Texas Department of Transportation

DESIGN-BUILD SPECIFICATIONS
Items 10-28

Table of Contents

Item 10 10-1
General 10-1
10.1 Offices, Equipment, and Vehicles 10-1
10.1.1 Core Office 10-1
10.1.2 Field Office 10-4
10.1.3 Office Network and Systems 10-6
10.2 Three Dimensional (3-D) Design 10-8
10.2.1 3-D Design Requirements 10-8
10.2.2 Immersive 3-D Over-the-Shoulder Milestone Review Meetings 10-9
10.2.3 3-D Design Deliverables 10-9
10.3 Required Software during Construction Activities 10-10
10.4 Design Visualization 10-10
10.4.1 Design Visualization Services – Photo Rendering and Exhibits 10-11
10.5 Submittals 10-11
Item 11 11-1
Public Information and Communications 11-1
11.1 General Requirements 11-1
11.2 Administrative Requirements 11-1
11.2.1 Public Information and Communication 11-1
11.2.2 Media 11-2
11.2.3 Public Information Coordinator 11-2
11.2.4 Public Information Office 11-3
11.2.5 Meetings with the Public and Customer Groups 11-3
11.2.6 Meeting Summaries 11-4
11.2.7 Emergency Communications 11-4
11.2.8 Disseminating Public Information 11-5
11.2.9 Third Party Claims 11-6
11.3 Submittals 11-6
Item 12 12-1
Environmental 12-1
12.1 General Requirements 12-1
12.1.1 CEPP 12-1
12.2 Environmental Approvals 12-1
12.2.1 TxDOT-Provided Approvals 12-1
12.2.2 New Environmental Approvals Including Amended TxDOT-Provided Approvals 12-1
12.2.3 Responsibilities Regarding Environmental Studies 12-2
12.2.4 TxDOT Review and Approval of DB Contractor Submissions 12-2
12.2.5 Responsibilities Regarding Commitments within Environmental Approvals 12-2
12.3 Environmental Team (ET) 12-5
12.3.1 ECM 12-6
12.3.2 Environmental Training Staff 12-6
12.3.3 Environmental Compliance Inspectors (ECIs) 12-6
12.3.4 Hazardous Materials Manager 12-6
12.3.5 Natural Resource Biologist 12-6
12.3.6 USFWS Permitted Karst Species Specialist 12-6
12.3.7 Licensed Professional Geoscientist 12-7
12.3.8 Water Quality Specialist 12-7
12.4 Submittals 12-7
Item 13 13-1
Third-Party Agreements 13-1
13.1 General Requirements 13-1
13.2 Traffic Signals 13-1
13.3 Roadway Illumination 13-1
13.4 Landscaping Enhancements 13-1
13.5 Frontage Road Access 13-1
13.6 Other Affected Third Parties 13-2

Item 14 ..... **14-1**
Utility Adjustments **14-1**
14.1 General Requirements 14-1
14.1.1 When Utility Adjustment is Required 14-1
14.1.2 Certain Components of the Utility Adjustment Work 14-1
14.1.3 Agreements Between DB Contractor and Utility Owners 14-2
14.1.4 Recordkeeping 14-3
14.2 Administrative Requirements 14-3
14.2.1 Standards 14-3
14.2.2 Communications 14-4
14.2.3 Utility Adjustment Team 14-4
14.2.4 Real Property Matters 14-5
14.2.5 Utility Management Plan 14-6
14.3 Design 14-6
14.3.1 DB Contractor's Responsibility for Utility Identification 14-6
14.3.2 Technical Criteria and Performance Standards 14-6
14.3.3 Utility Adjustment Concept Plans 14-6
14.3.4 Utility Adjustment Plans 14-7
14.4 Construction Requirements 14-9
14.4.1 Reserved. 14-9
14.4.2 General Construction Criteria 14-9
14.4.3 Inspection of Utility Owner Construction 14-9
14.4.4 Scheduling Utility Adjustment Work 14-9
14.4.5 Standard of Care Regarding Utilities 14-10
14.4.6 Emergency Procedures 14-10
14.4.7 UAFM 14-10
14.4.8 Switch Over to New Facilities 14-10
14.4.9 Utility Record Drawings 14-10
14.4.10 Maintenance of Utility Service and Access 14-11
14.4.11 Traffic Control 14-11
14.4.12 Substantial Completion and Final Acceptance Requirements for SAWS Utilities 14-11
14.5 Utility Assembly Submittals 14-11
14.5.1 Maximum Number of Submittals 14-13
14.5.2 DB Contractor's UTR 14-13
14.5.3 Utility Assembly Submittals and Final Closeout Procedures 14-14
14.5.4 FHWA Alternate Procedure 14-15
Item 15 ..... **15-1**
Right of Way (ROW) **15-1**
15.1 General Requirements 15-1
15.2 Administrative Requirements 15-1
15.2.1 Standards 15-1
15.2.2 Software Requirements 15-1
15.2.3 ROW Acquisition Management Plan 15-2
15.2.4 Schedule and Review Procedures 15-2
15.2.5 DB Contractor's Project ROW Scope of Services 15-2
15.2.6 Acquisition Process Summary 15-3
15.2.7 ROW Personnel Qualifications 15-3
15.2.8 DB Contractor Conflict of Interest 15-5
15.2.9 Meetings 15-5
15.2.10 Documentation and Reporting 15-5
15.2.11 Responsibilities of DB Contractor 15-6
15.2.12 Responsibilities of TxDOT 15-7
15.2.13 TxDOT Project Monitor/Reviewer 15-7
15.2.14 Responsibilities of the Office of the Attorney General 15-8
15.3 Pre-Acquisition Activities 15-8
15.3.1 Project ROW Surveying and Mapping 15-8
15.3.2 Additional Reporting Requirements 15-12
15.3.3 Title Services 15-12
15.3.4 Introduction to Property Owners 15-12

15.3.5 Appraisals ... 15-13
15.3.6 Project ROW Acquisition Package Approval ... 15-15
15.4 Acquisition Activities ... 15-17
15.4.1 ROW Negotiations ... 15-17
15.4.2 Relocation Assistance ... 15-18
15.4.3 Closing Services ... 15-20
15.4.4 Condemnation Support ... 15-20
15.4.5 Clearance/Demolition of Project ROW ... 15-23
15.4.6 Payment Submittal ... 15-23
15.4.7 Property Fence ... 15-23
15.4.8 Property Fencing for Public Properties ... 15-23
15.4.9 Property Fencing for Private Properties ... 15-23
15.5 Early ROW Acquisition ... 15-24
15.6 Submittals ... 15-24
Item 16 ... 16-1
Geotechnical & Pavement ... 16-1
16.1 General Requirements ... 16-1
16.2 Geotechnical Investigation ... 16-1
16.2.1 Geotechnical Investigation for Pavement Design ... 16-1
16.2.2 Geotechnical Investigation for Other Elements ... 16-2
16.3 Pavement Materials Requirements ... 16-4
16.3.1 Subgrade Material Composition ... 16-6
16.3.2 Select Fill Material ... 16-6
16.3.3 Treated Subgrade ... 16-6
16.3.4 Treated Base ... 16-6
16.3.5 Tack Coat ... 16-7
16.3.6 Surface Mix Type ... 16-7
16.3.7 Underseal ... 16-8
16.3.8 Final Surface ... 16-8
16.4 Design ... 16-8
16.4.1 New Pavement ... 16-8
16.4.2 Reserved. ... 16-12
16.4.3 Resurfaced Pavement Areas ... 16-12
16.4.4 Use of Shoulders to Carry Construction Traffic ... 16-13
16.4.5 Pavement Widenings ... 16-13
16.5 Construction Quality ... 16-14
16.5.1 Field Verification of Design Subgrade Modulus for Flexible Pavement ... 16-14
16.5.2 Smoothness Specification ... 16-15
16.6 Uniformity of Support Layers ... 16-16
16.7 Construction Requirements ... 16-16
16.8 Submittals ... 16-16
Item 17 ... 17-1
Land Surveying ... 17-1
17.1 General Requirements ... 17-1
17.2 Administrative Requirements ... 17-1
17.2.1 Standards ... 17-1
17.2.2 ROE ... 17-1
17.2.3 Survey by TxDOT ... 17-1
17.3 Design Requirements ... 17-1
17.3.1 Survey Control Requirements ... 17-1
17.3.2 Conventional Method (Horizontal & Vertical) ... 17-1
17.3.3 ROW Surveys ... 17-3
17.3.4 Survey Records and Reports ... 17-4
17.3.5 **Units** ... 17-4
17.4 Construction Requirements ... 17-4
17.4.1 Survey Records ... 17-4
17.4.2 Construction Surveys ... 17-4
17.4.3 ROW Monuments ... 17-5
17.4.4 Record Documents ... 17-5

17.5 Submittals ... 17-6
Item 18 ... 18-1
Grading ... 18-1
18.1 General Requirements ... 18-1
18.2 Preparation within Project Limits ... 18-1
18.3 Slopes and Topsoil ... 18-1
18.4 Sodding ... 18-2
18.5 Construction Requirements ... 18-2
18.6 Submittals ... 18-2
Item 19 ... 19-1
Roadways ... 19-1
19.1 General Requirements ... 19-1
19.1.1 Lead Roadway Design Engineer ... 19-1
19.2 Design Requirements ... 19-1
19.2.1 Control of Access ... 19-2
19.2.2 Design Criteria ... 19-3
19.2.3 Miscellaneous Design Requirements ... 19-9
19.3 Construction Requirements ... 19-9
19.4 Submittals ... 19-9
Item 20 ... 20-1
Drainage ... 20-1
20.1 General Requirements ... 20-1
20.2 Administrative Requirements ... 20-1
20.2.1 Data Collection ... 20-1
20.2.2 Coordination with Other Agencies ... 20-2
20.3 Design Requirements ... 20-2
20.3.1 Surface Hydrology ... 20-3
20.3.2 Storm Drain Systems ... 20-6
20.3.3 Miscellaneous Drainage Design Requirements ... 20-8
20.3.4 Stormwater Storage Facilities ... 20-9
20.3.5 Hydraulic Structures ... 20-10
20.4 Drainage Design Report ... 20-13
20.5 Construction Requirements ... 20-14
20.6 Submittals ... 20-14
Item 21 ... 21-1
Structures ... 21-1
21.1 General Requirements ... 21-1
21.1.1 Lead Structural Engineer ... 21-1
21.2 Design Requirements ... 21-1
21.2.1 NBI Reporting Procedures ... 21-1
21.2.2 Design Parameters ... 21-2
21.2.3 Bridge Design Loads and Load Ratings ... 21-3
21.2.4 Bridge Decks and Superstructures ... 21-4
21.2.5 Bridge Substructure ... 21-5
21.2.6 Bridge Railing and Barriers ... 21-7
21.2.7 Retaining Walls ... 21-7
21.2.8 Noise Barriers ... 21-11
21.2.9 Drainage Structures ... 21-11
21.2.10 Sign, Illumination, and Traffic Signal Supports ... 21-11
21.2.11 Rehabilitation of Structures to be Widened, Extended, or Reused ... 21-12
21.3 Construction Requirements ... 21-13
21.3.1 Concrete Finishes ... 21-13
21.3.2 Steel Finishes ... 21-13
21.3.3 Structure Metals ... 21-13
21.3.4 Steel Erection ... 21-13
21.4 Submittals ... 21-13
Item 22 ... 22-1
Rail ... 22-1
22.1 General Requirements ... 22-1

