Texas Department of Transportation

TECHNICAL PROVISIONS

FOR

TXDOT SH 288 TOLL LANES PROJECT IN HARRIS COUNTY

February 28, 2014

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Attachment 2-1 – Project Management Plan Contents

Attachment 2-2 – Work Breakdown Structure Requirements

Attachment 2-3 - Toll Operation Documents Retention Schedule

Attachment 2-4 - I2MS Test Form Fields

Attachment 6-1 – Utility Forms

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Attachment 14-1 - Amendments for the TxDOT's Traffic Operations Manual, Railroad Operations Volume, February 2000

Attachment 19-1 – Performance and Measurement Table Baseline

Attachment 19-2 – Residual Life Requirements

1. GENERAL

1.1 Project Scope

The TxDOT SH 288 Toll Lanes Project in Harris County generally consists of the construction of Toll Lanes, installation of necessary tolling infrastructure, establishment of a tolling operation, and the maintenance and operation within an approximately 10 mile portion of SH 288 from US 59 to the Harris County line at Clear Creek in Harris County.

Developer's scope of work includes the Initial Configuration to be constructed upon NTP2. The Initial Configuration includes the Base Scope consisting of the following:

- The design, construction, financing, operation, and maintenance of four Toll Lanes within the median of SH 288 from a point south of the SH 288/US 59 interchange to a point south of Clear Creek and north of FM 2234 just south of the Harris/Brazoria County line; and
- The design, construction, financing, operation, and maintenance of eight direct connectors at Beltway ("BW") 8; and
- The financing, operation, and maintenance of the General Purpose Lanes and facilities along Project within the SH 288 ROW corridor.

The Initial Configuration must accommodate the Ultimate Configuration which includes the following:

- General Purpose Lane Capacity Improvements consisting of the addition of one General Purpose Lane in each direction from Interstate Highway ("IH") 610 to BW 8; and
- IH 610 Interchange Work consisting of the reconstruction of IH 610 general purpose lanes from West of Cambridge Street to Scott Street, including the reconstruction of the eight direct connectors at SH 288 and construction of a proposed exit ramp to Almeda Road.

In addition to the Base Scope, the Initial Configuration may also include:

- As set forth in Article 4.6 of the Agreement, design, construction, financing, operation and maintenance of the IH 610 Interchange Work.

In addition to the Initial Configuration, Developer's scope of work may include at a future date under NTP3:

- As set forth in Article 25.1 of the Agreement, design and construction of the General Purpose Lane Capacity Improvements.

Specific limits of the O&M Work within the longitudinal limits of the Project are shown in Attachment 1-1.

Developer's responsibilities and activities in respect to the acquisition of Project ROW are set forth in Article 10 of the Agreement and Section 7 of the Technical Provisions.

Developer shall perform all Utility Adjustments in accordance with Section 6 of the Technical Provisions and Article 11 of the Agreement.

1.2 Project Description

SH 288 is proposed for 25.2 miles of ultimate improvements from US 59 to County Road 60 crossing Harris and Brazoria Counties. TxDOT will undertake SH 288 improvements within Harris County, while Brazoria County retains primacy for SH 288 within Brazoria County and will undertake improvements within that County.

The CDA comprises 10.3 miles of these SH 288 improvements from the SH 288/US 59 interchange to a point south of Clear Creek and north of FM 2234 just south of the Harris/Brazoria County line.

Descriptions of the Work included in the CDA are found below and as generally shown in the schematic layouts provided in the RID.

1.2.1 SH 288 Toll Lanes Project in Harris County

- Location : From South of SH 288/US 59 interchange to South of Clear Creek and North of FM 2234
- Length : 10.3 miles
- Number of Initial Configuration Toll Lanes : 4 (2 proposed lanes each direction)
- Number of Initial Configuration General Purpose Lanes:
    - US 59 to IH 610 : 8 (4 existing lanes each direction)
    - IH 610 to Beltway 8 : 6 (3 existing lanes each direction)
    - Beltway 8 to Harris/Brazoria County Line : 6 (3 existing lanes each direction)
- Number of Ultimate Configuration General Purpose Lanes:
    - US 59 to IH 610 : 8 (4 existing lanes each direction)
    - IH 610 to Beltway 8 : 8 (4 proposed lanes each direction)
    - Beltway 8 to Harris/Brazoria County Line : 6 (3 existing lanes each direction)
- ROW : Existing TxDOT Right-of-Way *with exceptions as noted in environmental documents:*
    - Environmental Assessment: State Highway 288 – US 59 to CR 60 – Harris and Brazoria Counties
    - SH 288 Texas Medical Center Direct Connector (*pending approval*)
- Initial Configuration Direct Connector/Ramp Bridges (10):
    - Beltway 8 NB to EB
    - Beltway 8 NB to WB
    - Beltway 8 SB to EB
    - Beltway 8 SB to WB
    - Beltway 8 EB to NB
    - Beltway 8 EB to SB
    - Beltway 8 WB to NB
    - Beltway 8 WB to SB
    - Texas Medical Center Direct Connector Holcombe to SH 288 SB Toll Lanes
    - Texas Medical Center Direct Connector from SH 288 NB Toll Lanes to Holcombe
- Ultimate Configuration Direct Connector/Ramp Bridges (9):
    - IH 610 NB to EB (Option)
    - IH 610 NB to WB (Option)
    - IH 610 SB to EB (Option)
    - IH 610 SB to WB (Option)
    - IH 610 EB to NB (Option)
    - IH 610 EB to SB (Option)
    - IH 610 WB to NB (Option)
    - IH 610 WB to SB (Option)
    - IH 610 WB Direct Connector Ramp to NB Almeda (Option)
- Initial Configuration Toll Lane Bridges (15):
    - Blodgett
    - Wheeler
    - Cleburne
    - Brays Bayou
    - Holly Hall
    - IH 610
    - Holmes/UPRR
    - Bellfort

    - Reed
    - Airport
    - Sims Bayou
    - Orem
    - Almeda-Genoa
    - Beltway 8
    - Clear Creek
- Initial Configuration General Purpose Bridges (4):
    - Cleburne
    - Wheeler
    - Blodgett
    - Clear Creek
- Ultimate Configuration General Purpose Bridges (6):
    - Bellfort
    - Reed
    - Airport
    - Sims Bayou
    - Orem
    - Almeda-Genoa
- Initial Configuration Cross Street Bridges (1):
    - Southmore
- Ultimate Configuration Cross Street Bridges (2):
    - IH 610 at Almeda/Cambridge (Option)
    - IH 610 at SH 288 (Option)

1.3 Project Requirements

The Initial Configuration and Ultimate Configuration, shall include, but shall not be limited to, the construction components described below and as generally shown in the schematic drawings as attached to the Reference Information Documents (RIDs).

Developer shall prepare and submit a Project Segment Plan to TxDOT that divides the Project into one or more Project Segments. The combination of the scope of all Project Segments must equal the scope of the entire Project. The Project Segment Plan at minimum should include Project Segment limits, Toll Lane permanent logical termini, Project termini, and General Purpose Lane and other infrastructure transitions to existing infrastructure. Approval of the Project Segment Plan shall be a condition of NTP2.

Developer shall prepare and submit Project schematics to TxDOT that demonstrate the Proposer approaches to the Initial Configuration without IH 610 Interchange Work, Initial Configuration with IH 610 Interchange Work, and Ultimate Configuration. Developer's Initial Configuration schematics shall clearly present the future construction sequencing necessary to implement the design presented in the Developer's Ultimate Configuration schematic. Project schematics shall clearly present how costs to implement the Ultimate Configuration are minimized and avoid to the extent possible:

- Impacts to the Toll Lanes constructed with the Initial Configuration; and
- Demolition or reconstruction of elements constructed with the Initial Configuration.

<u>Developer may submit backup information in addition to the Project schematics to further justify how the designs presented in the Project schematics minimize future Ultimate Configuration development costs.</u>

1.3.1 Base Scope Requirements

1.3.1.1 SH 288 between US 59 and IH 610

The proposed Base Scope would retain four General Purpose Lanes in each direction along SH 288 with auxiliary lanes for entrance and exit ramps. The proposed Base Scope includes the following improvements:

- Construct two Toll Lanes in each direction within the SH 288 median, beginning just south of US 59; and
- Construct northbound exit ramp for Toll Lanes near US 59; and
- Construct southbound entrance ramp and northbound exit ramp for Toll Lanes between Binz Street and Southmore Boulevard; and
- Reconstruct overpass at Southmore Boulevard; and
- Widen existing SH 288 bridges at Cleburne, Wheeler and Blodgett; and
- Widen existing northbound and southbound General Purpose Lanes from Southmore to US 59 as necessary to accommodate the Toll Lanes.

1.3.1.2 SH 288 between IH 610 and Beltway 8

The proposed Base Scope would retain three General Purpose Lanes in each direction along SH 288 with auxiliary lanes for entrance and exit ramps. The proposed Base Scope includes the following improvements:

- Construct two Toll Lanes in each direction within the SH 288 median, from Bellfort to Beltway 8; and
- Construct Toll Lane bridges over Holly Hall, IH 610 Holmes Road/UPRR and Bellfort; and
- Construct Toll Lane bridges each direction over Reed, Airport, Sims Bayou, Orem, Almeda-Genoa, and BW 8 Frontage Roads; andConstruct southbound entrance ramp from General Purpose Lanes to Toll Lanes, between Reed Road and Airport Boulevard; and
- Construct northbound exit ramp from Toll Lanes to General Purpose Lanes, between Reed Road and Airport Boulevard; and
- Construct southbound exit ramp from General Purpose Lanes to frontage road, south of Almeda-Genoa Road.

1.3.1.3 Connection to the Texas Medical Connector

The proposed Base Scope in the Texas Medical Connector area includes the improvements listed below:

- Construct Texas Medical Center Connector from Holcombe to SH 288 SB Toll Lanes; and
- Construct Texas Medical Center Connector from SH 288 NB Toll Lanes to Holcombe.

1.3.1.4 SH 288 at Beltway 8 Interchange

The proposed Base Scope includes the following improvements:

- Construct two Toll Lanes in each direction within the SH 288 median; and
- Construct direct connectors in all eight directions. Direct connectors would provide access to BW 8 from SH 288 General Purpose Lanes and Toll Lanes from the south side of the interchange. Direct connectors would provide access to Beltway 8 from SH 288 Toll Lanes from the north side of the interchange.

1.3.1.5 SH 288 between Beltway 8 and Harris/Brazoria County Line

The proposed Base Scope would retain three General Purpose lanes in each direction along SH 288 with auxiliary lanes for entrance and exit ramps. The proposed Project includes the following improvements:

- Construct two Toll Lanes in each direction within the SH 288 median; and

- Widen or reconstruct southbound General Purpose Lane bridge at Clear Creek to accommodate the Southbound Beltway 8 Interchange Connector ramp and transition to existing southbound General Purpose Lanes; and
- End construction of two Toll Lanes in each direction within the SH 288 median 200' south of the southern abutment of the improved General Purpose Lane bridge at Clear Creek; and
- Realign southbound General Purpose Lanes and southbound entrance ramp to accommodate terminus of direct connectors from BW 8.

1.3.1.6 Beltway 8 Widening

The proposed Base Scope must accommodate Project improvements to be performed by the Harris County Toll Road Authority (HCTRA) for a widening project on Beltway 8 including entrance and exit ramp modification as designed by HCTRA. Developer will construct the Beltway 8 Direct Connectors to accommodate the following proposed HCTRA improvements:

- Forty-two (42) feet, five (5) inch minimum widening on the north and south sides of the existing BW 8 Sam Houston Tollway Bridge over SH 288; and
- Proposed westbound exit ramp from the Sam Houston Tollway westbound just west of Scott Street; and
- Proposed westbound entrance ramp to the Sam Houston Tollway just east of SH 288; and
- Proposed westbound exit ramp from the Sam Houston Tollway just west of SH 288; and
- Proposed westbound entrance ramp to the Sam Houston Tollway just east of Kirby Drive; and
- Proposed eastbound entrance ramp to the Sam Houston Tollway just west of Scott Street; and
- Proposed eastbound exit ramp from the Sam Houston Tollway just east of SH 288; and
- Proposed eastbound entrance ramp to the Sam Houston Tollway just west of SH 288; and
- Proposed eastbound exit ramp from the Sam Houston Tollway just east of Kirby Drive; and
- Thirty (30) feet, five (5) inches widening on the north and south sides of the existing Beltway 8 Sam Houston Tollway between entrance and exit ramps located between SH 288 and Scott Street; and
- Thirty (30) feet, five (5) inches widening on the north and south sides of the existing Beltway 8 Sam Houston Tollway between entrance and exit ramps located between Kirby Drive and SH 288; and
- Thirty (30) feet, five (5) inches widening on the north and south sides of the existing Beltway 8 Sam Houston Tollway bridge over Scott Street and tollway to the east of Scott Street; and
- Thirty (30) feet, five (5) inches widening on the north and south sides of the existing Beltway 8 Sam Houston Tollway bridge over Kirby Drive and tollway to the west of Kirby Drive.

1.3.2 Ultimate Configuration Requirements

1.3.2.1 General Purpose Lane Capacity Improvements

The proposed Ultimate Configuration would increase the number of the General Purpose Lanes in each direction along SH 288 between IH 610 and BW 8, with auxiliary lanes for entrance and exit ramps. Unless specifically removed below, all existing General Purpose Lane auxiliary lanes, entrance, and exit ramps are to be maintained or reconstructed. The proposed Ultimate Configuration includes the following improvements:

- Construct one additional General Purpose Lane in each direction; and
- Construct southbound exit ramp from Toll Lanes to General Purpose Lanes, south of Almeda-Genoa Road; and
- Construct southbound exit ramp from Toll Lanes to General Purpose Lanes, south of Reed Road; and

- Construct northbound entrance ramp from General Purpose Lanes to Toll Lanes, north of Almeda-Genoa Road; and
- Construct northbound entrance ramp from General Purpose Lanes to Toll Lanes, north of Reed Road; and
- Construct southbound exit ramp from General Purpose Lanes to Frontage Road, south of Almeda-Genoa Road; and
- Construct southbound connection from Frontage Road to access road, north of BW 8; and
- Construct southbound Frontage Road between Almeda-Genoa Road and BW 8; and
- Construct southbound entrance ramp from Frontage Road to General Purpose Lanes, north of BW 8; and
- Construct one northbound auxiliary lane between the northbound entrance ramp from Almeda-Genoa to the northbound General Purpose Lanes to the northbound exit ramp from General Purpose Lanes to Orem; and
- Construct one southbound auxiliary lane between the southbound entrance ramp from Orem to the southbound General Purpose Lanes to the southbound exit ramp from General Purpose Lanes to Almeda-Genoa; and
- Construct one northbound auxiliary lane between the northbound entrance ramp from Orem to the northbound General Purpose Lanes to the northbound exit ramp from General Purpose Lanes to Airport; and
- Construct one southbound auxiliary lane between the southbound entrance ramp from Airport to the southbound General Purpose Lanes to the southbound exit ramp from General Purpose Lanes to Orem; and
- Remove existing northbound exit ramp from northbound General Purpose Lanes to Bellfort; and
- Remove existing southbound entrance ramp from Bellfort to southbound General Purpose Lanes; and
- Extend two northbound auxiliary lanes from the northbound entrance ramp from Reed to northbound General Purpose Lanes to north of Bellfort; and
- Construct one additional auxiliary lane from north of Bellfort to the southbound exit ramp from the southbound General Purpose Lanes to Reed; and
- Widen or reconstruct existing SH 288 bridges at Airport Road, Sims Bayou, W. Orem Drive, and Bellfort to accommodate additional General Purpose lane and auxiliary lanes; and
- Widen or reconstruct existing bridges at Reed Road and Almeda-Genoa Road to accommodate additional General Purpose Lane and the General Purpose Lane to Toll Lane entrance and exit ramps.

1.3.2.2 IH 610 Interchange Work

The proposed Ultimate Configuration includes the following improvements:

- Construct direct connectors in all eight directions at the IH 610 Interchange. Direct connectors would provide access to IH 610 from SH 288 General Purpose Lanes; and
- Construct entrance and exit ramps from IH 610 main lanes to frontage roads in both eastbound and westbound directions on both the east and west sides of the IH 610 Interchange; and
- Reconstruct of the IH 610 General Purpose Lanes from west of Cambridge Street to west of Scott Street; and
- Construct exit ramp to northbound Almeda Road from the northbound SH 288 to westbound IH 610 direct connector (General Purpose Lanes); and
- Construct entrance ramp from the IH 610 eastbound Frontage Road to access the eastbound direct connector from IH 610 general purpose lanes to SH 288 (to General Purpose Lanes); and

- Extend Cambridge Street south of IH 610 (IH 610 main lanes would be elevated over Cambridge Street); and
- Remove existing eastbound entrance ramp to IH 610 between Fannin Street and Almeda Road; and
- Remove existing westbound exit ramp from IH 610 between Almeda Road and Fannin Street; and
- Holly Hall improvements.

1.3.3 Brazoria County Works

The design, development and construction of the Brazoria County Works, which are the SH 288 Project elements south of the point 200' south of the southern abutment of the improved General Purpose Lane bridge at Clear Creek and within Brazoria County, will be undertaken by Brazoria County and include all work. Brazoria County will maintain and operate all Brazoria County Works.

The Brazoria County Works are anticipated to be undertaken concurrent to the development of the SH 288 Toll Lanes Project in Harris County, with coinciding dates of Substantial Completion. A Project Development Agreement is being developed between TxDOT and Brazoria County defining the responsibilities of the development of adjoining projects.

1.3.4 Coordination with Brazoria County

Developer shall coordinate with Brazoria County and shall locate, configure and design the SH 288 Toll Lanes Project in Harris County including its transition to the Brazoria County Works so that the SH 288 Toll Lanes Project in Harris County is compatible and integrated with the Brazoria County Works and provides a smooth, safe transition of traffic (and other infrastructure) to and from each adjoining project, which includes but is not limited to design, environmental requirements, ROW acquisition, utility adjustments, geotechnical investigation, land surveying, earthworks, pavement construction, drainage, construction of Highway structures, landscaping, pavement marking, signing, lighting and traffic control. Refer to Article 24.1 of the Agreement for further requirements regarding coordination.

1.4 Design-Build Phase

All Developer Design Work and Construction Work shall be in compliance with the Technical Provisions and Good Industry Practice.

Developer shall coordinate with TxDOT and adjacent Governmental Entities and other third parties as appropriate to determine the design criteria, standards, and specifications of those components of the Work which Developer will construct but which are maintained by others as specified in the Agreement. For components of the Work which impact the infrastructure of any Governmental Entity or third party entity, Developer's design shall conform to design requirements of such entity.

1.5 Operations and Maintenance (O&M Work) Requirements

All O&M Work shall be in compliance with the Technical Provisions and Good Industry Practice. The Developer shall refer to Attachment 1-1 for the specific limits of the Project's O&M Work.

1.6 Initial Configuration

Upon NTP2, Developer shall design, construct, finance, operate and maintain the Initial Configuration as described in the above Project requirements and the approved NEPA Schematic as attached in the RIDs.

1.6.1 Compatibility with the Ultimate Configuration

Developer shall design the Initial Configuration to minimize sections of the Initial Configuration that will become redundant to meet the requirements of the future Ultimate Configuration unless in accordance with the CDA documents. The design shall provide for minimal disruption to traffic and toll collection operations during the Ultimate Configuration construction phase. Prior to construction of the Initial Configuration, Developer shall provide to TxDOT a schematic level design showing the transition from the Initial Configuration to the Ultimate Configuration. Such design shall include a draft sequence of construction plan, a preliminary traffic control plan, horizontal and vertical alignments, wall locations, cross-sections, and bridge layouts in accordance with TxDOT's Project Development Process Manual, Chapter 2, Section 4 – Preliminary Schematics, paragraph 2360 – Develop Typical Sections.

1.7 Ultimate Configuration

Developer shall design, construct, operate and maintain the Ultimate Configuration as described in the above Project requirements and the approved NEPA Schematic as attached in the RIDs. Developer shall construct the Ultimate Configuration during the Term of the Agreement as required by traffic demand trigger as further detailed in Article 25 of the CDA. TxDOT will finance the design and construction of the Ultimate Configuration.

2. PROJECT MANAGEMENT

Developer shall establish and maintain an organization that effectively manages all Elements of the Work. This Project management effort shall be defined by and follow the Project Management Plan (PMP), which is a collection of several management plan Elements (PMP Elements) describing discrete Elements of the Work as described in Table 2-1 below. The Project Management Plan is an umbrella document that describes Developer's managerial approach, strategy, and quality procedures to design, build, operate, and maintain the Project and to achieve all requirements of the CDA Documents. Each PMP Element shall clearly and concisely define the Developer staff responsible for implementing the PMP Element, the procedures for implementing the PMP Element, and the timing, duration, and occurrence of implementing the PMP Element throughout the Term of the Agreement. As the Work progresses, certain portions of the Work will commence in the Operating Period, other portions will transition into the Operating Period, and other portions will still be in the Design-Build Phase (DB Phase). Unless specified otherwise in the CDA Documents, the PMP Elements shall clearly differentiate between the management activities during the DB Phase and Operating Period, and address the appropriate transition issues when Developer shifts from the DB Phase to the Operating Period.

Within the timelines established for implementing each Element of the PMP, the plan shall include details of external auditing procedures.

Table 2-1: Elements of the Project Management Plan

Chapter Title	Section of Technical Provisions That Defines the Chapter Requirements
Project Administration	Section 2
Quality Management Plan • **Design Quality Management Plan** • **Construction Quality Management Plan** • **Maintenance Management Plan** • **Operations Management Plan**	Sections 2, 19, 21 and 22
Comprehensive Environmental Protection Program	Section 4
Public Information and Communications • **Public, Local Government Entities, and Stakeholders** • **Developer Entities**	Section 3
Safety and Health Plan	Section 2
TxDOT – Developer Communications Plan	Section 2
Right of Way Acquisition Plan	Section 7

Cost Management Plan	Section 2
Risk Management Plan	Section 2
Tolling Plan	Section 21

A listing of documents to be included in the Project Management Plan is contained in Attachment 2-1, Project Management Plan Contents, which also indicates when each document must be submitted to TxDOT.

TxDOT and the Independent Engineer will audit and monitor the activities described in the management plans to assess Developer performance. All commitments and requirements contained in the PMP shall be verifiable.

2.1 Administrative Requirements

2.1.1 Project Schedule

2.1.1.1 General Requirements

Developer shall develop a Project Schedule that defines the timeframe for completion of the Project and achievement of milestones, and shall use such Project Schedule to monitor progress and denote changes that occur during design, construction, operations and maintenance as well as servingto determine the amount due to Developer for a progress payment, if applicable.

Before the commencement of any Schedule Activity, Developer shall submit to TxDOT for review and approval a Project Baseline Schedule (PBS) in accordance with the Work Breakdown Structure (WBS) described in Attachment 2-2, Work Breakdown Structure Requirements.The scheduling software employed by Developer shall be compatible with the current and any future scheduling software employed by TxDOT Compatible shall mean that TxDOT may load or import, as applicable, any Developer-provided electronic file version of a schedule using TxDOT's scheduling software without modifications, preparation, or adjustments to such software to do so.

Developer shall manage and execute the Work using schedules developed for management and execution of the DB Phase, the Project Baseline Schedule (PBS) and for activity related to O&M Work, Renewal Work, and the Renewal Work Schedule.

2.1.1.2 Project Baseline Schedule (PBS)

2.1.1.2.1 General

Developer shall use the Preliminary Project Baseline Schedule (PBS-1) submitted with the Proposal as a foundation to prepare a PBS and shall submit the Project Baseline Schedule (PBS-2) to TxDOT for review and approval. Developer shall submit the PBS to TxDOT with a reasonable amount of time for TxDOT review prior to NTP2. TxDOT will review the PBS within 30 days of submission. In the event that TxDOT does not accept the PBS , Developer shall revise and resubmit it with changes clearly identified. TxDOT will review each resubmission of the Project Baseline Schedule within 14 days of resubmission. Approval of the Project Baseline Schedule (PBS-2) shall be a condition of NTP2. Developer shall progress and update the PBS through schedule updates until a subsequent version of the PBS is approved by TxDOT.

Developer shall submit a hardcopy of the PBS on full-size (11" x 17") color plot sheets, as well as an electronic version of the schedule in its native format for each submittal along with the Project Schedule narrative.

Developer is solely responsible for planning and executing the Work; TxDOT's approval of the PBS does not:

- Imply approval of any construction methods or relieve Developer's responsibility to provide sufficient materials, equipment, and labor to guarantee completion of the Project in accordance with the Contract Documents.
- Attest to the validity of assumptions, activities, relationships, sequences or any other aspect of the PBS.

Failure of Developer to include any element of the Work required by the Contract Documents in the approved PBS does not relieve Developer of the responsibility to perform such Work

2.1.1.2.2 **Project Baseline Schedule OverviewDeveloper shall develop and implement the PBS in the following stages:**

a) PBS-1: Preliminary Project Baseline Schedule submitted with Developer's proposal.

b) PBS-2: Developer shall use the Preliminary Project Baseline Schedule (PBS-1) as a foundation to prepare PBS-2 and shall submit the PBS-2 to TxDOT for review and approval in advance of NTP2. PBS-2 shall reflect the intended execution plan meeting all schedule requirements.

   Developer shall incorporate the final design elements into the PBS-2 schedule updates as Release for Construction (RFC) plans are completed. Activity quantities related to Schedule of Value costs shall be based upon Developer's proposed design. The data date for PBS-2 shall be the date of NTP1. Developer shall progress and update the approved PBS-2 monthly until a subsequent version is approved.

c) PBS-3: Developer shall submit PBS-3 to TxDOT on or before six (6) months after NTP2 and shall reflect all final design elements to date, final quantity assessment for each scheduled construction activity, the updated plan and completed Schedule of Values reflecting final design. Developer shall update PBS-3 monthly until a subsequent version (PBS-3+) is approved or the Service Commencement Date, whichever is earlier.

Developer shall submit to TxDOT a Revised Project Baseline Schedule within 14 days after each Change Order, Relief Event or Compensation Event is executed. All approved Change Orders, Relief Event or Compensation Events shall be incorporated into the originally planned execution of the Work. TxDOT shall confirm in writing the approval of each Revised Project Baseline Schedule. The approved PBS or current approved revised PBS shall remain in force until a subsequent PBS or revised PBS is approved by TxDOT.

Developer shall include a separate narrative report with each PBS which describes the general sequence of design and construction, the proposed Critical Path , and all Milestone Schedule Deadlines.

Developer shall develop the PBS in accordance with the WBS, the minimum requirements of which are included in Attachment 2-2, Work Breakdown Structure Requirements, and the cost and resource loading requirements set forth in Table 2-2 and submit the PBS to TxDOT for review and approval. Developer shall map each Schedule Activity described in the PBS to one of the WBS levels and describe each work area of the Work to the same level of detail. At a minimum for reporting Project costs, Developer shall

utilize the organizational structure included in Attachment 2-5, Organizational Structure for Cost Reporting..

Table 2-2: Schedule Level-of-Detail Requirements

Discipline	Detail	PBS-1	PBS-2	PBS-3+
Right-of-Way Acquisition	WBS Level	4	All levels	All levels
	Cost Loading	No	No	No
	Resource Loading	No	No	No
	Maximum duration of Schedule Activity	No maximum	20 Days[1]	20 Days[1]
Preconstruction Submittals & Permitting	WBS Level	4	All levels	All levels
	Cost Loading	No	No	No
	Resource Loading	No	No	No
	Maximum duration of Schedule Activity	No maximum	20 Days[1]	20 Days[1]
Utility Coordination	WBS Level	4	All levels	All levels
	Cost Loading	No	No	No
	Resource Loading	No	No	No
	Maximum duration of Schedule Activity	No maximum	20 Days[1]	20 Days[1]
Design	WBS Level	4	All levels	All levels
	Cost Loading	No	No	No
	Resource Loading	No	No	No
	Maximum duration of Schedule Activity	No maximum	20 Days[1]	20 Days[1]
Utility Relocation	WBS Level	5	5	All levels
	Cost Loading	No	Yes	Yes
	Resource Loading	No	No	Yes
	Maximum duration of Schedule Activity	No maximum	No maximum	20 Days[1]
Construction	WBS Level	4	4	All levels
	Cost Loading	No	Yes	Yes
	Resource Loading	No	No	Yes
	Maximum duration of Schedule Activity	No maximum	No maximum	20 Days[1]

[1]Or as otherwise approved by TxDOT.

2.1.1.2.3 Project Baseline Schedule Requirements

Developer shall define a complete and logical plan that can realistically be accomplished for executing the Work and the PBS shall reflect such plan. The PBS shall:

a) Reflect the proposed approach to accomplish the Work;

b) Include all major activities of Work required by the Contract Documents and also include activities for property acquisitions, Utility Adjustments, permit acquisitions, and interfaces with other projects and Governmental Entities;

c) Indicate the sequence of performing each major activity and the logical dependencies and inter-relationships among the activities and shall provide a sufficient number of activities to assure adequate planning to allow monitoring and evaluation of progress and, if applicable, payments; and

d) Include a listing of all submittals and submittal activity durations including specific durations for TxDOT review and/or approval of Developer's submittals.

2.1.1.2.4 Project Baseline Schedule Coding

Developer shall utilize an activity coding structure for the PBS that allows project activities to be sorted by type of work and location of work, or as mutually agreed to by Developer and TxDOT. Developer shall assign each activity an activity code for each Work element to indicate the type of work related to the activity. Activity codes shall be Global Code values and shall be as indicated in Table 2-3 below.

Table 2-3: "Type of Work" Code Values

Code Value	Description
AGGREGATE	Granular Base
CLEAR&GRUB	Clear & Grub, Removal
DEMO	Building demolition, other
DESIGN	Design, studies, RFC package deliverables
DRAINAGE	Pipe, Box Culvert, Headwall
EXCAVATION	Cut, fill, excavate
FLATWORK	Curb, gutter, sidewalks
LANDSCAPE	Topsoil, mulch, seeding
MOT	Maintenance of Traffic
PAVING	Concrete, Asphalt,etc.
PROCURE	Procurement of materials
ROW	Right-of-Way
SIGNALS	Signals, foundations, poles
SIGNING	Signing - Permanent
STRIPING	Striping - Permanent
SUBSTRUCTURE	Foundation, Columns, Bent, Piles, Abutments (bridge)

SUPERSTRUCTURE	Girders, Deck, Approach Slabs, Parapet, Polymer Overlay (bridge)
SURCHARGE	Consolidation & Settlement Times
TRAIL	Trails - Pedestrian & Bike
UTILITY-COMM	Utility Communication
UTILITY-GAS	Utility Gas
UTILITY-POWER	Utility Power
UTILITY-WATER	Utility Water/Irrigation/Sewer
UTILITY - OTHER	Other Miscellaneous Utilities
WALLS	Noise, MSE, Retaining
NA	Not Applicable – Not on Mainline, Misc, LOE, etc. (Misc. programmatic activities not categorized by Type of Work code)

2.1.1.2.5 Work Breakdown Structure

Developer shall organize the PBS in a manner consistent with the WBS. Developer may add WBS elements and/or levels to those presented in Attachment 2-2 with TxDOT's written approval. Developer shall further develop and detail the initial WBS in accordance with its specific Schedule Activities and retain the ability to summarize to at least the same level as shown in Attachment 2-2 or as approved by TxDOT. Developer shall assign the WBS structure consistently and uniformly among all similar activity types and shall develop the WBS with clearly identifiable linkage to the Schedule of Values and Schedule Activities.

2.1.1.2.6 Calendars

Developer shall define calendars as follows:

a) TxDOT holidays are non-work days.

b) Project calendar descriptions shall begin with a unique project identifier.

c) The application of "Standard" Primavera calendars is not acceptable.

d) Potential non-work weather days are identified and included in each calendar's work month.

e) Adequately represent non-work days associated with limitations (such as paving seasons, utility shutdown seasons, landscaping seasons, etc.)

f) A 7-day calendar to be utilized for cure, settlement, and other activities as appropriate is included.

g) Project calendars are assigned consistently among similar activity types.

2.1.1.2.7 Milestones/Constraints

Developer shall separately identify each Completion Deadline, conform such Completion Deadline to the scheduling requirements set forth in the Milestone Schedule, and assign a "finish no later than" constraint date to such Completion Deadline. Developer shall include additional milestones in the PBS to define significant events such as NTPs, Substantial Completion, Final Acceptance, start and finish of major

segments/areas/regions of work, major traffic changes and coordination points with outside entities, such as Utilities.

The PBS shall not contain any constrained activities, other than contract milestones, without TxDOT approval. Utilization of constraints following the PBS-2 approval will be allowed only with TxDOT approval.

2.1.1.2.8 Activities

Developer shall describe activities with a unique and logical activity description to easily identify the specific activity so that the scope of work is identifiable and progress on each activity can be measured. Each activity description shall indicate its associated scope and location of work such as type of work, bridge number, station to station locations, side of highway, pipe number, etc. and shall include a verb in the activity description to indicate the action undertaken such as install, place, fabricate, etc. Developer shall create Schedule Activities so that the Work is broken down into similar manageable work elements with greater detail added as the schedule progresses from PBS-1 to PBS-3 (for example, Developer shall break down bridges minimally into foundations, substructure, superstructure, and deck for PBS-3.)

Developer shall define the duration of each activity and shall limit the maximum duration according to Table 2-2 unless otherwise approved by TxDOT. Exceptions could include non-work type activities such as mobilization, design, fabrication, settlement durations, curing and long lead procurement items. The duration for each activity shall be the time required to complete the Work based on the quantity of Work divided by reasonably anticipated production rates when applicable. Developer shall include separate activities for cure time, major inspection points requiring preparation, submittal periods, environmental approvals and other time consuming activities.

Developer shall clearly identify the relationships and logic that tie activities together. Each activity is to have at least one predecessor and one successor activity, except for NTP and Substantial Completion milestones. Unnecessary relationships or excessive ties to end milestones shall be avoided.

2.1.1.2.9 Miscellaneous

In developing schedules, Developer shall use schedule software settings similar to Primavera schedule software settings, if not using Primavera, as follows:

a) *Define critical activities as Longest Path* schedule option setting in lieu of *Total Float Less Than or Equal To x*.

b) *Retained Logic* schedule option setting to calculate the Critical Path and controlling activities in the PBS and subsequent schedule updates.

c) Highlight critical Path in red on all schedules to distinguish critical Schedule Activities from other Schedule Activities and Float shown for all Schedule Activities.

d) *Use Leveling Resources* schedule option only with prior notification to and concurrence of schedule update procedures by TxDOT.

Developer shall cost-load the PBS as follows:

a) Provide a sufficient number of activities so that the budget of any one activity does not exceed $1.0 million in the PBS-3 schedule, unless otherwise approved by TxDOT.

b) Allocate the total dollar amount that represents all of the Work that is reimbursable under Federal Law by the Price throughout the Payment Activities in the PBS. Such allocation shall not artificially inflate, imbalance, or front-load line items.

c) Developer shall prorate its indirect costs such as project management, administration, contingencies, site cleanup and maintenance and security costs related to design-build costs through all Payment Activities.

Developer shall revise the cost loading during the course of the Project in Project Baseline Schedule Updates if it becomes necessary to add, combine, eliminate, or modify Payment Activities or Schedule Activities to reflect modifications to the Work due to an executed Change Order. Developer shall add into the schedule Change Orders as they are approved by TxDOT with appropriate activities, resources, and units/budget to represent the modified scope of work. Developer shall include a WBS level for each executed Change Order under the "Change Modification" level of the cost breakdown structure (Attachment 2-3). Developer shall map all costs, if applicable, to the Change Order WBS level accordingly.

If applicable, Developer shall request revisions to the PBS and consequent realignment of funds between Payment Activities through Compensation or Relief Event Notices. The total cost in the schedule shall match the total Project cost inclusive of all approved Change Orders. As activities are added or split out in the course of revising a schedule update, units/budget for those activities shall also be re-allocated to represent the appropriate quantity to accomplish the Work within the activity duration.

Developer shall incorporate all executed Change Orders into the originally planned execution of the Work and submit to TxDOT a revised PBS within 10 days after each Change Order is executed.

2.1.1.2.10 **Float**

Developer shall not sequester total project Float through manipulating calendars, extending activities durations or any other such methodology. Float suppression techniques, negative Float, and Schedule Activity durations, logic ties, and/or sequences deemed unreasonable by TxDOT shall not be used. Float shall not be for the exclusive use of or benefit of either TxDOT or Developer but shall be a jointly owned, expiring resource available to the Project. Float shall not be used to the financial detriment of either party. Any schedule, including the PBS and all updates thereto, showing an early Substantial Completion Date shall show the time between the scheduled Substantial Completion Date and the applicable Milestone Schedule Deadline as the "Total Float" of the Project.

2.1.1.2.11 **Schedule of Values**

Concurrent with the PBS, Developer shall submit to TxDOT a complete Schedule of Values for all Payment Activities for TxDOT's approval. TxDOT's approval of the Schedule of Values is a condition of NTP2. If applicable, no payment by TxDOT will be made until the Schedule of Values is approved by TxDOT.

Pertaining to the presentation of the Schedule of Values:

a) Developer shall organize and group Payment Activities according to the approved WBS with subtotals for each WBS item at each WBS level. There can be one or more Payment Activity for each of the lowest (terminal) WBS elements in the WBS. For example, earthwork could have one Payment Activity or multiple Payment Activities that roll up costs to the WBS Level element.

b) Each Payment Activity from the PBS shall contain a unique identification number, the activity description, the quantity, the applicable unit, the unit price and scheduled cost value.

The Schedule of Values shall contain separate activities for temporary roads for access, off-site access roads, Project clean-up as well as planned maintenance, as applicable, to capture budgeted costs. Developer shall prorate its Project management, administration, quality assurance and quality control ,

contingencies and any allowance for inflation, profit and financing, as well as site security through all Payment Activities so that the sum of all the Schedule of Values line items equals the total Project cost.

If it becomes necessary to add, combine, eliminate or modify any Payment Activities due to changes in the Work, Developer shall submit a revised Schedule of Values as derived from a revised PBS within 10 days after the respective Change Order is executed. TxDOT will review the submittal and within 15 days of submission, return it to Developer as approved or returned for resubmission within 5 days from the date of receipt by Developer. Developer shall repeat the submittal process until receiving TxDOT approval of the submittal.

2.1.1.2.12 **Progress Report**

Each month, beginning with the first full month after NTP2, Developer shall submit to TxDOT the Progress Report. Developer shall submit the Progress Report by close of business within seven (7) days following prior month's end. Developer shall submit an electronic and printed copy of the entire Progress Report to TxDOT.

The Progress Report shall contain a narrative which shall include the following items:

a) Description of progress for each section and the Project as a whole, including all phases of Work. Identify start date and completion dates on major areas of Work. Group the information based on the WBS.
b) Summary Quality Assurance/Quality Control findings.
c) Listing of any Change Orders that were identified or executed during the period from the submission of the previous month's progress report to the submission of the current progress report. Include their status.
d) Identification of Schedule Activities planned for the upcoming period.
e) Identification of problems and issues that arose during the period from the submission of the previous month's progress report to the submission of the current progress report and issues that remain to be resolved.
f) Summary of resolution of problems/issues raised in previous progress reports or resolved during the period from the submission of the previous month's progress report to the submission of the current progress report.
g) Identification of Critical Path issues and proposed resolution.
h) A report on the Completion Deadlines showing the schedule dates for the immediate prior month and current month. A narrative is required to explain why the dates have changed for variances greater than thirty (30) days.
i) A monthly expenditure projection curves for the total Project.
j) Identification of requested and/or required TxDOT actions for the next month.
k) Digital progress photographs that accurately depict Project progress as outlined in the progress report narrative.

2.1.1.2.13 **Project Baseline Schedule Narrative**

Developer shall provide a schedule narrative with PBS-2 and subsequent PBS submittals. In developing the schedule narrative, Developer shall:

a) Describe the construction philosophy supporting the Work plan and approach to the Work outlined in the PBS.

b) Describe the approach used to apply relationships between activities, such as physical or chronological relationships between work activities, sequencing due to crew or equipment resources, or timing of Work based on limitations (such as ROW, environmental, utilities, etc.).

c) Describe any limited resources, potential conflicts, or other salient items that may affect the schedule and how they will be resolved.

d) Describe the Critical Path and identify challenges that may arise associated with the Critical Path.

e) Describe adverse weather sources and calculations used for assumptions in determining potential non-work weather days.

f) Describe activity coding structures and how they will be used.

g) Provide a list of planned resources describing crews, crew size, major equipment, and production rates. The work force listing shall include only planned resources available to Developer.

h) Provide a list of applicable activities and justification for usage of:

- Activities with durations exceeding 20 days
- Constraints
- Unusual calendars
- Assumptions and calculations for non-work weather days added to calendars
- Lag

Along with the schedule narrative, Developer shall include layouts, in pdf format, generated from the scheduling software to illustrate the following:

- Developer's approach to Work (based on WBS or other applicable coding) including, at a minimum, columns for activity ID, activity name, start, finish, original duration, remaining duration, total Float, longest path, budgeted cost, and Gantt chart;
- Longest path layout; and
- Other layouts or reports as agreed upon with TxDOT.

2.1.1.2.14 **Project Baseline Schedule Submission**

Developer shall establish a sequential numbering system for schedule submittals and associated reports to allow easy identification of PBSs, schedule updates and re-submissions. All schedules, charts and diagrams shall display the project title, the data date and a legend indicating the various symbols used and their meanings. Developer shall provide the following for each schedule submittal:

a) One electronic copy in native software of the schedule;

b) One electronic copy in pdf format of the narrative report; and

c) One electronic copy in pdf format of layouts as generated from the scheduling software.

TxDOT will review the schedule submittal and within 10 days of submission, return it to Developer as approved, approved with comments to be addressed in the following schedule update, or returned for resubmission within 10 days from the date of receipt by Developer. Developer shall repeat the submittal process until receiving TxDOT approval of the submittal.

2.1.1.3 Project Baseline Schedule Updates

2.1.1.3.1 <u>Project Baseline Schedule Update Requirements</u>

Developer shall provide schedule updates that comply with all PBS requirements. Data dates for schedule updates shall be the day after the progress period closes. No changes in activity durations, calendar assignments, logic ties, or constraints will be allowed without TxDOT's written approval. Developer shall show actual progress for each activity in the schedule updates such as:

a) Actual start and finish dates for completed activities;

b) Actual start dates, physical percent complete and remaining duration for activities in progress;

c) Projected sequences of activities for future work;

d) Revised relationships and durations for unfinished activities, if warranted; and

e) A well-defined Critical Path.

For each schedule update, Developer shall ensure that:

a) Planned budget values match total Project cost or revised total Project cost inclusive of all authorized Change Orders; and

b) All planning changes, adjustments, or revisions in sequencing and timing of the remaining Work are accurately represented.

If Work is performed out of sequence, Developer is required to implement logic changes consistent with the retained logic method of scheduling to allow the out-of-sequence Work to proceed.

Through schedule updates, Developer may demonstrate proposed modifications to planned Work that require adding or deleting activities, changing activity descriptions, or revising activity durations or logic that are consistent with the following requirements:

a) No changes are to disrupt the integrity or comparative relationship between current and previously approved PBSs or schedule updates;

b) An activity ID can only be used once (i.e., do not delete an activity then create a new activity at a later date utilizing the same activity ID);

c) Activity descriptions may be revised for clarification, but are not to be altered to represent a different scope than originally intended. For example, an earthwork activity may be further defined by adding station limits but the description cannot be changed to concrete paving with related logic ties; and

d) If changes impacting the Critical Path result in an extension of the Substantial Completion Deadline, beyond contractual limits, Developer shall be required to submit a time impact analysis.

2.1.1.3.2 <u>Project Baseline Schedule Update Narrative</u>

Developer shall provide a narrative with each schedule update submittal. In developing the narrative for the schedule update, Developer shall:

a) Describe the Work performed during the progress period. Describe progress for each segment/section and the Project as a whole, including all phases of Work and interim milestones organized and reported by the defined WBS;

b) Provide a summary of Quality Assurance / Quality Control issues that can potentially affect the CPM model;

c) Explain deviations between the Work planned and the Work performed for the period;

d) Describe the Work to be accomplished during the next period;

e) Describe the current Critical Path of the Project, explaining any changes since the previous update as well as potential issues and proposed resolutions;

f) Explain significant changes to the schedule since the previous update;

- Provide the reason or justification for the changes, and
- Describe any resulting affects or impacts to the Project Schedule. Particular focus should be on any changes that affect critical or near-Critical Paths.
- Explain changes to:
  - Calendar
  - Activity unit/budget allocations
  - Planned resource (crew) allocations that deviate from the baseline work plan
  - Critical Path

g) Identify requested and/or required TxDOT actions, if applicable, for the next month;

h) Provide the status on pending items applicable to the schedule such as:

- Permits, easements, agreements
- Contract changes or time adjustments
- Change Orders that were executed during the period from the submission of the previous month's progress report to the submission of the current progress report
- Time Impact Analyses

i) Describe current and anticipated problems or delays including:

- Listing of current/anticipated problems and/or delays with cause and effect on work, milestones and completion dates. A summary of the resolutions (status) to the problems and/or delays listed above (resolved, ongoing or anticipated).
- Developer's plans on how to mitigate or resolve ongoing and/or anticipated problems and/or delays.
- Identification of action TxDOT needs to take and required timeline for actions to be taken, to avoid or mitigate the problem.

A discussion of problems or delay in the schedule update narrative does not relieve Developer of complying with contractual requirements regarding notification and documentation of claims.

If any actual dates are changed or corrected in any subsequent month, Developer shall submit a separate narrative with the schedule update providing an explanation of the change.

Along with the schedule update narrative, Developer shall include layouts, in pdf format, generated from the scheduling software to illustrate the following:

a) Layout to demonstrate Developer's approach and progress of work based on WBS or other

applicable coding. At a minimum include columns for activity ID, activity name, start, finish, original duration, remaining duration, total Float, budgeted cost, and Gantt chart. The Gantt chart shall contain current planned bars and baseline / target bars that represent the previous period's progress forecast;

b) Longest Path layout organized by WBS and sorted by early start;

c) A 90-day look ahead Gantt chart showing all upcoming Submittals from Developer and approvals required by TxDOT or other Governmental Entities;

d) A 90-day look ahead Gantt chart grouped by WBS and sorted by early start date;

e) Graphical report which compares Developer's actual monthly progress to the previous month's planned progress, organized by WBS;

f) A 90-day look ahead Gantt chart of Design document submittals for the forthcoming period;

g) Monthly expenditure projections and cash expenditure curves by WBS or as requested by TxDOT, if applicable; and

h) Other layouts or reports as agreed upon or requested by TxDOT.

Progress payment requests, if applicable, shall accompany the schedule update narrative.

In addition to the schedule update narrative, Developer shall provide a separate report on the Milestone Schedule Deadlines showing the schedule dates for the immediate prior month and the current month. For variances greater than 30 days, Developer shall include a narrative to explain why the dates have changed.

2.1.1.4 Project Baseline Schedule Update Submission

Developer shall submit to TxDOT the schedule update, narrative and agreed upon layouts or reports each month during the Term beginning with the first full month after NTP2. Developer shall provide the following for each schedule update submittal:

a) One electronic copy in native software of the schedule file;

b) one electronic copy in pdf format of narrative report;

c) one electronic copy in pdf format of, agreed upon, layouts/reports as generated from the scheduling software; and

d) The project narrative as described in Section 2.1.1.3.2 above.

TxDOT will review schedule updates for consistency with Developer's WBS and the currently approved PBS and for conformance with the Contract Documents. TxDOT will return the schedule updates to Developer as approved, approved with comments to be addressed in the following schedule update, or not approved with comments to be incorporated for resubmission within 10 Days of receipt by Developer. The submittal process shall be repeated until receiving TxDOT approval of the submittal.

2.1.1.5 Renewal Work Schedule

Developer shall assemble a separate critical path method (CPM) schedule to coordinate, manage and construct O&M Work and Renewal Work. Before Service Commencement can occur, Developer shall expand and complete the Renewal Work Schedule submitted with the Proposal and submit the completed Renewal Work Schedule to TxDOT for review. The Renewal Work Schedule shall be sufficiently detailed to indicate the timing of O&M Work, Renewal Work, planned Capacity Improvements, and

planned Upgrades, and shall be consistent with the requirements contained in Sections 19 (Maintenance) and 22 (Operations).

The Renewal Work Schedule shall be developed utilizing the WBS and conform to the Project Baseline Schedule requirement or as approved by TxDOT.

2.1.1.6 As-Built Schedule

Upon completion of the Punch List, Developer shall submit the schedule update identified as the "as-built schedule". The "as-built schedule" shall reflect the exact manner in which the Work up to Final Acceptance, as described by the Contract Documents, was actually performed including start and completion dates, Schedule Activities, actual durations, sequences and logic.

2.1.1.7 Time Impact Analysis

Developer shall submit to TxDOT a written time impact analysis (TIA) in each of the following situations:

a) As part of a Relief Request or Compensation Event Notice based on a delay as set forth in the Contract Documents.

b) If any changes in a schedule update impact the Critical Path, such that they create an extension of the Substantial Completion Date beyond the Substantial Completion Deadline.

c) If Developer has claim for delay. Developer shall submit a separate TIA for each delay event.

TxDOT may request, at any time, a TIA demonstrating impact or potential impact to the schedule resulting from claimed delays or Change Orders which are being negotiated between TxDOT and Developer. If TxDOT requests a TIA, Developer shall submit the requested TIA within 15 Days of receiving the request. TxDOT will return the TIA to Developer as approved or not approved with comments to be incorporated for resubmission within 5 Days of receipt by Developer. The submittal process shall be repeated until receiving TxDOT approval of the submittal.

Submission of a TIA does not relieve Developer of complying with all contractual requirements regarding notification and documentation of potential Change Orders.

Time extensions will only be considered if:

a) The delay event is demonstrated to affect the controlling operation on the Critical Path. Changes that do not affect the Critical Path will not be considered as the basis for a time adjustment.

b) The total Float is absorbed and the scheduled Completion Deadline is delayed one or more Days because of the change or impact.

c) In the case of multiple lines of negative Float, the change or delay must cause the affected path to exceed all others before a time extension will be granted.

Each TIA submitted by Developer shall consist of the following steps or elements:

a) Establish the status of the Project before the impact by using the most recent schedule update that has the closest data date prior to the event for TIA, or as adjusted by mutual agreement.

b) Identify the impact event, estimate duration of the impact, determine appropriate logic, and insert the impact activity or fragnet of activities into the schedule.

c) Demonstrate any resulting affects from the impact through layouts generated from the scheduling software. Filter activities to show added or modified activities and activities impacted from

changes. Note any other changes made to the schedule including modifications to the calendars or constraints.

d) If the current Project baseline schedule update is revised subsequent to submittal of a TIA but prior to its acceptance, promptly indicate, in writing, to TxDOT the need for any modification to its TIA.

Developer shall submit the following with each TIA Submittal:

a. A narrative report which:

- Identifies the schedule update(s) used for analysis.
- Describes the procedures used to analyze schedule impacts, including:
  - Additions, deletions, or modification to activities and/or fragnets
  - Modifications to the calendars or constraints
  - Modifications to relationships
- Describes the impact or potential impact by comparing Work prior to the impact and Work affected or predicted to be affected after the impact.
- Describes mitigation efforts taken to date.
- Describes potential resolutions to mitigate or avoid impact.

b. Schedule layouts in pdf file format. Filter activities to clearly show impacted activities and affects to the Critical Path. Multiple layouts may be required to adequately demonstrate the impact to the Critical Path. At a minimum, provide a layout demonstrating associated activities prior to the impact and a layout demonstrating associated activities after the impact is inserted in the schedule and the schedule is progressed.

c. One electronic copy in native software of the impacted PBS.

d. Other information or documentation pertinent to the analysis.

Incorporation of TIA activities into the current schedule update submittal requires TxDOT approval.

2.1.1.8 Recovery Schedule

If the Work is delayed on any Critical Path item for a period which exceeds the greater of either thirty Days in the aggregate or that number of days in the aggregate equal to five percent of the days remaining until Final Acceptance for the last Project Segment, the next Project Status Schedule Update shall include a recovery schedule demonstrating the proposed plan to regain lost Project Schedule progress and to achieve Final Acceptance of the last Project Segment by the specified date.

If the recovery schedule is required hereunder, the Developer shall have no right to receive settlement of a Payment Request until such time as the Developer has prepared and TxDOT has accepted such recovery schedule.

2.1.2 Document Management

All electronic information submitted to TxDOT shall be searchable and legible.

2.1.2.1 Document Storage and Retrieval Requirements

Developer shall establish and maintain an Electronic Document Management System (EDMS) to store, catalog, and retrieve all CDA Documents using the applicable control section job (CSJ) numbers. Unless otherwise directed by TxDOT, record retention shall comply with the requirements of the *Texas State*

Records Retention Schedule, and shall be provided to TxDOT at the time of the expiration or earlier termination of the Agreement. Developer shall provide a Document Management Plan describing the EDMS approach and file structure.

Unless otherwise directed by TxDOT, Patron Confidential Information obtained by the Developer shall meet the requirements of Attachment 2-3, Toll Operation Documents Retention Schedule.

Maintenance records shall utilize the same format as TxDOT utilizes for its statewide asset inventory and condition assessments and shall be capable of being integrated into TxDOT's maintenance management systems.

Construction quality acceptance test results shall be automatically transmitted to TxDOT's I2MS system using TxDOT's extensible markup language (XML) Web service. A sample is shown in Attachment 2-4, I2MS Test Form Fields. Developer shall coordinate with TxDOT to obtain the most current version prior to commencing construction quality acceptance testing. The responsible technician and his/her supervisor shall sign the daily test reports and the results of the daily tests shall be provided to TxDOT and the Independent Engineer within 48-hours after test completion.

In the provision of a document management system, the Developer shall:

a) Use data systems, standards and procedures compatible with those employed by TxDOT and implement any new operating practices required as a result of TxDOT's amendments to any such systems, standards and procedures.

b) Provide a secure location for any interface as may be provided by TxDOT, such that only authorized users have access and that it is protected from loss, theft, damage, unauthorized or malicious use.

c) Employ appropriate standards and procedures, and train Developer personnel to operate any TxDOT data management system which TxDOT may require in connection with the Project.

d) Provide a mechanism for the electronic transfer of meta data along with the associated portable document format (PDF) images for uploading into an EDMS employed by TxDOT.

To allow for disaster recovery, the Developer shall back-up all Project-related documents on a nightly basis and store all Project-related documents in a secure off-site area on a weekly basis.

Developer shall provide TxDOT at Developer's expense, sufficient access to Developer's document control database as deemed necessary by TxDOT.

2.1.3 Design Visualization

Developer shall provide three-dimensional design files to TxDOT for use during the design and construction process.

2.1.3.1 Services to be Provided by TxDOT

The type of available data may vary dependent on the level of Project development. Typical types of data TxDOT will provide to the Developer if available are:

1. Data that TxDOT has on file concerning the Project, if available. Examples include as-built plans, field notes, etc.

2. Electronic data of topography, roadway alignments and edge lines, pavement markings, criteria files, cross sections, and Digital Terrain Models TxDOT or their consultant contractor have concerning the Project.

3. Drawings, sketches, renderings or photographs of special design elements such as, sidewalk paving materials, crosswalk details, landscaping, and any architectural treatments, if available.
4. Elevation data that may be needed in some areas where the terrain changes abruptly and special design features are required, such as retaining walls or elevated structures.

2.1.3.2 Services to be Provided by the Developer

Developer shall provide accurate three-dimensional models that depict the Project. Completed models will represent realism and aesthetic attributes of the existing conditions and the proposed Project. The Developer will add roadway design details to the model that are not normally provided at the stage of schematic design and verify that the schematic design complies with design guidelines presented in the TxDOT Roadway Design Manual, Texas MUTCD, and the AASHTO Green Book.

The design visualization models shall show existing and proposed design conditions either separately or combined in the same display. Based on specific Project requirements the final design visualization deliverables may include photo-matched renderings, rendered plan view layouts, and animated sequences. Developer shall provide a three dimensional CADD model of the completed Project and any work product generated during the modeling process such as site photographs, textures, material assignments, and additional terrain information. All CADD data should be in electronic format and native to TxDOT's CADD architecture using Bentley Systems, Inc. MicroStation to provide complete compatibility between the contractor and TxDOT. The current CADD architecture and standards can be viewed at http://www.txdot.gov/inside-txdot/division/information-technology/v8.html. The Developer shall collect, review, and evaluate all of the available existing data pertaining to the Project and prepare the design visualization models to reflect current design requirements. The data will include MicroStation design files, GEOPAK geometry files, existing terrain models, and digital ortho photography. The Developer shall field verify the existing and proposed condition of design visualization models for dimensional accuracy and realism.

2.1.3.3 Photo Rendering and Exhibits

The Developer shall provide photo of no more than five (5) locations to be determined by TxDOT.

The Developer shall coordinate the location of the photographs. The Developer shall take two existing condition photographs at each of the five (5) locations to be determined by TxDOT. These photographs will serve as the basis for the photo-renderings.

The Developer shall provide two (2) mounted "before" images and two (2) mounted "after" static 3D photo matched images of proposed design elements at each of the five (5) locations.

The computer model shall accurately depict the geometric design of the proposed improvements for proposed five (5) locations that would cover the limits of the existing condition photographs. Engineering judgment will be used for definition of slope, retaining wall, bridge abutment placement, and other physical features that may not be readily apparent from the design schematic. The computer model is intended to be used by TxDOT for public information purposes.

All CADD work and resulting data will duplicate TxDOT's existing CADD architecture to ensure total compatibility. This data shall be delivered in native format using Bentley Systems, Inc. MicroStation and GEOPAK or match present versions in use by TxDOT. Specific TxDOT data/configuration for GEOPAK and geometric design will be used. Resulting animations for design visualization purposes do not have to be native MicroStation, but do need to be capable of viewing on any device with minimal support or effort by the end user. The current CADD architecture and standards can be viewed at http://www.txdot.gov/inside-txdot/division/information-technology/v8.html.

