Texas Department of Transportation

Technical Provisions

SH 99 Grand Parkway Project

Book 2

August 1, 2012

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PREFACE

Key Personnel title Superindendent as referenced elsewhere in the Contract Documents shall herein be referred to as Construction Manager.

Key Personnel title Design Quality Manager as referenced elsewhere in the Contract Documents shall herein be referred to as Professional Services Quality Control Manager.

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1 GENERAL

1.1 Project Scope

Developer is to design and construct Segments F-1, F-2 and G of the Grand Parkway. The scope of the Project shall be consistent with the Schematic Design and shall include construction of the initial build Elements indicated on the Schematic Design and further described in the legend generally including number of mainlanes (2 lanes in each direction) with auxiliary lanes, number of frontage road lanes (2 lanes in each direction with auxiliary lanes), at-grade ramps, direct connector ramps and intersection improvements. The scope of Work also includes major work Elements along the major crossings at US 290, SH 249, IH 45 North, Hardy Toll Road, and US 59 North. The limits of the Work for this scope of Work shall be as shown on the Schematic Design.

1.2 Facility Description

State Highway 99 (the "Grand Parkway") is a proposed 180-mile circumferential highway traversing seven counties in the Greater Houston Area. It is divided into 11 segments designated A through I-2. All segments together are referred to as the "Grand Parkway."

Descriptions of the individual segments included in the Work are found in the subsections below.

1.2.1 Segment F-1

- Location : From South of US 290 to West of SH 249
- Length : 12.1 miles
- Number of initial mainlanes: 4 (2 each direction)
- Frontage Roads: 2 discontinuous frontage roads (2 lanes in one direction per frontage road)
- ROW width: 400 feet with exceptions as noted in the Schematic Design
- Direct Connector Bridges (4):
    - US 290 SB to EB (Conn C)
    - US 290 SB to WB (Conn D)
    - US 290 EB to NB (Conn B)
    - US 290 WB to NB (Conn A)
- Mainlane Bridges:
    - US 290
    - Future Cypresswood Dr
    - Future Cumberland Ridge Dr
    - Schiel Road
    - Little Cypress Creek
    - Future Mason Road
    - Stream at Sta 2603+00
    - L112-00-00

    - Mueschke Rd
    - Stream at Sta 2727+00
    - Willow Creek
    - Cypress-Rosehill Road
    - Willow Flats Floodway Bridge/Lindsey Lane/Cedar Road/Telge Road
- Frontage Road Bridges
    - None
- Ramp Bridges (4):
    - Eastbound Exit and Westbound Entrance Ramps; West of Telge Road
    - Eastbound Entrance and Westbound Exit Ramps; East of Telge Road
- Cross Street Bridges
    - None
- Turnarounds
    - Future Cypresswood Dr. (N-S and S-N)
    - Future Cumberland Ridge Drive (N-S)
    - Boudreaux Road (W-E)
    - SH 249 (E-W, S-N and N-S)
- Tolling Locations
    - Cumberland Ridge Ramps; Eastbound Exit and Westbound Entrance Ramps
    - Mainlane Toll Gantry between Cumberland Ridge and Mueschke Road
    - Mueschke Road Ramps; Eastbound Entrance and Westbound Exit Ramps
    - Telge Road Ramps; Eastbound Exit and Westbound Entrance Ramps
    - Mainlane Toll Gantry between Telge Road and Old Boudreaux Road

1.2.2 Segment F-2

- Location : From West of SH 249 to West of IH 45 North
- Length : 12.2 miles
- Number of initial mainlanes: 4 (2 each direction)
- Frontage Roads: 2 discontinuous frontage roads (2 lanes in one direction per frontage road)
- ROW width: 400 feet with exceptions as noted in the Schematic Design
- Direct Connector Bridges (2):
    - IH 45 SB to WB
    - IH 45 EB to NB
- Mainlane Bridges:
    - Old Boudreaux Road/SH 249/Future Boudreaux Road
    - M122-01-00

- Huffsmith-Korville Road/Burlington Northern Railroad
- Gleannloch Forest Drive/Champions Forest Drive
- Boudreaux Road
- Boudreaux Road/Kuykendahl Road/Hildebrandt Road
- Northcrest Road
- Gosling Road
- Rothwood Road/Union Pacific Railroad
- Mossy Oaks Road

- Frontage Road Bridges
  - None
- Ramp Bridges
  - None
- Cross Street Bridges
  - FM 2920
  - Springwoods Village Parkway
  - Holzwarth Road (By Others)
- Turnarounds
  - SH 249 (W-E)
  - Future Boudreaux Road (1st crossing)(E-W)
  - Gleannloch Forest Dr (W-E)
  - Champions Forest Dr (E-W and W-E)
  - FM 2920 (E-W and W-E) (On bridge)
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  - Mainlane Toll Gantry between Champions Forest Drive and FM 2920
  - FM 2920/Boudreaux Ramps; Eastbound Entrance and Westbound Exit Ramps
  - Gosling Road Ramps; Eastbound Exit and Westbound Entrance Ramps
  - Mainlane Toll Gantry between Gosling Road and Springwoods Village Pkwy

1.2.3 Segment G

- Location : From West of IH 45North to West of US 59 North
- Length : 13.5 miles

- Number of initial mainlanes: 4 (2 each direction)
- Frontage Roads: 2 discontinuous frontage roads (2 lanes in one direction per frontage road)
- ROW width: 400 feet with exceptions as noted in Schematic Design
- Direct Connector Bridges (1):
    - US 59 North NB to WB
- Mainlane Bridges:
    - Energy Drive/IH 45 North
    - Northgate Crossing Blvd
    - Nelson St/Union Pacific Railroad/East Hardy Road/Spring Creek Trail
    - Hardy Toll Road/Spring Creek/Riley Fuzzel Road
    - Rayford Road
    - Birnham Woods Dr
    - Woodson Gully
    - Future Townsen Blvd
    - San Jacinto River
    - Bridge at Sta. 4087+50
    - Future Riverwalk Drive (Sta 4153+00)
    - Bridge at Sta. 4169+70
    - FM 1314
    - Future Road 2 (Sta 4267+00)
    - Valley Ranch Blvd
    - White Oak Creek (partial westbound structure; partial eastbound structure if Option A Work is exercised by TxDOT)
- Frontage Road Bridges
    - EB & WB Frontage Roads at GP/IH 45 North interchange (2 bridges)
    - EB & WB Frontage Roads at GP/US 59 North interchange (2 bridges)
    - EB & WB Frontage Roads at Woodson Gully
    - EB & WB Frontage Roads at White Oak Creek
- Ramp Bridges
    - Eastbound Entrance and Westbound Exit Ramps; West of IH 45
- Cross Street Bridges
    - IH 45 NB & SB Frontage Roads at GP/IH 45 North interchange (2 bridges)
    - US 59 North NB & SB Frontage Roads at GP/IH 45 North interchange (2 bridges)
- Turnarounds
    - IH 45 North (E-W, S-N and N-S); (On bridge)

- Riley Fuzzel Rd (W-E)
- Rayford Road (E-W and W-E)
- Birnham Woods Drive (E-W and W-E)
- Future Townsen Blvd (E-W)
- San Jacinto River (E-W)
- Valley Ranch Blvd (W-E)
- Future Rd (E-W and W-E)
- US 59 North (E-W, W-E, N-S, S-N))

- Tolling Locations
  - Mainlane Toll Gantry between Riley Fuzzel Road and Spring Trails Ridge
  - Spring Trails Ridge Ramps; Eastbound Entrance and Westbound Exit Ramps
  - FM 1314 Ramps; Eastbound Exit and Westbound Entrance Ramps
  - Mainlane Toll Gantry between FM 1314 and Valley Ranch Thoroughfare

1.3 Project Requirements

1.3.1 Compatibility with Ultimate Scope

The ultimate scope of Work for the Project shall be for the addition of two mainlanes, one in each direction, for a total of 6 mainlanes (the "Ultimate Scope"). The additional lanes shall be constructed as a widening to the inside, within the center median consisting of one 12-foot lane and one 10-foot shoulder in each direction of travel. The Developer's Work shall be compatible with the Ultimate Scope and accommodate construction of the remaining direct connectors and ultimate configurations of cross streets per Attachment 11-2. The scope of work for Utilities includes the adjustment of Utilities whether in conflict with the initial-build or Ultimate Scope configuration.

The design documents furnished by Developer shall provide for a smooth transition from the Project's scope of Work to the Project's ultimate scope condition. Developer shall endeavor to minimize "throw-away" costs associated with improving the Project to meet the requirements of the future Ultimate Scope configuration. The Work shall provide for minimal disruption to traffic and toll collection operations during the ultimate scope construction phase. Additionally, the Project scope of work shall be designed and built to minimize the cost associated with the future ultimate scope construction to the extent that Developer costs to construct the Project scope of work is not unreasonably increased.

1.3.1.1 Specific Project Requirements

The columns for the US 290 direct connectors shall be designed and constructed to accommodate the future connection of the ultimate SH 99 frontage road, currently designed as a depressed intersection, at US 290. The columns for the US 290 direct connector shall also be designed to accommodate the future widening and construction along US 290.

The columns for the Hardy Toll Road direct connectors at SH 99 shall be designed and constructed to accommodate the future addition of an outside lane in each direction on Hardy Toll Road.

1.3.2 Additional Requirements

1.3.2.1 FAA Doppler Weather Radar Facility

Developer shall provide continuous access during and after construction to the FAA Terminal Doppler Weather Radar (TDWR) facility located within Segment F-2. Access should accommodate all field personnel, a WB-50 design vehicle, equipment including 8-10 ton cranes with an approximate 130' telescoping boom. Utilities servicing this facility shall not be interrupted without written authorization from the FAA.

Developer shall be responsible for recommending, installing, and maintaining per the terms of the Agreement a protective structure such as, but not limited to, guard rail or concrete rail blocks along the south and east side of the TDWR facility adjacent to oncoming high speed mainlanes.

1.3.2.2 Early Completion Work

Two portions of the Project's scope of Work have been identified as Early Completion Work. The two portions include improvements at the IH 45 North and US 59 North interchanges as shown in the Reference Information Documents. Developer shall design, construct and make these two portions of Work available to receive traffic before any other portion or portions of the Work are completed and opened to traffic. The Work defined as Early Completion Work is to be performed in accordance with the terms and conditions as specified in Sections 4.1and 4.2 of the Development Agreement.

1.3.2.2.1 NTP3 Work

NTP3 Work shall consist of the Work Elements, in their entirety, as shown on Exhibit for Priority Phased Construction at IH 45 in Other Plans of the Reference Information Documents. This portion of the Work includes construction of SH 99 frontage roads between Holzwarth Drive and IH 45 North, the frontage road box at IH 45 North, portions of northbound and southbound IH 45 North frontage roads, in addition to the westbound frontage road bypass under Holzwarth Drive and Springwoods Village Pkwy.

The commencement of NTP3 Work is intended to coincide with the completion of the Holzworth Road bridge by others over SH 99, which is scheduled for completion by the Spring of 2013, or earlier, depending on access to the required ROW parcels and performing the required utility relocations to begin construction. Developer shall expedite ROW activities and utility agreements prior to commencement of NTP3 Work. TxDOT currently anticipates issuing a separate NTP3 for this work in accordance with Section 4.1.6 of the Development Agreement and Developer shall have 365 days from NTP3 to complete the Work as described in Section 4.2.3 of the Development Agreement. Upon completion of the NTP3 Work, the eastbound and westbound SH 99 frontage roads and improvements at IH 45 North must be open and remain open to traffic at all times to provide connectivity between Holzwarth Bridge and IH 45 North.

1.3.2.2.2 NTP4 Work

NTP4 Work shall consist of the Work Elements, in their entirety, as shown on Exhibit for Priority Phased Construction at US 59 in Other Plans of the Reference Information Documents. This portion of the Work includes construction of SH 99 frontage roads from Valley Ranch Boulevard to US 59 North and US 59 North frontage roads from White Oak Creek to Cutter Road in addition to the frontage road box over US 59 North, transition pavement to access Community Drive and SH 99 intersection improvements at Valley Ranch Boulevard and Future Road.

The commencement and completion of NTP4 Work shall be in accordance with Section 4.1.7 and Section 4.2.4 of the Development Agreement. Developer shall expedite ROW activities and utility agreements

prior to commencement of NTP4 Work. Upon completion of the NTP 4 Work, the eastbound and westbound SH 99 frontage roads, intersection improvements and improvements at US 59 North must be open and remain open to traffic in order to provide connectivity between Valley Ranch Boulevard and US 59 North and access to Community Drive from SH 99 and US 59 North.

1.3.2.3 Option Work

1.3.2.3.1 Option A Work

Option A Work includes construction of a single direct connector at US 59 North in Segment G. The scope of the Work, which is shown in Schematic Plans of the Reference Information Documents, includes construction of the eastbound SH 99 to northbound US 59 North direct connector. If Option Work A is exercised by TxDOT then the eastbound SH 99 mainlane procurement limits will end at the exit gore to the eastbound SH 99 to northbound US 59 North direct connector.

1.3.2.3.2 Option B Work

Option B Work includes construction of two direct connectors at the Hardy Toll Road in Segment G. The scope of the Work is shown in Schematic Plans of the Reference Information Documents and includes construction of the northbound Hardy Toll Road to eastbound SH 99 direct connector and the northbound Hardy Toll Road to westbound SH 99 direct connector.

1.3.2.3.3 Option C Work

Option C Work includes construction of two additional direct connectors at the Hardy Toll Road in Segment G. The scope of the Work is shown in Schematic Plans of the Reference Information Documents and includes construction of the eastbound SH 99 to southbound Hardy Toll Road direct connector and the westbound SH 99 to southbound Hardy Toll Road direct connector.

1.3.2.3.4 Options D, E, F, G & H Work

Option D, E, F, G & H Work includes the design and construction of five additional SH 99 cross streets located in Harris County at the approximate SH 99 centerline alignment reference stations provided in Table 1-A below. The scope of work for Option Work D, E, F, G & H is shown in the Reference Information Documents and includes construction of the applicable cross street under SH 99. The cross street design criteria for the initial-build configuration and the typical sections for the ultimate configuration are shown in Attachments 11-1 and 11-2, respectively.

Table 1-A

Option Work	Segment	Location	Approximate Station
D	F-1	Future Bauer Hockley / Grant Rd	2556+70
E	F-1	Future Botkins / Juergen Rd	2602+25
F	F-1	Future Cypress Hill Rd	2730+75
G	F-1	Future Shaw Rd	2982+90
H	F-2	Future Max Conrad Dr	3246+50

The Design Deviation for Mainlane Stopping Sight Distance for Optional Work D is shown in the Table 1-B below. The Developer is to refer to Attachment 11-3 for application of the recommended shoulder width.

Table 1-B

Mainlane Curves	Radius	PI Station	Direction	Design Speed (MPH)	Inside Shoulder Width
Segment F-1					
Option D - Curve XXX	**5,729.58**	**Sta 2549+08.83**	**WB\SB**	**70**	**6**

1.3.2.4 Exxon Mobil Wells

Two plugged wells have been identified in Segment F-1 within the Schematic ROW. The first is located close to the Schematic ROW line, north of SH 99, at approximately STA 2991+50 (Well B-12) and the second is located under proposed westbound SH 99 mainlane pavement at approximately STA 3007+00 (Well B-2). Table 1-1 provides the Well coordinates based in Texas State Plane Coordinate System, South Central Zone, NAD 83 (1993 adj).

Table 1-1

Exxon	Well B2		Well B12	
	Northing	Easting	Northing	Easting
Exxon SH 99	13,947,323.93	3,034,945.72	13,947,513.96	3,033,378.69

Developer shall provide a design that allows Well B2 to remain in place. Developer shall also provide sufficient access and work area for future maintenance, testing or repairs which may be required. The dimensions of this access and work area are 111 ft. by 150 ft. around Well B-2 as shown on the drawing labelled "F1Exxon Exhibit 01" included in the RIDs.

1.3.2.5 Riley-Fuzzel Ramps

Service disconnection and demolition of existing Hardy Toll Road exit and entrance ramps to and from Riley-Fuzzel Road shall not be initiated until replacement ramps have been constructed by others. Developer shall coordinate decommissioning and removal of existing ramps and construction of the replacement ramps with the Harris County Toll Road Authority (HCTRA).

1.3.2.6 CenterPoint Energy Easement

The final design PGL elevations of the initial-build and future direct connector ramps within the CenterPoint Energy easement, located in the north-west, north-east and south-east corners of the SH 99 at IH 45 North interchange, shall not exceed the PGL elevations currently shown on the Schematic Design in the Reference Information Documents.

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 and build the Project and achieve all requirements of the Contract Documents. Within the timelines 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 Book 2 That Defines the Chapter Requirements
Project Administration	Section 2
Quality Management Plan • **Design Quality Management Plan** • **Construction Quality Management Plan** • **Maintenance Management Plan**	Sections 2 and 19
Comprehensive Environmental Protection Plan	Section 4
Communications Plan • **Public** • **Developer Entities** • **Local Government and Stakeholders** • **TxDOT**	Section 3
Safety Plan	Section 2
TxDOT – Developer Communications Plan	Section 2
Right of Way Acquisition Plan	Section 7
Risk Management Plan	Section 2

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 shall 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

The Project Schedule shall define the timeframe for completion of the Project and achievement of milestones, and be used to monitor progress and denote changes that occur during design, construction and maintenance as well as serving to determine the amount due to Developer for a progress payment. Before the commencement of any Schedule Activity, Developer shall submit a Project Baseline Schedule (PBS) in accordance with the Work Breakdown Structure.

The scheduling software employed by Developer shall be compatible with the current and any future scheduling software employed by TxDOT (currently Primavera 6.2). Compatible shall mean that the Developer-provided electronic file version of a schedule may be loaded or imported by TxDOT using TxDOT's scheduling software with no modifications, preparation, or adjustments to do so.

Developer shall manage and execute the Work using schedules developed for management and execution of the Project Baseline Schedule (PBS).

2.1.1.2 Project Baseline Schedule

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 Project Baseline Schedule and shall submit the Project Baseline Schedule (PBS-2) to TxDOT for review and approval. Developer shall submit the Project Baseline Schedule to TxDOT with a reasonable amount of time for TxDOT review prior to NTP2. TxDOT will review the Project Baseline Schedule within 21days of submission. In the event that TxDOT does not accept the Project Baseline Schedule, 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 submit a hardcopy color plot as well as an electronic version of the schedule in its native format for each submittal along with the project schedule narrative.

Before commencement of any scheduled construction Activity, Developer shall obtain TxDOT approval of the PBS. Developer shall progress and update the PBS through schedule updates until a subsequent version of the PBS is approved by TxDOT.

Developer is solely responsible for planning and executing the Work and 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 Overview

The PBS shall be developed and implemented in the following stages:

a) PBS-1: Preliminary Project Baseline Schedule submitted prior to execution of the Agreement.

b) PBS-2: Developer shall use the Preliminary Project Baseline Schedule (PBS-1) as a foundation to prepare the PBS-2. Developer shall submit the Project Baseline Schedule (PBS-2) to TxDOT for review and approval. PBS-2 shall reflect the intended execution plan meeting all schedule requirements. Activity quantities related to Schedule of Value costs shall be based upon the Developer's proposed design. The data date for PBS-2 shall be the date of NTP1. The approved PBS-2 shall be progressed and updated monthly until a subsequent version (PBS-2+) is approved.

c) PBS-3: Inclusion of final design Elements will be incorporated into the PBS-2 schedule updates as release for construction (RFC) plans are completed. PBS-3 will be submitted 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 revision (PBS-3+) is approved or the Substantial Completion Date, whichever is earlier.

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 the PBS which describes the general sequence of design and construction, the proposed Critical Path and all Milestone Schedule Deadlines.

Developer shall submit a PBS in accordance with the Work Breakdown Structure (WBS), the minimum requirements of which are included in Attachment 2-2 of the Technical Provisions, Work Breakdown Structure Requirements, which is resource and cost loaded in accordance with Table 2-2, to TxDOT for review and approval. Each Schedule Activity shall be mapped to one of the WBS levels. Each segment of the Work shall be to the same level of detail. Developer shall utilize the organizational structure of Table 2-2, the minimum requirements of which are included in Attachment 2-3 of the Technical Provisions, Organizational Structure for Cost Reporting, for reporting Project costs.

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	Yes	Yes
	Resource Loading	No	No	Yes
	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	Yes	Yes
	Resource Loading	No	No	Yes
	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	Yes	Yes
	Resource Loading	No	No	Yes

	Maximum duration of Schedule Activity	No maximum	20 Days[1]	20 Days[1]
Design	WBS Level	4	All levels	All levels
	Cost Loading	No	Yes	Yes
	Resource Loading	No	No	Yes
	Maximum duration of Schedule Activity	No maximum	20 Days[1]	20 Days[1]
Utility Relocation	WBS Level	5	All levels	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	All levels	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]Unless 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. 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 including interfaces with the tolling integrator in toll zones.

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.

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

Resources shall be incorporated into the PBS per the following requirements:

a. Provide a list of crews with associated labor and equipment resources to TxDOT with the schedule submittal.

b. Define crews as a Labor Resource Type and assign to appropriate activities.

c. Provide TxDOT with a definition, the composition of and production rate for each crew type.

d. Do not include any costs for labor resources and do not calculate cost from units (price/unit =$0.00).

e. The "quantity" assigned to each activity shall represent the estimated efforts in place for the Schedule Activity value.

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. Each activity shall be assigned 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

The PBS shall be organized 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

Each Milestone Schedule Deadline shall be separately identified, conform to the scheduling requirements set forth in the Milestone Schedule, and be assigned a "finish no later than" constraint date. 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. Schedule Activities shall be created 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, bridges shall be broken down 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 2-1 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. Separate activities for cure time, major inspection points requiring preparation, submittal periods, environmental approvals and other time consuming activities shall be included.

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. *Critical activities shall be defined 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. Critical Path shall be highlighted in red on all schedules to distinguish critical Schedule Activities from other Schedule Activities and Float shown for all Schedule Activities.

d. *Leveling Resources* schedule option shall only be used 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 throughout the Payment Activities in the PBS. Such allocation shall not artificially inflate, imbalance, or front-load line items.

c. Developer's indirect costs such as project management, administration, contingencies, site cleanup and maintenance and security costs related to design-build costs shall be prorated through all Payment Activities.

Developer shall revise the cost loading during the course of the Project in Project Status 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. Change Orders as approved by TxDOT shall be added into the schedule with appropriate activities, resources, and units/budget to represent the modified scope of work. A WBS level for each executed Change Order shall be added under the "Change Modification" level of the cost breakdown structure (Table 2 of Attachment 2-3) All costs, if applicable, shall be mapped to the Change Order WBS level accordingly.

If applicable, revisions to the PBS and consequent realignment of funds between Payment Activities shall be requested by Developer through a PCO 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.

All executed Change Orders shall be incorporated into the originally planned execution of the Work. Developer shall submit to TxDOT a revised PBS within 14 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 considered as time for the exclusive use of or benefit of either TxDOT or Developer but shall be considered as 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 shall be a condition of NTP2.

Pertaining to the presentation of the Schedule of Values:

a. Payment Activities shall be organized and grouped according to Attachment 2-3. There can be one or more Payment Activities for each of the lowest (terminal) organizational structure elements referenced in Attachment 2-3 of the Technical Provisions, Organizational Structure for Cost Reporting. For example, earthwork (organizational Level III) could have one Payment Activity or multiple Payment Activities that roll up costs to the Level III 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's project management, administration, QA/QC, contingencies and any allowance for inflation, profit and financing, as well as site security shall be prorated 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, a revised Schedule of Values as derived from a revised PBS shall be submitted within 14 days after the respective Change Order is executed. TxDOT will review the submittal and within 14 days of submission, return it to Developer as approved or returned for resubmission. Developer shall repeat the submittal process until receiving TxDOT approval of the submittal.

2.1.1.2.12 Project Baseline Schedule Narrative

Developer shall provide a schedule narrative with the PBS-2 schedule and subsequent PBS submittals as follows:

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 may 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. Only planned resources available to Developer shall be included in the work force listing.

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 generated from the scheduling software (PDF file) 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
- Other layouts or reports as agreed upon with the TxDOT

2.1.1.2.13 <u>Project Baseline Schedule Submission</u>

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

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

TxDOT will review the schedule submittal and within 14 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 14 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 Status Schedule Updates

2.1.1.3.1 <u>Project Status 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

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.

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.

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

2.1.1.3.2 Project Status Schedule Update Narrative

Developer shall provide a narrative with each schedule update submittal which addresses each of the following:

a. Description of 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 QA/QC issues that can potentially affect the CPM model.

c. Explanation of deviations between the Work planned and the Work performed for the period.

d. Description of the Work to be accomplished during the next period.

e. Description of the current Critical Path of the project, explaining any changes since the previous update as well as potential issues and proposed resolutions.

f. Explanation of 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. Identification of requested and/or required TxDOT actions, if applicable, for the next month.

h. 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. 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 problem 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 following 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 generated from the scheduling software, in pdf format, 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 months 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

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 Status Schedule Update Submission

Developer shall submit to TxDOT the schedule update, narrative and agreed upon layouts or reports each month during the life of the DB Phase 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

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 14 days of receipt by Developer. The submittal process shall be repeated until receiving TxDOT approval of the submittal.

2.1.1.5 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 each Final Acceptance and described by the Contract Documents was actually performed including start and completion dates, Schedule Activities, actual durations, sequences and logic.

2.1.1.6 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 PCO Notice based on a delay as set forth in 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 the 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 7 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 and 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 date is delayed one or more working 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. Progress 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 Status Schedule Update is revised subsequent to submittal of a time impact analysis but prior to its acceptance, Developer shall promptly indicate, in writing, to TxDOT the need for any modification to its time impact analysis.

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.
- Describe mitigation efforts taken to date.
- Describe 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 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.

2.1.1.7 Recovery Schedule

If the Work is delayed to the Substantial Completion Deadline for a period which exceeds the greater of either thirty (30) 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 schedule update shall include a recovery schedule demonstrating the proposed plan to regain lost schedule progress and to achieve Final Acceptance of the last Project Segment by the specified date.

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

If the PBS-3+ schedule performance index values of the Project Construction scope falls below 0.65 with negative trending for 4 consecutive update periods, TxDOT has the option of requiring the Developer to resource load the remaining construction activities and perform a resource analysis of the required work force.

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 Contract 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.

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 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.

2.2 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. Developer Quality Management Plan shall comply with the requirements of current *TxDOT Design-Build Quality Assurance Program Implementation Guide*.

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 Contract 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 for review. Developer shall provide TxDOT 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 Subcontractors of all tiers.
c) Developer shall submit to TxDOT the results of all Project quality audits within seven Days of their completion**.**
d) Developer shall promptly submit to 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 Contract 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 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 Contract 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 Subcontractors.
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 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 TxDOT advises Developer of such a problem.

2.2.5.1 TxDOT Construction Notices

On a weekly basis, Developer shall provide TxDOT with a rolling three-week inspection notice. The inspection notification shall include the fabrication schedule and planned construction activities for items where TxDOT is performing the fabrication inspection.