22.1.1 **Insurance Requirements** ... 22-1
22.2 Railroad Design Standards ... 22-1
22.2.1 Design Criteria ... 22-1
22.3 Administrative Requirements ... 22-1
22.3.1 Railroad Agreements ... 22-1
22.3.2 Operation Safety ... 22-2
22.3.3 DB Contractor ROE Agreement ... 22-3
22.4 Construction Requirements ... 22-3
22.4.1 Flagging ... 22-3
22.5 Submittals ... 22-3
Item 23 ... 23-1
Aesthetics and Landscaping ... 23-1
23.1 General Requirements ... 23-1
23.1.1 Aesthetics Concepts ... 23-1
23.1.2 Aesthetics and Landscaping Plan ... 23-2
23.1.3 Personnel ... 23-2
23.2 Design Requirements ... 23-2
23.2.1 Aesthetics Principles and Strategies ... 23-2
23.2.2 Walls and Sign Columns ... 23-3
23.2.3 Bridges and Other Structures ... 23-3
23.2.4 Trees, Shrubs, and Other Plant Materials ... 23-3
23.2.5 Riprap, Paving, and Pavers ... 23-3
23.2.6 Color Palette ... 23-4
23.2.7 Lighting Aesthetics ... 23-4
23.3 Construction Requirements ... 23-4
23.4 Aesthetic and Landscaping Enhancements ... 23-4
23.5 Submittals ... 23-4
Item 24 ... 24-1
Signing, Delineation, Pavement Marking, Signalization, and Lighting ... 24-1
24.1 General Requirements ... 24-1
24.2 Administrative Requirements ... 24-1
24.2.1 Meetings ... 24-1
24.3 Design Requirements ... 24-1
24.3.1 Preliminary Layouts ... 24-1
24.3.2 Signing and Delineation ... 24-1
24.3.3 Project Signs – Outside the Project ROW ... 24-2
24.3.4 Third-Party Signs ... 24-2
24.3.5 Sign Support Structures ... 24-2
24.3.6 Pavement Markings ... 24-2
24.3.7 Signalization ... 24-3
24.3.8 Lighting ... 24-5
24.3.9 Visual Quality ... 24-7
24.4 Construction Requirements ... 24-8
24.4.1 Maintenance of Existing Signals During Construction ... 24-8
24.4.2 Maintenance of Existing Lighting During Construction ... 24-8
24.4.3 Permanent Signing and Delineation ... 24-8
24.4.4 Permanent Pavement Marking ... 24-9
24.4.5 Permanent Signalization ... 24-9
24.4.6 Permanent Lighting ... 24-10
24.4.7 Reference Markers and Reference Location Signs ... 24-10
24.5 Submittals ... 24-11
Item 25 ... 25-1
Intelligent Transportation Systems ... 25-1
25.1 General Requirements ... 25-1
25.2 Design Requirements ... 25-2
25.2.1 DB Contractor ITS Communications Requirements ... 25-3
25.2.2 Conduit ... 25-4
25.2.3 CCTV Cameras ... 25-4
25.2.4 Vehicle Detection ... 25-6

25.2.5 DMS ... 25-6
25.2.6 Communications Hub Enclosures and Communications Cabinets ... 25-7
25.2.7 Wrong Way Detection System (WWDS) ... 25-7
25.2.8 Flood Stations ... 25-8
25.2.9 Access Control System (ACS) ... 25-8
25.3 Construction Requirements ... 25-8
25.3.1 General ... 25-8
25.3.2 Maintenance of Existing ITS During Construction ... 25-9
25.3.3 Existing ITS Relocation ... 25-9
25.3.4 ITS Implementation Plan ... 25-9
25.3.5 End-to-End Testing ... 25-10
25.3.6 Record Documents ... 25-10
25.4 Additional Requirements ... 25-11
25.5 Submittals ... 25-11
Item 26 ... 26-1
Traffic Control ... 26-1
26.1 General Requirements ... 26-1
26.1.1 Lead MOT Design Engineer ... 26-1
26.1.2 Lead MOT Implementation Manager ... 26-1
26.2 Design Requirements ... 26-1
26.2.1 Traffic Control Plans ... 26-1
26.2.2 Traffic Modeling Requirements ... 26-3
26.3 Construction Requirements ... 26-3
26.3.1 DB Contractor Responsibility ... 26-3
26.3.2 IQF Responsibility ... 26-4
26.3.3 Bicycle and Pedestrian Access ... 26-4
26.3.4 Detours ... 26-4
26.3.5 Local Approvals ... 26-4
26.3.6 Traffic Signals ... 26-4
26.3.7 Temporary Traffic Barrier ... 26-4
26.3.8 Pavement Markings and Signing ... 26-5
26.3.9 Smart Work Zone Technology and Traffic Management System Requirements ... 26-5
26.3.10 Reinstatement of Utility Cuts ... 26-5
26.3.11 Hauling Equipment ... 26-5
26.3.12 Final Clean-Up ... 26-6
26.3.13 Stockpiles ... 26-6
26.4 Submittals ... 26-6
Item 27 ... 27-1
Maintenance ... 27-1
27.1 General Requirements ... 27-1
27.1.1 General Maintenance Obligations ... 27-1
27.1.2 Scope of Maintenance Work and Interfaces with TxDOT and Third Parties ... 27-1
27.1.3 Maintenance Limits ... 27-2
27.2 Maintenance Management ... 27-2
27.2.1 Maintenance Management Plan ... 27-2
27.2.2 Reserved. ... 27-2
27.2.3 Maintenance Manager ... 27-2
27.3 Performance Requirements ... 27-2
27.3.1 Performance and Measurement Table ... 27-2
27.3.2 Defect Identification, Recording and Categorization ... 27-3
27.3.3 Baseline Inspections and Performance and Measurement Table ... 27-3
27.3.4 Updates of Baseline Performance and Measurement Table During Construction ... 27-4
27.3.5 Permanent Repair of Defects ... 27-5
27.3.6 Hazard Mitigation of Category 1 Defects ... 27-5
27.4 Inspections ... 27-5
27.4.1 General Inspections by DB Contractor ... 27-5
27.4.2 Performance Sections ... 27-5
27.4.3 Inspections by TxDOT ... 27-6
27.5 Maintenance Management System (MMS) ... 27-6

27.5.1 MMS Attributes 27-6
27.5.2 MMS Interfaces with TxDOT 27-6
27.6 Maintenance Obligations 27-6
27.6.1 Incident and Emergency Management 27-6
27.6.2 Snow and Ice Control 27-7
27.6.3 Severe Weather Evacuation 27-7
27.6.4 Maintenance Document Management 27-7
27.6.5 Safety 27-7
27.6.6 Communication 27-7
27.6.7 Hazardous Materials Management 27-7
27.6.8 Environmental Compliance and Mitigation 27-8
27.6.9 Traffic Management 27-8
27.7 Submittals 27-8
Item 28 28-1
Bicycle and Pedestrian Facilities 28-1
28.1 General Requirements 28-1
28.2 Administrative Requirements 28-1
28.3 Design Requirements 28-1
28.3.1 Bicycle Facilities 28-1
28.3.2 Pedestrian Facilities 28-1
28.4 Construction Requirements 28-2

Item 10
General

10.1 Offices, Equipment, and Vehicles

Except where noted elsewhere in the Contract Documents, DB Contractor and TxDOT shall co-locate until Final Acceptance to facilitate Project coordination and daily communication. The definition of "co-locate" for the Term is office space meeting the conditions of these DB Specifications that is within one mile of the Project ROW, or as approved by TxDOT. In addition to colocation requirements for specified personnel and Key Personnel elsewhere in these DB Specifications, the following DB Contractor's personnel shall be co-located with TxDOT:

- Senior design engineer, and at least one CADD technician for the design duration; and
- ROW AM during ROW acquisition phase.

The office space requirements for the Project office are provided below.

TxDOT will provide a portion of the Northeast Bexar Maintenance Yard office building and lot, located at 6550 Walzem Road, for the DB Contractor's use for construction staging or other Project-related activities, as approved by TxDOT. DB Contractor shall enter into a facility-specific agreement with TxDOT prior to using the facilities.

10.1.1 Core Office

DB Contractor shall provide all space, facilities, and support elements necessary to design, construct, and maintain the TxDOT core office in accordance with the Contract Documents. DB Contractor shall provide office space for TxDOT's design and Project management staff. If it is necessary to locate any office space for TxDOT's design and Project management staff off-site or outside of the core office, DB Contractor shall obtain TxDOT's prior written consent.

DB Contractor shall provide TxDOT office space. (i.e., available for occupancy) within 60 days following issuance of NTP1, and prior to NTP2. The location, condition, and amenities of the office space for TxDOT are subject to TxDOT's prior written approval. DB Contractor shall provide a preliminary TxDOT facility area layout plan, in which DB Contractor shall identify the portion of the Project office space provided by DB Contractor for TxDOT's use, to TxDOT no later than 10 days after NTP1. TxDOT will promptly review and comment on required modifications to the layout within 10 days. DB Contractor shall submit a final facility layout plan within 10 days of receipt of TxDOT comments.

DB Contractor 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 DB Contractor's office staff. TxDOT will be reasonable regarding re-use of existing space within DB Contractor's current office facility, provided that the space is contiguous and workable in TxDOT's good faith discretion.

10.1.1.1 Core Office Condition

The offices shall be in good and serviceable condition, at least of the same quality as those of DB Contractor'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 DB Contractor-provided TxDOT facility area to DB Contractor in essentially the same condition as when TxDOT first took occupancy of the facilities, except for reasonable wear and tear and except for alterations, or loss or damage, caused by any member of a DB Contractor-Related Entity.

10.1.1.2 Core Office Loss or Damage

If office spaces, related facilities, or fixtures are destroyed, damaged, or stolen during the Term in the TxDOT facility area, except as a direct result of willful misconduct of TxDOT or its personnel, DB Contractor shall, at its cost and within 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, DB Contractor shall replace the facilities noted herein within the

timeframes specified herein, and TxDOT shall reimburse DB Contractor for actual, reasonable, and documented costs incurred.

