptance.
- Establish construction requirements for cut slopes, excavations, dewatering, foundations for roadway embankments and structures, including bridges, retaining walls, drainage structures and protection of dike, Utilities and other structures.
- Provide soil corrosivity recommendations.
- Determine subgrade characteristics, California R-Values for pavement design, and corrective measures to meet design criteria.
- Provide recommendations for shoring and false work foundations during construction.
- Provide recommendation for construction observation and testing.

The Design-Builder shall submit applicable analysis and design calculations with each report as appendices for review. The person who performed the calculation must sign each calculation package.

The Department will notify the Design-Builder receipt of each Geotechnical report. The construction of subject structure, slope, or embankment, must not be started until the Design-Builder receives a notice of Released for Construction. If such work is performed before such notice is provided, it must be at the sole risk of the Design-Builder.

Section 13.2.1 – "Structure Design and Plans" is modified as indicated.

13.2.1 Structure Design and Plans

Structure Plans shall be prepared in accordance with, but by no means limited to, the latest editions of manuals and documents listed below.

Use the most current version of each listed standard and required software as of the Request For Proposals (RFP) issue date unless specified here or modified by Addendum or Change Order.

Section 13.2.1.1 – "All Structures and Structural Appurtenances and Retaining Walls" is modified as indicated.

13.2.1.1 All Structures and Structural Appurtenances and Retaining Walls

Structures Standards and Requirements

Priority	Agency	Title
1	Department	Seismic Design Criteria
2	AASHTO	LRFD Bridge Design Specifications, 4th Edition with California Amendments to AASHTO LRFD Bridge Design Specifications 4th Edition
3	AASHTO	LRFD Bridge Design Specifications – 5th Edition, only for Section 10.5.4
4	Department	Bridge Design Specifications (LRFD Version, April 2000)
5	Department	Bridge Memo to Designers (MTD)
6	Department	Bridge Design Aids
7	Department	Bridge Design Details
8	Department	Bridge Design Practice, as appropriate
9	Department	Bridge Standard Detail Sheets (XS Sheets)
10	Department	Structural Detailing Standards
11	AASHTO	Guide Specifications for Seismic Isolation Design, 2nd Edition with 2000 Interim Revisions.
12	AASHTO	Guide Specifications for Design and Construction of Segmental Concrete Bridges
13	CEB-FIB	Model Code for Concrete Structures, Appendix E: Time Dependent Behavior of Concrete, Creep and Shrinkage
14	Department	Standard Special Provisions
15	Department	2006 Standard Plans, May 2006
16	Department	Design-Build Modifications to the Standard Specifications for Construction
17	Department	2006 Standard Specifications, May 2006
18	Department	Bridge Deck Construction Manual

19	Department	Falsework Manual
20	Department	Foundation Manual
21	Department	Office of Special Funded Projects (OSFP) Information and Procedures Guide
22	Department	Prestress Manual
23	Department	Construction Manual
24	Department	Bridge Construction Record and Procedures Manual
25	Department	Trenching and Shoring Manual
26	Department	Outline of Field Construction Practices
27	Department	Plans Preparation Manual
~~28~~	~~USA~~	~~Surface Mining and Reclamation Act of 1975~~
~~29~~	~~California~~	~~Public Contract Code~~
~~30~~	~~Department~~	~~Bridge Inspection Report Information System (BIRIS)~~
28~~31~~	AASHTO	Manual for Bridge Evaluation, 2nd Edition
29~~32~~	Department	Highway Design Manual (HDM)
30~~3~~	Department	Plans Preparation Manual
~~34~~	~~DTSC~~	~~ADL Variances~~
31~~5~~	Department	Landscape and Structures Aesthetics Handbook
32~~6~~	Various	Technical Memoranda
~~37~~	~~USDOT~~	~~Record of Decision (ROD)~~
33~~8~~	Department	Final EIR/EIS for Project
		Sign and Lighting Structures
~~39~~	AASHTO	Standard Specifications for Structural Supports for Highway Signs, Luminaries and Traffic Signals, 5th Edition with Interim Revisions

Any non-standard structures designs, specifications, details, manuals, or documents other than those approved by the Department will require approval prior to being used for design or the preparation of structure plans. The Design-Builder is required to submit any non-standards designs, details, or documents to the Department for review and approval as soon as the need is identified.

Current Bridge Standard Details Sheets (XS-Sheets) and current 2006 Standard Plans including Revisions to Standard Plans (RSPs) shall be incorporated into the structure plans as applicable.

Section 13.2.2 – “Structure Design Submittals” is modified as indicated.

13.2.2 Structure Design Submittals

The following bridge submittals shall be provided to the Department for review on each bridge structure:

- Concept Design- Structure Type Selection (30%) Submittal
- Intermediate Design- Unchecked (65%) Structure Details Submittal
- Final Design- Checked (100%) Structure Details Submittal
- Released-for-Construction (RFC) Submittal
- Final As-Built Plans Submittal

Concept Design- Structure Type Selection (30 %) Submittal

The Design-Builder shall submit a Preliminary (30%) General Plan and Type Selection report for each structure requiring a type selection process to the Department for review and approval. Preliminary (30%) General Plan and Type Selection Report shall be prepared in accordance with preliminary data checklist provided in Caltrans *Bridge Design Aids and MTD 1-29*. The Type Selection Report shall include but is not limited to the following:

- Evaluation and location of deck drains for widened structures.
- Recommended maintenance work reflected in structure maintenance records.
- A quantitative seismic design evaluation of all new structures and retrofit evaluation of all existing structures to be widened, modified, or modifiedor replaced. For existing structures to be widened, t The Type Selection report shall include a summary of the seismic evaluation and potential retrofit strategies of the existing bridges, seismic design evaluation and strategies of the new structures, appropriatebridge, the potential retrofit strategies with supporting documentation, and other pertinent details.
- Preliminary Foundation and Geotechnical Report and other applicable documents
- Location of Hinges, Hinge access and Type of Joint Seal assemblies.

Type Selection reports shall clearly delineate aesthetic features the Design-Builder has incorporated into the structure type. The bridge aesthetic treatment shall be reviewed and approved prior to submitting the Type Selection Report.

All Type Selection Meetings will be scheduled after the Department has approved the project geometrics and a minimum of five (5) working days following receipt of a complete Type Selection Report and all related documents. The meeting will be held at project specified co-located facilities. At the meeting, the Design-Builder shall present the proposed structure and shall briefly discuss issues pertinent to the selection of the structure type, particularly requirements for foundations, hydraulics, construction (including falsework), seismic design, retrofit strategy, aesthetics, traffic handling, and other information needed to support the structure type.

After the meeting, the Design-Builder shall prepare a meeting summary and provide a copy to the Department within three working days. The meeting summary may be used to update or supplement the information in the Type Selection Report to address comments raised at the meeting. Provided all issues raised at the Type Selection Meeting are satisfactorily addressed, the Department will provide written approval or denial of the proposed structure type within five (5) working days of receiving the final meeting summary.