2.2.5.2 Reporting, Recordkeeping, and Documentation

Developer shall develop and maintain inspection and testing records that include, but are not limited to:

a) Quality control inspection reports and process control material sampling/testing results and control charts shall be submitted to TxDOT within twenty-four (24) hours following the inspection or test.

b) The Construction Quality Acceptance Firm (CQAF) shall maintain, electronically, a daily log of all inspections performed for both Developer and Subcontractor operations in a format acceptable to TxDOT and transmitted to TxDOT daily. The daily inspection reports shall identify inspections conducted, results of inspections, location and nature of defects found, causes for rejection, and remedial or corrective actions taken or proposed. The responsible technician and supervisor shall sign the daily inspection reports. The results of the daily inspections shall be provided to TxDOT in an electronic format within twenty-four (24) hours after the work shift.

c) The CQAF shall be responsible for establishing an electronic system for recording all material test results. The responsible technician and his/her supervisor shall sign the daily test reports. The results of the daily test shall be provided within one (1) Day of test completion.

d) The CQAF's inspection and materials quality program shall electronically deliver the laboratory and field test results to TxDOT in the database format provided in Attachment 2-2. This electronic reporting is intended to allow the Developer and TxDOT to make timely and accurate decisions on workmanship and material quality issues.

2.2.5.3 Laboratory Requirements

Developer shall perform testing in accordance with, but not limited to:

a) Quality acceptance tests shall be conducted by the CQAF's testing laboratory identified in the CQMP that complies with the requirements of the AASHTO Accreditation Program (AAP) or other appropriate accreditation acceptable to TxDOT for the pertinent test. A copy of AAP accreditation certificate(s) shall be transmitted to TxDOT upon their receipt by the testing laboratory.

b) Equipment in all laboratories shall be certified prior to commencing any construction activities and shall retain the certification by AASHTO, or TxDOT, as applicable for the duration of the Work.

2.2.5.4 Supply Source and Material Quality

Quality of all materials shall conform to requirements contained in the Contract Documents and to any requirements of affected Utility Owners. The CQAF shall provide plant inspection and aggregate sampling and testing at concrete and asphalt plants. Manufacturers' test reports may supplement, but not replace, the QA inspections, sampling, testing and certification provisions.

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.

Developer's 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 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 shall prepare and submit to TxDOT for review and approval a Design Quality Management Plan (DQMP) that describes its policies, procedures, and staffing to manage design quality in accordance with the requirements of this Section 2.2.7.

2.2.7.1 Released for Construction Documents

Developer shall submit to TxDOT all Released for Construction Documents in accordance with the submittal requirements of the Design Quality Management Plan. Developer's Released for Construction Documents shall comply with the requirements of the Contract Documents, and shall be detailed, complete, constructible, and shall allow verification of the design criteria and compliance with Contract Documents.

Not later than two Business Days after Developer has completed design of any particular Released for Construction Document, Developer shall submit the signed and sealed document to TxDOT.

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 Contract Documents, the Developer shall provide to TxDOT 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 Contract 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 Documents 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 CADD 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 Final Acceptance 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. Developer shall submit to TxDOT the electronic files used to prepare the Record Drawings and documentation.

2.2.7.3 DQMP General Requirements

The DQMP shall describe and include the following general requirements:

a) The quality control and quality review procedures for Professional Services products shall be organized by discipline (such as structural, civil, utilities). These procedures shall specify measures to ensure that appropriate quality requirements are specified and included in the Professional Services product and to control deviations from such requirements.

b) Specific quality control and quality review procedures, including all required forms and checklists, shall be specified for preparing, verifying and checking all Professional Services products to ensure that they are independently checked and back-checked in accordance with generally accepted engineering practices in the State of Texas and the requirements of the Contract Documents. The checking of structural design shall include a set of independent calculations, performed by the Developer's Design Firm for all structural Elements.

c) The designer and checker shall be clearly identified on the face of all Final Design Documents. The DQMP shall also include specific procedures for verifying the Professional Services product along with any computer programs being used for such purposes. Design Documents shall be stamped, signed and dated by the Engineer In Responsible Charge for that item, Element, or phase of the Work.

d) Procedures shall be described for coordinating Professional Services performed by different individuals or firms working in the same area, in adjacent areas, or on related tasks to ensure that conflicts, omissions or misalignments do not occur between drawings or between the drawings and the specifications. This shall also include the coordination of the review, approval, release, distribution and revision of documents involving such parties.

e) Procedures shall: (1) ensure that Developer personnel are familiar with all the provisions of the Contract Documents concerning their respective responsibilities; (2) provide for the education, training and certification, as appropriate, of personnel performing activities affecting or assessing the quality of the Work to assure that such personnel achieve and maintain reasonable

proficiency; and (3) ensure that the Work is performed according to the DQMP, generally accepted engineering practices in the State of Texas and the Contract Documents.

f) Procedures shall be established for meeting documentation requirements; the filing of design criteria, reports and notes, calculations, plans, specifications, schematics and supporting materials needed during the Final Design; and the specific responsibilities of personnel to satisfy these requirements. All Design Documents shall be maintained, organized and indexed by Developer and copies made available to TxDOT upon request.

g) Procedures and schedules for the PSQCM to perform audits of the Design Firm's quality control procedures under the DQMP.

2.2.7.4 Personnel and Staffing

Professional Services Quality Control Manager. Developer shall assign a Professional Services Quality Control Manager (PSQCM) who shall be responsible for management of quality control program for the design, environmental, ROW, Utilities and survey. The PSQCM shall not be involved with direct scheduling or production activities; and shall report directly to Developer's management team. The PSQCM shall see that the methods and procedures contained in the approved DQMP are implemented and followed by Developer design staff in the performance of the Work. The PSQCM shall be a Registered Professional Engineer.

Personnel in Responsible Charge. Developer shall designate (by name) the personnel in responsible charge for each item, Element, or phase of the Work. The Design Manager shall be responsible for ensuring that the overall Project design is completed and design criteria requirements are met. This individual shall be co-located whenever design activities are being performed, including design activities related to field design changes. The Lead Roadway Engineer shall be the engineer of record for the roadway, and shall be responsible for ensuring that the design of the roadway is completed and design criteria requirements are met. The Lead Bridge Design Engineer shall be the engineer of record for the bridges, and shall be responsible for ensuring that the design of bridges is completed and design criteria requirements are met. The personnel in responsible charge shall possess the necessary registrations in the State of Texas and shall be personally responsible for directly supervising the Work and who will stamp, sign and date the Professional Services product for a given item, Element, or phase of the Work as applicable.

Reviewing Professional Services. The Developer personnel performing the quality control check of the Professional Services shall not be directly involved with the original development of the item, Element, or phase being checked.

2.2.7.5 Professional Services Submittal Review Process

Developer shall conduct a series of working meetings with its Professional Services staff, the internal quality control of Developer staff and TxDOT to establish workflow processes and procedures to be utilized during the design review process that are consistent with the Contract Documents. The working meetings are also to develop an understanding on general design concepts such as geometrics, aesthetics, drainage, traffic control, and structures.

Developer and TxDOT shall collaborate and mutually agree upon (i) a list of proposed sections (i.e., Station x+xx to Station y+yy) for the Work; (ii) Professional Services packaging and content (such as drainage, individual structures, roadway, traffic sequencing, and others); (iii) a list of mandatory submittals; and (iv) a proposed submittal schedule. The Professional Services reviews shall be evenly scheduled over the duration of the Professional Services phase of the Work. Sections and packages shall be logically organized into manageable pieces and shall contain sufficient information and details to

confirm Developer intent and to validate conditions. Developer shall obtain TxDOT's written approval of the sections, packages and contents, the schedule, and the methodology prior to making the first submittal.

The PSQCM shall chair the submittal reviews with TxDOT and Developer shall maintain formal documentation of these meetings for TxDOT's audit.

The purpose of the submittal reviews is for TxDOT to review Professional Services products for general compliance with Project requirements, sound engineering practice, applicable Law, the Governmental Approvals and the Contract Documents. All submittals are subject to review and comment by persons designated in the Technical Provisions.

If the Developer and TxDOT cannot come to an agreement on the list of mandatory submittals, the following list shall be provided at minimum:

- Corridor Structure Type Study and Report submittals
- Preliminary Bridge Layout submittals
- Preliminary Design submittal
- Final Design Submittal
- Any deliverables described in the Technical Provisions
- Exhibits Supporting Railroad Agreements
- Design Exceptions and Design Waiver Requests

2.2.7.5.1 **Final Design Submittal**

The Final Design Submittal shall be submitted to TxDOT for general review and the PSQCM shall provide certification of compliance. Construction packages for individual Work items, Elements or phases shall be organized such that the final document package can be assembled in a manner similar to the standard construction documentation typically provided to TxDOT for conventional project letting, as mutually agreed upon by Developer and TxDOT.

When Developer has completed the Final Design Submittal for an item, Element, or phase and wishes to obtain TxDOT's concurrence of such a design, the PSQCM shall certify that:

a) The design meets all applicable requirements of the Contract Documents, applicable Law and the Governmental Approvals.

b) The design has been checked in accordance with Developer's approved DQMP.

c) The item or Element is ready for construction.

d) Developer has obtained all required Project ROW, Governmental Approvals, and Utility Owner approvals.

The Final Design Submittal shall be complete Design Documents incorporating all of the design submittal review comments. All documentation, including copies of TxDOT's approval of deviations for design standards and/or Design Exceptions shall be provided with the Final Design Submittal.

Prior to certifying the above items, Elements, or phases, and upon review and comment of the Final Design Submittal by the TxDOT, PSQCM shall schedule a formal review with TxDOT.

2.2.7.5.2 Formal Review

PSQCM shall conduct a formal review presentation to TxDOT at a location acceptable to TxDOT. The formal review presentation shall be held following the TxDOT's review and comment of the mandatory submittals.

At least five (5) Business Days prior to the applicable formal review presentation dates, Developer shall assemble and submit drawings or other documents to TxDOT for information and review.

Draft minutes of formal review presentations shall be submitted to TxDOT by PSQCM within five (5) Business Days after completion of each review.

2.2.7.6 Resubmittal Process

Resubmittals of any design submittal may be required if deemed necessary by TxDOT or any Governmental Entities with jurisdiction over the Project. Each resubmittal must address all comments received from a prior submittal in a manner satisfactory to the commenting party. Submittals shall be resubmitted as many times as necessary to address comments from TxDOT or any Governmental Entity with jurisdiction over the Project.

If TxDOT had requested additional information during the final formal review, PSQCM shall conduct an additional formal review of the resubmitted items, Elements, or phases. A copy of all correspondence relating to each submittal made to any Governmental Entity with jurisdiction over the Project shall be concurrently provided to TxDOT.

2.2.7.7 Certification of Compliance

PSQCM shall verify that Developer obtained approval from applicable Governmental Entities and Utility Owners prior to the issuance of a "Certification of Compliance" designation of the Design Documents by the PSQCM. Following issuance of a "Certification of Compliance" by the PSQCM, TxDOT shall review and provide written concurrence.

After Developer has incorporated the Final Design Submittal and/or the resubmittal of formal review comments into its design and all concerns and questions have been resolved to the satisfaction of TxDOT, Developer shall provide Final Design package to TxDOT. Developer as part of its Final Design package shall include all:

a) Design drawings

b) Design calculations

c) Design reports

d) Specifications

e) Electronic files

f) Documentation required for all Project ROW

g) Governmental Approvals

h) Utility Owner approvals

TxDOT's concurrence with the PSQCM's certification of compliance shall not constitute approval of the design or subsequent construction, nor relieve Developer of its responsibility to meet the requirements hereof. Irrespective of whether TxDOT provides Developer with the authority to begin construction on items, Elements, or phases of the Work prior to completion of the design for the entire Project, Developer

shall bear the responsibility to assure that construction meets the requirements of the Contract Documents, applicable Law and Governmental Approvals.

Construction on any item, Element or phase covered by the PSQCM's certification of compliance of said item, Element, or phase shall only progress to the extent covered by the Design Documents included in that statement except for the Work performed in accordance with Section 2.2.7.9 (Early Start of Construction). Prior to progressing further with construction of a certified package, Developer shall complete the next item, Element or phase of design or complete the Final Design, and obtain TxDOT's concurrence, except for the Work performed in accordance with Section 2.2.7.9. Any items, Elements or phases of design, subsequent to the certification of compliance from PSQCM, shall be checked and certified by the PSQCM in the same manner indicated above.

If TxDOT determines that the Final Design Documents do not meet the requirements of the Contract Documents, applicable Law and/or the Governmental Approvals, TxDOT will notify Developer in writing of any specific deficiencies in the Final Design Documents. Developer shall correct such deficiencies; modify the Final Design Documents; and, if necessary, modify construction upon receipt of TxDOT's comments.

If there is evidence that the DQMP procedures are not adequate, as evidenced by TxDOT's oversight reviews or problems during construction, TxDOT may, at its sole discretion, withhold payment for design and construction until sufficient DQPM procedures are in place. If construction is in progress, TxDOT may suspend ongoing Work represented by the deficient design and require correction of design and/or construction defects.

Developer shall provide quantity estimates for Work covered by Final Design Documents. The quantity estimates shall be in units consistent with the quality acceptance and quality review sampling and testing requirements in the DQMP.

2.2.7.8 Design Changes

Developer or TxDOT may initiate design changes. Design changes may occur either on items, Elements, or phases undergoing construction or after Final Design. In order to process these types of changes, Developer shall submit, when the problem or change occurs, a Request for Information (RFI) for TxDOT's approval.

All design changes submitted under the RFI procedure shall undergo the same DQMP checks as the original design.

The designer responsible for the original design shall approve design changes during construction, or design changes to Final Design Documents in writing. If the original designer is no longer available, then after notification to the original designer, an experienced Registered Professional Engineer shall provide documentation of design changes. All plans, final submittals, specifications, calculations, and reports for design changes shall be stamped, signed and dated by an experienced Registered Professional Engineer. In all cases, the PSQCM shall certify in writing that the design change has been:

a) Designed in accordance with the requirements of the Contract Documents, applicable Law and the Governmental Approvals,

b) Checked in accordance with Developer's approved DQMP, and

c) Prepared consistently with other Elements of the original design.

Developer shall request and schedule interim and final RFI formal design review(s) by TxDOT for all design changes made during construction or to the Final Design Documents. Design changes submitted under an RFI that are minor may not warrant interim review in addition to final formal design review(s)

by TxDOT. Design changes eligible for a single review shall be defined in the DQMP and approved by TxDOT. All changes made through the RFI process shall be documented in the Record Drawings.

2.2.7.9 Early Start of Construction

The following will set forth the circumstances under which certain items, Elements, or phases of the Work may be packaged by Developer to initiate an Early Start of Construction prior to obtaining TxDOT's concurrence of the Final Design for the item, Element or phase. The "Early Start of Construction" requirements shall apply to any Work that is performed by Developer prior to receiving TxDOT's written concurrence with the PSQCM's certification of compliance of the Final Design Submittal for the Work. All such Work is performed at the sole risk of Developer. TxDOT does not consider any items as satisfying the DQMP requirements until the PSQCM has issued a certification of compliance and TxDOT has issued a written concurrence therewith.

TxDOT, at its sole discretion, may defer Early Start of Construction for any portions of the Work as requested by Developer.

Any Work constructed by Developer prior to receiving TxDOT's concurrence of the Final Design Submittal for the Work, and later determined not to be in compliance with the requirements of the Agreement by TxDOT, in its sole discretion, shall be revised, removed or otherwise reconfigured to the satisfaction of TxDOT at Developer's sole cost and expense and without any consideration given to an extension of the Completion Deadline.

TxDOT and Developer shall agree on procedures for Early Start of Construction. These procedures shall among other things, include a process for review and comment by TxDOT, a process for distributing construction documents signed and sealed by a Registered Professional Engineer to TxDOT and Developer's field staff. In order for Developer to proceed with early phases of construction of a portion of the Work, specific pertinent items of the design shall have been previously reviewed by TxDOT and comments from TxDOT shall have been transmitted to the Developer. For example, Early Start of Construction may be rough grading of a specific portion of the Project, for which specific pertinent items of the design may include:

a) Horizontal and vertical drainage system
b) Typical sections
c) Related Elements of the drainage system
d) Related Elements of the traffic control plan specifically applicable during the term of the Early Start of Construction scope
e) Subsurface geotechnical investigations and recommendations
f) Slope stability analysis and recommendations
g) Preliminary structure general plans (if a structure is within the Element or portion of the nonstructural Work)
h) Settlement monitoring program
i) Construction specifications

An Early Start of Construction shall be at the sole and complete risk of Developer, and does not release Developer from any of the requirements described in Section 2.2.7 (Design Quality Management Plan). If, as a result of the review process, construction modification or changes to already completed Work Elements performed under the Early Start of Construction are required, Developer shall make any and all construction modifications to already completed construction activities at its sole cost and expense without any entitlement to time extensions or adjustments in the Price.

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 Contract Documents.

Developer's Construction Quality Management Plan (CQMP) shall contain detailed procedures for the Developer's quality control and quality assurance activities for construction activities. The CQMP shall be consistent with the applicable procedures contained in the current TxDOT *Contract Administration Handbook for Construction* and establish a clear distinction between quality control and quality acceptance activities and persons performing them. At a minimum, the CQMP shall specify:

a) Methods and procedures that clearly define the distinction/authority/responsibility for the administration of Developer's CQMP.

b) That Developer, Supplier, and Subcontractors designate an individual on each crew to be responsible for performing daily field inspections of their own Work and for preparing a daily QC report to document the inspection performed.

c) The review and approval of all Portland cement concrete and hot mix asphaltic concrete mix designs by a CQAF Registered Professional Engineer.

d) Methods and procedures to be utilized by Developer to obtain active participation of the work force in quality control operations to achieve a quality project; reporting forms to be used by the responsible quality control personnel shall be included.

e) A construction quality control organization and staffing plan. The period of time that the quality control staff member will be present on the site shall be shown, resumes of the Key Personnel shall be included, and the experience/knowledge/skill levels of the quality control support staff shall be stated.

f) CQAF organizational and staffing plans. The period of time that the quality acceptance staff member will be present on the site shall be shown; resumes of key staff members shall be included; and the required minimum knowledge, technical skills, and experience level of the personnel related to the various inspection functions, such as grading, drainage, pile-driving and structures inspections, that will occur on the Work shall be stated. The administrative/clerical support staff for maintenance and management of records/documents pertinent to quality acceptance for the QCP activities shall be identified.

g) Procedures for inspecting, checking, and documenting the Work. Inspection, examinations and measurements shall be performed for each operation of the Work to assure quality.

h) Procedures to ensure that all activities affecting the quality of the Work are accomplished under controlled conditions, using appropriate equipment for the task being performed.

i) Procedures to ensure that the education, training, and certification of personnel performing CQMP activities are achieved and maintained and that all Work is performed in accordance with the approved designs, plans, and specifications.

j) Procedures to ensure that critical Elements of the Work are not started or continued without inspection and testing by the quality acceptance personnel on site. Inspection or hold points shall be identified and communicated to the CQAF, Construction Quality Control Manager (CQCM), and TxDOT. Procedures to proceed beyond inspection points shall be developed.

k) Description of specific procedures to ensure that all Work conforms to the requirements fo the Contract Documents, Governmental Approvals and applicable Law, and the Design Documents, as well as that all materials, equipment, and Elements of the Work will perform satisfactorily for the purpose intended.

l) Documents specify that all activities undertaken by or on behalf of Developer affecting the quality of the Work shall be prescribed and accomplished by documented instructions, procedures, and appropriate drawings. Such instructions, procedures and drawings shall include quantitative and qualitative criteria to be used to determine compliance.

m) Measures to ensure that purchased materials, equipment, and services conform to the Contract Documents, and Governmental Approvals, applicable Laws, Rules, and the Design Documents. These measures shall be consistent with Good Industry Practice and shall include provisions for source evaluation and selection, objective evidence of quality furnished by Subcontractors and Suppliers, inspection at the manufacture or vendor source, and examination of products upon delivery.

n) Procedures for identification and control of materials, equipment, and Elements of the Work. These procedures shall be consistent with the Good Industry Practice to ensure that identification of the item is maintained by appropriate means, either on the item or on records traceable to the item, as necessary, throughout fabrication, erection, installation and use of the item.

o) Procedures to ensure that materials, equipment or Elements of the Work that do not conform to requirements of the Contract Documents, the Governmental Approvals, applicable Law or the Design Documents are not used or installed. These procedures shall include identification, documentation, segregation, disposition and notification to TxDOT and, if appropriate, Governmental Entities and other affected third parties, as well as procedures for TxDOT to review Nonconforming Work.

p) Procedures for processing a Request for Information (RFI) to resolve discrepancies and/or questions in the plans and specifications so that all changes are documented and approved by Developer's design engineers and TxDOT.

q) Procedures to indicate, by the use of markings such as stamps, tags, labels, routing cards, or other suitable means, the status of inspections and tests performed upon individual items of the Work.

r) A program for inspection for each operation of all Work examinations, measurement and test of materials or Elements of the Work to assure quality.

s) A program for coordination of all inspection and testing with the inspections and tests of Governmental Entities and Utility Owners.

t) A program to ensure performance of all testing required to demonstrate that all materials, equipment and Elements of the Work will perform satisfactorily for the purpose intended and meet the standards specified in the Contract Documents. It shall specify written test procedures which include provision for ensuring that all prerequisites for the given test have been met and that adequate test instrumentation is available and used. The CQMP shall require test results be documented and evaluated to ensure that test requirements have been satisfied. The CQMP shall also demonstrate how the CQAF shall track its testing frequencies to ensure compliance with the Contract Documents.

u) Procedures for reviewing and approving acceptance test results, categorizing test results in a manner acceptable to TxDOT, transmitting acceptance test results to TxDOT in a format

acceptable to TxDOT for use in fulfilling its statistical validation requirements, and working collaboratively with TxDOT to resolve statistical non-validation between CQAF and TxDOT test results.

v) Measures to ensure that tools, gauges, instruments, and other measuring and testing devices used in activities affecting quality are properly maintained, controlled, calibrated, certified and adjusted at specified periods to maintain accuracy within industry standards.

w) Procedures to control the handling, storage, shipping, cleaning and preservation of materials and equipment to prevent damage or deterioration.

x) Procedures to ensure that conditions adverse to quality, such as failures, malfunctions, deficiencies, defective material and equipment, deviations and other Nonconforming Work are promptly identified and corrected. The procedures shall ensure that the cause of the condition is determined and corrective action taken to preclude repetition. The identification of the significant condition adverse to quality, the cause of the condition and the corrective action taken shall be documented and reported to TxDOT in writing and to appropriate levels of Developer's management to ensure corrective action is promptly taken.

y) A comprehensive system of planned and periodic audits of Developer's CQMP to determine adherence to and the effectiveness of the CQMP. CQAF personnel shall perform the audits in accordance with the written procedures or checklists. Audit results shall be documented, reviewed, and acted upon by Developer. Follow-up action, including re-audit of deficient areas following corrective action, shall be taken where indicated.

z) Measures to control the receipt and issuance of documents, such as instructions, procedures, training manuals and drawings, including changes thereto, which prescribe activities affecting quality. These measures shall ensure that approved documents, including authorized changes thereto, are reviewed for adequacy and approved for release by authorized personnel of Developer and are distributed to and used at the location where the prescribed activity is performed. Changes to documents shall be reviewed and approved by the same organizations that performed the original review and approval unless TxDOT consents, in writing, to another responsible organization.

aa) The requirements and methods for controlling documents. Developer's document control system shall be compatible with TxDOT's.

bb) Procedures and personnel to be used to assure that specified instrumentation is installed and monitored in accordance with applicable specification.

cc) The form and distribution of certificates of compliance.

dd) Procedures for quality acceptance in the CQMP with respect to checking and verifying the accuracy and adequacy of construction stakes, lines, and grades established by Developer.

2.2.8.1 Personnel and Staffing

2.2.8.1.1 <u>Construction Quality Control Manager (CQCM)</u>

Developer shall assign an on-site Construction Quality Control Manager (CQCM) who shall be responsible for management of the quality aspect of the CQMP. The CQCM shall not be involved with scheduling or production activities, and shall report directly to Developer's management team. The CQCM shall see that the methods and procedures contained in approved CQMP are implemented and followed by Developer and Subcontractors in the performance of the Work.

2.2.8.1.2 Construction Quality Control Staff

Developer's and Subcontractors' Construction Work force are all considered to be members of Developer's quality control staff as each and everyone is responsible for the quality of the Work. Personnel performing QC inspection shall ensure quality of workmanship and QC sampling/testing shall ensure that materials meet the required specifications prior to acceptance testing performed by the CQAF. Personnel responsible for performing quality control inspection shall be knowledgeable and receive training to perform their quality control duties. Personnel performing quality control sampling/testing shall be knowledgeable in the testing methods and procedures and do not need to be certified or direct employees of the Developer, but cannot be employees of the CQAF.

2.2.8.1.3 Construction Quality Acceptance Manager (CQAM)

Developer's CQAF shall assign an on-site Construction Quality Acceptance Manager (CQAM) who shall be responsible for management of the quality acceptance aspect of the CQMP. The CQAM shall be a Registered Professional Engineer and shall be an employee of the CQAF. The CQAM shall report jointly to Developer's management team and TxDOT. The CQAM shall not report to any person or party directly responsible for design or construction production.

The CQAM shall review, approve, authorize, examine, interpret and confirm any methods or procedures requiring the "Engineers' review, approval, authorization, examination, interpretation, confirmation, etc." which are contained in the TxDOT Standards.

2.2.8.1.4 Construction Quality Acceptance Staff

A quality acceptance inspection and material sampling/testing staff shall be provided under the direction of the CQAM to perform inspection and material sampling/testing of all Work performed and materials incorporated into the Project by any member of Developer's group. If approved in writing in advance by TxDOT, qualified individuals who are employees of or retained by manufacturers, vendors or Suppliers may inspect certain portions of Work.

The quality acceptance inspection and testing staff shall be employees of the CQAF and shall have been trained in the applicable inspection and material sampling and testing procedures. The quality acceptance staff shall be experienced in highway inspection and material testing. The training and experience of the quality acceptance staff shall be commensurate with the scope, complexity, and nature of the activity to be controlled and tested. Qualifications shall include appropriate TxDOT or State Highway Agency certification for testing and inspection as well as nationally recognized certifications such as ACI certification in applicable inspection or testing activities. Construction quality acceptance staff shall report to the CQAM.

The quality acceptance staff shall provide oversight and perform audits of the quality control inspection and material sampling/testing operation.

The quality acceptance inspection staff shall check compliance of all material, equipment, construction, installations, and operations. Construction activities requiring continuous field quality acceptance inspection or sampling and testing, in the sole discretion of TxDOT, shall proceed only in the presence of assigned QA personnel. The CQMP shall identify those activities.