10.1.1.3 **Core Office Facilities and Equipment**

For the TxDOT facility area it provides, DB Contractor shall:

- General. Secure facility space, obtain all permits, install and pay for all utility services, and maintain the facilities as part of the Work;
- Access and Security. Provide separate TxDOT entrance/exit(s) from building, which shall be secured with electronic door lock(s) plus a deadbolt lock. DB Contractor 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., network/telecommunications, document storage, offices). DB Contractor shall provide software for maintaining access to these areas, which will be owned and/or maintained by TxDOT's design and Project management staff;
- Lighting and Electricity. Include with all interior spaces overhead lighting meeting OSHA, building, 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 20 amperes. In addition, each personal office area and conference room shall have a 1,500 Volt-ampere (VA) uninterruptible power supply (UPS). All LAN, telephone system equipment, and appurtenances shall have a UPS sized properly to be capable of providing up to one hour of battery run time;
- Janitorial and Trash Services. Provide daily janitorial service (except Saturdays, Sundays, and holidays) and maintain trash containers and trash pickup service for the building and surrounding 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 DB Contractor. DB Contractor shall pay for and procure janitorial services for the TxDOT facility area;
- Exterior Maintenance. Maintain the exterior areas of office spaces, including access to parking areas;
- Accessibility and Licensing. Meet all access requirements of the Texas Accessibility Standards, ADA Accessibility Guidelines, ADA, as amended, and the applicable building code. Facility design plans shall be submitted to the TDLR for review and approval as required by 16 TAC Chapter 68;
- 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 DB Contractor's office space/staff. These spaces and all TxDOT spaces shall have access 24 hours per day, seven (7) days per week, and 365 days per year. In lieu of access to a common break room, DB Contractor may provide a 200 SF break room/kitchen within the TxDOT space, with refrigerator with freezer compartment, sink, and microwave. Break room/kitchen will have storage closet (25 SF) and cabinets with drawers and counter tops. In the event that access to restrooms cannot be accessed from a common building entry/lobby, DB Contractor 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 3,000 SF TxDOT space allocation may be required to be increased to accommodate these spaces;
- HVAC. Provide electrical, HVAC systems capable of maintaining temperatures between 65 and 75 degrees Fahrenheit in all spaces, 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;
- Code Requirements. Meet all applicable building and fire code requirements;
- Disposal and Removal. Be responsible for disposal or removal of all DB Contractor-provided facilities and any facility and/or site restoration Work as required; and
- Pest Control. Provide pest control service to prevent and resolve pest infestation inside the office space.

10.1.1.4 Core Office Space Requirements

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

- Offices. Enclosed offices for TxDOT's management staff (nominal 150 SF each, unless otherwise approved by TxDOT), ten total with keyed door hardware, desk, desk chair, bookcase, file cabinet, credenza, and guest desk chair;
- Cubicles. Cubicle area spaces for administration staff (nominal 64 SF each), 20 total; (power supply and data and communication lines to cubicles may be provided through power pole drops);
- Conference Rooms. Two conference rooms (enclosed), one with a minimum size of 12 feet x 20 feet (240 SF) and one with a minimum size of 12 feet x 30 feet (360 SF); All shall have dimmable lighting; conference rooms shall have a 65-inch minimum flat panel monitor with VGA/HDMI accessibility, assembly room shall have an overhead projector and screen in the with a minimum 120-inch diagonal projected image 1024 by 768 resolution; 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;
- Reception Area. Receptionist space with waiting area with seating for six visitors (nominal 200 SF); minimum 46" flat panel monitor with VGA/HDMI accessibility; other furniture to be determined jointly by DB Contractor and TxDOT;
- Work Room. Work room (nominal 150 SF) with 30-inch high plastic laminate wall-mounted counters (15 linear feet of counter). Work room shall be located near the center of the facility, and in close proximity to the receptionist space;
- Storage and Filing. One lockable space for storage and filing, nominal 15 feet x 20 feet (300 SF);
- Server Room. One computer server room (150 SF or larger to meet ADA, OSHA, and NEC requirements as applicable) 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 non-static floor covering, a standard 7'-19" rack, and a minimum of six duplex receptacles with 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;
- Parking Area. Parking area for at least 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. If covered parking is available, no less than two covered parking spaces shall be made available to TxDOT;
- Exterior Lighting. Sufficient exterior security lighting that is automatically activated at low light levels to maintain 2 foot-candles of lighting within the building and parking areas of the site; and
- Corridors. Corridors within the TxDOT facility shall have a nominal width of 54 inches.

10.1.1.5 Core Office Miscellaneous Requirements and Features

The following shall be provided as noted:

- Flooring. Carpeted flooring (carpet not required in server room);
- Entry Access. Entry to TxDOT areas by electronic door hardware card access (not keyed), with UPS on locks (fail closed);
- Electrical Outlets. All data/voice outlets shall be installed next to power outlets;
- Window Coverings. Horizontal mini-blinds (no drapes) for each exterior window;
- Power Circuits. Provide dedicated electrical power circuits for copiers;
- Fire Extinguishers. DB Contractor shall provide fire extinguishers, per fire code and fire marshal with jurisdiction;
- Insurance. Insurance (obtained and provided by DB Contractor) covering the use of the Project office by DB Contractor 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 Contract Documents;

- Vending Area. DB Contractor shall provide access to general building vending area;
- Utilities. Initial installation and monthly expense of all utilities shall be paid by DB Contractor except long-distance telephone service;
- Monthly Services. DB Contractor shall procure and pay vendors directly for janitorial, trash, recycling, and secure document shredding services;
- Emergency Contacts. 24-hour emergency contact to DB Contractor;
- Furniture. DB Contractor-provided allowance of $15,000 in the Price for additional furniture not listed in the requirements of this Section 10.1.1, which shall be obtained by DB Contractor at the direction of TxDOT and billed through DB Contractor. At the end of the Project, DB Contractor 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; and
- Cable Television. Provide cable television connections and service to each flat screen television.

10.1.2 Field Office

DB Contractor shall provide all space, facilities, and support elements necessary to conduct field operations to complete the Work in accordance with the Contract Documents. DB Contractor shall provide office space for TxDOT's Project management acquisition staff including, the program manager and other contract employees. The field office shall be located within one mile of the Project ROW.

DB Contractor shall provide field office space for the exclusive use of TxDOT's field construction staff for the Project as specified herein. The field offices may be combined with the core office described in Section 10.1.1 as long as the combined offices meet the requirements of Sections 10.1.1 and 10.1.2.

Subject to TxDOT's prior written approval, DB Contractor shall provide separate facilities for TxDOT's resident engineer staff located within the same complex as DB Contractor's field office. Should DB Contractor 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 DB Contractor's counterpart management and field staff facilities.

Prior to commencing construction of TxDOT's field office space, DB Contractor shall submit for TxDOT's approval final wiring and circuitry plans, office furniture and equipment layout, a field office floor plan, a lighting plan, and a parking plan for TxDOT's Project management and contract staff vehicles.

Concurrent with NTP1, DB Contractor is authorized to begin work on the field office space. Final completion of TxDOT's field office space, including all punch list items, shall occur before TxDOT shall issue NTP2.

In regard to field offices for TxDOT field construction staff, DB Contractor shall ensure the following conditions are achieved:

10.1.2.1 Field Office Condition

The field office shall be in good and serviceable condition meeting all ADA and local government regulatory criteria for a safe workspace environment, at least of the same quality as those of DB Contractor's counterpart management and field staff facilities, and shall be 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 DB Contractor-provided facilities to DB Contractor in essentially the same condition as when TxDOT first took occupancy of the facilities, except for reasonable wear and tear and except for alterations, loss, or damage caused by any member of a DB Contractor-Related Entity.

10.1.2.2 Field Office Loss or Damage

If office space(s) or related facilities, furniture, or fixtures that are provided by DB Contractor are destroyed, damaged, or stolen during the Term, except as a direct result of willful misconduct of TxDOT or its personnel, DB Contractor shall, at its cost and within 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) 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, DB Contractor shall

replace the facilities noted herein within the timeframes specified herein, and TxDOT shall reimburse DB Contractor for actual, reasonable, and documented costs incurred.

10.1.2.3 **Field Office Facilities and Equipment**

For the facilities it provides, DB Contractor shall:

- General. Secure sites, obtain all site permits, install and pay for all utility services, and maintain the facilities clean and in good working order as part of the Work;
- Access and Security. Provide separate buildings or trailers for TxDOT staff that include at least two entrances/exits, providing an 8 foot by 10 foot (minimum) covered entrance area, from each building or trailer. Each entrance/exit shall be secured with a door lock plus a deadbolt lock;
- Lighting and Electricity. Include with all interior spaces overhead lighting meeting the requirements of 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 20 amperes;
- Janitorial and Trash Service. Provide daily janitorial service (except Saturdays, Sundays, and holidays) and maintain trash containers and trash pickup service. This will include, but not be limited to, sweeping and mopping floors, cleaning the toilet and lavatory, and emptying wastebaskets;
- Exterior Maintenance. Maintain the exterior areas of office spaces, including access to parking areas;
- Accessibility and Licensing. Meet all access requirements of the Texas Accessibility Standards, ADA Accessibility Guidelines, ADA, as amended, and the applicable building code. Facility design plans shall be submitted to the TDLR for review and approval as required by 16 TAC Chapter 68;
- Utility Service. Provide potable water, sewer service, and electricity to the field office facility;
- HVAC. Provide electrical and HVAC systems capable of maintaining temperatures between 65 and 75 degrees Fahrenheit in all spaces, 24/7/365, through the year. Server room or network/telecommunications room, as applicable, shall have dedicated air conditioning/cooling system capable of maintaining temperatures between 65 and 70 degrees Fahrenheit, and 15% relative humidity. Temperature controls for TxDOT's field office space shall be placed in an appropriate location within TxDOT's secured area;
- Code Requirements. Meet all local building and fire code requirements; and
- Disposal and Removal. Be responsible for disposal or removal of all DB Contractor-provided facilities and any site restoration Work as required.

10.1.2.4 **Field Office Space Requirements**

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

- Offices. Enclosed offices with lockable doors for TxDOT's construction representative, TxDOT-designated construction manager and four other TxDOT or contract employees (six offices at 150 SF each, unless otherwise approved by TxDOT), with keyed door hardware, desk, desk chair, book case, file cabinet, credenza and guest chair;
- Offices/Cubicles. Offices or cubicles for up to twenty field engineer/inspection/administration staff (60-80 SF each);
- Conference Rooms. One enclosed conference room of not less than (350 SF) for TxDOT's exclusive use and access to another common conference room of not less than (350 SF);
- Server room. One (1) server room, matching the requirements of the core office server room;
- Storage and Filing. Two lockable spaces for storage and filing at each field office (a combined space of 200 SF);
- Surveying Equipment Storage. Clean inside storage space for surveying equipment (80 SF);
- Tool Shed. Outside shed for small tools and equipment (200 SF);
- 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;

- Staff Parking Area. A parking area for at least thirty vehicles that is reasonably level (all-weather surface and all-weather access) within the boundaries of a security fence;
- 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 SF);
- Security. A 24-hour security service or silent watchmen-type security system;
- Exterior Lighting. Sufficient exterior security lighting that is automatically activated at low light levels to maintain 2 foot-candles of lighting within the fenced field office site;
- Window Security. Security bars on all exterior windows;
- Laboratory Facility. A completed facility suitable to accommodate a functioning portable lab (approximately 2,500 SF) located immediately adjacent to the Independent Quality Firm (IQF) laboratory required in Section 4.4 of the QAP for DB Projects;
- Kitchen/Break Room. Each field office shall contain a 300 SF kitchen with storage closet (25 SF), cabinets with drawers and counter tops. Kitchen shall be equipped as described above for the core office;
- Restrooms. Two restrooms including toilets and sinks; and
- First Aid Supplies. Provide emergency first aid supplies in accordance with DB Contractor's Safety Plan.

