13 STRUCTURES

13.1 General

The structural elements of the Project, including bridges, culverts, drainage structures, signage supports, illumination assemblies, traffic signals, retaining walls retaining and sound walls, shall be well-designed and well-constructed in conformance with the design requirements and Good Engineering Practice, in order to provide the general public a safe, reliable, and aesthetically-pleasing facility. Key requirements in this regard can be found in this Section 13, as well as in Sections 8, 12, and 15.

13.2 Design Requirements

13.2.1 Design Parameters

The Developer shall ensure that bridges crossing over waterways withstand a 100-year frequency event with no loss of structural integrity.

Bridges crossing over the Ultimate Design shall, at a minimum, be designed to accommodate the Ultimate Design and all planned expansion or update of each facility by its respective owner as designated in the owner's current transportation masterplan as included in the reference documents, while still maintaining the required horizontal and vertical clearances. Alignments shall meet the requirements indicated in Book 2A, Section 11 for the functional classification of each roadway The Developer shall design bridge structures required for the Interim Design, if applicable, to the total length and span arrangement required for the Ultimate Design, including spanning future lanes that will be constructed below the structure as a part of the Ultimate Design.

The Developer shall design bridge structures to accommodate the Ultimate Design and construct bridge structures to the width required for the Interim Design. The Developer shall ensure that bridges constructed for the Interim Design can be widened to the Ultimate Design width at a later date with minimal or no impact to aesthetics and traffic**.[NTA – tie to performance point evaluation**]

Direct-connect structures shall be constructed to satisfy the Ultimate Design. In locations where the Interim Design does not call for the construction of the direct-connect structures, the Developer shall make provisions to accommodate the future construction.

13.2.2 Bridge Design Loads and Load Ratings

The Developer shall provide to TxDOT both an inventory and an operating rating of the constructed structures using a form provided in Exhibit XXX. **[NTA – Define minimum design load requirements?]** Load ratings shall be in accordance with section ___ of AASHTO's *Manual for Condition Evaluation of Bridges*.

13.2.3 Bridge Decks and Superstructures

The Developer shall minimize the number of deck joints wherever possible. The Developer shall locate joints to provide for maintenance accessibility and future replacement.

The Developer shall protect sidewalks from vehicular impact by a TxDOT-approved bridge railing as required in the TxDOT Bridge Railing Manual based on roadway design speed. For Interim Design, pedestrian rail shall be used along structure pavement edges and installed to minimize future damage when accommodating the Ultimate Design.

To the extent possible, the Developer shall make bridge superstructures, joints, and bearings accessible for long-term inspection and maintenance. The Developer shall make open-framed superstructures accessible with walkways or by use of ladders or an under-bridge inspection truck. Where not possible, the elements shall conform with the Handback Standards.

The Developer shall install locked entryways on all hatches and points of access.

13.2.4 Bridge Foundations

The Developer's bridge span arrangement and foundation locations shall accommodate the Ultimate Design.

The Developer shall not use spread footings in locations with scour potential.

13.2.5 Bridge Railing and Barriers

All barrier systems used on the Project shall meet current crash test requirements as determined by TxDOT. All testing and associated costs for non-standard railings shall be the sole responsibility of the developer and shall be accomplished through a third party acceptable to TxDOT. TxDOT will provide a current list of standard railing in book 2A section 13.2.5 and will provide updated lists upon request. The Developer shall protect sidewalks from vehicular impact by using TxDOT-Approved bridge railings. For Interim Design, pedestrian rail shall be used along structure pavement edges and installed to minimize future damage when accommodating the Ultimate Design.

13.2.6 Retaining Walls

To the extent possible, the Developer shall design and construct components of the Interim Design and Ultimate Design to provide embankments without the use of retaining walls. Where earthen embankments are not feasible, the Developer may use retaining walls.

If pipe culverts are to extend through the retaining walls or noise walls, the pipe shall be installed so that no joints are located within or under the wall .

No weep holes through the face of the retaining walls will be allowed, except at the base of the walls.

13.2.7 Noise/Sound Walls

The Developer shall design and construct the noise/sound walls to achieve the decibel reduction requirement in Exhibit XXX. **[NTA – Insert Exhibit number for FEIS]**

13.2.8 Drainage Structures

In developing the design of drainage structures, the Developer shall account for maximum anticipated loadings in both the Interim Design and Ultimate Design configurations.

Energy dissipaters, if used, shall be considered as structural elements.

13.2.9 Sign, Illumination, and Traffic Signal Supports

For bridges and walls longer than **XXX** feet, sign supports shall be provided at **XXX**-foot intervals. The sign supports shall accommodate sign areas up to and including___ square feet. **[NTA – include project-specific information]**

The Developer shall design overhead and cantilever sign supports to accommodate the Ultimate Design configuration. Cantilever and sign bridge supports shall be placed outside the clear zone or shall be otherwise protected by appropriate safety measures.

13.3 Construction Requirements

13.3.1 Concrete Finishes

Concrete finishes shall comply with the performance requirements as stated in Appendix **XXX**.

13.3.2 Structure Metals

Welding shall be in accordance with the requirements of the ANSI/AASHTO/A WS DI. 5-96 Bridge Welding Code.

13.4 Deliverables

The Developer shall submit an inventory and operating ratings of constructed structures with the Record Set of Documents.