2.2.8.1.5 Construction Quality Acceptance Staff Levels

The size of the quality acceptance staff shall reflect the volume of quality acceptance activities necessary for the Work in progress and shall be maintained in accordance with the approved CQMP. The CQAF staff shall perform quality acceptance oversight, inspection, and testing services typically performed by TxDOT on traditional projects, with the exception of monitoring testing.

The Construction quality acceptance staffing requirements shall be updated as necessary throughout the Term of Work to reflect changes in the actual construction schedule. Developer shall ensure that adequate Construction quality acceptance staff is available and that CQMP activities are undertaken in a manner consistent with the Project Schedule and in a manner that will enable Developer to achieve the Substantial Completion of each Segment and Project Final Acceptance deadlines.

Should TxDOT determine that Developer is not complying with CQMP because of lack of staff, TxDOT shall have the right, without penalty or cost, including time extensions or delay damages, to restrict Work efforts until appropriate levels of staffing consistent with the CQMP and satisfactory to TxDOT are obtained or TxDOT may contract with a separate firm to perform these services and withhold payment to Developer for such services.

2.2.9 Maintenance Management Plan

Section 19 (Maintenance) includes requirements for maintenance management.

2.3 Comprehensive Environmental Protection Plan

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 Plan

Developer shall be responsible for the safety of its personnel and of the general public affected by the Project.

Developer shall submit to TxDOT for approval a comprehensive safety plan ("Safety Plan") that is consistent with and expands upon the preliminary safety plan submitted with the Proposal. The Safety Plan shall fully describe Developer's policies, plans, training programs, Work Site controls, and Incident response plans to ensure the health and safety of personnel involved in the Project and the general public affected by the Project during the Term of the Agreement.

Developer's Safety Plan shall address procedures for immediately notifying TxDOT of all Incidents arising out of or in connection with the performance of the Work, whether on or adjacent to the Project.

2.6 TxDOT-Developer Communications Plan

Developer shall submit to TxDOT for approval a TxDOT–Developer Communications Plan (Communications Plan) that is consistent with and expands upon the preliminary communications plan submitted with the Proposal. Developer shall maintain and update the Communications Plan throughout the Term.

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

The 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 Contract 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 TxDOT Offices, Equipment and Vehicles

Except where noted elsewhere in the Contract Documents, 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 conditions of this Technical Provision that are near each other along or adjacent to the Project within one mile of the Project ROW or as otherwise approved by TxDOT.

Developer shall provide TxDOT office space (i.e., available for occupancy) within sixty (60) Days of issuance of Notice-to-Proceed 1 (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 the field offices are provided below.

2.8.1 Computers and Equipment

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

- One computer with two flat panel monitors including all necessary peripherals for each personnel office area and the reception area in core and field office. Fifteen of these computers shall be laptops with docking stations.
- Desktop computers specifications and operating systems shall generally be same as those used by technical staff on Developer's team.
- Laptops specifications and operating systems shall generally be same as those used by the management staff on Developer's team.
- Necessary software required to perform TxDOT functions for the Project, Microsoft Office Professional 2010, Novell Groupwise and be compatible with all other Microsoft software products. Software currently employed:
    - Microsoft Office 2010
    - Novell GroupWise v.8
    - Microstation v8i v.2
    - GeoPakSS2
    - Adobe Acrobat

- Peripherals shall include at minimum, monitor stand, docking station for laptop computers, mouse, keyboard, extra battery for laptop computers, and a carry bag for laptop computers. The computers, monitors and peripherals shall be at least equal to the ones used by the Developer's staff.
- (3) 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)
- (3) Digital Video Cameras
- (6) iPad 2 with Wi-Fi + 3G 64GB along with 3G service (or latest version available)
- (6) iPhone 4S along with service (or latest version available)
- High Speed Office Internet access

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

a. 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 rooms.

b. 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.

c. Hardware and software shall be compatible with that of Good Industry Practice and of the Developer's system interface.

d. Full-scale color plotter capable of handling 36 inch roll plots, 34x22 inch plots and 11x17 plots (core office only).

e. One high-speed laser computer printer capable of handling 11x17 prints.

f. One high-speed color printer capable of handling 11x17 prints.

g. One high-speed color photocopy machine capable of handling 11x17 prints.

h. One facsimile transmission machine.

i. One color scanner capable of handling 11x17 prints.

- 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 shall 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 includes 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 TxDOTs 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.

- Certify and state supplied components as functional before installation and shall 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 the 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.

2.8.2 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 Contract Documents. Developer shall provide office space, not to exceed 12,000 square feet, for TxDOT's design and Project management staff including, the Program Manager 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 shall 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.

2.8.2.1 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 shall 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.

2.8.2.1.1 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.

2.8.2.1.2 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.

2.8.2.1.3 Office Facilities and Equipment

For the TxDOT facility area it provides, Developer shall:

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

b) Access and Security. Provide separate TxDOT entrance/exit(s) from building, which shall be secured with electronic door lock(s) plus a deadbolt lock. Developer shall provide security badge card access with locking doors running on time zone/holiday schedules for entry doors as well as other designated areas (e.g., server room, document storage, offices). Developer shall provide software for maintaining access to these areas, which shall be owned and/or maintained by TxDOT's design and Project management staff.

c) 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.

d) Janitorial, Trash and Recycling 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 shall pay for and procure janitorial services for the TxDOT facility area.

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

f) 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.

g) 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. If the building does not have a general building vending area then the breakroom shall have vending machines and a stand-alone ice machine. Break room/kitchen shall 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 6,000 SF TxDOT space allocation may be required to be increased to accommodate these spaces.

h) 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.

i) Code Requirements. Meet all applicable building and fire code requirements.

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

2.8.2.1.4 Space Requirements

Although actual spaces may vary slightly, the following nominal size requirements shall apply, and the typical TxDOT facility area shall include the following Elements:

a) Offices. Enclosed offices for TxDOT's management staff (nominal 150 square feet each) 15 total (5 with keyed door hardware).

b) Cubicles. Cubicle area spaces for administration staff (nominal 100 square feet each) 15 total; (power supply and data and communication lines to cubicles may be provided through power pole drops).

c) Conference Rooms. Three conference rooms (enclosed) 2 at nominal 12'x 20' (240 SF), one at nominal 12'x 30' (360 SF) and one assembly room (enclosed) at nominal 32'x45' (1575 SF) All shall have dimmable lighting, minimum 60-inch flat panel monitor with VGA/HDMI accessibility in conferences rooms, a minimum 120-inch diagonal projected image 1024 by 768 resolution in assembly room; 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.

d) Reception Area. Receptionist space with waiting area with seating for 8 visitors (nominal 200 SF); minimum 46" flat panel monitor with VGA/HDMI accessibility; other furniture to be determined jointly by developer and TxDOT.

e) Work Room. Work room (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.

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

g) 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.

h) Parking Area. Parking area for at least forty (40) vehicles (30 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.

i) 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.

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

2.8.2.1.5 Miscellaneous Requirements and Features

The following shall be provided as noted:

a) Flooring. Carpeted flooring (nonstatic in server room).
b) Entry Access. Entry to TxDOT areas by electronic door hardware card access (not keyed), with U.P.S. on locks (fail closed).
c) 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.
d) HVAC. 24/7/365 HVAC as previously described.
e) Window Coverings. Horizontal mini-blinds (no drapes) for each exterior window.
f) 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.
g) Fire Extinguishers. Developer shall provide fire extinguishers, per fire code and fire marshal with jurisdiction.
h) 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.
i) Vending Area. Developer shall provide access to general building vending area.
j) Utilities. Initial installation and monthly expense of all utilities paid by Developer except long-distance telephone service.
k) Emergency Contacts. 24-hour emergency contact to Developer.
l) 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.
m) Cable Television. Provide basic cable television connections or service to public information office.

2.8.2.1.6 Items Not Required

The following items are not required:

a) Outside storage.
b) Electronic security system (other than electronic door access hardware).

2.8.3 Field Offices

Developer shall provide field office space for the exclusive use of TxDOT's field construction staff for the Project as specified herein.

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 shall occupy the field staff facilities.

2.8.3.1 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.

2.8.3.2 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.

2.8.3.3 Office Facilities and Equipment

For the facilities it provides, Developer shall:

a) General. Secure sites, obtain all site permits, install and pay for all utility services, and maintain the facilities as part of the Work.
b) 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.
c) 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.
d) Janitorial and Trash Service. Provide daily janitorial service (except Saturdays, Sundays and Holidays) and maintain trash containers and trash pickup service. This shall include, but not be limited to, sweeping and mopping floors, cleaning the toilet, and lavatory and emptying wastebaskets.
e) Exterior Maintenance. Maintain the exterior areas of office spaces, including access to parking areas.
f) Accessibility. Meet all access requirements of the Americans with Disabilities Act, as amended (42 USC §§12101, et seq.).
g) Utility Service. Provide potable water, sewer service, and electricity to the office facility.
h) 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.
i) Code Requirements. Meet all local building and fire code requirements.

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

2.8.3.4 Space Requirements

Although actual space requirements shall depend upon Work schedule and geographic locations of the field offices, a typical field office should include the following Elements:

a) Offices. Enclosed offices for TxDOT's construction representative, TxDOT-designated construction manager and three other TxDOT or contract employees (150 square feet each).
b) Offices/Cubicles. Offices or cubicles for up to ten (10) field engineer/inspection/ administration staff (100 square feet each).
c) Conference Rooms. Conference rooms (enclosed) (200 square feet) and access to another conference room (350 square feet).
d) Storage and Filing. Two (2) lockable spaces for storage and filing at each field office (a combined space of 150 square feet).
e) Surveying Equipment Storage. Clean inside storage space for surveying equipment (80 square feet).
f) Tool Shed. Shed for small tools and equipment (outside) (150 square feet).
g) 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.
h) 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.
i) 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).
j) Security. A 24-hour security service or silent watchmen-type security system.
k) 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.
l) Window Security. Security bars on all windows.
m) Laboratory Facility. A completed facility suitable to accommodate a functioning portable lab (approximately 2500 square feet).
n) Cultural Resources Storage. Sufficient space and covered facilities for any archeological or paleontological recovery operations (approximately 2,000 square feet).
o) 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.
p) Restrooms. Two restrooms including toilets and sinks.
q) First Aid Facilities. Emergency first aid facilities.

2.8.3.5 Items Not Required

The following items are not required:

a) Laboratory Testing Equipment.

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 throughout every stage of the Project. 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 hardcopy 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.

The PICP shall be flexible to capture the full magnitude of yet-to-be-determined impacts from Project activities such as design, construction, and maintenance, and the public's reaction to these and other impacts. Together with the 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. This timeline shall be used as an initial guide and shall be updated by Developer as the Project is implemented but no less than on a yearly basis.

TxDOT 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 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.
g) Develop, disseminate and display timely, high-quality, innovative, user-friendly, accurate and appropriate community information including exhibits showing appropriate design details including but not limited to: slope grading, drainage, bridge structures, retaining walls, sound walls, and Project ROW acquisition.
h) Develop and manage a public relations campaign and communication strategy to convey key messages, branding and pertinent information about the Project.
i) At appropriate times and stages and as requested by TxDOT, allow tours of the Project.
j) Coordinate responses to invitations to attend group meetings, conferences, and other similar events.
k) Work with residents, communities and neighborhoods within the general vicinity of the Project to mitigate construction impacts to the neighborhoods, particularly during Off-Peak Hours.

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 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.

Developer shall assign audit and quality assurance responsibilities to a member of his quality assurance team. The Public Information Coordinator shall not perform those duties because of the potential conflict of interest.

3.2.2 Public Information Coordinator

Developer shall provide a Public Information Coordinator to lead Developer's responsibility for public involvement activities on a day-to-day basis throughout the Term of the Agreement. The Public Information Coordinator shall have a minimum of five 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 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 as outlined below. This office shall serve as the primary business location for the Public Information Coordinator and shall be conveniently located to the Project Office. 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.

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.

During major construction, the minimum hours of operation of the public information office shall be as follows.

Monday-Friday	7:30 am – 6:00 pm (Until 7:00 pm one day a week)
Saturday	9:00 am – Noon (One Saturday every month)
Sunday	Closed

Developer shall extend hours of operation to appropriately service Customer Groups.

Developer shall provide reasonable access to the Site to give TxDOT-approved Customer Groups the opportunity to view the construction.

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 Public Meetings

Developer shall organize and manage public meetings with the 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. Developer shall propose a schedule of public meetings to TxDOT and then conduct the public meetings that, at a minimum, shall address Project construction and maintenance.

To maximize public participation, public meetings shall be advertised with sufficient advance notice in the appropriate media outlets, such as the *Texas Register*, local newspapers, and television and radio stations. Developer shall be solely responsible for meeting advertisement except that the *Texas Register* advertising shall be routed through TxDOT's Public Information Office.

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. 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.

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, 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 restrictions 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 Public Information Coordinator shall input all Lane Closures (or an event that results in Lane Closures) into the TxDOT Highway Conditions Report.

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.

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, and maintenance

e) Timing of street and ramp closures and openings
f) Recommended route alternatives during closures
g) Newsletter 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

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 follow the TxDOT *Style Guide* and/or other appropriate spelling/writing 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.

Products and deliverables intended for public dissemination of information related to the Project shall be subject to review and approval by TxDOT.

Collateral materials (i.e, Project facts sheets, website page links, newsletters, displays, maps, circulars, etc) should be planned in advance with input from TxDOT. The Public Information Coordinator shall develop and submit a production schedule for each item with a review timeline inclusive of the target completion date(s), an initial draft review and a final draft review period allowing TxDOT not less than 36 hours to provide review and comment on each draft.

Media releases should be submitted for TxDOT approval as soon as the Public Information Coordinator has determined the need for a release and appropriate levels of detail are available for public dissemination. Once submitted for approval the TxDOT shall provide comments or approval within 24 hours, unless the media release is deemed needed in response to an emergency situation. Review and approval of media releases needed in response to emergency situations will be determined via coordination between the TxDOT and Public Information Coordinator on a case-by-case basis.

4 ENVIRONMENTAL

4.1 General Requirements

The Developer shall deliver the environmental commitments required by the RFP, Contract 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 Program 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 Program shall be designed to incorporate all features and guidelines of ISO 14001. The Program 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 program shall also effectively describe the quality control and assurance measures that the Developer will implement to verify the compliance of the program with all applicable Environmental Laws.

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

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 and 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 Schematic Design 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 Schematic Design 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 documents and Schematic Design.

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 and Laws. 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:

- The NEPA Approvals for Segments F-1, F-2 and G (Final Environmental Impact Statements (FEIS), Re-evaluation (F-1), and Records of Decision (ROD))
- Re-evaluations and/or revised Records of Decision (ROD) of the NEPA Approvals to be provided upon completion for Segments F-1, F-2 and G
- The U.S. Army Corps of Engineers Individual Permits (Section 404 and 401 Permits) for Segments F-1, F-2 and G will be provided upon completion and issuance of a Permit(s) by the USACE Galveston District.
- NEPA Approvals (FEIS and ROD) and U.S. Army Corps of Engineers (USACE) Individual Permit (Section 404 and 401 Permits) for Segment E.

4.3 Comprehensive Environmental Protection Program (CEPP)

As part of the PMP, the Developer shall develop and implement a Comprehensive Environmental Protection Program (CEPP), 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) Wetlands Delineations and 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) Texas Pollutant Discharge Elimination System (TPDES) Construction General Permit (TXR150000), Notice of Intent (NOI);

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 including verification of employee completion;

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 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 USACE and associated Section 401 State Water Quality Certification(s) as administered by the TCEQ (Texas Commission on Environmental Quality) 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;

e) Procedures for handling all applicable Municipal Separate Storm Sewer System (MS4) requirements.

- **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. TxDOT has provided approvals and proposed permanent noise mitigation measures based on the approved schematic design and schematic ROW based on the approved FEIS(s), Re-evaluation(s), and ROD(s). If the Developer proposes to make modifications to the approved schematic design and/or schematic ROW the Developer will be responsible for supplementing the TxDOT approved permanent 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 and schematic, and any supplemental noise studies completed by the 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.

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; and

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 agencies 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 (NHPA), 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 Schematic Design 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 possible cultural resources are 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, State Historic Preservation Office (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.
f) Environmental Approvals terms and conditions including an overview of the provisions of the ESA, Migratory Bird Treaty Act (16 U.S.C. § 703, *et seq.*, as amended), 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.

In addition to English, the workers must be provided the opportunity to receive their training and training materials in Spanish.

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 Site by the Developer, encountered or brought onto the Site by a third party, or otherwise, during the Term of the Agreement. The Developer shall submit the final Hazardous Materials Management Plan 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 Hazardous Materials Management Plan 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; operations or maintenance activities.
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 will, if found to be appropriate by TxDOT, and Federal and State agencies, 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.

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 Contract 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. 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, sidewalks, 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 (RP)

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 the 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.

4.4 Environmental Team (ET)

Developer, acting through the Environmental Compliance Manager (ECM), shall designate an 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, Historian, 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:

a) Staffing and availability of ECM and all ET personnel.
b) 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 of experience successfully managing environmental compliance of sub-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 (SW3P);

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 404/401 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 404/401 and permit provisions; and

d) FHWA and TxDOT Guidance on NEPA and environmental 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 4.3.3. Environmental Training Staff members shall have at least one year 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 (at a minimum) 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 an Archeologist and Historian to provide expertise in monitoring impacts to cultural resources during the course of the Work.

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

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 certification 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 SW3P and be able to demonstrate a working knowledge of the TPDES and MS4 permit requirements applicable to the Project.

The Water Quality Specialist shall meet the certification 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)

Developer shall identify, inspect, notify, amend notifications as necessary, pay notification fees and abate asbestos 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 will 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.

5.1.1 Project Specific Requirements

A list of TxDOT responsibilities as per pending MOUs are provided below. These obligations are in addition to the Project scope of Work requirements listed in Section 1:

5.1.1.1 MOU – Springwoods Reality and HCID no.18

- Design and Construct Springwoods Village Parkway Bridge. The aesthetics of the bridge shall be coordinated/approved by Springwoods Realty. <u>The profile of the bridge shall be designed to accommodate vertical clearance requirements over the Union Pacific right-of-way.</u> The aesthetics for Springwoods Village Parkway Bridge shall be consistent with the aesthetics for the future Holzwarth Road Bridge. The preliminary design plans for Holzwarth Road Bridge are included as RIDs. Construction to be concurrent with Section F-2.
- Provide temporary access to the Springwoods Reality contractor to construct the Holzwarth Road Bridge.
- Provide and install 2-20" steel casings for future utility crossing from ROW to ROW in the area located between Holzwarth Bridge and IH 45 (North). Exact locations for steel casings to be coordinated/approved by Springwoods Realty.
- A temporary haul road constructed by, maintained by and for the sole use of Springwoods Realty and their contractors is/will be located in the vicinity of Energy Drive. The haul road must remain operational throughout the construction of Segment F-2.

5.1.1.2 MOU – Fairfield W.C.I.D No. 155

- Construct 2- 10'x10' Box Culverts at the existing ditch location just north of Future Cypresswood Drive at SH 99.

5.1.1.3 MOU – Harris County MUD No. 383 (representing Gleannloch Farms)

- Construct 2-6'x6' Box Culverts north of Grand Parkway at the upper end of Gleannloch Farms "North Branch" (or Dry Gully) crossing the Grand Parkway alignment approximately sta 3175+00.

5.1.1.4 MOU – Harris County Flood Control District (HCFCD)

- Design and Construct a Bridge at approximate sta. 2604+00 for future drainage channel, Unit Number L112-03-00 and existing drainage channel, Unit Number L112-02-00
- Construct 5-9'x10' Box Culverts and 2-9'x4' Box Culverts at approximate sta. 2673+50 for drainage channel, Unit Number L112-01-00
- Design and Construct a Bridge at approximate sta. 2726+00 for drainage channel, Unit Number M100-00-00
- Construct 2-8'x10' Box Culverts at approximate sta. 2971+00 for future drainage channel, Unit Number M115-00-00
- Construct 5-6'x10' Box Culverts at approximate sta. 3475+00 for drainage channel, Unit Number M101-00-00

5.1.1.5 MOU – HCTRA

Riley-Fuzzel ramps are to be demolished and relocated by others. Ramps shall remain in operation until new ramps are operational.

5.1.1.6 MOU – Montgomery County

Construct SJ-Basin 2 per Exhibit 7.3 (page 6 of 14) of the Hydraulic Report.

5.1.1.7 MOU – Lakes of Avalon Village

- Provide and install 1-10" sanitary sewer line ROW to ROW
- Provide and install 2-12" PVC water mains ROW to ROW
- Provide and install 1-72" storm sewer line ROW to ROW

5.2 Traffic Signals

New construction or modifications to the existing traffic signals are defined in Section 16 (Signing, Delineation, Pavement Marking, Signalization, and Lighting).

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

Some local Governmental Entities may request continuous illumination along the frontage roads within the Project limits. Should this occur, additional agreements between TxDOT and the Governmental Entity will be required. Developer shall coordinate with and provide reasonable accommodations to the third party to carry out the installation, operations and maintenance obligations as specified in such agreements. Design and construction of additional illumination by the Developer will be treated as TxDOT-Initiated Change Order.

For sections of continuous lighting specified by these additional agreements, safety lighting including in that section is considered a component of the overall system and responsibilities for said safety lighting shall be those in the terms of the additional agreement.

New construction or modifications to the existing illumination are defined in Section 16 (Signing, Delineation, Pavement Marking, Signalization, and Lighting).

5.4 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.

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 Scope configuration. TxDOT will assist Developer in the Utility Adjustment process, to the extent described in the Contract Documents. 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 Substantial Completion Date, are set forth in Section 6.8.6 and Section 6.8.1.1 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 easements 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.

Pipelines and overhead electric lines, located on an existing compensable property interest, that are not in physical conflict with the Project but that cross the mainlane centerline at less than 90 degrees, may remain in the existing alignment, as long as the Utility facility crosses at no less than a 25 degree angle to the mainlane centerline and does not cross diagonally through connecting intersections. The pipelines

and overhead electric lines may remain or be relocated in place in these areas only if all conditions of the Utility Accommodation Rules(UAR) are met, other than the 90 degree reference in the UAR. The affected Utility Owners must agree and approve all proposed Utility Adjustment plans.

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 (unless prepared by the Utility Owner) and securing execution (by Developer and the Utility Owner) of all necessary Utility Agreements.

All Utility Agreements must be approved by TxDOT prior to any utility adjustment construction related activity.

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 providing for same becomes fully effective. Developer shall perform all coordination necessary for Betterments.

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. 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 Lines 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.

6.1.3 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 Acknowledgement and set of plans detailing UAR compliance is required pertaining to the Protection in Place work.

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.

Promptly following 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 PUAAs 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 standard form included in Attachment 6-1, Utility Forms. Developer shall not modify the standard forms except by approval of TxDOT. Developer shall include any proposed changes to a standard form (other than filling in the 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 Contract 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, Regulations and Technical Provisions of the Development Agreement, including the Utility Adjustment Standards, the TxDOT *Utility Manual*, Section 6.8 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 Contract 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)

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) 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.

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 standard 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.

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 TxDOT's standard form included in Attachment 6-1, Utility Forms. Each Quitclaim Deed shall be subject to TxDOT's review 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

Developer shall prepare a Utility Joint Use Acknowledgment (UJUA) 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 TxDOT's standard 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, 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 ascertaining, at its own expense, all pertinent details of 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.

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 Utility Strip Map showing the information obtained and/or confirmed pursuant to this Section 6.3.1. Developer's Utility Strip Map shall show in plan view all Utilities within the Project ROW or otherwise impacted by the Project, in each case detailing the type of Utility facility (communication, gas, oil, water, etc.) size, material and the Utility Owner's name and contact information. The scale of the Utility Strip Map shall be 1”=100’. Developer shall update the information provided in the Utility Strip Map with SUE data and shall submit the same to TxDOT in accordance with the PMP.

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 Contract 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 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, 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 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. Developer must update the Utility Adjustment Concept Plan as the Work progresses.

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.

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 Adjustments that are installed within the Project ROW must also be included with an assembly for TxDOT's prior approval unless TxDOT waives or allows other approval methods concerning Temporary 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 Project ROW lines along with the Control of access denial line,
4. Show an offset distance from the Project ROW line to all longitudinal Utilities within the Project ROW.
5. Present sufficient information to enable TxDOT to verify compliance with the UAR requirements for each Utility located within the Project 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 betterment credit calculation, salvage credit 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.

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 a transmittal memo, Utility Assembly Checklist, proposed UAAA cost estimate, a proposed UAAA which has been executed by the Utility Owner and Developer (one original in each of the two original Supplemental Utility Assemblies), including all required attachments, and applicable revisions to the Utility Adjustment Plans, as well as Utility Joint Use Acknowledgement(s) and Affidavit(s) of Property Interest, if applicable. The transmittal memo shall briefly describe the desired amendment and explain why the amendment is necessary including an estimated construction start date and duration.

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 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 4.4.2 of the Development 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 that 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 Contract 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 Contract 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.

6.4.7 Utility Adjustment Field Modifications

Developer shall establish a procedure to be followed if a Utility Adjustment Field Modification 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 PE 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 Contract Documents.

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 in this Section 6.5 or, if not stated therein, then as stated in Section 3.1 of the Development 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) Two Utility Assemblies (excluding Supplemental or Abbreviated Utility Assemblies)

b) Two of any documentation constituting any of the following:

- A modified or additional item submitted in response to TxDOT comments on a particular Utility Assembly
- A Quitclaim Deed
- Any other type of relinquishment document

c) Two Supplemental Utility Assemblies;

d) Two Utility Adjustment Agreements, Amendment Assemblies.

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 calendar week (or weeks), 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 500- 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 shall 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.

TxDOT will review the Utility Assembly for compliance with the requirements of this Section 6.5.3, and within ten (10) Business Days will return the Utility Assembly to Developer with the appropriate notations pursuant to Section 3.1.5 of the Development 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 will 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 Section 6.1 of the Development 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.

Notwithstanding anything to the contrary in this Section 7, the maximum number of Submittals submitted under this Section 7 (Right-of-Way (ROW)) that TxDOT will be responsible for reviewing per 10 Business Day period is fifty (50), regardless of whether such Submittals are Acquisition Packages, condemnation packages, appraisal submittals, ROW surveying or mapping submittals, Submittals required under any other provision in this Section 7 or any combination of the foregoing. Any Submittals that would require TxDOT to review more than fifty (50) Submittals under this Section 7 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). If Developer submits more than the maximum number of Submittals allowed under this Section 7, Developer may provide TxDOT with a list of Submittals to be deferred.

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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 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 current set 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 a current approved Project ROW map for public use. Any TxDOT forms referenced in this section shall be found in the TxDOT *Right of Way Manual* Collection or 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 fully 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 Contract 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 Key Personnel and other 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 Spanish, visually impaired, or hearing impaired translation, 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 Contract 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 will 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. TxDOT intends to review the completed Acquisition Packages 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 for Acquisition Packages that Developer submits as final and complete in accordance with Section 7.3.6 (Project ROW Acquisition Package Approval), up to a maximum of fifty (50) Acquisition Packages. Any Submittals that would require TxDOT to review more than fifty (50) Acquisition Packages within any given ten (10) Business Day period shall be considered excess, and TxDOT may defer its review of any such Acquisition Packages to a subsequent ten (10) Business Day period (or periods as necessary). TxDOT will notify Developer of its election to defer any excess Acquisition Packages within ten (10) Business Days after receipt. The balance of Acquisition Packages in excess of fifty (50) will be rolled over to the next ten (10) Business Day period and added to the Acquisition Package Submittals made by Developer in that period. When Developer submits more than ten (10) Acquisition Packages at any given time, Developer shall indicate the priority of review.