10.1.2.5 Field Office Miscellaneous Requirements and Features

The following shall be provided:

- Flooring. Carpeted flooring for offices (nonstatic in server room). All other rooms shall be tiled;
- Entry Access. Entry to TxDOT areas by electronic door hardware card access (not keyed), with UPS on locks (fail closed);
- 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;
- HVAC. 24/7/365 HVAC as previously described;
- Window Coverings. Horizontal mini-blinds (no drapes) for each exterior window;
- Power Circuits. Provide dedicated electrical power circuits for copiers;
- Fire Extinguishers. DB Contractor shall provide fire extinguishers, per fire code and fire marshal with jurisdiction;
- Insurance. Insurance (obtained and provided by DB Contractor) covering the use of the Project office by DB Contractor 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 Contract Documents;
- Utilities. Initial installation and monthly expense of all utilities shall be paid by DB Contractor except long distance telephone service;
- Emergency Contacts. 24-hour emergency contact to DB Contractor; and
- Furniture. DB Contractor-provided allowance of $15,000 in the Price for additional furniture not listed in the requirements of this Section 10.1.2, which shall be obtained by DB Contractor at the direction of TxDOT, and billed through DB Contractor. At the end of the Project, DB Contractor 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.

10.1.3 Office Network and Systems

DB Contractor shall, for each TxDOT representative, provide, furnish, install, operate, and maintain the following for the TxDOT office spaces described in Item 10, Section 10.1:

- A local area network (LAN) with a minimum two 1 gigabits per second (Gbps) network drops for each personal office area and a minimum of four 1 Gbps drops for each conference room. All drops shall have the ability to connect to the internet. The network shall allow for multiple virtual private network (VPN) connections/sessions. The network shall also provide WPA2

secured wireless (Wi-Fi ®) in accordance with IEEE 802.11n standards. Coverage shall be provided for the entire office utilizing dual band radios capable of operating at both 2.4 and 5 gigahertz (GHz);

- A touch-tone telephone system (with voicemail) with at least one telephone, with speakers, for each personal office area. Also provide at least one telephone, with speakers, and a minimum of one satellite microphone for each conference room. The telephone system shall have the ability to host two lines per telephone, access all outside lines, receive any incoming call, caller identification, conference-call capability (three-way calling), call forwarding, call transfer, hold, hold music, and send to voice mail functionality;
- Access to DB Contractor's electronic document management system (EDMS) systems for file sharing, collaboration, reviews, and responses at each personal office area and within each conference room;
- Each office space shall be equipped with a laptop docking station compatible with TxDOT staff's computers with a minimum of two flat panel monitors or three flat panel monitors if requested by TxDOT, including all necessary peripherals such as mouse, keyboard, 128 gigabyte thumb drive, and wireless internet for laptop computers for each personal office area and the reception area in the Project office;
- For each of the core and field offices, one external DVD drive and one external hard drive with not less than two terabytes of memory per external hard drive;
- High speed, highly reliable internet service(s) capable of providing a minimum download speed of 1 Gbps with a minimum of three concurrent download connections and a minimum of two concurrent upload connections;
- The ability to print to any printer listed in this Section 10.1.3 from any network drop or wireless connection regardless of user domain (e.g. TxDOT and others' computers shall be able to print to any printer listed in this Section 10.1.3 from any network drop);
- Include all network equipment, racks, structured cabling, wall plates, jacks, patch panels, patch cords (including patch cables for each LAN and telephone drop in each personal office area and conference room), power assemblies, and other appurtenances needed to meet the requirements contained within these DB Specifications;
- All hardware and software shall meet applicable industry standards and protocols;
- Provide on-site technical support eight hours per day, five days per week until the completion and close out of the Project;
- Provide the office equipment meeting the following requirements, or multipurpose piece of equipment capable of meeting multiple parts of the following requirements:
  - One high-speed color laser computer printer capable of handling 11 inches x 17 inches prints for core office and one for field office;
  - One color plotter capable of handling 36 inches x 24 inches roll plots (core office only)
  - One high-speed color photocopy machine capable of handling 11 inches x 17 inches prints for core office;
  - One high-speed color scanner capable of handling 11 inches x 17 inches prints for core office and one for field office;
- One paper shredder for core office and one for field office;
- One commercial grade three-hole punch for core office and one for field office;
- One commercial grade GBC binder (or equal) for core office; and
- All office supplies, including copier paper, toners, pens, pencils, notepads, and other miscellaneous office supplies.

DB Contractor shall certify supplied components as functional before installation and will bear all responsibility for replacement of parts at work commencement. DB Contractor shall prepare a test plan for all parts and components, submit the test plan prior to installation, test installed systems, and supply test results, in conformance with industry standard testing procedures.

The DB Contractor shall provide the following additional items for TxDOT's use:

- Twelve 10.5 inch iPad Pro (latest version available), or equal, with Wi-Fi + Cellular, 256 gigabyte (GB) capacity along with 4G/LTE cellular service and protective case with key pad;

and

- One GoPro Hero4 Black Edition (latest version available), or equal.

10.2 Three Dimensional (3-D) Design

DB Contractor shall design the Project utilizing 3-D methodologies and techniques and submit its 3-D design files to TxDOT for use during the design and construction process.

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

DB Contractor shall utilize design software and versions currently in use by TxDOT to develop the 3-D design unless DB Contractor receives advanced written approval from TxDOT in accordance with Section 5.2.7 of the General Conditions.

10.2.1 3-D Design Requirements

DB Contractor shall submit proposed 3-D design file naming conventions to TxDOT for review and approval.

DB Contractor shall incorporate the Schematic Design into DB Contractor's Project design files utilizing 3-D methodologies and techniques.

DB Contractor shall create an integrated 3-D model of the existing condition of the Project that reflects, among other things, existing ground surface and subsurface elements and infrastructure (including, but not limited to, drainage structures, utilities, bridges, and wall foundations), data from light detection and ranging (LiDAR), SUE, field surveys, and existing plans (as-built) data collection; including currently available LiDAR or other existing ground surface data (digital terrain model (DTM) or triangulated irregular network (TIN) formats) provided in the RIDs.

DB Contractor shall utilize 3-D methodologies and techniques to develop the geometric design, as well as the 3-D design model for each proposed roadway and incorporate it into the Project's integrated design models. When preparing any geometric design, DB Contractor shall:

- Refine and finalize 3-D horizontal and vertical alignments for all high-occupancy vehicle lanes, exclusive lanes, general purpose lanes, ramps, direct connectors, collector-distributors, crossing and parallel roadways, pavement transitions, and tie-ins to existing lanes;
- Determine horizontal and vertical clearances at grade separations, underpasses and overpasses; and
- Develop superelevation and superelevation transition designs for each roadway. Verify rollover constraints are adequately addressed, including ramp, collector-distributor, and direct connector gore locations.

DB Contractor shall include existing and proposed 3-D design features for the following Elements of Work in accordance with these DB Specifications:

- Roadway: pavement structures, metal beam guard fence (MBGF), pedestrian facilities, existing and proposed ROW;
- Drainage: storm sewers (inlets, manholes), culverts, and channel grading;
- Structures: sufficient detail to show top of deck surface, structure type, bottom of beam surface, bent cap, piers, foundations (size and length), abutment, and retaining wall locations including straps, nails and footings;
- Utilities: relocated and existing Utilities to remain in place (existing Utilities to be abandoned in place are not required to be included);
- Signing: overhead span or cantilever sign structure locations and structure type, foundations (size and length); and
- Temporary structures: including, but not limited to, temporary shoring, soil nails, and temporary retaining walls.

10.2.2 Immersive 3-D Over-the-Shoulder Milestone Review Meetings

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

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

- View the model and manipulate view settings to interactively change data display on the screen (e.g. pan, rotate, walk, fly, zoom, etc.);
- Measure distances and areas throughout all areas of the model;
- Reference baseline geometry, stationing, and existing and proposed ROW; and
- Dynamically visualize key existing and proposed design features and detect conflicts/clashes amongst the following disciplines:
    - Roadway;
    - Drainage;
    - Structures (bridges, retaining walls);
    - Utilities (existing and proposed);
    - Signing (overhead span or cantilever sign structure locations and structure type);
    - Lighting (pole and foundation locations);
    - Signals (controller, pole, and foundation locations); and
    - Temporary structures.

DB Contractor shall submit the following before every review meeting:

- Adobe PDF file of Project 3-D model which shall include proposed striping;
- All CADD and other electronic files used to develop the 3-D model along with all associated files required to duplicate the model; and
- Updated Utility Adjustment Concept Plan.

10.2.3 3-D Design Deliverables

DB Contractor shall prepare and submit to TxDOT for review and comment an integrated 3-D design model with the following Submittal packages:

- Preliminary Design Submittal
- Final Design Submittal
- Released for Construction Documents
- Early Start of Construction
- Record Documents

The integrated 3-D design model shall consist of 3-D MicroStation file(s) containing 3-D graphical elements (components, contours, superelevation transitions limits, and existing and proposed finish grade triangles) representative of the stage of design development of the Submittal package. The minimum level of detail of the elements in the 3-D model shall accurately depict the size, shape, and location of all Elements of the Work to be constructed in the Submittal package.

DB Contractor shall submit a final 3-D model consisting of a compilation of 3-D design models submitted with previous design submittal packages.

Additional electronic design files to be submitted to TxDOT by DB Contractor include:

- <u>OpenRoads:</u> 3-D MicroStation design files containing civil data of alignments, profiles, pertinent geometry, terrain surfaces, civil cells, corridor models and final surface,in addition to other MicroStation elements used in the creation of the corridor model such as point controls, corridor references, GPK files, etc.;
- <u>InRoads template library (ITL):</u> OpenRoads Template Libraries;

- XML: Output files of alignments, profiles, pertinent geometry, DTM for terrain surface and final surfaces;
- Drawing exchange format (DXF): Output files of DTM for terrain surfaces and final surfaces;
- Image color matching (ICM): Output files (infrastructure consensus model) in a rich data exchange format using Bentley i-model standards. The ICMs will be used to transfer the 3-D model information to construction equipment;
- DTM data:
  - GEOPAK original ground TIN file,
  - Preliminary design surface: A comprehensive model of existing terrain. Progression through detailed design will advance the preliminary design surface to a final design surface, and
  - Final design surface: Proposed Project model in final condition; and
- Electronic construction i-models: Compatible with DB Contractor's construction equipment to be utilized by TxDOT and IQFM to verify grading operations of subgrade and the final pavement surface, as well as construction of storm sewer systems and culverts.