Developer shall provide the following:

2.1.3.4 3-D Computer Design

2.1.3.4.1 General Requirements

The utilization of three dimensional (3-D) Design is an integral part of the performance of the Project prior to and during construction and throughout the Project's service life. Additionally, the implementation of 3-D Design techniques is intended to improve quality, reduce risk, improve collaboration with project stakeholders, provide an early focus toward technical review, and increase opportunity for innovation.

The Developer shall prepare a topographically accurate 3D computer models for the following locations: IH 610/SH 288 Interchange from Bellfort to Holly Hall along SH 288 and from Cambridge to Scott Street along IH 610; and for the SH 288/BW 8 Interchange from Clear Creek to Almeda-Genoa.

The computer model will accurately depict the geometric design (under separate contract) of the proposed improvements for the above locations and associated interchanges. Engineering judgment will be used for definition of slope, retaining wall, bridge abutment placement, and other physical features that may not be readily apparent from the design schematic. The computer model will also incorporate existing features in the corridor out to a distance of approximately 500-feet either side of the roadway centerline, but up to 750 feet as needed.

All CADD work and resulting data shall duplicate TxDOT's existing CADD architecture to ensure total compatibility. This data shall be delivered in native format using Bentley Systems, Inc. MicroStation and GEOPAK or match present versions in use by TxDOT. Specific TxDOT data/configuration for GEOPAK and geometric design shall be used. Resulting animations for design visualization purposes do not have to be native MicroStation, but do need to be capable of viewing on any device with minimal support or effort by the end user. The current CADD architecture and standards can be viewed at http://www.txdot.gov/inside-txdot/division/information-technology/v8.html.

2.1.3.4.2 Design Requirements

Developer shall utilize 3-D methodologies and techniques to incorporate the Developer's design schematic into Developer's project integrated design files. Developer's 3-D Design shall facilitate the coordination and accommodation of the Ultimate Configuration and any asset management considerations as it relates to operations and maintenance.

Geometric Design Requirements

Developer shall create an integrated-model of the existing condition utilizing 3-D methodologies and techniques. The existing condition model shall include existing ground surface and certain subsurface elements (including, at a minimum: drainage structures, utilities, bridge and wall foundations), features utilizing data from light detection and ranging (LiDAR), sub-surface Utility evaluation (SUE), field surveys, and existing plans data collection; including currently available LiDAR or other existing ground surface data (.dtm or .tin format) provided by TxDOT.

Developer shall utilize 3-D methodologies and techniques to develop the geometric design and the 3-D Design model for each proposed roadway and incorporate it into the Project's integrated design models. All geometric design shall be prepared in accordance with the Technical Provisions:

a) Integrated design model deliverables shall consist of 3-D MicroStation file(s) containing 3-D graphical elements (components, contours, superelevation transitions limits, existing and proposed finish grade triangles) representative of the design model, and .dtm or .tin surface files.

Developer shall include key existing and proposed 3-D Design features for the following elements of the Work:

a) Roadway

b) Drainage

c) Structures (including, at a minimum, sufficient detail to show top of deck surface, structure type, bottom of beam surface, and pier, abutment and retaining wall locations)

d) Utilities

e) Signing (including, at a minimum, overhead span or cantilever sign structure locations and structure type)

f) Lighting (including, at a minimum, pole and foundation locations)

g) Signals (including, at a minimum, controller, pole and foundation locations)

h) Toll Infrastructure (including, at a minimum, structure type; not to include detailed elements related to toll gantries or elements inside buildings).

i) Aesthetic Concepts and Elements (including, at a minimum: form shapes, scale, textures and colors)

j) Landscaping

Immersive 3-D Over the Shoulder Milestone Review Meetings

Developer shall present the project 3-D Design model to the Department and Stakeholders at review meetings. Developer shall utilize software that allows for interactive visualization of the 3-D Design model key features. The 3-D Design model shall be completed to a sufficient level of detail that existing terrain, proposed design features, and existing infrastructure to remain in place can be viewed, analyzed and discussed among participants. Review meetings shall occur prior to any design submittals to TxDOT.

Developer's 3-D Design model shall be capable of providing the following minimum functionality during the immersive 3-D milestone review meetings:

- View the model and manipulate view settings to interactively change data display on screen (e.g. pan, rotate, walk, fly, zoom, etc.).
- Measure distances and areas throughout all areas of the model.
- Reference baseline geometry, stationing, and existing and proposed right of way.
- Dynamically visualize key existing and proposed design features and detect conflicts/clashes amongst the following disciplines:

  a) Roadway

  b) Drainage

  c) Structures (sufficient detail to show top of deck surface, structure type, bottom of beam surface, and pier, abutment and retaining wall locations)

d) Utilities

e) Signing (overhead span or cantilever sign structure locations and structure type)

f) Lighting (pole and foundation locations)

g) Signals (controller, pole and foundation locations)

h) Toll Infrastructure (e.g. structure type, not to include detailed elements related to toll gantries or elements inside buildings)

i) Aesthetic Concepts and Elements (including, at a minimum: form, shapes, scale, textures and color)

j) Landscaping

2.2 Quality Management Plan

Developer shall submit a comprehensive Quality Management Plan to TxDOT for approval that is consistent with and expands upon the preliminary Quality Management Plan submitted with the Proposal. The Quality Management Plan shall comply with ISO 9001:2000 for quality systems, quality plans and quality audits, or most current version as updated by the International Standards Organization. Developer may elect to obtain formal ISO 9001 certification, but will not be required to do so.

2.2.1 General Requirements

Developer shall develop, implement, and maintain the Quality Management Plan for the Term. The Quality Management Plan shall describe the system, policies, and procedures that ensure the Work meets the requirements of the CDA Documents and provides documented evidence of same.

The complete Quality Management Plan shall incorporate the following features:

a) Developer shall make all quality records immediately available to TxDOT and the Independent Engineer for review. Developer shall provide TxDOT or the Independent Engineer with a copy of any and/or all quality records when requested.
b) The Quality Management Plan shall encompass all Work performed by Developer and Contractors of all tiers.
c) Developer shall submit to the Independent Engineer and TxDOT the results of all internal audits within seven Days of their completion**.**
d) Developer shall promptly submit to the Independent Engineer and TxDOT non-conformance reports both upon issuance and resolution.

The Quality Management Plan shall contain detailed procedures for Developer's quality control and quality assurance activities. Developer's quality process shall incorporate planned and systematic verifications and audits undertaken by an independent party. Developer shall conduct all quality control, quality assurance, performance verification, and design overlay and coordination among design disciplines, all in accordance with the Quality Management Plan and the requirements of the CDA Documents.

Inspections, reviews, and testing shall only be performed by personnel with appropriate training and qualifications, for each appropriate item of Work (items produced on and off the Project site) using appropriate equipment that is accurately calibrated and maintained in good operating condition at an AASHTO (AASHTO R18-10, *Establishing and Implementing a Quality System for Construction*

Materials Testing Laboratories) accredited facility, or at a facility with comparable accreditation (e.g., ISO 17025, *General Requirements for the Competence of Testing and Calibration Laboratories*).

2.2.2 Quality Terminology

Quality terminology, unless defined or modified elsewhere in the CDA Documents, shall have the meaning defined in ISO 9001. Terms used in ISO 9001 shall have the meanings defined below:

a) Organization: Developer's organization, including any Affiliates and Contractors.
b) Customers: the Users of the roadways, TxDOT, Customer Groups, and key Stakeholders that have an adjacent property interest or connecting roadway.
c) Product: the Work.

2.2.3 Quality Management Organization

Developer shall regularly maintain the Quality Management Plan to contain current versions of the following information:

a) The organizational chart that identifies all quality management personnel, their roles, authorities and line reporting relationships.
b) Description of the roles and responsibilities of all quality management personnel and those who have the authority to stop Work.
c) Identification of testing agencies, including information on each agency's capability to provide the specific services required for the Work, certifications held, equipment and location of laboratories for products produced both on and off the Project site.
d) Resumes for all quality management personnel.

2.2.4 Quality Policy

The Quality Management Plan shall contain a complete description of the quality policies and objectives that Developer will implement throughout its organization. The policy shall demonstrate Developer senior management's commitment to implement and continually improve the quality management system for the Work.

2.2.5 Inspection and Testing

The Quality Management Plan shall contain detailed descriptions of the inspection and test plans, including the timing, quantities represented and frequency of testing, that Developer will use to meet quality control and quality assurance requirements of the Work.

Developer shall revise its Quality Management Plan when its own quality management organization detects a systemic or fundamental non-conformance in the work performed or in the manner the Work is inspected or tested, or when either the Independent Engineer or TxDOT advises Developer of such a problem.

2.2.6 Responsibility and Authority of Developer Staff

Personnel assigned to perform inspection, testing, or monitoring of characteristics for acceptance shall not be those personnel performing or directly supervising the Work being accepted.

Developer's Quality Manager and quality assurance staff shall have no responsibilities in the production of the Work. Quality control staff shall only have responsibilities in the production of the Work and shall remain independent of the quality assurance staff.

The Quality Manager shall prepare a monthly report of the quality inspections and tests performed, results of such inspections and tests, and occurrences and resolution of non-conformance discoveries. Developer shall submit the monthly reports to the Independent Engineer and TxDOT for review.

Developer's Quality Manager, quality assurance manager, and quality control manager(s) shall have the authority to stop Work for quality-related issues.

2.2.7 Design Quality Management Plan

Developer's Final Design shall not deviate from but shall expand upon the preliminary design submitted with Developer's Proposal.

2.2.7.1 Design Submittals

Not later than two Business Days after Developer completes design of any particular Released for Construction Document, and Developer has reviewed and checked the design in accordance with the Quality Management Plan, and Developer's Registered Professional Engineer has signed and sealed the document, Developer shall submit the signed and sealed document to TxDOT. Developer's Released for Construction Document shall comply with the requirements of the CDA Documents, and shall be detailed, complete, constructible, and shall allow verification of the design criteria and compliance with CDA Documents.

The Developer shall prepare and provide all Project related Submittals and documents using English units of measure.

The Developer shall furnish all Submittals by electronic copy in accordance with Section 2.1.2. Unless otherwise stated in the CDA Documents, the Developer shall provide to TxDOT four paper copies and a single electronic copy of each Submittal and at the same time provide to the Independent Engineer four paper copies and a single electronic copy of each Submittal. Each Submittal shall have the signature of an authorized representative of the Developer, unless otherwise expressly stated for a particular Submittal. The electronic copy shall be in a suitable format (e.g. PDF) or in the format in which the Work was originally created unless stated otherwise in the CDA Documents.

The Developer shall include with each Submittal a transmittal cover sheet in a form acceptable to TxDOT.

The minimum sheet size for the Submittals shall be 8.5 inches by 11 inches. The maximum sheet size shall be 36 inches by 120 inches. Every page in a Submittal shall be numbered in sequence.

Each Submittal shall be full and complete and shall be assigned a unique, sequential number, clearly noted on the transmittal cover sheet. Original Submittal shall be assigned a unique numeric Submittal number. Revised Submittals shall bear an alphanumeric designation which consists of the unique Submittal number assigned to the original Submittal followed by a letter of the alphabet to represent that it is a subsequent Submittal of the original.

Any changes made on a revised Submittal, other than those made or requested by TxDOT, shall be identified and noted on the revised Submittal.

Design deliverables shall include a title block, consistent with the standard Project drawing format established as part of the Quality Management Plan, with the following information:

a) Date of issuance and including all prior revision dates.

b) Contract title and number.

c) The names of the Developer and applicable Affiliates.

d) Stage of development.

e) Reference to applicable Technical Provisions and amendments.

f) If required, review and acceptance or approval from a Governmental Entity, prior to submission to TxDOT.

g) Review stamp.

h) Action block space – All deliverables shall include a sufficient blank space in which the Developer may list required actions to be taken.

i) When calculations accompany drawings in a Submittal, cross-references from the body of the calculations to the individual drawing to which the pages of the calculations pertain.

j) Organization of the CAD drawings and associated documents in a logical manner, having a uniform and consistent appearance, and clearly depicting the intention of the design.

2.2.7.2 Record Drawings and Documentation

Within 90 Days of Service Commencement of all or part of the Project, Developer shall submit to TxDOT a complete set of Record Drawings in hard copy and native electronic format for the portion of the Project actually opened to traffic. The Record Drawings and documentation shall be an organized, complete record of Plans and supporting calculations and details that accurately represent what Developer constructed.

Developer shall ensure that the Record Drawings reflect the actual condition of the constructed Work.

2.2.8 Construction Quality Management Plan

Developer shall construct the Work in accordance with the Released for Construction Documents, following a reasonable timeframe for TxDOT review and comment, together with the relevant requirements and specifications of the CDA Documents.

Developer's Construction Quality Management Plan (CQMP) shall contain detailed procedures for the Developer's quality control and quality assurance for construction activities for items produced on and off the Project site. Developer's construction operations must incorporate quality processes as part of its Quality Management Plan, including planned systematic activities undertaken by a party independent of the construction process. Developer is to undertake all quality control, quality assurance, and performance verification testing in accordance with the Quality Management Plan and the requirements set out in the CDA Documents.

2.2.9 Operations Management Plan

Section 22 (Operations) includes requirements for operations management.

2.2.10 Maintenance Management Plan

Section 19 (Maintenance) includes requirements for maintenance management.

2.3 Comprehensive Environmental Protection Program

Section 4 (Environmental) includes requirements for environmental management.

2.4 Public Information and Communications Plan

Section 3 (Public Information and Communications) includes requirements for public information and communications.

2.5 Safety and Health Plan

Developer shall be responsible for the safety of its personnel and of the general public affected by the Project. Developer shall prepare and submit to TxDOT for approval a comprehensive safety and health plan ("Safety and Health Plan") that is consistent with and expands upon the preliminary safety and health plan submitted with the Proposal. All members of the Developer's team shall adhere to the Developer's Safety and Health Plan. Developer shall meet the following Safety and Health Plan content and preparation requirements.

The Developer shall take full account of the unique attributes of this Project in preparing the Safety and Health Plan, including but not limited to, the urban environment, the heavy traffic conditions and the size and scope of the Project. The Safety and Health Plan shall fully describe the Developer's policies, plans, training programs, Work Site controls, and Incident response plans to ensure the safety and health of personnel involved in the Project and the general public affected by the Project. The Safety and Health Plan shall cover all phases of the Work, and Developer shall be review, evaluate, and update such Plan as often as necessary to reflect relevant changes during the Term of the Agreement.

The Safety and Health Plan shall contain, as a minimum, the following provisions:

a) Safety Management

Developer shall identify the personnel and responsible staff who will implement, maintain, and enforce the Safety and Health Plan policies, plans and training programs in the Safety and Health Plan. As a minimum, the Developer shall provide a full time on-the-job Safety Manager. The Safety Manager's qualifications, as a minimum, shall include:

- Roadway construction and safety enforcement construction;
- Ten (10) years of progressive heavy construction experience, five years of which must be safety management experience on complex heavy civil projects;
- Designation as a Construction Health and Safety Technician (CHST) by the Board of Certified Safety Professionals (BCSP), or designation as a Certified Safety & Health Official (CSHO), either of which may be substituted for two years of safety management experience;
- Completion the OSHA#500 course – Trainer Course in OSHA Standards for Construction;
- Training and current certification for CPR and First Aid; and
- Completion of the following training sponsored by an accredited agency:
    - Work zone traffic control
    - Flaggers in work zones.

The Safety Manager shall report directly to the Project Manager's supervisor or other executive employee with authority over the Project but removed from the design and construction of the Project. The Safety Manager shall have authority to stop all Work on the Project..

In addition, Developer's safety management team shall also have the minimum additional personnel. As part of the Developer's safety management, all Work shifts shall have, as a minimum, an on-Site Shift Safety Representative. The Shift Safety Representative shall have the following minimum qualifications:

- Three years of progressive safety experience and general competency in the construction safety disciplines related to the Work;
- Completion of the OSHA 10-hour Construction Safety and Health Course; and
- Training and current certification for CPR and First Aid.

The Safety and Health Plan shall define the role and responsibilities of the Safety Manager and safety staff, the hierarchical relationship between the Safety Manager and other managers, supervisors, and employees, and how responsibility and accountability for safety will be incorporated at all levels.

The Safety and Health Plan shall set forth the obligations of all personnel in adhering to the Safety and Health Plan, as well as establish and communicate clear goals for safety, security, and health, including defined objectives for meeting the goals. Requirements for evaluating the effectiveness of policies and measuring success in meeting the goals and objectives of the Safety and Health Plan shall be set forth in the Safety and Health Plan. An environment and means for continuous evaluation and improvement shall be established to achieve the Safety and Health Plan goals and to identify deficiencies so that the goals and objectives can be revised as needed to improve the safety and health of Developer's personnel and of the general public affected by the Project.

The Safety and Health Plan shall set forth Incident response plans to ensure the safety and health of personnel involved in the Project and the general public affected by the Project. In addition, the Safety and Health Plan shall set forth procedures for immediately notifying TxDOT of all Incidents arising out of or in connection with the performance of the Work shall, whether on or adjacent to the Project.

b) Worksite and Jobsite Analysis

The Safety and Health Plan shall establish a reliable system for allowing employees to notify management personnel about conditions that appear hazardous, and to receive timely and appropriate responses, without fear of reprisal.

Developer shall keep readily available at the Developer's Project office site an updated summary of Work related incidents, which may include, at a minimum, a board promoting the number of consecutive incident-free days.

c) Hazard Prevention and Personal Safety

The Safety and Health Plans shall set forth (a) methods and procedures to identify and detail all hazards that may be encountered by employees while performing the Work, and (b) p ractices and procedures that have been developed and implemented to address prevention of identified hazards. Developer shall establish a communications protocol to ensure all employers and employees are aware of hazards in all areas and how to deal with them appropriately. Means shall be provided to evaluate all anticipated and unanticipated activities, and address potential hazards related to these activities.

Developer provide the means to ensure personnel understand and comply with safe work practices and procedures through training, positive reinforcement, correction of unsafe performance, and if necessary, enforcement through a clearly communicated disciplinary system established within the Safety and Health Plan.

Developer shall handle Hazardous Materials in compliance with Section 12.2 of the Agreement and the applicable requirements of the Technical Provisions.

d) Training

Developer shall establish methods within the Safety and Health Plan to identify, develop, and provide relevant training for employees and supervisors designed to ensure that all employees understand and are aware of the hazards to which they may be exposed, and are aware of the proper methods for avoiding the hazards.

Developer shall establish methods within the Safety and Health Plan to identify, develop, and provide supervisory training programs to ensure supervisors understand the key role they play in job site safety and to enable them to carry out their safety and health responsibilities effectively; to analyze the work under their supervision to anticipate and identify potential hazards; and to maintain physical protection in their work areas, including the establishment of policies that ensure each employee is provided with the equipment necessary to complete assigned tasks safely.

The Safety and Health Plan shall set for the procedures to plan and prepare for Emergencies, and to conduct training and Emergency drills, as required.

e) Drug Free Work Zone

The Safety and Health Plan shall set forth policies and procedures shall be provided to require adherence to a 100% drug/alcohol free work zone.

f) Incident and Emergency management

Developer shall establish procedures within the Safety and Health Plan to achieve at a minimum, the following:

- Maintain communication for the exchange of information between Developer, TxDOT, and other involved agencies.
- Coordinated support through interaction with local, State, and federal governmental entities, as well as other entities, for safe and efficient construction.
- Discussion and coordination with Emergency response, traffic control, security, and operational issues affecting construction of the Project, and associated system feeders and exits.
- Procedures to update Participating Agencies regarding status of construction of the Project, and associated system feeders and exits, to assure safe and timely response to Emergency events. As a minimum, this shall include off-Site and on-Site traffic routing changes, and changes to Site access, fire suppression system modifications and in-service availability of standpipes or fire suppression water supply, if applicable, and changes in the Work that may create a greater likelihood of occurrence of a particular type of Emergency.

2.6 TxDOT-Developer Communications Plan

Developer shall submit to TxDOT for approval a TxDOT–Developer Communications Plan that is consistent with and expands upon the preliminary communications plan submitted with the Proposal. Developer shall maintain and update the TxDOT-Developer Communications Plan as the Design-Build phase and Operating Period progress.

The TxDOT-Developer Communications Plan shall describe the procedures for communication of Project information between Developer's organization and TxDOT.

The TxDOT-Developer Communications Plan shall describe how Developer's organization will respond to unexpected requests for information, communicate changes or revisions to necessary Developer personnel, and notify affected Stakeholders before and after changes are made to the CDA Documents.

2.7 Right of Way Acquisition Plan

Section 7 (Right of Way) includes requirements for right of way acquisition management.

The ROW Acquisition Survey Document Package shall be reviewed by an independent Registered Professional Land Surveyor (RPLS) for consistency and compliance with all applicable laws, standards, and requirements. The boundary location and the survey methods remain the responsibility of Developer, and are not part of this review process. The reviewing surveyor shall review the survey document package and return his comments to Developer in a timely manner. Developer shall revise and correct the documents in accordance with the reviewing surveyor's comments in a timely manner. TxDOT will not accept the ROW Acquisition Survey Document Package as complete until the reviewing surveyor has signed and sealed the compliance certificate (see Reference Information Documents).

2.8 Cost Management Plan

For publicly funded or subsidized projects, Developer shall develop, implement, and maintain a Cost Management Plan. The Cost Management Plan shall describe the cost management approach and procedures and reporting as required by financial institutions and agencies involved in the Project.

2.9 Risk Management Plan

Developer shall develop, implement, and maintain a Risk Management Plan. The Risk Management Plan shall describe the approach to identification, management, mitigation, and allocation of Project-specific risks, including a risk matrix which shall identify the following at a minimum:

- Significant risk categories during the design and construction of the Project;
- The potential consequences of the identified risks;
- The probable likelihood of risks;
- Proposed procedures and tools to conduct a risk sensitivity analysis;
- Risk-mitigation strategies to eliminate or reduce specific risks;
- Contingency plan for if specific risks occur due to failure of mitigation strategies.

2.10 TxDOT Offices, Equipment and Vehicles

Except where noted elsewhere, Developer and TxDOT shall co-locate for the Term of the Agreement to facilitate Project coordination and daily communication. The definition of "co-locate" for this Agreement is office space meeting the requirements of this Technical Provision that are near each other along or adjacent to the Project and within one mile of the Project ROW. At a minimum, the following Developer's personnel shall be co-located with TxDOT:

- Project Manager, Design Manager, Environmental Compliance Manager, and at least one CADD technician during the design phase
- Project Manager and Construction Manager during the construction phase

Developer shall provide TxDOT office space (i.e. available for occupancy) within sixty (60) Days of issuance of NTP1. The location, condition and amenities of the office space for TxDOT are subject to TxDOT's prior written approval. The office space requirements for the core office and field offices are provided below.

2.10.1 Computers and Equipment

The Developer shall provide, install and maintain the following computers, peripherals and software for the TxDOT office spaces:

- One computer and monitor including all necessary peripherals for each personnel office area and the reception area;
- Desktop computers shall include at a minimum, built-in audio speakers, Core i7-3770 processor or higher, 8 GB RAM or higher, Windows 7 operating system or higher, DVD-RW capability, and a 500 GB hard drive or larger with a flat panel monitor providing a minimum wide-screen 20 inch LCD or LED display, and 1600 x 900 resolution or better;
- Laptop computers shall include at a minimum, built-in audio speakers, Core i7-3770 processor or higher, 8 GB RAM or higher, Windows 7 operating system or higher, DVD-RW capability, a 14-inch or larger display, and a 500 GB hard drive or larger with a docking station and a flat panel monitor providing a minimum wide-screen 20 inch LCD or LED display, and 1600 x 900 resolution or better;
- Peripherals will include at a minimum, monitor stand, docking station for laptop computers, mouse, keyboard, extra battery for laptop computers and a carry back for laptop computers;
- Necessary software required to perform TxDOT functions for the Project, Microsoft Office Professional, Microsoft Outlook, Microstation, Geopak, applicable drainage software and Adobe Acrobat. Software version currently employed:
    - Microsoft Office 2010
    - Microstation v8i v.2
    - GeopakSS2
    - Adobe Acrobat X Pro;
- Fully licensed Anti-virus software capable of real-time monitoring, detecting, quarantining, and removing malware and viruses;
- Software and licenses shall be compatible with all other Microsoft software products;
- The computers, monitors and peripherals shall be at least equal to the ones used by the Developer's staff;
- Three GPS Cameras (to include compass/GPS module, 4GB SD card, camera bag, additional battery, USB cable, neck strap, rechargeable lithium-ion battery, battery charger, instruction manuals and warranty card);
- One Digital Video Camera;
- Three iPad with Wi-Fi +3G 64GB along with 3G service (latest version available) and protective case;

- Three iPhone 4S along with service (or latest version available) and protective case.

The Developer shall provide, install and maintain the following telephones, servers, copiers and fax equipment, and premise wiring for the TxDOT office space:

- At least one touch-tone telephone for each personal office area, each with a status indicator, access to all outside lines and conference-call capability; and including speakers for the telephones in the enclosed offices;
- At least one touch-tone conference telephone with satellite microphones for each conference room, each with a status indicator, caller id, access to all outside lines and conference call capability;
- Hardware and software compatible with that of Good Industry Practice and of the Developer's system interface;
- One high-speed laser computer printer capable of handling 11"x17" prints;
- One high-speed color printer capable of handling 11"x17" prints;
- One high-speed color photocopy machine capable of handling 11'x17" prints;
- One facsimile transmission machine;
- One color scanner capable of handling 11"x17" prints.

(A multi-purpose piece of equipment capable of meeting multiple parts of the requirements above will be considered to meet the requirements.)

- All office supplies including copier paper, toners, pens, pencils, notepads and other miscellaneous office supplies;
- Provide and install the complete voice/data communications cabling system, which include but is not limited to the EMT conduit, bridle \rings, pull boxes, category 5e UTP cable, category 5e "RJ-45" UTP receptacles, category 3 "RJ-11" UTP receptacles, receptacle boxes, cover plates, and fiber optic cable. If the Developer can establish, to TxDOT's satisfaction, that alternate hardware and cabling can achieve the same level of service as TxDOT deems necessary to effectively manage this Project, then the Developer can submit for TxDOT's approval an alternate plan for hardware and cabling. Developer can use fiber optic or copper cable as long as it is sufficient enough to adequately support the Project and field offices. All cable shall be routed, terminated, labeled and tested. Voice and data circuits shall be installed in conjunction with ISD and TxDOT Department of Information Resources staff;
- All equipment shall be replaced and updated at least once every three years or when the Developer upgrades, whichever comes first. A multipurpose piece of equipment capable of meeting multiple parts of the requirements above all shall be considered to meet the requirements;
- Certify and state supplied components as functional before installation and will bear all responsibility for replacement of parts at work commencement;
- Prepare test plan and submit before installation, test installed system and supply test results, and shall conform to all industry standard testing procedures;
- Terminate all category 5e UTP cable in 66M150 punch down blocks for voice cabling and shall terminate all category 5e UTP data cable in data patch panels within the wiring closet;

- Each drop shall contain two data ports with RJ45 connectors and two voice ports with RJ11 connectors;
- Provide all materials, as needed and required, to complete installation of the cable plant which shall include all cable, connectors, patch panels, equipment rack(s), patch cables, face plates, punch down blocks, fiber optic cable and other miscellaneous materials.

2.10.2 Core Office

Developer shall provide all space, facilities, and support elements necessary to design, construct and maintain the TxDOT core office in accordance with the CDA Documents. Developer shall provide office space, not to exceed 12,000 square feet, for TxDOT's design and Project management staff including, the general engineering contractor and other contract employees. If it is necessary to locate any of these elements of the Work off-site or outside of this office, Developer shall obtain TxDOT's prior written consent.

Developer shall provide a preliminary TxDOT facility area layout plan to TxDOT no later than seven (7) Days after NTP1. TxDOT will promptly review and comment on required modifications to the layout within ten (10) Days. Developer shall submit a final facility layout plan within ten (10) Days of receipt of TxDOT comments.

Developer shall have the TxDOT facility area available for move-in no later than sixty (60) days from NTP1.

2.10.2.1 TxDOT Facility Area and Items Provided by Developer

Developer shall provide separate office space for the exclusive use of TxDOT's design and Project management staff in the TxDOT facility area as specified herein and subject to TxDOT's prior written approval. This office space shall be located within the same building or complex as Developer's office staff. TxDOT will be reasonable regarding re-use of existing space within Developer's current office facility, providing the space is contiguous and workable in TxDOT's sole discretion.

Office Condition. The offices shall be in good and serviceable condition, at least of the same quality as those of Developer's counterpart office space and available for occupancy as specified herein. Both Parties shall participate in a facility condition survey prior to and at the completion of occupancy. TxDOT shall return possession of Developer-provided TxDOT facility area to Developer in essentially the same condition as when TxDOT occupied the facilities, except for reasonable wear and tear and except for alterations, or loss or damage caused by any member of Developer-Related Entity.

Loss or Damage. If office spaces, related facilities or fixtures are destroyed, damaged or stolen during the Work, in the TxDOT facility area, except as a direct result of willful misconduct of TxDOT or its personnel, Developer shall, at its cost and within ten (10) Business Days after the occurrence of such destruction or damage, repair those items to their original condition or replace them. However, in the case of lost, damaged, or stolen office equipment (e.g., computers, fax machines, copy machines, and printers) necessary for normal office operations, replacement shall occur within two (2) Business Days. If loss or damage is caused as a direct result of willful misconduct of TxDOT or its personnel, Developer shall replace the facilities noted herein within the timeframes specified herein, and TxDOT shall reimburse Developer for actual, reasonable and documented costs incurred.

Office Facilities and Equipment. For the TxDOT facility area it provides, Developer shall:

1. General. Secure facility space, obtain all permits, install and pay for all utility services, and maintain the facilities as part of the Work.

2. Access and Security. Provide separate TxDOT entrance/exit(s) from building, which shall be secured with door lock(s) plus a deadbolt lock. Developer shall provide keys for entry doors as well as other designated areas (e.g., server room, document storage, offices).

3. Lighting and Electricity. Include with all interior spaces overhead lighting meeting OSHA, building, and electrical and energy code requirements for similar office space (provide nominal 30 foot candles of light at 30 inches above finish floor). Each office space shall have at least four duplex receptacles, with minimum circuit capacity of twenty (20) amperes.

4. Janitorial and Trash Services. Provide daily janitorial service (except Saturdays, Sundays and Holidays) and maintain trash containers and trash pickup service for the building and site areas beyond the TxDOT facility area. This shall include, but not be limited to, sweeping and mopping floors, cleaning restrooms and break room, emptying wastebaskets, and periodic dusting. This service shall be paid for by Developer. Developer will pay for and procure janitorial services for the TxDOT facility area.

5. Exterior Maintenance. Maintain the exterior areas of office spaces, including access to parking areas.

6. Accessibility and Licensing. Meet all access requirements of the Texas Accessibility Standards, the Americans with Disabilities Act Accessibility Guidelines, as amended (42 USC §§12101, et seq.), and the applicable building code. Facility design plans shall be submitted to the Texas Department of Licensing and Regulation (TDLR) for review and approval as required by Section 16, Chapter 68 of the Texas Administration Code.

7. Restrooms, Break Room, and Entry Space. Provide access to women's and men's restrooms, break room space and building entry space, these spaces may be shared with Developer's office space/staff. These spaces and all TxDOT spaces shall have access 24 hours per day, 7 days per week, 365 days per year (24/7/365). In lieu of access to a common break room, Developer may provide a 200 SF break room/kitchen within the TxDOT space, with refrigerator with freezer compartment, ice machine, sink including waste disposer, microwave, and dishwasher. Break room/kitchen will have storage closet (25 sq. ft.) and cabinets with drawers and counter tops. In the event that access to restrooms cannot be accessed from a common building entry/lobby, Developer may provide separate restrooms for the TxDOT facility area. In the event it is necessary to locate a separate break room and/or restrooms within the TxDOT facility area, the 2,000 SF TxDOT space allocation may be required to be increased to accommodate these spaces.

8. HVAC. Provide electrical, heating, ventilation, and air conditioning (HVAC) systems capable of maintaining temperatures between 65 and 75 degrees Fahrenheit in all spaces, 24 hours per day, 7 days per week, 365 days per year (24/7/365), through the year. Server room shall have dedicated air conditioning/cooling system capable of maintaining temperatures between 65 and 70 degrees Fahrenheit, and 15% relative humidity.

9. Code Requirements. Meet all applicable building and fire code requirements.

10. Disposal and Removal. Be responsible for disposal or removal of all Developer-provided facilities and any facility and/or site restoration Work as required.

Space Requirements. Although actual spaces may vary slightly, the following nominal size requirements will apply, and the typical TxDOT facility area shall include the following elements:

1. Offices. Enclosed offices for TxDOT's management staff (nominal 150 square feet each) 10 total with keyed door hardware.

2. Cubicles. Cubicle area spaces for administration staff (nominal 64 square feet each) 10 total; (power supply and data and communication lines to cubicles may be provided through power pole drops).

3. Conference Rooms. One conference room at nominal 12'x 25' (300 SF) All shall have dimmable lighting; each conference room shall have one chair for every 24 SF of conference room space and a conference table of sufficient size for each chair.

4. Reception Area. Receptionist space with waiting area with seating for 4 visitors; other furniture to be determined jointly by Developer and TxDOT.

5. Work Room. Work romm (nominal 150 SF) with 30-inch high plastic laminate wall-mounted counters (15 lineal feet of counter). Work room shall be located near the center of the facility, and in close proximity to the receptionist space.

6. Storage and Filing. One (1) lockable space for storage and filing, nominal 15'x20' (300 SF).

7. Server Room. One computer server room (100 SF) that has limited access and is locked via security card access. Server room shall be accessible via hallway entry not sharing any walls with the exterior of the building, and have no windows, a nonstatic floor covering, a standard 7'19" rack and at least three dedicated 20-amp power circuits and one 30-amp circuit. All patch panels (phone and data) shall be located within the designated server room. Temperature shall be maintained with a dedicated air conditioning/cooling system as defined above.

8. Parking Area. Parking area for at least 30 vehicles (20 staff/10 visitors) that is reasonably level (all-weather surface and all-weather access). A portion of the available parking area must accommodate an 8' vehicle height.

9. Exterior Lighting. Sufficient exterior security lighting that is automatically activated at low light levels to maintain two (2) foot-candles of lighting within the building and parking areas of the site.

10. Corridors. Corridors within the TxDOT facility shall have a nominal width of 54 inches.

Miscellaneous Requirements and Features. The following shall be provided as noted:

1. Flooring. Carpeted flooring (nonstatic in server room).

2. Entry Access. Entry to TxDOT areas by electronic door hardware card access (not keyed), with U.P.S. on locks (fail closed).

3. Electrical Outlets. Each office and conference room shall have two (2 data, 1 com Cat 5E) outlets per room, and one (2 data, 1 com Cat 5E) outlet per cubicle, as well as outlets at designated printer, fax and copier locations and any and all shared areas (i.e., workroom, storage room, etc.). All data/voice outlets shall be installed next to power outlets.

4. HVAC. 24/7/365 HVAC as previously described.

5. Window Coverings. Horizontal mini-blinds (no drapes) for each exterior window.

6. Power Circuits. Provide dedicated electrical power circuits for copiers, and minimum of 6 duplex receptacles with three dedicated 20-amp circuits and one 30-amp circuit for the server room.

7. Fire Extinguishers. Developer shall provide fire extinguishers, per fire code and fire marshal with jurisdiction.

8. Insurance. Insurance (obtained and provided by Developer) covering the use of the Project office by Developer and TxDOT, in accordance with the terms of the underlying property use agreement with the property owner, but in no event shall the insurance be less than that required by the Agreement.

9. Vending Area. Developer shall provide access to general building vending area.

10. Utilities. Initial installation and monthly expense of all utilities paid by Developer except long-distance telephone service.

11. Emergency Contacts. 24-hour emergency contact to Developer.

12. Furniture. Developer-provided allowance of $50,000 in the Price for furniture, which shall be obtained by Developer at the direction of TxDOT, and billed through Developer. At the end of the Project, Developer shall have ownership of the furniture and shall be entitled to the full salvage value of the furniture, with the right to retain or otherwise dispose of the furniture at its sole discretion, without any further accounting to TxDOT.

13. Cable Television. Provide basic cable television connections or service to public information office.

2.10.3 Field Offices

Developer shall provide field office space for the exclusive use of TxDOT's field construction staff for the Project as specified herein. [The field offices can be combined with the core office described in Section 2.10.2 as long as the combined offices meet the requirements of Sections 2.10.2 and 2.10.3except Developer may reduce the combined offices requirement to fifteen (15) TxDOT personnel comprising five (5) enclosed offices (nominal 150 square feet each) with keyed door hardware, and ten (10) offices or cubicles (64 square feet each).]

Subject to TxDOT's prior written approval, Developer shall provide separate facilities for TxDOT's resident engineer staff located within the same complex as Developer's field office. Should Developer elect to construct the Work using field offices other than the one specified, corresponding facilities shall be provided for TxDOT's exclusive use and shall be at least of the same quality as Developer's counterpart management and field staff.

Developer shall provide the field staff facilities at least ten (10) Business Days prior to starting any Work activity involving staff that will occupy the field staff facilities.

Office Condition. The field office(s) shall be in good and serviceable condition, at least of the same quality as those of Developer's counterpart management and field staff, respectively, and available for occupancy as specified herein. Both Parties shall participate in a facility condition survey prior to and at the completion of occupancy. TxDOT shall return possession of Developer-provided facilities to Developer in essentially the same condition as when TxDOT occupied the facilities, except for reasonable wear and tear and except for alterations, loss, or damage caused by any member of Developer-Related Entity.

Loss or Damage. If office space(s) or related facilities are destroyed, damaged or stolen during the Work, except as a direct result of willful misconduct of TxDOT or its personnel, Developer shall, at its cost and within ten (10) Business Days after the occurrence of such destruction or damage, replace those items that it had provided or repair them to their original condition; however, in the case of lost, damaged, or stolen office equipment (e.g., computers, fax machines, copy machines, printers, etc.) necessary for normal office operations, replacement shall occur within two (2) Business Days. If loss or damage is caused as a direct result of willful misconduct of TxDOT or its personnel, Developer shall replace the facilities noted herein within the timeframes specified herein, except that TxDOT shall reimburse Developer for actual, reasonable, and documented costs incurred.

Office Facilities and Equipment. For the facilities it provides, Developer shall:

1. General. Secure sites, obtain all site permits, install and pay for all utility services, and maintain the facilities as part of the Work.

2. Access and Security. Provide separate buildings or trailers for TxDOT staff that include at least two entrances/exits, providing an 8' x 10' (minimum) covered area, from each building or trailer. Each entrance/exit shall be secured with a door lock plus a deadbolt lock.

3. Lighting and Electricity. Include with all interior spaces overhead lighting meeting the requirements of the Occupational Safety and Health Administration (OSHA) and of building and electrical codes for office space. Each office space shall have at least two duplex receptacles. The minimum circuit capacity shall be twenty (20) amperes.

4. Janitorial and Trash Service. Provide daily janitorial service (except Saturdays, Sundays and Holidays) and maintain trash containers and trash pickup service. This will include, but not be limited to, sweeping and mopping floors, cleaning the toilet, and lavatory and emptying wastebaskets.

5. Exterior Maintenance. Maintain the exterior areas of office spaces, including access to parking areas.

6. Accessibility. Meet all access requirements of the Americans with Disabilities Act, as amended (42 USC §§12101, et seq.).

7. Utility Service. Provide potable water, sewer service, and electricity to the office facility.

8. HVAC. Provide heating, ventilation, and air conditioning (HVAC) systems capable of maintaining temperatures between 65 and 70 degrees Fahrenheit in all spaces through the year.

9. Code Requirements. Meet all local building and fire code requirements.

10. Disposal and Removal. Be responsible for disposal or removal of all Developer-provided facilities and any site restoration Work as required.

Space Requirements. Although actual space requirements will depend upon Work schedule and geographic locations of the field offices, a typical field office should include the following elements:

1. Offices. Enclosed offices for TxDOT's construction representative, TxDOT-designated construction manager and three other TxDOT or contract employees (150 square feet each).

2. Offices/Cubicles. Offices or cubicles for up to ten (10) field engineer/inspection/ administration staff (100 square feet each).

3. Conference Rooms. Conference room (enclosed) (200 square feet)

4. Storage and Filing. Two (2) lockable spaces for storage and filing at each field office (a combined space of 150 square feet).

5. Surveying Equipment Storage. Clean inside storage space for surveying equipment (80 square feet).

6. Tool Shed. Shed for small tools and equipment (outside) (150 square feet).

7. Site Amenities. A well-graded site for the office with access road, parking area, and security fence with lockable drive-in gates sufficient to enclose the office and parking area.

8. Staff Parking Area. A parking area for at least fifteen (15) vehicles that is reasonably level (all-weather surface and all-weather access) within the boundaries of a security fence.

9. Visitor Parking Area. An all-weather level surface outside the security fence to accommodate visitor parking (all-weather surface and all-weather access-minimum of 2,000 square feet).

10. Security. A 24-hour security service or silent watchmen-type security system.

11. Exterior Lighting. Sufficient exterior security lighting that is automatically activated at low light levels to maintain two (2) foot-candles of lighting within the fenced field office site.

12. Window Security. Security bars on all windows.

13. Laboratory Facility. A completed facility suitable to accommodate a functioning portable lab (approximately 2,000 square feet).

14. Kitchen/Break Room. Each field office shall contain a 200 sq. ft. kitchen with storage closet (25 sq. ft.), cabinets with drawers and counter tops.

15. Restrooms. Two restrooms including toilets and sinks.

16. First Aid Facilities. Emergency first aid facilities.

2.10.4 Field Office Vehicles

From the Operating Commencement Date to Final Service Commencement Date, Developer shall provide two (2) SUV-type vehicles for the exclusive use of TxDOT field construction staff for the Project as specified herein. Field vehicles will be used by TxDOT field construction staff in accordance with current TxDOT vehicle policies and procedures.Developer shall provide the field staff vehicles at least ten (10) Business Days prior to starting any Work activity involving staff that will occupy the field staff facilities.

Vehicle Condition. The vehicles shall be in good and serviceable condition, at least of the same quality as those of Developer's counterpart management and field staff, respectively, and available for use as specified herein. Both Parties shall participate in a vehicle condition survey prior to and at the completion of use. TxDOT shall return possession of Developer-provided vehicles to Developer in essentially the same condition as when TxDOT used the vehicles, except for reasonable wear and tear and except for alterations, loss, or damage caused by any member of Developer-Related Entity.

Loss or Damage. If vehicles are destroyed, damaged or stolen during the Work, except as a direct result of willful misconduct of TxDOT or its personnel, Developer shall, at its cost and within ten (10) Business Days after the occurrence of such destruction or damage, replace those vehicles that it had provided or repair them to their original condition. If loss or damage is caused as a direct result of willful misconduct of TxDOT or its personnel, Developer shall replace the facilities noted herein within the timeframes specified herein, except that TxDOT shall reimburse Developer for actual, reasonable, and documented costs incurred.

Insurance and Regular Maintenance. Developer shall provide vehicle liability insurance and perform regular maintenance activities on the field vehicles, at least of the same quality as those of Developer's counterpart management and field staff, respectively.

2.10.5 Offices after Service Commencement

From the Service Commencement Date, at a minimum, Developer shall provide office space for one TxDOT employee and three Independent Engineer employees. This office space shall be in a permanent facility for the remaining Term of the Agreement. Should Developer wish to relocate the office space to a different facility during the Term of the Agreement, Developer shall be responsible for all costs of the relocation of the TxDOT and Independent Engineer including technology that was not previously provided by Developer but is in use at the time of relocation.

From the Service Commencement Date, when Developer's planned Work exceeds $50 million in value in any calendar year, Developer shall provide additional office space to meet the total office space requirements noted below. Any additional office spaces beyond the minimum requirement may be in a temporary facility for the duration of the work activities.

Table 2-2: Office Space Requirements after Service Commencement

Annual Value of Work After Service Commencement	**Total Office Space After Service Commencement**
Minimum requirement for Term of the CDA, including maintenance and construction activities less than $50 million	Office space for one (1) TxDOT employee and three (3) Independent Engineer employees
$50,000,000 to $99,999,999	Office space for two (2) TxDOT employee space and six (6) Independent Engineer employees
$100,000,000 to $149,999,999	Office space for three (3) TxDOT employee space and nine (9) Independent Engineer employees
$150,000,000 to 199,999,999	Office space for four (4) TxDOT employee space and twelve (12) Independent Engineer employees
Construction value in excess of $200,000,000	Office space for five (5) TxDOT employee space and fifteen (15) Independent Engineer employees

3. PUBLIC INFORMATION AND COMMUNICATIONS

3.1 General Requirements

It is vital to the success of the Project that TxDOT and Developer gain and maintain public support. The public will better support TxDOT and Developer if they are kept abreast of Project information in a timely manner, are notified in advance of potential impacts, have an opportunity to identify issues and recommend solutions, receive timely and appropriate feedback from Developer, and perceive a high-quality, well executed communications plan for keeping them informed, engaged, and educated.

Developer shall coordinate all public information communication plans with ongoing TxDOT public information activities to ensure that a consistent message is being distributed to the Customer Groups. Copies of all materials to be presented to the public or the media shall be provided to TxDOT at least three Business Days prior to dissemination.

3.2 Administrative Requirements

3.2.1 Public Information and Communications Plan

At least 60 Days prior to NTP2, Developer shall submit, to TxDOT for approval, a comprehensive Public Information and Communications Plan (PICP), based upon the preliminary communications plan submitted with Developer's Proposal, which informs, educates, and engages the Customer Groups specifically addressing the Operating Period of the Project and after Service Commencement, to include Renewal Work. The PICP shall identify specific outreach or engagement activities, the frequency of those activities, what modes of communication will be used and what process Developer will use in order to measure the effectiveness of the PICP. Submittal shall be in both hard copy form and electronic format compatible with TxDOT software. TxDOT approval of the PICP shall be a condition of issuing NTP2.

In preparing this plan, Developer shall identify the Customer Groups and develop specific plans to respond to their concerns and needs in all respects regarding the Project. After incorporation of comments from TxDOT on the PICP, Developer shall implement the various activities and initiatives contained therein. Developer shall continually maintain the plan to ensure delivery of high-quality, well executed communications throughout the Term of the Agreement, specifically addressing phases of construction or O&M Work when appropriate.

The PICP shall be flexible to capture the full magnitude of yet-to-be-determined impacts from Project activities such as design, construction, maintenance, and operations, and the public's reaction to these and other impacts. Together with TxDOT's designated point of contact for the local Public Information Office, the Developer shall periodically review the PICP on a basis not less than annually to forecast, plan and coordinate updates in the plan and strategies needed to effectively accomplish the stated goals and objectives. The PICP shall also be resilient to successfully implement the outlined strategies, given the ever-changing desire for depth, breadth, and frequency of information by a variety of important Customer Groups such as the media, elected officials, and the general public.

The PICP shall include a general timeline listing public information activities for the Project over the entire Term of the Agreement including, but not limited to, the DB Phase, the Operating Period, and phases of O&M Work. This timeline shall be used as an initial guide and shall be updated as the Project is implemented but no less than on a yearly basis during the DB Phase and during phases of O&M Work and on a biennial basis otherwise.

TxDOT and the Independent Engineer may audit Developer's performance of the activities set forth in the PICP. Developer shall make appropriate changes to the PICP as required to meet the findings of any audit or review and to suit the changing goals and needs of the Project. Developer shall cooperate with TxDOT to amend the PICP as required to suit circumstances as yet unknown, including public reaction to the

impacts, real or perceived, from the Work and the depth, breadth and frequency of information necessitated by Customer Groups. Developer shall document the efforts and results of the PICP in measurable terms to clearly indicate compliance.

Developer shall provide sufficient qualified staffing to effectively implement the PICP.

In developing the PICP, Developer shall make appropriate provisions to achieve the following goals:

a) Gain and maintain support and/or informed consent from Customer Groups, building on existing community partnerships and communication networks.
b) Provide Customer Groups with opportunities for input.
c) Demonstrate to Customer Groups that the Project will be developed pursuant to a well-executed program.
d) Notify Customer Groups in advance of key Project ROW acquisition, construction, operations and maintenance activities and communicate the potential impacts of these activities.
e) Provide public information which facilitates alternative trip planning during construction.
f) Address the Project-specific concerns of Customer Groups, including but not limited to interests in Emergency Services vehicle access, business owner and patron driveway access, delivery access, adjacent neighborhood access, changes to bicycle and pedestrian access and neighborhood traffic patterns, changes to mobility access associated with the *Americans with Disabilities Act* (ADA), construction noise and lighting, and ongoing noise issues.

To achieve these goals, Developer shall use, but not be limited to, the following implementation strategies:

Customer Groups

a) Develop a forum to coordinate on-going dialogue among Customer Groups, TxDOT, and Developer.
b) Prepare and distribute Project-related materials in a user friendly format to inform Customer Groups through appropriate means such as: meetings, interviews, media kits, news releases, telephone correspondence, newsletters, brochures, e-mail, hotlines, Highway Conditions Reports (HCRs), dynamic message boards, Web alerts, public opinion polls/surveys, videos, display booths, presentations, public access information kiosks, and special events.
c) Organize and manage meetings and communications with key elected officials, the general public, representatives of civic organizations, businesses, and special interest groups along the Project corridor (individually or in groups) for the purpose of building rapport with Customer Groups.
d) Respond to invitations and seek opportunities to attend meetings, conferences and other events at which Project information can be exchanged with Customer Groups.
e) Notify Customer Groups in advance of key Project ROW acquisition, construction, operations and maintenance activities, and communicate the potential impacts of these activities.
f) Develop, disseminate and display timely, high-quality, innovative, user-friendly, accurate and appropriate community information concerning the Project, including exhibits showing slope grading, drainage, bridge structures, retaining walls, sound walls, Project ROW acquisition, and aesthetic characteristics.
g) Develop and manage a public relations campaign and communication strategy to convey key messages, branding, and pertinent information about the Project.
h) At appropriate times and stages and as requested by TxDOT, coordinate tours of the Project.
i) Comply with the requirements of the *Guidelines for Analysis and Abatement of Roadway Traffic Noise.*
j) Develop and implement a program to mitigate impacts to neighborhoods, communities, and residents within the general vicinity of the Project, particularly during the Off-Peak Hours.

Media

a) Build on existing TxDOT media resources and/or create and develop advertising messages, including graphics, logos, and slogans.
b) Place Project-related messages in the appropriate media.
c) Develop and distribute public service announcements, paid advertising, news reports, and other communication materials as appropriate.
d) Manage media relations with key transportation and business reporters and prepare and distribute news releases and media kits.
e) Develop and implement communications plans that anticipate and attempt to minimize traffic impacts of public, special and seasonal events adjacent to the corridor that may draw large crowds through the Project limits.
f) Employ the use of an internet based communications, media alert, press release and special list notifications system/service that provides information in real time with an up to date database of major media contacts in the area and subscriber lists.

Environmental

The PICP shall detail the communication hierarchy for information distribution related to compliance with the Comprehensive Environmental Protection Plan, as described in Section 4 (Environmental). The PICP shall include names and contact information, including emergency contact information, and the preferred methods of routine, and emergency communication distribution.

3.2.2 Public Information Coordinator

Developer shall provide a Public Information Coordinator (PIC) to lead Developer's responsibility for public involvement activities on a day-to-day basis throughout the Term of the Agreement. The PIC will lead all communication with and be the primary point of contact for the various Stakeholders and Customer Groups including, but not limited to media, elected officials, governmental entities, commuters, community groups, local special interest groups, and business owners within or adjacent to the Project. The Public Information Coordinator or TxDOT approved designee will be allowed to communicate with the media. Additionally, the PIC will be expected to coordinate all elected official interface with TxDOT's Public Information Office. The staff person to serve in this capacity shall be subject to approval by TxDOT. The Public Information Coordinator shall have a minimum of four years of relevant experience on projects of similar type and scope, and the ability to competently perform the following:

a) Serve as the primary point of contact between Developer and Customer Groups and act as clearinghouse for the receipt of and response to written or verbal comments or complaints regarding the Project.
b) Lead the production, implementation, audit, quality control/quality assurance and update of the PICP.
c) Coordinate and supervise day-to-day activities of Developer's personnel in performing the activities described in the PICP.
d) Facilitate communication among Developer, TxDOT personnel (including TxDOT's Public Information Officers), and Customer Groups.
e) Interact with Customer Groups and represent the interests of the Project at associated meetings and other formal and informal events.
f) Develop a "first-hand feel" for Customer Groups' concerns and reactions regarding the Project and public information program and incorporate that knowledge into improving the PICP.
g) Liaise with the person assigned to coordinate the initial response to any Incident or Emergency as set forth in Section 22 (Operations) and any Governmental Entity that may have jurisdiction in the Emergency.

3.2.3 Public Information Office

Developer shall maintain a public information office for the Term of the Agreement. The hours of operation for this office shall be in accordance with normal business hours Monday –Friday with extended hours of operation until 7 PM at least one day a week and from 9 AM – Noon at least one Saturday every month to allow Stakeholders access to the Project information outside of normal business hours. This office shall serve as the primary business location for the Public Information Coordinator and shall be conveniently located to the Project Site. The public information office shall facilitate the exchange of information between Developer and the public and provide a centralized location for residents and other Customer Groups to obtain information on the Project, including Project maps and Plans, alternative routes, lane closures, construction updates, community impacts, and commute options.

If there is an Emergency or a need arises to better serve the Customer Groups, hours of operation may be required to be extended.

The Public Information Office shall have readily available two conference rooms capable of hosting Customer Group meetings. The rooms shall be ADA-compliant, convenient to and accessible by Customer Groups, and appropriately supplied with electrical outlets, tables and chairs, and other basic equipment to meet meeting requirements. These conference rooms shall be at a convenient and accessible location that facilitates attendance by Customer Groups. One of these rooms shall accommodate at least 50 persons and another shall accommodate at least 15 persons.

Developer shall provide reasonable access to the Project site to give TxDOT-approved Customer Groups the opportunity to view the construction and operations.

In addition to the services listed above, Developer shall provide a 24-hour telephone hotline, manned during normal business hours of the public information office, with a recorded message describing Emergency procedures after hours. Developer shall respond to voicemail messages left after hours within 24 hours of receiving the voicemail message.

3.2.4 Customer Groups

The Public Information Coordinator shall actively engage, inform, and seek appropriate support from Customer Groups for the Project throughout every stage of the Project. Customer Groups shall include the following:

a) Media;
b) Governmental Entities, including regulatory and law enforcement agencies;
c) General public residing or working within the general vicinity of the Project, or traveling within or across the limits of the Project;
d) Business owners within or adjacent to the Project corridor ;
e) Utilities, railroads, transportation authorities and providers (such as local airports, transit operators, toll authorities, and other highway concessionaires) affected by the Project;
f) Neighborhood associations, community groups, and other organizations with special interest in the Project.

*3.2.5 **Meetings** with the Public and Customer Groups*

Developer shall organize and manage meetings with the general public and Customer Groups during design and construction activities. The frequency of public meetings shall be addressed in Developer's PICP and will increase or decrease as needs arise to better inform and engage the Customer Groups.

During such meetings, Developer shall inform the participants of the Project's progress and discuss key issues as they emerge. Developer shall provide timely and useful information regarding subjects of interest to the Customer Groups, including:

a) Design and construction issues affecting adjacent residential areas, frontage roads, local streets, and utilities, including such issues as Project ROW definition, Project ROW acquisition process, grading, drainage, access, lighting, aesthetics and noise and retaining walls;
b) Street and roadway detour design and implementation;
c) Scheduling and duration of Work, including hours of construction;
d) Haul routes;
e) Methods to minimize noise and dust;
f) Environmental mitigation measures.

Developer shall notify TxDOT a minimum of 48 hours in advance of any meetings with the public (i.e., attendance to group/Stakeholder meetings as an invited speaker/guest, topic specific meetings with key Stakeholders, Developer hosted meetings to discuss key issues/concerns related to the Project). TxDOT reserves the right to attend any such meetings. When requested by TxDOT, Developer shall participate in and provide support for any meetings with the Customer Groups called and conducted by TxDOT. When TxDOT decides to conduct such meetings, Developer shall share, in a readily manipulative form, all necessary information regarding potential Customer Groups at TxDOT's request. Developer shall bear all costs associated with the meetings organized and managed by Developer.

The frequency of meetings with the public is to be addressed in the Developer's PICP and shall increase or decrease as needs arise to better inform the public and Customer Groups. The Developer shall propose a schedule of meetings with the public to TxDOT and then conduct the meetings with the public that, at a minimum, shall address Project construction and maintenance.

To maximize public participation, Developer hosted meetings shall be advertised with sufficient advance notice to the public using electronic notices, flyers, Web postings and in the appropriate media outlets, such as, local newspapers, and television and radio stations.

3.2.6 Meeting Summaries

For all meetings with the Customer Groups which Developer conducts or directly participates in, Developer shall prepare meeting summaries within five Business Days after the conclusion of such meetings. At a minimum, Developer shall include the following items in the meeting summary:

a) A complete list of attendees (including their affiliations, telephone numbers, and e-mail addresses);
b) Documentation of the exhibits, presentations and/or handouts available at the meeting;
c) Documentation of the issues discussed and any associated solutions;
d) Description of remaining open issues and action items (including the person(s) responsible for follow-up and target date for resolution).

For any formal public meetings or open houses at which a court reporter is required, Developer shall also include detailed verbal transcripts in the summary. Developer shall submit draft versions of all meeting summaries to TxDOT for review before distributing final versions to the meeting attendees and appropriate Customer Groups.