Within two (2) weeks after receiving written approval of the structure type, Design-Builder shall update the General Plan and submit the required number of reduced copies to the Department for comment. Design-Builder shall incorporate any comments from the Department into the Final Design Documents.

Intermediate Design- Unchecked (~~60~~65%) Structure Plans Submittal

The Design-Builder shall submit the Intermediate (~~60~~65%) Unchecked Structure Plans to the Department for review and constructive feedback for use in preparing subsequent submittals. The bridge design information shall be suitable for content and format review and coordination with other design disciplines to integrate all bridge appurtenances into the plan set. It is not necessary to have structural design checks complete at this stage.

The Intermediate (~~60~~65%) Structure Plan packages shall include complete dimensional detailing for all bridge structural elements and include all detail design sheets. This shall include title sheets; bridge layouts; foundation layouts; foundation details and design tables; boring logs; abutment details; bent details; framing plans and elevations; hinge details, slab plans, typical sections and details; beam details and data sheets; joint seal details, deflection and camber diagrams; Draft Final Foundation and Geotechnical Reports, and other details as applicable. Packages shall list the Department bridge standards to be used. Proposed modification to the Department standards and draft structures special provisions to standard specifications shall also be provided.

Individual detail sheet contents shall be in accordance with applicable checklists provided in Caltrans Bridge Detailing Manual.

Final Design- Checked (100 %) Structure Plans Submittal

Final Checked (100 %) Structure Plans Submittal shall include completed bridge layouts and final structural details for superstructure, substructure, and all bridge appurtenances. Package shall include Final Structure Foundation Report, LOTB's, structure quantities, and structure special provisions.

The Final checked (100%) submittals will not be considered complete unless all the design and independent check calculations are available and completed. The completed design and independent check calculations shall be available for review.

Released-for-Construction (RFC) Submittal

The Design-Builder shall include all bridge and structural details in the Final RFC submittal. For RFC submittal procedure, refer to Section 2.4.2.3.~~5~~ 6 "Design Submittals – Released for Construction Submittals."
For structure elements or segments of a bridge structure, such as structure foundations, to be Released-for-Construction prior to final completed design, the RFC segment submittal shall meet the final checked (100%) bridge submittal requirements for each particular structural element to be constructed.

Final As-Built Structure Plans Submittal

The Design-Builder shall submit structure As-Built plans and documents per Section 2.4.3.4 "As-Built Documents" and Section 13.5.

Additional Submittals for Retaining Walls

The Design-Builder shall provide a Preliminary Geotechnical Report and a Geotechnical Design Report for standard retaining walls. For nonstandard walls, the Design-Builder will provide a Preliminary Foundation Report along with the Type Selection Report and a Foundation Report at the 65% Unchecked Submittal stage. The Preliminary Geotechnical Reports, Geotechnical Design

Reports, Preliminary Foundation Reports, and Foundation Reports shall conform to Technical Provisions Section 8, “Geotechnical”.

Section 13.3.1 – “Bridge Design” is modified as indicated.

13.3.1 Bridge Design

A Project Specific Bridge Design Criteria is required for segmental bridge structure types, should segmental bridge is selected by the Design-Builder and approved by the Department. The Department has developed a Project Specific Bridge Design Criteria-Segmental Structures (Exhibit 13-A) and the template contains minimum design requirements for segmental bridge structure frames. The Design-Builder shall enhance the criteria as necessary to provide an overall comprehensive bridge design criteria for the Project. The Design-Builder shall cover all the topics contained in the Department’s Template and meet all requirements of the Contract. This Bridge Design Criteria supersedes the standards listed in Section 13.2 and will be subject to the Approval of the Department~~ unless Cast-In-Steel-Shell is used with shear connectors and designed for~~.

The interchange connector bridge structure shall accommodate a 12 foot lane with a 5-feet left shoulder and a 10-feet right shoulder. The bridge branches off southbound I-605 to westbound over the existing directional connector, crossing over I-605 and I-10 freeways, and joining back into eastbound I-10 after crossing over the Athol St Overcrossing. The horizontal and vertical alignment and the bridge width shall conform to the final approved geometric layout.

Section 13.3.1.1 – “Proposed bridge scope and work” is modified as indicated.

13.3.1.1 ~~Proposed b~~Bridge scope and work

The ~~proposed~~ bridge structure has an estimated total length of 4,145 feet and the ~~propose~~ bridge description and work shall include the following:

a) Design and construct abutments and column pier/bent substructures.~~;~~ T~~t~~he superstructure shall be ~~is~~ supported on single-column bents and seat-type abutments.

b) Design and construct a 15-span bridge superstructure with a length of 3,280 feet; the proposed superstructure is a CIP/PS progressive segmental box girder frame spanning over I-605 mainline and a balanced segmental CIP/PS box girder frame spanning over I-10 mainline. The remaining spans are constructed of CIP/PS box girder superstructure. The ~~proposed~~ structural depth is minimum 10’-0” crossing over I-605 and varies from 10’-0” to 18’-0” when crossing I-10. Construct Type 736 barrier rail on the left edge of deck and Type 742 barrier rail on the right edge of deck.

c) Design and construct earth-retaining approaches to the bridge with estimated length of: a 510 feet and a 360 feet MSE wall at the beginning and the end of the bridge, respectively.

d) Design and construct Approach Slab Type N(30S) at both ends of the bridge.

e) ~~Remove existing soundwalls barrier rail and associated pile foundations that are in conflict with the proposed bridge substructures and foundations, and~~ Remove and reconstruct a portion (approximately 1000 ft in length) of the existing soundwall and pile foundations in conflict with the proposed bridge column/footing locations.

f) Remove portions of the existing soundwall that conflict with the project work where the connector roadway merges with the I-10 eastbound mainline and reconstruct soundwall from the end bridge abutment to the existing soundwall along Dalewood Street. construct new soundwalls and foundations along Dalewood Street.

gf) The bridge deck shall be subject to "grinding and longitudinal grooving" in accordance with the Department Specifications for reduce noise on decks. This will require the placement of an additional ¼" thickness of sacrificial concrete cover to the top mat prior to grinding and grooving.

hg) Construct joint seal assemblies across all joints.

Additional design requirements shall include the following:

a) The bridge shall be designed and constructed to accommodate future overlay loads (35psf).

b) The bridge superstructure exterior girder face shall have consistent geometry throughout the bridge lengths.

c) If the bridge superstructure exterior girder face is vertical, then the exterior soffit corner shall be rounded and the exterior girder face shall have a two-inch aesthetic treatment similar to that on the NB605/Rte10 Separation (53-3027H).

d) For segmental bridges, the bridge decks shall be prestressed in the transverse direction.

e) If precast segmental box girders are used on any span, then an 1-inch maximum polyester concrete wearing surface shall overlay the concrete deck of the entire bridge.

f) If box-shaped rectangular column sections are used, then a minimum 1-ft by 1-ft chamfer shall be provided at all exterior corners.

g) The barrier rails shall provide two 2-inch electrical conduits and one 3-inch conduit.

h) Aesthetics of the structures shall meet the requirements in Book 2 Section 15- Visual Quality Management.

i) Under all service load combinations (including long-term effects of concrete creep and shrinkage), the bridge superstructure shall provide the required vertical and horizontal clearances, and maintain the design vertical profile during the bridge design service life.The long term creep and shrinkage should be considered for the final profile of the Bridge structure.

i)j) The Design-Builder shall submit fill out the High Performance Concrete Ddata Ssheet (as shown on Exhibit 13-B) for when High Performance Concrete (concrete compressive strength greater than or equal to 6,000 psi) is used for any elements of the bridge structure.