If TxDOT notifies Developer that any submitted Acquisition Package has a deficiency, Developer shall correct such deficiency and resubmit the package to TxDOT. Resubmissions shall be treated as a new Acquisition Package as described above. An Acquisition Package 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 Acquisition Packages shall be the responsibility of Developer and will not be eligible for treatment as a Change Order.

TxDOT reserves the right to undertake additional review on Acquisition Packages 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 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 Acquisition Package is submitted. TxDOT shall review the preliminary submission of the survey and appraisal and notify Developer of any deficiencies within ten 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. Developer shall not be permitted to commence any condemnation action through the statutory "Declaration of Taking" procedure without the express written consent of TxDOT. 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).

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 will 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 and Montgomery Counties, 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 and Montgomery Counties 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 ROW-E-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 personnel 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 for properties acquired for the Project.

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 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 Developer or 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 the minutes 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 five (5) Business Days from the date of the meeting. TxDOT will respond within five (5) Business Days or at the next occurrence of the meeting. Proposed agendas shall be provided three (3) Business Days prior to the 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) Right-of-Way Control Section Job (RCSJ) Number

d) Highway Designation

e) Project limits

f) Parcel number

g) 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 Contract 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 transmit to TxDOT, in a format acceptable to TxDOT, monthly status reports including appraisal, acquisition and relocation status of all parcels and activities related to Project ROW, acquisition and disposition of Additional Properties and acquisition and disposition of 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

As set forth in Section 6.2 of the Development Agreement and as more fully described in this section, 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, jury trials, 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 be responsible for processing and distributing 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.

Developers cost shall include all costs not paid for by TxDOT.

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 Contract Documents, by the State, or by applicable Law within ten (10) Business Days after receipt of complete Acquisition 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. 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 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 after receipt of the condemnation petition from the Office of the Attorney General.

d) TxDOT will provide all coordination services between Developer and the Office of the Attorney General for prosecution of jury trials.

e) TxDOT will provide a ROW Administrator to serve as first point of contact for all Project ROW issues as set forth in 23 CFR § 710.313(d).

f) TxDOT will pay for payments to property owners and payments to displacees for relocation assistance.

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. 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, with the assistance of Developer and coordination of 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 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 for eviction of property owners or tenants.

7.3 Pre-Acquisition Activities

7.3.1 Project ROW Surveying and Mapping

Developer shall be responsible for all revisions to the ROW map upon issuance of NTP 1 and 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 Users 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 for review of each submitted ROW map,

each containing up to a maximum of 50 parcels. Any submittals that would require TxDOT to review more than 50 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 descriptions and parcel sketch, traverse closure sheets and a copy of the parent track deeds 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 and scanned copies of the instruments of record or other pertinent documents.

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 ROW map sheet and plat, shall show all areas of denied access for the parcel according to the current TxDOT *Access Control Management Manual*.

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 or as reviewed and approved by TxDOT.

d) The point of commencing (POC), where applicable, shall be a well-defined monument or monument of record, 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) (1993 adj), or as shown on the current ROW maps, and the Project grid-to-surface coordinate adjustment factor or refer to Primary Project Controls provided by TxDOT (refer to Section 9.3).

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 50 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 5/8-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 5/8-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 5/8-inch iron rod with a TxDOT aluminum cap stamped "TxDOT ADL" 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 5/8-inch iron rod and aluminum cap.

7.3.1.1 Design Certification

Developer shall provide sufficiency of design to determine the Ultimate Scope 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 operations and

maintenance 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 during the previous month, including a two-week look ahead of anticipated survey activity.

c) CADD Files: Developer shall provide digital CADD 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 CADD 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 Contract 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. 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 Administrator 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 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 ROW-A-5 - Real Estate Appraisal Report unless otherwise authorized by the TxDOT *Right of Way Manual* or TxDOT *Appraisal and Review Manual*; however, all appraisals for condemnation proceedings shall utilize TxDOT Form 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 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, specifically the Statement on Appraisal Standards No. 7 (SMT-7) 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 ROW-A-5 – Real Estate Appraisal Report or Form 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 ROW-A-5 – Real Estate Appraisal Report, or, when approved by TxDOT, TxDOT 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 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 *ROW Appraisal & 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 ROW-A-5 (Real Estate Appraisal Report) or TxDOT Form ROW-A-6 (Real Estate Appraisal Report) in the block provided. The review appraiser will also complete TxDOT Form 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 the 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 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.
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 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 purchased 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, lessees, licensees, occupants, and other holders of compensable interests, as applicable, of the administrative settlement process. Confer with and transmit to TxDOT's ROW Administrator 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. TxDOT shall 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 TxDOT 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 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 Administrator, 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 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, no sooner than 30 days from the date of the offer letter in accordance with Senate Bill 18. 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 12:00pm

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 displacees. 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 Administrator.
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 Administrator 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-E-49 (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 Administrator 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 Administrator concerning hearing dates.
18. Upon completion of the hearing, prepare TxDOT Form ROW-E-73 (Data Sheet – Special Commissioner's 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 Commissioner's 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 Contract 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, 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 at its sole discretion may require the Developer to complete the acquisition of certain parcels including the removal of improvements.

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 the Development Agreement requirements.

The Developer is responsible for all analyses, designs, detailing, clearances, and tolerances of components to ensure that components meet all form, fit, and functional requirements necessary for satisfactory operation of the indicated Elements of the Project in accordance with the current TxDOT Geotechnical Manual and Houston District Guidelines for Foundation Design in Attachment 8-1.

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.

The Developer shall utilize drilling and field investigation measures that safeguard groundwater from contamination, and shall be responsible for any mitigation or restoration associated with the geotechnical investigation program.

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 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, foundations, 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) Quantitative settlement analyses, when required, are intended to predict the post-construction settlements at the finished ground surface. These analyses should consider both total and differential settlements. Quantitative settlement analyses should consider the compressibility of the proposed fill and the underlying soil and rock and their potential for settlement due to the weight of the fill and the weight of proposed structures. These evaluations should consider primary consolidation, secondary compression, hydro-compression, expansion, and any other pertinent characteristics.

g) 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.

8.2.2 Pavement Design

Developer shall design, construct, and, where applicable, maintain roadway pavements using Good Industry Practice and the subsurface geotechnical data collected by Developer. The pavement designs shall be signed and sealed by a Professional Engineer Registered in the State of Texas. Developer shall include the proposed pavement designs for the Project in the Proposal and shall indicate the applicable roadway and station limits for each pavement design. Where applicable, the Proposal shall also include a detailed description of the proposed pavement maintenance program for the duration of the Capital Maintenance Agreement. The Developer shall provide in the Proposal a tabulation of the design k-values, resilient modulus, or other basis for the pavement thickness designs, and including station limits. After Developer has completed its pavement investigations and analyses, Developer shall provide verification of the Proposal pavement designs for TxDOT review.

The TxDOT *Pavement Design Guide* shall be the basis for all pavement designs for the Project, and is supplemented with the requirements contained within this document as identified in the paragraphs in this section. Where there are conflicts between the requirements in these two documents, the requirements in this document shall take precedence.

The number of ESALs and/or the traffic volumes to be used in the pavement designs shall be those provided in Attachment 8-2, Pavement ESALs. 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

Three lanes	0.7
Four or more lanes	0.6

For the mainlanes, lane distribution factor shall be based on the number of through lanes, excluding auxiliary lanes.

Developer should expect that subgrade materials will vary throughout the Project limits. Developer shall verify that the materials encountered or imported meet the Effective Modulus of Subgrade Reaction, modulus, or other design subgrade support value as utilized for the structural section design. If the site subgrade materials have a lower value than used for the Proposal-phase pavement designs, Developer shall submit an adjusted pavement design for review and acceptance by TxDOT.

Developer shall prepare separate pavement designs, as applicable, for the following:

a) Mainline and ramp pavements

b) Mainline and Ramp Toll Zones

c) Frontage road pavements

d) Cross-road pavements

e) Service driveways and parking areas

f) Temporary pavement construction areas

Pavement design report(s) shall document the assumptions, considerations, and decisions contributing to Developer's pavement designs, including the following:

a) Pavement design details by location, including structural layer materials, general specifications, and thicknesses

b) Where applicable, life-cycle cost analysis, including the periods for resurfacing, reconstruction, and other rehabilitation measures and what these activities are likely to entail

c) Relevant pavement evaluation data (structural and functional) and condition information on adjacent roads

d) Site conditions which might influence the design and performance of pavements

e) Relevant geotechnical data and drainage requirements including boring logs, laboratory soil test results, and active or passive drainage system design

f) Design criteria used in determining the pavement design(s), including traffic loads, pavement material characterization, environmental conditions, and pavement design life

g) Other considerations used in developing the pavement design(s), including subgrade preparations and stabilization procedures

Developer shall submit the following to TxDOT for review:

a) Pavement Design Reports including any later supplements or amendments

b) Verification of Proposal phase pavement thickness designs

c) Traffic Control Plans associated with subsurface geotechnical or pavement investigations

d) A list of all geotechnical and pavement design software proposed for use

e) Verification plan for effective modulus of subgrade reaction

8.2.2.1 Methodology Enhancements

Recognizing that the development of pavement design methods, products, and procedures are under continuous enhancement within the pavement community, the Developer and TxDOT understand that new methods, procedures, and products may present opportunities for improved pavement design and management during the time frame of this Agreement. Both parties mutually agree to consider the use of new design technologies provided that any such technologies and methods are agreed to by the Developer and approved by TxDOT in writing prior to final implementation.

8.2.2.2 Related Pavement Materials Specifications

Unless otherwise specified herein, pavement material requirements are defined in the most current version of the TxDOT Standard Specifications for Construction and Maintenance of Highways, Streets, and Bridges (hereafter referred to as the TxDOT Standard Specifications) and per special provisions as provided in these Documents. Test procedures identified herein shall be the most current version identified in the Materials Test Procedures, AASHTO or ASTM standards or equivalent guidance as approved or provided by TxDOT.

8.2.2.3 Pavement Type Selection.

The following requirements shall be incorporated into the final pavement selection and design:

Mainline Pavement. Continuously Reinforced Concrete Pavement (CRCP) pavement shall be used for the mainline pavement.

Shoulders. Pavement for the shoulders of all roadways shall be the same section (materials and depths) as the adjacent roadway pavement. This requirement may be waived for outside shoulders of the mainlanes if approved by TxDOT in writing. In case tied CRCP shoulders are not provided, use a minimum three-foot wider CRCP in the outside lane. If using flexible pavement, the remaining portion of outside shoulder shall meet the Modified Texas Triaxial Class design requirements.

Toll Zone. Toll Zone lanes shall be CRCP as shown on the "Plaza Pavement Details" as shown in Attachment 21-2.

Direct Connector Pavement. Direct Connector pavements shall be constructed with the same CRCP section (materials and depths) as the adjacent mainlane pavement.

Ramp Pavement. Ramp pavements shall be constructed with the same CRCP section (materials and depths) as the adjacent mainlane pavement up to the mainlane gore. The remainder may match the frontage road pavement.

Frontage Road Pavement. At Developer's option, Frontage Road pavements may be constructed using rigid or flexible pavement. If flexible pavement is chosen for the frontage roads, a minimum of two hundred (200) feet of Frontage Road and Cross Road approaching the intersection and the intersection itself shall consist of rigid pavement (CRCP) with a minimum thickness of eight (8) inches.

At intersections, approved by TxDOT, Fast Track may be used following the Houston standard, CRCP-FT "Fast Track Continuously Reinforced Concrete Pavement Details"

Cross Road Pavement. The pavement section of the cross roads shall match the frontage road.

8.2.2.3.1 Rigid Pavement

Design Specification. Rigid pavement shall be designed in accordance with the TxDOT's *Pavement Design Guide* using the design inputs as summarized in Table 8-2 below.

Table 8-2. Rigid Pavement Design Inputs

28 day Concrete Modulus of Rupture, psi	620
28 day Concrete Elastic Modulus, psi	5,000,000
Effective Modulus of Subbase/Subgrade Reaction, psi/inch	300 psi/inch
Serviceability Indices ▪ Initial Serviceability Index ▪ Terminal Serviceability Index	 4.5 2.5
Load Transfer Coefficient	*
Drainage Coefficient	**
Overall Standard Deviation	0.39
Reliability %	95
Design Traffic, 18 Kip Equivalent Single Axle Load (ESAL)	Attachment 8-2
* Table 8-1, *TxDOT Pavement Design Guide, January 2011* ** Table 8-2, *TxDOT Pavement Design Guide, January 2011*	

Effective Modulus of Subgrade Reaction. The Effective Modulus of Subgrade Reaction (k in psi/in) is to be used for design and the value to be achieved and verified at all times during construction activities.

Potential Vertical Rise (PVR). No Requirements.

Continuously Reinforced Concrete Pavement (CRCP). Continuously Reinforced Concrete Pavement (CRCP) may require longitudinal tining as approved by TxDOT. The current TxDOT and Houston District Standards shall be utilized. Including, but not limited to:

CRCP(1)-11 "Continuously Reinforced Concrete Pavement, One Layer Steel Bar Placement".

CRCP(2)-11 “Continuously Reinforced Concrete Pavement, Two Layer Steel Bar Placement”.

The TxDOT Standards shall be supplemented with Houston Standards including, but not limited to:

CRCP-HS “Continuously Reinforced Concrete Pavement Houston Supplement”

CRCP(1) MOD-11 "Continuously Reinforced Concrete Pavement, One Layer Steel Bar Placement For Low CTE Concrete".

“Plaza Pavement Details”, as shown in Attachment 21-2.

8.2.2.3.2 Flexible Pavement

Design Methodology. For flexible pavement design, the Developer shall use the TxDOT online *Pavement Design Guide*. The pavement designs shall utilize either the TxDOT FPS 21 procedure or the 1993 *AASHTO Guide for the Design of Pavement Structures* and the DARWin 3.1 computer program, approved by AASHTO. All pavement thickness designs shall be checked using the Modified Texas

Triaxial Class design method, and other analyses techniques necessary to prevent premature failure from rutting and fatigue.

Performance Life Requirements. A design life of 30 years shall be used with an initial performance period of 12 years.

Potential Vertical Rise. No Requirements.***Design Modulus***. The Developer shall establish the design modulus using laboratory resilient modulus tests conducted on representative samples of the soils supporting the pavement structures. This design modulus shall be used for either the FPS 21 or AASHTO design procedures, and shall not exceed the Effective Resilient Modulus as described below. Design moduli shall be determined for other pavement layers where the maximum value does not exceed values established from methods and criteria stated below. Design moduli determined from methods identified are irrespective of the pavement design method used, where the material is placed in the pavement structure, and depth of the layer. When it is in the interest of TxDOT to use alternative methods for determining material moduli proposed by the Developer, justification and documentation shall be provided to demonstrate that an equivalent pavement structure will be provided.

(a) Effective Resilient Modulus, (MR). Effective Resilient Modulus testing is only applicable to subgrade materials; that is, natural subgrade or materials imported as embankment and are not stabilized. Determine the MR using the AASHTO laboratory test method T307 for subgrade soil samples over the Project, or segments of the Project, with an adjustment of test results for seasonal variations, per AASHTO *Guide for the Design of Pavement Structures, 1993*. Only load sequence number 7 of 15 (4 psi confining pressure, 4 psi maximum axial stress for Type 2 materials; 10 psi confining pressure, 10 psi maximum axial stress for Type 1 materials) will be used to determine the test result.

Where multiple layers of material are present, MR shall be determined for the predominant soil within three feet in depth from the finished pavement subgrade elevation. Where rock is the predominant subgrade and MR determination is not practical, a maximum MR of 25,000 psi may be assumed.

Run tests on samples at optimum moisture content (OMC), 2% dry of OMC, and 2% wet of OMC. Optimum moisture content shall be determined by the appropriate TxDOT compaction procedure; molding shall be governed by the appropriate method for the material tested as identified in AASHTO T307.

Distribute MR values as shown in Table 8-3 for the region in which the Developer will be constructing the project. Determine which distribution to apply by selecting the rainfall range appropriate for the project location from Figure 1.

Table 8-3. Regional distribution of months used to determine Effective Resilient Modulus.

Region	Annual Rainfall Range	Moisture Content Weighting in Months		
		- 2% OMC	@ OMC	+ 2% OMC
1	0 – 12	6	4	2
2	12 – 24	4	4	4
3	24 – 36	2	5	5
4	36 – 48	2	4	6

5	48 – 56	0	3	9

(b) Unbound Base and Subbase. Not Allowed.

(c) Stabilized Base. Stabilized base materials shall meet the requirements of Stabilized Base in Section 8.3.1, or shall be considered a subgrade or subbase material that may require stabilization. The design moduli of stabilized base materials shall be established by the greater of: (a.) the ratio of stress to strain in a near-linear portion of the loading curve during UCS testing, or (b.) ten times the Effective Resilient Modulus for subgrade, whichever is greater. Refer to Table 3 for asphalt stabilized base moduli.

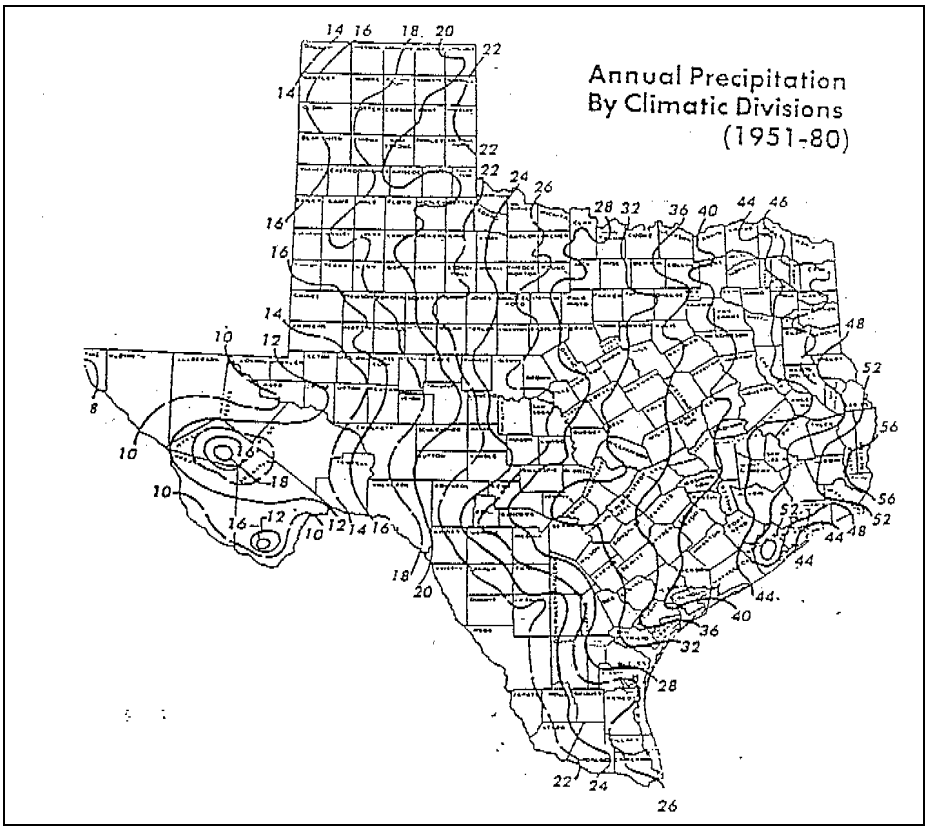

Figure 1. Rainfall graph for determining regional soil testing requirements

(d) ***Stabilized Subbase and Stabilized Subgrade.*** Materials shall meet the requirements of Subbases in Section 8.3.1 or the material shall be regarded as subgrade material and may be subject to MR measurements. Stabilized subgrade and stabilized subbases may be incorporated as a structural layer and shall have a design modulus equal to the greater of: (a.) the ratio of stress to strain in a near linear portion of the loading curve during UCS testing, or (b.) two times the value of the Effective Resilient Modulus of the subgrade.

(e) ***Design Structural Values.*** Use Table 8-4 for structural material design values. For materials not listed, provide documented testing establishing the design value appropriate for the design procedure being used.

Table 8-4. Design Structural Values

Material Type	2004 Specification	Maximum Modulus for FPS 21	AASHTO layer coefficient (max.)
Dense-Graded Hot Mix Asphalt	Item 340, 341	Combined HMA thickness: ≤8" use 500ksi > 8.0" use 650ksi	 0.44 0.45
Permeable Friction Course	Item 342	300 ksi	0.30
Performance Design Mixtures	Item 344	Combined HMA thickness: ≤ 6.0" use 650ksi 6"<T≤8" use 700ksi > 8.0" use 850ksi RBL: 350ksi	 0.45 0.46 0.47 RBL: 0.40
Stone-Matrix Asphalt	Item 346	Same as Item 344	Same as Item 344
Stabilized Base ▪ Cement ▪ Asphalt	 Items 275 and 276 Item 292	 *200ksi 350 ksi	 0.16 0.34
Stabilized Subgrade or Sub-base ▪ Hydrated Lime ▪ Cement	 Item 260 Item 275	 *30ksi *30ksi	 0.12 0.12

* Maximum design values.

Poisson's Ratio. Use 0.20 for cement stabilized or fly ash stabilized materials meeting the requirements of Items 275, 276 and 265 as defined in the most recent edition of the TxDOT *Standard Specifications*.

Use 0.35 for all other materials not identified in the aforementioned Items; except for subgrade or embankment/fill materials, use 0.4.

Truck Volumes. The percentage of truck traffic as well as the annual growth percentage in truck volumes shall be those which are provided in Attachment 8-2, Truck Volumes.

Initial ADT and 20yr projected ADT. The Initial ADT is the projected ADT when the Project is opened for public access as provided in Attachment 8-2, Average Daily Traffic. The ADT projected to occur 20 years after the Project is opened to public access is provided in Attachment 8-2, Projected Average Daily Traffic.

Initial Serviceability Index.. Frontage road pavements shall use an initial serviceability index of 4.5.

Serviceability Index (SI) after Overlay. The SI after overlay shall be 4.0.

Terminal (Minimum Acceptable) Serviceability Index. The terminal serviceability index at the end of any performance period for this Project shall be 2.5.

Serviceability Index After a Structural Overlay (FPS design only). Where no level up course of HMA is placed prior to a single lift HMA overlay, use 4.0. Where a level up used or multiple HMA lifts, use 4.2.

Design Reliability or Confidence Level. The reliability factor shall be 95%.

Maximum Period of Overlay. The maximum planning period for any overlay following the initial performance period of this Project shall not exceed 15 years. The minimum period shall be 8 years.

Overall Standard Deviation (AASHTO design only). Use 0.49.

8.3 Construction Requirements

8.3.1 Pavement Materials Requirements

The Developer shall incorporate the following requirements into the preparation of the initial pavement designs for the Proposal and the subsequent final pavement designs, plans, quality control and quality assurance programs, and the field construction procedures. Subject to approval by the TxDOT, alternate material specifications and construction requirements may be proposed by the Developer provided the objectives of the Project are met and an equivalent pavement structure is provided.

Subgrade Material Composition. The Developer shall analyze subgrade material composition, design the pavement structure, and perform necessary construction procedures to eliminate soluble sulfate induced heave. When soluble sulfates may present a potential for a reaction detrimental to the pavement structure, Developer shall submit alternate designs and/or construction procedures for TxDOT approval.

When quantities of soluble sulfates detected are greater than 500 ppm, the Developer shall determine the source of the sulfate and whether there are greater concentrations existing or that would be created when pulverized in and surrounding the sampled location. Use the TxDOT *Guidelines for Treatment of Sulfate-Rich Soils and Bases in Pavement Structures* to assist with testing and detection and construction practices. No soil shall have additives introduced to such material that would cause a detrimental reaction to the pavement structure or its ride quality as measured by the International Roughness Index (IRI).

Effective Plasticity Index (PI). No Requirement.

Unbound Base. Not Allowed.

Stabilized Base. Stabilized base may either be modified with chemical additives or asphaltic binders. Liquid additives shall not be used. CTB shall meet the requirements of Item 276 except as shown below. Materials to be stabilized shall meet the requirements of either Grade 1 or Grade 2, and Type A (under

flexible pavement) or Type D (under rigid pavement)base as defined by Item 247 of the TxDOT *Standard Specifications* or appropriate special provisions, and shall have a minimum thickness of 6 inches.

Asphalt stabilized base material shall meet the requirements of Item 292 of the TxDOT *Standard Specifications*.

When chemical additives are used to stabilize base, Table 8-5 will be used to determine the stabilizer content. Stabilized base will be designed to achieve the unconfined compressive strength shown in Table 5 immediately following a 10-day capillary moisture conditioning. Moisture conditioning will be conducted in a similar method as that used in TEX-121-E.

Table 8-5. Minimum and maximum retained unconfined compressive strength values to be achieved when using chemical additives for stabilization, by pavement type.

Pavement Type	Minimum UCS (psi)	Maximum UCS (psi)
Flexible Pavement	300	500
Rigid Pavement	500	750

Asphalt Bond Breaker (ASB) shall be in accordance with Item 292 of the TxDOT *Standard Specifications*., Asphalt Stabilized Base (Grade 4) (Performance Graded [PG] binder 64), and shall meet the following additional requirements:

(a) Meet the following grading requirements:

Sieve Size	**Percent Passing Grade 4 (Bondbreaker)**
1-3/4 in.	-
1 in.	-
1/2 in.	100
No. 4	30 - 70
No. 40	15 - 45

(b) For nominal aggregate size less than 0.5 in., design the mix in accordance with test method TEX 204-F. The minimum stability is 30 percent with a laboratory molded density of 96 percent plus or minus 1.5 percent.

(c) If the layer thickness after placing is 1.25 in. or less, the bond breaker is exempt from the in-place density control described in Section 292.4.E, "Compaction."

Subbases.

(a) Granular Materials. Materials classified by the Unified Soil Classification System as any of the following: GP, GM, SW, SP, SM, SC, ML, shall be stabilized if present within 30 inches of the

finished pavement surface. The aforementioned materials may be used as a subbase and included as a structural layer when stabilized and meet the requirements of stabilized subbase as defined herein. These materials shall be stabilized, when required, to achieve a minimum layer thickness of 6 inches. Untreated granular base meeting the requirements of Item 247 of the TxDOT *Standard Specifications*. Grade 1 or 2 may replace these materials without restriction.