10.3 Required Software during Construction Activities

DB Contractor shall utilize a mobile based, web hosted, collaborative design-construction productivity software solution (such as PlanGrid or an equivalent) allowing real-time access to and management of construction documents. The DB Contractor must purchase and provide licenses to DB Contractor staff (including subconsultants, as appropriate), and 40 copies for TxDOT staff and TxDOT's consultants from the commencement of Construction Work through Final Acceptance. Utilization will cover the course of the Construction Work. This software application will be used to view drawings, specs and documents in the field and facilitate collaboration between Project stakeholders. The software solution must meet the following technical requirements:

- All features and Project documents uploaded in the system must be available offline in the event that there is no wireless connection.
- The solution must be compatible with iOS, Windows, and Android operating systems and devices.
- The solution must be able to export an as-built set. This as-built must be complete with documents, photos and hyperlinks embedded in the set.
- The solution must be capable of being used during post construction operations and maintenance phases.
- After Final Acceptance, the solution should be handed to the operations and maintenance team for post construction coordination.
- The solution must be able to provide a detailed audit trail of all parties collaborating in the application. This includes date/time stamp of any mark-ups, photos, issues, RFIs and punch list items.
- The solution must auto-tag sheet disciplines to distinguish different trade drawings.
- Vendor must be able to support the Project and each customer with a dedicated sales representative for rollout.
- Vendor must offer training/consulting on the software solution as needed during the Project.

10.4 Design Visualization

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

DB Contractor shall provide accurate three-dimensional models that depict the Project. Completed models shall represent realism and aesthetic attributes of the existing conditions and the proposed Project. DB Contractor shall add roadway design details to the model that are not normally provided at the stage of Schematic Design and verify that the Schematic Design complies with design guidelines presented in the TxDOT *Roadway Design Manual*, Texas MUTCD, the AASHTO *Green Book*, the AASHTO *Roadside Design Guide*, and the AASHTO *Guide for the Development of Bicycle Facilities* or applicable standards listed in these DB Specifications.

The design visualization models shall show existing and proposed design conditions either separately or combined in the same display. Based on specific Project requirements the final design visualization deliverables may include photo-matched renderings, rendered plan view layouts, and animated sequences.

DB Contractor shall provide, along with the Record Drawings, a three-dimensional CADD model of the completed Project and any work product generated during the modeling process, such as site photographs, textures, material assignments, and additional terrain information. All CADD data should be in electronic format and native to TxDOT's CADD architecture using Bentley Systems, Inc. MicroStation (MicroStation) to provide complete compatibility between the DB Contractor's and TxDOT's CADD software and files.

DB Contractor shall collect, review, and evaluate all of the available existing data pertaining to the Project and prepare the design visualization models to reflect current design requirements. The data shall include MicroStation design files, GEOPAK geometry files, existing terrain models, and digital ortho photography. DB Contractor shall field verify the existing and proposed condition of design visualization models for dimensional accuracy and realism.

Resulting animations for design visualization purposes do not have to be native MicroStation, but do need to be capable of viewing on any device with minimal support to, or effort by TxDOT.

All CADD data and associated files, in native form, shall be submitted by the DB Contractor to TxDOT as part of its final deliverable.

10.4.1 Design Visualization Services – Photo Rendering and Exhibits

DB Contractor shall provide animation renderings video and create a fly-over video for the Project's existing condition and the future condition based on the Final Design, if requested by TxDOT. The animation renderings shall accurately depict the geometric design of the proposed improvements.

DB Contractor shall provide photographs and fly-over videos periodically throughout the construction for documentation purposes.

10.5 Submittals

All Submittals described in this Item 10 shall be in accordance with the schedule and for the purpose (approval, review and comment, for information) set forth on Table 10-1. Acceptable electronic formats include Microsoft Word, Microsoft Excel, or Adobe Acrobat files, unless otherwise indicated.

Table 10-1: Submittals to TxDOT

Submittals	Submittal Schedule	TxDOT Action	Reference Section
Preliminary TxDOT facility area layout plan	No later than 10 days after NTP1	Review and comment	10.1.1
Final TxDOT facility area layout plan	No later than 10 days after receiving comments from TxDOT	Approval	10.1.1
Final wiring and circuitry plans, office furniture and equipment layout, a field office floor plan, a lighting plan, and a parking plan	Prior to commencing construction of TxDOT's field office	Approval	10.1.2
3-D design files	Upon request and with the Submittal packages identified in Section 10.2.3	Review and comment	10.2
Proposed 3-D design file naming conventions	Prior to implementation	Approval	10.2.1
Project 3-D Model with proposed striping, all CADD files associated with the Model, and updated Utility Adjustment Concept Plans	Prior to every 3-D milestone review meeting and with the Submittal packages identified in Section 10.2.3	Review and comment	10.2.2, 10.2.3
Additional OpenRoads, ITL, XML, DXF, ICM and DTM design files	As necessary	For information	10.2.3

Table 10-1: Submittals to TxDOT

Submittals	Submittal Schedule	TxDOT Action	Reference Section
Electronic construction i-models	Upon request	For information	10.2.3

Item 11
Public Information and Communications

11.1 **General Requirements**

In coordination with TxDOT, DB Contractor shall be responsible for developing and implementing a public information and communication program in order to maintain a high level of two-way communication by informing and engaging local Governmental Entities, special interest groups, businesses, communities, and the general public about the Project status throughout the design and construction period.

DB Contractor shall coordinate all public information communications with ongoing TxDOT public information activities to ensure that a consistent message is being distributed to the Customer Groups.

11.2 **Administrative Requirements**

On a schedule mutually agreed upon between DB Contractor and TxDOT's public information officer, DB Contractor shall meet regularly with TxDOT's public information officer and Customer Groups to coordinate efforts.

DB Contractor shall use, but not be limited to, the implementation strategies described in Sections 11.2.1 through 11.2.9.

11.2.1 **Public Information and Communication**

- Develop a forum to coordinate on-going dialogue among Customer Groups, TxDOT, and DB Contractor.
- Prepare and distribute Project-related materials in a user-friendly format to inform Customer Groups through appropriate means such as: meetings, business owner task force meetings, interviews, website, media kits, news releases, telephone correspondence, newsletters, brochures, e-mail, text messaging service, social media, mobile phone apps, hotlines, HCRs, dynamic message boards, web alerts, public opinion polls/surveys, videos, display booths, presentations, public access information kiosks, open houses, milestone events, and special events.
- Organize and manage meetings and communications with Customer Groups. Meetings can be held on an ad hoc basis or, as appropriate, on a regular basis as established in consultation with TxDOT.
- Attend events and meetings when invited and seek opportunities to attend meetings, conferences, and other events at which Project information can be exchanged with Customer Groups.
- Notify Customer Groups in advance of Work being performed, including key Project ROW acquisition, construction, operations, and maintenance activities, and communicate the potential impacts of these activities.
- 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, noise walls, Project ROW acquisition, and aesthetic characteristics.
- Develop and manage a public relations campaign and communication strategy to convey key messages, branding, and pertinent information about the Project. Include Work elements, timing, and durations. Provide contact information for inquiries by Customer Groups.
- As requested by TxDOT, coordinate and perform tours of the Project.
- Comply with the latest requirements of the TxDOT Guidelines for Analysis and Abatement of Roadway Traffic Noise.
- Develop materials and make arrangements for multi-lingual groups when it can be reasonably anticipated that material will be presented to multi-lingual Customer Groups.

- Provide reasonable accommodation for individuals with disabilities, including providing access to and use of information and data that is comparable to the access to and use of the information and data provided to members of the public without disabilities.
- Communicate impacts to and Project design for accommodation of pedestrians and bicyclists throughout the Project.
- Develop 3-D drive-thru videos and renderings of the Project, as directed by TxDOT, to accurately depict the proposed Project to interested Customer Groups.
- Compile database of all Customer Group contacts and make readily available to TxDOT in an easily accessible format.

11.2.2 Media

- Utilize existing TxDOT media resources if available to create and develop advertising messages, including graphics, logos, and slogans.
- Place Project-related messages in the appropriate media.
- Develop and distribute public service announcements, paid advertising, news reports, and other communication materials as appropriate.
- Provide to TxDOT Project updates (such as anticipated closures and traffic switches) on a weekly basis that can be used on the TxDOT San Antonio District blog (http://txdotsanantonio.blogspot.com/).
- Manage media relations with key transportation and business reporters and prepare and distribute news releases and media kits.
- Develop and implement communications plans that anticipate and minimize traffic impacts on the Project from public, special, and seasonal events.
- Monitor local, state, and national media coverage regarding the Project for accuracy and to gauge local opinion. Coordinate with TxDOT regarding any inaccurate information related to the Project that DB Contractor discovers. Respond in a method, time, form, and message approved by TxDOT to such inaccurate information as soon as possible but no later than within one (1) day after discovery of the inaccurate information.
- Document and make available Project-specific media clips to the entire Project team.
- 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.

11.2.3 Public Information Coordinator

DB Contractor shall provide a Public Information Coordinator to lead DB Contractor's public information activities on a day-to-day basis throughout the Term. The Public Information Coordinator shall have recent, relevant experience on projects of similar type and scope, and the ability to competently perform the following:

- Serve as the primary point of contact between DB Contractor and Customer Groups, be responsible for the dissemination of Project information, and serve as the clearinghouse for the receipt of and response to written or verbal comments or complaints regarding the Project.
- Coordinate all interactions with elected officials or their representatives with TxDOT's Public Information Office and its Government Affairs Office.
- Lead the production, implementation, quality control, and update of the PICP.
- Coordinate and supervise day-to-day activities of DB Contractor's personnel in performing the public information activities described in the PICP.
- Facilitate communication among DB Contractor, TxDOT personnel (including TxDOT's public information officers), and Customer Groups.
- Interact with Customer Groups and represent the interests of the Project at meetings and other formal and informal events.
- Develop a clear understanding for Customer Groups' concerns and reactions regarding the Project and public information program and incorporate that knowledge into improving the PICP.

- 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.
- Liaise with the appropriate staff and Customer Groups as appropriate to outline the impacts and benefits of the Project in relation to parks and pedestrian/bicyclist access.
- Create and manage a Customer Group database. Allow TxDOT access to the database as requested.
- Speak fluent English and speak fluent Spanish or have a Spanish translator available at all times.

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

11.2.4 Public Information Office

DB Contractor shall maintain a public information office for the Term. 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 within one mile of the Project site. The public information office shall provide a centralized location for residents and other Customer Groups to obtain information on the Project, including Project maps and Plans, fact sheets, 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 meetings with Customer Groups. The rooms shall be ADA-compliant, convenient to and accessible by Customer Groups, and appropriately supplied with electrical outlets, tables, and chairs, and other equipment to meet meeting requirements. One of these rooms shall accommodate at least 50 persons and another shall accommodate at least 15 persons. DB Contractor shall provide sufficient parking to accommodate use of the public information office.

During design and construction, the minimum hours of operation of the public information office shall be as follows:

- Monday-Friday 8 a.m. – 5 p.m. and by appointment
- Saturday By appointment
- Sunday Closed

DB Contractor shall extend hours of operation to appropriately service Customer Groups.

In addition to the services listed above, DB Contractor shall provide a 24-hour telephone hotline that is manned locally during the public information office's normal business hours and that provides a recorded message describing Emergency procedures after hours. DB Contractor shall respond to voicemail messages left after hours within 48 hours of receiving the voicemail message. DB Contractor's Public Information Coordinator shall log the messages, responses, day and time of message, and day and time of response.

11.2.5 Meetings with the Public and Customer Groups

DB Contractor shall organize and manage meetings with the general public and Customer Groups during the Term and will develop with TxDOT the list of meeting and event invitations.