Section 13.3.1.2 – "Vertical Clearances" is modified as indicated.

13.3.1.2 Vertical Clearances

The proposed bridge structure shall meet the following vertical clearances:

a) Final Minimum Vertical Clearances are: 21'-6" over I-605 southbound, 27'-2" over I-605 northbound, and 16'-9" over Athol St Overcrossing, respectively.

b) Temporary Minimum Vertical Clearances for falsework opening are 17'-11" overI-605 southbound, and 15'-6" over Athol Street.

c) Further study and field survey are recommended to confirm the actual vertical clearance.

The minimum vertical clearances for the Project shall meet the following:

a) Permanent Minimum Vertical Clearances: 16'-6" over freeway mainlines, connectors, ramps, and Athol Street; 15'-0" over other local streets.

b) Temporary Minimum Vertical Clearances for falsework openingsduring construction: 16'-0" over freeway mainlines, connectors, and ramps; 15'-60" over Athol St and other local streets.

c) Vertical clearance over other local streets shall be 15'-0".

Section 13.3.1.3 – "Foundations" is modified as indicated.

13.3.1.3 Foundations

The proposed foundation type is Cast-In-Drilled-Holes (CIDH) Piles. If pile foundations are used, group piles shall be used. Driven piles shall not be used on the I-10 freeway mainline and/or at locations south of the I-10 freeway.

Settlement- Bridge substructure foundations shall be designed to allow a maximum of one (1) inch total settlement. One-inch differential settlement may be allowed if a structure analysis verifies the design and the required level of serviceability.

The Design-Builder shall perform geotechnical investigations at the bridge site and produce a Geotechnical and Foundation Recommendation Report. Foundation type, capacity, estimated lengths, and bottom elevations shall be determined by the Design-Builder in accordance with the Geotechnical Report for the structure. Abutments and bents foundations types may be selected in accordance to the Geotechnical Report.
Analysis shall include bearing capacities, factors of safety and an estimate of total and anticipated differential settlement for each structure.

For preliminary geotechnical and seismicity information, see the Revised District Preliminary Geotechnical Report (DPGR) and the Log of Test Borings (LOTBS). Differential settlement between individual piles within a pier shall be limited to 0.25 inches.

Section 13.3.1.4 – "Seismic Design" is modified as indicated.

13.3.1.4 Seismic Design

Several hinges are needed to separate the bridge into multiple frames.

In addition to the requirements of the Seismic Design Criteria and other Department standards, the following design and analysis procedures are required:

Performance Assessment

The seismic performance of all structures shall be assessed by verifying estimated structural demands on components are less than or equal to estimated structural capacities of those components.

All capacity-protected components, as defined by Caltrans *Seismic Design Criteria* or these criteria, shall have a force D/C ratio of 1.0 or less when subjected to over-strength forces.

Demands on structural components of the bridge shall be determined by analysis of global three dimensional computer models of the bridge that represent its dominant linear and nonlinear behavior and the effects of soil-foundation-structure interaction. Demands will be evaluated as load-type quantities (forces and moments) or as displacement-type quantities (displacements, relative displacements, and rotations) as required by the evaluation rules for various components.

Seismic demands for the bridge structures shall be determined by the appropriate methods specified in the Seismic Design Criteria and the following:

- Nonlinear multi-support dynamic time-history analysis.
- Site-specific response spectrum ~~analyses~~analysis.

The nonlinear time-history analysis will be for multiple-support excitations developed considering the propagation of the seismic waves from the fault to the bridge site and the passage of seismic waves through the site to account for incoherence of the seismic motions. Three sets of ground motions shall be used and the final design shall be based on the maximum response obtained from using the Seismic Design Criteria, site-specific response spectrum analyses, and the nonlinear time-history analyses.

Response spectrum analysis shall use the Complete Quadratic Combination (CQC) rule for the modal combination methods and the Complete Quadratic Combination- 3 (CQC3) rule for the ground motion directional combination methods

The Design-Builder shall use the commercially accessible computer bridge analysis program, ADINA, CSI SAP2000, or CSI Bridge, to generate either the original seismic nonlinear time-history design model or the independent check seismic nonlinear time-history design model. -The Design-Builder has the option of using the above-mentioned software for the design and/or the independent check.

Non-linear dynamic time-history analysis shall incorporate the following:

- Boundary condition non-linearities will be accounted for in the form of gap elements at expansion joints and foundation impedances.
- The structural model shall explicitly consider the geometric nonlinearity, inelastic structural components and other inelastic elements (e.g. dampers).
- Any reinforced concrete members with a force Demand/Capacity (D/C) ratio larger than 0.5 will be modeled with adjusted material and section properties to represent the cracked section. ~~Structural steel members with a force D/C ratio less than 1.5 will be modeled with elastic elements. Any members with a force D/C ratio larger than 1.5 will be modeled with nonlinear elements.~~

Foundation substructure models ~~may be used to~~shall capture significant soil-pile interaction effects. The foundation substructure model may ~~should~~ consist of ~~a~~an equivalent 3D-non-linear stiffness and ~~mass matrices~~ matrix representing the entire soil-~~pile~~ foundation system, and excited by a set of equivalent ground motion representing the kinematic effect of the depth-varying motions.

Rayleigh damping is to be used for non-linear dynamic time-history analysis. Modal damping may be used for other analytical tools. The range of Rayleigh damping values represents the target maximum and minimum damping values that apply over the dominant periods of the various element groups. Rayleigh damping ranges for non-linear dynamic time-history analysis shall be within the following ranges:

Reinforced Concrete Substructure/Columns: 4% - 6%
Steel Superstructure: 2% - 5%
Concrete Superstructure: 3% - 5%

Rayleigh damping will be incorporated into the model with values for each element group representing the expected extent of inelastic energy dissipation in that group. Judgment shall be used in defining the range of dominant periods for the various components and the variation of Rayleigh damping with structure period.

Modal Damping for Other Analytical Tools:

Reinforced Concrete Columns: 5%
Reinforced Concrete Towers: 5%
Steel Superstructure: 3%
Concrete Superstructure: 5%

No damping for foundation elements shall be permitted.

Seismic Loading during Construction

During all phases of construction, the ~~main span~~ bridge structures (except for segmental bridges) shall be designed to resist an equivalent static force of 0.1g for all configurations occurring during a construction sequence. For seismic loading during construction on segmental bridges, Exhibit 2-13-A shall apply.