(b) Stabilized Subbase. Materials not included in Granular Materials above, do not meet the requirements of Item 247, TxDOT Standard Specifications, or materials that have a Plasticity Index (PI) value less than 25, may be stabilized and used as a structural layer. For structural layers, provide a minimum 6-inch thickness of compacted material. Stabilized subbase materials shall be designed to achieve not less than 100 psi unconfined compressive strength immediately following a 10-day capillary moisture conditioning. Moisture conditioning will be conducted in a similar method as that used in TEX-121-E. These materials shall be designed as defined in test methods used for the selected additive.

(c) Stabilized Subgrade. If subgrade stabilization is used for purposes of providing a working platform then no structural benefits can be claimed and the stabilized subgrade shall not be included in the pavement design. For structural layers, provide a minimum 6-inch thickness of compacted material. If a structural layer is required, design and mold subgrade material with the desired additive using the TxDOT test method appropriate for the additive incorporated. The design shall achieve not less than 100 psi unconfined compressive strength immediately following a 10-day capillary moisture conditioning conducted in a method similar to that used in TEX-121-E.

Underseal. The developer shall place a one (1) course surface treatment as an underseal directly on top of treated base layer and/or prior to all hot mix asphalt concrete overlays.

Surface Course. The surface course for all roadways utilizing flexible pavement design shall be a minimum of 2 inches of asphaltic concrete pavement.

Class P Concrete. Class P Concrete for Rigid Pavement shall be in accordance with Item 360 of the TxDOT Standard Specifications. Use coarse aggregate to produce concrete with a Coefficient of Thermal Expansion (CTE) of less than 5.0x10-6 in/in/ °F. Prior to construction, submit test specimens to the TxDOT Construction Division for aggregate acceptance. Provide samples or test specimens as directed. The TxDOT Construction Division will perform the testing. Test results are final. Testing is required for naturally occurring aggregates.

Mix Selection. The final surface mix for frontage roads shall be Stone Matrix Asphalt (SMA) meeting the requirements of Item 346 when the combined HMA thickness is greater than 6.0 inches, or a regular dense-graded mix Type C or Type D meeting the requirements of Item 341/SS 3224 when the combined HMA thickness used is less than 6.0 inches.

8.3.2 Construction Verification

General. The independent Construction Quality Assurance Firm (CQAF) shall perform the Developer's quality acceptance. The construction verification tasks described below are part of the CQAF quality acceptance efforts.

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 third party structures and Utilities, the Developer shall coordinate excavation activities with Section 5 and 6. For those

occurrences involving TxDOT's structures and Utilities, the Developer shall coordinate excavation activities with TxDOT.

Effective Modulus of Subgrade Reaction. The Developer shall verify that the design effective modulus of subgrade reaction has been achieved through the field construction activities. This verification process shall include field sampling and testing activities designed to provide confirmation of the design effective modulus of subgrade reaction. This verification process shall be described in a plan that includes, but not limited to, the verification methodology, example calculations, reference documents, and frequency of field sampling and testing. The Developer shall submit this verification plan to the TxDOT for review and comment.

Effective Resilient Modulus, (MR). The Developer shall provide subgrade modulus verification testing in accordance with AASHTO T307. Retrieve a randomly selected verification sample at a minimum rate of one sample (three replicates per sample) for each 2500 linear feet of roadbed; where the roadbed has a dimensioned width greater than 100 feet, one additional sample will be collected and tested. Frontage and other access roads are sampled and tested independently if more than 100 feet separates the roadbeds or are not parallel to the mainline alignment. Additional samples shall also be taken at each location where a significant and recognizable change in subgrade material (a change in USCS classification) is encountered during grading operations.

Where multiple layers of material are present, MR shall be determined for the representative soil within three feet in depth from the finished pavement subgrade elevation. Where rock is the predominant subgrade and MR determination is not practical, a maximum MR of 25,000 psi may be assumed.

Regardless of the position of the layer or material sampled and tested, use only the AASHTO T307 load sequence number 7 of 15 for verification testing (4 psi confining pressure, 4 psi maximum axial stress for Type 2 materials; 10 psi confining pressure, 10 psi maximum axial stress for Type 1 materials). The MR results from this testing shall be compared to the Effective MR selected for use in designing the pavement structure, to confirm that the material meets the design criteria. If the materials fail to meet the criteria, Developer shall be responsible to take corrective action that is acceptable to the TxDOT.

Effective Plasticity Index (PI). No requirements.

Smoothness Specification. Smoothness of the pavement constructed shall conform to the requirements of TxDOT Item 585, Ride Quality for Pavement Surfaces, amended as cited below:

Article 585.3D. Acceptance Plan and Pay Adjustments. The entire section is voided and replaced by the following:

TxDOT will evaluate profiles based on the CQAF test results to determine acceptance and corrective action. Corrective action acceptable to TxDOT is required, at Developer's sole expense, for any 0.1-mile section that measures an average IRI in excess of 75 inches per mile for rigid pavements, or in excess of 65 inches per mile for flexible pavements. After making corrections, re-profile the pavement section to verify that corrections have produced the required improvements.

Use diamond grinding or other methods approved by TxDOT to correct surface areas that have more than 1/8 inch variation between any two contacts on a 10-foot straightedge. Use diamond grinding or other approved methods to remove localized roughness as determined using an inertial profiler in accordance with TEX-1001-S. For asphalt concrete pavements, fog seal the aggregate exposed from diamond grinding.

Article 585.4 Measurement and Payment. The entire section is voided.

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 Standards

Developer shall ensure that all surveying conforms to 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.

9.2.2 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.

9.2.3 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 for Harris County and 1.0000437 for Montgomery County:

$$\frac{\text{Surface Coordinates}}{\text{Adjustment Factor}} = \text{Grid Coordinates}$$

The surface adjustment factor for Montgomery County controls from the west end of the Spring Creek Bridge, located just west of the Montgomery County line, to the east side of the US 59 interchange.

9.3.2 Survey Control Requirements

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 Project 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 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 three miles.

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. Project survey control data for Segments F-1, F-2 and G is contained in Attachment 9-1.

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, South Central Zone, North American Datum of 1983 (NAD 83).

	Level 3	Level 4	Remarks and Formulae
Error of Closure	1: 50,000	1:20,000	Loop or between monuments
Allowable Angular Closure	$\pm 3'' \sqrt{N}$	$\pm 8'' \sqrt{N}$	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

Comply with design requirements.

9.4.2 Construction Surveys

Comply with design requirements.

9.5 Deliverables

9.5.1 Survey Records

Developer shall deliver to TxDOT, for its review and acceptance, a listing of all primary, secondary control coordinate values, original computations, survey notes and other records including GPS observations and analysis made by Developer within 90 days of Project Final Acceptance.

9.5.2 Project 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 surveyor, or the surveyor's 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.

9.5.3 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
b) Points of tangency
c) Points of intersection
d) Points of compound curvature
e) Points of reverse curvature
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 Project ROW lines will not be disturbed by construction, Developer shall replace all rod-and-cap monuments located on the Project ROW line at all points of curvature, points of tangency, points of intersection, points of compound curvature, and points of reverse curvature, 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 Project 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.

9.5.4 Record Drawings and Documentation

Developer shall submit the following as part of the Record Drawings and as a condition of Project Final Acceptance:

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 Scope and Interim 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.

10.2.1 Trees within Project ROW

Developer shall preserve trees according to the requirements and limits provided below in Table 10-1. All trees within the variable width section shall be preserved to the greatest extent possible. Horizontal clear zone requirements control with respect to the preservation of trees within the specified limits.

Segment	Minimum Requirement	Limits
F-1	120-foot wide section	2695+00 to 2702+00 (165' LT)
		2987+00 to 2997+00 (from the detention pond to south of Boudreaux Estates
F-2	50-foot wide section	3142+68 to 3152+93 (104' LT)
		3142+68 to 3153+73 (138' RT)

G	Variable-width section	3949+50 to 3966+70 (between the WB frontage road and WB mainlanes)

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 to a 4-inch compacted depth 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. Developer shall use only materials and soils next to pavement layers that do not cause water or moisture to accumulate in any layer of the pavement structure.

For designated construction easements and other approved Project Specific Locations (PSLs) 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.

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, and maintenance 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 Contract 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. All design transitions to existing facilities shall be in accordance with the TxDOT *Roadway Design Manual*.

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.

11.2.1 Control of Access

Unless shown to be deleted in the Project Schematic Design, Developer shall maintain all existing property accesses, including those not shown on the Schematic Design, and shall not revise control of access without TxDOT review and the written agreement of the affected property owner.

Developer shall not be required to provide new access to parcels shown as landlocked on the Schematic Design without a Change Order; provided however, Developer shall be responsible at its sole cost for analyzing possible access alternative(s), if any, for each landlocked parcel shown on the Schematic Design and submitting the proposed design and construction costs for providing such new access. Such costing information shall be submitted to TxDOT concurrently with the applicable Acquisition Package.

11.2.2 Roadway Design Requirements

The design Elements of the Project shall meet or exceed the geometric design criteria shown in Table 11-1 (Roadway Design Criteria), with the exclusion of the roadway design deviation listed in Section 11.2.2.2, in order to meet the Project objectives stated in Section 11.1

Developer shall not modify the centerline alignment except for the purposes of reducing Schematic ROW. Any modification to the centerline alignment that does not reduce Schematic ROW shall require TxDOT approval.**Table 11-1 Roadway Design Criteria**

	Mainlanes	Frontage Roads	Cross Streets

Functional Classification	Rural arterial	Urban collector	See Attachments 11-1 and 11-2
Design Speed	70 mph	45 mph	40-45 mph
Horizontal Alignment Criteria:			
Maximum Curvature (Min Radius)	3,405 ft	940 ft	675 ft (40 mph) 940 ft (45 mph)
Superelevation	e(max)= 6%	N/A	N/A
Maximum Curvature (Min Radius) w/o Superelevation	10,750 ft	-	-
Vertical Alignment Criteria:			
Maximum Gradient	3.0%	5.0%	4.0%
Minimum Gradient	0.35%	0.35%	0.35%
K-Value Crest	247	61	44 (40 mph) 61 (45 mph)
K-Value Sag	181	79	64 (40 mph) 79 (45 mph)
Maximum Algebraic Difference w/o Vertical Curve	0.5%	1.0%	1.0%
Min Vertical Clearance - Roadway	16.5 ft	16.5 ft	16.5 ft
Min Vertical Clearance - Railroad	23 ft	23 ft	23 ft
Cross Section Criteria:			
Lane Widths	12 ft	12 ft	12 ft[4]
U-turn width		25 ft	
Inside Shoulder Widths for Curves	4 ft	-	-
Outside Shoulder Widths	10 ft	-	-
Pavement Cross Slope	0.02 ft/ft	0.02 ft/ft	0.02 ft/ft
Side Slopes			
Within Clear Zone	6:1	6:1	6:1
Outside of Clear Zone	6:1 usual 4:1 max	6:1 usual 4:1 max	6:1 usual 4:1 max
Gore Width - Entrance	-	-	-
Gore Width - Exit	-	-	-
Curb Offset	-	1 ft	1 ft where curbed
Clear Zone Width	30 ft	3 ft[3]	See Attachments 11-1 and 11-2
Intersection horizontal and vertical criteria:			
Corner Radii	-	50 ft min	-
Design Vehicle (Intersections)	-	WB-50	See Attachment 11-1
Preferred Corner Geometry	-	Curve w/ taper	-

	Ramps	**Direct Connectors**
Functional Classification	-	-

Design Speed	50 mph	50 mph
Stopping Sight Distance	425 ft	425 ft
Maximum Curvature (Min Radius)	1055 ft	1055 ft
Superelevation	e(max)= 6%	e(max)= 6%
Maximum Curvature (Min Radius) w/o Superelevation	6,030 ft(1)	6,030 ft(1)
Maximum Gradient	4.0%	4.0%
Minimum Gradient	0.35%	0.35%
K-Value Crest	84	84
K-Value Sag	96	96
Maximum Algebraic Difference w/o Vertical Curve	0.5%	0.5%
Min Vertical Clearance - Roadway	16.5 ft	16.5 ft
Min Vertical Clearance - Railroad	23 ft	23 ft
Lane Widths	14 ft (one) 12 ft (two)	14 ft (one) 12 ft (two)
Inside Shoulder Widths for Curves	4 ft	4 ft(2)
Outside Shoulder Widths	8 ft	8 ft(2)
Pavement Cross Slope	0.02 ft/ft	0.02 ft/ft
Side Slopes		
Within Clear Zone	6:1	6:1
Outside of Clear Zone	6:1 usual 4:1 max	6:1 usual 4:1 max
Gore Width - Entrance	6 ft min	6 ft min
Gore Width - Exit	6 ft min	6 ft min
Curb Offset	-	-
Clear Zone Width	16 ft	16 ft
Corner Radii	-	-
Design Vehicle (Intersections)	-	-
Preferred Corner Geometry	-	-

Notes:

1. 2° 00' curve may be used at mainlanes and direct connector ramps with mainlane cross slope controlling.

2. In those areas where sight distance criteria is not met, an inside shoulder width of 8 ft and outside shoulder width of 4 ft may be used.

3. 3' for raised curb, otherwise 10' from edge of travel way.

4. Harris County has a standard detail permitting the use of 11' lanes, on selected cross-streets. See Attachments 11-1 and 11-2.

5. Clear Zone width for turnarounds shall be 6'

Developer shall coordinate, design and construct the improvements on the cross streets in accordance with the Governmental Entity having jurisdiction of said roadway. The crossing streets shall incorporate the design criteria in the Cross Street Design Criteria Matrix in Attachment 11-1. Ultimate configuration cross street typical sections for the Project have been provided in Attachment 11-2.

11.2.2.1 Superelevation

Existing superelevation in areas where ramps are to connect to existing pavement may be retained at existing superelevations. Pavement widening may be constructed by extending the existing pavement cross slope. 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 Roadway Design Deviations

11.2.2.2.1 Direct Connectors

Developer shall meet the design criteria shown in Table 11-1 for direct connectors except as listed below in Table 11-2: The minimum radius of curvature for direct connectors listed below in Table 11-2 for which a design deviation is required shall be in accordance with the minimum radius of curvature design values shown in the Schematic Design. For horizontal stopping sight distance (SSD), Developer shall meet at an absolute minimum the stopping sight distance for the design speed indicated in Table 11-2.

Table 11-2: Design Deviations for Direct Connectors

Interchange	Direct Connector	Horizontal Radius (FT)	Minimum Horizontal SSD (Design Speed))	Maximum Gradient
SH 99 - US 290	E - N	821	40 MPH	
	S - E	936	40 MPH	
	S - W	725	35 MPH	
	W - N	835	40 MPH	
SH 99 - SH 249	E - N		45 MPH	
	E - S		40 MPH	
	N - E	602	35 MPH	
	N - W	1012	40 MPH	
	S - E	912	40 MPH	
	S - W	862	40 MPH	
	W - N		40 MPH	
	W - S	930	40 MPH	
SH 99 - IH 45	E - N	849	40 MPH	5%
	E - S	860	40 MPH	5%
	N - E			
	N - W	853	40 MPH	5%

	S - E			5%
	S - W	900	40 MPH	5%
	W - N		45 MPH	
	W - S		45 MPH	
SH 99 - HARDY	W - S		40 MPH	
	E - S	900	40 MPH	
	N - W	900	40 MPH	
	N - E	900	40 MPH	
SH 99 - US 59	E - N		40 MPH	
	E - S	870	40 MPH	
	N - E		40 MPH	
	N - W		40 MPH	
	S - E		40 MPH	
	S - W		40 MPH	
	W - N	835	40 MPH	
	W - S		40 MPH	

11.2.2.2.2 Main lanes

A design deviation is approved for mainlane horizontal stopping sight distance. Minimum mainlane horizontal stopping sight distance shall be based on the mainlane curvature geometry shown in the Schematic Plan with the exception of Segment F-1, Curve PI Sta 2481+21.71 for which the radius shall be increased from 6135.67 feet to 6656 feet to accommodate a SSD of 70 mph. A design deviation is also approved for mainlane horizontal stopping sight distance for the entire length of the centerline alignment for the ultimate configuration.

The specific deviations for mainlane stopping sight distance are shown below in Table 11-4. Each of the deviations require an inside shoulder width of either 6 feet or 12 feet and shall be designed and constructed as shown in Attachment 11-3, "Proposed Shoulder Widening for SSD", in order to meet the required design speed for SSD indicated in Table 11-4. An outside shoulder width of 10 feet is considered adequate for providing sufficient mainlane horizontal stopping sight distance, as shown in Attachment 11-3.

Developer shall meet the maximum curvature requirements for mainlanes shown in Table 11-1 with the exception of the following deviations for mainlane maximum curvature shown below in Table 11-3.

Table 11-3: Design Deviations for Mainlanes

Segment F-2 Mainlane Curves	Radius	PI Station
Curve CLF2-3	2,989.35	Sta 3169+89.54
Curve CLF2-6B	2,851.66	Sta 3296+07.78
Curve CLF2-7	2,500.00	Sta 3338+57.59
Curve CLF2-8	2,500.00	Sta 3369+94.77
Curve CLF2-9	2,500.00	Sta 3395+26.72
Curve CLF2-12	2,300.00	Sta 3657+74.68
Curve CLF2-13	2,815.00	Sta 3686+30.03
Segment G Mainlane Curves	**Radius**	**PI Station**
Curve G-1	2,086.00	Sta 3734+50.05
Curve G-2	2,086.00	Sta 3744+51.81
Curve G-12	2,292.00	Sta 4312+46.01
Curve G-13	2,086.00	Sta 4336+64.73
Curve G-14	3,000.00	Sta 4353+83.21
Curve G-15	2,086.00	Sta 4373+52.91

Table 11-4: Design Deviations for Mainlane Stopping Sight Distance

Mainlane Curves	Radius	PI Station	Direction	Design Speed (MPH)	Inside Shoulder Width
Segment F-1					
Curve XXX	5,729.58	Sta 2633+86.07	WB\SB	70	6
Segment F-2					
Curve CLF2-3	2,989.35	Sta 3169+89.54	EB\NB	65	12
Curve CLF2-6B	2,851.66	Sta 3296+07.78	WB\SB	60	12
Curve CLF2-9	2,500.00	Sta 3395+26.72	EB\NB	60	12
Curve CLF2-13	2,815.00	Sta 3686+30.03	WB\SB	60	12
Segment G					
Curve G-1	2,086.00	Sta 3734+50.05	EB\NB & WB/SB	55	12
Curve G-2	2,086.00	Sta 3744+51.81	EB/NB & WB\SB	55	12
Curve G-3	4,700.00	Sta 3781+17.48	EB/NB & WB/SB	70	12
Curve G-8	4,584.00	Sta 4068+47.00	WB\SB	70	12
Curve G-15	2,086.00	Sta 4373+52.91	EB\NB	55	12

11.2.2.2.3 Cross Streets

The approved design deviations for cross streets are provided below:

- Lindsey Lane shall have a design speed of 20 mph and a minimum radius of curvature of 90 feet.
- Curve-2 on Boudreaux Road (Sta 3305+00) shall have a design speed of 45mph and a minimum radius curvature as shown on the Schematic Design
- Curves on Telge Road shall have a design speed of 45 mph and a minimum radius of curvature as shown on the Schematic Design
- Curve-1 on Hildebrandt shall have a design speed of 40 mph and meet minimum radius of curvature of 510 feet

11.2.2.3 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 Scope such that the Ultimate Scope can be implemented with little or no impact on traffic and/or rework.

Developer shall provide a continuous cable median barrier separating the mainlane roadways on the Project. The guidelines for placement of the median barrier can be found in Reports, Studies and Manuals in the Reference Information Documents.

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.

12.1.1 Project Specific Requirements

Developer shall incorporate the following requirements into the project drainage design:

- Developer is not permitted to increase existing water surface elevations at stream crossings within the Schematic ROW and at any cross section along the streams.
- Modifications to the drainage and water surface elevation at Willow Creek have been made by TxDOT as shown in the drainage report in the Reference Information Documents. A CLOMR at Willow Creek is required and is being completed by TxDOT. Developer will be required to prepare a LOMR after construction at Willow Creek is completed. A CLOMR and LOMR will be required at Willow Creek in case of revisions by Developer.

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.

Within 30 Days of Substantial Completion of each Segment, Developer shall submit to TxDOT, as part of the Record Drawings, a Drainage Design Report, which shall be a complete documentation of all components of the Project's drainage system. At a minimum, the Drainage Design 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) Storm sewer drainage report
d) Bridge and culvert designs and reports for major stream crossings
e) Pond designs, including graphic display of treatment areas and maintenance guidelines for operation
f) Correspondence file
g) Drainage system data (location, type, material, size, and other pertinent information) in a suitable electronic format

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) with FEMA.

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.

Elements of the existing drainage system within the Project limits scheduled to remain in place must meet hydraulic capacity requirements as detailed in Section 12. If any Elements of the existing system do not comply with the requirements of Section 12 (Drainage) or Section 13 (Structures), those Elements shall be replaced by Developer.

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.

A detailed drainage report has been prepared for the Project and is available in the Reference Information Documents. Vertical datum adjustment information used for the detailed design contained in the drainage report has been extracted and included as Attachment 12-1.

12.3.1 Springwood Development Drainage

A portion of the preliminary drainage design for Grand Parkway in Segment F-2 has been coordinated with Springwoods Village to determine the location of three Project drainage outfalls which are intended to direct Project flows to off-site detention facilities. Springwoods Village has agreed to receive Project flows and to provide mitigation volumes within their detention facilities. The outfall locations included in the preliminary drainage design, which are shown in the Final Report in the Reference Information Documents and listed in Table 12-1 below, have received environmental permit approval.

Table 12-1: Proposed Outfall Locations

Outfall I.D.	Location
J-D	STA 3636+23
J-E	STA 3659+00
J-F	STA 3685+50

The outfalls are recommended for the Developer's use. If the Developer chooses to utilize the permitted outfall locations and detention facilities then coordination of the availability of the facilities to receive Project flow and verification of the detention facility's storage capacity is the responsibility of the Developer. If the Developer elects not to utilize the specified outfall locations then the Developer is responsible for any and all environmental permit modifications and approvals.

12.3.2 Surface Hydrology

12.3.2.1 Design Frequencies

Developer shall use the design frequencies listed in Table 12-2 below.

Table 12-2: Drainage Design Frequencies

Design Element	Mainlanes	Ramp	Direct Connect.	Frontage Road	Arterial / Cross Street	Application Notes
Minimum Roadway Elevation at AHW	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	10-yr	2-yr	10-yr	2-yr	2-yr	Applies to ponded widths in gutter and inlet capacity.

Design Element	Mainlanes	Ramp	Direct Connect.	Frontage Road	Arterial / Cross Street	Application Notes
Storm Drain Conduits	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 for 10-year capacity
Cross Drain Culverts	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 for mainlanes.
Bridge Waterway Crossing	100-yr	10-yr	50-yr	10-yr	Match Exist.	New ML Bridge: 1.5' or greater freeboard for the 100-year. 1.0' may be used with TxDOT's prior concurrence. Other Roadways: Low chord > Design WSEL Small Bridges are less than 50 feet in length.
Storm Water Pumping Stations	50-yr	50-yr	50-yr	50-yr	50-yr	Design WSEL below AHW. Check for 100-year.
Outfall Ditches	Design for No Impact to 100-yr WSEL. Use HCFCD and Montgomery County Standard Details for Outfalls and other construction within HCFCD and Montgomery County channels and ponds.					
Separation Ditches	10-yr	10-yr	10-yr	N/A	N/A	
Roadside Ditches	N/A	N/A	N/A	2-yr*	2-yr**	*If required outside curb line. **Or match existing capacity.
Detention Ponds	100-year design. Provide Detention Summary with Area Serviced, Detention Storage Volume Required, Detention Storage Volume Provided, Maximum Design WSEL, Maximum Outflow Rate Allowed, Maximum Outflow Rate Provided, and Restrictor Size.					Sample plans are available from TxDOT upon request.

Design Element	Mainlanes	Ramp	Direct Connect.	Frontage Road	Arterial / Cross Street	Application Notes
Depressed Roadway* Storm Sewer (gravity drainage without pump)	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. Curb height is defined as 5”.

12.3.2.2 Hydrologic Analysis

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.

Determination of flows for inlets may differ from storm drain conduits. For frontage road inlets adjacent to undeveloped areas outside the right of way, the inlet drainage area should consider areas within the right of way plus areas within the 150’ development strip adjacent to the right of way using a runoff coefficient of 0.65. For frontage road inlets adjacent to developed areas (with internal drainage systems) outside the right of way, contributing drainage areas should consider areas within and outside the right of way.

12.3.3 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.

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.

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:

a) the lip of gutter;

b) the top of grate inlet; and

c) the top of manhole cover.

Runoff within the jurisdiction of the USACE shall be conveyed in accordance with applicable Laws and permits.

12.3.3.1 Pipes

Developer shall use the design criteria listed in Table 12-3 below for the design of drainage pipes.

Table 12-3: Pipe Design Criteria

Design Element	Mainlanes	Ramp	Direct Connect.	Frontage Road	Arterial / Cross Street	Application Notes
Storm Drain Conduits - General						
Conduit Material/Type	RCP or RCB					
Design Conduit Size	Full flow pipe capacity >= design Q					
Conduit Size Changes	Match soffits at conduit size changes, if possible. Matching flowlines is acceptable if grade is limited.					
Manholes/ Junctions	Type A or Type B Manholes Bridge Division Manhole Type M Junction Box with Access All other junction boxes require special design.					No manhole access on pavement. Maximum manhole spacing is 500'.
Conduit Connections	Lateral stub-in to boxes require 2' minimum size differential. Pipe to pipe stub-in requires 3' minimum size differential. Other connections require manhole, junction box, or junction box without riser. Provide detail for accommodating multiple (parallel) conduits at junctions - use equalizer openings.					