3.2.7 Emergency Event Communications

For all Emergency events, such as vehicle collisions, ice/snow conditions, and Hazardous Material spills, the Public Information Coordinator shall take timely and appropriate action to inform TxDOT and appropriate Customer Groups of all pertinent details. The Public Information Coordinator shall provide these details through the use of appropriate tools to ensure effective communication. These tools include, but are not limited to: dynamic message signs (DMS), TxDOT's Highway Conditions Report (HCR), TxDOT Houston District Office Highway Advisory Report, email/Web alerts, telephone notification, facsimiles, and media releases/interviews, as appropriate. The Public Information Coordinator shall continue to provide updated information, as available and on a timely basis, until the Emergency no longer exists.

In the event of an unforeseen Emergency, timely notification shall mean as soon as practicable, but in no event longer than within one hour of the occurrence. If advanced warning is available for an Emergency event such as ice/snow, timely notification shall mean as soon as practicable, but in no event longer than within one hour of the time the information is available. In both situations, the Public Information Coordinator shall continue to provide updated information, as available and on a timely basis, until the Emergency no longer exists.

3.2.7.1 Lane Closures

Subject to the lane closure restriction set forth in Section 18 (Traffic Control), Developer shall provide TxDOT and appropriate Customer Groups a minimum of two weeks advance notice for lane closures and/or traffic switches planned to be in effect longer than 24 hours, and a minimum of 48 hours advance notice for lane closures that are planned to be in effect less than 24 hours, using all appropriate tools as needed. The Developer shall report and input all lane closures (or an event that results in lane closures) in accordance with the Houston District Highway Conditions Reporting manual for the respective fiscal year. The Public Information Coordinator shall be responsible for advertising such closures via electronic notices, media releases, website posts and social media posts on, at minimum, a weekly basis. Additional emphasis and efforts will be expected related to scheduled closures anticipated to have major traffic impacts and/or Emergency situations that results in lane closures.

For planned lane closures and Emergency event lane closures, as appropriate, Developer shall coordinate lane closures that may affect crossing TxDOT facilities with appropriate TxDOT district and area offices, as needed, to ensure that no conflicts occur. Developer shall provide advance notification of all lane closure notices to the appropriate TxDOT district and area office. TxDOT will provide appropriate contacts and information upon request.

3.2.8 Disseminating Public Information

Developer shall prepare and distribute materials regarding Project-related subjects, using all appropriate methods, including, but not limited to: meetings, news releases, telephone correspondence, newsletters, email, hotlines, Highway Conditions Report, dynamic message signs, Web alerts, maps, displays, renderings, presentations, brochures, pamphlets, highway advisory radio and video news releases. Products and deliverables intended for public dissemination of information related to the Project shall be subject to review and coordination with TxDOT.

Developer shall create a public Web site to convey Project-related information, including, but not limited to:

a) Contact information
b) Project maps
c) Frequently asked questions (FAQs)
d) Current Project activities addressing design, construction, maintenance, and operations
e) Timing of street and ramp closures and openings
f) Recommended route alternatives during closures
g) Newsletters and meeting materials
h) Meetings and special events announcements and calendar
i) Links to TxDOT Highway Conditions Reports
j) Links to other related sites as deemed appropriate by TxDOT
k) Comment form
l) Mailing list request form

Web site design and creative development shall be coordinated with TxDOT's Communication Division to assure TxDOT brand management and concurrence.

The Web site shall also contain other general Project-related information that enhances the engagement or education of the general public. Developer shall regularly review and update information on this public Web site throughout the Term of the Agreement to provide current and appropriate information and the Web site shall provide for question and feedback opportunities for public communication. Developer shall develop and implement a plan to make the Customer Groups aware of the Project Web site.

All written materials produced for Customer Groups shall align with the TxDOT Brand Management Guidelines.

Developer, working collaboratively with TxDOT, shall assess the need for multi-lingual communications and, where appropriate, furnish Project-related materials in Spanish or other demographic adaptations.

3.2.9 Deliverables

Developer's PIC shall provide a production schedule for all collateral materials (i.e, Project facts sheets, website page links, newsletters, displays, maps, circulars, etc) that includes submittal of such collateral materials to TxDOT prior to the public release of each item.

Developer may submit preliminary drafts, and shall submit all proposed final materials to TxDOT at a minimum of 36 hours prior to public release of each item for review and concurrence.

Developer's PIC shall submit all media releases to TxDOT at a minimum of 24 hours prior to publication of such media release for TxDOT review. Media releases concerning Emergency situations shall be submitted to TxDOT, but the release shall be published as quickly as may be warranted by the Emergency situation.

Real-time electronic notices and social media postings/updates will be monitored by TxDOT as released.

4. ENVIRONMENTAL

4.1 General Requirements

The Developer shall deliver the environmental commitments required by the RFP, CDA Documents, Environmental Laws, Governmental Entities, Governmental Approvals, and all applicable federal and state Laws and regulations. To that end, the Developer shall develop, operate, and maintain a Comprehensive Environmental Protection Program (CEPP) for the Work to ensure environmental compliance with all applicable Environmental Laws and commitments. The CEPP shall obligate the Developer to protect the Environment and document the measures taken during the performance of the Work to avoid and minimize impacts on the Environment from the design, construction, maintenance, operation, and rehabilitation activities of the Project.

The CEPP shall be designed to incorporate all features and guidelines of ISO 14001. The CEPP shall effectively demonstrate in detail the Developer's knowledge of all applicable Project-specific Environmental Approvals, issues, and commitments and applicable Environmental Laws as set forth in these Technical Provisions, and shall describe the processes that will be followed during the course of the Work to comply with those Environmental Approvals, issues, and commitments and Laws, as well as the documentation required to validate compliance. All monitoring and reporting activities shall be concise, consistent throughout the Term of the Agreement as applicable to the activities being performed, and in accordance with the requirements set forth in the Environmental Laws. The CEPP shall also effectively describe the quality control and assurance measures that the Developer will implement to verify the compliance of the CEPP with all applicable Environmental Laws.

The CEPP shall establish and implement environmental permits, issues, and commitments consistent with the Environmental Approvals. The CEPP shall establish a goal of zero environmental violations during the performance of all Work activities. However, should violations occur, the CEPP shall set forth detailed processes for rectifying such violations in an appropriate and timely manner.

The Developer's obligation regarding Governmental Approvals and Laws, including Environmental Laws and Environmental Approvals, and the Developer's obligation for environmental compliance is set forth throughout this Section 4.

The Developer shall cause Work to comply with Environmental Approvals and compliance requirements for any additional actions throughout the Term of the Agreement. The Developer shall monitor and document Work activities so that documents providing evidence for compliance are available to TxDOT for inspection at any time.

The costs of all field laboratory and consulting work, including but not limited to Phases II to III environmental site assessments, related to Hazardous Materials will be considered part of the Hazardous Materials Allowance. In no event shall any Phase I Hazardous Materials investigation cost be included in the Hazardous Materials Allowance.

4.2 Environmental Approvals

4.2.1 New Environmental Approvals and Amended TxDOT-Provided Approvals

TxDOT-Provided Approvals are based on the Project schematic as presented in the Environmental Approvals. Such approvals may require re-evaluation, amendment, or supplement as the Work progresses or in order to accommodate actions not identified in the Environmental Approvals or covered specifically by existing resource agency coordination. Changes to the Project schematic or incorporation of Additional Properties into the Project shall require the validity of existing Environmental Approvals to be reassessed and may require new Environmental Approvals.

Developer shall be responsible for coordination with Governmental Entities necessary to obtain new Environmental Approvals or amendments to the TxDOT-Provided Approvals except where TxDOT has agreements with Governmental Entities to perform such coordination.

Developer shall be responsible for ensuring compliance with the conditions and schedules set forth in amendments to any TxDOT-Provided Approvals or new Environmental Approvals. TxDOT may, in its discretion, provide assistance in securing new Environmental Approvals or amendments to TxDOT-Provided Approvals.

4.2.2 Responsibilities Regarding Environmental Studies

Developer shall be responsible for conducting continuing environmental studies based on the Project approved NEPA document and Project schematic.

Developer shall be responsible for conducting environmental studies and re-evaluations caused by actions not identified in the Environmental Approvals, actions not covered specifically by existing resource agency coordination, or incorporation of Additional Properties into the Project. The Developer shall be responsible for all coordination of environmental studies with appropriate Governmental Entities, except where TxDOT has agreements with Governmental Entities to perform such coordination.

4.2.3 TxDOT Review and Approval of Developer Submissions

TxDOT reserves the right to review, comment on, require revisions to, and reject for resubmission documentation submitted for environmental compliance or Environmental Approvals. Documentation shall conform to current TxDOT submission standards and the requirements of all applicable Governmental Entities, laws, and regulations. TxDOT shall accept documentation meeting current submission standards. TxDOT shall return approved documentation to the Developer for submittal to the appropriate Governmental Entity in cases where the Developer performs coordination. TxDOT, acting reasonably, shall approve those submissions for which TxDOT signature or other approval is required. Documentation not meeting current submission standards or requirements of Governmental Entities will be returned to the Developer, and shall be revised by the Developer to meet standards or requirements.

4.2.4 TxDOT-Provided Approvals

The TxDOT-Provided Approvals are:

A Finding of No Significant Impact (FONSI), dated, May 23, 2013, for the preferred alternative based on the revised April 2013 Environmental Assessment (EA).

4.3 Comprehensive Environmental Protection Program (CEPP)

As part of the PMP, the Developer shall develop and implement a Comprehensive Environmental Protection Program, applicable throughout the Term of the Agreement to establish the approach, requirements and procedures to be employed to protect the environment. The CEPP shall be developed in the form of a comprehensive environmental management system, incorporating all features and guidelines outlined in ISO 14001. All component parts shall reflect in order of priority: impact avoidance, minimization and as last resort mitigation. The CEPP shall satisfy applicable FHWA, TxDOT and resource agency requirements, including those detailed as commitments in any Environmental Approvals.

The CEPP shall be the overarching system by which the Developer shall cause environmental commitments made during the Environmental Approval and permitting processes, and other environmental requirements to be carried forward and reflected, as appropriate, in the design and implemented throughout the Work. The Developer shall utilize the CEPP to track on-going issues, identify environmental compliances, non-compliances and identify actions required/taken to correct any such non-compliances.

At a minimum, the CEPP shall include the following component parts:

a) Environmental Management System (EMS)
b) Environmental Compliance and Mitigation Plan (ECMP)
c) Environmental Protection Training Plan (EPTP)
d) Hazardous Materials Management Plan (HMMP)
e) Communication Plan (CP)
f) Construction Monitoring Plan (CMP)
g) Recycling Plan (RP)
h) Environmental Team Resumes

The dates by which component parts comprising the CEPP are to be submitted for TxDOT approval are set forth throughout these Technical Provisions. Amendments and updates to the CEPP as necessary to address changing conditions and environmental requirements shall be in accordance with the procedures for amendments to the PMP.

4.3.1 Environmental Management System (EMS)

The EMS shall be the overarching system by which the Developer shall cause environmental commitments made during the Environmental Approval and permitting processes, and other environmental requirements to be carried forward and reflected, as appropriate, in the design and implemented throughout the Work. The Developer shall utilize the EMS to track on-going issues, identify environmental compliances, non-compliances and identify actions required/taken to correct any such non-compliance.

The EMS shall establish a schedule for periodic CEPP review to ensure it is up to date. The EMS shall provide a means to track the reviews and results. At a minimum, the EMS shall require documents in the following list to be on file at the Site and available at any time for TxDOT review:

a) CEPP component parts

b) Weekly Environmental Monitoring Reports

c) Investigative Work Plans, Site Investigation Reports, and Remedial Action Plans as necessary for hazardous material discovery/remediation

d) Appropriate Section 404 Permit Application if changes to the design or temporary construction impacts are necessary

e) Mitigation or resource monitoring reports, as required by resource-specific mitigation plans

f) Designs for wetland and floodplain mitigation

g) TPDES Construction General Permit (TXR150000), Notice of Intent

h) TPDES Construction General Permit (TXR150000), Notice of Termination for Work completed

i) Storm Water Pollution Prevention Plan (SW3P) and amendments, as required to reflect Project development and staging, including off-site plans, controls and reporting from borrow sites, waste sites, and plant location sites

j) Completed Permit applications and permits as issued

k) Pre-Construction Inspection Report

l) Training Documentation

m) Developer's final noise analysis, if different than that included in the TxDOT-Provided Approvals

n) Environmental Permits, Issues, and Commitments (EPIC) Sheets

o) Documentation of any right-of-way reduction considerations; and

p) Copies of correspondence between Developer and Federal, State, and local agencies.

4.3.2 Environmental Compliance and Mitigation Plan (ECMP)

The ECMP shall document and fully detail compliance strategies and procedures to be employed to cause Work performance in accordance with requirements of applicable Environmental Laws and Environmental Approvals. This plan shall establish and/or document schedules, protocols, and methodologies to be used in accomplishing Work, with an emphasis on monitoring, reporting, corrective actions and adaptive management. The plan shall include a Compliance Action Plan (CAP). The CAP shall consist of a decision making matrix which will define the triggers for initiating or re-initiating environmental compliance actions for construction and maintenance activities including construction noise mitigation measures and the triggers for initiating mitigation measures. For each trigger, the CAP shall identify the appropriate type or level of environmental study or other compliance action necessary to ensure the ongoing validity of Project Environmental Approvals and commitments. In addition, the ECMP shall detail any mitigation required by Environmental Approvals and the Developer's approach to satisfying mitigation requirements, including mitigation requirements identified after completion of the ECMP.

The ECMP shall include the following components:

- **Environmental Permits, Issues, and Commitments (EPIC) Sheets**

  The Developer shall develop and maintain EPIC construction plan sheets. Applicable permits and environmental commitments shall be identified on EPIC sheets and updated throughout the construction period to identify on-Site conditions. The State shall ensure that EPIC sheets shall include the Environmental Commitments required to ensure that any discharge from the Project site into a sanitary sewer system complies with appropriate codes and standards of the sanitary sewer owner.

- **Clean Water Act - Sections 404 and 401: Waters and Wetlands of the United States**

  The Developer shall document how they will comply with the terms and conditions for Section 404 permit(s) issued to TxDOT by the U.S. Army Corps of Engineers (USACE) and associated Section 401 State Water Quality Certification(s) as administered by the Texas Commission on Environmental Quality (TCEQ) as well as any additional Section 404 permits and 401 certifications issued to the Developer during the life of the Project. The documentation at a minimum shall include:

  a) Process for training personnel to recognize Waters of the U.S. that fall under the jurisdiction of the USACE,

  b) Process for communicating the terms and conditions of all USACE 404 permits and TCEQ 401 certifications and other permits as necessary,

  c) Procedures for carrying out any required mitigation,

  d) Procedures for handling off-right-of-way Project Specific Locations (PSL) as required by all Section 404 permit(s) issued to either TxDOT or the Developer by the USACE.

- **Clean Water Act - Sections 402: Texas Pollutant Discharge Elimination System (TPDES)**

  The Developer shall document how they will comply with Section 402 of the CWA. The documentation shall include that the Developer has day-to-day operational control over activities necessary to ensure compliance with the Storm Water Pollution Prevention Plan (SW3P) and has the sole responsibility for any potential non-compliance issue. The documentation shall also include that

the Developer is responsible for submitting a Notice of Intent (NOI) to TCEQ. The documentation at a minimum shall include:

a) Process for training personnel on the requirements and conditions of the Texas Construction General Permits for Storm Water Discharges from Construction Sites (CGP),

b) Procedures for incorporating additional properties outside the original NEPA approved schematic and any off- right-of-way PSL within one linear mile of the Project limits to comply with the CGP and the Project's SW3P,

c) Procedures for handling non-compliance issues,

d) Escalation procedures for SW3P items.

- **State Listed Species and Unregulated Habitat**

  Developer shall document how they will address state listed species and unregulated habitat. The documentation shall be in agreement with all MOU's and MOA TxDOT has with the Texas Parks and Wildlife Department (TPWD) including the requirement for coordination with TPWD to be conducted by TxDOT. The documentation at a minimum shall include:

  a) Process for communicating any commitments regarding state listed species and unregulated habitat,

  b) Procedures for complying with any commitments.

- **Endangered Species Act and Fish and Wildlife Coordination Act**

  Developer shall document how they shall comply with the Endangered Species Act (ESA) and the Fish and Wildlife Coordination Act (FWCA). The documentation shall reflect that coordination with U.S. Fish and Wildlife Service (USFWS) shall be conducted by TxDOT. The documentation at a minimum shall include:

  a) Process for training personnel on the requirements of the ESA and FWCA,

  b) Process for communicating any commitments regarding ESA and FWCA,

  c) Procedures for complying with any commitments including mitigation.

- **Traffic Noise**

  The Developer shall document how they will address traffic noise mitigation. The documentation at a minimum shall include:

  a) Process for carrying out noise mitigation measures as identified and discussed in the approved NEPA document schematic and any supplemental noise studies completed by Developer,

  b) Process for carrying out noise mitigation measures determined throughout the life of the Project,

  c) Process to handle changes that may occur to proposed permanent noise mitigation in the approved NEPA document and schematic.

  To fulfill the commitments of the previously mentioned TxDOT-Provided approvals the Developer shall be responsible for implementing all noise mitigation measures to minimize construction and long-term impacts of the Work as prescribed in TxDOT-Provided approvals and subsequent TxDOT-Provided approvals secured by the Developer. The Developer acknowledges that TxDOT-Provided approvals and proposed permanent noise mitigation are based on the schematic design and Schematic ROW; consequently the proposed permanent noise mitigation may require amending by the Developer as the Work progresses. Such amendments shall be submitted to TxDOT for review and approval.

The Developer shall refer to Section XXIII-Noise and Table 25 Preliminary Noise Barrier Proposal of the SH 288 April 2013 Environmental Assessment for additional noise abatement requirements.

Developer shall be responsible for public notification and involvement per TxDOT *Guidelines for Analysis and Abatement of Highway Traffic Noise* and in accordance with Section 3 of the Technical Provisions. Developer shall allow 15 days for adjacent affected property comments after each noise workshop.

Developer shall be responsible for all coordination with adjacent property owners and Governmental Entities necessary to obtain all such amendments to TxDOT-Provided Approvals and for ensuring compliance with the conditions and schedules set forth in the amendment of any TxDOT-Provided Approvals.

- **Water Well Impacts and Requirements**

Developer shall document how they will address wells (such as municipal, domestic, irrigation, oil and gas, or monitoring and observations wells) encountered during the life of the Project. The documentation shall include that the Developer is responsible for plugging and abandoning all wells in accordance with Item 103, Disposal of Wells, from TxDOT Standard Specifications for Construction and Maintenance of Highways, Streets, and Bridges, as well as the developer is responsible for any required remediation efforts. The documentation at a minimum shall include:

a) Process for training personnel on recognition of wells,

b) Procedures for handling wells,

c) Procedures for handling contamination of a well that results from the Developer's work. Procedures shall include a requirement to notify TxDOT and with TxDOT's concurrence notify appropriate regulatory agency within 24 hours of the discovery.

- **Cultural Resource Studies**

Developer shall be responsible for ensuring compliance with cultural resource Laws on the Project through the Term of the Agreement. TxDOT shall perform consultation for the Project according to current procedures for implementing Section 106 of the National Historic Preservation Act, and the Antiquities Code of Texas.

Subsequent to issuance of NTP1, Developer shall be responsible for performing any necessary cultural resource surveys, evaluations, testing, and mitigation in those areas outside the footprint of the Project ROW shown on the schematics as defined in the original NEPA Approval and within the area of potential effects. The Developer shall coordinate all necessary Antiquities Permits through TxDOT. Antiquities Permits shall be obtained from the Texas Historical Commission (THC) for archeological surveys, testing, monitoring, and data recovery.

Developer shall document efforts to avoid impacts to cultural resources that are listed on or determined to meet the eligibility criteria for listing to the National Register of Historic Places (NRHP) as specified in 36 CFR 60.4, or that are designated or determined to meet the criteria for designation as State Archeological Landmarks as specified in 13 TAC 26.8.

If evidence of a possible historic property is encountered during the course of the Work, the Developer shall immediately cease Work in the immediate area and contact TxDOT to initiate post-review discovery procedures under the provisions of the PA among TxDOT, SHPO, FHWA, and ACHP as well as the MOU between TxDOT and the THC. The Developer shall undertake appropriate measures to protect the site from further intrusion to the extent feasible until an appropriate evaluation of the site can be made by a qualified representative. Work shall not be resumed in the area until the Developer receives notification and approval from TxDOT.

- **Public Involvement**

  Developer shall document how they will comply with all public involvement requirements, including public involvement requirements specifically related to cultural resources. The documentation shall comply with all applicable requirements including, but not limited to, 43 TAC §2.4, Section 106 of the National Historic Preservation Act (36 CFR 800), Chapter 26 of the Texas Parks and Wildlife Code, the Civil Rights Act of 1964, and the Civil Rights Restoration Act of 1987. The documentation shall include that the developer is responsible for conducting all public involvement requirements for the life of the Project except where TxDOT has agreements with Governmental Entities to perform public involvement requirements. The documentation at a minimum shall include:

  a) Process for handling public involvements requirements,

  b) Procedures for documenting public involvement.

- **Standard Operating Procedures**

Developer shall develop standard operating procedures for the following activities and include them in the ECMP:

a) Controlling dust during construction;

b) Mitigating vibration during construction;

c) Mitigating light intrusion on adjacent properties; and

d) Complying with jurisdictional waters and wetlands permits.

4.3.3 Environmental Protection Training Plan (EPTP)

The Developer shall develop and implement an Environmental Protection Training Program that shall meet the minimum requirements set forth herein. The EPTP shall include methods and procedures documented in the ECMP to:

a) Educate every worker to:
   - Recognize the overall importance of environmental issues to constructing, operating and maintaining a successful Project.
   - Appreciate the various environmental sensitivities of the Project.

b) Train every worker to:
   - Recognize environmentally sensitive resources that may be encountered during the Work.
   - Avoid or take appropriate action to minimize environmental impacts from the Work.
   - Know the required actions, practices, and procedures regarding regulated resources.
   - Understand protocols for meeting environmental commitments for post-review discoveries.

c) Foster the Developer's management and supervisory personnel's attitude of commitment to the Project's environmental quality.

d) Convey to all workers, the Developer's management commitment to the Project's environmental quality.

e) Convey to all workers, TxDOT's and the Developer's commitment to zero tolerance for violations.

4.3.3.1 EPTP Scope and Content

The goal of the EPTP is to educate Project personnel about the following:

a) Overall importance of environmental protection to the Project

b) Compliance responsibility and Governmental Entity authority including background and environmental issues regulatory overview.

c) Overview of the Developer's environmental commitments and responsibilities at the Project level.
d) Worker responsibilities.
e) Wetlands identification and avoidance.
f) Environmental Approvals terms and conditions including an overview of the provisions of the ESA, Migratory Bird Treaty Act, and Stormwater Pollution Prevention Program (SW3P).
g) BMPs for environmental compliance, including pollution prevention, erosion, sedimentation, post construction controls, and dust control measures to maintain water and air quality.
h) Required mitigation measures.
i) Procedures and precautions in the event of spills of or discovery of Hazardous Materials or unknown chemicals or contamination.
j) Procedures and precautions in the event human skeletal remains or other archeological or paleontological resources are discovered.
k) Procedures regarding the relocation of historical markers (i.e. Texas Historic Commission Subject Markers, DAR OSR Markers, Texas Centennial Markers, Texas Highway Department Markers, and local/county markers).
l) Groundwater protection requirements.
m) CWA regulations and surface water protection requirements.
n) Overview of noise and residential impact reduction procedures.
o) Air quality requirements.
p) Penalties and/or fines for violations of and noncompliance with Environmental Approvals and Environmental Laws, including termination of employment.

Developer shall submit to TxDOT for review and approval course outlines containing learning objectives designed to achieve stated goals and suggested staff attendance for all anticipated training requirements through the Term of the Agreement. Course outlines shall be submitted within 90 days after NTP1.

4.3.4 EPTP Participation

Developer shall require all non-administrative employees to participate in the EPTP and shall keep accurate records documenting attendance, as well as materials presented.

4.3.4.1 EPTP Schedule

Developer shall include activities for implementation of the EPTP in the Project Schedule. The length of training sessions and their frequency shall be sufficient to achieve the goals set forth above. Periodic training sessions at key times (e.g., prior to construction or major maintenance in sensitive areas or construction timing restrictions to protect threatened and/or endangered species) shall be used to update workers on specific restrictions, conditions, concerns, and/or requirements.

4.3.5 Hazardous Materials Management Plan (HMMP)

Developer shall prepare an HMMP for the safe handling, storage, treatment and/or disposal of Hazardous Materials, whether encountered at or brought onto the Project Site by the Developer, encountered or brought onto the Project site by a third party, or otherwise, during the Term of the Agreement. The Developer shall submit the final HMMP to TxDOT for review and approval in its good faith discretion within 60 days of NTP1; approval of the Plan by TxDOT shall be a condition of commencement of Construction Work.

The HMMP shall include procedures compliant with all applicable Environmental Laws and include, at a minimum:

a) For all chemicals to be used on the Project, the Developer shall keep and update Material Safety Data Sheets (MSDS), per OSHA requirements, for the Term of the Agreement.
b) Designated individuals responsible for implementation of the plan,

c) Procedures for identifying and documenting potential contaminated sites which might impact Project development,
d) Procedures for mitigation of known contaminated sites anticipated to impact construction,
e) Procedures for mitigation of unanticipated contaminated sites encountered during construction,
f) Procedures for mitigation of contamination during the operation and maintenance of the Project,
g) Procedures for developing a detailed Spill Response Plan for the Term of the Project,
h) Process for training personnel for responding to and mitigating Incidents involving contamination or waste
i) Provisions for appropriate storage and disposal of all waste encountered or disposed of on the Project for the Term.
j) Provision for a Hazardous Materials training module as an Element of the EPTP component of the CEPP.
k) Procedures for preparing an Investigative Work Plan (IWP) and Site Investigative Report (SIR) in the event that Hazardous Materials are discovered during construction; O&M Work.
l) Identification and contact information for designated responsible individuals.

The HMMP shall include provisions for making all on-Site workers aware of and able to recognize the potential Hazardous Materials to which they may be exposed, limiting Contractors and other Site workers' exposure to Hazardous Materials and providing all necessary personal protection equipment to protect workers from exposure. The HMMP shall require Developer to provide any non-Developer personnel who visit the Project with the appropriate personal protection equipment.

The HMMP shall require that all personnel of Developer-Related Entities handling Hazardous Materials be trained and certified at least to the minimum requirements established under the current guidelines of OSHA 1910.120 (HAZWOPER Training).

Further, the HMMP shall include procedures for ensuring that all applicable certifications, licenses, authorizations and Governmental Approvals for Developer personnel handling Hazardous Materials are current and valid through the duration of the Work.

4.3.5.1 Investigative Work Plans (IWP) and Site Investigation Reports (SIR)

If Hazardous Materials are encountered within any of the Project ROW or Additional Properties used as Developer's staging area, field office site, plant sites, borrow site, or stockpile location, Developer shall prepare an investigation work plan that addresses the methods, techniques, and analytical testing requirements to adequately characterize the extent of the contaminated media (soil and/or groundwater) potentially impacting the Project. Developer shall locate and assess the likely source of contamination.

A Registered Professional Engineer and other qualified professionals, as needed, shall prepare the IWP and other necessary reports in accordance with applicable, relevant or appropriate Laws and guidance.

Upon satisfactorily completing the investigative work, Developer shall summarize the findings within a Site Investigation Report and make recommendations regarding potential response actions necessary for Project development. Developer shall take Hazardous Materials contamination into account during all subsequent phases of Project development, including Additional Properties negotiation and acquisition, property management, design, and construction.

The Site Investigation Report shall address the characterization of the impacted area; sampling efforts and findings; opportunities to avoid the contamination by adjusting the design; level of response action warranted if the contamination cannot be avoided; feasibility of initiating response actions prior to construction; pursuit of cost-reimbursement from responsible parties; the need for completing response actions concurrent with construction and nature of any special specifications and provisions necessary for incorporation into the Project.

Developer may initiate a preventative or corrective action after TxDOT review and approval of the Site Investigation Report from appropriate Federal or State agencies.

4.3.6 Communication Plan (CP)

The developer shall develop a CP which describes in detail the communication hierarchy for information distribution related to the compliance with the CEPP. The CP will include names and contact information, including Emergency contact information, and the preferred methods of routine, and Emergency communication distribution. Developer shall remain in compliance with CP through the Term of the Agreement.

4.3.7 Construction Monitoring Plan (CMP)

The CMP shall identify times, locations, and other conditions where monitoring of construction activities are to be performed to maintain and cause compliance with Environmental Laws, Environmental Approvals, and the CDA Documents. The CMP shall establish and/or document schedules, protocols and methodologies to be used for monitoring Work with an emphasis on timely reporting, corrective actions and adaptive management. The CMP shall establish reporting procedures, identify reporting requirements and establish controls for report distribution and records retention. All Environmental Monitoring Reports shall be made available for review by TxDOT at TxDOT's request. Developer shall remain in compliance with CMP through the Term of the Agreement. Should any non-compliance or violation be observed that represents an imminent danger to human health or the environment, the CMP shall include procedures to cause immediate notification of TxDOT.

Prior to NTP2, Developer and TxDOT shall jointly inspect existing facilities, structures, and environmentally sensitive areas in the vicinity of the Site but not included as part of the Work. Developer shall provide a minimum 2-week advance notice to TxDOT of this joint inspection. The inspection shall document the pre-construction condition of vegetation, streets, bicycle and pedestrian facilities, landscaping, residential and commercial property, creeks, storm drainage and infrastructure. The purpose of the inspection is to provide a point of reference from which TxDOT can determine if any facility, structure, and environmentally sensitive area damaged during the Work is restored to its pre-construction condition. Developer shall document the inspection with a report that shall include photographs, sketches, maps, and narratives clearly depicting the pre-construction Site condition.

All photographs shall be archival quality and shall be accompanied by a caption describing the date; time of day; location and direction in photograph was taken. If the photograph shows existing damage, the damage must be clearly shown and noted in the caption. All sketches and maps must be no larger than 11"x17". All photographs must be 4"x6".

The post award inspection shall inspect the municipal separate storm sewer system located within and adjacent to the Site. During the inspection, Developer shall note the following:

a) Storm drains, culverts, swales, and other components of the municipal separate storm sewer system that Developer verified as free of floatable trash, silt, debris, and functioning as originally intended.

b) Storm drains or culverts that do not function or appear not to function as originally intended.

c) Siltation of culverts, concrete swales, and other components of the municipal separate storm sewer system.

d) The presence of construction on adjacent, up-gradient, or down-gradient properties. If construction on other properties is noted, Developer shall photographically document the general condition of these properties and their compliance with storm water regulations.

e) Pre-existing off-site tracking from the Site or surrounding properties.

f) Potential pre-existing contamination (i.e., any areas of soil discoloration or distressed vegetation).

g) Any other pre-existing condition that, by its nature, could be construed as a violation of the TPDES General Construction Permit.

Following construction of the Project, Developer shall conduct a yearly inspection to monitor and repair any of the above mentioned deficiencies in the storm water system.

4.3.8 Recycling Plan

The recycling plan shall document and fully detail the Developer's commitment to recycling, waste minimization and use of "green products" during all aspects of Work. The recycling plan shall document Developer's recycling initiatives as well as methods and procedures for maximizing the use of recycled materials in all aspects of the Work. If recyclable materials shall be used in lieu of TxDOT approved construction and maintenance materials, the Developer shall follow the TxDOT Material Specification DMS 11000. Developer shall remain in compliance with the recycling Plan through the Term of the Agreement.

4.4 Environmental Personnel

Developer, acting through the Environmental Compliance Manager (ECM), shall designate an Environmental Team (ET), as detailed in this section, to prevent, minimize, and/or correct any violation of or noncompliance with Environmental Approvals. The ET shall include Environmental Training Staff, Environmental Compliance Inspectors (ECIs), Archeologist, Architectural Historian, Historian, Historical Architect, Natural Resource Biologist, Water Quality Specialist, and Hazardous Materials Manager. All of the ET shall be deemed other principal personnel.

In the CEPP, Developer shall establish a detailed approach, procedures and methods for:

- Staffing and availability of ECM and all ET personnel.
- ET staff response times during the Work.

4.4.1 Environmental Compliance Manager (ECM)

Developer shall designate a full-time ECM for the Work. The ECM shall report and coordinate all issues directly with TxDOT and the Developer's Project Manager. In the event the ECM, in consultation with Developer's Project Manager and TxDOT, is unable to reach satisfactory resolution of environmental issues, the ECM shall provide written notification to the Developer and TxDOT outlining the concerns, actions taken in attempt to correct the concerns, and provide a recommendation as to the suggested course of action.

The ECM shall direct the work of the ET and shall monitor, document, and report the current status of environmental compliance for the Work. The ECM shall report immediately to TxDOT and the Developer any violation or non-compliance and shall include with any such report, the appropriate recommendations for corrective action including stoppage of Work.

The ECM shall coordinate with TxDOT, the Developer, and appropriate Governmental Entities. The ECM shall submit all necessary environmental documentation and monitoring reports to the appropriate Governmental Entities and when applicable, through TxDOT, to the extent necessary to maintain compliance with applicable Environmental Approvals.

Developer shall not have the ability to relieve the ECM of his or her duty without the written consent of TxDOT. Should Developer desire to replace ECM, Developer shall submit to TxDOT the resume of a replacement candidate. The replacement candidate shall be available fulltime within thirty (30) Days after delivery of TxDOT's written acceptance. In the absence of the Environmental Compliance Manager, Developer's Hazardous Materials Manager shall act as an interim Environmental Compliance Manager.

The ECM candidate shall have at least five years experience successfully managing environmental compliance of urban freeway construction. The qualifying experience used to evaluate an ECM candidate must include the following experience:

a) Developing and managing a storm water pollution prevention plan;

b) Developing and managing a hazardous substance and petroleum products management plan;

c) Implementing environmental mitigation plans;

d) Providing environmental and personal protection training; and

e) Monitoring compliance with Section 404 Permit conditions.

The Environmental Compliance Manager's qualifying experience must demonstrate the Manager is familiar with:

a) The scope and terminology of ASTM E 1527-05, *Standard Practice for Environmental Site Assessments: Phase I Environmental Site Assessment Process*,

b) Provisions of the TPDES Construction General Permit (TXR 150000), and

c) Requirements of Section 404 and permit provisions.

d) Minimization of construction noise through abatement, and

e) Migratory Bird Treaty Act (MBTA) compliance

4.4.2 Environmental Training Staff

Under the direction of the ECM, the environmental training staff shall develop, schedule and conduct environmental awareness and environmental compliance training for the Developer's personnel. All training shall be in accordance with the requirements set forth in Section 4.2.3. Environmental Training Staff members shall have at least five years of experience providing environmental compliance inspection for freeway construction.

4.4.3 Environmental Compliance Inspectors (ECI)

The ECIs shall conduct on-Site environmental monitoring, prepare documentation, and report to the ECM daily all violations, compliance, and noncompliance with Environmental Approvals.

The ECI shall report immediately to the ECM any violation or non-compliance and shall include with any such reports, the appropriate recommendations for corrective action, including, but not limited to, stoppage of Work.

The ECIs shall have at least one year operational control experience of Storm Water Pollution Prevention Plan activities.

4.4.4 Cultural Resource Management Personnel

The ECM shall designate a Cultural Resource Expert to provide expertise in monitoring impacts to cultural resources during the course of the Work and in the event that a need arises for renewed activities to comply with cultural resource laws.

The Cultural Resource Management Personnel shall meet the following certification requirements of TxDOT Precertification Work Categories, 2.8.1, "Surveys, Research and Documentation of Historic Buildings, Structures, and Objects", 2.9.1, "Historic Architecture", 2.10.1, "Archaeological Surveys, Documentation, Excavations, Testing Reports and Data Recovery Plans", and 2.11.1, "Historical and Archival Research".

4.4.5 Natural Resource Biologist

The ECM shall designate a Natural Resource Biologist to provide expertise in monitoring impacts on wildlife and the natural environment during the course of the Work. The Natural Resource Biologist shall meet the Precertification requirement of TxDOT Work Category 2.6.1, "Protected Species Determination (Habitat)" and 2.6.3, "Biological Surveys".

4.4.6 Water Quality Specialist

The ECM shall designate a Water Quality Specialist to provide expertise in permitting delineation, stormwater pollution prevention, and the protection of jurisdictional waters during the course of the Work.

The Water Quality Specialist shall have verifiable experience implementing Storm Water Pollution Prevention Plans and be able to demonstrate a working knowledge of the Texas Pollutant Discharge Elimination System and MS4 permit requirements applicable to the Project. The Water Quality Specialist shall meet the Precertification requirements of TxDOT Work Category 2.4.1, "Nationwide Permit", and TxDOT Work Category 2.3.1, "Wetland Delineation".

4.4.7 Hazardous Materials Manager

The ECM shall designate a Hazardous Materials Manager to provide expertise in the safe handling of Hazardous Materials required to perform the Work and those that may be discovered/impacted during the duration of the Agreement. The Hazardous Materials Manager shall conduct appropriate activities such as the following:

a) Schedule and/or conduct training for the Developer's employees.
b) Verify all employee certifications prior to and required for any handling of Hazardous Materials.
c) Maintain records of all incidents involving Hazardous Materials and notify the ECM, TxDOT and appropriate authorities in writing of any such incidents.

The Hazardous Materials Manager shall be a qualified professional with 40-hour HAZWOPER certification and at least five years experience in similar projects in the following areas:

a) Experienced in developing IWPs, SIRs, and remedial action plans or equivalent reports necessary and acceptable to the TCEQ in material discovery and remediation efforts of Hazardous Materials.
b) Experienced in TCEQ guidance for the investigation and remediation of Hazardous Materials under the TCEQ Voluntary Cleanup Program and Texas Risk Reduction Program Rules.

The Hazardous Materials Manager shall meet the certification requirements of TxDOT Work Category 2.13.1, "Hazardous Materials Initial Site Assessment."

4.5 Property Access

To fulfill the obligation of the TxDOT-Provided Approvals to maintain current access during and after construction, Developer shall make reasonable efforts to minimize the inconvenience to vehicles, bicycles and pedestrians during the Term of Agreement. The Developer shall maintain access to adjacent properties during construction and ensure that visibility of businesses is maintained.

4.6 Dust Control

Developer shall institute dust control measures to minimize air quality impacts. The measures shall be adjusted as necessary based on construction traffic, forecasted wind speeds, and persistent dry weather conditions.

4.7 Asbestos Containing Material (ACM) and Lead-Based Paint

Developer shall identify, inspect, notify, amend notifications as necessary, pay notification fees and abate asbestos and/or lead-based paint found on any structure, including but not limited to bridges and buildings, in accordance with appropriate or relevant regulations or guidance.

5. THIRD PARTY AGREEMENTS

5.1 General Requirements

TxDOT has existing agreements with local Governmental Entities along the Project corridor that define the requirements for construction, maintenance, and operation of traffic signals, illumination, and roadway maintenance. These agreements specify the local Governmental Entities responsibilities and TxDOT's responsibilities with respect to the requirements and are provided in the Reference Information Documents.

For the purpose of the Agreement, Developer shall assume and execute TxDOT's responsibilities and duties as defined in the current and future agreements. Developer is responsible for providing TxDOT and Governmental Entities with all information necessary for it to fulfill TxDOT's responsibilities under these agreements.

In accordance with current and subsequent agreements requiring TxDOT to reimburse the local Governmental Entity for their role in operating and/or maintaining certain facilities, Developer shall reimburse TxDOT the said costs. Developer shall make payment to TxDOT within 30 days from receipt of TxDOT's request for payment.

5.2 Traffic Signals

Where TxDOT is responsible for the electrical power costs for the traffic signal systems, which are billed directly to TxDOT, Developer shall coordinate with the Utility Owner(s) to have the power services for all traffic signal systems in the Project limits to be billed directly to the Developer within 90 Days of NTP2.

Developer shall submit plans and specifications for proposed signal work to the relevant city and shall secure the city's written consent in accordance with the form required by the agreement between TxDOT and the city. The consent shall form part of the Released for Construction Documents.

Developer agrees to allow unconditional access to all traffic signal systems to TxDOT and the local Governmental Entities. Developer agrees to report in writing any issues regarding these traffic signals to all appropriate agencies as soon as the issue is identified.

5.2.1 Red Light Cameras

TxDOT shall have the sole discretion to approve any red light cameras within the corridor. Developer shall forward any red light cameras installation requests directly to TxDOT.

5.3 Roadway Illumination

Where roadway illumination agreements exist, Developer shall execute TxDOT's responsibilities and duties as defined by these agreements. Developer shall coordinate with and provide reasonable accommodations to the relevant third parties (municipalities) requiring access to fulfill the obligations as specified in the agreements.

As required due to reconstruction, Developer shall design and construct frontage road illumination where specified in existing roadway illumination agreements or where existing frontage roads in the Project limits are illuminated. The operations and maintenance responsibilities will remain as specified in the existing illumination agreements.

New agreements between TxDOT and the Governmental Entity will be required when a local Governmental Entity requests additional illumination along frontage roads within the Project limits.

Developer will be able to review and comment on these illumination agreements and any additional design, construction, operation, and maintenance costs associated with these improvements will be considered a TxDOT Change.

5.4 Municipal Maintenance Agreements

Where Municipal Maintenance Agreements exist, Developer shall execute TxDOT's responsibilities and duties as defined by these agreements. Developer shall coordinate the necessary arrangements directly with the appropriate local Governmental Entity for additional maintenance or improvements within the local Governmental Entity's jurisdiction if so required by the Work.

5.5 Other Affected Third Parties

When Work interfaces with other third party facilities, Developer is responsible for coordinating the Work with all third parties potentially affected by the Work. Developer shall prepare a plan, the Affected Third Parties Plan, which describes how the Developer will mitigate the impact of the Work upon potentially impacted third parties for TxDOT's review prior to initiating discussions with potentially impacted third parties. The plan shall include all potentially impacted third parties and shall address coordination with the following Project specific agreements:

- Brazoria County and the Brazoria County Toll Road Authority Project Development Agreement which provides for construction of an adjacent Toll Lanes project south of Clear Creek and that will interface with the proposed SH 288 Toll Lanes Project in Harris County.
- City of Pearland Regional Detention Memorandum of Understanding which provides for detention capacity available for a portion of the proposed Project.

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6. UTILITY ADJUSTMENTS

6.1 General Requirements

A number of existing Utilities are located within or in the vicinity of the Project ROW, some pursuant to statutory rights and some pursuant to property rights. Certain of those existing Utilities will need to be relocated or otherwise adjusted in order to accommodate the Project. This Section 6 establishes procedures and requirements for Utility Adjustments including such processes as coordination with Utility Owners, administration of the engineering, construction and other activities necessary for Utility Adjustments, and required documentation. This Section 6 references certain TxDOT forms for Developer's use in Utility Adjustments. Copies of those forms are included in Attachment 6-1, Utility Forms. Except as otherwise provided in this Section 6 or directed by TxDOT, whenever a TxDOT form is provided, Developer shall prepare all forms of the same type using the TxDOT form and is required to notify TxDOT of all changes to the forms for TxDOT's approval prior to execution by the Utility Owner.

Developer shall cause all Utility Adjustments necessary to accommodate construction, operation, maintenance and/or use of the Project, in both its Initial Configuration and in its Ultimate Configuration. . Some Utility Adjustments may be performed by the Utility Owner with its own forces and/or contractors and consultants (i.e., Owner-Managed); all others shall be performed by Developer with its own forces and/or Contractors and consultants subject to any approval rights required by the Utility Owner for those working on its facilities (i.e., Developer-Managed). The allocation of responsibility for the Utility Adjustment Work between Developer and the Utility Owners shall be specified in the Utility Agreements as described in Section 6.1.3.

Developer's obligations regarding reimbursement to Utility Owners for eligible costs of Utility Adjustment Work, and Developer's obligations regarding the accommodation of Utilities from and after the Service Commencement Date, are set forth in Section 11.3 and Section 15.5 of the Agreement.

This Section 6 does not address Utility services to the Project. Utility services to the Project shall be the subject of separate agreements between Developer and Utility Owners.

6.1.1 When Utility Adjustment is Required

A Utility Adjustment may be necessary to accommodate the Project for either or both of the following reasons: (a) a physical conflict between the Project and the Utility, and/or (b) an incompatibility between the Project and the Utility based on the requirements in Section 6.2.1 (Standards), even though there may be no physical conflict. The physical limits of all Utility Adjustments shall extend as necessary to functionally replace the existing Utility, whether inside or outside of the Project ROW. Section 6.2.4.2 (Acquisition of Replacement Utility Property Interests) contains provisions that address the acquisition of replacement Utility Property Interests for Utilities to be installed outside of the Project ROW.

Utilities may remain in their existing locations within the Project ROW if (a) the requirements of Section 6.2.1 (Standards) are met, and (b) the existing location will not adversely affect the construction, operation, safety, maintenance and/or use of the Project and Utility. The Utility Owner must agree to its facilities remaining in its existing location.

6.1.2 Certain Components of the Utility Adjustment Work

6.1.2.1 Coordination

Developer shall communicate, cooperate, and coordinate with TxDOT, the Utility Owners and potentially affected third parties, as necessary for performance of the Utility Adjustment Work. Developer shall be responsible for preparing and securing execution (by Developer and the Utility Owner) of all necessary Utility Agreements.

6.1.2.2 Betterments

Replacements for existing Utilities shall be designed and constructed to provide service at least equal to that offered by the existing Utilities, unless the Utility Owner specifies a lesser replacement. Utility Enhancements are not included in the Work; however, any Betterment work furnished or performed by Developer as part of a Utility Adjustment shall be deemed added to the Work, on the date the Utility Agreement becomes effective. Developer shall perform all coordination necessary for Betterments including changes to the appropriate Utility Agreement and approval of the changes.

6.1.2.3 Protection in Place

Developer shall be responsible for Protection in Place of all Utilities impacted by the Project as necessary for their continued safe operation and structural integrity and to otherwise satisfy the requirements described in Section 6.2.1 (Standards). The Utility Owner must agree to all Protection in Place work that pertains to Utility Owner's facilities.

6.1.2.4 Abandonment and Removal

Developer shall make all arrangements and perform all work necessary to complete each abandonment or removal (and disposal) of a Utility in accordance with the requirements listed in Section 6.2.1 (Standards), including obtaining Governmental Approvals and consent from the affected Utility Owner and any affected landowner(s), or shall confirm that the Utility Owner has completed these tasks. Developer shall include in the PMP a plan for Abandonment of Utilities in place shall require approval by TxDOT.

6.1.2.5 Service Lines and Utility Appurtenances

Whenever required to accommodate construction, operation, maintenance and/or use of the Project, Developer shall cause Service Line Adjustments and Utility Appurtenance Adjustments. The Service Line shall have a definitive point of termination such as a meter or point of sale. On completion of these, Developer shall cause full reinstatement of the roadway, including reconstruction of curb, gutter, sidewalks, and landscaping, whether the Utility Adjustment Work is performed by the Utility Owner or by Developer.

6.1.2.6 Early Adjustments

Not applicable.

6.1.3 Agreements Between Developer and Utility Owners

Except as otherwise stated in this Section 6 or in the Agreement, each Utility Adjustment shall be specifically addressed in a Project Utility Adjustment Agreement (PUAA) or in a Utility Adjustment Agreement Amendment (UAAA), as described elsewhere in this Section 6. Developer is responsible for preparing, negotiating (to the extent allowed by this Section 6), and obtaining execution by the Utility Owners, of all Utility Agreements, (including preparing all necessary exhibits and information about the Project, such as reports, Plans and surveys). A Utility Agreement is not required for any Utility Adjustment consisting solely of Protection in Place in the Utility's original location within the Project ROW, unless the Utility Owner is being reimbursed for costs incurred by it on account of such Protection in Place. If no reimbursement is required to the Utility Owner, a Utility Joint Use Acknowledgements and set of plans detailing UAR compliance is required pertaining to the Protection in Place work. All Utility Agreements must be approved by TxDOT prior to taking effect.

6.1.3.1 Project Utility Adjustment Agreements (PUAA)

Developer shall enter into one or more PUAAs with each affected Utility Owner to define the design, material, construction, inspection, and acceptance standards and procedures necessary to complete Utility Adjustments, as well as to define Developer's and the Utility Owner's respective responsibilities for Utility Adjustment costs and Utility Adjustment activities such as material procurement, construction,

inspection, and acceptance. A PUAA may address more than one Utility Adjustment for the same Utility Owner. Additional Utility Adjustments may be added to an existing PUAA by a Utility Adjustment Agreement Amendment (UAAA).

Developer shall prepare each PUAA using the standard form of TxDOT Project Utility Adjustment Agreement (Owner-Managed) or TxDOT Project Utility Adjustment Agreement (Developer-Managed), Attachment 6-1, Utility Forms. Developer shall not modify the standard forms except by approval of TxDOT.

On issuance of NTP1, Developer shall begin negotiations with each affected Utility Owner to reach agreement on one or more PUAAs. Developer shall finalize the necessary PUAA(s) with each affected Utility Owner within a reasonable time period after issuance of NTP1. Developer shall include any proposed changes to a standard form (other than filling in blanks specific to a particular Utility Owner) in a Utility Owner-specific addendum. Each PUAA (including the Utility Adjustment Plans attached thereto) shall be subject to TxDOT review and approval as part of a Utility Assembly.

Language modification to a PUAA shall be approved by TxDOT prior to the submission of a Utility Assembly.

6.1.3.2 Utility Adjustment Agreement Amendments

Except where Utility Adjustment Field Modifications are permitted pursuant to Section 6.4.7 (Utility Adjustment Field Modifications), modification of an executed PUAA or any component thereof, after it has been approved by TxDOT as part of a Utility Assembly, shall be stated in a Utility Adjustment Agreement Amendment (UAAA). A UAAA may be used only when the allocation of responsibility for the Utility Adjustment Work covered by that UAAA is the same as in the underlying Utility Agreement; otherwise, an additional PUAA will be required.

Each UAAA (including any Utility Adjustment Plans attached thereto) shall be subject to TxDOT's approval as part of a Supplemental Utility Assembly. Except as otherwise directed by TxDOT or provided in an applicable Utility Agreement, Developer shall prepare all UAAAs using the form included in Attachment 6-1, Utility Forms. Developer shall not modify the forms except by approval of TxDOT. Developer shall include any proposed changes to a form (other than filling in blanks specific to a particular Utility Owner) in a Utility Owner specific addendum.

Language modification to a UAA shall be approved by TxDOT prior to the submission of the UAAA.

6.1.4 Recordkeeping

Developer shall maintain construction and inspection records in order to ascertain that Utility Adjustment Work is accomplished in accordance with the terms and in the manner proposed on the approved Utility Adjustment Plans and otherwise as required by the CDA Documents and the applicable Utility Agreement(s).

6.2 Administrative Requirements

6.2.1 Standards

All Utility Adjustment Work shall comply with all applicable Laws, Codes (including, but not limited to 43 TAC, Part 1, Chapter 21, Subchapter C, Utility Accommodation Rules), Regulations and Technical Provisions of the Agreement, including the Utility Adjustment Standards, the TxDOT Utility Manual, Article 11 of the Agreement and the requirements specified in this Section 6.

6.2.2 Communications

6.2.2.1 Communication with Utility Owners

Developer is responsible for holding meetings and otherwise communicating with each Utility Owner as necessary to timely accomplish the Utility Adjustments in compliance with the CDA Documents. TxDOT shall be notified of all meetings and will participate in these meetings if requested by the Utility Owner or Developer, or otherwise as TxDOT deems appropriate.

Before distribution of any mass mailings to Utility Owners, Developer shall submit to TxDOT, 21 Days in advance of distribution, for its review and comment the form, content and addressees of any such mass mailings. For purposes of this Section 6, the term "mass mailing" means correspondence that is sent to 50 percent or more of Utility Owners within a three-week time period and contains substantially the same content with respect to each Utility Owner.

6.2.2.2 Meetings

At least three Business Days in advance of each scheduled meeting, Developer shall provide notice and an agenda for the meeting separately to TxDOT and, if necessary, to the appropriate Utility Owner. Developer shall prepare minutes of all meetings and shall keep copies of all correspondence.

Developer shall prepare meeting minutes within five Business Days after the conclusion of such meetings. At a minimum, Developer shall include the following items in the meeting minutes:

- A complete list of attendees (including their affiliations, telephone numbers, and e-mail addresses)
- Documentation of the issues discussed and any associated solutions
- Description of remaining open issues and action items (including the person(s) responsible for follow-up and target date for resolution)
- Decision Log detailing key decisions made and parties approving the decision

Developer shall submit draft versions of all meeting minutes to TxDOT for review before distributing final versions to the meeting attendees and appropriate Customer Groups.

6.2.3 Utility Adjustment Team

Developer shall provide a Utility Adjustment team with appropriate qualifications and experience for the Utility Adjustment Work. Developer shall provide the names and contact details, titles, job roles, and specific experience of the team members in the PMP. Specifically, Developer shall provide a Utility Manager (UM) and a Utility Design Coordinator (UDC), and on projects where Developer utilizes a design-build contractor, a Developer Utility Coordinator (DUC) as described herein.

The UM's primary work responsibility shall be the performance of all Developer's obligations with respect to Utility Adjustments. The Utility Manager shall have a bachelor's degree, and have at least four years of relevant experience in coordinating and solving complex utility adjustments on highway improvement projects. The Utility Manager should be authorized by the Developer to approve all financial and technical modifications associated with Utility Adjustments, and modifications to the Utility Agreement.

The UDC shall be a Registered Professional Engineer. The UDC shall be responsible for coordinating the Utility Adjustment design with the overall highway design features during the planning, design, and construction phases of the Work.

The DUC shall hold a bachelor's degree and have at least five years of relevant experience in ROW and Utility coordination activities involving large transportation projects. The DUC shall be responsible for tracking and following the design-build contractor's activities and communicating the progress to the

Developer. The DUC shall assist with developing good working relationships with the Utility Owners and assisting the design-build contractor in all utility coordination matters.

6.2.4 Real Property Matters

Developer shall provide the services described below in connection with existing and future occupancy of property by Utilities.

6.2.4.1 Documentation of Existing Utility Property Interests -- Affidavits

For each Existing Utility Property Interest within the Project ROW claimed by any Utility Owner, Developer shall include an Affidavit of Property Interest in the applicable Utility Assembly, with documentation of the Existing Utility Property Interest (e.g., an easement deed) attached. Any such claim shall be subject to TxDOT's review as part of a Utility Assembly approval. Except as otherwise directed by TxDOT, Developer shall prepare all Affidavits of Property Interest using the forms included in Attachment 6-1, Utility Forms.

6.2.4.2 Acquisition of Replacement Utility Property Interests

Each Utility Owner will be responsible for acquiring any Replacement Utility Property Interests that are necessary for its Utility Adjustments. Developer shall have the following responsibilities for each acquisition:

1. Developer shall coordinate with, and provide the necessary information to, each Utility Owner as necessary for the Utility Owner to acquire any Replacement Utility Property Interests required for its Utility Adjustments.
2. If any of Developer-Related Entities assists a Utility Owner in acquiring a Replacement Utility Property Interest, such assistance shall be by separate contract outside of the Work, and Developer shall ensure that the following requirements are met:
    a) The files and records must be kept separate and apart from all acquisition files and records for the Project ROW.
    b) The items used in acquisition of Replacement Utility Property Interests (e.g., appraisals, written evaluations and owner contact reports) must be separate from the purchase of the Project ROW.
    c) Any Developer-Related Entity personnel negotiating the acquisition of Replacement Utility Property Interests must be different from those negotiating the acquisition of Project ROW.

Developer is not responsible for Utility Owner condemnation proceedings. The Utility Owner is responsible for its condemnation proceedings

6.2.4.3 Relinquishment of Existing Utility Property Interests

Developer shall cause the affected Utility Owner to relinquish each Existing Utility Property Interest within the Project ROW, unless the existing Utility occupying such interest is either (i) remaining in its original location or (ii) being reinstalled in a new location still subject to such interest.

6.2.4.4 Quitclaim Deeds

Except as otherwise directed by TxDOT, Developer shall prepare a Quitclaim Deed for each relinquishment of an Existing Utility Property Interest using the TxDOT form included in Attachment 6-1, Utility Forms. Each Quitclaim Deed shall be subject to TxDOT's approval as part of a Utility Assembly approval as described below.

Developer understands and expects that a Utility Owner will not relinquish any Existing Utility Property Interest until after the Utility Adjustment has been accepted by the Utility Owner in its new location. Accordingly, instead of an executed Quitclaim Deed, the Utility Assembly for such a Utility Adjustment

shall include a letter signed by the Utility Owner's authorized representative confirming that the interest will be quitclaimed upon completion of the Utility Adjustment, and a copy of the unsigned Quitclaim Deed. In these cases, Developer shall obtain the executed Quitclaim Deed within 90 Days of completion of the Utility Adjustment or unless otherwise approved by TxDOT in writing. The Quitclaim Deed must be approved by TxDOT prior to recording.

6.2.4.5 Utility Joint Use Acknowledgements (UJUA)

Developer shall prepare a Utility Joint Use Acknowledgment for:

1. Each Utility proposed to be relocated within the Project ROW
2. Each Utility proposed to remain in its existing location within the Project ROW
3. Any Existing Utility Property Interest located within the Project ROW that is not required to be relinquished pursuant to Section 6.2.4.3 (Relinquishment of Existing Utility Property Interests), and is not addressed in the foregoing clause (a) or clause (b)

Developer shall prepare all Utility Joint Use Acknowledgments using the TxDOT form included in Attachment 6-1, Utility Forms. Developer also shall prepare all required documentation to be included with each Utility Joint Use Acknowledgment.

Developer shall arrange for the Utility Owner to execute each Utility Joint Use Acknowledgment. Each Utility Joint Use Acknowledgment (executed by the Utility Owner) shall be subject to TxDOT's approval as part of a Utility Assembly.