Definition of Ground Motions

Ground motions for use in ~~dynamic~~ seismic analysis of the bridge structure shall be taken from the project geotechnical report(s). The design ground motions shall consist of three, 2-component acceleration-time histories. Each acceleration-time history shall consist of 2-horizontal independent orthogonal components. Horizontal components of t~~T~~he three sets of ground motion time histories used in the analysis shall be generated by matching recorded acceleration-time histories to the respective design spectrum. The characteristics of the recorded initial acceleration-time histories shall be selected by considering the major characteristics the design ARS, including but not limited to the spectral acceleration at or near the structure natural period, the corresponding modal earthquake magnitude, the type and distance of the causative fault ~~compatible for their respective firm ground acceleration spectra~~.

The design acceleration response spectra shall be based on the surface ground ~~outcrop of the firm ground~~motion. Development of the design ARS (Acceleration Response Spectrum) curves ~~for bridge design using a response spectrum approach~~ shall consider the effects of local soil wave propagation in local soil conditions and a soil-structure interaction (SSI) on seismic wave propagationmechanism. The equivalent linear To incorporate the effects of local soil conditions, free-field ground motion shall be generated by conducting site-specific dynamic ground one-dimensional site response analysis. Soil non-linearity shall be considered in these analyses. using site-specific soil properties is conducted to evaluate the free-field motions. The SSI analysis shall take into account the depth-varying free-field ground motions and the kinematic interaction between soil and pile within the significant soil-pile interaction zone.

The potential effects of local soil conditions and soil-foundation-structure-interactions (SFSI) shall be considered in the development of the design ground motion for the bridge structures. In addition, due to the length of the main bridge structure, the potential effects of spatial variation of ground motions such as due to wave passage and loss of coherence shall be considered when developing design ground motions for multiple support time histories analysis.

The design ground motions and including the the ARS curves shall be reviewed and approved by the Department before application to analysis and design.

The bridge shall be instrumented to record accelerations from strong ground motions. The bridge shall be designed and constructed to accommodate motion sensors and accessories.

Section 13.3.1.6 – “Maintenance Issues” is modified as indicated.

13.3.1.7 Maintenance Issues

Joints- Several superstructure hinge joints are required along the structure. The design and location of the hinge joints shall provide for maintenance accessibility and future replacement. Soffit access openings shall be provided in every frame.

For sSegmental superstructures, one soffit access opening and hatch shall be provided in each frame backspan near the hinge. Multi-cell superstructures shall provide access openings through interior box girder webs to allow maintenance staff access to all cells of the superstructure.

Soffit access hatches shall be lockable, weatherproof steel, and provided with a spring-assisted hinge cover that either helps lift the cover or helps resist the cover from falling, depending on the horizontal location and application. The Design-Builder shall determine the locking scheme for each soffit access hatch so it can be locked and opened under the locked condition from the appropriate sides.

Section 13.3.6 – “Structure Types Restricted from Use” is modified as indicated.

13.3.6 Structure Types Restricted from Use

The following structure alternative types are not allowed on the project as permanent structures:

- C-bents;
- oOutrigger bents spanning over any portions of the I-605 mainline;
- oOutrigger bents spanning over any portions of the I-10 mainline
- Structural steel bridge superstructures (e.g. girders and bent caps).
- Open-girder superstructure systems (i.e. any girder system without bottom slab soffits)

- Integral-type abutments
- Hollow concrete column sections and precast concrete column sections
- Soil-nail wall and ~~mechanically~~Mechanically-~~stabilized~~ Stabilized ~~earth~~ Earth (MSE) systems serving as bridge abutments
- Recycled materials used for structure backfills on earth retaining systems and foundations
- Earth retaining systems and other structural elements that are not pre-approved by the Department or not currently allowed by the Department.
- Asphalt concrete overlay on bridge decks

Section 13.5.1 – "Structure Construction Forms and Documents Required" is modified as indicated.

13.5.1 Structure Construction Forms and Documents Required

The Design Builder shall submit following completed forms and documents to the Department;

- Report of Completion
- Pile driving logs and pile layout at the completion of the operation for each location of bridges, retaining walls and sound walls.
- Report of falsework clearance, (Form SC 12.6.1, formerly Form DS-OSC 108).
- Cast In Drilled Holes (CIDH) Pile Quantity and Drilling Record.
- Test Result Summary sheet for couplers and location of couplers.
- Pre-Stressing Monitoring for concrete structures.
- Pre-Stressing Calibration Monitoring Sheet for concrete structures.
- Notice of Change in Clearance or Bridge Weight Rating, (Form TR-0019 or TR-0029).
- Notice of Change in Vertical or Horizontal Clearance.
- Joint Movement calculations for type "B" seals and Joint Seal Assemblies.
- Column Guying plans.
- Falsework plans.
- Structures As-Built plans including the following:
    - a. complete bridge load-rating report
    - ~~a.~~b. The load rating model based on the final As-Built conditions of the bridges considering the effects of construction staging. The model can be either generated by the CSI BRIDGE or MIDAS Civil computer bridge analysis program. Submitted information shall include all electronic model input, output, and auxiliary files.
- Bridge demolition plans.
- Profilograph test results (CA Test 547)
- Skid test results (CA test 342)

- Test results of concrete samples
- Seismic nonlinear time-history analysis design or check model based on the final As-Built conditions of the bridge. The model can be generated by the CSI BRIDGE, CSI SAP2000, or ADINA computer bridge analysis program. Submitted information shall include all electronic model input, output and auxiliary files.

The Design Builder shall provide the Department with completed project files at the end of the project.

Section 13.5.2 – "Mock-ups and Samples" Plans is modified as indicated.

13.5.2 Mock-ups and Samples

Mock-ups and samples will be required for all structure products (e.g. joint seal assembly, soundwall block, MSE concrete panel, and etc.) for approval by the Department of textures, colors and construction methods a minimum of 14 Working ~~days~~ Days prior to construction. Approved mock-ups and samples will be used as a standard throughout construction.

Exhibit 13-A Project Specific Bridge Design Criteria-Segmental Structures

Replace current Exhibit 13-A with the revised Exhibit 13-A attached to this Addendum.

Exhibit 13-B High Performance Concrete Data Sheet

Add new Exhibit 13-B attached to this Addendum.

BOOK 3 APPLICABLE STANDARDS

Section 1 Index of Standards, Manuals, Guidelines and References is modified as follows:

Add the following reference to the Index of Standards, Manuals, Guidelines and References.