Design Element	Mainlanes	Ramp	Direct Connect.	Frontage Road	Arterial Cross Street	Application Notes
Minimum Vertical Clearance (Cover)	1 ft in graded areas. The lower of (a) 2 ft below pavement surface or (b) below treated subgrade.					See Houston District E&BD standard for additional information.
Maximum Fill Height	Verify pipe strength requirements under high fill.					
Location near Retaining Wall	Where possible, avoid placement of conduit parallel to MSE wall if located within wall backfill. Preferred lateral placement is under wall, normal to wall alignment (see AZR and AZR2G inlet standards). If conduits are outside of and parallel to a fill wall, offset conduit 15 ft minimum from face of wall. If less spacing is required, review with TxDOT.					
Storm Drain Conduits – Laterals						
Minimum Pipe Size	24"	24"	24"	24"	18"*	* Use of 18" requires approval by TxDOT
Minimum Slope	0.2%					0.1% Allowed with TxDOT approval
Maximum Slope	3%					Steeper allowed with TxDOT approval
Minimum Velocity	3 ft/sec at full flow					
Maximum Velocity	10 ft/sec					
Storm Drain Conduits – Trunk Lines						
Minimum Pipe Size	24"	24"	24"	24"	24"	
Minimum RCB Depth	3'	3'	3'	3'	3'	Use of <3' depth requires approval by TxDOT
Minimum Slope	0.2%					0.1% Allowed with TxDOT approval

Design Element	Mainlanes	Ramp	Direct Connect.	Frontage Road	Arterial / Cross Street	Application Notes
Maximum Slope	3%					Steeper allowed with TxDOT approval
Minimum Velocity	2 ft/sec at full flow					
Maximum Velocity	10 ft/sec					

12.3.3.2 Ponding

Developer shall design drainage systems to limit ponding, in both Ultimate Scope configuration and Initial Configuration, to the widths listed below in Table 12-4 for the design frequency event:

Table 12-4: Ponding Criteria

Design Element	Mainlanes	Ramp	Direct Connect.	Frontage Road	Arterial / Cross Street	Application Notes
Pavement Drainage						
Allowable Ponding Width/AHW	Shldr Width	Shldr Width + 2'	Shldr Width + 2'	Curb offset + 1 Lane	Curb offset + 1 Lane*	* Discuss with TxDOT any situation that does not maintain at least 1 lane in each direction.
Maximum Low Point Ponding Depth	Function of Allowable Ponding Width and Cross Slope					

12.3.4 Miscellaneous Drainage Design Requirements

12.3.4.1 Separation Ditch Design Criteria

In general, separation ditches shall collect and convey runoff from between the mainlanes and frontage roads to appropriate discharge points. Design of separation ditches shall follow the guidelines listed below in Table 12-5***:***

Table 12-5: Separation Ditch Design Criteria

Design Element	Mainlanes	Ramp	Direct Connect.	Frontage Road	Arterial / Cross Street	Application Notes
Minimum Depth	Variable					
Maximum Depth	Dictated by roadway design					
Minimum Slope	Minimum slope should be 0.1% if grass lined or pavers, 0.05% if concrete lined					
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					
Ditch Inlet Types	Separation Ditches: AD, AAD, SET Side Road Ditches: A, AD, AAD, SET					Provide detail to add concrete riprap collar 2'-wide around inlet perimeter.

12.3.4.2 Inlet Design Criteria

Inlets shall be placed as per the following guidelines listed below in Table 12-6:

Table 12-6: Inlet Design Criteria

Design Element	Mainlanes	Ramp	Direct Connect.	Frontage Road	Arterial / Cross Street	Application Notes
Storm Drain Inlets						
Pavement Inlet Types	AZ AZ2G AZR AZR2G Trench Drains*	AZ AZ2G AZR AZR2G C or C1	AZ AZ2G AZR AZR2G	C1 (only)	C, C1	* Use Trench Drains in ramp gores. See "Ramp Layout Guidelines" for location details. Request design procedures from Program Team.

Design Element	Mainlanes	Ramp	Direct Connect.	Frontage Road	Arterial / Cross Street	Application Notes
Inlet Locations						1. On-grade: Place inlets to keep gutter ponding <= allowable. Carryover is 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 a maximum spacing of 100' from low point. 3. Redundant inlets: End of curb returns at intersection and in separation ditches. 4. 100% flow interception: On pavement at end of ret. wall, at ramp gores, at intersections. 5. Provide detail for equalizer pipes to connect multiple boxes in trunkline at inlets.

12.3.5 Stormwater Storage Facilities

Preliminary stormwater storage facility locations have been identified for the Project as shown in Schematic Plans in the Reference Information Documents and in the environmental re-evaluation for Segments F and Gfor the purpose of assisting the Developer with locating appropriate discharge points for the collection of Project runoff.

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 include TxDOT in any coordination with third parties.

Developer shall ensure that stormwater storage facilities meet the requirements listed above by performing all required analyses.

12.3.6 Hydraulic Structures

12.3.6.1 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.

See Section 12.3.2.1 for additional design requirements.

12.3.6.2 Bridges

All bridge hydraulic computations, designs, and recommendations shall be consistent with past studies and projects in the area by the USACE and other State or federal agency studies and projects.

Where bridge design is influenced by upstream storage, the analysis of the storage shall be considered in the design of the bridge.

See Section 12.3.2.1 for additional design requirements.

12.3.6.3 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 obtain the effective hydrologic and hydraulic model, if available, from the Harris County Flood Control District (HCFCD).

For a crossing not located within a FEMA Flood Insurance Study (FIS) but on the same waterway as a stream gauging station with a length of record of at least 25 years, Developer shall collect and use the flow data available from the station, as appropriate, to determine design flows within the following limitations, provided there is no major control structure (e.g., a reservoir) between the gauge and the Project:

a) For crossings near the gauging station on the same stream and watershed, use the discharge directly for a specific frequency from the peak stream flow frequency relationship.
b) For crossings within the same basin but not proximate to the gauging station, transposition of gauge analysis results is allowable.
c) For crossings not within a gauged basin, the peak-flow flood frequency shall be developed using data from a group of several gauging stations based on either a hydrologic region (e.g., regional regression equations), or similar hydrologic characteristics.
d) If no significant changes in the channel or basin have taken place during the period of record, the stream gauging data may be used. The urbanization character of the watershed must not be likely to change enough to affect significantly the characteristics of peak flows within the total time of observed annual peaks and anticipated service life of the highway drainage facility.

For crossings not located within a FEMA FIS or on a gauged waterway, Developer shall select the appropriate method for calculating the design flows based on site conditions, and Good Industry Practice.

12.3.6.3.1 Design Frequency

Bridge waterway crossings, bridges, culverts and storm drain systems shall be designed for the design-year frequency corresponding to the functional classification of the associated roadway provided in Section 12.4.1). The functional classification for each roadway is shown in Book 2, Section 11.

Developer shall evaluate bridges for contraction scour and pier scour concerns and incorporate protection in accordance with Good Industry Practice.

12.3.6.3.2 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.

12.3.6.3.3 Bridge/Culvert Waterway Design

For existing crossings, Developer shall analyze the existing structure with the proposed flows to ensure the headwater does not exceed that of the current conditions. 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 exceed that of the corresponding event for the current condition. 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.

12.3.6.3.4 Bridge Deck Drainage

Runoff from bridge decks shall be carried off the bridge and into the adjacent roadway drainage system except as noted in Table 12-7 for locations reviewed and approved by TxDOT. Bridge approach drains shall intercept gutter flow at each end of the bridge and 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 regulation prior to discharge to the natural waters of the State.

Table 12-7: Bridge Deck Drainage Design Criteria

Design Element	Mainlanes	Ramp	Direct Connect.	Frontage Road	Arterial Cross Street	Application Notes
Bridge Deck Drainage	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. Use Bridge Drain Inlets (Welded) BD-2 where drainage through slots in rail is not acceptable. Use slotted rail with water blocks even in locations where bridge deck inlets are used. Outfall deck drain pipe system directly into nearby storm drain inlet or manhole below grade.					

12.3.6.3.5 Drainage Report for Major Stream Crossings

As part of the Drainage Design Report, Developer shall prepare a study for each major stream crossing. The study 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 study shall include:

Hydrology

- Drainage area maps with watershed characteristics, hardcopy
- Hydrologic calculations (where computer software is used, both hardcopy and electronic input and output files)
- Historical or site data used to review computed flows

Hydraulics and Recommended Waterway Opening and/or Structure

- Photographs of Site (pre- and post-construction)
- General plan, profile, and elevation of recommended waterway opening and/or structure
- 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
- Cross-sections of waterway (Developer shall provide a hard copy plot, plus any electronic data used)

- Channel profiles

Scour Analysis

- Channel cross-sections at bridge showing predicted scour
- Calculations and summary of calculations, clearly showing predicted scour and assumptions regarding bridge opening and piers used to calculate predicted scour
- Discussion of review of long-term degradation/aggradation and effects
- Recommendation for abutment protection

12.4 Drainage Design Report

A preliminary Drainage Design Report shall be submitted with prefinal set of construction plans. The preliminary Drainage Design Report shall include preliminary design of all components that will be included in the final Drainage Design Report. Within 30 days of Substantial Completion, 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 Drainage Design 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
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 report

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

The structural Elements of the Project, 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 Contract Documents, the current AASHTO *LRFD Bridge Design Specifications* except where directed otherwise by the TxDOT *Bridge Design Manual – LRFD* and the TxDOT *Geotechnical Manual*, in order to provide the general public a safe, reliable, and aesthetically-pleasing facility.

For bridges, walls, bridge class culverts, sign structures and other miscellaneous structures, a Corridor Structure Type Study and Report shall be submitted to TxDOT for review and comment prior to design of these Elements. At a minimum, structural concepts, details and solutions, soil parameters, hydraulics, environmental requirements, wetland impacts, safety, highway alignment criteria, constructability, aesthetics requirements, and continuity for the Project shall be evaluated in the Corridor Structure Type Study and Report. Evaluation of existing structures that will be retained shall be included in the Study and Report. The Study and Report shall clearly define Developer's action to achieve a 100-year service life for Project bridges, walls, culverts and miscellaneous structures. Bridges, retaining walls, sound walls and sign structures shall be designed in conformance with the Houston District Green Ribbon Guidelines.

Developer shall submit to TxDOT an inventory and operating ratings of constructed structures with the Record Drawings.

13.2 Design Requirements

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.

13.2.1 Design Parameters

Unless otherwise noted, design for all roadway and pedestrian structural elements shall be based on the Load and Resistance Factor Design (LRFD) methodology included in TxDOT's *Bridge Design Manual – LRFD* and the most recent AASHTO *LRFD Bridge Design Specifications*, including all interim revisions. Sidewalks shall be provided on bridge structures in accordance with Section 20 of these Technical Provisions.

Segmental bridges shall additionally conform to the requirements of AASHTO *Guide Specifications for Design and Construction of Segmental Concrete Bridges*.

Pedestrian bridges shall additionally conform to the requirements of 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 a 100-year frequency event with no loss of structural integrity.

Bridges crossing over the Project shall, at a minimum, be designed to accommodate the Project and all planned expansions or updates of each facility by its respective owner as designated in the owner's current transportation master plan. Alignments shall meet the requirements indicated in Section 11 for the functional classification of each roadway. Developer shall design bridge structures required for the Interim Configuration, if applicable, to the total length and span arrangement required for the Ultimate

Scope, including spanning future lanes that will be constructed below the structure as a part of the Ultimate Scope.

Developer shall design bridge structures to accommodate the Ultimate Scope and construct bridge structures to the width required for the interim configuration. Developer shall ensure that bridges constructed for the interim configuration can be widened to the Ultimate Scope width at a later date with minimal or no impact to aesthetics and traffic**.**

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

All electronic and paper files and calculations design notebooks shall be made available at TxDOT's request.

13.2.2 Bridge Design Loads and Load Ratings

a) Live Loads

All 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 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 AASHTO *LRFD Bridge Design Specifications* and the AASHTO *Guide Specifications for Design of Pedestrian Bridges*. In addition, all pedestrian bridges shall also be designed for an AASHTO H-10 truck live load as defined in the AASHTO *Standard Specifications for Highway Bridges*, 17th edition to account for maintenance and emergency vehicles.

b) Additional Loads

Bridges (except pedestrian bridges) shall also be designed to accommodate a minimum future overlay load of 25 psf.

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 AASHTO's *Manual for Condition Evaluation of Bridges*.

13.2.3 Bridge Decks and 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.

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.

Developer shall design sidewalks to meet the criteria of the AASHTO *Roadside Design Guide* and protect sidewalks from vehicular impact by a TxDOT-approved bridge railing as required in the TxDOT *Bridge Railing Manual* based on roadway Design Speed. For the Project, pedestrian rail shall be used along structure pavement edges and installed to minimize future damage when accommodating the Ultimate Scope.

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.

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 Foundations

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 Scope.

Spread footing foundations are not allowed.

Houston District Cement Stabilized Backfill Embankment (CSBE) standards shall be incorporated when continuously reinforced concrete pavement (CRCP) is used at bridge approaches.

13.2.5 Bridge Railing and Barriers

All barrier systems used on the Project shall meet current crash test and other safety requirements as determined by TxDOT. 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 current list of standard railing is provided in Attachment 13-1, TxDOT *Standard Bridge Railing*. Developer shall protect sidewalks from vehicular impact by using TxDOT-approved bridge railings. For interim configuration, pedestrian rail shall be used along structure pavement edges and installed to minimize future damage when accommodating the Ultimate Scope.

13.2.6 Retaining Walls

Wall types and components 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.

The retaining wall layout shall address slope maintenance above and below the wall.

To the extent possible, Developer shall design and construct components of the Project 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 Scope can be implemented, unless specified otherwise, with little to no rework or impact on traffic. The interim foundations shall be designed and constructed to include any additional height and weight associated with the Ultimate Scope.

Metal walls, including bin walls and sheet pile walls, recycled material walls and timber walls are not allowed.

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

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

13.2.7 Noise/Sound Walls

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.

13.2.8 Drainage Structures

In developing the design of drainage structures, Developer shall account for maximum anticipated loadings in both the interim configuration and Ultimate Scope.

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

13.2.9 Sign, Illumination, and Traffic Signal Supports

For bridges and walls longer than 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 and cantilever sign supports to accommodate the Ultimate Scope. Cantilever and sign bridge supports shall be placed outside the clear zone or shall be otherwise protected by appropriate safety measures.

13.2.10 Widenings

Developer shall complete a load rating and condition survey of existing structures to be widened. Ratings shall be based on current TxDOT procedures.

13.2.11 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 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. Ordinary Surface Finish as defined by the TxDOT Standard Specifications for Construction and Maintenance of Highways, Streets, and Bridges, latest version, shall be applied to the following as a minimum:

a) Inside and top of inlets
b) Inside and top of manholes
c) Inside of sewer appurtenances
d) Inside of culvert barrels
e) Bottom of bridge slabs between girders or beams
f) Vertical and bottom of surfaces of interior concrete beams or girders.

13.3.2 Structure Metals

Welding shall be in accordance with the requirements of the AASHTO/AWS DI.5 2010 Bridge Welding Code.

13.3.3 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 Contract 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. 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 Chapter 11 of Book 2 shall be required over the entire railroad ROW within 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.

Developer may refer to the Reference Information Documents for various design and construction details or specifications commonly used by the Houston District and railroads operating within the district. Developer bears sole responsibility for verifying the completeness and accuracy of this information.

14.3 Administrative Requirements

14.3.1 Railroad Agreement

Developer shall be responsible for obtaining the required approvals, permits, and agreements as required for the Work, including any railroad related Work.

14.3.2 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. Developer shall be responsible for obtaining the required

approvals, permits, and agreements as required for the railroad-related Work and shall coordinate the design and installation of all railroad warning devices and traffic signals with the appropriate Governmental Entities and operating railroads.

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

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.

A landscaping allowance has been included for the Project as referenced in Section 12.1.6 of the Agreement. The allowance shall be limited to furnishing and installing landscaping Elements but not inclusive of top soil, seeding and sodding. All design tasks including but not limited to developing landscape concept plan, detailed landscaping plans, estimating and pricing any alternates, re-design of detailed landscape plans to accommodate allowance budget etc are excluded from the landscaping allowance. The construction elements excluded from the landscaping allowance are cost of furnishing and installing hardscape, cost of furnishing and installing irrigation systems, cost of installing water lines, permits and the cost to irrigate, etc. Cost related to maintenance of landscaped areas is also excluded from the landscaping allowance.

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, shape 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 prepare aesthetics concepts of the Project that provide a design intent of conformance with the Houston District Green Ribbon Project Guidelines, Principles, and approved Standards for presentation to local communities and Customer Groups. It shall be understood that these concepts 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 improvement opportunity areas, gate way markers, bridge enhancements, landscaping)
    - 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
- Landscaping
    - a) A plan that indicates plant palette, plant locations, plant specifications, planting specifications, 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

The Aesthetic and Landscaping Plan(s) shall include al plans, elevations, perspectives, isometrics, etc., as needed to fully convey the aesthetic treatment.

Upon completion of the Aesthetic and Landscaping Plan(s), Developer shall consolidate the information, which establishes the requirements for engineering of the highway corridor aesthetics. The guidelines shall serve as the primary standard guidance necessary to produce the intended aesthetic form, function, and appearance of this and future similar projects.

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)

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.

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.

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:

a) Aesthetics shall not interfere with safety, constructability and maintenance requirements.
b) The Project design shall minimize impact on the existing natural environment to the extent possible.
c) The Project design shall emphasize and enhance the existing natural context and landscape to the fullest extent possible.
d) Simple geometric shapes for structures shall be used to the extent possible for continuity along the entire length of the Project.
e) All bridges and other structures shall be simplified in their design, and to the greatest extent possible kept small in size, bulk, and mass.
f) All structures shall be carefully detailed so as to achieve the greatest level of aesthetic quality and fit within the regional context.
g) Color, texture, and form shall be used appropriately for all structures.
h) Graphics, signage, and lighting shall be consistent along the entire length of the Project.
i) Existing trees and natural features shall be preserved to the greatest extent possible.
j) Aesthetics Elements shall be fully integrated with the overall landscape design.
k) Visual quality of the landscape shall be consistent along the entire length of the Project.
l) Native-area and/or naturalized plant materials that exhibit good drought tolerance shall be used to the extent possible.
m) Aesthetic Elements shall be easy to maintain and resistant to vandalism and graffiti.
n) Aesthetic Elements shall conform to the Houston District Green Ribbon Project Design Guidelines for the Construction of Highways, Streets and Bridges, and approved Houston District Standards.

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 other physical features such as structures, landscaping, and other highway components.

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.

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 consisting entirely of steel girders or concrete beams. For superstructures where both steel girders and concrete beams are used, such as at direct connection structures and braided ramps, transition from concrete beams to steel girders may be accomplished by dapped end girders and concrete beam spans shall be of constant depth throughout the structure.

Developer shall ensure consistency with the existing Segment E bridge aesthetic treatments at the US 290 interchange connections to Segment F-1 by using U-beams at the US 290 interchange and for the Cypresswood Drive direct connector and mainlane bridge structures.

15.3.3.1 **Low Visibility Bridges**

Low visibility bridges do not require aesthetic treatments and can be designed and constructed using standard TxDOT bent caps, standard TxDOT round columns, standard TxDOT overhangs, standard TxDOT bridge rails and sloped concrete riprap at abutments.

Low visibility bridges are:

- F-1, Mainlanes over Little Cypress Creek
- F-1, Mainlanes over stream at approximate Sta 2603+00
- F-1, Mainlanes over drainage channel L112-00-00
- F-1, Mainlanes over stream at approximate Sta 2727+00
- F-1, Mainlanes over Willow Creek

- F-1, EB and WB Ramps at Telge Road
- F-2, Mainlanes over drainage channel M122-01-00
- F-2, Mainlanes over Rothwood Road/Union Pacific Railroad (Requires reduced aesthetic treatment, i.e. omit flared columns)
- G, Mainlanes over Woodson Gully
- G, Frontage Roads over Woodson Gully

The following bridges require aesthetic treatments for the five bents on either side and adjacent to the roadways they intersect. The remaining spans of these structures do not require aesthetic treatments and can be designed and constructed using standard TxDOT bent caps, standard TxDOT round columns, standard TxDOT overhangs, standard TxDOT bridge rails and sloped concrete riprap at abutments.

The bridges are:

- F-1, Mainlanes over Willow Flat (Sta. 2808+70 to Sta 2940+75)
- G, Mainlanes over Spring Creek
- G, Mainlanes and Frontage Roads over White Oak Creek
- G, Mainlanes over San Jacinto River

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 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 may be placed in the Facility ROW between mainlanes and frontage roads, within interchanges, at detention areas, and adjacent to sound walls. Trees shall conform to landscape development concepts, guidelines and principles set forth in the Houston District Green Ribbon Project Corridor Aesthetics and Landscape Master Plan.
- 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, bent columns, retaining walls, freeway ramp gores, paved ditches, flumes, and ditch inlets to improve roadway appearance.

15.3.6 Lighting

Developer shall design the aesthetic enhancement lighting with the following aesthetic criteria:

- One pole type for the entire corridor. 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.

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. TxDOT must review and approve the sample panels before any construction form liners may be ordered, obtained, or used. Developer shall provide sample panels having a textured portion at least 5.0 feet by 5.0 feet 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, and maintain all signing, delineation, pavement markings, signalization, and lighting, for the Project.

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) and TxDOT's *Standard Highway Sign Design for Texas* (SHSD), and TxDOT's Traffic Engineering Standard Sheets and TxDOT Standard Specifications.

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.

16.3.1 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 *Standard Highway Sign Design for Texas*.

16.3.3 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 and installation of such signs.

16.3.4 Advance Toll Information Signs

For advance toll information signs, Developer shall be responsible for determining sign locations and foundation types, and design and installation of the new signs. The Developer shall prepare and submit a preliminary advance toll information signing schematic for review and approval by TxDOT no later than six months prior to the scheduled date for Substantial Completion of each Segment.

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. At a minimum, advance toll information signs shall be installed at the following locations:

- At all locations where an existing roadway provides public access to the Project
- Prior to all entrance ramps to the Project

16.3.5 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.

16.3.6 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 21 feet 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 the overhead sign structure tower installed on bridge structures shall be steel pipe with the standard truss as shown on standard sheets.

16.3.7 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 mainlanes 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.

16.3.8 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.

16.3.8.1 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 Site.

TxDOT authorized intersections requiring permanent traffic signals are:

- F-1, SH99 Frontage Roads at Cumberland Ridge Drive, approximate Sta 2479+00
- F-1, SH99 Frontage Roads at Mueschke Road, approximate Sta 2675+00
- F-1, SH99 Frontage Roads at Cypress-Rosehill Road, approximate Sta 2791+00
- F-1, SH99 Frontage Roads at Telge Road, approximate Sta 2912+00
- F-1, SH99 Frontage Roads at SH249 Frontage Roads, approximate Sta 3054+00
- F-2, SH99 Frontage Roads at Future Boudreaux Road, approximate Sta 3073+00

- F-2, SH99 Frontage Roads at Gleannloch Forest Drive, approximate Sta 3182+00
- F-2, SH99 Frontage Roads at Champions Forest Drive approximate Sta 3194+00
- F-2, SH99 Frontage Roads at FM2920, approximate Sta 3287+00
- F-2, SH99 Frontage Roads at Boudreaux Road, approximate Sta 3305+00
- F-2, SH99 Frontage Roads at Boudreaux Road, approximate Sta 3387+00
- F-2, SH99 Frontage Road at Kuykendahl Road, approximate Sta 3396+00
- F-2, SH99 Frontage Road at Gosling Road, approximate Sta 3466+00
- F-2, SH99 Frontage Roads at Springwoods Village Parkway, approximate Sta 3624+00
- F-2, SH99 Frontage Roads at Holzwarth Road, approximate Sta 3645+00
- G, SH99 Frontage Roads at IH45 Frontage Roads, approximate Sta 3700+00
- G, SH99 Frontage Roads at Rayford Road, approximate Sta 3862+00
- G, SH99 Frontage Roads at Birnham Woods Drive, approximate Sta 3887+00
- G, SH99 Frontage Roads at FM 1314, approximate Sta 4208+00
- G, SH99 Frontage Roads at Valley Ranch Blvd, approximate Sta 4362+00
- G, SH99 Frontage Roads at Future Road, approximate Sta 4395+00
- G, SH99 Frontage Roads at US59 Frontage Roads, approximate Sta 4412+00

New or modified traffic signal equipment shall conform to 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 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.

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 XHHW for 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.

16.3.8.2 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.

16.3.8.3 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 including those listed in Section 16.3.8.1and 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. 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.

16.3.8.4 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.

16.3.8.5 Traffic Signal Systems

Developer shall provide interconnection systems between new or modified signals and any other signal system within one mile of the 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 Site, and shall provide all communication hardware/equipment for TxDOT or the appropriate Governmental Entity to communicate with the signal systems within the 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.

16.3.9 Lighting

Developer shall provide safety roadway lighting as required within the Project limits and high mast lighting for the direct connector ramps at the major interchanges.

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 submit a computer generated light level array for all lighted areas within the Project limits to TxDOT for review.

All third-party requests for lighting within the Site shall be subject to TxDOT approval.

High mast and conventional lighting shall meet the photometric level requirements as stated in TxDOT Standards RID(LUM)-07, HMID(7)-03 and the AASHTO design guide Informational Guide for Roadway Lighting.

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*. At all times during the Term of the Agreement, Developer shall maintain safe lighting conditions along the Project roadway.

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.

16.3.9.1 Additional Requirements

Additional requirements are as follows:

a) High-mast lighting must not infringe into residential areas adjacent to the Project ROW.

b) Developer must coordinate with the FAA regarding installation of obstruction lights, if any, on a case-by-case basis.

c) 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.

d) 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.

e) 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.

f) 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.

g) Minimum inside dimensions for ground boxes shall be 15.25 inches (width) by 28.25 inches (length) by 20 inches (depth).

h) Ground box covers shall be 2-inch-thick (nominal), nonconducting material and labeled "Danger High Voltage Illumination".

i) Riprap aprons shall be provided to ground boxes located in grassy areas.

j) 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.

k) Electrical part of the installation shall be designed and installed in conformance with the National Electrical Code (NEC), TxDOT Standards and Specifications.

16.3.10 Visual Quality

Notwithstanding the requirements of Section 16.3.8 (Permanent 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/m^2), 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	W4-2 – Lane Ends	W11-6 – Snowmobile Crossing
W1-10 – Intersection in Curve	W4-3 – Added Lane	W11-7 – Equestrian Crossing
W1-11 – Hairpin Curve	W4-5 – Entering Roadway Merge	W11-8 – Fire Station
W1-15 – 270 Degree Loop	W4-6 – Entering Roadway Added Lane	W11-10 – Truck Crossing
W2-1 – Cross Road	W6-1, -2 – Divided Highway Plaques Begins and Ends	W12-1 – Double Arrow
W2-2, -3 – Side Road	W6-3 – Two-Way Traffic	W16-5p, -6p, -7p – Pointing Arrow Plaques
W2-4, -5 – T and Y Intersection	W10-1, -2, -3, -4, -11, -12 – Highway-Railroad Advance	W20-7a – Flagger
W2-6 – Circular Intersection		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 of the Segment. 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 hours 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 connect to the new system provided by Developer. 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.

Developer shall maintain and protect the use of the existing ITS functionality within the Project at all times, except for system crossovers that are approved by TxDOT.

The Project ITS shall conform to the Houston-Galveston Regional ITS Architecture, conform with the Regional Data and Video Communications System (RDVCS) and have physical connections with the existing TxDOT ITS communications network on major freeways. 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 (TMC) 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 TMC for this project. Communication and interoperability shall be achieved with other TMCs in the region, including Houston TranStar, 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.

All components of the ITS shall conform to the provisions of the National Transportation Communication for ITS Protocol (NTCIP) and be compatible with the latest version of TxDOT's LoneStar Software that is operational at Houston TranStar.

All ITS devices and associated mountings shall meet the100 mph wind load design standards.

The installed ITS Equipment shall 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.

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 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 for 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 primary control of all CCTV cameras. 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 1.0 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 protocol. In order to prove compatibility and operability of CCTV systems submitted for use on this project, 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. Submit the CCTV equipment for testing no later than 60 days after completion of TxDOT submittal review. The equipment submitted for testing must be fully assembled and in a fully operational condition. 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 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	

Upon completion of installation, test the communications link installed between the communications hub building and the CCTV field equipment locations. Perform the test at all CCTV locations on the project.