6.2.4.6 Documentation Requirements

Developer shall prepare, negotiate (to the extent permitted by this Section 6.2.4 (Real Property Matters), and obtain execution by the Utility Owner of (and record in the appropriate jurisdiction, if applicable) all agreements and deeds described in this Section 6.2.4, including all necessary exhibits and information concerning the Project (e.g., reports, Plans, and surveys). Each agreement or deed shall identify the subject Utility(ies) by the applicable Utility Assembly Number (*[four-digit number beginning with 0500]*), and shall also identify any real property interests by parcel number or highway station number, or by other identification acceptable to TxDOT.

6.3 Design

6.3.1 Developer's Responsibility for Utility Identification

Developer bears sole responsibility for locating and identifying, at its own expense, all Utilities located within the Project ROW or otherwise affected by the Project, whether located on private property or within an existing public ROW, and including all Service Lines.

6.3.2 Technical Criteria and Performance Standards

All design plans for Utility Adjustment Work, whether furnished by Developer or by the Utility Owner, shall be consistent and compatible with the following:

a) The applicable requirements of the CDA Documents, including Section 6.2.1 (Standards)
b) The Project as initially designed
c) Any Utilities remaining in, or being installed in, the same vicinity
d) All applicable Governmental Approvals
e) Private approvals of any third parties necessary for such work

6.3.3 Utility Adjustment Concept Plans

Developer shall prepare and submit to TxDOT, no later than 90 days after NTP2 or 30 days before the first assembly package is submitted a proposed conceptual Utility design (a Utility Adjustment Concept Plan) for the Project (or proposed Utility Adjustment Concept Plans for various segments of the Project,

as appropriate), showing the approximate location of each existing Utility in accordance with Section 6.3.1, the existing Utilities to remain, proposed location of each Utility and Developer's Utility Adjustment recommendations.

In accordance with the PMP, Developer shall submit the proposed Utility Adjustment Concept Plans(s) to TxDOT for its review. The Utility Adjustment Concept Plan(s) shall be submitted in both tabular and plan formats. The tabular format shall identify and numerically list each utility conflict and each associated utility. The plan(s) shall be color-coded and shall utilize a scale that clearly depicts all of the required information. Developer shall coordinate with the affected Utility Owners as necessary to obtain their respective concurrence with the Utility Adjustment Concept Plan(s) as initially submitted to TxDOT and with any subsequent revisions. The Utility Adjustment Concept Plan is a working document, and Developer will modify the plan as project information becomes available. Each approved PUAA or UAAA will identify and approve the exact final approved utility location.

6.3.4 Utility Adjustment Plans

Utility Adjustment Plans, whether furnished by Developer or by the Utility Owner, shall be signed and sealed by a Registered Professional Engineer (PE) per governmental regulations and industry practice.

6.3.4.1 Plans Prepared by Developer

Where Developer and the Utility Owner have agreed that Developer will furnish a Utility Adjustment design, Developer shall prepare and obtain the Utility Owner's approval of plans, specifications, and cost estimates for the Utility Adjustment (collectively, "Utility Adjustment Plans") by having an authorized representative of the Utility Owner sign the plans as "reviewed and approved for construction." The Utility Adjustment Plans (as approved by the Utility Owner) shall be attached to the applicable Utility Agreement, which Developer shall include in the appropriate Utility Assembly for TxDOT's approval.

Unless otherwise specified in the applicable Utility Agreement(s), all changes to Utility Adjustment Plans previously approved by the Utility Owner (excluding estimates, if the Utility Owner is not responsible for any costs) shall require written Utility Owner approval. Developer shall transmit any TxDOT comments to the Utility Owner, and shall coordinate any modification, re-approval by the Utility Owner and re-submittal to TxDOT as necessary to obtain TxDOT's approval.

6.3.4.2 Plans Prepared by the Utility Owner

For all Utility Adjustment Plans to be furnished by a Utility Owner, Developer shall coordinate with the Utility Owner as necessary to confirm compliance with the applicable requirements as referenced in Section 6.2.1. Those Utility Adjustment Plans shall be attached to the applicable Utility Agreement, which Developer shall include in the appropriate Utility Assembly for TxDOT's approval. Developer shall transmit any TxDOT comments to the Utility Owner, and shall coordinate any modification, review by Developer and re-submittal to TxDOT as necessary to obtain TxDOT's approval.

6.3.4.3 Design Documents

Each proposed Utility Adjustment shall be shown in the Design Documents, regardless of whether the Utility Adjustment Plans are prepared by Developer or by the Utility Owner.

6.3.4.4 Certain Requirements for Underground Utilities

Casing as specified in the Utility Accommodation Rules (UAR) shall be used for all underground Utilities crossing the Project ROW. However, high-pressure gas and liquid petroleum pipelines may be allowed to cross the Project ROW without steel casing as long as the requirements of the Utility Accommodation Rules are met. All high-pressure gas pipelines within the Project ROW shall comply with a design factor "F" = 0.6 or less as required by the class location of the pipeline. The Utility Owner is required to submit or approve the Barlows calculation(s) in writing to be included in the Utility Assembly.

All water and sewer lines crossings shall be encased in steel casing.

Non-metallic natural gas lines crossing side streets shall be encased in steel casing.

6.3.4.5 Utility Assemblies

Each Utility Adjustment, in addition to each Utility remaining in place in the Project ROW and not requiring any Protection in Place or other Utility Adjustment, shall be addressed in a Utility Assembly prepared by Developer and submitted to TxDOT for its review and comment, and for TxDOT's approval of any items for which this Section 6 requires TxDOT's approval. Temporary Utility Adjustments that are installed within the final ROW must also be included with an assembly for TxDOT's prior approval unless TxDOT waives or allows other approval methods concerning temporary Utility Adjustments. Each Utility Adjustment shall be addressed in a full Utility Assembly, unless it is appropriate for a Supplemental Utility Assembly or Abbreviated Utility Assembly, as described below. Developer shall coordinate with the Utility Owner to prepare all components of each Utility Assembly. Completion of the review and comment process for the applicable Utility Assembly, as well as issuance of any required TxDOT approvals, shall be required before the start of construction for the affected Utility Adjustment Work.

Provisions governing the procedure for and timing of Utility Assembly submittals are in Section 6.5 (Deliverables).

All Utility Adjustments covered by the same initial PUAA can be addressed in a single full Utility Assembly.

Each set of the required Utility Assembly shall include the following:

a) A transmittal memo recommending approval and detailing any unique characteristics or information pertaining to the adjustment.

b) A completed Utility Assembly Checklist.

c) A TxDOT approved Utility Adjustment Agreement.

d) Plans which:

   1) Show the existing and proposed Utility facilities,

   2) Show existing and proposed grades for all utility crossings,

   3) Show the existing and final ROW lines along with the control of access denial line,

   4) Show an offset distance from the final ROW line to all longitudinal Utilities within the final ROW.

   5) Present sufficient information to enable TxDOT to verify compliance with the UAR requirements for each Utility located within the final ROW, including highway design features.

   6) Are folded to 8.5" x 11" size unless waived by TxDOT.

e) Estimate(s) from the Utility Owner (and also from Developer, where Developer is furnishing design and/or performing construction), which estimates shall, without limitation, detail material type and quantity (material quantities detailed on the estimates must correlate to the materials shown on the plans described in (d) above. The estimate must list the estimated amount of reimbursement to the Utility Owner, taking into consideration the credit calculation for Betterment, credit for any salvage and any applicable eligibility ratio.

f) A proposed Utility Joint Use Acknowledgement

g) Statement of Work form, if applicable

h) Affidavit(s) of Property Interest form (With property interest instrument of conveyance attached), if applicable; and

j) A ROW map showing the existing and proposed utility facilities identified on a plan view. This ROW map will only be required to be included with TxDOT's copy of the Utility Assembly.

k) All utility no conflict sign off forms.

l) Proposed starting date and estimated time to completion for the adjustment.

Utility Adjustment Amendment Agreements (UAAA). For each UAAA, Developer shall prepare an additional Utility Assembly for the relevant initial PUAA (an Assembly), covering all Utility Adjustments addressed in the UAAA. The UAAA Assembly shall contain all requirements listed in a) through l) as identified in 6.3.4.5.. Each of the foregoing items shall comply with the requirements for same described in Attachment 6-2, Utility Assembly and Tracking Report Requirements.

Abbreviated Utility Assemblies. Developer shall prepare an Abbreviated Utility Assembly for each Utility proposed to remain at its original location within the Project ROW that is not required to be addressed in a PUAA or UAAA, unless an Adjustment is required pursuant to Section 6.1.1. If Developer is reimbursing the Utility Owner any of its costs, a PUAA or UAAA is required. Each Abbreviated Utility Assembly shall contain a transmittal memo recommending that the subject Utility(ies) remain in place, a set of plans detailing UAR compliance,a completed Utility Assembly Checklist, a certification from the Utility Owner approving leaving the Utility(ies) in place, as well as Utility Joint Use Acknowledgement(s) and Affidavit(s) of Property Interest, if applicable. Each of the foregoing items shall comply with the requirements for same described in Attachment 6-1, Utility Forms.

6.4 Construction

6.4.1 Reserved

6.4.2 General Construction Criteria

All Utility Adjustment construction performed by Developer shall conform to the requirements listed below. In addition, Developer is responsible for verifying that all Utility Adjustment construction performed by each Utility Owner conforms to the requirements described below. In case of nonconformance, Developer shall cause the Utility Owner (and/or its contractors, as applicable) to complete all necessary corrective work or to otherwise take such steps as are necessary to conform to these requirements.

a) All criteria identified in Section 6.3.2 (Technical Criteria and Performance Standards)
b) The Utility Adjustment Plans included in the Utility Agreement approved by TxDOT (other than Utility Adjustment Field Modifications complying with Section 6.4.7 (Utility Adjustment Field Modifications)
c) All Project safety and environmental requirements
d) All pre-construction meeting requirements
e) The ROW acquisition schedule described in Section 7 (ROW)
f) Utilities standards provided in the Utility Agreement

6.4.3 Inspection of Utility Owner Construction

Developer shall set forth procedures in the PMP for inspection of all Utility Adjustment Work performed by Utility Owners (and/or their contractors) to verify compliance with the applicable requirements described in Section 6.4.2 (General Construction Criteria). Developer is responsible for Quality Control and Quality Assurance for all Work performed by the Utility Owners and/or their contractors.

6.4.4 Scheduling Utility Adjustment Work

The Utility Adjustment Work (other than construction) may begin at any time following issuance of NTP1. Refer to Section 6 and Article 11 of Agreement for the conditions to commencement of Utility Adjustment Construction Work by Developer. Developer shall not arrange for any Utility Owner to begin any demolition, removal, or other Construction Work for any Utility Adjustment until all of the following conditions are satisfied:

a) The Utility Adjustment is covered by an executed Utility Agreement (and any conditions to commencement of such activities that are included in the Utility Agreement have been satisfied);
b) Pre-construction meeting, in accordance with Section 6.2.2.2, shall be required after execution of the Utility Agreement and prior to commencement of any construction activities, unless otherwise approved by TxDOT.
c) Availability and access to affected Replacement Utility Property Interests have been obtained by the Utility Owner (and provided to Developer, if applicable);
d) If any part of the Utility Adjustment Construction Work will affect the Project ROW, availability and access to that portion of the Project ROW has been obtained in accordance with the applicable requirements of the CDA Documents.
e) If applicable, the Alternate Procedure List has been approved by FHWA, and either (a) the affected Utility is on the approved Alternate Procedure List, as supplemented, or (b) the Utility Owner is on the approved Alternate Procedure List, as supplemented.
f) The review and comment process has been completed and required approvals have been obtained for the Utility Assembly covering the Utility Adjustment.
g) All Governmental Approvals necessary for the Utility Adjustment construction have been obtained, and any pre-construction requirements contained in those Governmental Approvals have been satisfied.
h) All other conditions to that Work stated in the CDA Documents have been satisfied.

6.4.5 Standard of Care Regarding Utilities

Developer shall carefully and skillfully carry out all Work impacting Utilities and shall mark, support, secure, exercise care, and otherwise act to avoid damage to Utilities. At the completion of the Work, the condition of all Utilities shall be at least as safe and permanent as before.

6.4.6 Emergency Procedures

Developer shall provide Emergency procedures with respect to Utility Adjustment Work in the PMP. Developer shall obtain Emergency contact information from, and establish Emergency procedures with each Utility Owner in the event of rupture, break or damage to Utility Owner's Utility facilities. Developer shall immediately notify Utility Owner after any rupture, break or damage to Utility Owners facilities.

6.4.7 Utility Adjustment Field Modifications

Developer shall establish a procedure to be followed if a Utility Adjustment Field Modification (UAFM) is proposed by either Developer or a Utility Owner, after the Utility Assembly (which includes the Utility Adjustment Plans) has been approved. The procedure shall contain, at minimum, the following processes:

a) The Utility Owner's review and approval of a Utility Adjustment Field Modification proposed by Developer, or Developer's review and approval of a Utility Adjustment Field Modification proposed by the Utility Owner. The UAFM shall have approval prior to commencement of construction. All revisions shall be signed and sealed by a Registered

Professional Engineer (PE) or approved as required by governmental regulations and industry practice and formally submitted to TxDOT for review and approval;

b) Transmittal of Utility Adjustment Field Modifications to the appropriate construction field personnel;

c) Inclusion of any Utility Adjustment Field Modifications in the Record Drawings for the Project.

Developer shall cause the procedure to be followed for all Utility Adjustment Field Modifications, whether the construction is performed by Developer or by the Utility Owner.

6.4.8 Switch Over to New Facilities

After a newly Adjusted Utility has been accepted by the Utility Owner and is otherwise ready to be placed in service, Developer shall coordinate with the Utility Owner regarding the procedure and timing for placing the newly Adjusted Utility into service and terminating service at the Utility being replaced.

6.4.9 Record Drawings

Developer shall provide Record Drawings to each Utility Owner for its Adjusted Utilities, in accordance with the applicable Utility Agreement(s).

Developer shall provide Record Drawings to TxDOT (regardless of whether design and/or construction of the subject Utilities was furnished or performed by Developer or by the Utility Owner). These drawings shall show the location of, and label as such, all abandoned Utilities, shall show and label all other Utilities, whether remaining in place or relocated, located within the Project ROW or otherwise impacted by the Project, and shall otherwise comply with Section 2 (Project Management). Developer shall provide the Record Drawings for each Adjustment to TxDOT not later than 90 Days after Utility Owner acceptance as defined in the Utility Agreement, the Adjustment or before such earlier deadline as is specified elsewhere in the CDA Documents.

Developer shall provide, within 90 days after final utility adjustment is complete, a plan view of all final utility facility locations both Owner Managed and Developer Managed which includes utilities that remained in place, were adjusted in place and/or relocated. The plan must detail the utility facility horizontal alignment with highway stationing, ROW lines, roadway features, Utility owners name, Utility facility type size and U-Number. This overall inventory set of plans is separate from the individual record drawings required for each utility assembly. The plan view map shall be submitted for TxDOT review upon completion of 50% of the required utility adjustments.

6.4.10 Maintenance of Utility Service

All Utilities shall remain fully operational during all phases of construction, except as specifically allowed and approved in writing by the Utility Owner. Developer shall schedule Utility Adjustment Work in order to minimize any interruption of service, while at the same time meeting the Project Schedule and taking into consideration seasonal demands. Each Utility Adjustment or remain in place location must allow for adequate access to the Utility Facility that is agreed to by the Utility Owner.

6.4.11 Traffic Control

Developer shall be responsible for the Traffic Management Plan. The Traffic Management Plan shall cover all traffic control made necessary by for Utility Adjustment Work, whether performed by Developer or by the Utility Owner. Traffic control for Adjustments shall be coordinated with, and subject to approval by, the local agency(ies) with jurisdiction. Traffic control shall comply with the guidelines of the TMUTCD and of Section 18 (Traffic Control).

6.5 Deliverables

Developer shall time all submittals described in this section to meet the Project Schedule, taking into account the maximum number of submittals set forth TxDOT's in Section 6.5 or, if not stated therein, then as stated in Section 8.1.2 of the Agreement. All deliverables shall conform to the standards required in the Project Management Plan.

6.5.1 Maximum Number of Submittals

Developer shall coordinate all Submittals required pursuant to this Section 6.5, so as not to overburden TxDOT's staff and consultants. In each calendar week, Developer shall not submit more than:

a) Four Utility Assemblies (excluding Abbreviated Utility Assemblies)
b) Two of any other Submittal requiring TxDOT review and approval.

Where the number of Submittals exceeds these limits, the Submittals shall be considered excess and TxDOT may defer its review of any such excess Submittals to a subsequent ten (10) Business Days period as necessary.

6.5.2 Developer's Utility Tracking Report

Developer shall maintain a Utility Tracking Report in tabular form, listing all Utilities located within the Project ROW or otherwise potentially affected by the Project. Developer shall submit the Utility Tracking Report to TxDOT on a monthly basis in the format described below unless otherwise approved by TxDOT. The Utility Tracking Report shall, at a minimum, contain the following information for each utility:

a) The name of the Utility Owner and a unique tracking number starting with the prefix "Highway U-" followed by a four digit number starting with 0001- to be assigned by the Developer;

b) Utility size and type;

c) Location of the Utility based upon station and offset;

d) The proposed method of treatment;

e) State whether the adjustment will be Owner or Developer Managed;

f) Dates on which the PUAA/UAAA was executed by TxDOT, Utility Owner, Design-Build Contractor, Developer;

g) Dates on which the UJUA was executed by the Utility Owner and TxDOT;

h) The Utility Owner's existing right of occupancy of the right of way for each Utility (e.g. UJUA, permit, easement or combination);

i) Whether any Replacement Utility Property Interest will be necessary;

j) Estimated cost approved in the PUAA or UAAA;

k) Amounts and dates of payments made by the Developer to the Utility Owner, listing in each case the type of payment (final, partial or lump sum);

l) Scheduled start and completion date for construction of each adjustment;

m) Percent complete of construction;

n) Whether any Betterment is included in the adjustment

The Utility Tracking Report shall also include a separate section for Replacement Utility Property Interest including each necessary Replacement Utility Property Interest with the names of property owners or

parcel number(s), Utility Assembly Numbers, status of the acquisition, acquisition cost, and other information as necessary. Developer shall maintain this section of the Utility Tracking Report and submit to TxDOT in the same manner as all other portions of the Utility Tracking Report.

6.5.3 Utility Assembly Submittals

The following procedure shall govern submittal and review of each Utility Assembly, including Supplemental and Abbreviated Utility Assemblies:

a) Before submitting a Utility Assembly to TxDOT, Developer shall:

- Verify that each subject Utility (or the Utility Owner) is on the approved Alternate Procedure List, if applicable;
- Submit the complete Utility Assembly to the quality control/quality assurance entity designated by Developer in accordance with the PMP; and
- Resolve all comments made by the quality control/quality assurance entity, coordinating with the Utility Owner as appropriate.

b) Developer shall submit to TxDOT three identical and complete originals of each Utility Assembly, each of which shall be bound and labeled "Developer Copy," "TxDOT Copy," or "Utility Owner Copy," as appropriate. The "TxDOT Copy" shall be color coded and include the Project ROW map with the existing and proposed Utility facilities identified on a plan view. These submittals shall be for TxDOT's review and comment, except for any components of the Utility Assembly for which TxDOT's approval is required by this Section 6.5.

c) Developer shall submit to TxDOT a Utility Assembly Submittal Log with each submittal or group of submittals. The Utility Assembly Submittal Log shall establish the review priority.

TxDOT will review the Utility Assembly for compliance with the requirements of this Section 6.5.3, and within ten (10) Business Days excluding TxDOT holidays will return the Utility Assembly to Developer with the appropriate notations, pursuant to Section 8.4.1 of the Agreement to reflect its responses. Developer shall transmit any TxDOT comments to the Utility Owner, and shall coordinate any modification, review and approval by the Utility Owner and re-submittal to TxDOT, as necessary to resolve all TxDOT comments and/or obtain TxDOT's approval, as applicable. Upon (a) TxDOT's approval of any Utility Assembly components for which TxDOT's approval is required, and (b) completion of the review and comment process for all other Utility Assembly components, TxDOT will sign three originals of any approved UJUA and of any other components of the Utility Assembly for which this Section 6 requires TxDOT's signature.

6.5.4 FHWA Alternate Procedure

The Developer shall develop the Alternate Procedure List that includes the Utility Owner's name, approximate station numbers and estimated cost. TxDOT will then submit to the FHWA the Alternate Procedure List in order to obtain FHWA authorization for federal reimbursement Promptly upon determining that any additional Utility Owner not referenced on the Alternative Procedure List is impacted by the Project, Developer shall submit to TxDOT all documentation as referenced above in order to update the Alternative Procedure List.

TxDOT will forward the approved Alternate Procedure List (and any amendments thereto) to Developer, promptly upon receipt of same from the FHWA.

7. RIGHT OF WAY (ROW)

7.1 General Requirements

Developer's obligations in respect of the acquisition of Project ROW are set forth in Article 10 of the Agreement.

This Section 7 sets forth the ROW activities assigned to Developer, including pre-acquisition and acquisition activities, and designates which ROW activities TxDOT will conduct. This section also sets forth the requirements applicable to the Work assigned to Developer related to the acquisition of Project ROW. Developer shall provide all services necessary to acquire title to the Project ROW, in form and substance acceptable to TxDOT, in the name of the State; relocation of displaces; and clearance/demolition of the improvements from the Project ROW, as more fully described in the following sub-sections.

Except as otherwise set forth in the Agreement, Developer's Project ROW staff and/or Contractors will function as independent contractors while acquiring Project ROW, and not as an agent, representative, or employee of TxDOT.

If Developer obtains a Property Agreement to facilitate design, construction, operation or maintenance in relation to the Project, Developer shall provide a copy of the agreement to TxDOT.

7.2 Administrative Requirements

7.2.1 Standards

Project ROW shall be acquired in accordance with State and federal Law and the practices, guidelines, procedures, and methods contained in the following as it pertains to Right of Way:

a) TxDOT *Right of Way Manual* Collection (available online at http://onlinemanuals.txdot.gov/manuals)
b) TxDOT *Access Management Manual* (available online at http://onlinemanuals.txdot.gov/manuals)
c) TxDOT *Survey Manual*
d) TxDOT *Appraisal and Review Manual*

Pursuant to the applicable federal regulations, Developer shall (i) acquire ROW parcels for the Project on behalf of the State, but without the direct participation of TxDOT, subject to TxDOT's rights of review, approval, and audit; (ii) certify acceptance of the TxDOT *Right of Way Manual*; (iii) provide adequate access to all occupied properties; (iv) maintain Utility service to occupied properties until relocation is complete; and (v) not permit open burning within 1000 feet of an occupied dwelling.

Developer shall maintain a complete and of the TxDOT *Right of Way Manual* Collection, Volumes 1 through 8 (available online at http://onlinemanuals.txdot.gov/manuals), TxDOT *Access Management Manual*, TxDOT *Appraisal and Review Manual*, and an approved Project ROW map which is current at the time of contract execution for public use. Any TxDOT forms referenced in this section will be provided by TxDOT.

All Project ROW activities must be completed and documented in compliance with all applicable Laws, including the Uniform Act, and the rules and regulations implementing the Uniform Act.

7.2.2 Software Requirements

Developer shall employ software that is compatible with the software in use by TxDOT, or fully transferable to TxDOT's systems. Developer must supply and maintain a Web-based, parcel-by-parcel database that incorporates the fields and information required by TxDOT's approved ROW tracking system: ROWIS. Developer must maintain and participate in any other required ROW tracking system required by the CDA Documents or otherwise agreed to by the parties. The database shall be fully accessible to Persons authorized by TxDOT.

7.2.3 ROW Acquisition Plan

Developer shall prepare a ROW Acquisition Plan in accordance with the requirements of this Section 7 and Section 2 (Project Management). The ROW Acquisition Plan shall set forth Developer's organization including names, titles and qualifications of Project ROW personnel, integration of the Project ROW schedule into the Project Schedule, interface between design and Project ROW activities, documentation and reporting, quality control procedures and quality review standards.

The ROW Acquisition Plan shall contain, as a minimum, the following:

a) The name of TxDOT approved title company(ies) to be used for title services
b) The name and qualifications of the proposed ROW Acquisition Manager (ROW AM)
c) The resumes and qualifications for appraisers, appraisal reviewers, land planners, relocation agents, negotiators, real estate attorneys, eminent domain specialist and ROW personnel who shall have the minimum qualifications and experience specified in Section 7.2.7

The ROW Acquisition Plan shall establish the specific means by which Developer will:

a) Provide sufficient personnel to achieve, in accordance with the Project Schedule, the goals and milestones established for Project ROW acquisition, relocation assistance, appraisals and appraisal review, and clearance/demolition of the improvements from the Project ROW.
b) Provide administrative support.
c) Provide for language, visually impaired, or hearing impaired translation services, as necessary.
d) Provide documentation and reports.
e) Produce and distribute acquisition and relocation brochures as approved by TxDOT.
f) Establish, implement, and maintain quality control procedures and quality review standards for the acquisition for Project ROW.
g) Prevent fraud, waste, and mismanagement.

Developer shall update the ROW Acquisition Plan regularly, at least quarterly, in accordance with the CDA Documents.

7.2.4 Schedule and Review Procedures

The Project Schedule shall indicate the date to begin the acquisition of the Project ROW and the anticipated completion date of acquisition activities for each parcel. TxDOT shall be advised of all Additional Properties and temporary rights or interests in real property to be acquired by Developer. In developing the Project Schedule, Developer shall give priority to the acquisition of parcels that have significant impact on the Project Schedule and/or affect the Critical Path as so indicated. The monthly status reports required by Section 2.1.1 shall provide updated projections for the acquisition date of each parcel.

In developing the Project Schedule, Developer shall incorporate adequate time periods for TxDOT review and approval of Acquisition Packages, Closing Packages, Condemnation Packages, Payment Packages or any other Submittal requiring TxDOT approval. TxDOT intends to review the completed Submittal as expeditiously as possible; however, for the purposes of the Project Schedule, Developer shall assume that the reviews performed by TxDOT will require ten (10) Business Days excluding TxDOT holidays for all

Submittals that Developer submits as final and complete in accordance with Section 7.3.6 (Project ROW Acquisition Package Approval), up to a maximum of ten (10) Acquisition Packages. Any Submittals that would require TxDOT to review more than ten (10) Submittals within any given ten (10) Business Day period shall be considered excess, and TxDOT may defer its review of any such Submittals to a subsequent ten (10) Business Day period (or periods as necessary). TxDOT will notify Developer of its election to defer any excess Submittals within ten (10) Business Days excluding TxDOT holidays after receipt. The balance of Submittals in excess of ten (10) will be rolled over to the next ten (10) Business Day period and added to the Submittals made by Developer in that period. When Developer submits more than ten (10) Submittals at any given time, Developer shall indicate the priority of review.

If TxDOT notifies Developer that any Submittal has a deficiency, Developer shall correct such deficiency and resubmit the package to TxDOT. Resubmissions shall be treated as a new Submittal as described above. A Submittal shall be deficient, as determined by TxDOT, if any of its components fails to meet any of the criteria established by this section for such component, or contains any material errors or omissions. Schedule delays resulting from inadequate or incomplete submissions of Submittals shall be the responsibility of Developer and will not be eligible for treatment as a Relief Event or Compensation Event.

TxDOT reserves the right to undertake additional review on Submittals that contain or identify facts or issues of an unusual nature or which do not clearly fit within TxDOT standards and will notify Developer in writing that the review period will be extended by an additional ten (10) Business Days before rendering a decision to Developer.

Developer may request TxDOT to do a preliminary review of the survey and appraisal before the complete Submittal is submitted. TxDOT shall review the preliminary submission of the survey and appraisal and notify Developer of any deficiencies within ten (10) Business Days after TxDOT's receipt of such preliminary submission.

7.2.5 Developer's Project ROW Scope of Services

Developer shall complete all administrative activities and prepare all documentation sufficient for Developer to acquire the Project ROW. Developer shall obtain TxDOT's review and prior written approval of all Project ROW maps and surveys, appraisals, legal descriptions, acquisition documentation, purchase price, requests to acquire Project ROW, condemnation-related activities, and funding/closing procedures. TxDOT will (i) approve and return the Project ROW acquisition documentation, (ii) provide review comments for incorporation by Developer in accordance with Section 7.2.4 (Schedule and Review Procedures), or (iii) in the case of an Acquisition Package that is deficient, notify Developer of the deficiency(ies) to be corrected by Developer in accordance with Section 7.2.4 (Schedule and Review Procedures). Except as otherwise authorized by applicable State and federal policy and regulations for early acquisition and approved by TxDOT, Developer shall not proceed with acquisition of the Project ROW until the NEPA Approval is issued, public involvement procedures have been completed, and ROW maps and legal descriptions for the applicable constructible segment as established by the logical termini of the Project have been prepared and approved by TxDOT. TxDOT will provide a separate release for each approved segment. Further, Developer shall not commence any negotiations with landowners nor will TxDOT begin eminent domain procedures until the specific Acquisition Package for that particular parcel is approved by TxDOT.

If Developer and the landowner cannot negotiate an agreed-upon purchase price, acceptable to TxDOT, TxDOT will commence acquisition of the property through eminent domain procedures. TxDOT will not commence any condemnation action through the statutory "Declaration of Taking" procedure without the. Consent may be withheld in TxDOT's sole and absolute discretion.

Developer shall not begin construction on any parcel of real estate unless property rights for the parcel have been conveyed and recorded in favor of TxDOT, possession has been obtained through eminent domain or any other method as provided for in Section 7.2.1 (Standards), or a Possession and Use Agreement has been validly executed and delivered by all necessary parties in accordance with Section 7.4.1 (Project ROW Negotiations), and all appropriate relocation assistance has been accomplished.

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7.2.6 Acquisition Process Summary

Developer's major activities with respect to the acquisition of the Project ROW include:

a) Project ROW surveying and mapping
b) Project ROW budget estimates and updates
c) Title services
d) Appraisal services
e) Appraisal review
f) Negotiations
g) Closing services
h) Relocation assistance
i) Condemnation support services
j) Clearance and demolition of Project ROW
k) Environmental due diligence
l) Documentation and document control
m) Progress reports
n) Project ROW administration and management
o) Project ROW quality management
p) Letter from Developer's design engineer certifying that the required Project ROW acquisition is necessary and that any proposed alternatives are not feasible or are cost prohibitive
q) Obtaining rights of entry, as necessary

7.2.7 ROW Personnel Qualifications

Developer's ROW Acquisition Manager shall have at least five years experience managing the acquisition of transportation ROW projects for a condemning authority, be licensed as a real estate salesman or broker pursuant to the *Texas Real Estate License Act* or rules established by the Texas Real Estate Commission, be familiar with appraisal and appraisal report review pursuant to the Uniform Standards of Professional Appraisal Practice (USPAP), and be familiar with the Uniform Act and applicable Laws of the State of Texas.

Quality Control Specialist(s) – Developer shall designate a specific person(s) responsible for internal quality control and quality assurance. This individual shall review all Developer deliverables associated with survey, title, appraisal, acquisition, relocation and eminent domain prior to the deliverable being delivered to TxDOT for review.

Appraiser and Appraisal Reviewer – Each appraiser and appraisal reviewers shall be licensed and certified in the State of Texas and shall have a minimum of five years experience in appraising real property for eminent domain purposes, including partial taking appraisal, partial taking appraisal review and expert witness testimony. He or she must also have been actively and continuously engaged for at least three years immediately preceding his or her selection for this Project in appraisal work primarily in Harris County, or as approved by TxDOT. The appraisers and the appraisal reviewers shall have separate and distinct duties, and appraisers must be employed by different firms from the appraisal reviewers. Each appraiser shall be required to submit three samples of previous appraisal work prepared for eminent domain purposes. All appraisers preparing and signing appraisals must be approved by TxDOT before

performing any appraisals on the Project. If required by TxDOT, the appraiser will be required to demonstrate his/her skills at expert witness testimony.

Land Planner - Each land planner shall have a minimum of five years experience in land planning including experience with expert witness testimony in eminent domain proceedings. He or she must also have been actively and continuously engaged for at least three years immediately preceding his or her selection for this Project in land planning work primarily in Harris County, or as approved by TxDOT. Developer shall provide a minimum of two land planners to assist appraisers and complete land plans.

Relocation Agent - Each relocation agent shall have a minimum of three years experience in relocation assistance for ROW projects pursuant to the Uniform Act. A relocation agent's responsibilities shall include the following: Determination of eligibility of all displacees, contacting all displacees and informing them of their benefits, maintaining a file of all documentation concerning the relocation of the displacees, and extending all relocation assistance advisory services.

Negotiator - Each ROW negotiator shall be licensed either as a real estate sales person or broker pursuant to the *Texas Real Estate License Act* or rules established by the Texas Real Estate Commission, and shall be familiar with appraisal and appraisal report review pursuant to the USPAP. The negotiator shall have a minimum of three years experience in right of way negotiations. The ROW negotiator's responsibilities shall include the following: contact with property owners on the Project to discuss the acquisition of property needed for the Project, maintaining complete and accurate files of all transactions and contacts with the property owners and/or their representatives, and actively working toward a joint resolution to acquire the property with the property owner.

Eminent Domain Specialist – Each eminent domain specialist shall have a minimum of 3 years experience with TxDOT procedures and policies as related to acquisition of property through the use of eminent domain. The eminent domain specialist must be well versed in all activities necessary with the acquisition of parcels through the TxDOT Eminent Domain process. This includes correctly completing all TxDOT forms including the RTE-49, filing the eminent domain forms, coordinating the hearing with all appropriate parties and ensuring that the Award of Special Commissioners is deposited into the registry of the Court and all notices sent to the appropriate parties.

Real Estate Attorney - Each real estate attorney shall be licensed by the State of Texas and shall have at least five years experience in title review and curative matters. The real estate attorney's responsibilities shall include coordinating and clearing all title issues and compliance assistance with State and federal acquisition requirements for the properties acquired for the Project.

ROW Title Specialist – Each Title Specialist shall have at least three years experience in title review and curative matters. ROW personnel's responsibilities shall include, but not be limited to the following: maintain complete and accurate files of all transactions and contacts with the property owners and/or their representatives, coordinate and clear all title issues and assist at closing the properties acquired for the Project.

All ROW personnel shall have at least three years experience in the appropriate ROW discipline

7.2.8 Developer Conflict of Interest

If at any time, Developer or to the best of Developer's knowledge, any Developer-Related Entity directly or indirectly (i) acquires or has previously acquired any interest in real property likely to be parcels of the Project ROW or the remainders of any such parcels; (ii) loans or has previously loaned money to any interest holder in any real property likely to be a Project ROW parcel and accepts as security for such loan the parcel, or the remainder of any such parcel that is not a whole acquisition, or (iii) purchases or has previously purchased from an existing mortgagee the mortgage instrument that secures an existing loan against real property likely to be a Project ROW parcel, or the remainder of any such parcel, Developer

shall promptly disclose the same to TxDOT. In the case of acquisitions, loans or mortgage purchases that occurred prior to the execution of the Agreement, such disclosure shall be made within ten (10) Business Days days after execution of the Agreement.

In the event that Developer, or any subsidiary or parent company of Developer, acquires a real property interest, whether title or mortgage, in parcels of the Project ROW, the real property interest acquired or a release of mortgage as the case may be, shall be conveyed to the State of Texas without the necessity of eminent domain.

Developer shall not acquire or permit the acquisition by any Developer-Related Entity of any real property interest in a Project ROW parcel, whether in fee title or mortgage, for the purpose of avoiding compliance with the Laws, practices, guidelines, procedures and methods described in Section 7.2.1 (Standards).

7.2.9 Meetings

Developer shall attend meetings as requested by TxDOT. At such meetings Developer shall provide exhibits, take minutes, and distribute to all attendees for review and comment. Minutes will not be finalized until all attendees agree on content. Meeting minutes shall be provided to TxDOT within 5 Business Days from date of meeting. TxDOT will respond within five (5) Business Days excluding TxDOT holidays or at the next occurrence of the meeting. Proposed agendas shall be provided three (3) Business Days prior to meeting.

7.2.10 Documentation and Reporting

Developer shall provide TxDOT with all specific reports and supporting documentation for review and approval during the acquisition process. All correspondence with TxDOT and property owners relating to acquisition of real property shall include a heading with the following information (at a minimum):

a) County
b) Control Section Job (CSJ) number
c) Highway Designation
d) Project limits
e) Parcel number
f) Name of record owner(s)

In administering and managing its Project ROW activities, Developer shall:

a) Maintain parcel records on file of all aspects of the acquisition process in accordance with TxDOT requirements and applicable Law. Each parcel file shall include all documents required by the CDA Documents, the FHWA, and/or TxDOT.
b) Provide monthly summaries for the cost of Project ROW acquisition and related relocation assistance including amounts authorized and amounts paid on a parcel-by-parcel basis and budget forecasting on an overall Project basis as requested by TxDOT.
c) Maintain and electronically submit to TxDOT, in a format acceptable to TxDOT, monthly status reports for all ROW activities, including activities related to the acquisition and disposition of Additional Properties, temporary easements or other property interests, and provide weekly (or as requested) updates to TxDOT.
d) Evaluate and report to TxDOT, Subcontractor status and performance on a monthly basis or more frequently as requested.
e) Prepare and submit electronically to TxDOT, on a monthly basis, a spreadsheet that contains Project ROW specific data required in order to complete the fields in TxDOT's ROWIS tracking software program or as directed by TxDOT.

f) Input and update parcel status in TxDOT approved Web-based tracking system or as directed by TxDOT.

7.2.11 Responsibilities of Developer

Developer shall be responsible for the costs of all services and preparation of all documentation for all Project ROW acquisition, easement acquisition, permitting and related relocation assistance for the Project. The Work related to Project ROW acquisition includes mapping, surveying, environmental assessment, testing and remediation, appraisal, appraisal review, negotiation, acquisition, procurement of title insurance, clearing of title, closing of acquisitions, condemnation support including expert witnesses required by TxDOT and/or the Attorney General's Office for all condemnation proceedings through special commissioner's hearings. The Developer shall also be responsible for all exhibits, transcripts, and photos associated with condemnation services and proceedings required by the Attorney General's Office through special commissioner's hearings through jury trials and appeals, relocation assistance, and clearance/demolition of improvements, as required.

Developer shall not contact the Attorney General's Office or an Assistant Attorney General handling a specific parcel that has been filed for eminent domain action or is in the process of settlement unless authorized by TxDOT.

Developer acknowledges that Developer has incorporated the value of saleable improvements into the Project ROW costs shown in the Base Case Financial Model and any Base Case Financial Model Updates, and Developer shall concurrently, with conveyance of the real property interest to the State of Texas, and without the necessity of further documentation executed by the State, obtain the rights to said saleable improvements. Developer shall not be entitled to a credit for any improvements retained by a property owner. Upon conveyance of the real property interest to the State of Texas, Developer shall comply with all applicable Laws with respect to relocation assistance and demolition.

Developer shall also be responsible for the costs of acquisition and documentation for the acquisition of any temporary right or interest in real property not necessary for the Project but that Developer deems advisable to acquire for work space, contractor lay-down areas, material storage areas, borrow sites, or any other convenience of Developer. Except as otherwise authorized by Law for temporary areas necessary for construction of the Project, TxDOT shall not be obligated to exercise its power of eminent domain in connection with Developer's acquisition of any such temporary right or interest, and TxDOT shall have no obligations or responsibilities with respect to the acquisition, maintenance or disposition of such temporary rights or interests.

Developer shall pay the cost of, and shall be responsible for processing and issuing all payments of: agreed purchase prices or court awards and judgments; special commissioner's awards; relocation assistance payments; all legal, administrative, and incidental expenses of, or related to, Project ROW (including the purchase price of Project ROW for drainage and other required easements); and temporary easements or other interests in real property acquired for the Project.

Developer is responsible for the payment of all closing costs associated with the purchase of Project ROW in accordance with the Uniform Act and TxDOT policies.

7.2.12 Responsibilities of TxDOT

TxDOT will have the following responsibilities in connection with acquisition of Project ROW:

a) Except as otherwise set forth in this Section 7, provide final approval for all Acquisition Packages, relocation assistance payments, administrative settlement requests, negotiated settlement requests, court settlement requests, payments, and other approvals required by the CDA Documents, by the State, or by applicable Law within ten (10) Business Days after receipt of complete Packages from Developer.

b) After receiving a complete condemnation packet from Developer in accordance with Section 7.4.4, TxDOT will submit a minute order request on the agenda of the next scheduled Texas Transportation Commission meeting; provided the completed condemnation package is submitted before the Commission's required deadline for eminent domain minute order requests.
c) TxDOT shall endeavor to reasonably accommodate a written request from Developer for early submission to the agenda of the Texas Transportation Commission.
d) TxDOT will coordinate with the Office of the Attorney General to provide legal counsel to prepare and deliver to TxDOT the condemnation petition within twenty (20) Business Days excluding TxDOT holidays after the Attorney General's receipt of the condemnation packet, including Commission minute order approval. TxDOT will deliver the condemnation petition to Developer within ten (10) Business Days excluding TxDOT holidays after receipt of the condemnation petition from the Office of the Attorney General.
e) TxDOT will provide all coordination services between Developer and the Office of the Attorney General for prosecution of jury trials.
f) TxDOT will provide a ROW Project Manager to serve as first point of contact for all Project ROW issues as set forth in 23 CFR § 710.313(d).

7.2.13 TxDOT Project Monitor/Reviewer

In addition to its review and approval authority as expressly set forth in other provisions of this Section 7, TxDOT may, at its sole discretion, audit and/or monitor the ROW activities and services performed by Developer. TxDOT may contract with independent consultants to assist it in fulfilling the audit/monitoring function provided that the audit authority is not delegated. The foregoing does not limit the authority of the Independent Engineer to audit the Project ROW activities and services of Developer.

In addition to any of the matters specifically required to be provided by Developer to TxDOT pursuant to the foregoing sections, Developer shall provide information to TxDOT as requested to assist in its review and assessment of the progress, timeliness, adequacy, or sufficiency of Developer's Project ROW activities.

7.2.14 Responsibilities of the Office of the Attorney General

The Office of the Attorney General, in coordination with TxDOT, shall be responsible for implementing all necessary legal actions for acquiring and obtaining possession of the Project ROW (and any necessary temporary construction easements approved by TxDOT for acquisition by condemnation) through the eminent domain process and eviction process. The Developer shall provide technical assistance when requested by TxDOT in relation to the condemnation actions. The responsibilities of the Office of the Attorney General will include:

a) Represent TxDOT as the State’s Attorney of Record
b) Preparation of complete petitions for condemnation with the appropriate court for a cause number to be assigned
c) Coordination with TxDOT on all legal matters concerning acquisition processes, including negotiated settlements
d) Analysis of recommended parcel values and/or appraisal issues
e) Additional legal advice and opinions as needed by TxDOT
f) Special commissioners’ hearings
g) Jury trials including determination of expert witnesses and all appeals
h) Preparation, obtaining, and filing of all necessary legal documentation, including the eviction of property owners or tenants.

7.3 Pre-Acquisition Activities

7.3.1 Project ROW Surveying and Mapping

Developer shall perform all Project ROW surveying and mapping and shall prepare all Project ROW documents in accordance with applicable TxDOT Standards, including the TxDOT *Right of Way Manual*, the TxDOT *Survey Manual*, and the TxDOT *GPS User's Manual*. Developer shall refer to the current *Manual of Practice* by the Texas Society of Professional Land Surveyors and the *US National Map and Accuracy Standards*. Developer shall refer to Section 9 (Land Surveying) for additional survey requirements.

The Project ROW map shall be prepared by Developer and submitted to TxDOT for review and approval. The Project ROW map may be prepared in separate constructible segments established by the logical termini of the Project. TxDOT shall have ten (10) Business Days excluding TxDOT holidays for review of each submitted ROW map. Any submittals that would require TxDOT to review more than20] parcels within any given ten (10) Business Day period shall be considered excess, and TxDOT may defer its review of any such excess parcels to a subsequent ten (10) Business Day period (or periods as necessary).

Developer shall assemble an Acquisition Survey Document Package and deliver to TxDOT upon request of preliminary and/or final review. The Acquisition Survey Document Package shall include:

a) Three half size right of way maps on paper, Scale 1"= 100' (11"X 17").

b) One separate set of Originals signed and sealed by RPLS, legal and sketch, traverse closure sheet and a copy of the parent track deed and subdivision plat if tract is a platted lot.

c) Create CD with DGN Master File, Map Sheets, Excel Point List and Raw Data File and/or Field Notes.

d) One full size right of way map on paper, Scale 1" = 50' (22"x34").

e) One set of folders for each parcel, Parts 1 & 2, etc., would be considered one folder. With one (copy signed and sealed) legal description, sketch, closure sheet, parent tract deed and subdivision plat if tract is a platted lot (and bi-section if applicable) secured inside on the right side.

f) Three copies (signed and sealed) of each legal and sketch.

Developer shall prepare all Project ROW surveying and mapping in accordance with the following supplemental specifications:

a) Developer shall assemble an Acquisition Survey Document Package. The Acquisition Survey Document Package shall include the Project ROW map, a parcel (metes and bounds) description, and a parcel plat, with a closure report for each of these three items for each of the parcels to be acquired. The latter three items shall be on standard 8½" x 11" bond paper. The Project ROW map sheets shall be on 22" x 34" paper. Each final submission to TxDOT shall include two sets of each document, unless otherwise directed. Each map sheet and document page shall have an "as of" date near the lower right hand corner. The parcel plat and parcel description for a given parcel should show identical "as of" dates.

b) The Parcel, as shown on the ROW map sheet and plat, shall show all areas of denied access according to the current TxDOT *Access Management Manual* or as reviewed and approved by TxDOT.

c) The point of beginning (POB) shall be located on the proposed Project ROW line and shown in all documents with its centerline (survey baseline) station and offset.

d) The point of commencing (POC), where applicable, shall be a well-defined monument, and shall be tied to the POB by measured bearing and distance. The POC shall not be located on any proposed Project ROW line, or existing Project ROW line within the proposed Project ROW.
e) The centerline (survey baseline) station and offset shall be shown on the Project ROW map sheets for all significant points along the Project ROW line such as point of curvature (PC), point of tangency (PT), point of intersection (PI), point of compound curvature (PCC), and point of reverse curvature (PRC), and for property line intersections (PLI) with the Project ROW line, and for any other monumentation points on the Project ROW line.
f) The centerline (survey baseline) station and offset shall be shown in the parcel description and parcel plat at the beginning and ending, being the points with the lowest station and the highest station, of each parcel along the proposed Project ROW line.
g) Project ROW map sheets shall include all curve data, with the station and coordinates of the PI, and the stations at each end (PC, PT, PRC, PCC), for every centerline (survey baseline) curve on that map sheet.
h) Any existing ROW lines being incorporated into the proposed Project ROW, including intersecting rights of way, shall be surveyed and monumented (if not previously monumented).
i) All Project ROW maps (and on the title sheet) and all parcel descriptions (at the end of the description) shall include a notation that identifies the State Plane Coordinate System and UTM zones, datum (NAD83) (HARN) (2002), and the Project grid-to-surface coordinate adjustment factor.
j) A Project ROW map title sheet with signature blocks shall be produced for each portion of the Project. Developer shall sign the Project ROW map.
k) All Project ROW maps shall include a control sheet (or sheets), to show the primary survey control points with their location relative to the Project.
l) The parcel description and parcel plat documents shall all be referenced as parts of the exhibit recorded with the deed, so the pages shall be numbered accordingly. For example, if the parcel description is two pages, the parcel plat is one page, then the first page of the parcel description is denoted “Page 1 of 3”, the parcel plat is denoted “Page 3 of 3”.
m) Improvements within 100 feet outside of all proposed Project ROW shall be depicted on the Project ROW map sheets. All improvements should be current as of the date of the on-the-ground property survey.
n) All visible improvements (buildings and structures) within 25 feet outside of the proposed Project ROW line shall be located by an “on-the-ground” survey and documented on the Project ROW map sheets and the parcel plats by measured offset distance from the proposed Project ROW line. Clearly indicate which distances are surveyed on–the-ground.
o) Calculated points shall be shown by a symbol on the drawing, with their relationship to the found reference points.
p) All property, city, county, abstract, section, and survey lines shall be indicated appropriately. A map legend should clearly define the line styles and symbols used.
q) Upon final submittal from Developer of the Project ROW documents to TxDOT, Developer shall cause the surveyor to mark on the ground, using permanent and stable monuments as defined in Section 663.17 of the General Rules of Procedures and Practices of the Texas Board of Professional Land Surveying (TBPLS), all significant points along the Project ROW line, as described above, and all property line intersections with the Project ROW line. TxDOT requires these monuments to be a ½-inch iron rod, driven just below surface level, capped by a TxDOT-labeled aluminum cap (rod-and-cap monument).
r) Prior to acceptance of the ROW maps and surveys by TxDOT, Developer shall cause a TxDOT Type II monument to be set at all significant points on the Project ROW line and at intersections

with existing Project ROW lines, replacing monuments as described above (construct according to TxDOT specifications), unless otherwise directed by TxDOT.

s) Developer shall cause a TxDOT Type II monument to be set at all significant points on the Project ROW line and at intersections with existing Project ROW lines, replacing monuments as described above, unless directed by TxDOT. Project ROW line intersections with property lines shall remain monumented by a ½-inch iron rod with a TxDOT aluminum cap (rod-and –cap monument).To reference all significant points along the centerline (survey baseline), Developer shall set a rod-and-cap monument; and upon completion of the Project ROW acquisition or as directed by TxDOT, Developer shall replace it with a TxDOT Type II monument, on the final Project ROW lines, perpendicularly left and right of each significant centerline point, regardless of the relative orientation of the final Project ROW line.

t) For any required revisions, Developer shall resubmit to TxDOT all documents pertaining to the parcel to reflect the most recent revision date, and shall add a notation on the appropriate documents to state briefly the reason for the revision.

u) Documents shall contain deed references (survey name, abstract number, volume and page or document number, grantee, and area) for all existing public right of way encountered within the Project limits. If there is no recorded information found, a note shall state "Based upon our research, there appears to be no recorded vesting deed for the public right of way as shown hereon".

v) The documents produced by the surveyor are the property of TxDOT, and release of any document shall be subject to TxDOT's prior written approval.

w) Developer shall cause the surveyor to include the denial of access line on the Project ROW map sheets and on the parcel plats, as required for controlled access facilities. Developer also shall cause the surveyor to describe the area of denied access in the parcel description and monument on the ground with a ½" iron rod with orange cap stamped "TxDOT ADL" at the limits of the denial of access.

x) The Project ROW map and each parcel plat shall include a parcel information table containing the areas, expressed in square feet, of the following: 1) the parent ownership as stated in all adjoining record vesting deeds or converted from the stated record acreage in those vesting deeds; 2) the parcel to be acquired as shown on the closure report for that parcel, and; 3) the remainder tract (item 1 minus item 2). If the parcel to be acquired consists of multiple parts, the Project ROW map shall show the net remainder. The parcel information table shall also contain the areas, expressed in acres, of the parent tract, the parcel to be acquired, and the remainder. This acreage (except stated record) shall be converted from the square footage as contained in the table. A note shall be included on the Project ROW map and on each parcel plat stating: "The acreage calculated and shown hereon is converted from the square footage shown hereon, and is for informational purposes only." Parcels with area less than one acre will not require acreage units to also be shown. All parcels, including parcels acquired by TxDOT or other Governmental Entity, shall be included on the Project ROW map.

y) Within the proposed Project ROW, all property owned by a city, county, or other local public agency (LPA) in fee or easement that does not have a vesting deed shall be identified by a parcel number and included on the Project ROW map. Developer shall cause the surveyor to prepare a parcel description and parcel plat for use as an exhibit in the Project ROW acquisition (property transfer) documents.

z) Developer shall cause an independent Registered Professional Land Surveyor (RPLS) to review the Acquisition Survey Document Package for consistency as to the information delineated thereon and for compliance with all applicable Technical Provisions and survey documents. The boundary location and the survey methods remain the responsibility of Developer, and are not part of this review process. TxDOT will have no obligation to accept the Acquisition Survey

Document Package as complete until the reviewing RPLS has signed and sealed the compliance certificate (compliance certificate form to be provided by TxDOT).

aa) Parcel numbering shall follow the TxDOT *ROW Manual*. Parcels are to be numbered based upon the parent tract. Developer shall revise parcel numbering due to subsequent transactions as in the following example: From a 50-acre parent tract, with a proposed Project ROW acquisition parcel identified as Parcel 14, a 5-acre tract is sold which will also require Project ROW acquisition. The result is, Parcel 14 is "Not Used", and the two new Project ROW acquisition parcels are identified as Parcel 14A and 14B. If the property containing Parcel 14B sells a portion, then 14B is "Not Used" and the new Project ROW acquisition parcels are identified as Parcel 14C and 14D, etc. Developer shall not use the letter "E" to avoid confusion with easement designations. Parcel numbering shall be sensitive to the appraisal of the required parcels.

bb) Complicated portions of a Project ROW acquisition survey can cause the Project ROW Map to be very difficult to read. TxDOT's preferred solution is to create an additional Project ROW map sheet or sheets for details, curve data, general notes, etc. The primary page would still retain the whole property inset, record ownership data, and most of the usual information. The additional sheet(s) should be clearly referenced and be numbered as the next sequential page(s). Pages numbered with a letter added (for example: 6A, 6B) are for revisions and corrections. Developer shall use the preferred solution unless TxDOT approves an alternate method.

cc) An ownership sheet or sheets, containing an index to the information for all the parcels, shall be included and located near the beginning of the Project ROW map, after the title sheet and control sheet. The ownership sheet index shall include the parcel numbers, the names of the property owners, the vesting deed recording information, the record area of the parent tract, the area of parcel(s) to be acquired, the area of the remainder(s) left and right, the beginning and ending stations of the parcel along the Project ROW line, and the sheet number in the Project ROW map where the parcel is located.

dd) At property corners where more than one monument is found, a detail shall be provided to show the measured relationship between the monuments found and the monument set or held.

ee) Developer shall purchase all materials, supplies and all items necessary for proper survey monumentation. Developer may purchase Type II monuments from TxDOT. TxDOT shall make available for pick-up by Developer Type II monuments within 75 Days after TxDOT receives from Developer a written order, specifying the number of monuments to be purchased. Payment for TxDOT-supplied monuments shall be due within 30 Days after TxDOT delivers to Developer a written invoice. Developer may use these monuments only for this Project and shall be responsible for proper storage thereof.

ff) Developer at the request of the property owner or TxDOT shall re-stake the proposed ROW with ½" iron rod and aluminum cap.

gg) Developer shall provide sufficiency of design to determine the Ultimate Configuration ROW need and produce ROW maps that delineate the proposed ROW and potential impacts to the remaining ROW. A design certification of ROW will be provided by the Developer for each parcel which confirms that the proposed ROW acquisition is adequate and necessary to construct and perform O&M Work on the Project and that other ROW acquisition alternatives are not feasible and/or cost prohibitive.

7.3.2 Additional Reporting Requirements

In addition to the Project ROW map, parcel description, and parcel plats, Developer shall provide the following reports and electronic files:

a) Monthly Parcel Report: Developer shall provide a report, prior to the first of the month, listing all parcel deletions, parcel additions, and parcel splits.

b) Monthly Progress Report: Developer shall provide a report of all survey activity that occurred over the previous month, including a two-week look ahead of anticipated survey activity.
c) CAD Files: Developer shall provide digital CAD files in MicroStation format which includes: property lines and/or existing ROW lines, as surveyed; proposed ROW lines; parcel numbers; resource files; level assignments; and plot files. Developer shall submit CAD files prior to submitting the first Acquisition Package, and provide updates as needed.

7.3.3 Title Services

With respect to title services, Developer shall comply with the applicable standards identified in Section 7.2.1, including the following requirements:

a) Select and contract with one or more title companies approved by TxDOT and deliver to TxDOT a five-year sales history, a preliminary title commitment or preliminary title report, and, if necessary or appropriate, copies of all underlying documents and a plot of all easements, including Existing Utility Property Interests, referenced therein for each parcel (including fee acquisitions, slope easements, other drainage and roadway ROW or easements and abandonment of utility easements) to be acquired by TxDOT for the Project. Each title report shall be dated not more than 90 Days prior to the date of submittal to TxDOT of the Acquisition Package for such parcel. Developer shall, at its own cost, review each title report to ensure that it complies with the format required by the CDA Documents. Developer shall, at its own cost, retain the services of a real estate attorney, licensed and located in the State of Texas, to be available for title support and acquisition assistance. All title reports must be in the following required format: clearly indicate which exclusions and exceptions shall be deleted upon acquisition of the subject parcel, and clearly indicate any required deliverables to the title company to clear identified exclusions and exceptions. Title reports shall be in accordance with Good Industry Practice. Subject to TxDOT approval, Developer shall notify the title company, by letter, which exceptions should be removed, including easements that (a) are appurtenant to and/or of benefit to the parcel but not included in the parcel to be acquired, and (b) are a burden on the parcel and not acceptable.
b) Review the preliminary title commitment or report to ensure that all current owners of record title are contacted and that negotiations or condemnation actions are conducted with all appropriate parties.
c) Work with the current owners of record title to each parcel or interest in a parcel or their designee and all other appropriate parties to clear any title exceptions or exclusions not acceptable to TxDOT.
d) Secure an owner's policy of title insurance in the amount of the total acquisition cost for each parcel from a title company acceptable to TxDOT for each parcel acquired, whether by deed or eminent domain judgment, insuring title as required by TxDOT. All Project ROW shall be acquired, and TxDOT's title in the Project ROW shall be insured, in fee simple absolute or easement interest as appropriate, free and clear of any and all liens and encumbrances. Developer shall pay the applicable title company for the cost of the title policies, including all endorsements thereto required by TxDOT. Title policies must be in a form and substance approved by TxDOT. Title to the Project ROW shall be insured in the name of the "State of Texas by and through the Texas Department of Transportation."