FHWA	High-Performance Concrete (HPC) Defined for Highway Structures	W	http://www.fhwa.dot.gov/bridge/HPCdef.htm

REFERENCE INFORMATION DOCUMENTS (RID)

See revised RID Index for a list of provided Reference Information Documents in the Data Room

Exhibit 13-A

I-605/I-10 Connector

07-245404

Project Specific Bridge Design Criteria-
Segmental Structures

Date:

Prepared By:
xxxxx

1. **INTRODUCTION**
   1.1. This *Bridge Design Criteria* applies to the prestressed segmental concrete box girder bridge constructed by the xxxxxxx method.
   1.2. The bridge design shall satisfy the *AASHTO LRFD Bridge Design Specifications*, 4th Edition (*LRFD*), and as modified by *California Amendments v.4.xx.*, collectively referred to herein as "LRFD BDS".
   1.3. In addition to the *LRFD* BDS, pertinent sections of the following documents are to be used unless otherwise noted or revised in this Design Criteria:
   - *Caltrans Seismic Design Criteria*, Version 1.6 (*SDC*)
   - *Caltrans Bridge Memo to Designers* (*MTD*)

   1.4. Platforms, ladders, and accessories inside the box girder shall be designed to the 2007 California Building Code (CBC).
   1.5. Some details included in the *Standard Plans, Revised Standard Plans* and Bridge Standard Detail Sheets were created using Load Factor Design or Working Stress Design.

Note: Numbered sections of this Criteria generally conform to the numbering of the LRFD BDS. Sections noted "unchanged" or not specified have not been modified from the LRFD BDS provisions.

2. **GENERAL DESIGN & LOCATION FEATURES**

2.1. Scope

The structure shall be a prestressed segmental concrete box girder bridge. The box girder superstructure shall be longitudinally post-tensioned and the bridge deck shall be transversely prestressed.

2.2. Definitions

2.3. Location Features

2.3.1. Operational Importance

2.3.1.1. The Bridge is categorized as an ordinary nonstandard bridge.

2.3.1.2. For all limit states, the Operational Importance Factor (*LRFD* 1.3.5), $\eta_I = 1.0$.

2.3.2. Bridge Site Arrangement

2.3.2.1. Traffic Safety

xxxx carried on the roadway shoulders.

2.4. Foundation Investigation

2.5. Design Objectives

2.5.1. Seismic Performance

2.5.1.1 "No Collapse" performance: significant damage shall be allowed, with no collapse. Damage should be limited to:
- Failed abutment backwall and shear keys.
- Failed expansion joints.
- Bearing offsets requiring recentering.
- Inelastic response resulting in concrete cracking, reinforcement yield, and spalling of cover concrete in columns.

2.5.1.2 Earthquake During Construction

2.5.1.2.1 The ground motion shall be assessed probabilistically as specified in Article 3.10.

2.5.1.2.2 "No Collapse" performance: significant damage shall be allowed, with a minimum risk of collapse.

2.5.2 Serviceability

2.5.2.1 General

2.5.2.1.1 xxxx

2.5.2.2 Durability

The design shall include the following measures to improve durability and minimize the life cycle costs of the bridge:

- High performance concrete with low permeability (maximum w/c =0.35)
- High performance concrete curing methods
- Permanent deck access openings are not permitted.
- Temporary deck access openings (one per cantilever) are permitted near the inflection points.

2.5.2.3 Instrumentation

-

2.5.2.4 Rideability

2.5.2.5 Utilities

2.5.2.5.1 Systems to be carried

- Bridge Interior Lighting
- Instrumentation (Article 2.5.2.3)
- Hoist Trolley
- Future Utilities

2.5.2.5.2 Structural Details for Utilities

2.5.2.5.2.1 xxxx

2.5.2.5.2.2 Anchors for utility hangers shall be cast-in threaded anchors; drilled anchors are not permitted in prestressed elements unless their penetration is less than or equal to 2 inches.

2.5.2.6 Unchanged (Deformations)

2.5.2.7 Consideration of Future Widening

2.5.2.7.1

2.5.3 Constructability

xxxx

2.6 Hydrology & Hydraulics

2.6.1 General

xxx

2.6.2 Site Data

2.6.2.1 xxxx

2.6.2.2 xxxx

2.6.3 Hydrologic Analysis

2.6.4 Hydraulic Analysis

2.6.5 Culvert Location

2.6.6 Roadway Drainage

2.6.6.1 General

Roadway drainage shall discharge through xxxx

2.6.6.2 Design Storm

Drainage systems shall be designed for a peak rainfall intensity of xxxx in/hr.

3 LOADS AND LOAD FACTORS

3.1 Scope- unchanged

3.2 Definitions

3.3 Notation

3.4 Load Factors and Load Combinations

3.4.1 Unchanged

3.4.2 Load Factors for Construction Loads

3.4.2.1 Construction load combinations in *LRFD* Table 5.14.2.3.3-1 shall apply to the superstructure at the service limit state.

3.4.2.2 Construction load factors in *LRFD* Article 3.4.2.1 shall apply to the superstructure and substructure at the strength limit state. The segmental construction loads in *LRFD* Article 5.14.2.3.2 shall be included and factored as follows:

3.4.2.2.1 DIFF shall have the same load factors as DC.

3.4.2.2.2 CE shall have the same load factors as DC, except that γ_{CE}=1.5 for the Strength I combination during cantilever construction.

3.4.2.2.3 CLL shall have the same load factors as LL.

3.4.2.2.4 WE and WUP shall have the same load factors as WS. During cantilever construction, γ_{WS}=1.25.

3.5 Permanent Loads

3.5.1 Dead Loads

3.5.1.1 DC

DC shall be based on a unit weight of concrete (including rebar) of 155 lb/ft^3.

3.5.1.2 DW

DW loads applied to the structure after completion of the segmental construction shall include the following:

- Utilities and Services xx.xx kips/ft per box girder
- Future wearing surface 35.00 psf

3.6 Live Loads

3.6.1.1 xxxx

3.6.1.2 Design Vehicular Live Load

3.6.1.2.1 xxxx.

3.6.1.2.2 The design lane load shall not be decreased for span lengths up to 600 feet.

3.6.1.3 Application of Design Vehicular Live Loads

3.6.1.3.1 The wheel load for transverse deck design shall be increased by 25%, to 20.2 kips (HS-25 loading)

3.6.1.3.2 The Strength II load combination shall not include any HL-93 live load.

3.6.1.3.3 The load factor for live load combined with seismic loading (Extreme Event I) shall be γ_{EQ}=0.0.

3.7 Water Loads

N/A

3.8 Wind Load

3.8.1 Horizontal Wind Pressure

3.8.1.1 The base wind velocity shall be V_B = xxxx

3.9 Ice Loads- unchanged

3.10 Earthquake Effects

3.10.1 General

3.10.1.1 xxxx

3.10.1.2 Attention is directed to Article 2.5.1, Seismic Performance.

3.10.2 Ground Motions

3.10.2.1 The controlling fault is the xxxx fault, as described in the *Seismic Design Recommendations*.

3.10.2.2 Design Ground Motion

The horizontal and vertical design loadings on the completed structure shall be based on a site-specific determination of the xxxx. The associated Acceleration Response Spectrum (ARS) shall be the elastic, 5% damped curve shown below:

Figure 3.10.2.2-1 Design ARS Curve

3.10.2.3 Construction Earthquake

During segmental construction, the horizontal and vertical design loadings on the partially completed structure shall be based on a probabilistic ground motion with a 10% probability of exceedence in 10 years (*MTD* 20-2). The associated Acceleration Response Spectrum (ARS) shall be the elastic, 5% damped curve.