The frequency of such meetings is addressed in the PICP. This frequency must be increased or decreased as needs arise to better inform and engage the Customer Groups. From time to time, upon TxDOT's request, DB Contractor shall modify its meeting schedule to better inform and engage the Customer Groups.

To maximize public participation, DB Contractor shall advertise meetings hosted by DB Contractor a minimum of two weeks in advance. Advertisement shall include utilization of e-alerts, social media, and the Project website, and in the appropriate media outlets, such as the Texas Register, local newspapers, and television and radio stations, or via media advisories and media releases. Notices must include the following language:

"Special accommodations: If you have a disability and need assistance, special arrangements can be made to accommodate most needs. If you are a person with a disability who requires an accommodation to attend a meeting, please contact [Name], [Phone] or by email at [Email address] within two days of the meeting no later than 4:00 p.m. Please be aware that advance notice is requested as some accommodations may require time for TxDOT to arrange."

DB Contractor is solely responsible for creating all meeting advertisements.

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

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

DB Contractor shall notify TxDOT a minimum of 15 Business Days in advance of any meetings with the public. TxDOT reserves the right to attend any such meetings. When requested by TxDOT, DB Contractor shall participate in and provide support for any meetings with the Customer Groups scheduled and conducted by TxDOT. When TxDOT decides to conduct such meetings, DB Contractor shall share, in a form that is easy to manipulate, all necessary information regarding potential Customer Groups at TxDOT's request.

11.2.6 Meeting Summaries

For all meetings DB Contractor conducts or directly participates in, DB Contractor shall prepare meeting summaries. DB Contractor shall submit draft versions of all meeting summaries to TxDOT for review and comment on SharePoint upon request. TxDOT comments shall be incorporated before distributing final versions to the meeting attendees and appropriate Customer Groups. At a minimum, DB Contractor shall include the following items in each meeting summary:

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

For any formal public meetings or open houses at which a court reporter is required, DB Contractor shall also include detailed oral transcripts in the summary.

11.2.7 Emergency Communications

For all Emergencies, including major vehicle collisions, severe weather conditions, and Hazardous Materials spills, the Public Information Coordinator shall timely notify and take appropriate action to inform TxDOT and 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: DMS, TxDOT's HCR, email/web (if applicable)/text alerts, telephone notification, 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 Emergency, "timely notify" shall mean as soon as practicable, but in no event longer than within one hour of the occurrence. DB Contractor shall follow TxDOT's general guidelines requiring notification when an Emergency results in delays for motorists in traffic extending beyond 20 minutes. If advanced warning is available for an Emergency event such as ice/snow, "timely notify" 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.

11.2.8 Disseminating Public Information

DB Contractor shall prepare and distribute public information using all appropriate methods, including materials for meetings, news releases, telephone correspondence, newsletters, emails, text messages, mobile device applications, hotlines, HCR, DMS, web alerts (if applicable), maps, displays, renderings, presentations, milestone events, business owner taskforce meetings, open houses, brochures, pamphlets, highway advisory radio, video news releases, and other social media services as directed by TxDOT. Copies of draft public information materials shall be submitted to TxDOT. TxDOT shall have a period of five (5) Business Days to review and comment in advance of final editing. After incorporation of TxDOT comments to the satisfaction of TxDOT, DB Contractor shall provide complete copies of all final materials to TxDOT at least three (3) Business Days prior to dissemination.

All written materials produced for Customer Groups shall follow TxDOT *Brand Guidelines* and other appropriate spelling/writing guidelines.

DB Contractor shall create a public website to convey Project-related information, including:

- DB Contractor contact information;
- Project maps;
- Frequently asked questions (FAQs);
- Current Project activities addressing design, construction, and maintenance;
- Timing of street and ramp closures and openings;
- Recommended route alternatives during closures;
- Newsletter and meeting materials;
- Meetings and special events announcements and calendar;
- Links to TxDOT Highway Conditions Reports;
- Links to other related sites as deemed appropriate by TxDOT;
- Job opportunities;
- Subcontractor information;
- Comment form;
- Mailing list request form;
- Historical archive of photos taken during construction;
- Renderings or video animations of the Project, as appropriate; and
- Published materials in Spanish and other languages as needs warrant and in consultation with TxDOT.

Website design and creative development shall be coordinated with TxDOT's Communications Division to ensure content is consistent with TxDOT brand management and concurrence. DB Contractor shall submit the draft public website design to TxDOT for review and comment, and the final website design elements to TxDOT for approval. DB Contractor shall also coordinate website development to complement and integrate with TxDOT's existing My35.org website. The website shall contain other general Project-related information that enhances the engagement or education of the general public. DB Contractor shall regularly review and update information on this public website as it becomes available throughout the Project to provide current and appropriate information and the website shall provide for question and feedback opportunities for public communication. DB Contractor shall develop and implement a plan to make the Customer Groups aware of the Project website. DB Contractor shall ensure electronic and information technology is accessible to people with disabilities, in accordance with ADA and in compliance with Title VI of the Civil Rights Act of 1964, 42 U.S.C. 2000d et seq.

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

DB Contractor shall track all incoming comments, inquiries, and requests for information related to the Project. The following information shall be collected with each contact, and a summary of all contacts (after removing information obtained in response to items (a) through (d) below) shall be reported to TxDOT on a bi-weekly basis:

a) Name of individual

b) Address (not required)
c) Phone number
d) E-mail address
e) Subject matter
f) Specific comment, question or request
g) Date of comment, question or request
h) Response given

DB Contractor shall track requests for language assistance services and ADA accommodations and provide information to TxDOT each quarter for TxDOT's use, including for its inclusion in the Office of Civil Rights' Limited English Proficiency Report, the Office of Civil Rights' Transition Plan Progress Report, and FHWA's ADA Program Reporting.

11.2.9 **Third Party Claims**

DB Contractor shall be responsible for resolving all complaints regarding the Project, whether received directly or forwarded by TxDOT, appropriately and in a timely manner and shall retain a record of the actions DB Contractor has taken with respect to each such complaint. Other Third Party Claims are addressed in the Contract Documents.

11.3 **Submittals**

All Submittals described in this Item 11 shall be in accordance with the schedule and for the purpose (approval, review and comment, for information) set forth on Table 11-1. Acceptable electronic formats include Microsoft Word, Microsoft Excel, or Adobe Acrobat files, unless otherwise indicated.

Table 11-1: Submittals to TxDOT

Submittals	Submittal Schedule	TxDOT Action	Reference Section
Media responses as listed in Section 11.2.2	Within one (1) day of release	Approval	11.2.2
Draft meeting summaries	Upon request	Review and comment	11.2.6
Final meeting summaries (to TxDOT and meeting attendees)	Upon request	For information	11.2.6
Draft public website design	Prior to website development	Review and comment	11.2.8
Final website design elements	Five business days prior to publishing	Approval	11.2.8
Drafts of all materials to be presented to the public/media	At least five Business Days prior to final editing	Review and comment	11.2.8
Final copies of all materials to be presented to the public/media	At least three Business Days prior to dissemination	For information	11.2.8
Public comment/inquiry log	Bi-Weekly	For information	11.2.8
Language assistance and ADA accommodation log	Quarterly	For information	11.2.8

Item 12
Environmental

12.1 **General Requirements**

DB Contractor shall ensure fulfillment of the Environmental Commitments required by the Contract Documents, Governmental Entities, Environmental Approvals (including all TxDOT-Provided Approvals), all other Governmental Approvals, the CEPP and all applicable Laws and regulations, including, Environmental Laws.

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

12.1.1 **CEPP**

DB Contractor shall develop, implement and, as necessary, update a CEPP for the Work to ensure compliance with all applicable Environmental Laws, Environmental Approvals and Environmental Commitments. The CEPP shall obligate DB Contractor to protect the environment and document the measures to be 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 requirements for the CEPP are contained in Section 4.2.4 of the General Conditions.

The CEPP shall effectively demonstrate in detail DB Contractor's knowledge of all applicable Environmental Approvals, environmental issues on the Project, Environmental Commitments, and applicable Environmental Laws. The CEPP shall also describe the processes that will be followed during the course of the Work to address environmental issues to comply with those Environmental Approvals, Environmental Commitments, and Laws, as well as the documentation required to validate compliance. All monitoring and reporting documentation shall be:

- concise and consistent throughout the Term;
- applicable to the activities being performed; and
- in accordance with the requirements set forth in the DBA, the Environmental Approvals and applicable Environmental Laws.

The CEPP shall also effectively describe the quality control and assurance measures that DB Contractor will implement to verify the compliance of the program with all applicable Environmental Laws.

The CEPP shall describe procedures for obtaining Environmental Approvals and implementing procedures, and Environmental Commitments consistent with the Environmental Approvals, including New Environmental Approvals, and TxDOT environmental policies. The CEPP shall establish a goal of zero environmental violations during the performance of all Work activities. However, should violations occur, the CEPP shall set forth detailed processes for rectifying such violations in an appropriate and timely manner.

12.2 **Environmental Approvals**

12.2.1 **TxDOT-Provided Approvals**

For TxDOT-Provided Approvals, see Section 3.1 of the DBA.

12.2.2 **New Environmental Approvals Including Amended TxDOT-Provided Approvals**

TxDOT-Provided Approvals are based on the design features illustrated therein. Such approvals may require re-evaluation, amendment, supplement or additional studies and reports as the Work progresses in order to accommodate actions not identified in the TxDOT-Provided 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.

DB Contractor is responsible for any coordination with Governmental Entities necessary to obtain New Environmental Approvals except where TxDOT has agreements with Governmental Entities to perform such coordination. DB Contractor shall extend an invitation to TxDOT five Business Days in advance for any

meetings it has with Governmental Entities to discuss changes to the NEPA Approvals and any other TxDOT-Provided Approvals.

12.2.3 Responsibilities Regarding Environmental Studies

DB Contractor is responsible for conducting continuing environmental studies based on the NEPA Approvals and the Schematic Design.

DB Contractor is 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. DB Contractor is responsible for all coordination of environmental studies with appropriate Governmental Entities, except where TxDOT has agreements with Governmental Entities to perform such coordination.

12.2.4 TxDOT Review and Approval of DB Contractor Submissions

TxDOT reserves the right to review, comment on, require revisions to and reject for resubmission documentation that is submitted for environmental compliance or Environmental Approvals. Documentation shall conform to current TxDOT submission standards and the requirements of all applicable Governmental Entities and applicable Laws. TxDOT shall return approved documentation to DB Contractor for submittal to the appropriate Governmental Entity in cases where DB Contractor performs coordination. Those submissions for which TxDOT signature or other approval is required shall be subject to TxDOT approval, provided TxDOT approvals of such submissions are not subject to the review time limitations in the Contract Documents. Documentation not meeting then-current submission standards or requirements of Governmental Entities will be returned to DB Contractor and shall be revised by DB Contractor to meet the applicable standards or requirements.

12.2.5 Responsibilities Regarding Commitments within Environmental Approvals

DB Contractor is responsible for ensuring all commitments identified in the Environmental Approvals are met.

A document containing a summary of the NEPA commitments and mitigation measures is provided in Attachment 12-1 (Environmental Permits, Issues and Commitments (EPICs)).