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, 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. No degradation of the video signal must be discernible using the video monitor.

Connect a laptop computer containing TxDOT-supplied CCTV control software on the link and used to control the CCTV movement and control functions from the communications hub building utilizing the data link. Demonstrate the ability to control all CCTV functions outlined in the specifications.

Supply all test equipment, cabling and connectors necessary for performing the tests by the Contractor.

The equipment must be 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. All issues of non-compliance and all discrepancies must be resolved for the second test. Equipment which is not able to be retested within 30 days or which does not pass the second test will be rejected and cannot be used on the project. No additional time or compensation will be granted for the testing of the CCTV equipment. Successful testing of the CCTV equipment must be completed prior to any construction activities at the CCTV locations. No camera poles, cabinets or any other CCTV related equipment shall be installed until successful CCTV equipment testing has occurred.

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 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.

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 each vehicle detection sensor.

Developer shall also install Bluetooth readers every two miles 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 conform to the TxDOT special specification National Transportation Communications for ITS Protocol for Dynamic Message Signs and shall demonstrate compliance before installation of DMS.

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.

DMS shall be placed to provide a driver-friendly sign-viewing angle at each DMS location. Location and placement shall be approved by TxDOT. Developer shall locate the DMS to comply with large guide sign spacing as stated in the *Texas Manual on Uniform Traffic Control Devices.* A DMS shall also be placed at one (1.0) mile before the approach prior to any mainlane tolling facility. 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.

18 TRAFFIC CONTROL

18.1 General Requirements

Developer shall design and construct 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.

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 mainlane 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.

18.3 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.

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 21 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 roadway design speed**.** Approved traffic control devices can be found in the *Compliant Work Zone Traffic Control Device List* (CWZTCD list).

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.

18.3.1.1 Design Parameters for Traffic Control Plans

Design Vehicle. Turning movement 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. The minimum number of lanes to be maintained shall be the number of lanes currently available on each facility. Lane Closures on other roadways may be considered, within reason, so long as all traffic patterns and accesses are maintained. The term "facility" is intended to include Toll, IH, US and SH designated roadways. "Other roadways" include County Roads (CR), Farm to Market roads (FM) and all other named roadways. Below is a list of specific facilities within the Grand Parkway limits by designations.

- Toll Road: Hardy
- Interstate Highway (IH): 45
- US Highways (US): 290 & 59
- State Highways (SH): 99 (Grand Parkway) & 249

Lane Widths. During construction, the minimum lane width for mainlanes, frontage roads and major crossing streets is 11 feet. For minor crossing streets, TxDOT may, in its sole discretion, allow 10-foot 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 or arterial 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 mainlanes in accordance with Table 18-1 (Permitted Lane Closures) during non-restricted hours. Lane Closures other than those permitted in Table 18-1 shall cause Liquidated Damages to be levied against Developer as specified in Exhibit 17 of the Development Agreement. Liquidated Damages may be levied in accordance with Table 18-1 and as specified in Exhibit 17 of the Development Agreement until Project Final Acceptance and thereafter during the Warranty Term as defined in Section 11.1.2 of the Development Agreement.

Table 18-1: Permitted Lane Closures

Description of Operations		**Permitted Lane Closures[1]** (For all mainlane facilities other than the tolled mainlanes)	
Category of Work	**Roadway Lanes** (One Direction)	**Peak Period[2]**	**Off Peak Period[3]**
Placement of CTB, Placement of Pavement Markings, Full Depth Roadway Repair, Placement of Bridge Beams, Bridge Demolition or Similar Operations	5	None	3
	4	None	2
	3	None	1
	2	None	None
Adjacent Construction, Lanes for Construction Traffic or Similar Operations	5	None	2
	4	None	2
	3	None	1
	2	None	None

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 17 of the Agreement.
3. **Off-Peak Period** means the periods as described in Exhibit 17 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 the shall be adjusted as necessary.

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:

- US 290
- US 290 Frontage Roads
- Mueschke Rd.
- Cypress Rosehill Rd.
- Telge Rd.
- Boudreaux Rd.
- SH 249
- SH 249 Frontage Roads
- Huffsmith-Kohrville Rd.
- Gleannloch Forest Dr.
- Champions Forest Dr.
- FM 2920
- Kuykendahl Rd.
- Northcrest Dr.
- Gosling Rd.
- I-45
- I-45 Frontage Roads
- Northgate Crossing Blvd.
- Hardy Toll 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 5)

e) Labor Day Weekend (Friday through Monday)

f) Thanksgiving Holiday (Wednesday through Sunday)

g) Christmas Holiday (December 23 through December 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) Shell Open (Developer shall verify event dates)

18.3.2.3 Hardy Toll Road

Developer is allowed single Lane Closures on the Hardy Toll Road, Monday through Friday, inbound towards Houston from 6pm to 5am and outbound from 8pm to 10am. Single Lane Closures on the Hardy Toll Road are allowed both inbound and outbound anytime on weekends.

For the Hardy Toll Road, 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 both TxDOT and HCTRA.

18.3.2.4 US 290

No Lane Closures will be permitted on US 290 inbound or outbound in the vicinity of the outlet mall at US 290 from the beginning of the Thanksgiving Holiday through the end of the Christmas Holiday in order to accommodate the holiday shopping season.

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 will 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.

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

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.

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.

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.
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 performance of maintenance activities.
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, periodic maintenance, and routine maintenance in accordance with the provisions of Developer's Maintenance Management Plan and Developer's Safety Plan.

Developer is responsible for providing all resources necessary for the performance of all activities in the Maintenance Management Plan.

The Performance and Measurement Table Baseline is included in Table 19-1.

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 and Warranty Term. 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 better. 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.

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.

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.

19.2.1 Maintenance During Work

Developer shall be responsible for maintenance activities and repairs to any portion of the Work, as described in Section 1 of these Technical Provisions, until Project Substantial Completion~~Final Acceptance~~ is issued in accordance with the Agreement. Maintenance activities shall include, but shall not be limited to, routine maintenance (such as litter pickup, mowing, and repair of third-party-damaged traffic control and safety devices), responding to emergencies and operational problems, and inspections and repairs required on an as-needed basis or as directed by TxDOT until issuance of Project Substantial Completion~~Final Acceptance~~. All required maintenance activities during the term of the Agreement for each physical element of the Project shall be performed in accordance with Table 19-1. If Developer fails to perform such maintenance within 10 Business Days of discovery of the need for the work, TxDOT reserves the right to perform such work as it deems necessary with its own forces, and/or to enter into special contracts for the maintenance of specific items.

Table 19-1: Performance and Measurement Table Baseline

Performance and Measurement Table Baseline									
ELEMENT CATEGORY	**REF**	**ELEMENT**	**PERFORMANCE REQUIREMENT**	**RESPONSE TO DEFECTS**			**INSPECTION AND MEASUREMENT METHOD***	**MEASUREMENT RECORD***	**TARGET**
				Cat 1 **Hazard Mitiga-tion**	**Cat 1** **Perma-nent Remedy**	**Cat 2** **Perma-nent Repair**			
1) ROADWAY									
							Unless stated otherwise, measurements shall be conducted using procedures, techniques, and measuring equipment consistent with TxDOT's *Pavement Management Information System Rater's Manual.* Unless otherwise stated, pavement performance measurement records relate to 0.1-mile sections as described in the *Pavement Management Information System Rater's Manual*.		
	1.1	Obstructions and debris	Roadway and clear zone free from obstructions and debris	2 hrs	N/A	N/A	Visual Inspection	Number of obstructions and debris	Nil

* - Items in these columns shall be reviewed annually by Developer as part of the MMP to comply with Technical Documents and/or Good Industry Practice.

Performance and Measurement Table Baseline

ELEMENT CATEGORY	REF	ELEMENT	PERFORMANCE REQUIREMENT	RESPONSE TO DEFECTS			INSPECTION AND MEASUREMENT METHOD*	MEASUREMENT RECORD*	TARGET
				Cat 1 **Hazard Mitigation**	**Cat 1** **Permanent Remedy**	**Cat 2** **Permanent Repair**			
	1.2	Pavement	All roadways have a smooth surface course (including bridge decks, covers, gratings, frames and boxes) with adequate skid resistance and free from Defects.	24 hrs	28 days	6 months	**a) Pavement Condition Score** Measurements and inspections necessary to derive Pavement Condition Score	Pavement Condition Score for 80% of Auditable Sections exceeding: • Mainlanes and ramps – 90 • Frontage roads – 80 Pavement Condition Score for each Auditable Section exceeding: • Mainlanes and ramps – 80 • Frontage roads – 70	100% 100% 100% 100%
	1.2						**b) Ruts – Mainlanes,**		

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Performance and Measurement Table Baseline

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				Cat 1 Hazard Mitiga-tion	Cat 1 Perma-nent Remedy	Cat 2 Perma-nent Repair			
	cont						**shoulders & ramps** Depth as measured using an automated device in compliance with TxDOT standards.	Percentage of wheel path length with ruts greater than ¼" in depth in each Auditable Section	
								• Mainlanes, shoulders and ramps – 3%	Nil
								• Frontage roads – 10%	Nil
							10ft straight edge used to measure rut depth for localized areas.	Depth of rut at any location greater than 0.5”	Nil
							c) Ride quality Measurement of International Roughness Index (IRI) according to TxDOT standard Tex-1001-S, Operating Inertial Profilers and Evaluating	For 80% of all Auditable Sections measured, IRI throughout 98% of each Auditable Section is less than or equal to:	

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Performance and Measurement Table Baseline

ELEMENT CATEGORY	REF	ELEMENT	PERFORMANCE REQUIREMENT	RESPONSE TO DEFECTS			INSPECTION AND MEASUREMENT METHOD*	MEASUREMENT RECORD*	TARGET
				Cat 1 Hazard Mitiga-tion	Cat 1 Perma-nent Remedy	Cat 2 Perma-nent Repair			
							Pavement Profiles	• Mainlanes, ramps – 95" per mile** • Frontage roads – 120" per mile**	100% 100%
	1.2 cont			24 hrs	28 days	6 months	** To allow for measurement bias, an adjustment of -10 (minus ten) is made to IRI measurements for concrete pavements before assessing threshold compliance.	IRI measured throughout 98% of Auditable Section of less than or equal to: • Mainlanes, ramps 120" per mile** • Frontage roads – 150" per mile**	100% 100%
							(Capital Asset Replacement Work and new construction subject to construction quality	Mainlanes, ramps, 0.1 mile average – 150" per mile**	100%

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				Cat 1 Hazard Mitigation	Cat 1 Perma-nent Remedy	Cat 2 Perma-nent Repair			
							standards)		
								Frontage roads, 0.1 mile average – 180" per mile**	100%
								IRI measured throughout 98% of each lane containing a bridge deck in any Auditable Section , 0.1 mile average – 200" per mile**	100%
							10-ft straightedge used to measure discontinuities	Individual discontinuities greater than 0.75"	Nil
							d) Failures Instances of failures exceeding the failure criteria set forth in the TxDOT PMIS Rater's Manual, including potholes, base failures, punchouts and jointed concrete pavement	Occurrence of any failure	Nil

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				Cat 1 **Hazard Mitiga-tion**	**Cat 1** **Perma-nent Remedy**	**Cat 2** **Perma-nent Repair**			
							failures		
	1.2 cont			24 hrs	28 days	6 months	**e) Edge drop-offs** Physical measurement of edge drop-off level compared to adjacent surface	Instances of edge drop-off greater than 2" (Number)	Nil
							f) Skid resistance ASTM E274/E274M-11 Standard Test Method for Skid Resistance Testing of Paved Surfaces at 50 MPH using a full scale smooth tire meeting the requirements of ASTM E524-08 .	• Mainlanes, shoulders and ramps – Number of sections investigated as to potential risk of skidding accident and appropriate remedial action taken where average Skid Number for 0.5-mile section of mainlanes, shoulders and ramps is in excess of 30.	100%

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				Cat 1 Hazard Mitigation	Cat 1 Perma-nent Remedy	Cat 2 Perma-nent Repair			
	1.2 cont							• Frontage roads –Number of sections investigated as to potential risk of skidding accident and appropriate remedial action taken where average Skid Number for 0.5-mile section of frontage roads is in excess of 30.	100%
								• When the skid number is below 25 and/or when required by the Wet Weather Accident Reduction Program, areas categorized as high risk, the Concessionaire shall perform a site investigation and perform required corrective action.	100%

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				Cat 1 **Hazard Mitiga-tion**	**Cat 1** **Perma-nent Remedy**	**Cat 2** **Perma-nent Repair**			
			Road Users warned of potential skidding hazards	24hrs	7days	N/A	**Skid resistance** (as above)	Instances where road Users warned of potential skidding hazard where remedial action is identified.	100%
	1.3	Crossovers and other paved areas	Crossovers and other paved areas are free of Defects	24 hrs	28 days	6 months	**a) Potholes** **b) Base failures**	Potholes of low severity or higher (Number) Base failures of low severity or higher (Number)	Nil Nil
	1.4	Joints in concrete	Joints in concrete paving are sealed and watertight Longitudinal joint separation	24 hrs	28 days	6 months	Visual inspection of joints Measurement of joint width and level difference of two sides of joints	Length unsealed joints greater than ¼" Joint width more than 1" or faulting more than ¼"	Nil Nil

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				Cat 1 **Hazard Mitiga-tion**	**Cat 1** **Perma-nent Remedy**	**Cat 2** **Perma-nent Repair**			
	1.5	Curbs	Curbs are free of defects	24 hrs	28 days	6 months	Visual inspection	Length out of alignment	Nil
2) DRAINAGE									
	2.1	Pipes and channels	Each Element of the drainage system is maintained in its proper function by cleaning, clearing and/or emptying as appropriate from the point at which water drains from the travel way to the outfall or drainage way.	24 hrs	28 days	6 months	Visual inspection supplemented by CCTV where required to inspect buried pipe work	Length with less than 90% of cross section clear (feet)	Nil
	2.2	Drainage treatment devices	Drainage treatment and balancing systems, flow and spillage control devices function correctly and their location and means of operation is recorded adequately to permit their correct operation in Emergency.	24 hrs	28 days	6 months	Visual inspection	Devices functioning correctly with means of operation displayed (Number)	100%

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				Cat 1 **Hazard Mitiga-tion**	**Cat 1** **Perma-nent Remedy**	**Cat 2** **Perma-nent Repair**			
	2.3	Travel way	The travel way is free from water to the extent that such water would represent a hazard by virtue of its position and depth.	24 hrs	28 days	6 months	Visual inspection of water on surface	Instances of hazardous water build-up	Nil
	2.4	Discharge systems	Surface water discharge systems perform their proper function and discharge to groundwater and waterways complies with the relevant legislation and permits.	24 hrs	28 days	6 months	Visual inspection and records	Non-compliances with legislation	Nil
	2.5	Protected species	Named species and habitats are protected.	24 hrs	28 days	6 months	Visual inspection	Compliance with the requirement	100%
3) STRUCTURES									
	3.1	Structures having an opening measured along the centre of the roadway of more than 20 feet between	Substructures and superstructures are free of: • graffiti • undesirable vegetation • debris and bird droppings	24 hrs	28 days	6 months	Inspection and assessment in accordance with the requirements of federal National Bridge Inspection Standards (NBIS) of the Code of Federal Regulations, 23 Highways – Part 650, the	Records as required in the TxDOT Bridge Inspection Manual Occurrences of condition rating below seven for any	Nil

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ELEMENT CATEGORY	REF	ELEMENT	PERFORMANCE REQUIREMENT	RESPONSE TO DEFECTS			INSPECTION AND MEASUREMENT METHOD*	MEASUREMENT RECORD*	TARGET
				Cat 1 Hazard Mitiga-tion	Cat 1 Perma-nent Remedy	Cat 2 Perma-nent Repair			
		undercopings of abutments or springlines of arches or extreme ends of openings or multiple boxes	• blocked drains, weep pipes manholes and chambers • blocked drainage holes in structural components • defects in joint sealants • defects in pedestrian protection measure • scour damage • corrosion of rebar • paint system failures • impact damage				TxDOT Bridge inspection Manual, and the Federal Administration's Bridge Inspector's Reference Manual.	deck, superstructure or substructure All condition states to be one for all structure components	100%
	3.2	Structure components	i) Expansion joints are free of: • dirt debris and vegetation • defects in drainage systems • loose nuts and bolts	24 hrs	28 days	6 months	Inspection and assessment in accordance with the requirements of federal National Bridge Inspection Standards (NBIS) of the Code of Federal Regulations, 23 Highways – Part 650, the TxDOT Bridge inspection	Records as required in the TxDOT Bridge Inspection Manual Occurrences of condition rating below seven for any deck, superstructure or	Nil

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				Cat 1 **Hazard Mitiga-tion**	**Cat 1** **Perma-nent Remedy**	**Cat 2** **Perma-nent Repair**			
			• defects in gaskets ii) The deck drainage system is free of all and operates as intended. iii) Parapets are free of: • loose nuts or bolts • blockages of hollow section drain holes • graffiti				Manual, and the Federal Administration's Bridge Inspector's Reference Manual..	substructure All condition states to be one for all structure components	100%
	3.2 cont.		• vegetation • impact~~accident~~ damage iv) Bearings and bearing shelves are clean. v) Sliding and roller surfaces are clean and greased to ensure satisfactory performance. Additional advice contained in bearing manufacturers' instructions	24 hrs	28 days	6 months			

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				Cat 1 Hazard Mitiga-tion	Cat 1 Perma-nent Remedy	Cat 2 Perma-nent Repair			
			in the Structure Maintenance Manual is followed. Special finishes are clean and perform to the appropriate standards. vii) All non-structural items such as hoists and electrical fixings, operate correctly, are clean and lubricated as appropriate, in accordance with the manufacturer's recommendations and certification of lifting devices is maintained.						
	3.3	Non-bridge class culverts	Non-bridge-class culverts are free of: • vegetation and debris and silt • defects in sealant to movement joints	24 hrs	28 days	6 months	Visual inspection	Number with vegetation, debris and silt Number with defects in sealant and movement joints	Nil Nil

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				Cat 1 **Hazard Mitiga-tion**	**Cat 1** **Perma-nent Remedy**	**Cat 2** **Perma-nent Repair**			
			• scour damage					Number with scour damage	Nil
	3.4	Gantries and high masts	Sign signal gantries, high masts are structurally sound and free of: • loose nuts and bolts • defects in surface protection systems • graffiti	24 hrs	28 days	6 months	Visual inspection	Number with loose assemblies Number with defects in surface protection Number with graffiti	Nil Nil Nil
	3.5	Load ratings	All structures maintain the design load capacity.	24 hrs	28 days	6 months	Load rating calculations in accordance with the Manual for Bridge Evaluation and the TxDOT Bridge Inspection Manual. Load restriction requirements as per the TxDOT Bridge Inspection Manual	Number of load restrictions for Texas legal loads (including legally permitted vehicles)	Nil

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				Cat 1 Hazard Mitiga-tion	Cat 1 Perma-nent Remedy	Cat 2 Perma-nent Repair			
	3.6	Access points	All hatches and points of access have fully operational and lockable entryways.	24 hrs	28 days	6 months	Visual Inspection	Number with defects in locks or entryways	Nil
	3.7	Mechanically Stabilized Earth and Retaining Walls	Mechanically Stabilized Earth and Retaining Walls free of: • blocked weep holes • undesirable vegetation • defects in joint sealants • defects in pedestrian protection • scour damage • corrosion of reinforcing bars • paint system failure • concrete spalling • impact damage	24 hours	28 days	6 months	Inspection and assessment in accordance with the requirements of federal Nations Bridge Inspection Standards (NBIS) of the Code of Federal Regulations, 23 Highways - Part 650, the TxDOT Bridge Inspection Manual and the Federal Highway Administration's Bridge Inspector's Reference Manual.	Records as required in the TxDOT Bridge Inspection Manual	100%

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				Cat 1 Hazard Mitiga-tion	Cat 1 Perma-nent Remedy	Cat 2 Perma-nent Repair			
			Parapets free of: • loose nuts and bolts • blockage of drain holes • undesirable vegetation • impact damage • concrete spalling						
4) PAVEMENT MARKINGS, OBJECT MARKERS, BARRIER MARKERS AND DELINEATORS									
	4.1	Pavement markings	Pavement markings are: • clean and visible during the day and at night • whole and complete and of the correct color, type, width and length • placed to meet the TMUTCD and TxDOT's Pavement Marking	24 hrs	28 days	6 months	a) Markings - General Portable retroreflectometer, which uses 30 meter geometry meeting the requirements described in ASTM E 1710	Length meeting the minimum retroreflectivity 175 mcd/sqm/lx for white Length meeting the minimum retroreflectivity 125 mcd/sqm/lx for yellow	100% 100%

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				Cat 1 Hazard Mitigation	Cat 1 Permanent Remedy	Cat 2 Permanent Repair			
			Standard Sheets				Physical measurement	Length with more than 5% loss of area of material at any point	Nil
								Length with spread more than 10% of specified dimensions.	Nil
							b) Profile Markings Visual inspection	Length performing its intended function and compliant with relevant regulations	100%

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				Cat 1 **Hazard Mitiga-tion**	**Cat 1** **Perma-nent Remedy**	**Cat 2** **Perma-nent Repair**			
	4.2	Raised reflective markers	Raised reflective pavement markers, object markers and delineators are: • clean and clearly visible • of the correct color and type • reflective or retroreflective as TxDOT standard • correctly located, aligned and at the correct level • are firmly fixed • are in a condition that will ensure that they remain at the correct level.	24 hrs	28 days	6 months	Visual inspection	Number of markers associated with road markings that are ineffective in any 10 consecutive markers. (Ineffective includes missing, damaged, settled or sunk) [A minimum of four markers should be visible at 80' spacing when viewed under low beam headlights] Uniformity (replacement rpms having equivalent physical and performance characteristics to adjacent markers).	Nil 100%
	4.3	Delineators & markers	Object markers, mail box markers and delineators are: • clean and visible • of the correct color and	24 hrs	28 days	6 months	Visual inspection	Number of object markers or delineators defective or missing	Nil

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				Cat 1 Hazard Mitiga-tion	Cat 1 Perma-nent Remedy	Cat 2 Perma-nent Repair			
			type • legible and reflective • straight and vertical						
5) GUARDRAILS, SAFETY BARRIERS AND IMPACT ATTENUATORS									
	5.1	Guard rails and safety barriers	All guardrails, safety barriers, concrete barriers, etc... are maintained free of Defects. They are appropriately placed and correctly installed at the correct height and distance from roadway or obstacles. Installation and repairs shall be carried out in accordance with the requirements of NCHRP 350 standards.	24 hrs	28 days	6 months	Visual inspection	Length of road restraint systems correctly installed Length free from defects Length at correct height Length at correct distance from roadway and obstacle	100% 100% 100% 100%
	5.2	Impact attenuators	All impact attenuators are appropriately placed and correctly installed	24 hrs	7 days	6 months	Visual inspection	Number correctly placed and installed	100%

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				Cat 1 **Hazard Mitiga-tion**	**Cat 1** **Perma-nent Remedy**	**Cat 2** **Perma-nent Repair**			
6) TRAFFIC SIGNS									
	6.1	General – All signs	i) Signs are clean, correctly located, clearly visible, legible, reflective, at the correct height and free from structural and electrical defects	24 hrs	28 days	6 months	**a) Retroreflectivity** Coefficient of retro reflectivity	Number of signs with reflectivity below the requirements of TxDOT's TMUTCD	Nil
			ii) Identification markers are provided, correctly located, visible, clean and legible				**b) Face damage** Visual inspection	Number of signs with face damage greater than 5% of area	Nil
	6.1 cont.		iii) Sign mounting posts are vertical, structurally sound and rust free				**c) Placement** Visual inspection	Signs are placed in accordance with TxDOT's Sign Crew Field Book including not twisted or leaning	100%

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				Cat 1 Hazard Mitiga-tion	Cat 1 Perma-nent Remedy	Cat 2 Perma-nent Repair			
			iv) All break-away sign mounts are clear of silt or other debris that could impede break-away features and shall have correct stub heights				**d) Obsolete signs** Visual inspection	Number of obsolete signs	Nil
			v) Obsolete and redundant signs are removed or replaced as appropriate vi) Visibility distances meet the stated requirements vii) Sign information is of the correct size, location, type and wording to meet its intended purpose and any statutory requirements viii) All structures and Elements of the signing system are kept clean and free from debris and have clear access provided. ix) All replacement and repair materials and equipment are in accordance with the				**e) Sign Information** Visual inspection **f) Dynamic Message Signs** Visual inspection	Sign information is of the correct size, location, type and wording to meet its intended purpose Dynamic message signs are fully functioning	100% 100%

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				Cat 1 **Hazard Mitiga-tion**	**Cat 1** **Perma-nent Remedy**	**Cat 2** **Perma-nent Repair**			
			requirements of the TMUTCD x) Dynamic message signs are in an operational condition						
	6.2	General - Safety critical signs	Requirements as 6.1, Plus: "Stop," "Yield," "Do Not Enter," "One Way" and "Wrong Way" signs are clean legible and undamaged.	2hrs	1 week	6 months	Visual inspection	Number of damaged safety critical signs	Nil
7) TRAFFIC SIGNALS									
	7.1	General	i) Traffic Signals and their associated equipment are: • clean and visible • correctly aligned and operational • free from damage caused by accident or vandalism • correctly aligned and	2 hrs	24 hrs	6 months	**a) General condition** Visual inspection **b) Damage** Visual inspection	 Signals are clean and visible Signals are undamaged	 100% 100%

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				Cat 1 **Hazard Mitiga-tion**	**Cat 1** **Perma-nent Remedy**	**Cat 2** **Perma-nent Repair**			
			operational ii) Signal timing and operation is correct iii) Contingency plans are in place to rectify Category 1 defects not immediately repairable to assure alternative traffic control is provided during a period of failure				**c) Signal timing** Timed measurements **d) Contingency plans** Records review	Installations have correct signal timings Full contingency plans are in place	100% 100%
	7.2	Soundness	Traffic signals are structurally and electrically sound	24 hrs	28 days	6 months	**a) Structural soundness** Visual inspection **b) Electrical soundness** Testing to meet NEC regulations	Inspection records showing safe installation and maintenance	100%
	7.3	Identification marking	Signals have identification markers and the telephone number for reporting faults are correctly located, clearly visible, clean and legible	N/A	28 days	6 months	Visual inspection	Inspection records showing identification markers and other information are easily readable	100%
	7.4	Pedestrian	All pedestrian Elements and	24 hrs	28 days	6	Visual Inspection	Inspection records showing	100%

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				Cat 1 **Hazard Mitiga-tion**	**Cat 1** **Perma-nent Remedy**	**Cat 2** **Perma-nent Repair**			
		Elements and vehicle detectors	vehicle detectors are correctly positioned and fully functional at all times			months		compliance	
8) LIGHTING									
	8.1	Roadway lighting – General	i) All lighting is free from defects and provides acceptable uniform lighting quality ii) Lanterns are clean and correctly positioned iii) Lighting units are free from accidental damage or vandalism iv) Columns are upright, correctly founded, visually acceptable and structurally sound	24 hrs	28 days	6 months	**a) Mainlane lights operable** Night time inspection or automated logs **b) Mainlane lights out of action** Night time inspection or automated logs	Number of sections with less than 90% of lights functioning correctly at all times Instances of more than two consecutive lights out of action	Nil Nil