7.3.4 Introduction to Property Owners

Developer shall prepare and send out initial contact letters of introduction for both property owners and displacees. The letters shall clearly describe the Project, TxDOT's need for the owner's property, and shall include the name and telephone number of a Developer's representative. TxDOT's ROW Project Manager or his/her designee will sign the letters on TxDOT letterhead. The forms for these letters shall be

approved by TxDOT prior to use. Property owners or displaces unable to read or understand the notice must be given appropriate translation.

Developer shall prepare a copy of the State of Texas Landowner's Bill of Rights for each property owner and submit a copy to be included with the letter of introduction. The copy of the Bill of Rights shall be the latest version as shown on the Attorney General's Website, https://www.oag.state.tx.us/agency/Landowners_billofrights.pdf.

7.3.5 Appraisals

7.3.5.1 Appraisal Services

Developer shall provide TxDOT with fair market value appraisals prepared by appraisers meeting the minimum qualifications established herein. All appraisals shall be prepared in conformance with applicable law (including the Uniform Act), and in accordance with professional appraisal methods and applicable TxDOT standards for all parcels to be acquired by TxDOT. Developer shall:

1. Select appraisers from TxDOT's list of approved fee appraisers and meeting the requirements specified in Section 7.2.7 (ROW Personnel Qualifications). TxDOT shall have final approval of the selection of each appraiser and appraisal reviewers submitted by Developer. Developer must identify and receive written approval of the appraiser who will be responsible for the appraisal work product and who will be signing the reports.
2. Establish personal pre-appraisal contact with each owner of record title and each occupant, and document all contacts utilizing forms provided by TxDOT.
3. If necessary, make a diligent effort to secure a written agreement between the record title owner and Developer granting TxDOT, Developer or assignees permission to enter the applicable parcel to be acquired (a "Right of Entry Agreement"). Developer may at its sole discretion and expense offer to pay reasonable compensation for any required Right of Entry Agreements. If Developer, after best efforts, is unable to secure a Right of Entry Agreement from the property owner, Developer shall provide documentation acceptable to TxDOT indicating conversations, correspondence, and efforts used to attempt to secure the Right of Entry Agreement.
4. Contact the record title owners or their designated representatives, in writing, to offer them the opportunity to accompany the appraiser on the appraiser's inspection of the parcel, and maintain a record of all such contacts in the parcel file.
5. Cause the appraiser to prepare a complete appraisal report for each parcel to be acquired to include the whole property, the portion to be acquired, and any damage to the remainder. It shall also include all improvements on the whole property, unless otherwise directed in writing by TxDOT. The appraisal reports shall comply with and include all matters required by this section and TxDOT ROW related manuals, and shall satisfy the requirements of the USPAP in effect at the time the appraisal is submitted. Special analyses, studies or reports, as necessary, shall be made a part of each appraisal. The appraiser must use the most current edition of the standards referenced above and continually monitor these standards to ensure the appraisals conform to the most current requirements of professional appraisal practice. All appraisals shall utilize TxDOT Form SPD-ROW-A-5 - Real Estate Appraisal Report unless otherwise authorized in writing by TxDOT; however, all appraisals for condemnation proceedings shall utilize TxDOT Form SPD-ROW-A-5 - Real Estate Appraisal Report.
6. Obtain and provide TxDOT with copies of all written leases, licenses and other occupancy agreements, including outdoor advertising/sign agreements, in order to identify lessees, licensee and other occupants with potential compensable interests in each parcel and to determine the value of each such interest.
7. Perform an evaluation of all outdoor advertising signs, as required, utilizing the appropriate forms as instructed by TxDOT.

8. Cause the appraiser(s) to testify as an expert witness(es) or provide expert witness(es) approved by TxDOT in special commissioners' hearings or eminent domain proceedings through jury trial and be available for depositions, other discovery, pre-hearing or pre-trial meetings and appeals, as directed by TxDOT. Developer shall also provide administrative and/or technical support for such proceedings as requested by TxDOT.
9. Coordinate with the review appraiser regarding corrections and/or additional information that may be required for a particular appraisal.
10. Cause a report to be prepared by an environmental professional that meets ASTM E-1527-05, Standard Practice for Environmental Site Assessments: Phase 1 Environmental Site Assessment Process, or provide a report in a manner approved by TxDOT, documenting the environmental condition of each parcel, which may be based on field investigations and/or historical review, as appropriate for the particular parcel. The report shall be completed in coordination with the appraiser(s) and shall be available to the appraiser(s). A Phase I environmental site assessment, or a report provided in a manner approved by TxDOT, shall be performed for all properties. If it is determined that there is a potential environmental risk based on the Phase I report or other report then a Phase II investigation shall be performed. A Phase III investigation shall be performed if the Phase II report justifies it. The Phase III report must indicate the approximate cost to remediate the parcel to achieve its current use and its highest and best use. Prepare timely written notification to TxDOT of any environmental or other concerns associated with the Project ROW or Additional Properties to be acquired that could require environmental remediation or other special attention or which would cause a report to be prepared.
11. Engage the services of, and cause, a land planner to perform, or otherwise assist in the preparation of, any and all appraisals that involve a parcel with a valuation analysis indicating a highest and best use that is other than the current use of such parcel, or as directed by TxDOT for certain other appraisals. Developer shall notify TxDOT in writing of each and every instance when the highest and best use of a parcel is different than its current use and TxDOT will determine to what degree land planner services will be utilized by Developer.
12. Cause the appraiser(s) to prepare updated appraisals, as well as updated appraisal reviews, when required by TxDOT or as needed during eminent domain proceedings. An updated appraisal package shall comply with USPAP and Advisory Opinion, AO-3. The term "Update of an Appraisal" is defined as "an extension of a complete or limited appraisal and report relied on by a client for a prior business decision." At a minimum, the updated appraisal report must include:
    - A letter of transmittal with a specific reference to the original appraisal report, any changes in market conditions, since the original appraisal, any changes in the subject property since the original appraisal, a statement of the current value or extension of the original value opinion and the listing of the current date of value.
    - An updated Page 1 from TxDOT Form SPD-ROW-A-5 – Real Estate Appraisal Report or Form SPD-ROW-A-6 – Real Estate Appraisal Report, as appropriate, with the current date of a recent inspection of the subject property and a current date of value. This form needs to have a current signature and date by both the appraiser and the reviewing appraiser in the appropriate spaces on the form.
    - Any qualifying and limiting conditions or general assumptions by the appraiser shall be clearly stated and attached.
    - A copy of the survey and legal description of the property being acquired, current photographs of the subject property, clearly showing the area being acquired, even though the original appraisal report contained photographs of the subject and the area of the acquisition. If there are significant changes to the subject property, the area being acquired, access to the remainder property, damages to the remainder(s), market conditions, the subject property's highest and best use from the previous appraisal or significant changes in the approaches to

value, the property shall be reappraised using either TxDOT Form SPD-ROW-A-5 – Real Estate Appraisal Report, or, when approved by TxDOT, TxDOT SPD-Form ROW-A-6 – Real Estate Appraisal Report, depending on the report used for the original appraisal. Appraisers shall refer to Sections 6.03 and 6.04 of the TxDOT *Appraisal & Review Manual* for additional guidance. Developer shall follow these guidelines in producing updated appraisal reports and shall discuss specific updating requirements for any complex appraisals with TxDOT before beginning the assignment.

13. Prepare and deliver to TxDOT upon request, a copy of all file documents, as formally requested in discovery motions or request for production.
14. Complete and furnish, to the appraiser, TxDOT Form SPD-ROW-A-9 - Property Classification Agreement before appraisal is completed.

7.3.5.2 Appraisal Review

In connection with appraisal review, Developer shall:

1. Select review appraisers from TxDOT's list of approved fee appraisers and meeting the requirements of Section 7.2.7. The review appraiser selected must follow the appraisal guidelines and procedures found in Chapter 4 of the TxDOT *ROWAppraisal & Review Manual*.
2. Determine, in consultation with TxDOT, if additional appraisal reports or technical expert reports are required. Initiate, review, and reconcile each report required.
3. Review all appraisal reports for each parcel to determine consistency of methodology, supporting documentation related to the conclusion reached, and compliance with TxDOT standards, as defined in Section 7.3.5.1 (Appraisal Services) and this Section 7.3.5.2 (Appraisal Review), the TxDOT *ROW Appraisal & Review Manua*l, the *Uniform Appraisal Standards and Federal Land Acquisitions* and the requirements of the Appraisal Foundation's USPAP in effect at the time the appraisal is reviewed. The review appraiser must use the most current edition of the standards referenced above and continually monitor these standards to ensure the appraisals conform to the most current requirement of professional appraisal practice.
4. Inspect the subject properties and the sale properties used in direct comparison for each appraisal being reviewed.
5. Upon completion of the review outlined above, the appraiser shall certify in writing to TxDOT that all required standards have been met. This certification will occur by signing on Page 1 of each TxDOT Form SPD-ROW-A-5 (Real Estate Appraisal Report) or TxDOT Form SPD-ROW-A-6 (Real Estate Appraisal Report) in the block provided. The review appraiser shall also complete TxDOT Form SPD-ROW-A-10 (Tabulation of Values) to accompany each appraisal.
6. For appraisal updates, the review appraiser shall perform a complete review of the updated appraisal, re-inspecting the subject property and the sales used, as of the current date of value. The review appraiser shall follow the procedures outlined in the TxDOT *ROW Appraisal and Review Manual*. A new TxDOT Form ROW-A-10 (Tabulation of Values) will be required for each updated appraisal ordered by Developer.
7. In accordance with providing a Quality Control Specialist(s) as stated in Section 7.2.7, ensure that appraisal consistency and quality for the entire Project is monitored for Project-wide controls and consistency.

7.3.6 Project ROW Acquisition Package Approval

Acquisition Packages submitted by Developer for TxDOT's approval shall include the following items, prepared for each parcel in accordance with the requirements of this section:

1. A cover sheet setting forth the following information for each parcel.

- Parcel number and number of parts
- Station number
- CSJ number
- Location of parcel
- Name of owner
- County and/or other jurisdiction
- Extent of acquisition (partial or whole acquisition)
- Type of conveyance (fee, easement, etc.)

2. A complete legal description of the parcel adequate to effect the desired acquisition of the parcel, signed and sealed by an RPLS. A legal description and parcel plat is required for each parcel. Control of access shall be addressed in all legal descriptions. All descriptions shall be in recordable form and shall be prepared in a form and manner acceptable to TxDOT in all respects.
3. The parcel plat, as prepared by the RPLS, and a half size (11" x 17") copy of the ROW map sheet(s) pertaining to the parcel, such plat to include control of access designations.
4. A title report, current within 90 Days, including copies of all documents identified in the exceptions listed therein and a plot of all easements identified therein. The Acquisition Package shall include Developer's analysis of each preliminary title report or title commitment to determine potential problems and proposed methods to cure title deficiencies. Developer shall perform title curative Work. Developer shall provide TxDOT with copies of all curative documents.
5. A copy of the appraisal report with an effective date less than 180 Days and all supporting documentation.
6. A copy of the environmental site assessment and all amendments as described in Section 7.3.5.1 (Appraisal Services).
7. A real/personal property report detailing what items making up each parcel are classified as real estate, tenant-owned improvements or personal property. Particular attention shall be paid to items that have questionable classifications. A completed TxDOT Form SPD-ROW-A-9 (Property Classification Agreement).
8. Replacement Housing Calculations, notification of business eligibility, completed displacee interviews, all comparables used in estimating the Replacement Housing Calculations, and letter to displacee(s) explaining Replacement Housing Calculations. Calculations and replacement housing benefit package shall be prepared and reviewed by a qualified consultant, in conformance with TxDOT's standard relocation procedures and applicable to State and federal laws and regulations.
9. The proposed initial offer letter, memorandum of agreement, deed, and any other documents, which shall be prepared by Developer as required or requested by TxDOT, on Developer's letterhead or as otherwise directed. TxDOT will provide the format for preparing these documents. Documents referred to in this section are standardized by TxDOT and modification of standardized documents shall be kept to a minimum. All changes are subject to approval by TxDOT in writing, in TxDOT's sole discretion.
10. Any other required TxDOT forms, such as record of all contacts with the property owner or any party with a compensable interest.

No Acquisition Packages will be approved if performed or submitted by appraisers or agents not previously approved by TxDOT for this Project.

Upon TxDOT's prior written approval of the Acquisition Package, Developer may proceed with the offer to the property owner.

7.4 Acquisition Activities

7.4.1 ROW Negotiations

Developer shall conduct all negotiations in accordance with the requirements of applicable Law. In conjunction with negotiations, Developer shall:

a) Within ten (10) Business Days of TxDOT's approval of the Acquisition Package, contact each property owner or owner's designated representative, in person where practical, to present the offer and deliver an appraisal report (not more than 6 months old) and appropriate brochures. The approved appraisal shall be sent by certified mail, return receipt requested. A copy of the appraisal report for the subject property shall be provided to the property owner or authorized representative at the time of offer. All appraisal reports produced or acquired by TxDOT relating specifically to the property owner's property and prepared in the 10 years preceding the date of the offer must also be delivered to the property owner. Developer shall also maintain a file record of receipt of appraisal signed by the property owner. Developer shall also maintain follow-up contacts and secure the necessary documentation and title curative Work upon acceptance of the purchase offer.

b) At the time of offer, produce and distribute to all property owners and displacees, TxDOT-approved informational brochures, as appropriate. The ROW brochures shall be printed by Developer and shall include language about the use of the *Declaration of Taking* procedure if Developer anticipates requesting the utilization of this procedure by TxDOT anywhere within the Project.

c) Identify lessees, licensees, occupants, or other parties with potential compensable interests including outdoor advertising sign owners, and, if appropriate, after consultation with TxDOT, negotiate with such parties for the acquisition of their compensable interests.

d) Advise the property owners, lessee, licensees, occupants, and other holders of compensable interests, as applicable, of the administrative settlement process. Confer with and transmit to TxDOT's ROW Project Manager any settlement request from property owners, lessees, licensees, occupants, or other holders of any compensable interest, as applicable, including a detailed recommendation from Developer in accordance with standards, manuals and procedures as defined in Section 7.2. Developer and TxDOT shall jointly determine whether to accept a settlement request. Delivery of the administrative settlement request and Developer's recommendation to TxDOT must occur within fifteen (15) Business Days following Developer's receipt of the administrative settlement request.

e) Developer, at its request or the request by TxDOT and/or the TxDOT Administrative Settlement Committee, may participate in the evaluation of the administrative settlement request and attend the committee meeting.

f) Developer shall provide a letter with the Administrative Settlement Committee's response to the property owner, lessee, licensee, occupant, or other holder of a compensable interest, as applicable. Developer shall deliver all settlement responses (if within reasonable proximity of the Project) by hand within three (3) Business Days after receipt. If this delivery method is not feasible, Developer shall mail (return receipt requested) response letters not more than three Business Days following any decision by the TxDOT Administrative Settlement Committee. If Developer selects the mailing option, Developer shall make a telephone call to the property owner to discuss the settlement offer prior to mailing the response letter. The TxDOT ROW Project Manager, on an as-needed basis, will convene the TxDOT Administrative Settlement Committee.

g) Notwithstanding an unsuccessful completion of the formal administrative settlement process, Developer may, in its sole discretion, engage in ongoing negotiations with the owners of compensable interests. Developer shall develop and incorporate in its ROW Acquisition Plan a

procedure for these negotiated settlements. Said negotiations may continue until such time as the Texas Transportation Commission adopts a minute order authorizing the filing of a condemnation petition. Developer shall submit to TxDOT its recommendation of a negotiated settlement and obtain TxDOT's consent prior to acceptance of any settlement.

h) Provide timely (i.e., not more than ten (10) Business Days after inquiry) response to the verbal or written inquiries of any property owner, lessee, licensee, occupant or other holder of a compensable interest, as applicable.

i) Prepare a separate negotiator contact report for each meeting or conversation with any person (or their appointed representative(s) supported by a written confirmation of appointment) who has a compensable interest in each parcel on TxDOT Form ROW-N-94 – Negotiator's Report. Contact reports shall also be prepared for unsuccessful attempts to contact such persons.

j) Maintain a complete parcel file for each parcel. All original documentation related to the purchase of the real property interests will be maintained (housed separately from the relocation files) in conformance with TxDOT standards, manuals, and procedures, as defined in Section 7.2. All original Project ROW documents must be retained and properly secured in Developer's Project office or as otherwise approved by TxDOT. Signed original documents shall be forwarded to TxDOT periodically or as requested by TxDOT with a transmittal form during the acquisition process; provided, however, that all remaining original documents shall be forwarded upon completion of the acquisition of Project ROW for the Project.

k) Prepare and deliver documents of conveyance (including bisection clause and access clause, if applicable) to the property owner, lessee, licensee, occupant, or other holder of any compensable interest, as applicable, and obtain their execution of the same. All signatures on documents to be recorded shall be notarized in accordance with Texas law.

l) Pursue and obtain Possession and Use Agreements (PUA) concurrently with the parcel negotiations. The form of PUA will be provided by TxDOT and will contain provisions allowing for construction to commence while negotiations are finalized. Such agreements will be sought and negotiated by Developer strictly in accordance with the Law and only with the prior written consent of TxDOT. If Developer exercises the use of a TxDOT PUA, Developer must obtain a deed or commence action on condemnation proceedings by forwarding a condemnation packet to TxDOT for approval within six months from the date of the PUA.

m) Be open to all reasonable settlement requests (that comply with the regulations as outlined in this section) from the property owners, which are feasible and help expedite the Project ROW acquisition process. Developer acknowledges and understands that TxDOT encourages all positive and creative solutions which satisfy the property owner and promote the success of the Project.

n) Developer shall prepare and deliver a final offer letter to the property owners, lessees, licensees, occupants, or other holders of any compensable interest, as applicable. The letter shall be on Developer's letterhead and shall be signed by the ROW Acquisition Manager. The final offer letter shall allow a property owner lessee, licensee, occupant or other holder of compensable interest at least fourteen (14) Days as the consideration time period to review the final offer. Developer shall submit to TxDOT, a copy of the final offer letter within two days after delivery to the property owner.

If the offer is not accepted, Developer shall follow the procedures established for condemnation.

7.4.2 Relocation Assistance

Developer shall coordinate and perform the administrative requirements necessary to relocate any occupants from Project ROW. All Work prepared by Developer with respect to relocation assistance shall be performed in accordance with applicable Law, including the *Uniform Act* and TxDOT standards, and in accordance with all provisions of this Agreement.

Developer shall maintain a relocation office (meeting ADA requirements) within reasonable proximity of the Project area as approved by TxDOT. At a minimum, the office hours of the relocation office shall be posted to meet the following timetables:

a) Monday thru Friday: 8:00 am to 5:00 pm
b) Saturday: 9:00 am and 12:00 pm
c) Sunday: office may be closed

In addition to the office hours listed above, Developer shall be available to all displacees for relocation services at the convenience of the displacees.

Developer's major activities with respect to the relocation assistance of occupants from Project ROW include:

1. Prepare a Relocation Plan in accordance with the TxDOT *Right of Way Manual*, Volume 3, Chapter 8 (Relocation Program Planning and Construction).
2. Monitor relocation assistance activities.
3. Prevent fraud, waste and mismanagement.
4. Assist with all requests and be responsible for carrying out decisions made by TxDOT, the review/appeal process and judicial reviews.

Developer shall provide relocation assistance strictly in accordance with the Law, and, in particular, the Uniform Act and TxDOT standards. With respect to relocation assistance, Developer shall:

1. Provide written notice to all property owners, lessees, licensees, occupants, other holders of compensable interests, and other potential displacees regarding relocation assistance and produce and provide them with a relocation assistance brochure that has been approved by TxDOT. Developer shall perform relocation interviews, complete and maintain interview forms and discuss general eligibility requirements, programs, and services with potential displaces. Developer shall maintain a written record of all verbal contacts.
2. Give written notice of the pending acquisition to any non-eligible occupants. Any questions as to the eligibility of a potential displacee shall be directed in writing to TxDOT's ROW Project Manager.
3. Contact and provide relocation assistance to those parties affected by the Project ROW acquisition and complete forms for all displacees, as required.
4. Locate, evaluate and maintain files on comparable available housing, commercial, retail, and industrial sites.
5. Calculate replacement supplement benefits.
6. Compute and submit requests for relocation rental/housing supplement to TxDOT prior to submission to relocatees. All relocation supplements shall be subject to TxDOT's written approval.
7. Perform a Decent, Safe and Sanitary (DSS) inspection for each replacement housing comparable, photograph the comparable and complete the DSS inspection form, TxDOT Form ROW-R116 (Replacement Housing Inspection).
8. Request at least two moving estimates from moving companies to effect relocation of personal property or consistent with the Uniform Act.
9. Prepare moving plan with appropriate photos, sketches and inventory of personal property to be moved.
10. Coordinate moves with displacees and moving companies in accordance with TxDOT standards and the Uniform Relocation Act.
11. Maintain relocation contact logs on a TxDOT Form ROW-R96-R (Relocation Advisory Assistance – Parcel Record).

12. Attend all closings on replacement properties, if requested by any party involved, and assure supplemental payments, if any, are properly distributed.
13. Process and compute increased interest payments on the mortgage of owner-occupied dwellings, as required.
14. Deliver to displacees a 90 Day notice of eligibility letter simultaneous with the delivery of the relocation benefits package. Deliver a 90 Day letter to displacees with the location of the comparable property used to compute the supplement.
15. Deliver a 30 Day notice to displacees and property owners upon acquisition of Project ROW.
16. Notify TxDOT's ROW Project Manager office immediately if a displacee has not moved after 30 Day notice expires. Prepare a written recommendation to facilitate the displacee's move.
17. Be available for any appeals or hearings.
18. Prepare relocation payment claim submissions for all displacees and all relocation assistance benefits.
19. Verify DSS dwelling criteria on all replacement housing as selected by the displacees.
20. Secure dwellings and structures no later than ten Days after vacancy and protect the Project ROW following acquisition and relocation.
21. Maintain a complete file, separate from acquisition files, on each displacee and make available for inspection.
22. Be responsible for all relocation activities that may occur after deposit of the special commissioner's award in the courts, including instances when a parcel referred to the Attorney General's office for eminent domain also has a relocation issue.
23. Prepare all correspondence to the displacees or their representative(s) on Developer's designated relocation letterhead and have Developer's correspondence signed by the Project ROW relocation specialist.
24. Deliver to each displacee the relocation assistance payments according to the TxDOT *Right of Way Separation of Duties* chart provided.
25. Assist the Attorney General's office with eviction proceedings. Serve notice of eviction proceedings to the occupant(s) of the property who have not complied with move dates. Coordinate the eviction process with the local authorities and accompany the Sheriff's Department when the local authorities are carrying out eviction.

7.4.3 Closing Services

For purposes of closing services, Developer shall:

1. Submit a closing package to TxDOT for review a minimum of 24 hours prior to closing. The package shall include the following: a.) a reference to the disposition of any environmental matters; b) updated title commitment, no more than fifteen (15) Days prior, with notations indicating the disposition of all schedule "C" items; c) a copy of the executed warranty deed to be delivered; d) a proposed closing statement indicating disposition of all proceeds; e) a copy of any and all releases of liens; f) a copy of any miscellaneous documents and other curative matters required to be delivered at closing and g) a copy of the closing memorandum outlined in item 2 below.
2. Prepare the escrow agreement and closing documents, including a closing memorandum identifying all parties involved in the closing, and listing all documents to be executed and/or delivered in connection with the closing.
3. Attend closings; provide curative documents and exhibits as required and in conjunction with the applicable title company. Confirm that all conditions to closing are satisfied and notify TxDOT of all closing appointments.
4. Obtain an issued title policy based on the approved updated title commitment within 30 Days following closing and transmit the same to TxDOT.

5. Obtain and deliver to TxDOT one certified copy of each instrument of conveyance immediately after closing, and provide a copy of the title policy to TxDOT within five Business Days after receipt. Cause to be delivered to TxDOT a copy of the recorded deed within ten Days after the title company receives the recorded deed.

7.4.4 Condemnation Support

Developer shall provide an individual or individuals having sufficient knowledge of the design of the Project to appear as an expert witness for testimony at the special commissioners' hearing or other proceedings. This individual(s) is also responsible for preparing exhibits as requested by TxDOT or the Office of the Attorney General in support of said testimony.

Developer shall support condemnation efforts as directed by TxDOT and further delineated as follows:

1. Notify TxDOT of any potential condemnation and document the reason(s) for condemnation including recommendations for property closure.
2. Conduct all applicable eminent domain-condemnation activities in accordance with the policies and procedures as described in the TxDOT *Right of Way Manual*, Volume 4: "Eminent Domain "; in the TxDOT *ROW Appraisal and Review Manual*, Chapter 7 "Eminent Domain-State Acquisition" or as revised; and in Chapter 21, Texas Property Code and Senate Bill 18.
3. After non-response or upon receipt of a copy of the rejected final offer from a property owner or other property right holder entitled to compensation, request an updated title report from the title company issuing the original title commitment.
4. Provide to TxDOT, within ten Days following non-response or rejected certified mailing, notification thereof together with a signed and sealed parcel description and parcel plat, and a bisection clause and access clause, if necessary, with the clauses attached to a property exhibit containing the parcel description and parcel plat.
5. Use the information from the title report to join all parties having a property interest on applicable the TxDOT form. Spouses of property holders with compensable rights must also be joined.
6. Upon completion of TxDOT Form ROW-E49 (Request for Eminent Domain Proceedings), prepare a condemnation packet containing two copies each of the following documents: the completed TxDOT form, negotiation logs, the updated title report not more than 90 Days old, appraisal receipt acknowledgment, pre-appraisal contact sheet, signed and sealed field notes, parcel sketch, bisection clause and access clause exhibits (if necessary), initial offer letter and final offer letter reflecting latest appraisal, complete minute order request form (form to be provided by TxDOT), any correspondence sent by Developer or from the owner of the compensable interest or representatives, one copy of the appraisal report not more than 180 Days old from the effective date of the appraisal report and evidence of a bona fide offer to the property owner. Submit two (2) complete condemnation packets to TxDOT's ROW Project Manager for review and approval.
7. Send a copy of the complete petition to the title company and confirm with the title company that the appropriate parties were joined in the case and that no changes in title have occurred since the original litigation guaranty was issued.
8. File the petition for condemnation with the appropriate court clerk after a determination that a timely settlement is not feasible. Send a copy of the petition, by certified mail, return receipt requested, to the owner, lessee, licensee, occupant or other holder of compensable interest.
9. Coordinate and provide legal and technical support to the Attorney General's office, as required to facilitate filing the petition, assignment of a court, and setting of a hearing date.
10. Make available to TxDOT on behalf of the Attorney General's office an agent who will be expected to assist in making arrangements for conferences with witnesses prior to trial, filing the condemnation petition, informing the Attorney General's office as to the filing date of the petition and the case number assigned to the suit, and perform any other duties which will assist in the

successful prosecution of the suit, including his or her attendance in court and filing necessary documents to complete all eminent domain proceedings.

11. Depending on the market conditions or if over six months have elapsed since the date of the initial offer, contact the attorney handling the case for TxDOT and confer about the advisability of preparing an updated appraisal. If it is determined that an updated or new appraisal is necessary or desirable, obtain such appraisal using the same procedures as described in Section 7.3.5.1 (Appraisal Services) above. Developer must also undertake appraisal review as described in Section 7.3.5.2 (Appraisal Review).
12. Coordinate with TxDOT on behalf of the Attorney General as to land planners and/or other expert witnesses as required by the Attorney General. Developer, at its cost, shall provide the land planner or other expert at the request of TxDOT or the Attorney General. The land planner or other expert report, if required, shall be completed and forwarded to the appraiser before the updated appraisal is completed.
13. Appear or provide for the appearance of expert witness(es) or fact witness(es) when requested by TxDOT or the Attorney General's Office. The appearances may include pre-commissioner's hearing preparations, special commissioner's hearings, and subsequent proceedings including jury trials and related proceedings.
14. Submit the updated appraisal to TxDOT and the attorney handling the case for TxDOT for review and approval, which review and approval shall occur within ten Business Days of receiving the updated appraisal. TxDOT and Developer must approve any revised offer in writing prior to an offer letter being sent. If a revised offer is approved, prepare a final offer letter, make the revised offer to the property owner or other holder of a compensable interest, as applicable, and submit a copy of the final offer letter to TxDOT for written approval.
15. Communicate with TxDOT as to the parcel status on a monthly basis and in the Project Progress Report or as requested by TxDOT.
16. Serve in person, a "Notice of Hearing" not later than twenty (20) Days before the date of the special commissioners' hearing or other hearings and notice requirements as directed or authorized by the court.
17. Call and send reminders letter two to three weeks in advance of any hearing to the assigned attorney, engineer, technical experts, appraiser, the commissioners, court reporter, and TxDOT's ROW Project Manager concerning hearing dates.
18. Upon completion of the hearing, prepare TxDOT Form ROW-E73 (Data Sheet – Special Commissioners Hearing) and commissioners' time sheets. Developer shall make payment to all commissioners involved in the hearing and include payment for commissioners as part of general Project ROW services.
19. Coordinate and provide support to TxDOT's counsel and facilitate distribution of copies of award, prepare request for payment, and file notice of deposit. Developer shall coordinate with TxDOT on behalf of the Office of the Attorney General regarding expert witnesses needed to testify on behalf of the State at the special commissioners' hearing and subsequent proceedings including jury trials. At the request of the Office of the Attorney General or TxDOT, Developer shall provide and pay for all necessary expert witnesses including: engineering, land planners, real estate consultants, cost estimators, outdoor advertising sign experts and environmental consultants and Developer shall appear as expert witness or fact witness, as requested. Developer shall also make any Contractors available to appear as an expert witness or fact witness, as requested at the special commissioners' hearing or subsequent proceedings. The selection of all expert witnesses to be used for jury trials shall be determined by the Attorney General's Office.
20. Schedule and pay for all court reporter services, transcription costs, expert witness fees, exhibits, and exhibit workbooks as directed by TxDOT.

21. Be responsible for coordinating the pre-hearing meeting with TxDOT on behalf of the Attorney General's office and all others required for testimony or exhibit preparation. Developer shall require expert witnesses with all exhibits and documents to be present at a pre-hearing meeting.
22. Timely file and provide proper service of objections if requested by TxDOT after completion of the special commissioner's hearing and promptly provide evidence of filing and copies of all filed documents to TxDOT. Within three days after objections have been filed, Developer, at its cost, shall order transcripts of such hearing.
23. Developer shall provide an individual or individuals having sufficient knowledge of the design of the Project to appear as an expert witness for testimony at the Special Commissioners Hearing or other proceedings. This individual(s) is also responsible for preparing exhibits as requested by TxDOT or the Office of the Attorney General in support of said testimony. Exhibits shall be left in the custody of TxDOT at the close of the hearing.

7.4.5 Clearance/Demolition of Project ROW

Prior to demolition of any improvements, Developer shall provide to TxDOT, photographs of the property and all improvements, unless the special commissioner's hearing has been completed and objections have not been filed. Developer shall also have photos of personal property and any other items of dispute in and of a quality suitable for presentation as evidence in court. Following acquisition or possession of any parcel of Project ROW, Developer shall:

1. Within ten (10) Days from acquisition of the property and improvements, secure and protect the buildings, improvements and fixtures on the Project ROW until they are disposed of or demolished. Developer shall board-up, mow, and winterize as required by TxDOT or applicable Law.
2. Coordinate with the owner and occupants to assure the clearance of personal property from the Project ROW, as applicable.
3. Provide for any insect and rodent control and initiate extermination as required to protect the adjacent properties and rid the Project ROW from infestations.
4. Secure Governmental Approvals required for demolition and environmental surveys or tests, and notify TxDOT in writing of all such activities.
5. To the extent required by Section 7.2.11 (Developer Responsibility for Costs), prepare necessary documentation for disposal of improvements, fixtures and buildings in accordance with applicable Laws and submit the same to TxDOT.
6. Provide written notification to TxDOT of any real and/or personal property remaining on the Project ROW after vacated by the occupants and not acquired as part of the acquisition.
7. Terminate all utility service(s) when appropriate.
8. Process all required forms, documents and permit applications in order to proceed with the timely demolition or removal of any and all improvements, buildings and fixtures located within the Project ROW, as applicable.
9. Demolish and/or remove all improvements.
10. Notify TxDOT upon completion of the demolition and clearance of the Project ROW, as applicable.

7.4.6 Property Fence

In connection with fences, Developer shall comply with the policies and procedures of the TxDOT *Right of Way Manual*, as well as the specifications found in the current TxDOT *Standard Specifications for Construction of Highways, Streets and Bridges*. Fencing standards for Developer-provided fencing shall conform to the overall aesthetics requirements found elsewhere in these CDA Documents and referenced standards.

7.4.6.1 Property Fencing for Public Properties

Where public facilities now exist that are in high risk areas for public use (particularly those containing parks, sport areas, schools or any highly traveled pedestrian areas), Developer shall, at a minimum, construct a 6-foot-high chain-link fence with metal posts. Developer shall use Good Industry Practice in fencing public properties to control public access to the Project.

7.4.6.2 Property Fencing for Private Properties

Developer shall instruct the appraiser to use the "Cost to Cure" format to compensate an owner of private property for a replacement fence when the Project ROW line leaves one or more unfenced remainder property(s) that were fenced before the taking. Compensation for the new fencing will be based upon the same type of fence as the property owner's existing fence.

When the property owner is paid through the appraisal process for the cost to rebuild the fence on the remainder property, Developer shall include in the memorandum of agreement or the purchase agreement for such property the following clause:

"It is further understood and agreed that the Grantor has been compensated for the construction of a new fence and shall be responsible for constructing the necessary fencing within 30 Days from the date of closing. Grantor specifically understands and agrees that the fences are the property of the Grantor and they shall be liable and responsible for any reconstruction, maintenance, or adjustment with regard to such fencing."

Developer shall make reasonable and good faith efforts to ensure that the property owners, who have been compensated for fencing of the remainder properties, erect the fence in accordance with the construction schedule.

If necessary to maintain the Project construction schedule and to control unauthorized access to the Project ROW by the public or livestock, Developer shall be responsible for providing temporary fencing in cases where the property owner refuses to fence the property within the allotted timeframe.

After the property owner's retention period has expired and if any existing fencing remains, Developer shall remove the existing fences from the newly acquired Project ROW and will be responsible for all costs associated therewith.

7.5 Early ROW Acquisition

TxDOT shall notify the Developer if certain Project ROW parcels are scheduled to be acquired by Governmental Entities prior to issuance of the NTP. The Developer will be updated regularly on the status of the acquisition process for each parcel.

After NTP 1, Developer shall be responsible for coordinating the scheduling of any remaining early Project ROW acquisition by other Government entities with the Project Schedule. Based on the status of each parcel, TxDOT may require the Developer to complete the acquisition of certain parcels.

8. GEOTECHNICAL

8.1 General Requirements

Developer shall perform all geotechnical investigations, testing, research, and analysis necessary to effectively determine and understand the existing surface and subsurface geotechnical conditions of the Project ROW to be used by Developer to carry out the Work. Developer shall ensure the geotechnical investigations and analyses are both thorough and complete, so as to provide accurate information for the design of roadways, pavements, foundations, structures, and other facilities that result in a Project that is safe, and meets operational standards and Handback Requirements.

8.2 Design Requirements

8.2.1 Subsurface Geotechnical Investigation by Developer

Developer shall determine the specific locations, frequency, and scope of all subsurface geotechnical investigations, testing, research, and analysis Developer considers necessary to provide a safe and reliable roadway, pavement, foundation, structure, and other facilities for the Project.

Developer shall prepare and amend, as needed, Geotechnical Engineering Reports documenting the assumptions, conditions, and results of the geotechnical investigation and analysis, including the following:

a) The geology of the Project area, including soil and/or rock types, and drainage characteristics

b) Field investigations and laboratory test results used to characterize conditions. Field investigations shall include descriptions of the soil/rock, Texas Cone Penetration test results, and Rock Quality Designation (RQD) for rock. If laboratory testing is required than the results shall include moisture content, plasticity index, gradations for each major soil strata change, levels of shrink/swell potential, levels of sulfate (on-site and borrow), soil compressibility, and short term and long term strength tests and properties

c) A discussion of conditions and results with reference to specific locations on the Project

d) Design and construction parameters resulting from the geotechnical investigation and analysis, including parameters for the design of pavements, pipes, structures, slopes, and embankments.

e) Slope stability analyses for embankment and excavation and retaining wall slopes including both short-term (undrained) and long-term (drained) conditions, and discussion of design measures undertaken to ensure stability and safety of all slopes. The design minimum factor of safety required for global stability of a slope shall be in accordance with the TxDOT *Geotechnical Manual*. The analysis shall consider the potential for long-term surficial slide failures common to high plasticity clays in Texas, and specific recommendations shall be provided to minimize their occurrence

f) Plan view locations of field sampling, boring logs and other field data, laboratory test results, calculations, and analyses that support design decisions

The report shall:

a) Ensure that adequate investigation, testing, analysis, design, mitigative measures and construction planning are applied to assess and provide for the effects of swell pressures from expansive soil and rock materials on foundations and earth retaining structures. They shall address all design features and facility characteristics that could affect expansive soil behavior.

b) Provide design and construction parameters derived from geotechnical investigation.

c) Assess the corrosion potential of the soil and rock materials and conditions that will be encountered, and the impacts to planned surface and subsurface facilities.

Each Geotechnical Engineering Report, upon completion and including any later supplements or amendments, shall be submitted to TxDOT for review and comment.

If environmentally-sensitive conditions are encountered during the subsurface exploration activities, Developer shall undertake appropriate actions in accordance with Section 4 (Environmental).

8.2.2 Pavement Design

Developer shall design, construct, and maintain roadway pavements using Good Industry Practice and the subsurface geotechnical data collected by Developer. Roadway pavements shall meet the operation standards and requirements contained in Sections 19 (Maintenance) and 22 (Operations).

Developer shall prepare a pavement design report for record that documents the assumptions, considerations, and decisions contributing to Developer's pavement design, including the following:

a) Tabulation of the relevant subgrade design values such as the modulus of subgrade reaction (k-value), resilient modulus, or other basis for each pavement design section
b) Description of Site conditions including any potentially soft compressible zones requiring special design considerations, and the presence and location of expansive soils requiring special design considerations
c) Procedures undertaken to identify soluble sulfates and measures to prevent potentially deleterious reactions
d) Description of recommended subgrade stabilization procedures including the type of stabilizing agents, the application rates, compaction criteria, strength requirements, total depth of treatment, and other relevant details
e) Pavement design details by location, including structural layer materials, general specifications, and thicknesses
f) Lifecycle cost analysis, including the periods for resurfacing, reconstruction, and other rehabilitation measures and what these activities are likely to entail
g) Relevant pavement evaluation data (structural and functional) and condition information on adjacent roads
h) Relevant geotechnical data and drainage requirements
i) Design criteria used in determining the pavement design(s), including traffic loads, material characterization, and pavement design life
j) Design methods adopted in developing the pavement design(s) and the rationale for their selection
k) Other considerations used in developing the pavement design(s)

The design of roadway pavement, including roadways adjacent to and crossing the Project that are disturbed by the construction activities of the Project, shall provide at a minimum:

a) The pavement shall be designed for the current functional highway classifications as provided in Section 11.

b) Assessment of requirements for subgrade stabilization or modification.

c) For all concrete pavements and bridge decks, longitudinal joints shall be located within six inches of a lane line.

d) Developer shall obtain appropriate Governmental Approvals for all Developer constructed roadways beyond Developer's responsibilities for maintenance.

e) The TxDOT *Pavement Design Guide* shall be the basis for all pavement designs for the Project , and the requirements contained within this document

f) Lane distribution factors for both flexible and rigid pavement designs shall be applied in accordance with the following criteria:

Table 8-1. Lane Distribution Factors

Total Number of Lanes in One Direction	Lane Distribution Factor
One or two lanes	1.0

8.2.3 Geotechnical Instrumentation

For subsurface Work, if any, the Developer is responsible for developing a geotechnical instrumentation program, including plans and specifications as necessary, to monitor surface and subsurface components, prior to and during construction, in response to ground and groundwater conditions. The performance of the following components shall be included:

a) structures;

b) buildings and enclosed facilities;

c) tunnels and subsurface facilities, and

d) Utilities.

The geotechnical instrumentation program shall monitor the safety and adequacy of the design and construction approach, and shall permit appropriate modifications or remedial action if necessary.

8.2.4 Preconstruction Survey Requirements

Developer shall develop appropriate procedures and plans for and shall perform a preconstruction survey(s) of the Project Right-of-Way (ROW) and immediate vicinity to identify facilities or structures that could be affected by movements initiated by Project construction activities. The survey(s) shall accurately establish the structural condition of the identified facilities or structures prior to commencing construction in the vicinity of these facilities or structures.

Developer shall submit to TxDOT the results of the preconstruction survey prior to beginning construction of any portion of the Project to which the preconstruction survey results are applicable.

8.3 Construction Requirements

8.3.1 Construction Impacts

When performing construction activities under or adjacent to existing structures or Utilities, the Developer shall limit vertical settlements and ground deformations so as to not damage structures, including foundation elements, and/or Utilities. For those occurrences involving TxDOT's structures and Utilities, the Developer shall coordinate excavation activities with TxDOT. For those occurrences involving third party structures and Utilities, the Developer shall coordinate excavation activities in accordance with Sections 5 and 6.

8.3.2 Geotechnical Instrumentation

Developer shall install instrumentation and perform instrumentation readings, data collection, analyses, record keeping, and preparation of interim summary reports. The Work shall include overall interpretation

of monitoring data necessary to provide for safe construction and operations, and to permit timely implementation of proper remedial measures, when and as required, to prevent damage to structures, facilities and Utilities.

Following each Service Commencement, the Developer shall be responsible for identifying and monitoring geotechnical instrumentation that is required for evaluating the long-term performance of the constructed facilities, and shall do so until a point at which it is able to demonstrate to TxDOT's satisfaction that geotechnical conditions will no longer impact the Work.

8.3.2.1 Instrument Decommissioning

Developer's instrumentation plans and procedures shall contain appropriate procedures for salvage, abandonment, or removal of instrumentation that are compliant with ROW and easement requirements and with all applicable regulations.

At the end of the Term, Developer shall submit to TxDOT, as part of the Record Drawings, all instrumentation plans and all installation and monitoring records developed over the Term of the Project.

8.3.3 Noise and Vibration Monitoring Requirements

Developer shall assess and monitor the effect of noise and vibration caused by all construction upon structures, facilities, and neighbors to the ROW.

9. LAND SURVEYING

9.1 General Requirements

Developer shall provide accurate and consistent land surveying and mapping necessary to support ROW acquisition, design, and construction of the Project.

Developer shall review existing survey data and determine the requirements for updating or extending the existing survey and mapping data. Developer is responsible for the final precision, accuracy, and comprehensiveness of all survey and mapping.

9.2 Administrative Requirements

9.2.1 Right-of-Entry

Developer shall secure written permission prior to entering any private property outside the ROW. It shall be Developers' sole responsibility to negotiate this permission and Developer shall be responsible for any and all damages and claims resulting from that ingress. Proper documentation of right-of-entry shall be maintained at all times by Developer.

9.2.2 Survey by TxDOT

In performing surveys for other adjoining projects, TxDOT may need to verify and check Developer's survey work. Developer shall coordinate with the developer of the adjoining project regarding planned construction activities. Developer shall notify TxDOT within 2 Business Days if TxDOT stakes and marks are altered or disturbed.

9.3 Design Requirements

9.3.1 Units

All survey Work shall be performed in the U.S customary units system of measurement. Work shall conform to state plane coordinates. The surface adjustment factor for the Project is 1.00013.

9.3.2 Survey Control Requirements

Developer shall ensure that all surveying conforms to all applicable surveying laws and the Professional Land Surveying Practices Act and must follow the *General Rules of Procedures and Practices* of the Texas Board of Professional Land Surveying. Developer shall ensure that any person in charge of a survey field party is proficient in the technical aspects of surveying.

Developer shall base all additional horizontal and vertical control on the Level 2 and Level 3 control provided by TxDOT.

Developer shall establish and maintain additional survey control as needed and final ROW monumentation throughout the duration of the Project.

Developer shall tie any additional horizontal and vertical control for the Project to the TxDOT-supplied Primary (Level 2) or Secondary (Level 3) control network. If Developer chooses to use GPS methods, Developer shall meet the accuracy of the appropriate level of survey as defined in the TxDOT *GPS User's Manual* and shall utilize the primary survey control to be provided by TxDOT.

All survey control points shall be set and/or verified by a Registered Professional Land Surveyor licensed in the State of Texas.

Developer shall establish and maintain a permanent survey control network. The control network should consist of, at a minimum, monuments set in intervisible pairs at spacing of no greater than 3miles. Monuments shall be TxDOT bronze survey markers installed in concrete and marked as directed by the

most current edition of the TxDOT Survey Manual. Developer shall replace all existing survey monuments and control points disturbed or destroyed. Developer shall make all survey computations and observations necessary to establish the exact position of all other control points based on the primary control provided.

Developer shall deliver to TxDOT, a listing of all primary and secondary control coordinate values, original computations, survey notes and other records including GPS observations and analysis made by Developer as the data are available.

9.3.3 Conventional Method (Horizontal & Vertical)

If Developer chooses to use conventional methods to establish additional horizontal control, Developer shall meet the accuracy of the appropriate level of survey as defined in the following tables.

9.3.3.1 Horizontal Accuracy Requirements for Conventional Surveys

Horizontal control is to be established (at a minimum) on the Texas State Plane Coordinate System NAD 83 (93 HARN).

	Level 3	**Level 4**	**Remarks and Formulae**
Error of Closure	1: 50,000	1:20,000	Loop or between monuments
Allowable Angular Closure	± 3" $\sqrt{N}$	± 8" $\sqrt{N}$	N= number of angles in traverse
Accuracy of Bearing in Relation to Course *	± 04”	± 10”	Maximum for any course
Linear Distance Accuracy (Minimum Length of Line)	1: 50,000 (2,500 feet)	1: 20,000 (1,000 feet)	
Positional Tolerance of Any Monument	AC/50,000	AC/20,000	AC = length of any course in traverse
Adjusted Mathematical Closure of Survey (No Less Than)	1:200,000	1:200,000	

* TxDOT policy requires all bearings or angles be based on the following source: Grid bearing of the Texas Coordinate System of 1983, with the proper zone and epoch specified.

9.3.3.2 Vertical Accuracy Requirements for Conventional Surveys

Vertical control shall be established (at a minimum) on the North American Vertical Datum of 1988 (NAVD 1988), 1995/1996 Adjustment.

	1st ORDER	**2nd ORDER**	**3rd ORDER**	**REMARKS AND FORMULAE**
Error of Closure	0.013 feet $\sqrt{K}$	0.026 feet $\sqrt{K}$	0.039 feet $\sqrt{K}$	Loop or between control monuments
Maximum Length of Sight	250 feet	300 feet		With good atmospheric conditions

Difference in Foresight and Backsight Distances	±10 feet	±20 feet	±30 feet	Per instrument set up
Total Difference in Foresight and Backsight Distances	±20 feet. per second	±50 feet per second	±70 feet per second	Per total section or loop
Recommended Length of Section or Loop	2.0 miles	3.0 miles	4.0 miles	Maximum distance before closing or in loop
Maximum Recommended Distance Between Benchmarks	2000 feet	2500 feet	3000 feet	Permanent or temporary benchmarks set or observed along the route
Level Rod Reading	± 0.001 foot	± 0.001 foot	± 0.001 foot	
Recommended Instruments and Leveling Rods	Automatic or tilting w/ parallel plate micrometer precise rods	Automatic or tilting w/ optical micrometer precise rods	Automatic or quality spirit standard, quality rod	When two or more level rods are used, they should be identically matched
Principal Uses	Broad area control, subsidence or motion studies jig & tool settings	Broad area control, engineering projects basis for subsequent level work	Small area control, drainage studies, some construction and engineering	

9.3.4 Right of Way Surveys

Developer shall base all surveys on the horizontal and vertical control network provided by TxDOT.

9.3.4.1 Accuracy Standard

In performing right of way surveys consisting of boundary locations, Developer shall meet the accuracy standards of the appropriate level of survey as defined in the following table.

CHART OF TOLERANCES

	URBAN / RURAL	URBAN BUSINESS DISTRICT	REMARKS AND FORMULAE
Error of Closure	1:10,000	1:15,000	Loop or between Control Monuments
Angular Closure	15" $\sqrt{N}$	10" $\sqrt{N}$	N = Number of Angles in Traverse

Accuracy of Bearing in Relation to Source *	20 "	15 "	Sin α = denominator in error of closure divided into 1 (approx.)
Linear Distance Accuracy	0.1 foot per 1,000 feet	0.05 foot per 1,000 feet	Sin α x 1000 (approx.) where ± = Accuracy of Bearing
Positional Error of any Monument	*AC*/10,000	*AC*/15,000	*AC* = length of any course in traverse
Adjusted Mathematical Closure of Survey (No Less Than)	1:50,000	1:50,000	

* TxDOT policy requires all bearings or angles be based on the following source: Grid bearing of the Texas Coordinate System of 1983, with the proper zone and epoch specified.

9.3.5 Survey Records and Reports

Developer shall produce a horizontal and vertical control report including coordinate listing, maps showing control, preparation of standard TxDOT data sheets for all primary control, monument description and location description of all primary and secondary survey control points installed, marked and referenced along with a listing of the existing control used to create the installed control points. Control from adjoining, incorporated, or crossed roadway projects, which are currently in design, will be located and a comparison of the horizontal and vertical values will be shown. Developer shall provide survey records and reports to TxDOT upon request.

Developer may use an electronic field book to collect and store raw data. Developer shall preserve original raw data and document any changes or corrections made to field data, such as station name, height of instrument, or target. Developer shall also preserve raw and corrected field data in hardcopy output forms in a similar manner to conventional field book preservation.

Field survey data and sketches that cannot be efficiently recorded in the electronic field book shall be recorded in a field notebook and stored with copies of the electronic data.

All field notes shall be recorded in a permanently bound book. (Loose leaf field notes will not be allowed.) Developer shall deliver copies of any or all field notebooks to TxDOT upon request.

9.4 Construction Requirements

9.4.1 Units

Developer shall conform to design requirements.

9.4.2 Construction Surveys

Developer shall perform all construction surveys in accordance with the design requirements.

9.5 Deliverables

9.5.1 Final ROW Surveying and Mapping

Developer shall coordinate with TxDOT regarding the assignment of right of way Control Section Job (CSJ) numbers for each new mapping project.

The documents produced by the Developer or the Developers subcontractors, are the property of TxDOT, and release of any such document must be approved by TxDOT. All topographic mapping created by Developer shall be provided to TxDOT in digital terrain model format using the software and version thereof being used by TxDOT at the time the mapping is developed.

9.5.2 ROW Monuments

Upon final submittal of the ROW documents to TxDOT, Developer shall set, using permanent and stable monuments as defined in Section 663.17 of the General Rules of Procedures and Practices of the Texas Board of Professional Land Surveying (TBPLS), all significant points along all ROW lines of the Project including the following:

a) Points of curvature (PCs)
b) Points of tangency (PTs)
c) Points of intersection (PIs)
d) Points of compound curvature (PCCs)
e) Points of reverse curvature (PRCs)
f) All intersecting crossroad ROW lines and all property line intersections with the ROW line. These monuments shall be 5/8-inch iron rods, driven just below surface level, capped by a TxDOT-labeled aluminum cap (rod-and-cap monument)
g) All beginning and ending points of control of access (denied) lines

Upon completion of the ROW acquisition and all Construction Work, such that the final ROW lines will not be disturbed by construction, Developer shall replace all rod-and-cap monuments located on the final ROW line at all points of curvature (PCs), points of tangency (PTs), points of intersection (PIs), points of compound curvature (PCCs), and points of reverse curvature (PRCs), and all intersecting crossroad ROW lines, with TxDOT Type II monuments (constructed according to current TxDOT specifications). Developer shall monument with a TxDOT Type II monument all final ROW lines where the distance between such significant ROW line points exceeds 1500 feet. ROW line intersections with property lines shall remain monumented by a 5/8-inch iron rod with a TxDOT aluminum cap (rod-and-cap monument).

Developer shall purchase all materials, supplies, and other items necessary for proper survey monumentation.

Developer shall submit updated maps with the monumentation information. (This is for final monumentation set, for example type II, and type of monuments set, etc.) All deed recording information to be added to the map sheets in the ownership blocks on the map sheets.

9.5.3 Record Drawings and Documentation

Developer shall submit the following as part of the Record Drawings and as a condition of each Service Commencement:

a) A listing of all primary and secondary control coordinate values, original computations and other records including Global Positioning System (GPS) observations and analysis made by Developer

b) Copies of all survey control network measurements, computations, unadjusted and adjusted coordinate and evaluation values; and

c) Survey records and survey reports.

Developer shall produce reports documenting the location of the as-built alignments, profiles, structure locations, Utilities, and survey control monuments. These reports shall include descriptive statements for the survey methods used to determine the as-built location of the feature being surveyed. Developer's as-built data shall include the coordinate types (x, y, and/or z) and feature codes in the same format in which the preliminary construction data was generated. Where data has been provided to Developer from

TxDOT in an x, y, z only coordinate format, or z only coordinate format, Developer shall provide TxDOT with data in an x, y, z only coordinate format or z only coordinate format.

10. GRADING

10.1 General Requirements

Developer shall conduct all work necessary to meet the requirements of grading, including clearing and grubbing, excavation and embankment, removal of existing buildings, pavement and miscellaneous structures, subgrade preparation and stabilization, dust control, aggregate surfacing and earth shouldering, in accordance with the requirements of this Section 10.

Developer shall demolish or abandon in place, all existing structures within the Project ROW, including but not limited to, pavements, bridges, and headwalls that are no longer required for service, or are required to be treated as described in Section 4 (Environmental). Any features that are abandoned in place shall be removed to at least two (2) feet below the final finished grade or one (1) foot below the pavement stabilized subgrade and drainage structures. Developer shall ensure that abandoned structures are structurally sound after abandonment.

10.2 Preparation within Project Limits

Developer shall develop, implement, and maintain, for the Term, a Demolition and Abandonment Plan that considers types and sizes of Utilities and structures that will be abandoned during the Term. The plan shall ensure that said structures are structurally sound after the abandonment procedure. The plan shall account for conditions in the Ultimate Configuration and Initial Configuration and shall be submitted to TxDOT for approval no later than 60 days prior to the scheduled date for NTP2.

TxDOT reserves the right to require Developer, at any time to salvage and deliver to a location designated by TxDOT within the TxDOT District in which the Project is located, any TxDOT-owned equipment and materials in an undamaged condition. TxDOT reserves the right to require Developer to salvage and deliver to a reasonable location designated by TxDOT any ITS equipment and materials in an undamaged condition.

Unless otherwise specified by TxDOT, the material from structures designated for demolition shall be Developer's property. All material removed shall be properly disposed of by Developer outside the limits of the Project.

TxDOT reserves the right to remove buildings to level one finished floor or other appropriate condition on ROW acquired by TxDOT for the Project.

10.3 Slopes and Topsoil

Developer shall exercise Good Industry Practice regarding design limitations and roadside safety guidelines associated with the design of slopes along roadways. Developer shall adjust grading to avoid and minimize disturbance to the identified waters of the U.S.

Developer shall perform finished grading and place topsoil in all areas suitable for vegetative slope stabilization (and areas outside the limits of grading that are disturbed in the course of the Work) that are not paved. For areas outside Developer's limits of maintenance, Developer shall provide stable slopes. For slopes steeper than 4:1, Developer shall submit to TxDOT a slope stability analysis that demonstrates the adequacy of Developer's design. Developer shall submit the slope stability analysis to TxDOT for approval with the Released for Construction Documents.

10.4 Sodding

Block sod shall be placed at all grate inlets, manholes and culvert headwalls and along sidewalks and back of curbs.

11. ROADWAYS

11.1 General Requirements

The objectives of the Project include the provision of a safe, reliable, cost-effective, and aesthetically-pleasing corridor for the traveling public. The requirements contained in this Section 11 provide the framework for the design and construction of the roadway improvements to help attain the Project objectives.

Developer shall coordinate roadway design, construction, maintenance, and operation with other Elements of the Project to achieve the objectives of the Project.

Where changes to the roadway geometrics result in revisions to the Project ROW, Developer is responsible for demonstrating the proposed change is an equally safe alternative as well as the initiation and progression of all environmental and public involvement processes in coordination with TxDOT. Developer shall perform all ROW services that are necessitated by proposed changes in accordance with the CDA Documents.

11.2 Design Requirements

Developer shall coordinate its roadway design with the design of all other components of the Project, including aesthetics. The Project roadways shall be designed to integrate with streets and roadways that are adjacent or connecting to the Project.

Developer shall design all Elements in accordance with the applicable design criteria and Good Industry Practice based on the Design Speeds for various Elements.

The Project roadways shall be designed to incorporate roadway appurtenances, including fences, noise attenuators, barriers, and hazard protection as necessary to promote safety and to mitigate visual and noise impacts on neighboring properties according to the requirements of the approved NEPA Environmental Assessment.

11.2.1 Control of Access

Unless shown to be deleted in the Project Schematic, Developer shall maintain all existing property accesses, including those not shown on the schematic, and shall not revise control of access without TxDOT review and the written agreement of the affected property owner.

11.2.2 Roadway Design Requirements

The Developer shall complete the design of the Project roadways in a manner that meets or exceeds the requirements shown in Table 11-1, with the exclusion of the roadway design deviation listed in Section 11.2.2.2.