12.2.5.1 Clean Water Act – Sections 404 and 401: Waters and Wetlands of the United States

TxDOT-Provided Approvals may identify Section 404 impacts associated with Project improvements. Based on the NEPA Approvals, the temporary and permanent Section 404 impacts are anticipated to be authorized by Nationwide Permit 14 – Linear Transportation Projects with or without a Preconstruction Notification. Table 12-1 below identifies water crossings that are subject to Nationwide Permit General Condition 18 regarding endangered species. Due to the potential to encounter Karst Features and listed karst invertebrates, any Work performed below the ordinary high water mark of the crossings listed in Table 12-1 must be authorized by a Nationwide Permit with a Preconstruction Notification, regardless of the area or linear feet of impacts required to complete the Work. The crossings not listed in Table 12-1 may be permitted with a Nationwide Permit without a Preconstruction Notification, depending on the area or linear feet of impacts required to complete the Work.

Table 12-1: Water Crossings Subject to General Condition 18

Crossing Number	Crossing Name
3	Walzem Creek
4	Beitel Creek tributary
5	Beitel Creek tributary
6	Beitel Creek
7	Quail Creek
8	Beitel Creek tributary

Crossing Number	Crossing Name
9	Salitrillo Creek
10	Selma Creek tributary
11	Selma Creek tributary
12	Selma Creek tributary
13	Selma Creek tributary
14	Selma Creek
15	Cibolo Creek
23	Salado Creek (at IH 410)
24	Salado Creek tributary
26	Cibolo Creek tributary

DB Contractor shall, based on Final Design, assess impacts to each potentially jurisdictional feature. Based on results of the assessment, and if required, DB Contractor shall update the related Section 404 impacts associated with the Project and perform all Work required to procure the necessary Section 404 permits and Section 401 certifications from the USACE and TCEQ. DB Contractor shall determine Project mitigation requirements, prepare a mitigation plan per 33 CFR Part 332, and perform all required mitigation.

DB Contractor is responsible for the maintenance and monitoring of any permittee-responsible mitigation sites for the term stipulated within the USACE approved mitigation plan. Project mitigation options shall be provided in accordance with TxDOT's *Standard Operating Procedure: Acquiring and/or Purchasing Section 404 Compensatory Mitigation Credits* dated August 2019. All coordination with the USACE regarding Section 404 permitting and mitigation shall be disclosed to TxDOT for review and comment before submission to USACE.

DB Contractor shall document how they will identify Section 404 impacts, obtain required Section 404 permits, and comply with the terms and conditions of the Section 404 permits and 401 certifications issued to DB Contractor during the life of the Project. At a minimum, the documentation shall include:

- Process for training personnel to recognize waters of the U.S. that fall under the jurisdiction of the USACE;
- Process for identifying Section 404 impacts associated with the Project;
- Process for obtaining required Section 404 permits;
- Process for communicating the terms and conditions of all Section 404 permits and TCEQ 401 certifications and other permits as necessary;
- Procedures for carrying out any required Environmental Commitments and mitigation; and
- Procedures for incorporating additional properties outside the original NEPA approved Schematic Design and any off-right-of-way Project Specific Locations (PSL) as required by all Section 404 permit(s) issued to either TxDOT or DB Contractor by the USACE.

DB Contractor shall comply with all general and regional conditions set forth by authorized Section 404 nationwide permits as described in TxDOT-Provided Approvals.

12.2.5.2 Property Access

To fulfill the obligation of the TxDOT-Provided Approvals to maintain current access during and after construction, DB Contractor shall make reasonable efforts to minimize the inconvenience to vehicles,

bicycles, and pedestrians during the Term. DB Contractor shall maintain access to adjacent properties during construction and ensure that visibility of businesses is maintained.

12.2.5.3 **Dust Control**

DB Contractor 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.

Dust control measures shall include a combination of watering, chemical stabilization, and construction vehicle speed reduction (not to exceed 20 mph).

DB Contractor shall keep concrete traffic barriers and any other elements that can cause accumulation of dust, sand and debris (such as retaining walls, bridge columns, and drainage walls) within the Project limits clean of dust, sand and debris during construction.

DB Contractor shall prevent, control, and mitigate fugitive noxious or toxic vapors or particulate matter (dust) during disturbance of noxious or hazardous materials and media.

DB Contractor shall utilize the Texas Emissions Reduction Plan (TERP) to the fullest extent practicable.

12.2.5.4 **Asbestos Containing Material and Lead Based Paint**

Bridge and building demolition will be required for the Project. Prior to the Effective Date, TxDOT has performed some asbestos containing material (ACM) and lead based paint (LBP) surveys on existing bridge structures. DB Contractor shall test remaining structures, including but not limited to bridges, buildings, rails, girders, and retaining walls for ACM and LBP. DB Contractor shall notify, amend notifications as necessary, pay notification fees, and perform abatement of ACM and LBP in accordance with appropriate or relevant Laws or guidance. TxDOT has provided the ACM and LBP inspection reports in the RIDs.

DB Contractor shall submit to TxDOT all inspection reports, proposed abatement plans, and/or reports documenting ACM and LBP abatement (as necessary).

Prior to scheduled demolitions, DB Contractor shall notify the Texas Department of State Health Services of bridge demolitions or building structures demolitions.

12.2.5.5 **Other Hazardous Materials**

DB Contractor shall inspect, identify, test, issue and amend notifications as necessary, and pay notification fees for all Hazardous Materials encountered during construction. In accordance with Section 4.8.1 of the General Conditions, DB Contractor shall manage, treat, handle, store, remediate, remove, transport, and dispose of all Hazardous Materials, including contaminated groundwater, encountered within the Project limits, in accordance with applicable Laws, guidance, Governmental Approvals, the Hazardous Materials Management Plan, and all applicable provisions of the Contract Documents.

TxDOT-Provided Approvals have identified Hazardous Materials concerns within the Project limits. TxDOT has performed some Hazardous Materials site investigations that have confirmed contaminated areas exist within the Project limits. DB Contractor shall be responsible for abating the Hazardous Materials contamination identified in TxDOT's Site Investigation Reports prior to constructing in these areas. TxDOT has provided the Phase II Environmental Site Assessment Reports in the RIDs.

DB Contractor shall take appropriate measures to prevent the spillage of Hazardous Materials in the construction areas. All construction materials used for the Project shall be removed as soon as the work schedule permits. DB Contractor shall initiate early regulatory agency coordination during Project development.

12.2.5.6 **Karst Features**

The Project area may contain Karst Features. DB Contractor shall adhere to the USFWS conservation measures below for construction activities within karst zones 2 and 3 (the "Action Area" defined in the USFWS Informal Consultation Letter in the Re-evaluation of the 2015 Final EA and FONSI provided in the RIDs).

If previously unknown Karst Features are encountered during the construction process, within 24 hours of discovery, DB Contractor shall evaluate such Karst Features for the presence of endangered karst invertebrate habitat using the reconnaissance excavation and evaluation procedures outlined by the document entitled "United States Fish and Wildlife Service, Section 10(a)(1)(A) Scientific Permit

Requirements for Conducting Presence/Absence Surveys for Endangered Karst Invertebrates in Central Texas." If a Karst Feature is determined to contain suitable endangered karst invertebrate habitat, DB Contractor shall notify TxDOT within 24 hours of such determination and DB Contractor shall cause presence/absence surveys to be conducted by a Karst Species Specialist. If a discovered Karst Feature is determined to be occupied or presumed to be occupied by an endangered karst invertebrate, then DB Contractor shall stop Work in the area and immediately notify TxDOT. In accordance with Section 4.2.4.2.6.1 of the General Conditions, DB Contractor shall assist TxDOT's agency coordination efforts by developing conservation and mitigation measures for the Project and preparing all reports and materials needed for completing the required agency coordination.

During borehole activities, Karst Features in bedrock are usually indicated by an unexpected drop of the drill bit or a decrease in drilling pressure. If a bit drop of more than one foot is detected or a decrease in drilling pressure indicates a Karst Feature while advancing a borehole, then the drill operator shall cease operation, and the borehole shall be inspected by a Karst Species Specialist using a downhole camera. If the borehole contains no Karst Features that meet the criteria for suitable endangered karst invertebrate habitat, then Work at that bore can continue. If the borehole contains Karst Features that meet the criteria for suitable endangered karst invertebrate habitat, an area no less than 50 feet from the edge of the Karst Feature (unless traffic control requirements dictate a smaller area) shall be cordoned off and protected. All other Work in the area immediately around the borehole shall cease until it can be safely closed. A Work stoppage near a borehole that contains a Karst Feature with suitable endangered karst invertebrate habitat shall be maintained during the period required for closure and to obtain the approvals of applicable protection plans. TxDOT shall coordinate with appropriate regulatory agencies and provide instructions to DB Contractor on how to proceed. Typically, the borehole will be plugged above the Karst Feature, leaving the Karst Feature open for endangered karst invertebrate habitat, and filled to the surface with grout or other suitable material.

If a potential Karst Feature is encountered during excavation, Work within at least 50 feet of the feature shall cease until an evaluation is complete. If an endangered karst invertebrate habitat assessment is warranted, DB Contractor shall follow the same protocols and steps outlined above. While a Karst Feature is being evaluated, the surface expression shall be covered in order to minimize the influence of diurnal variations in surface temperature. Protection of the Karst Feature may include a wood cover, plastic sheeting, and/or blanket that is weighted down with rocks around the perimeter of the Karst Feature in order to provide a moisture barrier and insulation. During periods of high temperatures (>100° F), a piece of insulation shall be added to the cover. Hazard fencing or barricades may be used to protect the area if there is a fall hazard, such as the case of an open shaft. Appropriate temporary erosion and sedimentation controls shall be implemented to prevent surface runoff from entering the feature.

If the Karst Feature does not meet the criteria for suitable endangered karst invertebrate habitat or is determined not to be occupied after conducting presence/absence surveys, then Work shall continue and disturbance to the Karst Feature shall be minimized if practical.

12.2.5.7 Existing Trees and Vegetation

DB Contractor shall make efforts to protect any trees that are not in conflict with construction, especially those trees located near the edge of construction areas.

12.2.5.8 Federal Aviation Administration (FAA)

Due to the Project's proximity to airport and heliport facilities, DB Contractor shall coordinate Plans with FAA and notify the FAA utilizing FAA Form 7460-1 no later than 45 days prior to the start of construction.

12.2.5.9 Project Specific Locations (PSLs)

DB Contractor shall ensure regulatory compliance of all its PSLs. DB Contractor shall ensure its PSLs avoid impacting riparian vegetation areas.

12.3 Environmental Team (ET)

DB Contractor, acting through the ECM, shall designate a team, as detailed in this Section 12.3, to prevent, minimize, and/or correct any violation of or noncompliance with Environmental Approvals (the "Environmental Team" or "ET"). The ET shall include staff meeting the qualification requirements as indicated in this Section 12.3 below. All members of the ET shall be deemed other principal personnel.

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

- Staffing and availability of ECM and all ET personnel; and

- ET staff response times during the Work.

12.3.1 **ECM**

DB Contractor shall designate an ECM for the Work in accordance with Section 4.2.4.1.1 of the General Conditions.