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				Cat 1 **Hazard Mitiga-tion**	**Cat 1** **Perma-nent Remedy**	**Cat 2** **Perma-nent Repair**			
	8.2	Sign lighting	Sign lighting is fully operational	24 hrs	28 days	6 months	Night time inspection or automated logs	Instances of more than one bulb per sign not working	Nil
	8.3	Electrical supply	Electricity supply, feeder pillars, cabinets, switches and fittings are electrically, mechanically and structurally sound and functioning	24 Hrs	7 Days	1 Month	Testing to meet NEC regulations, visual inspection	Inspection records showing safe installation and maintenance	100%
	8.4	Access panels	All access panels in place at all times.	24 Hrs	7 Days	1 Month	Visual inspection	Instances of missing access panels	Nil

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				Cat 1 **Hazard Mitiga-tion**	**Cat 1** **Perma-nent Remedy**	**Cat 2** **Perma-nent Repair**			
	8.5	High mast lighting	i) All high mast luminaries functioning on each pole ii) All obstruction lights are present and working (if required) iii) Compartment door is secure with all bolts in place iv) All winch and safety equipment is correctly functioning and maintained without rusting or corrosion (for structural requirements refer to Element Category 3)	24 hrs	48 hrs	1 Month	Yearly inspection and night time inspections or automated logs	Instances of two or more lamps not working per high mast pole Identification of other defects	Nil Nil
9) FENCES, WALLS AND SOUND ABATEMENT									
	9.1	Design and location	Fences and walls act as designed and serve the purpose for which they were intended	24 hrs	28 days	6 months	Visual Inspection	Inspection records showing compliance	100%
	9.2	Construction	Integrity and structural condition of the fence is	24 hrs	28 days	6	Structural assessment if visual	Inspection records showing	100%

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				Cat 1 **Hazard Mitiga-tion**	**Cat 1** **Perma-nent Remedy**	**Cat 2** **Perma-nent Repair**			
			maintained			months	inspection warrants	compliance	
10) ROADSIDE MANAGEMENT									
	10.1	Vegetated areas – Except landscaped areas – General	Vegetation is maintained so that: i) Height of grass and weeds is kept within the limits described for urban and rural areas. Mowing begins before vegetation reaches the maximum height. ii) Spot mowing at intersections, ramps or other areas maintains visibility of appurtenances and sight distance.	24 hrs	7 days	28 days	**a) Urban areas** Physical measurement of height of grass and weeds	Individual measurement areas to have 95% of height of grass and weeds between 5 in. and 18 in	100%
							b) Rural areas Physical measurement of height of grass and weeds	Individual measurement areas to have 95% of height of grass and weeds between 5 in. and 30 in	100%

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Performance and Measurement Table Baseline

ELEMENT CATEGORY	REF	ELEMENT	PERFORMANCE REQUIREMENT	RESPONSE TO DEFECTS			INSPECTION AND MEASUREMENT METHOD*	MEASUREMENT RECORD*	TARGET
				Cat 1 **Hazard Mitiga-tion**	**Cat 1** **Perma-nent Remedy**	**Cat 2** **Perma-nent Repair**			
			iii) Grass or vegetation does not encroach into or on paved shoulders, mainlanes, sidewalks, islands, riprap, traffic barrier or curbs.				**c) Encroachment** Visual inspection of instances of encroachment of vegetation	Occurrences of vegetation encroachment in each auditable section	Nil
	10.1 cont.		iv) A herbicide program is undertaken in accordance with the TxDOT Herbicide Manual to control noxious weeds and to eliminate grass in pavement or concrete.	24 hrs	7 days	28 days	**d) Wildflowers** Visual Inspection with audit of process.	Adherence to vegetation management manuals	100%
			v) A full width mowing cycle is completed after the first frost.				**e) Sight lines** Visual inspection	Instances of impairment of sight lines or sight distance to signs	Nil
			vi) Wildflowers are preserved utilizing the guidelines in the mowing specifications and TXDOT *Roadside Vegetation Manual*.						

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Performance and Measurement Table Baseline

ELEMENT CATEGORY	REF	ELEMENT	PERFORMANCE REQUIREMENT	RESPONSE TO DEFECTS			INSPECTION AND MEASUREMENT METHOD*	MEASUREMENT RECORD*	TARGET
				Cat 1 Hazard Mitiga-tion	Cat 1 Perma-nent Remedy	Cat 2 Perma-nent Repair			
	10.2	Landscaped areas	i) All landscaped areas are maintained to their originally constructed condition. Landscaped areas are as designated in the plans. ii) Mowing, litter pickup, irrigation system maintenance and operation, plant maintenance, pruning, insect, disease and pest control, fertilization, mulching, bed maintenance, watering is undertaken as per MMP. iii) The height of grass and weeds is kept between 2“ and 8”. Mowing begins before vegetation reaches 8 in iv) Damaged or dead vegetation is replaced.	24 hrs	7 days	28 days	Visual inspection	Inspection records showing compliance	100%

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Performance and Measurement Table Baseline

ELEMENT CATEGORY	REF	ELEMENT	PERFORMANCE REQUIREMENT	RESPONSE TO DEFECTS			INSPECTION AND MEASUREMENT METHOD*	MEASUREMENT RECORD*	TARGET
				Cat 1 Hazard Mitiga-tion	Cat 1 Perma-nent Remedy	Cat 2 Perma-nent Repair			
	10.3	Fire hazards	Fire hazards are controlled	24 hrs	7 days	28 days	Visual inspection	Instances of dry brush or vegetation forming fire hazard	Nil

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Performance and Measurement Table Baseline

ELEMENT CATEGORY	REF	ELEMENT	PERFORMANCE REQUIREMENT	RESPONSE TO DEFECTS			INSPECTION AND MEASUREMENT METHOD*	MEASUREMENT RECORD*	TARGET
				Cat 1 **Hazard Mitiga-tion**	**Cat 1** **Perma-nent Remedy**	**Cat 2** **Perma-nent Repair**			
	10.4	Trees, brush and ornamentals	i) Trees, brush and ornamentals on the right of way, except in established no mow areas, are trimmed in accordance with TxDOT standards. ii) Trees, brush and ornamentals are trimmed to insure they do not interfere with vehicles or sight distance, or inhibit the visibility of signs. iii) Dead trees, brush, ornamentals and branches are removed. Potentially dangerous trees or limbs are removed. iv) All undesirable trees and vegetation are removed. Diseased trees or limbs are treated or removed by licensed contractors.	24 hrs	7 days	28 days	Visual inspection	Inspection records showing compliance	100%

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Performance and Measurement Table Baseline

ELEMENT CATEGORY	REF	ELEMENT	PERFORMANCE REQUIREMENT	RESPONSE TO DEFECTS			INSPECTION AND MEASUREMENT METHOD*	MEASUREMENT RECORD*	TARGET
				Cat 1 Hazard Mitiga-tion	Cat 1 Perma-nent Remedy	Cat 2 Perma-nent Repair			
	10.5	Wetlands	Wetlands are managed in accordance with the permit requirements	24 hrs	7 days	28 days	Visual inspection, assessment of permit issuers	Instances of permit requirements not met	Nil

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Performance and Measurement Table Baseline

ELEMENT CATEGORY	REF	ELEMENT	PERFORMANCE REQUIREMENT	RESPONSE TO DEFECTS			INSPECTION AND MEASUREMENT METHOD*	MEASUREMENT RECORD*	TARGET
				Cat 1 Hazard Mitiga-tion	Cat 1 Perma-nent Remedy	Cat 2 Perma-nent Repair			
11) REST AREAS AND PICNIC AREAS									
	11.1	Rest areas and picnic areas	i) Picnic areas are clean and neat in appearance.	24 hrs	28 days	6 months	Inspection records showing compliance	Instances where 90% of measured area shall have grass and weeds height between 2 in. and 8 in.	100%
			ii) Trash barrels are painted and attached to their supports to prevent stealing.					Mowing shall begin before vegetation reaches 8 in.	100%
			iii) Site free of any visible litter, all litter properly disposed. Litter removed from the picnic area grounds and barrels before being allowed to accumulate outside of the barrels.	24 hrs	28 days	6 months		Number of bare ground areas larger than 5 square feet	Nil

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Performance and Measurement Table Baseline

ELEMENT CATEGORY	REF	ELEMENT	PERFORMANCE REQUIREMENT	RESPONSE TO DEFECTS			INSPECTION AND MEASUREMENT METHOD*	MEASUREMENT RECORD*	TARGET
				Cat 1 Hazard Mitiga-tion	Cat 1 Perma-nent Remedy	Cat 2 Perma-nent Repair			
			iv) All vehicles used in transporting litter are equipped to prevent the accumulated litter from being strewn along the roadway.					Number of prohibited, invasive or noxious weeds present.	Nil
	11.1 cont		v) Vegetation damaged due to improper or careless mowing and trimming operations or any other reason is replaced.					Occurrences of encroachment of vegetation or debris for more than two (2) inches onto any curb or sidewalk located throughout each rest area.	Nil

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Performance and Measurement Table Baseline

ELEMENT CATEGORY	REF	ELEMENT	PERFORMANCE REQUIREMENT	RESPONSE TO DEFECTS			INSPECTION AND MEASUREMENT METHOD*	MEASUREMENT RECORD*	TARGET
				Cat 1 Hazard Mitigation	Cat 1 Perma-nent Remedy	Cat 2 Perma-nent Repair			
			vi) Weeds, grass and other undesirable growth are removed from beds of plants and shrubs as needed. Trees and shrubs are trimmed neatly. All curbs and sidewalks are edged and repaired.					Occurrences of deviation of soil or mulch above or below the top of the curb.	Nil
			vii) All picnic tables are clean, free of stains and free of any defect.					Paved surfaces maintained clean and safe with minimal obstruction.	100%
			viii) All directional, informational, safety and any other type of signage is properly installed, contains accurate information and is visible from a reasonable distance.					Occurrences of undermining greater than 2”	Nil

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Performance and Measurement Table Baseline

ELEMENT CATEGORY	REF	ELEMENT	PERFORMANCE REQUIREMENT	RESPONSE TO DEFECTS			INSPECTION AND MEASUREMENT METHOD*	MEASUREMENT RECORD*	TARGET
				Cat 1 Hazard Mitiga-tion	Cat 1 Perma-nent Remedy	Cat 2 Perma-nent Repair			
			ix) All striping is intact and all parking and travel areas are clearly marked.					Number of unsealed cracks > ½ inch.	Nil
			x) All curbs are in place and intact.					Number of lights fully functional.	100%
12) EARTHWORKS, EMBANKMENTS AND CUTTINGS									
	12.1	Slope failure	All structural or natural failures of the embankment and cut slopes of the Facility are repaired	24 hrs	28 days	6 months	Visual inspection by geotechnical specialist and further tests as recommended by the specialist	Recorded instances of slope failure	Nil

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Performance and Measurement Table Baseline

ELEMENT CATEGORY	REF	ELEMENT	PERFORMANCE REQUIREMENT	RESPONSE TO DEFECTS			INSPECTION AND MEASUREMENT METHOD*	MEASUREMENT RECORD*	TARGET
				Cat 1 Hazard Mitigation	Cat 1 Permanent Remedy	Cat 2 Permanent Repair			
	12.2	Slopes - General	Slopes are maintained in general conformance to the original graded cross-sections, the replacement of landscaping materials, reseeding and re-vegetation for erosion control purposes and removal and disposal of all eroded materials from the roadway and shoulders	24 hrs	28 days	6 months		Inspection records showing compliance	100%

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Performance and Measurement Table Baseline									
ELEMENT CATEGORY	REF	ELEMENT	PERFORMANCE REQUIREMENT	RESPONSE TO DEFECTS			INSPECTION AND MEASUREMENT METHOD*	MEASUREMENT RECORD*	TARGET
				Cat 1 Hazard Mitiga-tion	Cat 1 Perma-nent Remedy	Cat 2 Perma-nent Repair			
13) ITS and ETCS EQUIPMENT									

* - Items in these columns shall be reviewed annually by Developer as part of the MMP to comply with Technical Documents and/or Good Industry Practice.

Performance and Measurement Table Baseline

ELEMENT CATEGORY	REF	ELEMENT	PERFORMANCE REQUIREMENT	RESPONSE TO DEFECTS			INSPECTION AND MEASUREMENT METHOD*	MEASUREMENT RECORD*	TARGET
				Cat 1 Hazard Mitigation	Cat 1 Permanent Remedy	Cat 2 Permanent Repair			
	13.1	ETCS equipment – Maintenance	All ITS and ETCS equipment is fully functional and housing is functioning and free of defects. i) All equipment and cabinet identification numbers are visible, sites are well drained and access is clear. ii) Steps, handrails and accesses are kept in a good condition. iii) Access to all communication hubs, ground boxes, cabinets and sites is clear, iv) All drainage is operational and all external fixtures and fittings are in a satisfactory condition. v) All communications cable markers, cable joint markers and duct markers are visible and missing markers are replaced. vi) Backup power supply system is available at all times	24 hrs	14 days	1 month	Visual inspection	Inspection records showing compliance	100%

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Performance and Measurement Table Baseline

ELEMENT CATEGORY	REF	ELEMENT	PERFORMANCE REQUIREMENT	RESPONSE TO DEFECTS			INSPECTION AND MEASUREMENT METHOD*	MEASUREMENT RECORD*	TARGET
				Cat 1 **Hazard Mitiga-tion**	**Cat 1** **Perma-nent Remedy**	**Cat 2** **Perma-nent Repair**			
	13.2	VES equipment - Maintenance	All VES equipment is kept clean, the identification numbers are visible.	24 hrs	14 days	1 month	Visual inspection	Inspection records showing compliance	100%
	13.3	Dynamic message sign equipment	Dynamic message signs are free from faults such as: i) Any signal displaying an message which is deemed to be a safety hazard ii) Failure of system to clear sign settings when appropriate. iii) 2 or more contiguous sign failures that prevent control office setting strategic diversions iv) Signs displaying an incorrect message.	2 hrs	24 hrs	14 days	Defect measurement dependent on equipment	Inspection records showing compliance	100%

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Performance and Measurement Table Baseline

ELEMENT CATEGORY	REF	ELEMENT	PERFORMANCE REQUIREMENT	RESPONSE TO DEFECTS			INSPECTION AND MEASUREMENT METHOD*	MEASUREMENT RECORD*	TARGET
				Cat 1 Hazard Mitiga-tion	Cat 1 Perma-nent Remedy	Cat 2 Perma-nent Repair			
	13.4	CCTV equipment	CCTV Systems are free from faults that limit the availability of the operators to monitor the area network, such as: i) Failure of CCTV Systems to provide control offices with access and control of CCTV images ii) Failure of a CCTV camera or its video transmission system. iii) Failure of a pan / tilt unit or its control system. iv) Moisture ingress onto CCTV camera lens v) Faults that result in significant degradation of CCTV images	2 hrs	24 hrs	14 days	Defect measurement dependent on equipment	Inspection records showing compliance	100%

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Performance and Measurement Table Baseline

ELEMENT CATEGORY	REF	ELEMENT	PERFORMANCE REQUIREMENT	RESPONSE TO DEFECTS			INSPECTION AND MEASUREMENT METHOD*	MEASUREMENT RECORD*	TARGET
				Cat 1 **Hazard Mitiga-tion**	**Cat 1** **Perma-nent Remedy**	**Cat 2** **Perma-nent Repair**			
	13.5	Vehicle detection equipment	All equipment free of defects and operational problems such as; i) Inoperable loops. ii) Malfunctioning camera controllers.	2 hrs	24 hrs	1 month	Defect measurement dependent on equipment Traffic detector loops: Loop circuit's inductance to be > 50 and < 1,000 micro henries. Insulation resistance to be > 50 meg ohms.	Inspection records showing compliance Instances of loops out of compliance	100% Nil
14) TOLLING Facilities and Buildings (Not Used)									

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Performance and Measurement Table Baseline

ELEMENT CATEGORY	REF	ELEMENT	PERFORMANCE REQUIREMENT	RESPONSE TO DEFECTS			INSPECTION AND MEASUREMENT METHOD*	MEASUREMENT RECORD*	TARGET
				Cat 1 **Hazard Mitiga-tion**	**Cat 1** **Perma-nent Remedy**	**Cat 2** **Perma-nent Repair**			
15) AMENITY									
	15.1	Graffiti	Graffiti is removed in a manner and using materials that restore the surface to a like appearance similar to adjoining surfaces	24 hrs	28 days	6 months	All graffiti is considered a Category 1 defect	Inspection records showing compliance	100%
	15.2	Animals	All dead or injured animals are removed from the ROW	2 hrs	N/A	N/A	Visual inspection	No dead or injured animals are present on ROW	
	15.3	Abandoned vehicles and equipment	All abandoned vehicles and equipment are removed from the ROW.	1 hr	24 hrs	N/A	Visual inspection	No abandoned vehicles or equipment present	
16) SNOW AND ICE CONTROL									
	16.1	Travel lanes	Maintain travel way free from snow and ice	2hrs	N/A	N/A	Maximum 1hr response time to complete manning and loading of spreading vehicles Maximum 2hrs from departure from loading point to complete treatment and return to loading point	Inspection records showing compliance	100%

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Performance and Measurement Table Baseline

ELEMENT CATEGORY	REF	ELEMENT	PERFORMANCE REQUIREMENT	RESPONSE TO DEFECTS			INSPECTION AND MEASUREMENT METHOD*	MEASUREMENT RECORD*	TARGET
				Cat 1 Hazard Mitiga-tion	Cat 1 Perma-nent Remedy	Cat 2 Perma-nent Repair			
							Maximum 1hr response time for snow and ice clearance vehicles to depart from base		
	16.2	Weather forecasting	weather forecast information is obtained and assessed and appropriate precautionary treatment is carried out to prevent ice forming on the travel way	2hrs	N/A	N/A	Operations plan details the process and procedures in place and followed	Inspection records showing compliance	100%
	16.3	Operational plans	Operate snow and ice clearance plans to maintain traffic flows during and after snowfall and restore the travel way to a clear condition as soon as possible.	2hrs	N/A	N/A	Operations plan details the process and procedures in place and followed	Inspection records showing compliance	100%
17) INCIDENT RESPONSE									
	17.1	General	Respond to Incidents in accordance with the MMP	1 hr	N/A	N/A	Response times met for 98% of Incidents measured on a 1 year rolling basis. No complaints from	Inspection records showing compliance	100%

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Performance and Measurement Table Baseline

ELEMENT CATEGORY	REF	ELEMENT	PERFORMANCE REQUIREMENT	RESPONSE TO DEFECTS			INSPECTION AND MEASUREMENT METHOD*	MEASUREMENT RECORD*	TARGET
				Cat 1 **Hazard Mitiga-tion**	**Cat 1** **Perma-nent Remedy**	**Cat 2** **Perma-nent Repair**			
							Emergency Services.		
	17.2	Hazardous Materials	For any Hazardous Materials spills, comply with the requirements of the MMP.	1 hr	N/A	N/A	MMP details the process and procedures in place and followed.	Inspection records showing compliance	100%
	17.3	Structural assessment	Evaluate structural damage to structures and liaise with Emergency Services to ensure safe working in clearing the Incident	1 hr	N/A	N/A	Inspections and surveys as required by Incident	Incident reports showing compliance	100%
	17.4	Temporary and permanent remedy	Propose and implement temporary measures or permanent repairs to Defects arising from the Incident. Ensure the structural safety of any structures affected by the Incident	24 hrs	28 days	N/A	Review and inspection of the Incident site	Auditable inspection records showing compliance	100%
18) CUSTOMER RESPONSE									
	18.1	Response to inquiries	Timely and effective response to customer inquiries and complaints.	48 hrs	28 days	N/A	Contact the customer within 48 hours following initial customer inquiry.	Number of responses within specified times	100%

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Performance and Measurement Table Baseline

ELEMENT CATEGORY	REF	ELEMENT	PERFORMANCE REQUIREMENT	RESPONSE TO DEFECTS			INSPECTION AND MEASUREMENT METHOD*	MEASUREMENT RECORD*	TARGET
				Cat 1 **Hazard Mitiga-tion**	**Cat 1** **Perma-nent Remedy**	**Cat 2** **Perma-nent Repair**			
	18.1 cont			48 hrs	28 days	N/A	All work resulting from customer requests is scheduled within 48 hours of customer contact. Follow-up contact with the customer within 72 hours of initial inquiry. All customer concerns/requests are resolved to TxDOT's satisfaction within 2 weeks of the initial inquiry.		
	18.2	Customer contact line	Telephone line manned during business hours and 24 hour availability of messaging system. Faults to telephone line or message system rectified	24 hrs	28 days	N/A	Instances of line out of action or unmanned	Operations records showing non availability including complaints from public.	nil
19) SWEEPING AND CLEANING									

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Performance and Measurement Table Baseline

ELEMENT CATEGORY	REF	ELEMENT	PERFORMANCE REQUIREMENT	RESPONSE TO DEFECTS			INSPECTION AND MEASUREMENT METHOD*	MEASUREMENT RECORD*	TARGET
				Cat 1 Hazard Mitiga-tion	Cat 1 Perma-nent Remedy	Cat 2 Perma-nent Repair			
	19.1	Sweeping	i) Keep all channels, hard shoulders, gore areas, ramps, intersections, islands and frontage roads swept clean, ii) Clear and remove debris from traffic lanes, hard shoulders, verges and central reservations, footways and cycle ways iii) Remove all sweepings without stockpiling in the right of way and dispose of at approved tip.	24 hrs	28 days	6 months	Buildup of dirt, ice rock, debris, etc. on roadways and bridges not to accumulate greater than 24" wide or 1/2" deep	Inspection records showing compliance	100%
	19.2	Litter	i) Keep the right of way in a neat condition, remove litter regularly ii) Pick up large litter items before mowing operations. iii) Dispose of all litter and debris collected at an approved solid waste site.	24 hrs	28 days	6 months	No more than 20 pieces of litter per roadside mile shall be visible when traveling at highway speed.	Inspection records showing compliance	100%

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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.

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. Developer shall coordinate with Governmental Entities to ensure consistency with existing and proposed bicycle facilities as indicated in the FEIS.

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

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)

Developer is responsible for obtaining Texas Department of Licensing and Regulation (TDLR) reviews and approvals of pedestrian facility design and construction.

21 TOLLING

21.1 General Requirements

TxDOT will enter into a separate contract with tolling integrator (hereinafter the "Integrator") to provide the Electronic Toll Collection System ("ETCS") for the Project. Developer shall support the installation of the ETCS as described herein. Developer shall coordinate with TxDOT and the Integrator during the design phase to finalize the design of all ETCS-related civil Elements. Developer shall provide access to the Project and coordinate construction activities for the Integrator to construct civil Elements for the Toll zones concurrent with Developer's Work.

21.2 Administrative Requirements

Not applicable.

21.3 Design Requirements

Developer shall be responsible for designing general roadway work through each tolling zone. This will include a special pavement section with stub ups, in accordance with the details shown in Attachment 21-2, through the Toll Zone meeting the Integrator's specifications. It shall also include general grading, duct banks, and other typical roadway items included in Developer's Work. Developer shall provide communication fiber, meeting the Integrator's specification, up to the Integrator's designated roadside equipment cabinet in each Toll Zone, and shall provide electric service connections at each Toll Zone. TxDOT will be responsible for civil design Elements related to the Integrator's work. Developer shall coordinate design work in the Toll Zones with TxDOT and the Integrator to determine design requirements specific to the Toll Zones.

21.3.1 ETCS Infrastructure Requirements

21.3.1.1 Mainline Tolling

Mainline Tolling will consist of ETCS at the tolling locations indicated in Section 1 of these Technical Provisions.

21.3.1.2 Ramp Tolling

Ramp Tolling will consist of ETCS at the tolling locations indicated in Section 1 of these Technical Provisions.

21.3.1.3 Utility and Personnel Access-way

Developer shall furnish, and install power drops at each toll gantry location.

21.3.2 ETCS Functional Requirements

21.3.2.1 General

Not applicable.

21.3.2.2 User Classification Sub-system (UCS)

Not applicable.

21.3.2.3 Video Exception Sub-system (VES)

Not applicable.

21.3.3 ETCS Performance Requirements

Not applicable.

21.4 Construction Requirements

Developer shall be responsible for all general roadway work through each tolling zone including grading, special paving, striping, and other items included in the Developer's Work. Pavement placed by Developer in the Toll Zones shall meet the Integrator's specifications. Developer shall coordinate construction schedules with TxDOT and the Integrator for work taking place within the Toll Zones with specific regard for conduit and grounding under structures and in-pavement loops. Developer shall provide access and coordination for the Integrator to perform construction of toll systems civil Elements.

Pavement in all Toll Zones shall be in accordance with the pavement standard as shown in Attachment 21-2. To allow for Integrator's testing of the toll systems, Developer shall provide a minimum of 500 feet of pavement at each end of this special pavement section. These 500 foot sections do not have to meet the requirements of the special pavement standard provided in the attachment.

Developer shall furnish and install safety lighting for the facility including mainlanes, ramps, and at toll gantries.

Developer shall provide and install all static toll signs and sign support structures except those mounted on the toll gantries. Developer shall coordinate with TxDOT and obtain graphic design of the current TxTAG logo, HCTRA logo, NTTA logo and No Cash signs. Developer shall integrate these logos into the design, fabrication, and installation of guide signs and sign support structures in accordance with Texas MUTCD requirements. All advance toll information signs shall be consistent with the adjacent Grand Parkway facility.

Developer shall be responsible for coordinating with the electrical Utility Owners to purchase and install the service on behalf of TxDOT. Developer shall furnish, and install power drops at each toll gantry location. Developer shall be responsible for installing power and communication lines to the Integrator's designated roadside equipment cabinet.

Conduit for electrical service to the roadside equipment cabinets shall be three (3) inches in diameter.

Developer shall provide, install, and test single mode fiber for the toll systems communications. Fiber shall be placed in a dedicated vault in the duct banks along the corridor and shall consist of four (4) strands for each Toll Zone. All fiber, conduit and ground boxes for the toll systems shall be separate from those used for ITS and shall be exclusive to the toll systems.

Developer shall coordinate with Integrator to ensure that there are no power lines or radio frequency (RF) elements in the Toll Zone that could cause interference to the toll systems.

Integrator will be responsible for construction of all toll related civil Elements in the Toll Zone including, fabrication, inspection, and installation of toll gantries, installation of toll gantry traffic barrier, construction of concrete pads for roadside equipment cabinets and generators. Integrator shall be responsible for installing power and communication lines from the Integrator's designated roadside equipment cabinet to the toll systems.

A complete listing of Developer/TxDOT/Integrator responsibilities is provided in Attachment 21-1, Toll Systems Responsibilities Matrix.