Table 11-1: Geometric Design Criteria

	TOLL LANES	GENERAL PURPOSE LANES(4)	FRONTAGE ROADS(4)	RAMPS/DIRECT CONNECTORS	CROSSING STREETS(4)
Roadway classification	Urban freeway	Urban freeway	Urban collector	Urban freeway	Urban local
Design Speed	60 mph	60 mph	45 mph	45 mph(1) / 35mph(2) / 30 mph(5)	35mph / 30 mph(6)
Stopping sight distance	570’	570’	360’	360’(1) / 250’(2) / 200(5)	250’/ 200(6)
Maximum Superelevation rate	6%	6%	6%	6%	N/A
Minimum radius of curvature	1330’	1330’	643’	643’(1) / 340’(2) / 231(5)	454’/ 300(6)
Minimum grade	0.35%	0.35%	0.35%	0.35%	0.35%
Maximum grade	3.0%	3.0%	6.0%	6.0 %	7.0%
Minimum K-value for crest vertical curve	151	151	61	61(1) / 29(2) / 19(5)	29 / 19(6)
Minimum K-value for sag vertical curve	136	136	79	79(1) / 49’(2) / 37(5)	49 / 37(6)
Lane width	12’	12’	12’ inside lanes 14’ outside lane (includes 2’ shared use lane)	14’ (single lane) 12’ per lane (multi-lane)	12’

	TOLL LANES	GENERAL PURPOSE LANES(4)	FRONTAGE ROADS(4)	RAMPS/DIRECT CONNECTORS	CROSSING STREETS(4)
Inside shoulder	4’	10’	NA (curbed)	4’(3)	NA (curbed)
Outside shoulder	10’	12’	NA (curbed)	6’(3) (Ramps)/ 8’(3) (Direct Connectors)	NA (curbed)
Curb offset	N/A	N/A	2’ Outside 1’ Inside	N/A	1’
Cross-slope (typical) Lanes	2.0 %	2.0 %	2.0 %	2.0 %	2.0 %
Cross-slope (typical) Shoulders	2.0 %	2.0 %	2.0 %	2.0 %	2.0 %
Distance from edge of travel lane unless noted otherwise	30’	30’	3’ (measured from face of curb)	16’	3’ (measured from face of curb)
Side slopes (within clear zone)	4:1 max	4:1 max	4:1 max	4:1 max	4:1 max
Side slopes (outside clear zone)	3:1 max	3:1 max	3:1 max	3:1 max	3:1 max
	TOLL LANES	**GENERAL PURPOSE LANES(4)**	**FRONTAGE ROADS(4)**	**RAMPS/DIRECT CONNECTORS**	**CROSSING STREETS(4)**
Over streets	16’-6”	16’-6”	16’-6”	16’-6”	16’-6”
Over railroad	23’-4”	23’-4”	23’-4”	23’-4”	23’-4”
Over electrified light rail	26’-6”	26’-6”	26’-6”	26’-6”	26’-6”
Overhead signs	21’ 0”	21’ 0”	21’ 0”	21’ 0”	21’ 0”
Pedestrian crossings	17’-6”	17’-6”	17’-6”		
Design vehicles	WB-62	WB-62	WB-62	WB-62	WB-62

Driveway radius	N/A	N/A	30’ min commercial, 15’ min. residential	N/A	30’ min commercial, 15’ min. residential

Notes:

(1) Applicable to all Ramps/Direct Connectors
(2) Applicable only to IH 610 WB Direct Connector Ramp to NB Almeda and southbound Texas Medical Center Connectors
(3) To mitigate restrictions on the design imposed by sight distance, it is acceptable to position the 8’ shoulder on the inside of the curve and the 4’ shoulder on the outside of the curve.
(4) The Design Criteria does not apply to existing roadways absent from Section 1.3 (i.e. General Purpose Lanes, Frontage Roads and cross streets), provided all O&M work maintains their existing alignment and design configuration. New alignment reconstructions of existing roadways are subject to the Design Criteria in Table 11-1. Renewal Work of existing roadways must meet or exceed the existing conditions of these roadways.
(5) Applicable to northbound Texas Medical Center Connector
(6) Applicable to Holly Hall

11.2.2.1 Superelevation

Existing superelevation in areas where ramps are to connect to existing pavement may be retained at existing superelevations. Superelevation transitions shall be designed and constructed such that zero percent cross-slopes will not occur on bridges or on grades flatter than 0.35 percent.

Developer may maintain the existing pavement normal crown in overlay sections so long as it shall not be flatter than 1.5 percent. At normal crowns, pavement widening adjacent to existing pavement shall be constructed on a 2 percent cross slope. The transition from existing cross slope to 2 percent shall occur within 1-foot of the closest lane line to the roadway widening.

11.2.2.2 Deviations

The Developer shall meet the criteria in Table 11-1 except for the following locations and conditions:

a) SH 288 General Purpose auxiliary lanes and toll lane ramps on bridge widenings over Blodgett, Wheeler, and Cleburne where vertical clearance over these cross streets shall match existing vertical clearance as verified through survey measurements by Developer, and where vertical and horizontal curvature, cross slope and superelevation shall match existing conditions for the respective structure and associated approach pavement widening.

b) Proposed Toll Lanes under North MacGregor and South Macgregor existing bridges at Brays Bayou shall meet the minimum vertical clearance of the existing SH 288 Southbound and SH 288 Northbound general purpose lanes under these respective bridges.

c) Existing bridges, including General Purpose Lanes, frontage roads, and ramps, where work is limited to maintenance activities shall be maintained at existing criteria for geometrics including vertical clearances. Should these bridges or associated approach roadway pavements be reconstructed, the design criteria in Table 11-1 shall be met.

Any deviations from the criteria in Table 11-1 that is not included in Section 11.2.2.2 will require TxDOT review and comment. TxDOT in its sole discretion will determine if the deviation may be considered a design exception based on the controlling criteria listed below:

a) Design speed
b) Lane width
c) Shoulder width

d) Bridge width
e) Structural capacity
f) Horizontal alignment
g) Vertical alignment
h) Grades
i) Stopping sight distance
j) Cross slope
k) Superelevation
l) Vertical clearance

11.2.3 Miscellaneous Roadway Design Requirements

All roadside safety devices used on the Project shall meet current crash test and other safety requirements in accordance with TxDOT standards.

Driveways shall be designed in accordance with the guidelines, which will be considered requirements, specified in TxDOT's *Roadway Design Manual* – Appendix C, "Driveways Design Guidelines" to be functionally adequate for land use of adjoining property.

The border width, measured from back of curb, along frontage roads and crossing streets shall be 15 feet minimum unless specified otherwise.

Unless specified otherwise in these documents, all ramps, bullnoses, tie-ins and ramp terminals shall be located horizontally and vertically to accommodate the Ultimate Configuration such that the Ultimate Configuration can be implemented with little or no impact on traffic and/or rework.

12. DRAINAGE

12.1 General Requirements

Efficient performance of the drainage system is an integral part of the performance of the Project. Developer shall account for all sources of runoff that may reach the Project, whether originating within or outside the Project ROW, in the design of the drainage facilities.

If existing drainage patterns are revised during the Project design, then the Developer shall design and construct a solution that does not adversely impact property owners outside the ROW.

The City of Pearland has provided up to 6.8 acre-feet of detention capacity in regional facilities that they are building near the southwest quadrant of the Beltway 8 Interchange. The detention is provided as an option to offset impervious area resulting from the proposed Project for construction between Almeda-Genoa Road and Clear Creek. The Developer shall coordinate with the City of Pearland for drainage study and drainage design activities and shall be responsible for compliance with requirements in the Memorandum of Understanding between the State and the City of Pearland

12.2 Administrative Requirements

12.2.1 Data Collection

To establish a drainage system that complies with the requirements and accommodates the historical hydrologic flows in the Project limits, Developer is responsible for collecting all necessary data, including those elements outlined in this Section 12.2.1.

Developer shall collect available data identifying all water resource issues, including water quality requirements as imposed by State and federal government regulations; National Wetland Inventory and other wetland/protected waters inventories; in FEMA mapped floodplains; and official documents concerning the Project, such as the FEIS or other drainage and environmental studies. Water resource issues include areas with historically inadequate drainage (flooding or citizen complaints), environmentally sensitive areas, localized flooding, maintenance problems associated with drainage, and areas known to contain Hazardous Materials. Developer shall also identify watershed boundaries, protected waters, county ditches, areas classified as wetlands, floodplains, and boundaries between regulatory agencies (e.g., watershed districts and watershed management organizations).

Developer shall acquire all applicable municipal drainage plans, watershed management plans, and records of citizen concerns. Developer shall acquire all pertinent existing storm drain plans and/or survey data, including data for all culverts, drainage systems, and storm sewer systems within the Project limits. Developer shall also identify existing drainage areas that contribute to the highway drainage system and the estimated runoff used for design of the existing system.

Developer shall obtain photogrammetric and/or geographic information system (GIS) data for the Project limits that depicts the Outstanding National Resource Waters and/or impaired waters as listed by the TCEQ. Developer shall conduct surveys for information not available from other sources.

If documentation is not available for Elements of the existing drainage system within the Project limits and scheduled to remain in place, Developer shall investigate and videotape or photograph the existing drainage system to determine condition, size, material, location, and other pertinent information.

The data collected shall be taken into account in the Final Design of the drainage facilities.

12.2.2 Coordination with Other Agencies

Developer shall coordinate all water resource issues with affected interests and regulatory agencies. Developer shall document the resolutions of water resource issues.

The Developer shall provide to the local floodplain administrators all information and technical data needed to file Letters of Map Revision (LOMR) and Conditional Letters of Map Revision (CLOMR) with FEMA, as well as to obtain all required environmental permits.

12.3 Design Requirements

Developer shall design all Elements of the drainage facilities in accordance with the applicable design criteria and Good Industry Practice.

The design of drainage systems shall include reconfiguration of the existing drainage systems within the Project limits, and design of new and reconfigured storm drainage systems as required to meet the performance requirements as defined in this Section 12.

Developer shall provide facilities compatible with existing drainage systems and all applicable municipal drainage plans or approved systems in adjacent properties. Developer shall preserve existing drainage patterns wherever possible.

Developer may make use of existing drainage facilities, provided overall drainage requirements for the Project are achieved and the combined drainage system functions as intended.

Developer shall base its Final Design on design computations and risk assessments for all aspects of Project drainage.

Developer shall design roadside open channels such that the profiles have adequate grade to minimize sedimentation.

The Developer shall provide a drainage system that maintains or improves the existing drainage.

12.3.1 Surface Hydrology

12.3.1.1 **Design Frequencies**

Developer shall use the design frequencies listed in Table 12-1 below.

Table 12-1: Drainage Design Frequencies

Design Element	Reference	Toll Lanes /General Purpose Lanes	Ramp	Direct Connect.	Frontage Road	Arterial / Cross Street	Application Notes
Minimum Roadway Elevation at AHW	HDM – Ch 4, Sec 6 TxDOT HOU	100-yr	10-yr	100-yr	10-yr	10-yr	Applies to cross drainage and parallel floodplain WSEL. Does not apply to storm drain HGL
Storm Drain Inlets and Pavement Drainage	HDM – Ch 4, Sec 6 TxDOT HOU	10-yr	2-yr	10-yr	2-yr	2-yr	Applies to ponded widths in gutter and inlet capacity.
Storm Drain Conduits	HDM – Ch 4, Sec 6 TxDOT HOU	2-yr	2-yr	2-yr	2-yr	2-yr	Size conduit for non-pressure flow; i.e. Design Q<= Full Flow Capacity Q. Check mainlane storm sewer HGL for 10-year capacity
Cross Drain Culverts	HDM – Ch 4, Sec 6 TxDOT HOU	50-yr	10-yr	50-yr	10-yr	Match Exist.	Design upstream WSEL below AHW at low point in roadway profile. Check for 100-year.
Bridge Waterway Crossing	HDM – Ch 4, Sec 6 HDM – Ch 9, Sec 3 TxDOT HOU	100-yr	10-yr	50-yr	10-yr	Match Exist	New ML Bridge: 1.5' or greater freeboard for the 100-year, 1' OK with TxDOT concurrence. Other Roadways: Low chord > Design WSEL
Storm Water Pumping Stations	HDM – Ch 11, Sec 3	50-yr	50-yr	50-yr	50-yr	50-yr	Design WSEL below AHW. Check for 100-year.
Outfall Ditches	TxDOT HOU	Design for No Impact to 100-yr WSEL. Use HCF CD and/or governing Local County Standard Details for Outfalls and other construction within county channels and ponds.					
Separation Ditches	TxDOT HOU	10-yr	10-yr	10-yr	N/A	N/A	
Roadside Ditches	TxDOT HOU	N/A	N/A	N/A	2-yr*	2-yr**	*If required outside curb line. **Or match existing capacity.
Detention Ponds	TxDOT HOU	100-year design. Provide Detention Summary w/area serviced. Detention Storage Volume Required, Detention Storage Volume Provided, Maximum Design WSEL, Maximum Outflow Rate Allowed, Maximum Outflow Rate Provided, and Restrictor Size.					
Depressed Roadway* Storm Sewer (gravity drainage without pump)	HDM – Ch 4, Sec 6 TxDOT HOU	50-yr	10-yr	50-yr	10-yr	10-yr	*Depressed roadway has nowhere for water to drain when curb height is exceeded. Check for 100-yr HGL.

12.3.1.2 Hydrologic Analysis

Developer shall design drainage structure capacities for the frequencies and hydrologic conditions as described in Table 12-1 above.

Developer shall design the drainage system to accommodate the roadway improvements within the right of way. Flood damage potential for the completed Project shall not exceed pre-Project conditions.

When determining flow for conduits from outside the right of way the flow shall be the greater of (a) the contributing drainage area at existing development conditions, or (b) the 150' development strip adjacent to the right of way using a runoff coefficient of 0.65. Peak flows from existing development with compensatory onsite stormwater detention should consider the flow reduction benefits of the stormwater detention.

12.3.2 Storm Sewer Systems

Where precluded from handling runoff with open channels by physical site constraints, or as directed in this Section 12, Developer shall design enclosed storm sewer systems to collect and convey runoff to appropriate discharge points. Storm sewer system layout should be logic driven by constructability and work phasing, in that way, temporary drainage conditions during construction can be enhanced. Therefore, conveyance can be maintained while minimizing impacts to traffic.

Developer shall prepare a storm sewer drainage report encompassing all storm sewer systems that contains, at a minimum, the following items:

a) Drainage area maps for each storm drain inlet with pertinent data, such as boundaries of the drainage area, topographic contours, runoff coefficients, time of concentration, and land use with design curve number and/or design runoff coefficients, discharges, velocities, ponding, and hydraulic grade line data.
b) Location and tabulation of all existing and proposed pipe and drainage structures. These include size, class or gauge, catch basin spacing, detailed structure designs, and any special designs.
c) Specifications for the pipe bedding material and structural pipe backfill on all proposed pipes and pipe alternates.
d) Complete pipe profiles, including pipe size, type, and gradient; station offsets from the centerline of the roadway; length of pipe; class/gauge of pipe; and numbered drainage structures with coordinate location and elevations.

This report shall be a component of the Drainage Design Report.

a) Developer shall design all storm sewer systems such that the hydraulic grade line for the design frequency event is no higher than 1 foot below: the lip of gutter;
b) the top of grate inlet; and
c) the top of a manhole cover.

Runoff within the jurisdiction of the U.S. Army Corps of Engineers (USACE) shall be conveyed in accordance with applicable laws and permits.

12.3.2.1 **Drainage Design**

AHW	Allowable High Water	HOU	District Design Practice
HCFCD	Policy Criteria & Procedure Manual (HCFCD)	RCB	Reinforced Concrete Box
HDM	Hydraulic Design Manual (TxDOT)	RCP	Reinforced Concrete Pipe
HGL	Hydraulic Grade Line	WSEL	Water Surface Elevation

Design Element	Reference	Toll Lanes /General Purpose Lanes	Ramp	Direct Connect.	Frontage Road	Arterial / Cross Street	Application Notes
Storm Drain Conduits – Laterals							
Minimum Pipe Size	TxDOT HOU	24”	24”	24”	24”	24”	
Minimum Slope	TxDOT HOU	0.2%					
Maximum Slope	TxDOT HOU	3%					
Minimum Velocity	TxDOT HOU	2 ft/sec at full flow					
Maximum Velocity	TxDOT HOU	10 ft/sec					
Storm Drain Conduits – Trunk Lines							
Minimum Pipe Size		24”	24”	24”	24”	24”	
Minimum RCB Depth		3'	3'	3'	3'	3'	
Minimum Slope		0.2%					
Maximum Slope		3%					
Minimum Velocity		2 ft/sec at full flow					
Maximum Velocity		10 ft/sec					
Separation Ditches							
Minimum Depth		Variable					
Maximum Depth		Dictated by roadway design					
Minimum Slope		0.5% if grass lined or pavers, 0.2% if lined with concrete					
Maximum Slope		Based on sheer stress of lining					
Maximum Flow Depth		Top of bank					
Side Slopes/ Shape		Based on roadway design criteria and typical section					
Pavement Drainage							
Allowable Ponding Width/AHW	HDM – Ch 10, Sec 2 TxDOT HOU	Shldr Width	Shldr Width + 2'	Shldr Width + 2'	Curb offset + 1 Lane	Curb offset + 1 Lane*	
Maximum Low Point Ponding Depth	HDM – Ch 10, Sec 4	Function of Allowable Ponding Width and Cross Slope					Provide flank inlets to avoid hydroplaning.

Design Element	Reference	Toll Lanes /General Purpose Lanes	Ramp	Direct Connect.	Frontage Road	Arterial / Cross Street	Application Notes
Storm Drain Inlets							
Pavement Inlet Types	TxDOT HOU	AZ, AZ2G, AZR, AZR2G, Trench Drains[1]	AZ, AZ2G, AZR, AZR2G, C or C1	AZ, AZ2G, AZR, AZR2G	C1 (typical)	C, C1	1. Use Trench Drains in ramp gores.
Ditch Inlet Types	TxDOT HOU	Separation Ditches: AD, AAD, SET Side Road Ditches: A, AD, AAD, SET					Provide detail to add concrete riprap collar 2'-wide around inlet perimeter.
Inlet Drainage Area	TxDOT HOU	In general, contributing drainage area to the inlet from within and outside the right of way, with following clarifications: 1. For Frontage Road inlets Adjacent to **Undeveloped Areas Outside Right Of Way :** Contributing area within the right of way, plus 150' strip outside right of way at an assumed runoff coefficient 'C' = 0.65 2. For Frontage Road inlets Adjacent to **Developed Areas (with internal drainage system) Outside Right of Way:** Contributing areas within and outside right of way. 3. Drainage area for storm drain conduits may differ (see 'Conduit Drainage Area' below).					
Inlet Locations	HDM – Ch 10 – Sec 5 TxDOT HOU	1. On-grade: Place inlets to keep gutter ponding <= allowable, Carryover acceptable. 2. Low points: Verify inlet location is at sag of vertical curve, not at P.I. Place flanking inlets both sides of low point at maximum 100' spacing from L.P. 3. Redundant inlets: End of curb returns at intersection, and in separation ditches. 4. 100% flow interception: On pavement at end of retaining wall , at ramp gores, at intersections. 5. Provide detail for equalizer pipes to connect multiple boxes in trunkline at inlets.					
Bridge Deck Drainage	HDM – Ch 9 – Sec 7 TxDOT HOU	1. Drain free-fall through slots in rail, where falling water would not affect adjacent roadway/bridge or other features below. 2. Use current Bridge Drain Inlets per Houston District Bridge Section details, where drainage through slots in rail is not acceptable. 3. Use slotted rail w/water blocks in sag locations. 4. Outfall deck drain pipe system directly into nearby storm drain inlet or manhole below grade.					
Storm Drain Conduits - General							
Conduit Drainage Area	TxDOT HOU	In general, contributing drainage area to the conduit from within and outside the right of way, with following clarifications: 1 Flows to the conduit from areas outside the right of way are based on the higher of (1) contributing area at existing development conditions or (2) 150' strip adjacent to right of way at runoff coefficient 'C' = 0.65 2 'Existing development conditions' in #1 should consider effect of any existing stormwater detention. 3 Drainage area for storm drain inlets may differ (see 'Inlet Drainage Area' above).					
Conduit Material/Type	TxDOT HOU	Reinforced Concrete Pipe – RCP, or Reinforced Concrete Box - RCB					
Design Conduit Size	HDM – Ch 10, Sec 6	Full flow pipe capacity >= design Q					

Design Element	Reference	Toll Lanes /General Purpose Lanes	Ramp	Direct Connect.	Frontage Road	Arterial / Cross Street	Application Notes
Conduit Size Changes	HDM – Ch 10, Sec 6	Match soffits at conduit size changes, if possible. Matching flowlines is acceptable if grade is limited.					
Manholes/Junctions	TxDOT HOU	Ty A or Ty B Manholes. Bridge Division Manhole Ty M, JB w/Access. All other JB's require special design.					No MH access on pavement. Provide MH spacing per TxDOT HDM.
Conduit Connections	TxDOT HOU	1. Lateral stub-in boxes require 2' minimum size differential 2. Pipe to pipe stub-in requires 3' minimum size differential 3. Other connections require M/H, JB, or JB w/out riser 4. Provide detail for accommodating multiple (parallel) conduits at junctions – use equalizer openings					
Minimum Conduit Clearance (Cover)	TxDOT HOU	1. Graded areas: 1 ft 2. Paved areas: the lower of (a) 2 ft below pavement surface, or (b) below treated subgrade.					
Location near Retaining Wall	TxDOT HOU	1. Where possible, avoid placement of conduit parallel to MSE wall if located within wall backfill. 2. Preferred lateral placement is under wall, normal to wall alignment (see AZR and AZR2G inlet standards). 3. If conduits are outside of and parallel to a fill wall, offset conduit 15 ft minimum from face of wall.					

Stormwater Storage Facilities

Developer shall complete preliminary design of the stormwater storage facilities to meet requirements for water quality, water quantity, and rate control, as determined by the Texas NPDES regulations. Local requirements, if more stringent, shall be handled by Developer with a third party agreement.

Developer shall ensure that stormwater storage facilities meet the requirements listed above by performing a detailed flood routing analysis, for ponds affected by significant environmental issues such as hazardous waste or groundwater concerns. The analysis shall ensure that post-Project peak runoff rates shall not exceed pre-Project rates.

12.3.3 Hydraulic Structures

12.3.3.1 Culverts

Developer shall analyze existing and proposed culverts and drainage-ways impacted, replaced, or created by the Project design, for any localized flooding problems.

Where culvert design is influenced by upstream storage, the analysis of the storage shall be incorporated into the design of the culvert.

For all culverts, the maximum allowable headwater elevation for the design frequency shall not exceed one foot below the shoulder point of intersection elevation of the applicable roadway low point. The maximum allowable velocity shall not surpass 6 FPS. If this value is exceeded, velocity protection devices shall be used to protect the channel from erosion damage.

The hydraulic analysis should include a thorough investigation of field conditions and appropriate survey data to develop hydraulic models to evaluate water surface elevations, velocities, and floodplain boundaries; perform scour analysis to determine scour depths, and develop countermeasures. Coordination with the local Floodplain Administrator and FEMA should be done in order to satisfy all floodplain permitting requirements.

12.3.3.2 Bridges

All bridge hydraulic designs shall not adversely impact the implementation of federal flood damage reduction projects currently underway by the USACE and the Harris County Flood Control District (HCFCD) for Brays Bayou, Sims Bayou, or Clear Creek.

Where bridge design is influenced by upstream floodplain storage, the analysis of the storage shall be considered in the design of the bridge.

12.3.3.2.1 Method Used to Estimate Flows

Developer shall ensure that the selected hydrologic method is appropriate for the conditions in the watershed.

For all crossings located within a FEMA Flood Insurance Study (FIS) with peak flow information, Developer shall gather and utilize, as appropriate, the flow information provided in the FIS and any subsequent Letters of Map Revision (LOMR) for estimating flow. For channel crossings within Harris County the Developer shall use the effective hydrologic and hydraulic model from the HCFCD. For channel crossings affected by approved flood reduction projects by USACE, HCFCD, and other State or federal agencies, the Developer may use, as appropriate, the ultimate or post-project hydrologic and hydraulic models associated with such studies.

12.3.3.2.2 **Design Frequency**

Major waterway crossings, bridges, culverts and storm drain systems shall be designed for the frequency corresponding to the functional classification of the associated roadway.

Developer shall evaluate bridges for contraction scour and pier scour concerns and incorporate protection in accordance with Good Industry Practice. The Developer shall provide a scour analysis in accordance with TxDOT's *Geotechnical Manual* (Chapter 5 – Section 5 Scour) for all new bridges. If necessary, the Developer shall provide countermeasures for any instability and scour problems in accordance with FHWA Hydraulic Engineering Circular No. 23 - *Bridge and Scour and Stream Instability Countermeasures Experience Selection and Design Guidance*.

The developer shall estimate the peak discharge, for both, existing and proposed condition; water surface profiles for design and check flood conditions will have to be determined. Higher freeboards may be required when the stream is prone to heavy debris loads, or to accommodate other clearance needs.

12.3.3.2.3 **Hydraulic Analysis**

Developer shall design riprap at abutments in accordance with the procedures outlined in HEC-23. For bridge abutments in urban areas, Developer shall install protection in accordance with the Project's aesthetic plan.

12.3.3.2.4 **Bridge/Culvert Waterway Design**

For existing crossings, Developer shall analyze the existing structure with the proposed flows to ensure the headwater does not exceed allowable. If this condition is not met, Developer shall design a replacement structure with sufficient capacity to pass the design-frequency flows and ensure the maximum headwater for any frequency event does not cause an adverse impact. Culvert extensions may increase the headwater elevation, but not above the maximum allowable headwater, with respect to adjacent property and floodplain concerns.

Bridge waterway design shall maintain the existing channel morphology through the structure, if possible.

12.3.3.2.5 **Bridge Deck Drainage**

Runoff from bridge decks shall be carried off the bridge and into the adjacent roadway drainage system using bridge deck drains, slots in the rail, and/or capture in bridge approach drains to intercept gutter flow at each end of the bridge, according to criteria in Table 12-7 below.

Stormwater flowing toward the bridge shall be intercepted upstream from the approach slab. Runoff from bridge deck drainage shall be treated as required by TCEQ or other applicable regulation prior to discharge to the natural waters of the State.

Table 12-7: Bridge Deck Drainage Design Criteria

Design Element	Toll Lanes /General Purpose Lanes	Ramp	Direct Connect.	Frontage Road	Arterial / Cross Street	Application Notes
Bridge Deck Drainage	1. Drain free-fall through slots in rail, where falling water would not affect adjacent roadway/bridge or other features below. Review open slot (free-fall) locations with Program Team. 2. Use Bridge Drain Inlets (Welded) BD-2 where drainage through slots in rail is not acceptable. 3. Use slotted rail with water blocks even in locations where bridge deck inlets are used. 4. Outfall deck drain pipe system directly into nearby storm drain inlet or manhole below grade.					

12.3.3.2.6 Drainage Report for Major Stream Crossings

As part of the Drainage Design Report, Developer shall prepare a report for each major stream crossing. Major stream crossings are defined as waterways listed as a FEMA studied floodplain (Zone AE) or requiring a bridge or bridge class culvert structure. The report shall include the detailed calculations and electronic and printed copies of the computer software input and output files, as well as a discussion about hydrologic and hydraulic analysis and reasons for the design recommendations. At a minimum, for each crossing the report shall include:

FEMA Special Flood Hazard Area (SFHA)

a) Firmette
b) Discussion of SFHA and implications

Hydrology

a) Drainage area maps with watershed characteristics, hardcopy
b) Hydrologic calculations (where computer software is used, both hardcopy and electronic input and output files)
c) Historical or site data used to review computed flows

Hydraulics and Recommended Waterway Opening and/or Structure

a) Photographs of Site (pre- and post-construction)
b) General plan, profile, and elevation of recommended waterway opening and/or structure
c) Calculations – hardcopy of output, as well as electronic input and output files for all computer models used for final analysis or for permit request, as well as summary of the basis of the models
d) Cross-sections of waterway (Developer shall provide a hard copy plot, plus any electronic data used)
e) Channel profiles

Scour Analysis

a) Channel cross-sections at bridge showing predicted scour
b) Calculations and summary of calculations, clearly showing predicted scour and assumptions regarding bridge opening and piers used to calculate predicted scour
c) Discussion of review of long-term degradation/aggradation and effects
d) Recommendation for abutment protection

Major stream crossings are waterways with a FEMA studied SFHA or requiring a bridge class structure, which is defined as any bridge or a culvert with a total opening width greater than or equal to twenty feet. Any other waterway will be by default a minor stream crossing.

12.3.4 Drainage Design Deviations

The Developer shall meet the criteria in Section 12 except for the locations and conditions stated in this Section 12.3.4.

For the proposed toll lanes over Brays Bayou and existing SH 288 General Purpose Lanes over Brays Bayou, the following design deviations are allowed:

a) Design frequency shall meet 50-year event requirements
b) Low chord of proposed structures shall match or be above the existing low chord of the SH 288 General Purpose Lane bridges.
c) Bridge structure type shall be compatible with existing structures and proposed substructure within the channel shall align with existing SH 288 General Purpose Lane bridge columns and shall be the same width of or smaller than existing bridge columns.

For the proposed toll lanes and existing SH 288 General Purpose lanes in the depressed roadway section north of Brays Bayou, the following design deviations are allowed:

a) Design frequency shall meet at least 25-year event requirements.

12.4 Drainage Design Report

A preliminary Drainage Design Report shall be submitted with prefinal set of construction plans. Within 30 days of Service Commencement, Developer shall submit to TxDOT, as part of the record set documents, a Final Drainage Design Report, which shall be a complete documentation of all components of the Project's drainage system. At a minimum, the Report shall include:

a) Record set of all drainage computations, both hydrologic and hydraulic, and all support data.
b) Hydraulic notes, models, and tabulations
c) Bridge and culvert designs and reports for major stream crossings including all items listed in Section 12.3.4.2.6
d) Pond designs, including graphic display of treatment areas and maintenance guidelines for operation
e) Correspondence file
f) Drainage system data (location, type, material, size, and other pertinent information) in a suitable electronic format
g) Storm sewer drainage reports (if applicable)

12.5 Construction Requirements

Developer shall design drainage to accommodate construction staging. The design shall include temporary erosion control ponds and other Best Management Practices needed to satisfy the NPDES and other regulatory requirements. The water resources notes in the plans shall include a description of the drainage design for each stage of construction.

13. STRUCTURES

13.1 General Requirements

This Project must provide the general public a safe, reliable, and aesthetically-pleasing facility. To achieve this, the structural Elements , including bridges, culverts, drainage structures, signage supports, illumination assemblies, traffic signals, retaining walls, and sound walls, shall be designed and constructed in conformance with the requirements of the CDA Documents, the current TxDOT *Bridge Design Manual – LRFD,* TxDOT *Geotechnical Manual*, *AASHTO LRFD Bridge Design Specifications* and *AASHTO Standard Specifications for Structural Supports for Highway Signs, Luminaires, and Traffic Signals*. Requirements of TxDOT manuals have precedence over others. The design and construction of all structural elements shall be based on the most current version of manuals, specifications, and guides at the time Notice To Proceed (NTP) is provided for the Initial or Ultimate Configuration. Bridges, retaining walls, sound walls and sign structures shall be designed in conformance with the Green Ribbon Project Guidelines. A deviation from Green Ribbon Project Guidelines is allowed at low visibility crossings over Sims Bayou and Clear Creek, and for bridge structures over Brays Bayou. Bridges at these locations shall be compatible with aesthetic features of existing structures.

13.2 Design Requirements

Developer shall prepare a detailed plan for each Element constructed on the Project with recommended design, construction and maintenance activities to achieve service life that meets the Residual Life at Handback requirements as defined in Section 19. Developer shall obtain National Bridge Inventory (NBI) numbers from TxDOT for all bridges and bridge class culverts. The NBI numbers shall be shown on the applicable layout sheets of the Final Design Documents.

Developer shall submit a corridor structure type study report for new bridges, retaining walls, noise walls, sign structures, and other structure components to TxDOT for comment. The corridor structure type study report will describe the structural system to be used on the Project, design parameters for the system, materials, performance history of the chosen system and ability to meet the Residual Life at Handback requirements, impacts to the public during construction, and other information to describe the chosen system.

13.2.1 Design Parameters

Sidewalks on bridges shall be provided in accordance with Section 20.

Segmental bridges shall additionally conform to the requirements of the current AASHTO *Guide Specifications for Design and Construction of Segmental Concrete Bridges*.

Pedestrian bridges shall additionally conform to the requirements of the current AASHTO *Guide Specifications for Design of Pedestrian Bridges*.

The Developer shall proportion bridge spans to avoid uplift at supports.

Developer shall ensure that bridges crossing over waterways withstand the design frequency event with no loss of structural integrity. Design frequencies are defined in Section 12.

Bridges crossing over the Project shall, at a minimum, be designed to accommodate the Ultimate Configuration and all planned expansions or updates of each facility by its respective owner as designated in the owner's current transportation master plan. Developer shall design bridge structures required for the Initial Configuration, if applicable, to the total length and span arrangement required for the Ultimate Configuration, including spanning future lanes that will be constructed below the structure as a part of the Ultimate Configuration.

Developer shall design bridge structures to accommodate the Ultimate Configuration and construct bridge structures to the width required for the Initial Configuration. Developer shall ensure that bridges constructed for the Initial Configuration can be widened to the Ultimate Configuration width at a later date with minimal or no impact to aesthetics and traffic**.**

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

All electronic and paper files and calculation design notebooks shall be made available at TxDOT's request.

13.2.2 Bridge Design Loads and Load Ratings

All new or widened roadway bridges and bridge class culverts shall be designed to accommodate the following live loads:

> An HL-93 truck or a tandem truck plus lane load as defined in the current AASHTO *LRFD Bridge Design Specifications* shall be utilized for bridges except pedestrian bridges.
>
> Pedestrian bridges and sidewalks of vehicular bridges shall be loaded in accordance with requirements in the current AASHTO *LRFD Bridge Design Specifications* and AASHTO *Guide Specifications for Design of Pedestrian Bridges*. All pedestrian bridge designs shall include live load for an AASHTO H-10 truck to account for maintenance and emergency vehicles.

Developer shall provide to TxDOT both an inventory and an operating rating of the constructed structures using a form provided by TxDOT. Load ratings shall be in accordance with the current AASHTO *Manual for Condition Evaluation of Bridges*.

13.2.3 Bridge Superstructures

Fracture critical members shall not be used for bridges without written authorization from TxDOT, and if allowed by TxDOT fracture critical members shall be designed to allow full access for inspection.

The type of bridge shall not be restricted to those typically used by TxDOT. Other types and components may be used, but will be allowed only if:

a) They have been accepted for general use by the Federal Highway Administration (FHWA); and

b) Developer can demonstrate that the design of the bridge type and components will meet the functional requirements of the Project.

All barrier systems used on the Project shall meet the requirements of the current TxDOT *Bridge Railing Manual*. All testing and associated costs for non-standard railings shall be the sole responsibility of Developer and shall be accomplished through a third party acceptable to TxDOT. A list of standard railing is provided in the current TxDOT *Bridge Railing Manual*. Developer shall protect sidewalks from vehicular impact by using TxDOT-approved bridge railings. For Initial Configuration, pedestrian rail shall be used along structure pavement edges and installed to minimize future damage when accommodating the Ultimate Configuration.

Modular joints shall be used when anticipated movement exceeds 5 inches and shall be designed and tested for fatigue loading.

Developer shall minimize the number of deck joints wherever possible. Developer shall locate joints to provide for maintenance accessibility and future replacement. Joints for all grade separation structures shall be sealed.

To the extent possible, Developer shall make bridge superstructures, joints, and bearings accessible for long-term inspection and maintenance. 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 to the Handback Requirements.

Steel and concrete box girders and caps (substructure) shall be accessible without impacting traffic below. Developer shall make steel and concrete box girders and caps (substructure) with a minimum inside depth of six (6) feet to facilitate interior inspection. Developer shall include a minimum access opening of 3'-0" diameter into all cells, and between cells, of the girders to allow free flow of air during inspections. The outside access opening cover shall hinge to the inside of the box girder and caps (substructure). An electrical system (110V and 220V) shall be incorporated inside the box girder and caps (substructure) with lighting and power outlets. Developer shall install air-tight sealed and locked entryways on all hatches and points of access.

Segmental bridges shall additionally conform to the following:

a) Segmental bridge decks shall use deck protection systems to prevent infiltration of corrosive agents into reinforcing in the superstructure. The deck protection system used shall be such that cracking is minimized and adequate bond strength is developed with the superstructure.

b) If monolithically cast overlay is used as part of the deck protection system, the Developer shall develop fully engineered design guidelines for the thickness of the monolithic concrete removed and replaced in a manner that keeps distress and changes in surface profile at the time of concrete removal to levels that do not reduce the structural integrity of the structure.

c) All expansion joints shall be sealed or drained. External tendons, if used, shall be protected with a water-tight duct jointing system.

d) The design, detail and construction of segmental bridges shall provide for the easy addition of supplemental post-tensioning.

13.2.4 Bridge Substructures

Integral abutments, where the superstructure is structurally framed (either completely or partially) into the abutment, shall not be permitted. Mechanically Stabilized Earth (MSE) walls shall not serve as structural foundations for bridges on the Project and shall not be subjected to vertical loads from the bridges. Bridge approach slabs shall be designed and constructed to mitigate settlement immediately behind abutment backwalls.

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

Spread foundations are not allowed.

13.2.5 Retaining Walls

The type of wall shall not be restricted to those typically used by TxDOT. Other types and components may be used, but will be allowed only if:

a) They have been accepted for general use by FHWA; and

b) Developer can demonstrate that the design of the wall type and components shall meet the functional requirements of the Project.

Modular walls employing interlocking blocks shall not be used where surcharge loads from vehicular traffic are present.

The design of wall structures shall take into account live load surcharges. The Developer shall apply the appropriate live loading condition (vehicular, heavy rail, transit etc.) that each wall is subjected to. These live load surcharges shall be based on the latest AASHTO *LRFD Bridge Design Specifications*, American

Railway Engineering and Maintenance of Way Association (AREMA) specifications, or the requirements of the specific railroad and transit owner/operator, as appropriate.

Structural integrity of retaining walls shall be inspected and monitored in accordance with Good Industry Practice. Tolerances and mitigation measures shall be in accordance with the Maintenance Management Plan and Good Industry Practice.

Avoid perching walls on top of slopes to the extent possible. The retaining wall geometry and material shall ensure slopes can be maintained above and below the wall.

To the extent possible, Developer shall design and construct components of the Initial and Ultimate Configuration to provide embankments without the use of retaining walls. Where earthen embankments are not feasible, Developer may use retaining walls. These retaining walls shall be located and designed such that the Ultimate Configuration can be implemented, unless specified otherwise, with little to no rework or impact on traffic. The Initial foundations shall be designed and constructed to include any additional height and weight associated with the Ultimate Configuration.

Metal walls, including bin walls and sheet pile walls, recycled material walls and timber walls are not allowed except as temporary shoring during construction.

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.

13.2.6 Noise/Sound Walls

Developer shall design and construct the noise/sound walls to achieve the decibel reduction requirement in the NEPA Approval(s).

Panel design and construction shall limit the risk of falling debris resulting from traffic impacting the sound wall.

Timber sound walls are not allowed.

13.2.7 Drainage Structures

In developing the design of drainage structures, Developer shall account for maximum anticipated loadings in both the Initial Configuration and Ultimate Configuration. See Section 12 for additional information.

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

13.2.8 Sign, Illumination, and Traffic Signal Supports

For bridges and walls longer than 500 feet, sign supports shall be provided at 500-foot intervals. The sign supports shall accommodate sign areas up to and including 16 square feet.

Developer shall design overhead sign supports to accommodate the Ultimate Configuration. Overhead sign supports shall be placed outside the clear zone or otherwise protected by appropriate safety measures. Overhead sign structures placed over bridges shall be supported at bents or use supports that are independent from the bridge.

13.2.9 Widenings

Developer shall complete a load rating and condition survey of existing structures to be widened. Ratings shall be based on current TxDOT procedures.

13.2.10 Structures to be Used in Place or Rehabilitated

For existing structures to be used in place or rehabilitated, Developer shall perform a pre-condition survey including the location, condition rating, remaining service life and recommended mitigation measures.

13.3 Construction Requirements

13.3.1 Specifications

All structural elements of the Project shall be construction according to the current TxDOT *Standard Specification for Construction and Maintenance of highways, Streets, and Bridges.*

13.3.2 Concrete Finishes

All concrete surfaces that do not have aesthetic treatments shall have a uniform texture and appearance. Color treatment, where required as an aspect of the aesthetic treatment of the concrete, shall be uniform in appearance.

13.3.3 Structure Metals

Welding shall be in accordance with the requirements of the current AASHTO/AWS D1.5 Bridge Welding Code.

13.3.4 Steel finishes

Except for weathering steel, all structural steel shall be protected. The color for structural steel paint shall conform to the aesthetic scheme of the Project.

If weathering steel is used, the Developer shall protect all components of the structure (superstructure and substructure) that are susceptible to corrosion and/or staining from weathering steel run-off.

14. RAIL

14.1 General Requirements

If the Project includes a rail corridor within the Project ROW, Developer shall prepare a geometric design for the rail corridor. Developer's PMP shall set forth an approach, procedures, and methods for the rail corridor design and construction meeting the requirements set forth in the CDA Documents.

14.2 Railroad Design Standards

The design for all railroad elements of the Project shall be based on the most recent American Railway Engineering and Maintenance of Way Association (AREMA) and the requirements of operating railroad. Developer's design shall minimize service interruptions to existing rail lines.

All work involving railroad companies, work on railroad Right of Way (ROW), and the development and execution of railroad programs shall be in accordance with State and federal law and the practices, guidelines, procedures and methods contained in the TxDOT *Traffic Operations Manual*, Railroad Operations Volume as amended per Attachment 14-1, *Amendments for the TxDOT's Traffic Operations Manual*, Railroad Operations Volume, February 2000. Additionally, the requirements of the owner of each facility crossed shall be compared to the requirements in the TxDOT manual, and the most restrictive criteria shall be utilized.

At highway-rail grade crossings, the roadway and drainage design parameters shall be maintained at the crossing with exception to the cross slope of the pavement which may be transitioned to match the grade across the rail line. The structural design of any Utilities, including drainage structures, installed by the Developer and crossing a rail line, shall be in accordance with the operating railroad's design criteria. Developer shall coordinate, design and construct the construction staging, including any shooflies, with the operating railroad.

Developer's design shall minimize service interruptions to existing rail lines.

14.2.1 Design Criteria

Unless otherwise approved by the operating railroad, the minimum vertical clearance as shown in Section 11(Roadways) shall be required over the entire railroad ROW with the Project limits.

Developer shall avoid placement of bridge columns or other structures inside railroad ROW to the extent possible. Any such placements inside railroad ROW require approval of the operating railroad. The Developer shall be responsible for attaining required approvals.

14.3 Administrative Requirements

14.3.1 Project Work Affecting Railroad Operations

Should the Project cross a railroad right of way owned by an operating railroad, Developer shall coordinate the Work with the operating railroad. The design and installation of all railroad warning devices and traffic signals shall be coordinated with the appropriate Governmental Entities and operating railroads.

14.3.2 Railroad Agreement

Developer shall be responsible for obtaining the required approvals, permits, and agreements as required for the Work, including any railroad related Work.

14.3.3 Agreement for Construction, Maintenance and Use of Right of Way

Whenever a license agreement for construction, maintenance, and use of railroad ROW (hereinafter called the "License Agreement") between the operating railroad and TxDOT is required, Developer shall prepare all the documentation required to obtain the License Agreement, including preparation of the License Agreement application on behalf of TxDOT, the Plans and specifications, making necessary modifications as required, and preparation of the License Agreement.

Developer shall submit the draft License Agreement to TxDOT for transmittal to the operating railroad. After all comments have been incorporated or satisfactorily resolved by either Developer, railroad or TxDOT, Developer shall submit a complete and final License Agreement to TxDOT for execution.

14.3.4 Operation Safety

Developer shall arrange with the operating railroad for railroad flagging as required. Developer shall comply with the operating railroad's requirements for contractor safety training prior to performing Work or other activities on the operating railroad's property.

14.3.5 Railroad Right of Entry Agreement

In order to enter the operating railroad's right-of-way to perform the Work, Developer shall secure a railroad Right of Entry Agreement and shall coordinate the arrangements of the necessary agreements directly with the operating railroad.

Executed railroad agreements in entirety, shall be submitted as part of the Final Design Documents.

14.3.6 Developer Right of Entry Agreement

Developer shall cooperate and coordinate with all operating railroads for access by the operating railroad and/or their agents to the rail ROW as necessary for rail maintenance and operations activities, inspection, repair and Emergency responses.

14.3.7 Insurance Requirements

Developer shall procure and maintain, prior to working adjacent to and entry upon operating railroad property, insurance policies naming TxDOT, TxDOT's Consultants, and railroad as named insured.

Developer shall obtain the following types of insurance:

1. Railroad Protective Liability Insurance Policy
2. Comprehensive General Liability Insurance
3. Contractors' Protective Liability Insurance.

All insurance policies shall be in a form acceptable to the operating railroad. Copies of all insurance policies shall be submitted to TxDOT prior to any entry by Developer upon operating railroad property.

14.4 Construction Requirements

Developer shall comply with all construction requirements and specifications set forth by the operating railroad.

Developer shall be responsible for scheduling the work to be completed by operating railroad as well as the work to be completed by its own forces. Developer shall be responsible for all costs associated with the railroad/transit force account work.

15. AESTHETICS AND LANDSCAPING

15.1 General Requirements

Aesthetics play a significant role in tolled facilities. As paying customers, motorists expect a higher standard for all Elements of the Project, including aesthetic value. This Section 15 defines requirements with which Developer shall design and construct aesthetic treatments for the roadway, structures, drainage, and landscaping Elements of the Project. Aesthetic treatments shall be designed to harmonize with the local landscape and architecture, as well as the developed themes of the local setting. Developer shall coordinate with local and State agencies to achieve this harmonization.

15.2 Administrative Requirements

This Section 15 presents minimum aesthetics and landscape design requirements for Project designs. For purposes of this Section 15, the following list of items will be considered the aesthetics Elements of the Project design:

a) Material, finish, color, and texture of bridge Elements
b) Materials, finish, and color of barriers and railings
c) Paved slope treatments
d) Finish, color, and texture of retaining and noise walls
e) Contour grading, slope rounding, channel treatments, and drainage
f) Sculptural and artistic features of other structures
g) Sidewalks, median or pedestrian specialty paving, including material, finish, and color
h) Hardscape at interchanges and intersections
i) Fencing
j) Signage – overhead, attached, and ground-mounted
k) Gantries
l) Any permanent building construction within the Project, including ancillary support, operational, and toll collections
m) Light fixture, ambient light colors and general layout conditions

15.2.1 Aesthetics Concepts

Aesthetic elements shall be designed as corridor-wide enhancements. To the extent practicable, the aesthetic elements shall remain consistent in form, materials, and design throughout the length of the Project where applied.

Developer shall use the Design Guidelines for the Construction of Highways, Streets, & Bridge, Houston District as the basis for the development of the Aesthetics on the Corridor. Known as the Green Ribbon Project Guidelines. Developer shall use the Wave concept provided in these guidelines as the concept. Developer shall prepare one (1) aesthetics concept of the Project that provides a design intent of as specified in the Wave concept of the Green Ribbon Project Guidelines for presentation to local communities and Customer Groups. It shall be understood that this concept may need to be adapted to site specific conditions. Developer shall base this presentation on the principles, requirements, and strategies provided in Section 15.3 (Design Requirements). Before presenting the aesthetics concepts to the public, Developer shall meet and review the proposed aesthetics concepts with TxDOT. After meeting with the public, Developer shall prepare a final aesthetic concept and submit it to TxDOT for approval within 60 Days of issuance of NTP1. The approved aesthetic concept shall be incorporated into the Aesthetics and Landscaping Plan for TxDOT approval.

15.2.2 Aesthetics and Landscaping Plan

Developer shall prepare an Aesthetics and Landscaping Plan(s) in conformance with the Project's final aesthetic concept which provides guidelines and requirements for the aesthetics design of the Project. Developer shall submit the Aesthetics and Landscaping Plan(s) to TxDOT for review and approval in its good faith discretion within 120 Days of issuance of NTP1. Approval of the Aesthetics and Landscaping Plan(s) shall be a condition of NTP2.

The Aesthetics and Landscaping Plan(s) shall include all elements to fully communicate the proposed aesthetic treatment to TxDOT and shall address:

- Aesthetics

a) All plans, sections, elevations, perspectives, isometrics, etc., as needed to fully communicate the aesthetic treatment and approach to aesthetic Elements including: walls, noise walls, bridges, traffic rail, and signage structures.

b) A master plan that will convey the layout of the various roadway conditions (i.e. depressed sections, elevated sections, at-grade roadways, bridges, cantilevered structural sections, etc.)

c) Drawings showing locations of site specific elements (i.e. fences, signage, colored lighting, potential locations of community involvement improvements, etc.)

d) Drawing showing the location of Utilities as they relate to the location of aesthetic improvements. Developer shall provide composite drawings showing potential conflicts for proposed improvements.

e) Color schemes and their locations.

- Landscape

a) A plan that indicates plant palettes, locations of plants, plant types, and planting dates.

b) A maintenance program.

c) Composite drawings of all utilities and easements that would interfere with landscaping, markers, or any other identified enhancements.

This Aesthetics and Landscaping Plan(s) shall be presented in the following format:

a) 11x17 format

b) Front sided only

c) Eight paper copies, in color

d) Eight CD copies, with guidelines in portable document format (PDF)

e) Eight CD copies with a 3D animation of the Project corridor. The animation shall provide a drive through the entire corridor. The animation shall have a visual drive through of the General Purpose Lanes, Toll Lanes and Managed Lanes, as appropriate.

   At a minimum the animation will show the following components:

   - Textures and colors
   - Aesthetic concepts as provided by the Developer
   - Form, shapes, and scale
   - Ramp conditions

- Landscaping
- Roadway conditions as per the engineered solution

The Developer shall prepare this animation as part of the Aesthetic and Landscaping Plan. The video shall focus on aesthetic treatment and final appearance.

The Aesthetics and Landscaping Plan(s) shall be incorporated into the final engineering design.

TxDOT approval of the Aesthetics and Landscape Plan(s) is required prior to construction of any Elements affected by the Plan.

The Aesthetics and Landscaping Master Plan shall be in accordance with the Green Ribbon Project Guidelines. The concepts produced shall follow the Wave Pattern.

15.2.3 Personnel

Developer shall provide a Landscape Architect, registered in the State of Texas, with a minimum 5 years experience in designing aesthetics and landscaping Elements for roadway projects of similar scope and size, to develop the Aesthetics and Landscaping Plan. The Landscape Architect shall remain involved from beginning of the Aesthetics and Landscaping Plan, through construction to ensure continuity and compliance with the Green Ribbon Project Guidelines.

15.3 Design Requirements

15.3.1 Aesthetics Principles and Strategies

Developer shall follow the guidelines and requirements of the approved Aesthetics and Landscaping Plan, as well as the aesthetics principles, requirements, and strategies established by TxDOT for the Project design, including the following:

- Aesthetics shall not interfere with safety, constructability, and maintenance requirements.
- The Project design shall minimize impact on the existing natural environment to the extent possible.
- The Project design shall emphasize and enhance the existing natural context and landscape to the fullest extent possible.
- Simple geometric shapes for structures shall be used to the extent possible for continuity along the entire length of the Project.
- All bridges and other structures shall be simplified in their design, and to the greatest extent possible kept small in size, bulk, and mass.
- All structures shall be carefully detailed so as to achieve the greatest level of aesthetic quality and fit within the regional context.
- Color, texture, and form shall be used appropriately for all structures.
- Graphics, signage, and lighting shall be consistent along the entire length of the Project.
- Existing trees and natural features shall be preserved and/or replaced if disturbed to the greatest extent possible.
- Aesthetics Elements shall be fully integrated with the overall landscape design.
- Visual quality of the landscape shall be consistent along the entire length of the Project.
- Native-area and/or naturalized plant materials that exhibit good drought tolerance shall be used to the extent possible.
- Aesthetic Elements shall be easy to maintain and resistant to vandalism and graffiti.

15.3.2 Walls

Developer shall design noise/sound walls to be similar in color, texture, and style to those of retaining walls, and shall develop an aesthetics treatment that is consistent with the Green Ribbon Project Guidelines.

Developer shall apply aesthetic treatments to the vertical surfaces of retaining and noise/sound walls where the surface is visible from the roadway or adjacent houses. Consistent treatments shall be used for retaining and noise/sound walls that articulate the design themes established for the Project.

Developer shall pay special attention to aesthetic design Elements and utilize high aesthetic quality of finishes and materials at interchanges and approaches to toll collection points.

The Developer shall clearly detail and identify how wall patterns shall be incorporated into the chosen design solution.

The roadside face of noise walls shall have a consistent appearance throughout their length. The side of the noise walls facing away from the roadway may vary based upon community input gathered by the Developer.

15.3.3 Bridges and Other Structures

All aesthetic treatments for structural Elements shall be coordinated with Developer's structural design team to facilitate constructability and maintain safety requirements. All substructure columns shall be consistent in form and texture, with similar shapes and details used for all bridges, in accordance with the Projects aesthetics concept.

No exposed conduits or drain pipes will be allowed on bents, columns, bridge beams, retaining walls or any other visible surface.

Developer shall ensure that a constant superstructure depth is maintained throughout the bridge length for all bridges other than direct connection structures and braided ramps. For direct connection structures and braided ramps, concrete beam spans shall be of constant depth throughout the structure.

Developer shall not use varying shaped columns structures. All columns shall have the same form throughout the Project.

The following requirements apply to bridge abutments:

1. On all bridges that have sloped abutments and are visible to traffic, the Developer shall not be allowed to wrap concrete riprap around the bridge abutments. The concrete rip rap shall be limited to three feet past the limits of the bridge deck overhead. However, this requirement shall not be applicable to bridges spanning creeks.
2. The Developer may choose to use selected locations of the vertical abutment walls for art work, color, or any other aesthetic element at various locations as described in Attachment 15-1. This added enhancement can not change any form of concrete but may enhance designated areas with colors and textures.
3. The Developer shall provide the appearance of a symmetric design for bridges where possible.

15.3.4 Trees, Shrubs, and Other Plant Materials

All trees, shrubs, deciduous vines, and perennials shall comply with the applicable requirements of *ANSI Z60.1 American Standard for Nursery Stock*.

Developer shall consult with the agricultural extension agent of the applicable county and TxDOT for recommended plant species lists. Developer shall use plant species native to the area or naturalized for the Project Site.

In order to monitor and control weeds, Developer shall provide weed control measures in the Aesthetics and Landscape Plan.

Vegetation provided as a part of Developer's Aesthetic and Landscaping plan, other than grassing, and erosion control measures, shall be incorporated with the following guidelines:

- Trees, if used shall be placed in accordance with TxDOT's minimum clearance zones and shall be placed in the Project ROW between mainlanes and frontage roads. Trees shall be a minimum of six (6) feet high and shall have a three (3) inch caliper minimum. Developer shall coordinate with TxDOT on landscaping within the ROW.
- The mature canopy shall not overhang the travel lane or shoulder of any part of the roadway.

15.3.5 Riprap

Concrete paving shall be used in hard to reach mowing areas or under structures, such as, but not limited to, areas between, near, or next to guard fence posts, sign posts, bent columns, retaining walls, freeway ramp gores, paved ditches, flumes, and ditch inlets, to improve roadway appearance.

Concrete riprap shall be applied per the Green Ribbon Project Guidelines.

15.3.6 Lighting

Developer shall design the aesthetic enhancement lighting with the following aesthetic criteria:

- One pole type for the entire corridor during the DB Phase and, to the extent practicable, the Operating Period. Developer shall provide a lighting layout plan that addresses each light fixture (i.e. roadside lighting, high mast lighting, under bridge fixture, etc.) and type of light fixture (i.e. LED lighting, point source lighting, HID, etc.)

15.3.7 Color Pallet

As part of the Aesthetics and Landscaping Plan, Developer shall submit a plan that indicates where each color is to be applied. This plan can be diagrammatic in nature, but shall list each element and its colors. In addition to integrated colors, painting, and staining, Developer may use colored lighting in selected areas to add color.

Colored lighting shall be identified on the Aesthetics and Landscaping Plan and shall be incorporated into the overall engineered drawings. Developer shall ensure that all wiring, conduit, controllers, etc are not exposed. These items shall be buried, behind walls, or hidden from view.

15.4 Construction Requirements

Developer shall provide TxDOT sample panels a minimum of 60 Days in advance of starting construction of textured concrete surfaces. Developer shall construct sample panels in accordance with TxDOT *Standard Specifications for Construction and Maintenance of Highways, Streets, and Bridges* Item 427.4.B.2.d (Form Liner Finish) that comply with the principles, requirements, and strategies established by TxDOT and the approved Aesthetics and Landscaping Plan(s). TxDOT must review and approve the sample panels before any construction form liners may be ordered, obtained, or used. Developer shall provide sample equivalent to the size of the panels that will be installed when constructed with a representative un-textured surrounding surface.

The approved sample panel shall be the standard of comparison for the production concrete surface texture.

For textured panels or concrete surfaces finished with a coating of paint or stain, Developer shall prepare a corresponding coated panel or surface area of an in-place Element for approval prior to the coating operation.

Color samples shall be provided from the Federal Standard 595B Colors Fan Deck. All sample panels shall be representative of the actual panel that will be placed. Primary, secondary and accent colors shall be displayed.

15.5 Aesthetic Enhancements

The Developer shall provide adjacent Governmental Entities the opportunity to enhance aesthetic and landscaping features consistent with the requirements herein. The capital and maintenance costs of the adjacent Governmental Entity improvements (Aesthetic Enhancements) shall be the responsibility of the adjacent Governmental Entity. Developer shall coordinate the necessary arrangements directly with the appropriate local Governmental Entity for Aesthetic Enhancements within the local Governmental Entity's jurisdiction if so required by the Work.