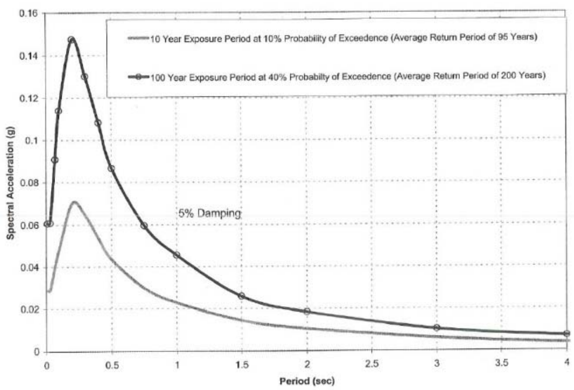

Figure 3.10.2.4-1 Construction ARS Curve

3.10.3 Importance Categories

xxxx

3.10.4 xxxx

3.10.5 xxxx

3.10.6 xxxx

3.10.7 Response Modification Factors

3.10.8 Unchanged

3.10.9 Unchanged

3.10.10 Requirements for Temporary Bridges and Stage Construction

See Article 2.5.1.4.

3.11 Earth Pressure

3.12 Force Effects Due to Superimposed Deformations

3.12.1 Unchanged

3.12.2 Uniform Temperature

The design temperature range for calculating forces in the structure (TU) shall be xx.x°F rise or fall from the assumed construction temperature. The design temperature range accounts for the lag between the air temperature and the interior of massive concrete members or structures.

3.12.3 Temperature Gradient

3.12.4 Unchanged

3.12.5 Creep

Creep and Shrinkage effects (CR&SH) shall be evaluated for all load combinations on both a young and an old structure. The "young structure" shall be at the time when all closures have been made. The "old structure" shall be a minimum of 30 years old.

3.12.6 Unchanged (Settlement)

3.13 Friction Forces

3.14 Vessel Collision- unchanged

3.15 Special Construction Loads

3.15.1 Construction Equipment

The assumed form traveler loading (CE) for the contract plans analysis shall be as follows:

Traveler weight	xxxx kips
Formwork	xxxx kips
Center of gravity	Traveler only: xxxx m in front of the leading edge of supporting segment. Forms only: ½ formed segment in front of the leading edge of supporting segment.

The Contractor shall base the structural analysis on the actual form traveler equipment to be used during construction.

3.15.2 Interior Transport Load

The typical section shall be designed to support a prestress tensioning jack transported inside the box girder by floor dolly or by a ceiling-mounted crane rail. The design load (including IM=33%) shall be assumed to be a xxxx kips concentrated load. As an element of future construction, this load shall be applied as "DC" in combination with the Service I and Strength I limit states.

3.15.3 Closure Forces

The structure shall accommodate erection tolerances of L/1000 (where L is the cantilever length from center of pier to the cantilever tip.) Misalignment correction stresses shall assume uncracked sections and be included as a component of "EL" in *LRFD* Equation 3.4.1-2.

4 STRUCTURAL ANALYSIS & EVALUATION

All construction, live, and permanent load cases shall be analyzed using three-dimensional structural analysis software with time-dependent creep, shrinkage, and relaxation capability.

Columns and pile shafts shall be designed using the p-y method to account for soil-structure interaction.

The bridge shall be designed to meet the displacement ductility requirements of the Caltrans Seismic Design Criteria using three-dimensional elastic dynamic analysis, inelastic time-history dynamic analysis, and inelastic static analysis.

5 CONCRETE STRUCTURES

5.1 Unchanged

5.2 Unchanged

5.3 Unchanged

5.4 Material Properties

5.4.1 Unchanged

5.4.2 Normal Weight Concrete

5.4.2.1 Compressive Strength

The specified 28-day concrete strength shall not exceed f'_{c28} = xxxx ksi unless verified through physical tests on the Contractor's concrete mix design.

5.4.2.2 Shrinkage and Creep

5.4.2.2.1 General

The effects of shrinkage and creep shall be estimated using the provisions of the 1990 CEB-FIP Model Code, using:

- average relative humidity = xxxx
- average ambient temperature = xxxx
- Type II Modified Portland Cement
- Medium water/cement ratio

5.4.2.2.2 Creep

5.4.2.2.3 Shrinkage

Shrinkage reducing admixtures may be used to enable the concrete performance predicted by the CEB-FIP Model Code.

5.4.2.3 Modulus of Elasticity

The 28-day modulus of elasticity shall be calculated by *LRFD* Eq. 5.4.2.4-1 with K_1 = 1.0, or as verified by mix-specific physical tests.

5.4.3 Unchanged (Reinforcing Steel)

5.4.4 Unchanged (Prestressing Steel)

5.5 Limit States

5.5.1 Unchanged (General)

5.5.2 Unchanged (Service Limit State)

5.5.3 Unchanged (Fatigue Limit State)

5.5.4 Strength Limit State

The segmental resistance factors in LRFD 5.5.4.2.2 shall not apply to CIP construction where mild reinforcement crosses the joints.

5.5.5 Extreme Event Limit State

The resistance factors shall be those specified for the strength limit state in *LRFD* 5.5.4.2.

5.6 Design Considerations

5.7 Design for Flexural and Axial Force Effects

At the strength and extreme limit states for permanently cased portions of pile shafts, the maximum usable concrete strain may be taken as ε_c = 0.005. The casing shall not be considered as part of the reinforcement, and composite action between the steel casing and the concrete core shall not be used to develop flexural strength.

5.8 Shear and Torsion

5.8.1 Superstructure Girders

The shear design shall be based on *LRFD* BDS

5.8.2 Shear in CIDH shafts and rock sockets

See section 10.5.4 (Extreme Event Limit State)

5.8.3 Girder Stirrups

Stirrups in girder webs shall be designed for the longitudinal shear and torsion (A_v) and the out of plane bending from the transverse box girder analysis (A_f). The minimum area of steel should not be less than the larger of the following combinations of the two effects:

a) $A_v + 0.5A_f$

or b) $0.5A_v + A_f$

or c) $0.7(A_v + A_f)$

(*Construction and Design of Prestressed Concrete Segmental Bridges*, Podolny & Muller, page 203)

5.9 Prestressing and Partial Prestressing

5.9.1 Unchanged (General Design Considerations)

5.9.2 Unchanged (Stresses Due to Imposed Deformation)

5.9.3 Unchanged (Stress Limitations for Prestressing Tendons)

5.9.4 Stress Limits for Concrete

5.9.4.1 For Temporary Stresses Before Losses

5.9.4.2 For Stresses at Service Limit State After Losses

5.9.4.2.1 Compression Stresses- unchanged

5.9.4.2.2 Tension Stresses- unchanged for longitudinal design

- Transversely Prestressed Bridge Deck Design:
  A. Top of deck- No tension
  B. Bottom of deck- $3\sqrt{f_c'}$ psi

5.10 Unchanged

5.11 Unchanged

5.12 Durability

5.12.1 The minimum concrete cover at the top surface of the concrete deck shall have 2.25 inch cover to allow deck grinding.

5.13 Unchanged

5.14 Unchanged

5.15 Seismic Design and Detailing

5.15.1 General

5.15.1.1 The Caltrans *Seismic Design Criteria* shall govern design for the design ground motion.

5.15.1.2 Attention is directed to Article 2.5.1, Seismic Performance.

5.15.2 Superstructure Flexural Strength (*MTD* 20-6)

5.15.2.1 The superstructure shall be designed to resist the internal forces generated when the structure has reached its Collapse Limit State in the longitudinal direction. Any prestressing steel used to satisfy *MTD* 20-6 shall be stressed to at least $0.3f'_{su}$ to prevent wedge slip.

5.15.2.2 The *MTD* 20-6 recommended minimum mild steel reinforcement (#8 @ 12-inch top and bottom) shall not apply.

5.15.2.3 The “service splice” requirements for mild steel may be satisfied with a double length lap splice.

5.15.3 Column and Pile Shaft Design

5.19.3.1 Concrete strains shall satisfy the reduced ultimate values of *SDC*

5.15.3.1.1 Reinforcement strains shall satisfy the reduced ultimate values of *SDC* 3.2.3.

5.15.3.1.2 Minimum Local Displacement Ductility Capacity (*SDC* 3.1.4.1)

For this long-period structure on large diameter CIDH extensions, the minimum displacement ductility capacity shall be $\mu_C = 2.5$.

5.15.4 Joint Shear Design

5.15.4.1.1 xxxx.

5.15.4.1.2 xxxx.

5.15.5 Vertical Acceleration

The superstructure shall be designed to resist the effects of vertical acceleration using the vertical ARS curves in Article 3.10.2. Dead load and prestressing (primary and secondary) shall be included to create the combined load. Splices in reinforcement shall satisfy *SDC* 7.2.2.

6 STEEL STRUCTURES- unchanged

7 ALUMINUM STRUCTURES- unchanged

8 WOOD STRUCTURES- unchanged

9 DECK & DECK SYSTEMS- unchanged

10 FOUNDATIONS

10.1 Unchanged
10.2 Unchanged
10.3 Unchanged
10.4 Unchanged
10.5 Limit States and Resistance Factors

10.5.1 General

All foundations shall be designed using the LRFD method.

10.5.2 Service Limit States

10.5.2.1 Unchanged

10.5.2.2 Tolerable Movements and Movement Criteria

10.5.2.2.1 Differential settlement between piers shall be limited to 1 inch.

10.5.2.2.2 Differential settlement between individual piles within a pier shall be limited to 0.25 inches.

10.5.3 Strength Limit State

10.5.4 Extreme Event Limit State

10.5.4.1 To ensure the structural integrity and serviceability of the bridge after the earthquake, permanent vertical settlements shall not exceed 4 inches.

10.5.4.2 The design shear force in CIDH shafts and rock sockets need not be taken as more than two times the seismic overstrength shear force: $V_u \le 2V_o$.

10.5.5 Resistance Factors

10.5.5.1 Unchanged

10.5.5.2 Unchanged

10.5.5.3 Extreme Limit States

xxxx.

10.6 Spread Footings
10.7 Driven Piles
10.8 Drilled Shafts

10.8.1 Unchanged
10.8.2 Unchanged
10.8.3 Unchanged
10.8.4 Unchanged
10.8.5 Pile Penetration For Lateral Loads

10.8.5.1 General

The minimum pile penetration for lateral loads shall ensure stable load-deflection characteristics at the strength limit state and the extreme event limit state. Attention is directed to the pile shaft design procedure in Caltrans *Bridge Design Aids* Chapter 12.

10.8.5.2 Strength Limit State

10.8.5.2.1 The minimum pile penetration shall be increased 20% beyond that required by the load-deflection analysis.

10.8.5.2.2 Attention is directed to the balanced cantilever overturning requirements of *LRFD* 5.14.2.4.4.

10.8.5.3 Extreme Event Limit State

10.8.5.3.1 The minimum pile penetration shall ensure stable load-deflection characteristics at the collapse limit state (*MTD* 20-1), using expected material properties to calculate M_p and V_p (*SDC* 3.2).

10.8.5.3.2 The factor of safety against overturning shall be greater than 1.0.

11 ABUTMENTS, PIERS & WALLS

Abutments and retaining walls shall be designed by the LRFD method.

12 BURIED STRUCTURES & TUNNEL LINERS

13 RAILINGS

xxxx.

14 JOINTS & BEARINGS

14.1 Bearings

The bearings at the abutments shall be designed according to Caltrans *MTD* 7.1 with the following modifications:

- The “Prestress Shortening” shall be the shortening due to creep and shrinkage effects (CR+SH) for both the young and old structures as defined in Article 3.12.5.
- Thermal effects (movement and reactions) on the bearings shall include both uniform temperature changes and the temperature gradient (Articles 3.12.2, 3.12.3).
- Bridge bearings shall accommodate structure displacements during the Functional-Evaluation Event.

14.2 Expansion Joint Assemblies

The expansion joint assemblies shall be designed according to Caltrans *MTD* 7.10 with the following modifications:

- The “Anticipated Shortening” shall be the shortening due to creep and shrinkage that is anticipated to occur between the casting of the abutment diaphragm and 30 years in the future (Article 3.12.5). Due to the uncertainty of the material model for concrete, creep and shrinkage displacements at the joints shall be increased by 50%.

EXHIBIT 13-B
High Performance Concrete Data Sheet
(For Concrete Strength greater than or equal to 40 Mpa (6000 psi), or where a bridge has special performance requirements)**

Dist-Co-Rte; EA			
Bridge Name, Bridge #			
Branch # and PE			Date:

Bridge Data (Design) [to be completed by PE]

Bridge Type (Circle all applicable types and furnish information where required)	CIP P/S Box CIP RC Box CIP RC "T" Precast bulbT / I Other Precast Segmental CIP Slab Precast Slab Other type (please describe)	
	Single span Multiple simple spans Multiple spans - continuous	
	Bridge Span (max):	Max span/depth ratio:
Bridge element (s) with concrete strength greater than /equal to 40 MPa and/or performance requirement	Element	Strength (MPa)/Performance
****Performance requirement:** Special Design Considerations	Lightweight Super Structure ___________kg/ m^3 High Early Strength (details) ______________________ Increased elastic modulus _____________ Mass Concrete ___________ Other_____________________________	
****Performance requirement:** Exposure Condition (BDS 8-22)	Element ____________________ ____________________ ____________________	Exposure condition ____________________ ____________________ ____________________
Additional remarks		

Bridge Data (Specifications) [to be completed by Spec. Engineer]

Special mix-design and mineral admixtures required if different from Standard Specifications. Please use a separate sheet for each structural element as needed. Bridge # ____________	Flyash ______% Silica fume ______% Micro-silica ______% Slag _____ % Other__________ Element:	Max aggregate size_______ w/c _______ Air _______ ECR-G: Yes / No ECR-P/G: Yes / No Other_______
Deck curing requirement	a) Standard Specification b) Special requirements – describe	
Additional remarks		

The PE should address all pertinent information & transmit this form to the Spec. Engineer (along with other memos to Spec. Engineer). The Spec. Engineer will complete the form and return it to the PE to be returned to the to the Chair, RC committee. Contact the Chair of the RC committee if there are any questions.