Aesthetic enhancements shall be incorporated into the final aesthetic concept plan to be submitted to TxDOT for approval.

16. SIGNING, DELINEATION, PAVEMENT MARKING, SIGNALIZATION, AND LIGHTING

16.1 General Requirements

This Section 16 includes requirements with which Developer shall design, construct, operate, and maintain all signing, delineation, pavement markings, signalization, and lighting, for the Project unless stated otherwise in the CDA Documents. Developer shall be responsible for the cost of power to all signs, traffic signalization, and illumination for the Project unless stated otherwise in the CDA Documents.

16.2 Administrative Requirements

16.2.1 Meetings

Developer shall arrange and coordinate all meetings with local agencies that will assume responsibility for maintaining and operating traffic signals and roadway lighting. Developer shall provide TxDOT with notification of such meetings a minimum of 48 hours prior to the start of the meeting. TxDOT, in its discretion, may attend such meetings.

Developer shall arrange and coordinate all meetings with requesting agencies or individuals regarding special signs.

16.3 Design Requirements

The Developer shall design all signing, delineation, pavement marking, and signalization in accordance with the Texas Manual on Uniform Traffic Control Devices (TMUTCD), TxDOT's *Standard Highway Sign Design for Texas* (SHSD), TxDOT's Traffic Engineering Standard Sheets, and TxDOT specifications. The Developer shall design all illumination in accordance with the TxDOT's *Highway Illumination Manual* (HIM), National Electric Code (NEC), AASHTO *Roadway Lighting Design Guide*, TxDOT's Traffic Engineering Standard Sheets, and TxDOT specifications.

16.3.1 Final Design

Developer shall advance the Final Design of the signing, delineation, pavement marking, signalization, and lighting based on the preliminary operational signing schematic received with the Proposal. If a preliminary operational signing schematic does not exist, Developer shall prepare and submit a preliminary operational signing schematic for review and approval by TxDOT and Federal Highway Administration (FHWA) prior to commencing Final Design. Before placing any signs, delineation, advance toll warning signs, third party signs, non-standard sign structures, pavement markings, traffic signals, and lighting, Developer shall provide TxDOT a layout indicating the proposed location of such items.

16.3.2 Signing and Delineation

Developer shall design and install all signs as shown on the Final Design. Signs include new signs, as well as modifications to existing sign panels and structures. Developer's design shall include the locations of ground-mounted and overhead signs, graphic representation of all signs, proposed striping, delineation placement, guide sign and special sign details, and structural and foundation requirements. Signs shall be located in a manner that avoids conflicts with other signs, vegetation, dynamic message signs (DMS), lighting, and structures.

Developer shall ensure that signs are clearly visible, provide clear direction and information for users, and comply with all applicable TMUTCD requirements.

Developer shall review with TxDOT all requests for new signs, including traffic generators, or modifications of existing sign text. Such requests are subject to TxDOT's approval.

Developer's design of delineators and object markers shall comply with TMUTCD requirements.

Signs shall meet the requirements of TxDOT's SHSD.

Developer's design shall incorporate the following requirements:

- Minimum size for all the proposed warning signs shall be 36"x36".
- Install warning signs W19-2 (48"x48") "WATCH FOR ICE ON BRIDGE" in advance of all bridges.
- Use R3-7R "RIGHT LANE MUST TURN RIGHT" and R3-7L "LEFT LANE MUST TURN LEFT" signs where required. Do not use R3-5R or R3-5L "Arrow and ONLY" signs.
- Install object markers OM-2Y under the route marker assembly located at the entrance ramp gore between the frontage road and mainlanes.
- Install object markers OM-1 on each leg of large ground mounted signs where the signposts are not protected by concrete barrier or metal beam guard fence, similar to the exit sign at the exit gore.
- Install appropriate added lane sign W4-R (48"x48") or merge sign W4-1R (48"X48") on the mainlanes of the freeway in advance of each entrance ramp.
- Install advisory exit speed limit sign W13-2 (48"x60") on the mainlanes in advance of each exit ramp.
- Design guide sign details according to the Standard Highway Sign Designs for TxMUTCD and TxDOT standard drawings "Typical Sign Requirements", TSR (1)-08 through TSR (5)-08.
- Use the B-3 arrow for overhead guide sign panel at the exit ramps.
- Design all overhead sign structures for Zone 1, 100 mph wind zone.
- All proposed signs installed on overhead sign structure facing same direction of traffic shall have the same height, except for supplemental overhead speed limit signs (which are 72"x90").
- Center all proposed overhead sign panels on the overhead sign structure truss.
- The bottom of the proposed overhead sign panels facing the same direction of traffic shall be on the same horizontal plane.
- All the small signs shall be Aluminum Type A.
- Design all large ground mounted signs for Zone 1 (Type 100) which is 90 mph wind zone. (See TxDOT drawing "Roadside Guide Sign Post Selection Worksheet-SMD (8W1)).
- All overhead sign panels shall be extruded aluminum.
- All large ground mounted signs shall be extruded aluminum.

16.3.2.1 Project Signs – Outside the Project ROW

For signs located outside the Project ROW but within a public ROW, Developer shall install the signs in existing rights-of-way controlled by local or other State agencies. Developer shall coordinate with appropriate Governmental Entities for the design, installation and maintenance of such signs.

16.3.2.2 Advance Toll Information Signs

Developer shall design, install, operate, and maintain advance toll information signs in accordance with TxDOT Standards. For advance toll information signs, Developer shall be responsible for determining sign locations and foundation types, and design and installation of the new signs. No later than twelve

(12) months before the start of construction of the toll collection system, the Developer shall submit to TxDOT for review and approval a preliminary advance toll information signing schematic identifying the proposed locations and details (including wording) of all advance toll information signs. The advance toll information signs shall be coordinated with other Project signs. Signs shall be located to provide maximum visibility to Users and situated prior to all entrance ramps and locations providing User access to the Project adjusted as necessary for Project specific requirements. In addition, the signs shall consist of static panels, and if any sign element varies periodically (e.g. toll rate amount), variable LED-based displays designed, installed and operated as necessary for Project specific requirements.

Developer shall coordinate with all local toll entities in the area and shall use Good Industry Practice in determining the locations for advance toll information signs.

Developer shall meet or exceed all existing applicable federal Manual on Uniform Traffic Control Devices (MUTCD) and TxDOT MUTCD (TMUTCD) standards and sanctioned guidelines for toll related signs. Developer shall meet or exceed all future applicable federal and TMUTCD standard and sanctioned guideline changes within the mandated compliance period.

The Developer shall prepare and submit to TxDOT, as part of the Final Design Documents, an Advance Toll Information Sign plan that includes all the signing components related to Toll Lanes.

16.3.2.3 Third-Party Signs

In addition to the warning, regulatory, and guide signs within the Project ROW, TxDOT or Governmental Entities may request that third-party signs, including logo signs, be installed by a third party. Developer shall coordinate and cooperate with any third party performing such work. TxDOT may solicit input from Developer in reviewing applications for new third-party signs, but will retain sole authority for approving installation of these signs. All costs associated with fabricating and installing these signs shall be borne by the sign applicant. If approved by TxDOT, TxDOT may require Developer to fabricate and/or install these signs as a TxDOT-Directed Change.

16.3.2.4 Sign Support Structures

Developer shall determine foundation types and design sign foundations based upon geotechnical surveys/tests using Good Industry Practices. Designs for sign supports shall also comply with requirements in Sections 13 (Structures) and 15 (Aesthetics and Landscaping).

Developer shall design sign support structures to provide a vertical clearance of not less than 21ft between the roadway and the bottom of the sign.

Developer's design shall also incorporate the following requirements:

- All overhead sign structures towers shall be concrete with the standard truss as shown on standard sheets. Coordinate the overhead sign structure elevation details with the overhead sign structure concrete column design.
- All of the overhead sign structure towers installed on bridge structures shall be steel pipe with the standard truss as shown on standard sheets.

16.3.3 Pavement Marking

Developer shall ensure that the design and installation of all pavement markings comply with applicable TMUTCD requirements and TxDOT's Traffic Engineering Standard sheets.

Developer shall mark median noses of all raised islands and inside edges of exclusive turn lanes (channelized curbs) in accordance with the requirements of TMUTCD and TxDOT's Traffic Engineering Standard sheets.

Developer shall use contrast markings for skip lines on the controlled access main lanes where light-colored pavement does not provide sufficient contrast with the markings. Contrast markings consist of black background in combination with standard TMUTCD marking colors.

Developer's design shall also incorporate the following requirements:

- Painted or thermoplastic longitudinal pavement markings shall not be used on mainlanes and frontage roads.
- All pavement markings on frontage roads and mainlanes shall be Multipolymer Pavement Markings, except mainlane lane lines, words, symbols, and shields.
- Mainlane lane lines shall be 12" contrast Prefabricated Pavement Markings with Warranty (6" white with 3" black on each side).
- All word, symbol, and shield pavement markings shall be Prefabricated Pavement Markings Type C.
- Frontage road lane line pavement markings shall be 6" Multipolymer Pavement Markings with shadow.
- All edge lines on the mainlanes and frontage roads shall be 6" pavement markings.
- Paint all median noses and exclusive left turn lane curbs with reflective pavement markings (Type II).
- Pavement marking shields, cardinal direction (WEST, EAST, NORTH, SOUTH), and arrows shall be used on the mainlanes approaching major interchanges to identify exiting and through traffic lanes. Install these pavement markings within approximately one mile of the interchange.
- All signing and pavement markings at the exit ramps and frontage roads shall be according to standards ER-FR (1)-09 or ER-FR (2)-09. Exit gore pavement markings shall not require 12" diagonal pavement markings as shown on FPM (1)-12 through FPM (4)-12. Exit gore pavement markings on mainlanes shall include exit number gore markings that match the exit number as shown on standard PM (4)-12.

16.3.4 Signalization

Traffic signal designs and modifications to existing traffic signals shall be completed in accordance with the current TxDOT standards and specifications, the TMUTCD, and the requirements of the appropriate Governmental Entity.

TxDOT authorized intersections requiring permanent traffic signals are:

- SH 288 Frontage Roads at Southmore
- SH 288 Frontage Roads at Holly Hall

16.3.4.1 Traffic Signal Requirements

Developer shall design and install fully-actuated permanent traffic signals at all TxDOT-authorized intersections within Project limits. In addition, Developer shall modify, as appropriate, any existing traffic signals impacted by the Final Design. Developer shall coordinate with TxDOT and the appropriate Governmental Entities to define appropriate traffic signal design requirements, local agency oversight of Developer's Work, and final acceptance of traffic signals. Developer shall coordinate with the appropriate Governmental Entities for synchronization of traffic signal networks.

Developer shall provide interconnection systems between new or modified signals and any other signal system within the Site as required by TxDOT or the appropriate local Governmental Entity. Developer

shall make existing signal systems compatible with the proposed interconnections. Developer shall ensure continuous communication with the traffic signal system within the Site, and shall provide all communication hardware/equipment for TxDOT or the appropriate local Governmental Entity to communicate with the signal systems within the Project Site.

New or modified traffic signal equipment shall conform to the regional Intelligent Transportation System (ITS) architecture and existing interconnected traffic signal systems.

Developer shall provide both pedestrian and vehicle detectors at all traffic signals within the Project Site and shall comply with TxDOT's *Accessible Pedestrian Signal (APS) Guidelines*.

Developer is responsible for preparing traffic signal agreements (or supplements thereto) for execution by TxDOT and the appropriate Governmental Entity having operation and/or maintenance responsibilities. Except for traffic signal systems excluded by agreement, Developer shall be responsible for the operations and maintenance of all traffic signal systems for the Term of the Agreement.

Developer's design shall also incorporate the following requirements:

- Use Type D ground boxes.
- Traffic signal heads shall be black polycarbonate housing and with black backplates installed
- Vehicular signal indications shall be 12" LED.
- Pedestrian signal heads shall be LED and have countdown indications.
- Locate signal cabinets between the frontage roads between the columns of the mainlane overpass. Located on the CTMS-cabinet side, if present.
- Single left turn lane to have single 4-section signal head with "<R <R <Y <G" centered over left turn lane.
- Dual left turn lanes to have two 3-section signal heads with "<R <Y <G" centered over each left turn lane.
- Through signal heads are to be 3-section signal head closest to the stop bar of the one-way frontage R Y G" centered over each through lane for two through lanes and on the lane lines for three or more through lanes.
- For the cross street approaches, the 3-section signal closest to the stop bar of the one-way frontage road shall have an R6-1L (R) "one way" sign mounted beneath it.
- For dual left turn lanes on the cross streets, provide an R3-8 VAR lane assignment sign on the mast arm.
- Use loop detectors for vehicle detection.
- For electrical services greater than 300' in distance from the controller, provide a Type T service at the controller as an electrical service disconnect.
- Show luminaires on top of signal poles (two for each frontage road direction). Use LED luminaires.
- Use 1/C #4 XHHWfor all power cable.
- Use 1/C #4 bare for grounding of all conduits containing power cable.
- Use 1/C #6 bare for grounding of all conduits containing non-power cable.
- Use 2/C #14 AWG Type C for all loop detector cable.
- Use 25 PAIR -#22 AWG for copper interconnect, where applicable.
- Use 12 STRAND (SM) for fiber interconnects, where applicable.
- Use Schedule 80 for all PVC conduits.

- Use rigid metal conduit between all ground boxes and signal/pedestal poles.
- Use rigid metal conduit between all ground boxes and controllers.
- Use rigid metal conduit between all ground boxes and electrical services.
- Minimum 3" conduit for bores or conduit beneath proposed pavement.
- Run power cable in separate conduit with separate ground boxes.
- Run signal cable in separate conduit.
- Run 4/C #12 TRAY cable for safety lighting in same conduit as signal cable.
- Illumination cable to bypass the controller.
- Use 2/C #12 AWG Type A for all pedestrian pushbutton cable.
- Use 4/C #12 AWG Type A for all pedestrian signal head cable.
- Use 7/C #12 AWG Type A for all traffic signal head cable.

16.3.4.2 Traffic Signal Timing Plans

Developer shall design signal timing plans for all new and modified traffic signals and shall submit to TxDOT for review. Developer shall coordinate and implement signal timing plans that optimize traffic flows and provide signal coordination with adjacent intersections and arterials for all existing and new traffic signals, modified signals, and interconnected signals. Unless timing maintenance is otherwise provided by a Governmental Entity, Developer shall be responsible for updating signal timing as necessary to maintain optimized flow signal timing and phasing plans at diamond interchanges shall conform to the coordinated signal phasing and timing of the corridor.

Developer shall provide copies of all final implemented signal timing plans.

16.3.4.3 Traffic Signal Warrants

As part of the Final Design process, Developer shall collect traffic data and prepare traffic warrant studies for intersections not signalized at the time of NTP1 and shall submit these signal warrant studies to TxDOT for review. The warrant studies shall address all signal warrant criteria in the TMUTCD. Developer shall make recommendations for new signal installations based on these warrant studies in consultation with TxDOT and the appropriate Governmental Entities. TxDOT will reasonably determine if a signal or modification is required, based upon the warrant study.

All requests for signals within the Project ROW throughout the Term of the Agreement shall be subject to TxDOT approval.

Signal warrant studies shall be based on actual traffic and/or opening year traffic projections. If actual traffic volumes are not available, but opening year traffic is available, Developer shall use the procedure in Section 3.5 of the TxDOT *Traffic Signals Manual* to determine the volumes to be analyzed. If opening year traffic volumes are not available, opening year traffic volumes shall be calculated by applying a 50-percent reduction to the Design Year traffic projections. Developer shall conduct additional traffic signal warrant studies for all intersections located in the Project ROW, commencing six months after the Project is opened for traffic. Developer shall conduct additional traffic signal warrant studies for all intersections located in the Project ROW, every other year starting after the Project is opened for traffic throughout the Term of the Agreement. If additional signals or modifications to existing signals are warranted, based on the traffic volumes obtained through these studies, Developer shall be responsible for installation of additional traffic signals or modification of previously-installed traffic signals. If, based on the above traffic counts, the need for a signal or signal modification is unclear, TxDOT will reasonably determine if the new signal or signal modification is required.

16.3.4.4 Traffic Signal Support Structures

Developer shall coordinate with TxDOT and the appropriate Governmental Entities to determine the type of traffic signal support structures. Developer shall obtain the maintaining Governmental Entities' approval of traffic signal support structures to be used on new signal installations. Designs for traffic signal support structures shall also comply with requirements in Sections 13 (Structures) and 15 (Aesthetics and Landscaping).

16.3.4.5 Traffic Signal Systems

Developer shall provide interconnection systems between new or modified signals and any other signal system within one mile of the Project Site as required by TxDOT or the appropriate Governmental Entity. Developer shall make existing signal systems compatible with the proposed interconnections. Developer shall ensure continuous communication with the traffic signal system within the Project Site, and shall provide all communication hardware/equipment for TxDOT or the appropriate Governmental Entity to communicate with the signal systems within the Project Site.

Developer shall coordinate with TxDOT and the appropriate Governmental Entities to determine the type of traffic signal support structures. Developer shall obtain the maintaining Governmental Entities' approval of traffic signal support structures to be used on new signal installations.

Developer shall provide to TxDOT, as part of the Final Design Documents, an Acceptance Test Plan (ATP) for all traffic signals. This ATP shall also be submitted to the appropriate Governmental Entity. The Developer shall conduct testing in accordance with the ATP and document those results to show conformance.

16.3.5 Lighting

Developer shall provide conventional or high mast roadway lighting along SH 288 between the existing high mast north of Southmore Blvd to south of Yellowstone Blvd within the Project limits. Developer shall relocate existing high mast within the Project limits as needed to accommodate the design.

Developer shall prepare lighting studies that consider illumination levels, uniformity, and sources for the roadways, interchanges, and special areas. Developer shall maintain an average horizontal luminance on the roadways as described below. Developer shall the photometric data results for all lighted areas within the Project limits to TxDOT for review.

All third-party requests for lighting within the Project Site shall be subject to TxDOT approval.

Developer shall provide an average to minimum uniformity ratio of 3.1, with a minimum lux of 1.85 and an average lux of 6.5 to 8.6 on all traveled roadways to be illuminated. Traveled roadways include: Toll Lanes, General Purpose Lanes, HOV lanes, auxiliary lanes, ramps, Frontage Roads, and ramp terminal intersections with cross streets.

Developer shall design the lighting system to minimize or eliminate illumination of areas outside the Project ROW. Developer shall design continuous and safety lighting systems in accordance with Chapters 5, 6, 7, and 9 of the TxDOT *Highway Illumination Manual*.

Luminaire poles and breakaway bases shall be designed in accordance with AASHTO's *Standard Specifications for Structural Supports for Highway Signs, Luminaires, and Traffic Signals*. For all poles located within the clear zone of the roadways, Developer's design shall incorporate breakaway devices that are pre-qualified by TxDOT.

Developer shall place all understructure lighting in a configuration that minimizes the need for lane closures during maintenance.

Developer shall determine and design appropriate foundation types and lengths for permanent lighting structures.

Developer shall not place ITS cable, fiber-optic lines, signal conductors, or any other non-lighting related cables or conductors in the lighting conduit, ground boxes, or junction boxes.

Developer shall minimize the potential hazards of lighting poles through the careful consideration of mounting options and pole placements, including the following options:

- Placing mast arms on traffic signal poles
- Placing pole bases on existing or proposed concrete traffic barrier
- Placing poles behind existing or proposed concrete traffic barrier or metal beam fence
- Placing high mast lighting outside the clear zone, especially in roadway horizontal curves

Developer shall ensure that lighting structures comply with FAA height restrictions near airport facilities. In the event that proposed or existing luminaires, mast arms, or poles infringe into an airport's or heliport's base surface, Developer shall coordinate with the FAA and TxDOT to permit or relocate such structures. If FAA restrictions prohibit lighting structures from being placed in certain areas near an airport facility, Developer shall find alternative ways of providing the required level of lighting.

Developer shall provide to TxDOT, as part of the Final Design Documents, an Acceptance Test Plan (ATP) for all illumination. This ATP shall also be submitted to the appropriate Governmental Entity. The Developer shall conduct testing in accordance with the ATP and document those results to show conformance.

Developer's design shall also incorporate the following requirements:

- High-mast lighting must not infringe into residential areas adjacent to the Project ROW.
- Developer must coordinate with the FAA regarding installation of obstruction lights, if any, on a case-by-case basis.
- At a minimum, underground conduit shall be Schedule 80 polyvinyl chloride (PVC) in interchange areas or temporary detours and shall not be less than 2" in diamater; all other underground conduit installations shall not be less than 2" or Schedule 40 PVC.
- The minimum conductor size shall be #8 AWG copper on roadway and #12 AWG on underpass lights. Developer shall not use duct cable for illumination purposes.
- Developer shall place bridge lighting brackets no more than 10 feet from abutments or bents; however, in special circumstances, the bridge lighting brackets may be placed a maximum of 20 feet from abutments and piers.
- Non-standard light pole design shall be submitted to TxDOT for approval. For light poles with a base 25' above the elevation of surrounding terrain, Developer shall electronically submit design calculations and shop drawings to TxDOT, Bridge Division.
- Minimum inside dimensions for ground boxes shall be 15.25 inches (width) by 28.25 inches (length) by 20 inches (depth).
- Ground box covers shall be 2-inch-thick (nominal), nonconducting material and labeled "Danger High Voltage Illumination".
- Riprap aprons shall be provided to ground boxes located in grassy areas.
- Lights shall have an identification tag denoting a contact person or office in case of Emergency or for maintenance, and the address and telephone number.
- Electrical part of the installation shall be designed and installed in conformance with the National Electrical Code (NEC), TxDOT Standards and Specifications.

16.3.6 Visual Quality

Notwithstanding the requirements of Section 16.3.4 (Signalization), Developer shall make a reasonable attempt to provide luminaires of equal height along the roadway.

Developer shall not use timber poles for permanent installation.

Developer shall re-sod or re-seed areas of construction disturbed by the installation of signs, traffic signal systems, or lighting systems after final installation.

16.4 Construction Requirements

16.4.1 Permanent Signing and Delineation

Developer shall use established industry and utility safety practices to erect and remove signs located near any overhead or underground utilities, and shall consult with the appropriate Utility Owner(s) prior to beginning such Work. Developer shall stake each sign location in the field and provide TxDOT 72 hours notice prior to installation of any sign.

Developer shall leave all applicable advance guide signs and/or exit direction signs in place at all times and shall not obstruct the view of the signs to the motorist. Developer shall replace any other removed signs before the end of the work day.

Developer shall affix a sign identification decal to the back of all signs for inventory purposes and shall submit inventory information to TxDOT in a TxDOT-compatible format.

All installed signs are required to meet the minimum retro-reflectivity values specified in TMUTCD Table 2A-2.1 (Minimum Maintained Retroreflectivity Levels).

Table 16-2: Retroreflectivity Values

Sign Colors	Sheeting Type (ASTM D4956-04)				Additional Criteria
	I	II	III	VII, VIII, IX	
White on Green	W*; G _	W*; G 15	W*; G 25	W 250; G 25	Overhead
	W*; G 7	W 120; G 15			Ground-mounted
Black on Orange or Black on Yellow	Y*; O*	W _50; G 50			See Note 1
	Y*; O*	W 75; G 75			See Note 2
White on Red	W 35; R 7				See Note 3
Black on White	W 50				—

Notes:
The minimum maintained retro-reflectivity levels shown in this table are in units of candelas per lux per square meter (cd/lx/m2), measured at an observation angle of 0.2° and an entrance angle of -4.0°.
1 For text and fine symbol signs measuring at least 1200 millimeters (mm) (48 inches) and for all sizes of bold symbol signs
2 For text and fine symbol signs measuring less than 1200 mm (48 inches)
3 Minimum Sign Contrast Ratio _ 3:1 (white retroreflectivity ÷ red retroreflectivity)
* This sheeting type should not be used for this color for this application.

Bold Symbol Signs

W1-1, -2 – Turn and Curve	W3-1 – Stop Ahead	W11-2 – Pedestrian Crossing
W1-3, -4 – Reverse Turn and Curve	W3-2 – Yield Ahead	W11-3 – Deer Crossing
W1-5 – Winding Road	W3-3 – Signal Ahead	W11-4 – Cattle Crossing
W1-6, -7 – Large Arrow	W4-1 – Merge	W11-5 – Farm Equipment

W1-8 – Chevron W1-10 – Intersection in Curve W1-11 – Hairpin Curve W1-15 – 270 Degree Loop W2-1 – Cross Road W2-2, -3 – Side Road W2-4, -5 – T and Y Intersection W2-6 – Circular Intersection	W4-2 – Lane Ends W4-3 – Added Lane W4-5 – Entering Roadway Merge W4-6 – Entering Roadway Added Lane W6-1, -2 – Divided Highway Plaques Begins and Ends W6-3 – Two-Way Traffic W10-1, -2, -3, -4, -11, -12 – Highway-Railroad Advance	W11-6 – Snowmobile Crossing W11-7 – Equestrian Crossing W11-8 – Fire Station W11-10 – Truck Crossing W12-1 – Double Arrow W16-5p, -6p, -7p – Pointing Arrow Plaques W20-7a – Flagger W21-1a – Worker
Fine Symbol Signs – Symbol signs not listed as Bold Symbol Signs		
Special Cases W3-1–Stop Ahead: Red retroreflectivity, 7 W3-2–Yield Ahead: Red retroreflectivity, 7, White retroreflectivity, 35 W3-3–Signal Ahead: Red retroreflectivity, 7, Green retroreflectivity, 7 W3-5–Speed Reduction: White retroreflectivity,_50 For non-diamond-shaped signs such as W14-3 (No Passing Zone), W4-4p (Cross Traffic Does Not Stop), and W13-1, -2, -3, -5 (Speed Advisory Plaques), use largest sign dimension to determine proper minimum retroreflectivity level.		

16.4.2 Permanent Pavement marking

Developer shall meet the following minimum retroreflectivity values for edge line markings, centerline/no passing barrier-line markings, and lane line markings when measured anytime after three (3) days but not later than ten (10) days after application:

a) Type I, Thermoplastic, Pavement Markings:

- White markings: 250 millicandelas per square meter per lux (mcd/m2/lx)
- Yellow markings: 175 mcd/m2/lx

b) Type II, Paint & Beads, Pavement Markings:

- White markings: 175 mcd/m2/lx
- Yellow markings: 125 mcd/m2/lx

16.4.3 Permanent Signalization

Developer shall coordinate with the Utility Owner(s) and ensure necessary power service is initiated and maintained for permanent signal systems. Developer shall ensure power is provided to all Developer-installed signals. Developer shall stake each pole location in the field and provide TxDOT 72 hours notice prior to installation of any foundation.

Developer shall provide TxDOT with copies of all signal warrant studies as required in this Section 16. Developer shall also provide copies of all final signal timing.

Before placing any permanent traffic signals, Developer shall provide TxDOT a layout indicating the proposed location of such items.

16.4.4 Permanent Lighting

Developer shall coordinate with the Utility Owner(s) and ensure power service is initiated and maintained for permanent lighting systems. Where the Work impacts existing lighting, Developer shall maintain existing lighting as temporary lighting during construction and restore or replace prior to Substantial Completion. At all times during the Term, safe lighting conditions shall be maintained along the Project

roadway. Developer shall stake each pole location in the field and provide TxDOT 72 hour's notice prior to installation of any foundation.

Developer shall remove all old illumination-related cable and conduit that does not have existing pavement or riprap above it; any existing illumination-related cable and conduit that is under the existing pavement or riprap may be abandoned.

Developer shall place all bore pits safely away from traffic, provide positive barrier protection, and provide necessary signs to warn of the construction area.

Developer shall contact Utility Owners regarding their specific required working clearance requirements.

Developer shall affix an identification decal on each luminaire, ground box, and electrical service maintained and/or operated by Developer for inventory purposes and shall submit inventory information to TxDOT in a TxDOT-compatible format. This identification shall denote that these are property of Developer and shall provide a contact phone number and address in the event of Emergency or necessary maintenance.

17. INTELLIGENT TRANSPORTATION SYSTEMS

17.1 General Requirements

An Intelligent Transportation System (ITS) is necessary for monitoring the Project's traffic flow and performance both during construction and as a permanent installation. The Project ITS must accurately detect traffic and traffic operational conditions throughout the Project limits, and clearly communicate relevant and useful travel information to the people using the facility.

TxDOT is operating an ITS network that will need to remain in place, in service, and be physically separate from the new system provided by Developer. Developer shall maintain and protect this system, including any and all enhancements made by TxDOT and other Governmental entities that have roadways within or intersecting the project. The TxDOT existing ITS network includes system connections and transfer of data through the project limits from other roadways or transportation systems currently operated by TxDOT and other Governmental Entities.

The Project ITS must be compatible with such in-place system(s) that TxDOT and other agencies (including other developers) are currently operating. Developer shall coordinate the ITS planning and implementation with TxDOT and other Governmental Entities that have roadways within or intersecting the Project.

The Project ITS shall conform to Houston-Galveston Regional ITS Architecture and have physical connections with the existing TxDOT ITS communications network on major freeways where approved by TxDOT. The functionality of the ITS shall be such that command and control of appropriate field devices is shared and exchanged with appropriate Governmental Entities.

Developer shall be responsible for the planning, design, installation, maintenance, and operation of safe and functional ITS for the Project using Good Industry Practice. All components of the ITS shall conform to the provisions of the National Transportation Communication for ITS Protocol (NTCIP). Developer shall maintain ITS interoperability over the Term of the Agreement with TxDOT's Houston TranStar Traffic Management Center and other Governmental Entities. The ITS shall be coordinated with the Electronic Toll Collection System (ETCS) such that the communication requirements of the ETCS system are accommodated.

The Project ITS shall operate under the Houston-Galveston Regional ITS Architecture. Houston TranStar shall be the main Traffic Management Center for this Project. Communication and interoperability shall be achieved with Houston TranStar, while other regional Traffic Management Centers, including future such regional centers, shall be permitted to be interoperable, such that with appropriate privileges, access to data, command, control and information sharing can occur among centers. All communication and access of information shall occur in near real-time (within logistical restraints).

17.2 Design Requirements

Developer shall provide a complete and operational ITS network throughout the Project that is expandable as capacity is increased along the Project roadways, utilizes hardware and software components consistent and compatible with TxDOT in the manner described in this Section 17.2 and the other affected Governmental Entities, resistant to weather encountered in the Project area, and places components in locations that are not hazardous to Users. Developer shall prepare a preliminary ITS layout for review and concurrence by TxDOT to ensure adequate planning of the ITS implementation.

Subject to the specific requirements of this Section 17, Developer shall determine the number and specific locations of all ITS components.

Developer shall provide safe ingress/egress areas and structures to accommodate authorized personnel access to ITS components for maintenance and operation activities.

Developer shall provide all components of the ITS conforming to the provisions of the National Transportation Communication for ITS Protocol (NTCIP) and compatible with the latest version of TxDOT's LoneStar Software that is operational at Houston TranStar.

Developer shall construct all ITS devices and associated mountings to meet the100 mph wind load design standards.

Develop shall install ITS Equipment to provide TxDOT access to accurate and reliable data and quality video images and accurate control of field devices from Houston TranStar on a real-time basis 24 hours a day, 7 days a week. Real-time is defined as correct data being available at Houston TranStar within thirty (30) seconds of being processed or the correct response of a field component within one (1) millisecond of the command being sent.

Developer shall be responsible for ensuring the CCTV, DMS, and vehicle detection systems meet the reliability requirements specified in the most current TxDOT statewide and/or Houston District specifications as well as any standard publications provided by TxDOT at the time of actual design work.

The design and construction requirements, together with the design criteria presented in the most current TxDOT statewide and/or Houston District specifications as well as any standard publications provided by TxDOT at the time of the actual design work define the minimum standards and scope that must be met by the Developer. The Developer may supplement these requirements in order to access the data and video images and control of the CCTV for the sole purpose of managing the Project. As between the parties, TxDOT shall retain ownership and all rights to the data and video images and the Developer shall not provide access to the data or video images to any third party without the authorization of TxDOT's representative.

Developer shall be responsible for the installation and access to power required to operate the ITS devices including all utility costs until Substantial Completion of the Segment and Project Final Acceptance by TxDOT.

17.2.1 ITS Communications Requirements

Developer shall provide a communications network that has redundant routing capabilities. The communications network shall serve the highway ITS components along the highway Elements of the Project. Where necessary, as determined by TxDOT, Developer shall provide communication node buildings and cabinets to support the communications network. For all new or replacement installations, a minimum 144 strand fiber with two (2) – three (3) inch conduits and two (2) – four (4) inch multiduct conduits shall be provided.

The current TxDOT communications network backbone is a 10 Gigabit Multiple Protocol Label Switching (MPLS) Ethernet network.

17.2.2 Conduit

Developer shall determine the type, quantity, and design of the conduit above and below ground, ground boxes, and all communication cable and electrical conductors to support the ITS network and operations. Developer shall install a conduit system that is consistent with the number of conduits within the existing conduit network or meets the minimum number of ducts noted in Section 17.2.1, whichever is greater.

Developer shall repair each communication cable or electrical conductor that is severed or otherwise rendered not usable.

The Developer shall provide materials and use construction methodology in conformance at a minimum with the most current or applicable TxDOT statewide and/or Houston District specifications.

17.2.3 CCTV Cameras

Developer shall provide CCTV cameras for Incident verification, traffic management, Emergency management, security and support necessary maintenance of the system.. The system of cameras shall accurately identify all vehicle(s) involved in an Incident or Emergency, the extent of vehicle(s) damage, and if applicable the likelihood of personal injury. Operation of the cameras shall result in no visual delay in response of the camera pan/tilt/zoom by a user.

17.2.3.1 Equipment

Developer shall provide all necessary CCTV equipment, including cameras, camera controls, cables, and connections. Developer shall provide all the equipment necessary for TxDOT secondary control of all CCTV cameras on the General Purpose Lanes and the Toll Lanes.

Developer shall provide a digital video format and communications protocol at all connections. The digital format and protocol provided by Developer shall be compatible with systems in use by TxDOT at Houston TranStar, and if necessary convertible for use by TxDOT's in-place ITS network.

17.2.3.2 Placement

Developer shall provide overlapping roadway coverage by CCTV cameras for all highway lanes and intersecting cross streets within the Project limits to provide redundant camera field of view. CCTV cameras shall be placed to enable Developer or TxDOT to monitor traffic conditions on highway lanes, frontage roads, connecting facilities, and entrance and exit ramps, and messages displayed on any remotely-controlled dynamic message signs in the Project area. To provide a stable video image, Developer shall mount cameras on dedicated structures unless otherwise approved by TxDOT.

The Developer shall utilize multiple CCTV camera installations at multi-level interchanges to ensure complete visual coverage of the interchange.

Distance between CCTV cameras shall not exceed 0.5 miles.

17.2.3.3 Video Requirements

Developer shall provide state-of-the-art CCTV cameras that meet the requirements of the most current or applicable TxDOT statewide or TxDOT Houston District standard. Should any CCTV cameras fail to meet the latest TxDOT statewide or TxDOT Houston District standard specifications at the time of design, Developer shall replace such cameras within 48 hours of discovery of lack of compliance.

17.2.3.4 Operating Requirements

Developer shall provide cameras with built-in heaters, mounting structure, and related equipment capable of operating within the following weather conditions:

a) Wind load of 100 mph without permanent damage to mechanical and electrical equipment
b) Ambient temperature range of -35 degrees Fahrenheit to +140 degrees Fahrenheit
c) Relative humidity range not to exceed 95 percent within the temperature range of +40 degrees Fahrenheit to +110 degrees Fahrenheit
d) Humidity range of 0 to 100 percent condensing

17.2.3.5 Control Requirements

The Developer shall supply CCTV equipment on this Project which is fully compatible with the existing CCTV control system operated from Houston TranStar. The existing CCTV system utilizes an American Dynamics and Cohu protocols. In order to prove compatibility and operability of CCTV systems submitted for use on this Project, the Developer shall deliver one complete set of CCTV equipment to Houston TranStar for testing by Houston TranStar Information Technology Personnel as part of the equipment submittal and approval process. Allow a minimum of 30 days for testing by Houston TranStar IT personnel. The Developer shall submit the CCTV equipment for testing no later than 60 days after completion of TxDOT submittal review. The Developer shall submit the equipment for testing fully assembled and in a fully operational condition. The Developer shall configure all equipment submitted for testing as is intended for use on the Project. Prototype equipment will not be allowed. The equipment will be interconnected to the existing CCTV control system and must be fully operational using that system. No modifications to the existing CCTV control system will be made by Houston TranStar to accommodate the submitted CCTV equipment. To be considered fully operational, as a minimum, the equipment must correctly respond to the following commands:

pan left	focus far
pan right	iris override
tilt up	iris open
tilt down	iris close
Zoom in	Camera power (latching)
Zoom out	pan tilt position preset
Focus near	

Houston TranStar shall test the communications link installed between the communications hub building and the CCTV field equipment locations. Houston TranStar shall perform the test at all CCTV locations on the Project.

Houston TranStar shall use a test signal generator and a video monitor to demonstrate the ability of the video signal link to transmit a NTSC compliant video signal from the CCTV cabinet to the communications hub building. After completion of testing with the signal generator, Houston TranStar shall connect the CCTV camera to the link and use a video monitor at the communications hub building to verify the presence of an NTSC compliant video signal. A passing test must exhibit no degradation of the video signal discernible using the video monitor by Houston TranStar personnel.

Houston TranStar shall connect a laptop computer containing TxDOT-supplied CCTV control software on the link and control the CCTV movement and control functions from the communications hub building utilizing the data link. Houston TranStar must demonstrate the ability to control all CCTV functions outlined in the specifications to indicate a passing test.

The Developer shall supply all test equipment, cabling and connectors necessary for performing the tests.

Developer shall provide equipment fully operational using the existing control system from Transtar. Equipment which in any manner is not fully operational with the control system will be considered as not passing the test. Equipment which does not pass the test will be allowed one chance to be retested. The retest must occur within 30 days after the initial test. Developer shall resolve all issues of non-compliance and all discrepancies prior to a second test. Developer shall not utilize equipment on the Project which is not able to be retested within 30 days or which does not pass a second test. The Developer shall not be granted additional time or compensation for the testing of the CCTV equipment.

17.2.4 Vehicle Detection

Developer shall provide permanent detection in each highway lane of the Project that measures vehicle classification, vehicular volume, lane occupancy, and speed information on the roadway. The detectors shall be non-intrusive to the roadway users. Spacing for the permanent vehicle detection shall be no greater than one mile in each highway lane with the exception of the Toll Lanes in the Project, or, at a minimum, provide detection for all highway lanes at one location between interchanges, each entrance ramp lane, and each exit ramp lane. Spacing for the permanent vehicle detection for each lane of the Toll Lanes shall meet the spacing requirements in CDA, Exhibit 10.

Vehicle detection sensors shall determine vehicle speed for each vehicle passing the sensor. Developer shall provide upon TxDOT request, the raw speed data (volume and speed) for the for each vehicle detection sensor.

Developer shall also install Bluetooth readers every half-mile for the Toll Lanes, every two miles for the General Purpose Lanes and/or at locations approved by TxDOT. These readers will be used to determine average segment speeds and travel times. The Bluetooth readers must be compatible with existing systems at Houston TranStar.

Developer may attach detection units to existing structures with prior concurrence from TxDOT. Where an existing structure is not available, or in lieu of attaching the detection unit to an existing structure, Developer shall install a mounting pole solely for the vehicle detector. Any mounting poles placed specifically for ITS items shall conform to TxDOT specifications for CCTV mounting poles

17.2.5 Dynamic Message Signs (DMS)

Developer shall provide a comprehensive network of electronic DMS using only light-emitting diode

(LED) display technology.

Developer shall position each DMS to allow motorists to safely view the messages being displayed. Developer shall locate the DMS to comply with large guide sign spacing stated in the TMUTCD.

DMS shall be used to inform motorist of the availability of alternate routes, and to advise travelers of adverse road conditions and congestion. DMS shall be placed to provide a driver-friendly sign-viewing angle at each DMS location.

A DMS shall also be placed at one (1.0) mile before SH 288 interchanges at US 59, IH 610, and Beltway 8. DMS shall have the ability to be controlled using the latest TxDOT's DMS operating system being used at Houston TranStar.

DMS shall be mounted using a T-mount and located so that mainlane closures are not needed to maintain the sign.

17.2.6 Lane Control Signals (LCS)

No LCS required.

17.2.7 Single-Line DMS (SDMS)

No SDMS required.

17.2.8 Communication Hub Enclosures/Communication Cabinets

Developer shall coordinate with TxDOT the connection of all new ITS components to the existing ITS communication hub enclosures and communication cabinets covering the Project.

17.3 Construction Requirements

17.3.1 General

Developer shall notify TxDOT 30 days in advance of making connections to the existing TxDOT system.

Developer shall maintain existing ITS communications functionality during construction activities. Developer shall coordinate with Utility Owner(s) and ensure that power service is available for permanent ITS systems.

17.3.2 Salvaging Existing Items

TxDOT reserves the right to require Developer, at any time to salvage and deliver to a location designated by TxDOT within the TxDOT District in which the Project is located, any TxDOT-owned equipment and materials in an undamaged condition. TxDOT reserves the right to require Developer to salvage and deliver to a reasonable location designated by TxDOT any ITS equipment and materials in an undamaged condition.

17.3.3 Existing ITS Relocation

Developer shall relocate any existing ITS components, including hubs, satellite buildings, CCTV cameras, DMSs, detection devices, and fiber-links, as required to continue service from the existing components. Developer shall sequence construction and relocation of existing ITS components, facilities, and systems to prevent lapses in TxDOT's receipt of video or data within the Project area. The existing physical links and the proposed physical links shall be in separate physical conduits.

Before removing existing ITS items and before beginning construction of segments without existing ITS, Developer shall perform all activities necessary to maintain system operations during construction, including installing new ITS items, relocating or replacing existing ITS items, and connecting such ITS items to the existing network.

17.3.4 ITS Implementation Plan

Developer shall provide an ITS Implementation Plan as part of the Final Design Documents to demonstrate system interoperability with other Traffic Management Centers in the region as well as compatibility with the operational procedures for command and control of devices, sharing of data, and priority control that various parties will assume under different operating conditions of the corridor and surrounding roadway system. The ITS Implementation Plan shall include the following:

a) Functional design plan;
b) Communications analysis report;
c) Operational and requirements report; and
d) Acceptance Test Plan (ATP).

The functional design plan shall show each device's relationship in the overall functional design of the ITS and proposed roadway system. This functional design plan shall include the location of devices, technology and functional specifications of devices and any unique design elements that are necessary to achieve the desired functionality or space restrictions.

The communications analysis report shall document the communications design. This report shall show all ITS field devices, their flow through all communications mediums, and throughput within the ITS. This shall include communications between any involved Governmental Entities. The report shall contain a narrative describing the information to be transmitted as well as a high level plan for its use. Communications diagrams shall be provided showing the location of any communication hubs (existing or proposed), any planned fibers (source as well as identification tag), modem/transceiver equipment

planned at field equipment cabinets, and other equipment deemed necessary to functionally operate the ITS.

The operational and requirements document for the ITS shall describe the functional capability of the system and the method and level of integration. The document shall describe in detail the design of the system, hardware and software to be utilized, functional capabilities, command and control, data sharing capabilities and priority use of devices by multiple agencies. In developing the operational and requirements document, Developer is required to hold scoping meetings with TxDOT such that requirements are defined to achieve interoperability with other Traffic Management Centers and priority logic and information for command and control and data sharing is created to enable effective management and incident response along the corridor as well as regionally.

For each component of the ITS, an ATP shall assure proper operation, control and response of each device meeting the functional requirements. Developer shall implement the ATPs and provide certified documentation that its requirements have been met prior to operational use of the ITS.

As part of the ATP, Developer shall prepare a system acceptance procedure prior to start of construction to assure proper operation, control and response of each device as part of the overall ITS including the overall operating system and software. Developer shall conduct the procedure and provide certification that the ITS effectively meets the required functional requirements. Developer shall provide this certification prior to the use of the ITS for service.

Developer shall provide the CCTV secondary control equipment and design to TxDOT for approval a minimum of six months prior to each Service Commencement.

17.3.5 Record Drawings and Documentation

The Record Drawings shall include the construction drawings as well as catalog sheets for all equipment and components. Developer shall maintain for the duration of the Operating Period, records of all updates and modifications to the system.

For each component of the ITS, all computer codes and software shall be available to TxDOT.

18. TRAFFIC CONTROL

18.1 General Requirements

Developer shall design, construct, operate and maintain the Project, in conformance with the requirements stated in this Section 18, to provide for the safe and efficient movement of people, goods, and services, through and around the Project, while minimizing negative impacts to Users, residents, and businesses. Developer shall coordinate with local government entities on the development of the Traffic Control Plan (TCP)

It shall be the responsibility of the Developer to gain approval from the appropriate Governmental Entity or property owner on each intersecting street or driveway closure.

During all phases, temporary or existing Intelligent Transportation System (ITS) equipment, street lights, and traffic signals shall remain in operation such that the new and existing equipment operate as a coherent system.

18.2 Administrative Requirements

18.2.1 Traffic Management Plan

Developer shall prepare and implement a Traffic Management Plan (TMP) that includes the following items:

a) Descriptions of the qualifications and duties of the traffic engineering manager, traffic control coordinator, and other personnel with traffic control responsibilities
b) Procedures to identify and incorporate the needs of transit operators, Utility Owners, Governmental Entities, local governmental agencies, Emergency Service providers, school districts, business owners, and other related Users, Customer Groups or entities in the Project corridor and surrounding affected areas
c) Procedures for obtaining acceptance of detours, road and lane closures and other traffic pattern modifications from applicable Governmental Entities, and implementing and maintaining those modifications
d) Procedures for signing transitions during construction from one stage to the next and from interim to permanent signing
e) Procedures for maintenance and replacement of traffic control devices, including pavement markings and traffic barriers, if used
f) Procedures to regularly evaluate and modify, if necessary, traffic signal timings, and the procedures for the development, TxDOT approval, implementation, testing, and maintenance of all affected signals
g) Procedures to coordinate with the appropriate Governmental Entities operating signal networks along the Project or Project detour routes to ensure temporary system compatibility, establish responsibilities for temporary signal installation, maintenance, operation and removal, and coordinate traffic signal timing with local signal networks
h) Procedures and process for the safe ingress and egress of construction vehicles in the work zone
i) Provisions to provide continuous access to established truck routes and Hazardous Material (HazMat) routes, and to provide suitable detour routes, including obtaining any approvals required by the appropriate governmental entities for these uses
j) Procedures to modify plans as needed to adapt to current Project circumstances including a contingency plan to alleviate unreasonable construction-related back-ups that can be implemented immediately upon notification from TxDOT

k) Procedures to communicate TMP information to Developer's public information personnel and notify the public of maintenance of traffic issues in conjunction with the requirements of Section 3
l) Descriptions of contact methods, personnel available, and response times for any deficiencies or Emergency conditions requiring attention during off-hours.
m) Procedures for night work (9:00pm to 5:00am) to include a work zone light system design in accordance with NCHRP Report 498 – *Illumination Guidelines for Nighttime Highway Work*.
n) Developer shall notify the traveling public by placing changeable message signs a minimum of seven (7) Days in advance of actual roadway closure or major traffic modifications. Where available and when possible, the Developer shall coordinate and utilize Dynamic Message Signs on the regional ITS system.
o) Developer shall utilize uniformed police officers to effect main lane closures.

The TMP must be approved by TxDOT prior to the start of construction activities. Developer shall provide TxDOT sufficient time for review of, and comment on, the TMP. TxDOT retains the right to require revision and re-submittal of the TMP within a reasonable amount of time.

18.2.2 Road User Costs

The Developer shall incur road user costs (RUC) in the form of Lane Rental Charges (LRCs) and/or Noncompliance Points under the following circumstances.

LRCs in the form of liquidated damages as set forth in Exhibit 18 of the Agreement shall be applied to closures of, or widths that are less than those permitted for, General Purpose Lanes as described in this Section 18.

18.2.3 Lane Closure Notices

Fourteen Days prior to the publication of any notices or placement of any traffic control devices associated with lane closures, detour routing or other change in traffic control requiring lane closures (except routine closures of less than 24-hour duration), the Developer shall issue a Lane Closure Notice (LCN) to TxDOT and affected Governmental Entities.

For a LCN utilizing a non-TxDOT controlled facility, the Developer must secure concurrence in writing from the controlling Governmental Entity.

A LCN shall contain the estimated date, time, duration, and location of the proposed work.

If an Emergency condition should occur, a LCN shall be provided to TxDOT within 2 Days after the event. For non-TxDOT controlled facilities, the Developer shall immediately notify the controlling Governmental Entity. The Developer shall keep TxDOT informed of any and all changes or cancellations of proposed lane closures prior to the date of their implementation.

18.3 Design Requirements

18.3.1 Traffic Control Plans

Developer shall use the procedures in the TMP and the standards of the TMUTCD to develop detailed traffic control plans which provide for all construction stages and phasing, as well as all required switching procedures. Traffic control plans are required for the DB Phase and O&M Work during the Term of the Agreement.

Developer shall produce a traffic control plan for each and every phase of Work that impacts traffic and involves traffic control details and shall coordinate with appropriate Governmental Entities on the

development of the plan. Developer is responsible for obtaining all necessary permits from such local entities to implement the plans.

Each traffic control plan shall be submitted to TxDOT for review a minimum of 10 Days prior to implementation. The traffic control plan shall include details for all detours, traffic control devices, striping, and signage applicable to each phase of construction. Information included in the traffic control plans shall be of sufficient detail to allow verification of design criteria and safety requirements, including typical sections, alignment, striping layout, drop off conditions, and temporary drainage. The traffic control plans shall clearly designate all temporary reductions in speed limits. Changes to posted speed limits will not be allowed unless specific prior approval is granted by TxDOT.

Opposing traffic on a normally divided roadway shall be separated with appropriate traffic control devices in accordance with Good Industry Practice and TMUTCD based on the road Design Speed**.** Approved traffic control devices can be found in the TxDOT *Compliant Work Zone Traffic Control Device List* (CWZTCD list). Any traffic control that involves the physical separation of contiguous lanes of the General Lanes traveling in the same direction shall not be allowed.

Developer shall maintain signing continuity on all active roadways within or intersecting the Project at all times.

Throughout the duration of the Project, Developer shall ensure all streets and intersections remain open to traffic to the greatest extent possible by constructing the Work in stages. Developer shall maintain access to all adjacent streets and shall provide for ingress and egress to public and private properties at all times during the Project.

Developer shall prepare public information notices, in coordination with Section 3 (Public Information and Communications), in advance of the implementation of any lane closures or traffic switches. These notices shall be referred to as Traffic Advisories.

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18.3.1.1 Design Parameters for Traffic Control

Design Vehicle: Turning movements on all local streets and driveways shall, at a minimum, provide similar characteristics as existing.

Design Speed: On Interstate and State Highways, the design speed shall be 55 miles per hour (mph) or greater, except for major alignment transitions where the design speed may be reduced to 45 mph if approved by TxDOT, in its sole discretion.

Number of Lanes: Except as allowed by Section 18.3.1.2, the minimum number of lanes to be maintained during the DB Phase and O&M Work in each direction shall be the number of lanes available on each facility of the Project including Frontage Roads and cross streets immediately prior to such DB Phase and O&M Work. Lane closures on other roadways may be considered, so long as all traffic patterns and accesses are maintained.

Lane Widths: During the DB Phase, Renewal Work, and O&M Work, the minimum lane width for Toll Lanes, General Purpose Lanes, Frontage Roads and major crossing streets is 11 feet. For minor crossing streets, TxDOT may, in its sole discretion, allow 10' lanes in limited circumstances during construction for short distances after reviewing the Developer's traffic control plan.

Shoulders: A minimum one foot offset from the edge of travel way to the edge of pavement or traffic barrier is required.

18.3.1.2 Allowable Lane and Roadway Closures

Closures will only be permitted when the Developer can demonstrate that the closure will provide clear benefit to the progress of the Work. Closures must be coordinated with adjacent projects and priority shall be given to the closure submitted first.

Lane Closures

Developer shall not reduce the number of roadway controlled access lanes below the current number of roadway controlled access lanes during the Peak Period. Developer may lower the number of roadway lanes in each direction during the Off-Peak Period provided that a minimum of two roadway controlled access lanes in each direction are maintained.

If reasonable mobility can be maintained, or exceptional circumstances exist, additional lanes may be closed during the Off-Peak Period with the written permission of TxDOT. Off Peak Hours may be started earlier or extended later with TxDOT approval if reasonable mobility can be maintained.

Developer shall seek TxDOT approval if a reduction in the current number of Frontage Road, ramp, direct connector, or cross street lanes are required.

If a bridge cannot be demolished safely within these requirements, roads may need to be closed and traffic detoured during the lowest-volume times. Developer shall seek TxDOT's approval for such traffic closures.

Any complete roadway closure will require a traffic control plan to be submitted and approved by TxDOT.

When Lane Closures are necessary, Developer shall use the public information and communication methods available to inform the appropriate Customer Groups (refer to Section 3).

Lane Closures must be coordinated with adjacent projects.

Except for Incidents or Emergencies, Developer may reduce the number of General Purpose Lanes in accordance with Table 18-1 (Permitted Lane Closures) during non-restricted hours. Lane Closures other than those permitted in Section 18.3.1 shall cause road user costs to be levied against Developer as specified in Section 28 of the Agreement. Liquidated Damages or Noncompliance Points may be levied in accordance with Section 18.3.1 and as specified in Section 28 of the Development Agreement until Project Final Acceptance and thereafter during the Term.

Table 18-1: Permitted Lane Closures

Description of Operations		**Permitted Lane Closures[1 & 4]** (For all facilities other than the Toll Lanes)			
Category of Work	**General Purpose Lanes** (One Direction)	**Weekday AM/PM Peak Period (peak direction)**	**Weekday Off_peak Period**	**Weekend Peak Period**	**Late Night**
Placement of CTB, Placement of Pavement Markings, Full Depth Roadway Repair, Placement of Bridge Beams, Bridge Demolition or Similar Operations	5	None	3	3	3
	4	None	2	2	2
	3	None	1	1	1
	2	None	None	None	1
Adjacent Construction,	5	None	2	2	2

Lanes for Construction Traffic or Similar Operations	4	None	2	2	2
	3	None	1	1	1
	2	None	None	None	1

Notes:
1. A minimum of 2 lanes in each direction shall be required at all times except as specifically approved by TxDOT.
2. **Peak Period** means the period as described in Exhibit 18 of the Agreement.
3. **Off-Peak Period** means the periods as described in Exhibit 18 of the Agreement.
* Times shall be established utilizing 7 day-24 hour traffic counts to be performed by the Developer, results of which shall be provided to TxDOT for evaluation. Peak Period hours shall be evaluated on an annual basis and shall be adjusted as necessary.
4. Refer to Section 18.3.2.3 for permitted lane closures on Beltway 8.

Full Roadway Closure

Developer may close mainlanes for short-term durations only upon written approval by TxDOT and after the traffic control plans and details have been reviewed and approved. TxDOT shall have the right to lengthen, shorten, or otherwise modify the foregoing restrictions as actual traffic conditions may warrant.

The detour route for these full roadway closures shall be limited to usage of the on and off ramps at the mainline interchange locations.

Major crossing streets must remain open to traffic prior to Project Final Acceptance. When minor crossing streets are closed, the major crossing streets must have a minimum of two lanes in each direction. Below is a list of major crossing streets for the Project:

- Beltway 8
- IH 610
- US 59
- US 90
- SH 288
- Southmore Blvd
- MacGregor Way
- Hocombe Blvd
- Yellowstone Blvd
- Holly Hall St
- Holmes Rd
- Bellfort St
- Reed Rd
- Airport Blvd
- Orem Dr
- Aimesa-Genoa Rd

Minor crossing streets may be closed for bridge construction if adjacent cross streets are open to traffic and continuous frontage roads are open. Coordinate with the TxDOT for all minor street identification.

Any complete roadway closure shall require a traffic control plan to be submitted and approved by TxDOT and Governmental Entities having jurisdiction of roadways affected by the closure. Availability of frontage roads, ramp locations and detour distances shall be considered in the design. Complete mainlane closure may only be allowed during night times.

Driveway Closures

Developer shall maintain a minimum of one driveway per business at all times. For businesses with multiple driveways, when driveway closure is necessary to progress Work, no driveway may be closed for more than 30 consecutive days or more than 45 days in a 90-day period.

18.3.1.3 Detour Usage

Developer shall use State routes for detour routes, wherever applicable. If State routes are unavailable, Developer shall use local arterials, provided that Developer has obtained the necessary permits from the Governmental Entity having jurisdiction.

Developer shall provide motorists with guidance on diverting around the construction, detouring around specific construction sites, and traveling through the construction areas. This shall include the installation and maintenance of temporary regional signs to divert traffic around the Project. Motorist guidance to and along detour routes shall be provided, together with regional guidance.

18.3.2 Restricted Hours

18.3.2.1 Holiday Restrictions

No lane closure that restricts or interferes with traffic shall be allowed from noon on the day preceding to 10:00 pm on the day after the following holiday schedule. TxDOT has the right to lengthen, shorten, or otherwise modify these restrictions as actual traffic conditions may warrant.

a) New Year's Eve and New Year's Day (December 31 through January 1)
b) Easter Holiday Weekend (Friday through Sunday)
c) Memorial Day Weekend (Friday through Monday)
d) Independence Day (July 3 through noon on July 5th)
e) Labor Day Weekend (Friday through Monday)
f) Thanksgiving Holiday (Wednesday through Sunday)
g) Christmas Holiday (December 23 through 26)

18.3.2.2 Event Restrictions

No lane closure that restricts or interferes with traffic shall be allowed for the regional events set forth below. TxDOT has the right to lengthen, shorten, or otherwise modify these restrictions as actual traffic conditions may warrant. TxDOT also has the right to modify the list of major events as they are added, rescheduled or warranted.

a) Houston Livestock Show and Rodeo

18.3.2.3 Beltway 8

Developer is allowed single Lane Closures on the Beltway 8, Monday through Friday, from 10pm to 5am. Single Lane Closures on Beltway 8 are allowed anytime on the weekends.