Notes on HPC Data Sheet

What is HPC?

High Performance Concrete is concrete that meets requirements of performance and uniformity that cannot be achieved routinely using conventional constituents and normal practice. [The term HPC has been in and out and is now back in].

FHWA has set up a team to promote the use of HPC in all States.

In Caltrans, the Design Engineer does not explicitly specify the use of HPC. However, depending on exposure conditions (example exposure to sulfates and chlorides), or other performance requirements (example increased modulus, high early strength etc), the specifications are correspondingly developed.

Who will maintain this database?

Chair, RC Committee
(The hope is to develop an electronic data base that will be accessible to all DES Engineers).

What will this database contain?

The Concrete-Data Sheet and the associated mix design (where practical).

Objectives for this database:

1. To provide the Design Engineer with an easy access to basic technical information that would be useful from type-selection stage to PS&E – basically let engineers know what is achievable or has been achieved.

2. Trouble-shooting short-term and long-term problems.

3. Participate in the FHWA's HPC program (we have been using HPC for a long time – we just don't call it that!).

Process:

The RC Committee Chair will maintain the database. The PE will manage this data sheet until Expedite (fill out the form, send it to Spec Engineer with other memos to Specifications Engineer, and receive it from the Spec Engineer). Then this document will be passed on to the Chair of the RC committee who will work with Structure Construction in completing the database.

Index of Reference Information Documents

A "W" under available column indicates documents that can be found on the Internet, an "E" indicates the document will be provided electronically, and "CO" indicates the Contractor shall obtain the document. Web sites are not guaranteed but are supplied for information. It is ultimately the Contractor's responsibility to locate the documents.

Title	Available
EXISTING INFORMATION	

Right-of-Way Record Maps.pdf – Existing Right-of-Way Record Maps:
• I-10:
    o F1860-2A
    o F1860-4A
    o F1860-4B
    o F1860-6A
• I-605:
    o F1970-1
	W

TP6-Utilities.zip – Zipped File containing Existing Utilities; Relocation Letters for Distribution & Lighting Poles & Signed Engineering Certificate	W

AS-BUILT PLANS FOLDER	
AtholOC.pdf – Athol Street Overcrossing As-Built Plans	W
BessPOC.pdf – Bess Avenue Pedestrian Overcrossing As-built Plans	W
Connectorprofiles.pdf – NB 605/Route10 Separation Profile & Superelevation Diagrams As-Built Plans	W
Dalewood-section-profile.pdf – Dalewood Street Typical Cross Sections & Profile As-Built Plans	W
Drainage.pdf – Drainage As-Built Plans	W
Fiberoptic-details.pdf – Fiber Optics Electrical Details As-Built Plans	W
Layouts.pdf – Layout As-Built Plans	W
Route10-sections-profile.pdf – Route 10 Title Sheet, Typical Cross Sections & Profiles As-Built Plans	W
Sewer.pdf – Sanitary Sewer Plan & Profile As-Built Plan	W
Soundwall322.pdf – Sound Wall No. 605-322 As-Built Plans	W
Soundwall508.pdf – Sound Wall No. 10-508 As-Built Plans	W
SouthConnector.pdf – South Collector Undercrossing (Br. No. 53-1631QR) Structures As-Built Plans	W
SouthConnUC.pdf – South Connector Undercrossing (Br. No. 53-1631) Structures As-Built Plans	W
SouthConnUC2.pdf – South Connector Undercrossing (Br. No. 53-1631) Approach Slab Rehabilitation Structures As-Built Plans	W
Utilityplan.pdf – Utility As-Built Plans	W

PROJECT STUDIES AND REPORTS	
07-245400-Project-Report.pdf – Signed Project Report dated 03/27/09 including TMP Data Report, Traffic Counts & Forecast, etc.	W
07-245404-Segmental-Br-Specs.pdf – Special Provisions for Segmental Bridge Template	W
10-605_Connector_MND_FONSI.pdf – Interstate Routes 10/605 Direct Connector Project Environmental Documents “Mitigated Negative Declaration / Finding of No Significant Impact” dated 01/30/09	W
APS.pdf – Structures Advance Planning Study dated 03/20/09	W
Final Value Analysis.pdf – Final Value Analysis dated 10/20/08	W
Foundation-Recommendation-Existing-Structures.pdf - Foundation Recommendations for Existing Str., e.g., SB 605/10 Separation, NB 605/10 Separation, Bess Ave. POC & Culvert Walls, etc.	W
NSSP-3-Electrical-Examples.pdf – Zipped File containing 3 Lighting Non-Standard Special Provision (NSSPs) Examples	W
NSSP-22-ITS-Examples.pdf – Zipped File containing 22 ITS Non-Standard Special Provision (NSSPs) Examples	W
RID-DPGR-605-10.pdf – Revised District Preliminary Geotechnical Report (DPGR) for Proposed Connector From I-605 South to I-10 East	W
ROW Cert Special Design Build I-10-605.pdf – Right-of-Way Special Design-Build Certification No. 3 dated 05/17/11	W
Site-Investigation-3939-1r-seg1.pdf – Lead Investigation Report, Interstate 10 HOV Widening Project, Ninyo-Moore, dated October 24, 2002 (Caltrans ID# 569)	W
Site-Investigation-Geocon-1-17-95.pdf – Site Investigation Report, Bess-Frazier Pedestrian Overcrossing; SR-237, GEOCON Environmental Consultants, January 17, 1995, (Caltrans ID # 113)	W
Site-Investigation-Geocon-5-1-95.pdf – Site Investigation (SI) Report, LA-10 Freeway PM 31.1/33.4, by GEOCON Environmental Consultants, dated May 1, 1995, (Caltrans ID# 103)	W

PROJECT STUDIES AND REPORTS (Continue)	
DWP-Utility-Relocation-PDF-Files.zip – Zipped folder containing files associated to Utility Relocations with the Los Angeles Department of Water & Power	W
PSR-PDS-NB605-to-WB10-S605-Connector – Zipped folder containing files for the Project Study Report (PDS) for the NB I-605 to WB I-10 Connector	W
CONCEPTUAL PLANS	
07-245401-Conceptual-Plan.pdf – PDF Files of all the Conceptual Plans	W