For Beltway 8, the Developer is limited to fourteen full roadway closures from 10pm on Friday to 5am on Monday. The full closures cannot be on consecutive weekends without written approval from TxDOT and HCTRA.

18.4 Construction Requirements

Construction shall be in accordance with Developer's TMP, the manufacturer's directions or recommendations where applicable, and the applicable provisions of the TMUTCD.

18.4.1 Developer Responsibility

If at any time TxDOT determines Developer's traffic control operations do not meet the intent of the TMP or any specific traffic control plan, Developer shall immediately revise or discontinue such operations to correct the deficient conditions.

Developer shall provide TxDOT the names of the traffic control coordinator and support personnel, and the phone number(s) where they can be reached 24 hours per day, seven days per week.

18.4.2 Access

Existing bicycle and pedestrian access and mobility shall be maintained parallel with the frontage roads and across all cross streets. Access to existing transit stop locations shall be maintained during construction or reasonable alternative locations shall be provided.

18.4.3 Detours

Developer shall maintain all detours in a safe and traversable condition. A pavement transition, suitable for the posted speed of the section shall be provided at all detour interfaces.

Developer shall use State routes for detour routes, wherever applicable. If State routes are unavailable, Developer shall use local arterials, provided that Developer has obtained the necessary permits from the Governmental Entity having jurisdiction.

Developer shall provide motorists with guidance on diverting around the construction, detouring around specific construction sites, and traveling through the construction areas. This shall include the installation and maintenance of temporary regional signs to divert traffic around the Project. Motorist guidance to and along detour routes shall be provided, together with regional guidance.

18.4.4 Local Approvals

Developer shall communicate any ramp closure and staging analysis with the Governmental Entity having jurisdiction within the Project. When ramp movements are diverted or detoured along existing roads, Developer shall be responsible for any and all user costs that may be assessed for the use of these existing roads. This may include traffic operation analysis, temporary traffic control devices, and road user costs, all payable to the local road authority. Developer shall be responsible for obtaining the necessary approvals from agencies having jurisdiction over the routes used.

18.4.5 Pavement Markings

Developer shall be required to remove existing pavement markings that conflict with temporary or permanent pavement markings. These pavement markings shall be removed by any method that does not materially damage the surface or texture of the pavement. Pavement marking removal by over-painting is prohibited.

Roadways cannot be opened to traffic without standard pavement markings in place.

Remove or cover permanent or construction signing that is incorrect or not applicable to the current situation for a particular phase. Erect temporary signing providing correct information to the travelling public.

18.4.6 Reinstatement of Utility Cuts

After installation of drainage structures, storm sewers, or any other public or private Utility facility by open cut beneath existing pavements carrying traffic during construction, the pavement shall be restored to provide a normal satisfactory riding surface.

18.4.7 Hauling Equipment

Developer shall keep traveled surfaces used in its hauling operations clear and free of dirt or other debris that would hinder the safe operation of roadway traffic.

Rubber-tired equipment shall be used for moving dirt or other materials along or across paved surfaces.

Where Developer moves any equipment not licensed for operation on public highways on or across any pavement, Developer shall protect the pavement from all damage caused by such movement. Any damage caused by the operation of Developer shall be repaired at the expense of Developer.

All haul routes utilizing any street of an adjacent Governmental Entity shall be coordinated with the appropriate Governmental Entity

These provisions include overweight/oversize equipment or loads.

18.4.8 Final Clean-Up

Developer shall clear and remove from the site all surplus and discarded materials and debris of every kind and leave the entire Project in a smooth and neat condition, after any construction process.

18.4.9 Stockpiles

Barricades and warning signs are to be placed at stockpiles to adequately warn motorists of a hazard in accordance with TxDOT's Traffic Engineering Standard sheets and the TMUTCD. All material stockpiles shall not be located within the clear zone of any traveled lane, unless positive protection is provided.

Do not mix or store materials, or store or repair equipment, on top of concrete pavement or bridge decks.

19. MAINTENANCE

19.1 General Requirements

Developer shall maintain the Project in a manner that provides a safe and reliable transportation system for improved mobility. The O&M Work shall include all activities to be performed by Developer to satisfy the Performance Requirements and the Handback Requirements with respect to the maintained Elements, together with other duties described in this Section19.

19.1.1 General Maintenance Obligations

Developer shall take all necessary actions to achieve the following:

a) Maintain the Project and Related Transportation Facilities in a manner appropriate for a facility of the character of the Project and Related Transportation Facilities.
b) Minimize delay and inconvenience to Users and, to the extent Developer is able to control, users of Related Transportation Facilities.
c) Identify and correct all Defects and damages from Incidents
d) Monitor and observe weather and weather forecasts to proactively deploy resources to minimize delays and safety hazards due to heavy rains, snow, ice, or other severe weather events.
e) Remove debris, including litter, graffiti, animals, and abandoned vehicles or equipment from the Project ROW.
f) Minimize the risk of damage, disturbance, or destruction of third-party property during the O&M Work.
g) Coordinate with and enable TxDOT and others with statutory duties or functions in relation to the Project or Related Transportation Facilities to perform such duties and functions.
h) Perform systematic Project inspections and O&M Work in accordance with the provisions of Developer's Maintenance Management Plan and Developer's Safety and Health Plan.

Developer is responsible for providing all resources necessary for the performance of all activities in the Maintenance Management Plan.

19.1.2 Developer's Obligation to Remedy and Repair

19.1.2.1 Performance Requirements of Existing Elements from the Operating Commencement Date to Service Commencement

The Developer is responsible for O&M Work within the limits of the Project in accordance with Section 1.5 including the Existing Elements. For the avoidance of doubt, "existing" means Elements in place and operating prior to the Proposal Due Date.

Developer shall take necessary action such that the Category 1 Defect hazards to Users are mitigated within the period given in the column entitled "Cat 1 Hazard Mitigation" in the Performance and Measurement Table Baseline, Table 19-1, included in Attachment 19-1. The Developer shall permanently remedy the Defect within the period given in the column entitled "Category 1 Permanent Remedy" in Table 19-1.

For Category 2 Defects, the Developer shall undertake the permanent repair within the period specified in the column entitled "Category 2 Permanent Repair" in Table 19-1.

19.1.2.2 Performance Requirements of Temporary Ramps and Diversions

Temporary Work for the maintenance of traffic during Construction Work and O&M Work is to be maintained in a safe, functional and fair condition meeting the requirements of TxDOT standards and Good Industry Practice.

19.1.2.3 Performance Requirements after Service Commencement

After an Element has been constructed, re-constructed, or renewed or after Service Commencement of each Project Segment, Developer is to maintain the Elements in accordance with Table 19-1. In meeting the requirements of this Section 19, where a Category 1 Defect is revealed by any inspection or is otherwise brought to the attention of Developer, Developer shall take immediate steps to alert Users to the hazard and shall categorize, correct, make safe and repair the Defect in accordance with Table 19-1.

For Category 1 Defects, Developer shall:

a) Take necessary action such that the hazard to Users is mitigated within the period given in the column entitled "Cat 1 Hazard Mitigation" in Table 19-1.
b) Permanently remedy the Defect within the period given in the column entitled "Cat 1 Permanent Remedy" in Table 19-1.

For Category 2 Defects, Developer shall undertake the permanent repair within the period specified in the column entitled "Cat 2 Permanent Repair" in Table 19-1.

Developer shall prepare and submit to the Independent Engineer and TxDOT for review and comment a Work Plan that demonstrates how the existing Elements will meet the Performance Requirements of Table 19-1 by the Substantial Completion date.

The Developer's obligation is to remedy and repair the Project as a preventative measure, including Renewal Work not scheduled in the Developer's annually recurring highway maintenance and repair program. The Developer shall use the results of the inspections described in his Maintenance Management Plan (MMP) and other relevant information to determine, on an annual basis, the Residual Life of each Element of the Project. From this, the Developer shall determine the scope of the Renewal Work Schedule. Renewal Work shall be performed at the point in time necessary to establish a Useful Life for each Element that will avoid deterioration of any Element to the extent that such deterioration would result in the failure to comply with a Performance Requirement.

19.1.3 TxDOT's Obligation to Remedy and Repair

In the period between the Proposal Due Date and the Operating Commencement Date, TxDOT will reasonably perform the type of routine maintenance of each Element Category which is normally included as an annually recurring cost in the TxDOT highway maintenance and repair budgets including repairs required to restore asset condition following accidents and Incidents. TxDOT is not obligated to extend the Residual Life of any Element through reconstruction, rehabilitation, restoration, renewal, or replacement.

19.1.4 Transition of Maintenance

Developer shall coordinate with TxDOT to achieve a smooth transition of maintenance activities from TxDOT. Developer shall assume full responsibility for all maintenance activities as described in Section 16.2 of the Agreement.

19.2 Maintenance Management Plan (MMP)

Developer shall prepare a Maintenance Management Plan (MMP) that is consistent with the general maintenance obligations described in Section 19.1 (General Requirements) and defines the process and procedures for the maintenance of the Project for the Term of the Agreement. The MMP shall include performance requirements, measurement procedures, threshold values at which maintenance is required, inspection procedures and frequencies, and subsequent maintenance to address noted deficiencies, for each physical Element of the Project in accordance with Table 19-1, including impacts to Related Transportation Facilities. The MMP shall identify response times to mitigate hazards, permanently

remedy, and permanently repair Defects. Response times shall be in accordance with the Performance and Measurement Table Baseline, or lower. Developer shall differentiate response times for Defects that require prompt attention due to immediate or imminent damage or deterioration, excluding those items which have no impact on any parties other than Developer, and response times for other Defects. Developer shall update this plan as required, or at least annually.

Developer shall submit the MMP to TxDOT for review and approval at least 60 Days prior to the issuance of NTP2. Approval by TxDOT of the MMP shall be a condition of NTP2.

The MMP shall include procedures for managing records of inspection and maintenance activities, including appropriate measures for providing protected duplication of the records. Inspection and maintenance records shall be kept for the Term of the Agreement and shall be provided to TxDOT at the time the Project is delivered to TxDOT, at either the expiration of the Term or earlier termination of the Agreement.

19.2.1 Additional Requirements

The MMP shall address, but shall not necessarily be limited to, the following:

a) Maintenance and service manual
b) Spare parts
c) Inventory control
d) Maintenance Management Information System (MMIS) functionality
e) Software maintenance
f) Special tools and equipment
g) Defect tracking and corrective action
h) Reliability and maintainability analysis
i) Vendors for equipment and maintenance services
j) Retaining wall monitoring

The Developer shall include in the MMP how the following specific obligations are implemented:

a) Preventative Maintenance

   The minimum standards shall be as determined by the equipment manufacturer's recommended maintenance schedule and operating procedures.

b) Maintenance and Service Manual

   The Developer shall prepare and update a Maintenance and Service Manual in both printed and electronic file format (searchable PDF). This manual shall be comprehensive and shall include, but not be limited to, detailed technical maintenance and servicing descriptions for all major and safety critical components as well as equipment that is specialized to meet the needs of this Project. The manual shall include preventive maintenance schedules, testing and troubleshooting techniques, corrective measures, both temporary and permanent, the location and availability of support services, point to point component wiring schematics and logic signal flows, assembly and disassembly drawings, including exploded view drawings.

   Standard service manuals for unmodified commercial products are acceptable for inclusion in the MMP provided that they contain details and accurate information in order to properly service the specific equipment supplied under this Agreement. Large size diagrams and mechanical assembly diagrams need not be reduced or incorporated into the manual if these drawings are delivered with the manuals.

c) Spare Parts and Inventory Levels

The Developer shall maintain a comprehensive, accurate, and auditable parts and spares inventory adequate to address the maintenance obligations. This information contained in the inventory shall be compatible with the Maintenance Management Information System (MMIS) as described in Section 19.5.3.

d) Maintenance Records

The Developer shall prepare quarterly Work Plans together with one year and five year Work Plans. The five year Work Plan is to be updated each year and include all renewal activities. The one year Work Plans shall be updated every quarter and shall include a rolling 12-month Work Plan.

In respect of this requirement a Work Plan means a detailed plan that identifies all maintenance activities that will be undertaken during a specified period, including a schedule of the associated road closures expected.

19.2.2 Standard of Remedy or Repair

The remedy or repair of any Element shall meet or exceed the standard identified in the column entitled "Target" in the Performance Measurement Table and an O&M Record shall be created by Developer to verify that this requirement has been met.

19.2.3 Accident Reduction Program

The Developer is to implement an accident monitoring and reduction program in accordance with FHWA requirements and Good Industry Practice.

19.2.4 Highway Conditions Report (HCR) System

The Developer shall report to TxDOT highway and weather conditions every workday morning by 8.00 AM and update the information as needed to TxDOT and include this information on the Developer's Web page.

The following types of information are to be reported:

a) Highway conditions which close travel in one direction for more than four hours or create hazardous travel including construction or maintenance sites, roadway or right of way damage, major accidents or hazardous spills; and
b) Weather-related events which may cause unsafe driving conditions such as ice, sleet, snow, floods, high winds or hurricanes.

19.2.5 Renewal of Elements

Elements are to be renewed when any of the following conditions are evident:

a) The Asset Condition Score of an Element is below 3 as described in Table 19-4, except for asphalt and concrete pavement.
b) For asphalt and concrete pavement, rehabilitation must be initiated when the Pavement Condition Score of any one-mile continuous segment falls below 75.
c) The "Reliability" is less than 99.9% for any safety critical Element. Such an Element is one that, should it fail, the safe operation of the Project would be in jeopardy or an immediate or imminent safety hazard would result.
d) The "Reliability" is less than 90% Element other than a safety critical Element.
e) The Element ceases to function, or dies (as in the case of certain landscaping).
f) The frequency of repair is higher than that recommended in the manufacturer's preventive maintenance schedule.

"Reliability" is calculated as the in-service time over a prescribed time period. For example, if an Element is out of service for 20 days of 365 days, its "Reliability" is 94.5% (i.e. (365 – 20)/365 x 100%). The reliability measurement is made over a moving 365 days.

All renewed Elements shall meet all applicable code requirements and industry design standards at the time of Renewal Work.

19.2.6 Change of Use or Technology Changes

During the Term, Elements may require a change of use from the original intentions, e.g. an office space may become a computer server room, or a parking lot may need to be modified to accommodate larger vehicles through re-striping and curb line alterations. For any such change of use or modification of use, the Developer shall document the reason for the change, how the original use will be accommodated or the reason why the original use is no longer required and provide the total cost of ownership implications of the change.

During the Term, Technology Enhancements will occur for certain Elements. It is the Developer's responsibility to implement Technology Enhancements as set forth in Section 25.2 of the Agreement and applicable Sections of the Technical Provisions, and such that the overall system capabilities are achieved.

19.2.7 Mitigation for Severe Weather Events

In addition to the obligations of Section 19.1.1 to monitor and observe weather and weather forecasts and to proactively deploy resources accordingly for weather events, the Developer's MMP shall establish the means by which all the Project's trafficked roadway types are to be managed to minimize delays and safety hazards in the event of any severe weather event.

19.3 Inspections

Developer shall cause trained and competent personnel to plan and implement a program of inspections of the Project which:

a) Verifies the continuing safety of the Project for Users.

b) Prioritizes Defects requiring immediate and urgent attention because they are likely to create a danger or serious inconvenience to Users (Category 1 Defects).

c) Identifies Category 2 Defects to be included for repair.

d) Is responsive to reports or complaints received from Customer Groups.

e) Takes account of Incidents and Emergencies affecting the Project.

f) Monitors the effects of extreme weather conditions.

g) Collates data to monitor performance of the Project and to establish priorities for future O&M Work.

Developer shall ensure that personnel performing inspections of road pavements and structures are certified as inspectors and/or raters in accordance with the Technical Provisions.

19.3.1 Inspection Frequency

Developer shall establish an annual schedule for inspections which will be appropriately spaced throughout the year. After periods of inclement weather or other events which may cause accelerated deterioration of the Elements, safety hazards or other detrimental impacts to the Project, Developer shall conduct comprehensive visual surveys which will identify all such areas of concern.

Developer shall establish inspection procedures and carry out inspections so that:

a) All Category 1 Defects are identified and remedied such that the hazard to Users is mitigated within the period given in the column entitled "Category 1 Hazard Mitigation" in the Performance and Measurement Table.
b) All Category 1 Defects are identified and permanently remedied within the period given in the column entitled "Category 1 Permanent Remedy" in the Performance and Measurement Table.
c) All Category 2 Defects excluding those items which have no impact on any parties other than Developer are identified and permanently repaired within the period given in the column entitled "Category 2 Permanent Repair" in the Performance and Measurement Table.

The periods stated in the Performance and Measurement Table under each of the above headings shall be deemed to start upon the date Developer first obtained knowledge of, or first reasonably should have known of, the Defect. For this purpose Developer shall be deemed to first obtain knowledge of the Defect not later than the date of delivery of the initial notice to Developer. Developer shall investigate reports and complaints on the condition of the Project received from all sources. Developer shall record these as O&M Records together with details of all relevant inspections and actions taken in respect of Defects, including temporary protective measures and repairs.

19.3.2 Inspection Standards

In performing inspections to identify Category 1 and Category 2 Defects, Developer shall, for any Element defined in the column entitled "Element" in Table 19-1, conform at a minimum to the inspection standards set forth for that Element in the column entitled "Inspection and Measurement Method" in Table 19-1.

19.3.3 General Inspections

Developer shall perform General Inspections in accordance with the MMP so that the repairs of all Defects are included in the O&M Work.

O&M Records in respect of General Inspections shall include details of the manner of inspection (e.g. center lane closure or shoulder), the weather conditions and any other unusual features of the inspection.

General Inspections shall be performed such that Category 2 Defects are identified and repaired within the period shown in Table 19-1 or, if the Defect is not specified in Table 19-1, within six (6) months of the Defect occurring; provided that Defects which require special equipment to identify or are listed under the heading of Specialist Inspections in Section 19.3.4 may have different identification periods.

19.3.4 Specialist Inspections

Developer shall undertake Specialist Inspections for Elements listed in Table 19-3 below and shall include the inspection results as O&M Records.

Table 19-3 Specialist Inspections

Maintained Element	Specialist Inspection
All Maintained Elements in Element Category 'Roadway' in Attachment 19-1 to this Technical Provision	Annual survey of pavement condition for the entire Project, including main lanes, ramps, and frontage roads, undertaken using automated condition survey equipment to measure all necessary criteria including: ruts, skid resistance and ride quality according to the inspection and measurement methods set forth in Attachment 19-1 to this Technical Provision.

Electrical Supplies to lighting, signs, traffic signals and communications equipment	Inspections as required by FHWA or electrical Laws.
Toll Equipment	Inspections as required by the equipment manufacturer.

19.3.5 Developer Audit Inspections

After the Service Commencement Date, the Developer shall undertake detailed inspections of randomly selected Auditable Sections for audit purposes (the "Developer's Audit Inspections") at least once quarterly. On each occasion that a Developer's Audit Inspection is undertaken, the inspection shall include at least five (5) percent of the total available Auditable Sections. Developer shall assess the condition of each Element of the Project, as set forth in the column entitled "Element" in Table 19-1 using the inspection and measurement method set forth in the column entitled "Inspection and Measurement Method". Developer's Audit Inspections shall include physical inspection of those Elements that are safely accessible without traffic control. Where the measurement method would require specialist equipment or would require traffic lane closures to implement, Developer shall assess the condition of the relevant Element by reference to the current O&M Records held in Developer's database.

Developer shall create a new O&M Record for each Element physically inspected in accordance with the column entitled "Measurement Record" in Table 19-1. Developer's Audit Inspections shall be undertaken on a schedule agreed to with the Independent Engineer on Auditable Sections randomly selected by the Independent Engineer. The Independent Engineer shall be given the opportunity with seven (7) Days notice, to accompany Developer when it undertakes the physical inspections associated with the Audit Inspection.

19.3.6 Asset Condition Score by Developer

Within ten (10) Days of the Developer's Audit Inspections, Developer shall assess its achievement of the Performance Requirements by self scoring against the Targets set forth in Table 19-1, the Performance and Measurement Table Baseline.

Developer shall report quarterly to TxDOT and the Independent Engineer an Asset Condition Score to include, for each Element Category, all of the Auditable Sections inspected in the most recent Developer's Audit Inspection. Developer shall assess the Asset Condition Score according to the measurement criteria set forth in Table 19-4 below.

Table 19-4 Asset Condition Score Criteria for Element Categories

(Reported quarterly for each Element Category for all inspected Auditable Sections)

Score	Criteria
5	• Targets for individual Elements are almost entirely met (95% to 100% compliance with the relevant Targets for each Element within each Auditable Section), and • Is fully functional and in nearly new condition, meeting or exceeding Performance Requirement.
4	• Targets for individual Elements are substantially met (less than 95% compliance and 90% or greater compliance with the relevant Targets for each Element within each Auditable Section), and • Is functional and in good condition, meeting Performance Requirement.

3	• Targets for individual Elements are mostly met (less than 90% compliance and 75% or greater compliance with the relevant Targets for each Element within each Auditable Section), and • Is in fair condition, but suggesting need for early replacement, renewal or repair of individual Element and/or maintenance or operation improvement action to meet Performance Requirement.
2	• Targets for individual Elements are barely met (less than 75% compliance and 50% or greater compliance with the relevant Targets for each Element within each Auditable Section), or • In poor condition demonstrating need for immediate replacement, renewal or repair of individual Element and/or immediate change to PMP.
1	• Targets for individual Elements are not met (less than 50% compliance with the relevant Targets for each Element within each Auditable Section), or • In very poor condition demonstrating need for immediate replacement, renewal or repair of individual Element and/or immediate change to PMP.

Notes to Table 19-4:

1. The Asset Condition Score for any Element Category shall be determined by the lowest Asset Condition Score for any Element within the Element Category. The calculation of Asset Condition Score is demonstrated by the following example:

   Assume there are 520 Auditable Sections, of these 5%, or 26 are audited each quarter. There are five Targets to be assessed for Element "pavement markings". There are therefore, 5 x 26 = 130 measurement records for pavement markings. If 125 of these measurement records meet the Target, there would be 96% compliance and an Asset Condition Score of five assigned for that Element. However, if one of the remaining Elements in the Element Category achieves an Asset Condition Score of four the Asset Condition Score for the Element Category shall be four.

2. The mean of the Asset Condition Scores across Elements in any Element Category is calculated to 1 decimal point and also recorded.
3. Where a measurement record relates to a service measured over time or an Element that is not represented in more than 25% of Auditable Sections then the Asset Condition Score will be based on the total service and not a 5% random sample. This applies to the performance measurement of Element Categories: Structures, Traffic Signals, Incident Response, Customer Service, Snow and Ice Control, Project Buildings and Toll Equipment or other Element Categories meeting the above criteria identified following establishment of the Auditable Sections.
4. Pavement Condition Score is a component of Asset Condition Score for Element Category "Pavement", but Pavement Condition Score shall also be reported annually for the entire Project.
5. Developer acknowledges that Asset Condition Score is a mechanism to benchmark the performance of the Project against the performance of other similar facilities and that TxDOT may, during the Term, alter the Asset Condition Score criteria to reflect Good Industry Practice.
6. "Mean" in this context shall be the arithmetic mean.

Each Asset Condition Score of less than three or a mean Asset Condition Score across Elements of less than 3.5 (for any Element Category) is deemed a Noncompliance Event.

19.3.7 Temporary Ramps and Diversions

For Frontage Road Auditable Sections that will require modification for the provision of temporary ramps or diversions during Construction Work and/or Renewal Work, a minimum Asset Condition Score of 2 and a minimum mean Element compliance score of 2.5 is allowed. The Asset Condition Score and mean Asset Condition Score shall be restored to at least 3 and 3.5 respectively prior to each Service Commencement following and/or completion of Renewal Work.

19.4 Handback Requirements

Developer shall prepare a Handback Plan that contains the methodologies and activities to be undertaken or employed to meet the Handback Requirements at the end of the Term of the Agreement for newly constructed and all Toll Lane Elements. Existing Elements, excluding those Existing Elements that may fall within the Toll Lanes, will not be subject to Handback Requirements. Developer shall submit the Handback Plan, including a Residual Life Methodology Plan, to TxDOT for review and approval at least 60 months before the anticipated Termination Date. The Residual Life Methodology Plan shall include all elements for both existing and newly constructed. The Residual Life Methodology Plan for those Existing Elements outside of the Toll Lanes will be necessary to plan Renewal Work as indicated in section 19.1.2.3.

Table 19-2, Residual Life Requirements, defines the Residual Life at Handback which the Elements must have. Table 19-2, Residual Life Requirements, is included as Attachment 19-2. Table 19-2 shall be populated throughout the Term to define the Residual Life at Handback of all applicable Elements if it is deemed certain Elements are not included. At Handback for any Element of the Project for which a Residual Life at Handback is not specified in Table 19-2, excluding Existing Elements outside of the Toll Lanes, the Residual Life at Handback for the Element shall equal the documented serviceable life of the Element or five (5) years, whichever is less.

Developer shall perform Residual Life Inspections within the Project as noted below. Within thirty (30) Days following performance of each Residual Life Inspection, Developer shall submit to TxDOT the findings of the inspection, Residual Life test results and Residual Life calculations, as more particularly described in Section 20.1.2of the Agreement.

The Residual Life Methodology Plan shall contain the evaluation and calculation criteria to be adopted for the calculation of the Residual Life at Handback for all Elements of the Project. The scope of any Residual Life testing shall be included, together with a list of all independent Residual Life testing organizations, proposed by Developer. These organizations shall be on TxDOT's approved list, have third party quality certification, and be financially independent of Developer and not be an Affiliate of Developer.

TxDOT's approval of the Residual Life Methodology, including the scope and schedule of inspections, shall be required before commencement of Residual Life Inspections.

Developer shall perform all Work necessary to meet or exceed the Residual Life requirements contained in Table 19-2 by the time of handback of the Project to TxDOT.

At the point of handback, Developer shall certify in writing to TxDOT that all physical Elements of the Project meet or exceed their respective Residual Life requirements defined in the Agreement.

19.4.1 Residual Life Inspections

Developer shall perform Residual Life Inspections and testing with appropriate coverage such that the results are representative of the whole Project as described in Table 19-2, TxDOT shall be given the opportunity to witness any of the inspections and/or tests. Developer shall deliver to TxDOT, within ten Days after it is created, the output data arising from any testing and any interpretation thereof made by the testers.

19.4.1.1 First Residual Life Inspection

Between sixty-three (63) and sixty (60) months prior to the end of the Term, Developer shall perform the first Residual Life Inspection (the First Inspection), including all Elements set forth in Table 19-2. Within 30 Days following performance of the First Inspection, Developer shall submit to TxDOT the First Inspection Report which shall contain the findings of the inspection, including Residual Life test results, the report of the independent testing organization(s), and Developer's calculation of the Residual Life at Handback for all Elements.

19.4.1.2 Second Residual Life Inspection

Between twenty-one (21) and eighteen (18) months before the end of the Term, Developer shall perform the second Residual Life Inspection (the Second Inspection) including all Elements within the Project, regardless of whether Developer has undertaken Renewal Work for a particular Element in the period since the First Inspection. Within thirty (30) Days following performance of the Second Inspection, Developer shall submit the Second Inspection Report to TxDOT, which shall contain the findings of the inspection.

19.4.1.3 Final Residual Life Inspection

Between ninety (90) and thirty (30) days before the end of the Term, Developer shall perform a final Residual Life Inspection (the Final Inspection) including all Elements within the Project, regardless of whether Developer has undertaken Renewal Work for a particular Element in the period since the First Inspection. Within thirty (30) Days following performance of the Final Inspection, Developer shall submit the Final Inspection Report to TxDOT, which shall contain the findings of the inspection.

19.4.1.4 Specialist Inspections

Developer shall undertake Specialist Inspections for Elements listed in Table 19-3 in Section 19.3.4 of the Technical Provisions and shall include the inspection results as O&M Records.

19.4.2 Renewal Work Schedule at Handback

The Renewal Work Schedule for each of the five years before handback shall include, in addition to any other requirements specified in the CDA Documents:

a) Developer's calculation of Residual Life for each Element calculated in accordance with the Residual Life Methodology and taking into account the results of the inspections set forth above.
b) The estimated cost of the Renewal Work for each Element at the end of its Residual Life.

19.4.3 Residual Life Requirements

For any Element in Table 19-2:

a) Where a Residual Life at Handback is specified, the Residual Life at Handback shall be equal to or greater than the period set forth.

19.5 Highway Location and Data Requirements

19.5.1 Texas Reference Marker System (TRMS)

TxDOT shall establish the *Texas Reference Marker System* for the Developer's implementation.

19.5.2 Establishment of Auditable Sections

The entire Project and all Work shall be subject to Auditable Sections. Developer shall establish Auditable Sections referenced to the *Texas Reference Marker System*. Developer shall establish and prepare plans identifying the Auditable Sections. The plans shall identify the boundaries of each Auditable Section and shall cross reference to an inventory describing each Element of the Project contained within each Auditable Section. Developer shall submit these plans no later than thirty (30) days prior to commencement of initial inspections.

19.5.3 Maintenance Management Information System (MMIS)

Developer shall implement a computer based MMIS to record inventory, failures, repairs, maintenance activities and inspections performed. Developer shall enter all of the physical Elements into the MMIS with Element identifications (IDs) consistent with those descriptions and units of measure used by TxDOT. All information shall be recorded in a consistent manner and shall be searchable by individual attribute.

Developer shall include relevant physical Element information in the MMIS including but not limited to, location, equipment nomenclature, serial number, name, date of installation, technician ID, type of failure, date-time of failure, date-time of response to the site and date-time time returned to service, preventive maintenance work, scheduled work, work repair code, failure and repair history, and statistical data on mean time between failure and mean time to repair. The MMIS shall be configured to report work by TxDOT function code, physical Element, reference marker, crew and unit of measurement.

In the MMIS, the information for bridges shall include National Bridge Inventory (NBI) sheets. The MMIS shall be fully populated and operational prior to each Operating Commencement Date and kept updated and operational for the duration of the Agreement.

The MMIS shall be capable of reporting system performance on a geographical basis to demonstrate compliance with the Performance Requirements. The MMIS shall incorporate a Geographical Information System (GIS), which shall use the same database engine as the MMIS and shall use the MMIS for display of physical Element information. All physical Elements shall be recorded on the MMIS. The physical Element locations are to be accurate to within one foot in 100 feet. The information displayed geographically shall include pavement condition measurements, maintenance limits, average daily traffic and truck counts, Work performed by roadway segment, type of work, crew/contractor, etc., and any other information relevant to the construction, operation, maintenance and renewal of the Project. When a physical Element is constructed, installed, maintained, inspected, modified, replaced or removed, the MMIS shall be updated within three (3) days of completion of such Work. Defects shall be recorded on the MMIS within three (3) days of them coming to the attention of Developer. All other recording requirements shall be recorded on the MMIS within fifteen (15) days of completion or occurrence of the relevant activity.

Developer shall fully populate and make operational the MMIS prior to the Operating Commencement Date for the Project and shall keep the MMIS updated and operational for the duration of the Agreement. Developer shall provide equipment, facilities and training necessary to permit remote, real-time, dedicated high-speed access to the MMIS, via one terminal each, for TxDOT and the Independent Engineer. Developer shall handover the fully populated MMIS and everything required for its operation

to TxDOT, or other entity as directed by TxDOT, upon expiration or earlier termination of the Agreement and Lease.

20. BICYCLE AND PEDESTRIAN FACILITIES

20.1 General Requirements

This Section 20 includes requirements with which Developer shall design and construct all bicycle and pedestrian facilities for the Project. Developer shall ensure the bicycle and pedestrian facilities of this Project support TxDOT's commitment to integrate bicycle and pedestrian travel into Project development. Developer shall coordinate the Elements of this Project with the existing and planned trails and other facilities of local and county administrations for pedestrians and cyclists.

20.2 Administrative Requirements

Developer shall maintain and keep operational all bicycle and pedestrian facilities during construction and throughout the Term of the Agreement. If Work disrupts a bicycle or pedestrian facility, Developer shall provide alternative routes to be reviewed and approved by TxDOT.

20.3 Design Requirements

20.3.1 Bicycle Facilities

Developer's facilities shall be consistent with the region's bicycle and pedestrian plan, and accommodate existing bicycle paths and crossings, and on-street bicycle facilities. Work shall accommodate existing and planned bikeways in the City of Houston Bikeway Network. Developer shall coordinate with Governmental Entities to ensure consistency with existing and proposed bicycle facilities.

Developer's facilities shall meet the requirements of the AASHTO Guide for the Development of Bicycle Facilities and shall incorporate the following elements relating to bicycle facilities into the Design:

a) Alignment, profile, cross-section, and materials
b) Points of connection to existing and proposed bicycle facilities
c) Signing, signalization, and pavement markings
d) Separation between bicycle facilities and the nearest travel lane
e) Methods of illumination, where applicable
f) Requirements of the Aesthetics and Landscaping Plan

If Work disrupts the bikeways along Brays Bayou, Developer shall coordinate with City of Houston and the Houston Parks Board to develop detours and signage to maintain the connectivity of these bikeways through the SH 288 right-of-way. Developer shall submit to City of Houston a detour plan for City of Houston's review and approval. The Developer shall not disrupt nor detour the bike routes on the north and south sides of Brays Bayou at the same time. At least one existing bike route shall remain operational along the top bank of the channel in its current location during any Work. Bike routes impacted by the Work shall be restored to their current condition and function.

20.3.2 Pedestrian Facilities

Developer shall design, construct, and maintain sidewalks along the frontage roads and side streets where sidewalks currently exist and where required by State or federal regulations. Sidewalks and pedestrian facilities shall comply with the *Texas Accessibility Standards*. Developer shall install pedestrian signals and curb ramps at all existing and proposed signalized intersections. All pedestrian facilities shall be designed to incorporate ambulatory, visibility, and auditory needs of all users and shall include the following elements relating to pedestrian facilities:

a) Alignment, profile, cross-section, and materials
b) Points of connection to existing and proposed pedestrian facilities
c) Signing, signalization, and pavement markings
d) Separation between pedestrian facilities and the nearest travel lane
e) Methods of illumination, where applicable
f) Requirements of the Aesthetics and Landscaping Plan(s)

Prior to NTP2, the Developer shall conduct an inventory of all existing sidewalks and footpaths. Developer shall design, construct, and maintain sidewalks along the Frontage Roads and side streets as follows:

a) There is evidence of pedestrian traffic (either pedestrians are observed, there is a beaten down path, or significant potential exists for pedestrians to walk in the roadway); or
   The Frontage Road is located on a route to a school or a transit route.
b) At all intersections that are affected by the Work.

Developer is responsible for obtaining Texas Department of Licensing and Regulation (TDLR) reviews and approvals of pedestrian facility design and construction.

21. TOLLING

This section sets forth the technical requirements for tolling, based on the principle that Developer provides toll transaction data and images to TxDOT in a prescribed format and within required performance requirements and TxDOT provides back-office functions including call center operations, customer account management, transponder issuance, customer noticing, and customer payment collection.

21.1 General Requirements

In the PMP, Developer shall specifically set forth a managerial approach, strategy and quality procedures and methods to design, develop, test, integrate, deploy, operate, and maintain the Open Road Tolling (ORT) Electronic Toll Collection System (ETCS) aspect of the Project while achieving all requirements herein.

Developer acknowledges that toll transaction data records will be provided to TxDOT according to the screenline principle in which Users are assessed a toll whenever they pass a given Tolling Zone (i.e., the physical area, typically under or near the gantry structure that contains the toll lane sensors and equipment, within which a toll transaction takes place due to the passage of a vehicle) regardless of the distance traveled on the Project, and not according to the trip-generation principle, in which Users are assessed a toll depending on the distance traveled.

Developer shall include the ETCS design in the Final Design Documents and shall submit the design and related documents in accordance with the PMP and CDA Documents. Developer shall demonstrate through the documentation and testing that its ETCS design is capable of serving the Ultimate Configuration.

Developer shall design, develop, test, integrate, deploy, operate and maintain the ETCS to:

- Provide data to and receive data from TxDOT, including properly creating and transmitting to TxDOT for each User a record of the toll due, in accordance with the requirements specified herein; and
- Enable TxDOT to maximize collection of all toll payments from Users.

21.2 Administrative Requirements

Developer shall meet all requirements herein and those set forth in, including but not limited to, the Tolling Services Agreement (TSA) for the Project, TxDOT's tolling business rules, and TxDOT's SH288 Tolling Policy.

21.3 Design Requirements

Developer shall prepare the ETCS design in accordance with the requirements of this Section 21 and all applicable TxDOT Standards. Developer shall specifically identify, within the PMP, proposed Deviations from the requirements of this Section 21 and TxDOT Standards.

21.4 ETCS Design and Operational Criteria

21.4.1 ETCS Infrastructure Requirements

Developer shall design, build, operate and maintain the ETCS infrastructure needed to satisfy the ETCS functional requirements set forth in Section 21.4.2. The ETCS infrastructure shall accommodate safe and

secure access to all ETCS components for maintenance and repairs and shall not incorporate any feature to cause or require vehicles to slow down.

21.4.1.1 Mainline Tolling

Not used.

21.4.1.2 Ramp Tolling

Not used.

21.4.1.3 Utility and Personnel Access-way

Not used.

21.4.1.4 Vehicle Occupancy Declaration

Not used.

21.4.2 ETCS Functional Requirements

In addition to the requirements herein, the ETCS shall also be subject to the performance standards set forth in Table 21-2 below.

21.4.2.1 General

The ETCS shall be modular in design, allowing for expedited removal and replacement of components during lane closures. All ETCS components that perform the same function shall be interchangeable.

21.4.2.2 Vehicle Detection

For each vehicle that passes through a Tolling Zone either on the traffic lane or on the shoulder, the ETCS shall detect the vehicle's presence and shall correctly discriminate and associate a transaction to the vehicle and lane the vehicle is traveling in.

21.4.2.3 Vehicle Identification

The ETCS shall prevent any Transponder read from being assigned incorrectly to any leading, trailing or nearby vehicle. For each vehicle carrying a properly mounted, valid, working transponder that passes through the Tolling Zone, whether the vehicle is in a traffic lane, on a shoulder or between lanes, the ETCS shall correctly read from the transponder and produce a valid Transponder Transaction.

21.4.2.4 User Classification

The ETCS shall accurately classify each detected vehicle according to the specified User Classification (see Exhibit 10 – Toll Regulation). When the ETCS detects a vehicle, the ETCS shall count and record the number of axles on the vehicle. Based on the number of axles and the specified classification structure, the ETCS shall determine the vehicle's User Classification.

21.4.2.5 Image Capture and Processing

Regardless of whether or not the ETCS is able to generate a valid Transponder Transaction, the ETCS shall capture images of the front and rear license plate areas of each detected vehicle, including motorcycles, that passes through the Tolling Zone and associate the images with the vehicle.

For all Toll Transactions, Developer shall cause all images associated with each vehicle to be processed by a Developer-provided optical character recognition / automatic license plate reading (OCR/ALPR) system in order to determine the plate characters, plate type and jurisdiction of issue of the vehicle's license plate(s).

21.4.2.6 Supplemental Lighting

Any supplemental lighting that Developer chooses to install shall be deployed within the Project ROW and shall not cause light pollution at Tolling Zones that are in close proximity to neighborhoods or waterways.

21.4.2.7 Interfaces

The ETCS shall interface with the specified CSC Host in accordance with TxDOT's latest approved Service Provider to Subscriber Interface Control Documents (ICD). As specified by the ICD, for each Video Transaction, the ETCS shall include in the transaction record information indicating why a valid Transponder Transaction could not be generated.

21.4.2.8 Interoperability

The ETCS shall be interoperable with all transponders issued by tolling authorities sanctioned by TxDOT. The different types of transponders currently in use in Texas are shown in Table 21.1. Developer shall provide and integrate transponder readers and antennae that are compatible with the ATA protocol compatible transponders.

Table 21.1: Transponder Models

TransCore Model Number	Power	Internal/External	Mounting Surface	Agency
AT5544	Battery	Either (sealed case)	Non-metallic	HCTRA/TxDOT
AT5545	Battery	Either (sealed case)	Metallic	HCTRA
AT5547	Battery	Internal	Non-metallic	HCTRA
AT5140	Battery	External (bumper)	Metallic or Non-metallic	HCTRA
13-0700-900	Beam	External (bumper)	Metallic or Non-metallic	HCTRA
AT5100	Beam	Internal	Non-metallic	NTTA
AT5145	Beam	External (bumper)	Metallic or Non-metallic	NTTA/TxDOT
13-07xx-xxx	Beam	Internal	Non-metallic	HCTRA/NTTA/TxDOT

21.5 Advance Toll Information Signs

See Section 16.3.2.2 for requirements.

21.6 Functional Availability and Performance Requirements

Each Tolling Zone in the ETCS shall meet the Functional Availability and Performance Requirements stated in Table 21-2.

A Tolling Zone's Functional Availability is defined as the ratio of the hours that the Tolling Zone operates while satisfying the Performance Requirement(s) related to the function expressed as a percentage of the total hours of operation for the Tolling Zone.

The Tolling Zone's Performance Requirements shall apply throughout all times of the day and throughout a vehicle speed range of 1 to 100 mph, with the exceptions of classification and image capture, for which the stated Performance Requirement shall be achieved for a speed range of 5 to 100 mph. In addition, the Performance Requirements shall apply to all vehicles whether they are traveling closely together or far apart.

Table 21-2: Tolling Zone Functional Availability and Performance Requirements

Function			*Functional Availability Requirement* (measured on a monthly basis)	
Vehicle detection, transponder read, and transaction creation capability			≥ 99.96%	
Video image capture capability			≥ 99.50%	
Vehicle classification capability			≥ 99.00%	
OCR/ALPR capability			≥ 96.00%	
Ref.	Parameter	Requirement	Measurement Method (measured on a monthly basis)	Performance Requirement
1	Vehicle detection and transaction creation success rate	For all vehicles passing through the Tolling Zone, a Transponder Transaction or Video Transaction is produced.	The success rate is defined as the total number of transactions correctly recorded, expressed as a percentage of the total number of vehicles passing through a Tolling Zone. A maximum of one toll transaction per vehicle shall be considered for each vehicle, whether a Transponder Transaction or Video Transaction.	≥99.80%
2	Transponder read success rate	For all vehicles carrying a valid, properly mounted transponder and passing through the Tolling Zone, a correct Transponder Transaction is reliably produced.	Transponder read success rate is defined as the number of Transponder Transactions correctly generated, expressed as a percentage of all vehicles carrying a valid, properly mounted transponder and passing through a Tolling Zone.	≥99.95%

3	License plate image readability success rate	For Toll Transactions, the license plate images produced by the image capture system shall be human-readable and contain images from which the plate characters, plate type and issuing jurisdiction can be identified.	The license plate image readability success rate is defined as the number of readable plate images (regardless of how many images are associated with a specific transaction) in which the plate characters, plate type and jurisdiction of issue are discernible and can be converted unambiguously to text by an operator, expressed as a percentage of the total number of plate images that Developer is required to obtain (excluding plate images for ineligible vehicles, *see Note 1*).	≥98.00%
4	OCR/ALPR success rate	For each human-readable license plate image produced by the image capture system, the OCR/ALPR system shall process the image and automatically identify the license plate's characters, plate type, and issuing jurisdiction and provide a confidence value for such.	The OCR/ALPR success rate is defined as the number of Toll Transactions with at least one human-readable plate image in which the vehicle's license plate characters, plate type and issuing jurisdiction are correctly identified by the OCR/ALPR system based on the Toll Transaction's image that the OCR/ALPR system deemed to have had the highest confidence value, expressed as a percentage of the total number of Toll Transactions with at least one human-readable plate image.	≥90%

Note 1: Ineligible vehicles are those for which an image is obtained that due only to one or more of the following conditions cannot be reliably read by the human eye:

- The vehicle either has no license plate or it is not mounted in the legally required position
- The license plate is covered by dirt or snow rendering it unreadable
- The license plate is damaged, bent or broken rendering it unreadable
- The license plate is blocked by an object carried by the vehicle (such as a plate frame, overhanging cargo or a trailer towing ball)
- The license plate is blocked by something in the lane such as a person or another vehicle

21.6.1 ETCS Performance Audit

At a minimum, Developer shall conduct an annual performance audit to verify that system reliability and accuracy has not degraded below the requirements stated herein.

No more than 30 days after the performance audit has been completed, Developer shall submit a report of the results. The report shall include, at least, the following:

- A summary of the overall testing methodology and test results
- An explanation of, and remedy for, any system deficiencies
- An appendix containing the detailed test procedures, results, and data used in evaluating the system's operational performance

21.7 Construction Requirements

Developer shall furnish and install a ground box at each conduit terminus. Developer shall coordinate with TxDOT to determine the exact dimensions of the Tolling Zone maintenance area and the location of all conduits and ground boxes.

Developer shall be responsible for coordinating with the communications and electrical Utility Owners to purchase and install the service on behalf of TxDOT.

22. OPERATIONS

22.1 General Requirements

The responsibility of Developer for operations Work will begin as noted in Section 16.2 of the Agreement and continue for the Term of the Agreement. Developer shall institute an effective operations management system to monitor the condition of the Project.

22.2 General Operations Obligations

Developer shall prepare an Operations Management Plan, which shall set forth in detail, at a minimum, the approach, procedures, and implementation for the following:

a) Employment and training of competent personnel to carry out all aspects of the Operations Management Plan
b) Coordination of activities of other entities with interests within the Project limits
c) Monitoring the condition and operational performance of the Project
d) Incident response, management and reporting
e) Traffic operations restrictions, including periods of lane closure restrictions
f) Tolling integration with other tolling agencies, if applicable
g) Approach, procedures, and methods for an Open Road Toll (ORT) Electronic Toll Collection System (ETCS), if applicable
h) Standard operating and communication procedures for Emergency preparation, response, and recovery, including impacts from extreme weather conditions
i) Planning and coordination with all affected Governmental Entities, including Emergency Services
j) Liaison with any Traffic Management Centers that TxDOT or other entities may establish
k) Analysis of vehicular accident patterns to identify safety issues and implement cost effective solutions to maximize safety
l) Identification, containment and disposal of Hazardous Materials spills
m) Prompt investigation of reports or complaints received from all sources
n) Policing of the Project

Developer shall submit the Operations Management Plan (OMP) for operations during the DB Phase to TxDOT for approval at least sixty (60) Days prior to NTP2; approval of the plan by TxDOT shall be a condition of NTP2. The OMP for the DB Phase shall be developed by Developer to a level of detail appropriate for the operations to be performed during the DB Phase.

The OMP shall be updated by Developer as necessary to include the operations to be performed after Service Commencement including addressing any requirements when only part of the Project has opened for traffic. The updated OMP shall be submitted to TxDOT at least sixty (60) Days prior to Service Commencement; approval of the plan by TxDOT shall be a condition of Service Commencement.

Between NTP1 and the Operating Commencement Date, Developer will coordinate with TxDOT to ensure a smooth transition of operation responsibilities from TxDOT to Developer, which will be effective as noted in Section 16.2 of the Agreement.

Developer is to prepare the following reports on a quarterly basis, except as noted below:

a) Incident Reports: For each Incident, the report shall identify the nature of the Incident, detection time, verification time, move time, clearance time, date, location, number of lanes affected, which lanes are affected, number of lanes, direction of lanes affected, parties involved, and actions taken. Developer shall include details for any traffic control in place at the time of the Incident.

For Incidents involving deaths, a report shall be submitted to TxDOT within 24 hours of the Incident.

b) Non-Conformance Reports: For each material Defect in the Project Elements, the report shall identify the location, nature, and cause of the material Defect and the steps that will be, or have been, taken to address the material Defect.
c) Traffic Reports: Each traffic report shall summarize traffic volumes along the Project on a daily, weekly, and monthly basis.
d) Maintenance Work Report: Each maintenance work report is to describe the following:
    - Inspections conducted, including the date and type of inspection
    - Material Defects or damage identified, including the date, infrastructure component, details of material Defect or damage
    - Details of the maintenance work carried out
e) Quality conformance summary (i.e., the results of a quality program).
f) Environmental monitoring activities, as required in Section 4 (Environmental)
g) Rehabilitation plans (annually): Description of the rehabilitation program conducted in the previous year and updates to the five-year rehabilitation plan to describe the planned rehabilitation Work and identify any changes from the previous plan
h) Operations plans (annually): updates to the Operations Management Plan, including planned operating procedures and any changes from the previous operations plan

Upon request, Developer shall also provide TxDOT any technical documentation it maintains regarding the operations or maintenance Work.

22.3 Operation of the Project

22.3.1 Corridor Management

Developer shall coordinate access to the Project by companies and Governmental Entities that have a legitimate need to work within the Project ROW, including Utility operators.

22.3.2 Condition Preservation

To protect the traveling public and other Users from unsafe pavement surface conditions and to facilitate drainage, Developer shall remove accumulations of dirt, sand, and gravel from the roadways, shoulders, curbs, intersections, traffic islands, and bicycle and pedestrian paths and along medians and roadside barriers throughout the year, as necessary to provide a safe, clean, free-draining condition. Developer shall ensure traffic control measures are implemented in accordance with the TMUTCD during pavement cleaning operations so that hazardous conditions are not created for the traveling public and other Users.

22.3.3 Patrols

Developer shall conduct regular patrols of all lanes of the facility, to identify conditions that are unsafe or have the potential to become unsafe; to identify conditions that could threaten the infrastructure; and to attend to existing or changing conditions. Patrols must be conducted at least once every 24 hours during normal operating conditions, but no less frequently than every two hours during significant weather events.

The record of a patrol shall include details of the weather conditions, road surface condition and any unusual features of the method of inspection.

22.3.4 ITS Operations

Developer shall have primary access to and control of all DMS, CCTV, and vehicle detection systems placed on and data/video generated from the Toll Lanes, General Purpose Lanes, and Frontage Roads. Developer shall provide TxDOT with secondary access to the same.

Secondary access to data shared between TxDOT and Developer shall be through a center-to-center interface, conforming to the most current technology being used by TxDOT.

ITS operations and equipment shall be limited to real-time traffic information, public service announcements, construction/maintenance lane closures, and Incident notifications. Developer shall not engage in commercial use or selling of ITS data, equipment, or space.

22.3.5 Traffic Control and Incident Management

Developer shall manage access and use of the Project, including access and use by vehicles, cyclists, and pedestrians. Lane closures for repair and reconstruction during the Term of the Agreement, shall conform to TMUTCD.

In the event of an Incident, Developer shall provide traffic management and cooperate with responding agencies, police, and Emergency Services, as appropriate, depending on the nature of the Incident.

As a part of Developer's Operations Management Plan (OMP), a comprehensive Incident Management Plan (IMP) shall be developed by and documented by Developer to ensure that Developer has considered, planned, addressed, and trained for all likely natural and man-made events or situations that are Incidents or Emergencies, and has established protocols, procedures, and guidelines to mitigate the impacts, and respond to and recover from all such events. In the IMP, Developer shall clearly distinguish between events or situations considered as either Incidents or Emergencies. Developer shall prepare the IMP and its subcomponents in coordination with and input from the Participating Agencies that are responsible for resolving Emergency events. Developer shall submit the IMP as a part of the Project's OMP Submittal and shall include in the IMP the following items:

a) Procedures to identify Incidents and notify Emergency Services providers and establish traffic control for Incident management activities in a timely manner;
b) Procedures for removal of stalled, broken down, wrecked or otherwise incapacitated vehicles from the travel lane and shoulder lane, including coordination with Emergency Services/Law enforcement;
c) Procedures to provide a maximum response time of fifteen (15) minutes by Developer and all measures to be instituted by Developer to initiate traffic control within forty-five (45) minutes of notice of the Incident;
d) Procedures for cleanup of debris, oil, broken glass, etc. and other such objects foreign to the roadway surface;
e) Procedures to communicate IMP information to Developer's public information personnel and notify the public of traffic issues related to Incidents in keeping with the requirements of Section 3 of the Technical Provisions; and
f) Descriptions of contact methods, personnel available, and response times for any Emergency condition requiring attention during off-hours.

22.3.5.1 **Incident Response**

Developer shall cause a trained member of staff to be available twenty-four (24) hours a Day, seven (7) Days a week to coordinate Developer's response to any Incident or Emergency. Developer shall assist Participating Agencies providing Emergency Services to minimize danger, disruption or delay to the public and pollution of watercourses or groundwater.

Developer shall attend to Incidents with trained personnel, equipped to perform the functions required in Section 22 of the Technical Provisions, in accordance with the obligations stated in the Performance and Measurement Table Baseline (See Table 19.1).

Developer shall provide services for automobile towing of Users' light and heavy vehicles at the Users' expense.

22.3.5.2 Clearance

Where an Incident or Emergency has an effect on the operation of the Project, Developer shall clear obstructions and repair damage to the Project, in accordance with the IMP, under the supervision of the relevant Participating Agencies if necessary, such that the Project is returned to normal operating standards and safe conditions as quickly as possible.

- Where liquid or soluble material spills are involved, Developer shall take all necessary measures to minimize pollution of watercourses or groundwater.
- Where structural damage to Highway structures is suspected, Developer shall cause that a suitably qualified bridge engineer or specialist inspector is available to evaluate the structure and to advise on temporary repairs and shoring needed to provide safe clearance of the Incident or Emergency.
- Where such an Incident or Emergency involves a personal injury, Developer shall not remove any vehicle or other item that may assist a potential investigation by a Participating Agency until authorized to do so by such agency or agencies.

22.3.5.3 Safety

In the event of an Incident, Developer shall commence the implementation of safety procedures (including road signing, information for Users, information for Law enforcement agencies) as soon as practicable.

Developer shall appoint a traffic safety officer and one or more deputies to make all arrangements necessary for safety and traffic control including the provision and operation of recovery vehicles for breakdowns. Developer shall cause the traffic safety officer or one of his/her deputies to be on site at all times when safety and traffic management measures are proceeding and to be readily available at all times to deal with matters related to safety and traffic control. Developer shall perform traffic control and incident management of the Toll Lanes and General Purpose Lanes in an identical manner.

Developer shall not reopen any area of the Project which has been closed, until all appropriate safety and traffic management measures have been completed.

22.3.6 Policing

Developer shall coordinate Project policing requirements with the appropriate law enforcement agencies to provide a level of policing consistent with that provided on other similar facilities.

Should Developer require additional policing over and above this level, Developer shall be responsible for negotiating this additional service at no additional cost to TxDOT.

23. BUILDINGS AND ENCLOSED FACILITIES

23.1 General Requirements

23.1.1 Scope of Work

The Developer shall provide all buildings necessary to operate and maintain the Project in accordance with the requirements herein and Good Industry Practice. Buildings and enclosed facilities may include but are not limited to Maintenance Facilities and the Customer Service Center (CSC).

Buildings and enclosed facilities located inside the Project ROW and within State owned property shall be designed and built in accordance with the current codes and regulations of the Governmental Entity adjacent to the property location. Municipal ordinances regulating construction, including requirements for approvals, permits, etc., will not apply to facilities undertaken on property owned by the State; however, the Developer shall coordinate with appropriate Governmental Entities at relevant service connections.

23.2 Design Requirements

The Developer shall plan all required buildings and enclosed facilities to meet the functional requirements of the Project.

The Developer shall determine which Technical Provisions (or portions of) will be applied to the design of buildings and enclosed facilities covered herein.

23.2.1 Environmental Objective

For buildings with occupied spaces, the Developer shall achieve the goals of Leadership in Energy and Environmental Design (LEED™) V 2.2 Silver Certification.

23.2.2 Floor Flatness

For buildings with occupied spaces, floors on grade and elevated floors are to be engineered and constructed to achieve the following degree of floor flatness (Ff), when measured in accordance with American Society for Testing and Materials (ASTM) E 1155 – 1996:

a) Specified Overall Value: Ff 25
b) Minimum Localized Value: Ff 17

Floors on grade are to be engineered and constructed to achieve the following degree of floor levelness (Fl), when measured in accordance with ASTM E 1155-1996:

a) Specified Overall Value: Fl 20
b) Minimum Localized Value: Fl 15

23.2.3 Interior Design Criteria

For buildings with occupied spaces, the Developer shall provide finished interiors and fixtures as required to function properly for planned occupancies.

The acoustic performance/background noise shall meet the following criteria:

a) Provide interiors that maintain ambient sound levels in occupied spaces in accordance with the following, and within the Guideline Criteria for Heating Ventilation and Air Conditioning (HVAC)-Related Background Sound in Rooms, as defined in ASHRAE HVAC Applications Handbook, 2003.

Executive offices:	NC 20-30
Conference rooms:	NC 25-30
Semiprivate office:	NC 30-35
Large open office:	NC 35-45
Open office:	NC 40-45

23.2.4 Mechanical

The Developer shall provide mechanical systems appropriate for the intended functions of the facility(ies).

23.2.5 Electrical

The Developer shall provide electrical systems appropriate for the intended functions of the facility(ies).

23.2.6 Lightning/Surge Protection

The Developer shall provide lightning protection for the protection of all structures, buildings, equipment and areas exposed to the effects of lightning. The recommendations of NFPA 780 shall be considered required and the determination for the need for lightning protection on any particular structure, building or area shall be based on the results of a lightning risk assessment in accordance with Annex L of NFPA 780.

23.2.7 Security and Life Safety

Interior spaces used to house Critical Operations shall be located inboard of exterior walls and designed to prevent debris from entering operations areas. Exterior equipment that supports Critical Operations must be protected from flying debris. Additional security and life safety requirements are defined in Section 24.

23.3 Deliverables

23.3.1 Record Drawings and Documentation

Record Drawings shall include as-built drawings, specifications, and shop drawings necessary to completely describe the constructed Project, and with sufficient detail to adequately locate constructed elements.