12.3.2 **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 DB Contractor's personnel. All training shall be in accordance with the requirements set forth in Section 4.2.4.3 of the General Conditions. Environmental training staff members shall have at least one year of experience providing environmental compliance inspection services for freeway construction.

12.3.3 **Environmental Compliance Inspectors (ECIs)**

The ECM shall designate as needed, staff members, who shall conduct on-site environmental monitoring, prepare documentation, and report to the ECM daily all violations, compliance, and non-compliance with Environmental Approvals (each an "Environmental Compliance Inspector" or "ECI").

The ECIs shall report immediately to the ECM any violation or non-compliance with Environmental Approvals 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 with SW3P activities.

12.3.4 **Hazardous Materials Manager**

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

- Schedule and/or conduct training for DB Contractor's employees;
- Verify all employees have required certifications prior to the handling of Hazardous Materials; and
- Maintain records of all incidents involving Hazardous Materials and notify the ECM, TxDOT and appropriate authorities in writing of any such incidents in accordance with the Contract Documents.

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

- 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; and
- TCEQ guidance for the investigation and remediation of Hazardous Materials under the TCEQ Voluntary Cleanup Program, Texas Risk Reduction Program, and the TCEQ Petroleum Storage Tank Rules.

12.3.5 **Natural Resource Biologist**

The ECM shall designate an on-call 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 have experience performing migratory bird and nest surveys in accordance with the Migratory Bird Treaty Act, and experience performing freshwater mussel surveys and mussel relocations in accordance with Texas Parks and Wildlife's *Freshwater Mussel Survey and Relocation Protocols*.

The natural resource biologist shall meet the certification requirements of TxDOT Work Category 2.6.2, "Impact Evaluation Assessments" and 2.6.4, "Biological Evaluations/Assessments".

12.3.6 **USFWS Permitted Karst Species Specialist**

The ECM shall designate an on-call USFWS permitted Karst Species Specialist (must possess the appropriate 10(a)(1)(A) permit) to determine if an encountered Karst Feature is occupied or presumed

occupied by endangered karst invertebrates. Endangered karst invertebrate species of concern include *Cicurina baronia* and *Texella cokendolpheri*.

The Karst Species Specialist shall be on-Site within 24 hours of DB Contractor encountering a Karst Feature. DB Contractor shall identify a secondary Karst Species Specialist meeting the criteria listed above in the event the primary Karst Species Specialist is unable to appear on-site in the allotted time.

The Karst Species Specialist shall assess the encountered Karst Feature using USFWS excavation and evaluation procedures to determine if the feature contains suitable habitat for endangered karst invertebrates or if the Karst Feature could open up into another Karst Feature with such suitable endangered karst invertebrate habitat.

The Karst Species Specialist also conducts presence/absence surveys to determine if a Karst Feature is occupied or presumed occupied by endangered karst invertebrates.

12.3.7 Licensed Professional Geoscientist

The ECM shall designate an on-call Licensed Professional Geoscientist to assist in the mapping of Karst Features and development and signing and sealing of Karst Feature closure plans. The Licensed Professional Geoscientist also assists the Karst Species Specialist in assessing the potential for a Karst Feature to contain suitable habitat for endangered karst invertebrates or if the Karst Feature could open up into another Karst Feature with such suitable habitat.

The Licensed Professional Geoscientist shall meet the certification requirements of TxDOT Work Category 2.5.1, “Geological Assessment for Edwards Aquifer Recharge Zone”.

12.3.8 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 SW3Ps 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 2.3.1, “Wetland Delineation” and TxDOT Work Category 2.4.1, “Nationwide Permit”, and TxDOT Work Category 2.4.2, “Clean Water Act §404 (Title 33, United States Code §1344) Permits (including mitigation and monitoring)”.

12.4 Submittals

All Submittals described in this Item 12 shall be in accordance with the schedule and for the purpose (approval, review and comment, for information) set forth on Table 12-2. Acceptable electronic formats include Microsoft Word, Microsoft Excel, or Adobe Acrobat files, unless otherwise indicated.

Table 12-2: Submittals to TxDOT

Submittals	Submittal Schedule	TxDOT Action	Reference Section
Environmental monitoring reports	Upon request	For information	12.1.1
Section 404 Permit/Mitigation Plan	As necessary, prior to commencement of Construction Work	Review and comment prior to submittal to USACE	12.2.3.1
ACM / LBP Inspection Reports	Prior to demolition of applicable structures	Approval prior to demolition of applicable structures	12.2.3.6
ACM / LBP Abatement Plan	Prior to demolition of applicable structures	Approval prior to demolition of applicable structures	12.2.3.6
ACM / LBP Mitigation Report	Prior to demolition of applicable structures	Approval prior to demolition of applicable structures	12.2.3.6
FAA Form 7460-1	No later than 45 days prior to start of construction	For information	12.2.3.7

Table 12-2: Submittals to TxDOT

Submittals	Submittal Schedule	TxDOT Action	Reference Section
Threatened and endangered species survey report	As necessary, prior to commencement of Construction Work	Approval prior to commencement of Construction Work	General Conditions 4.2.4.2.5 & 4.2.4.2.6.1
Archeological survey report	As necessary, prior to commencement of Construction Work	Approval prior to commencement of Construction Work	General Conditions 4.2.4.2.9
IWP	As necessary, when Hazardous Materials are encountered prior to property acquisition and/or Construction Work	Approval prior to property acquisition and/or Construction Work	General Conditions 4.2.4.4.1
SIR	As necessary, when Hazardous Materials are encountered and prior to preventative or corrective actions	Review and approval prior to preventative or corrective actions	General Conditions 4.2.4.4.1

Item 13
Third-Party Agreements

13.1 **General Requirements**

TxDOT has existing agreements with certain local, state and federal Governmental Entities with respect to the Project. These agreements define additional requirements for the design, construction, operations, and maintenance of the Project. These agreements do and will specify the local Governmental Entities' responsibilities and TxDOT's responsibilities with respect to the requirements.

DB Contractor shall assume and execute TxDOT's responsibilities and duties stated in Third Party Agreements to the extent set forth in the DBC, including payments for work performed or services provided by the Governmental Entity. DB Contractor is responsible for providing TxDOT and Governmental Entities with all information necessary to fulfill TxDOT's responsibilities stated in such agreements. In the case that the local Governmental Entity, under such agreements, will need to be reimbursed by TxDOT for work performed, DB Contractor shall make payment of stated costs to TxDOT within 30 days from receipt of TxDOT's request for payment. TxDOT will reimburse the local Governmental Entity such costs.

Executed Third Party Agreements for which the DB Contractor shall assume and execute TxDOT's responsibilities and duties are described in Exhibit 8 to the DBA.

13.2 **Traffic Signals**

New construction or modifications to the existing traffic signals are defined in Item 24.

13.3 **Roadway Illumination**

Some local Governmental Entities may request continuous illumination along sections of the Project. Should this occur, additional agreements between TxDOT and the Governmental Entity will be required. DB Contractor shall coordinate with and provide reasonable accommodations to the third-party designated to carry out the installation, operations, and maintenance obligations as specified in such agreements. Design and construction of additional illumination by DB Contractor will be handled in accordance with terms of the DBC.

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

New construction or modifications to the existing illumination are defined in Item 24.

13.4 **Landscaping Enhancements**

Some local Governmental Entities may request landscaping enhancements along sections of the Project. Should this occur, additional agreements between TxDOT and the Government Entity will be required. DB Contractor shall coordinate with and provide reasonable accommodations to the third-party designated to carry out the design, installation, and maintenance obligations as specified in such agreements. Design and construction of landscaping enhancements by DB Contractor will be handled in accordance with the terms of the DBC.

Landscaping enhancements are defined in Item 23.

13.5 **Frontage Road Access**

TxDOT shall be solely responsible, at its expense, for handling requests and permitting for adjacent property access to frontage roads of the Project, provided that TxDOT may request DB Contractor to review access permit applications at DB Contractor's expense. DB Contractor shall provide TxDOT with any comments within 10 business days after receipt of the application. Nothing in the Contract Documents shall restrict TxDOT from granting access permits or determining the terms and conditions of such permits. TxDOT will keep DB Contractor regularly informed of access permit applications and will deliver to DB Contractor a copy of each issued access permit within five days after it is issued. DB Contractor shall have no claim for a Change Order by reason of TxDOT's grant of access permits, the terms and conditions thereof, or the actions of permit holders or their employees, agents, representatives and invitees. DB Contractor at its

expense shall cooperate and coordinate with permit holders to enable them to safely construct, repair and maintain access improvements allowed under their access permits.

13.6 Other Affected Third Parties

DB Contractor is responsible for coordination and cooperation with all third parties affected by the Work, except as specifically provided otherwise.

Item 14
Utility Adjustments

14.1 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 Item 14 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 Item 14 references certain TxDOT forms for DB Contractor's use in Utility Adjustments. Copies of those forms are included in Attachment 14-1 (Utility Adjustment Forms). Except as otherwise provided in this Item 14 or directed by TxDOT, whenever a TxDOT form is provided, DB Contractor shall prepare all forms of the same type using the TxDOT form and obtain TxDOT approval of all changes to the forms agreed to by DB Contractor and the Utility Owner prior to execution by the Utility Owner.

DB Contractor shall cause all Utility Adjustments necessary to accommodate construction, operation, maintenance, and/or use of the Project. Some Utility Adjustments may be performed by the Utility Owner with its own employees and/or contractors and representatives (i.e., Owner-Managed); all others shall be performed by DB Contractor with its own employees and/or Subcontractors and representatives (subject to any approval rights required by the Utility Owner for those working on its facilities) (i.e., DB Contractor-Managed). The Utility Agreement shall specify the allocation of responsibility for the Utility Adjustment Work between DB Contractor and the Utility Owners as described in Section 14.1.3.

TxDOT form 1818 Buy America (Material Statement) is required for all work performed for Utility Owners prior to construction of the Utility Adjustment Work to document compliance with Buy America requirements, as identified in Attachment 14-1 (Utility Adjustment Forms), if applicable. If the costs of the Utility Adjustment Work are not eligible for reimbursement from TxDOT under applicable law, the Utility Owner is not required to comply with 23 CFR Part 645 Subpart A, 23 CFR § 635.410 (Buy America) and FHWA's associated policies for such Utility Adjustment.

This Item 14 does not address utility services to the Project. Utility services to the Project shall be the subject of separate agreements between DB Contractor and the Utility Owners.

14.1.1 When Utility Adjustment is Required

A Utility Adjustment may be necessary for the following reasons: (a) a physical conflict between the Project and the Utility, or (b) an incompatibility between the Project and the Utility based on the requirements in Section 14.2.1, 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 14.2.4.2 contains provisions that address the acquisition of Replacement Utility Property Interests for Utilities to be installed outside of the Project ROW.

Utilities may remain in their existing locations within the Project ROW if (a) the requirements of Section 14.2.1 are met, (b) the existing location will not adversely affect the construction, operation, safety, maintenance, or intended use of the Project, and (c) the Utility Owner agrees to the Utility remaining in its existing location.

Existing Utilities that are not in physical conflict with the Project that cross a roadway centerline at approximately 90 degrees may remain in the existing alignment. The existing Utilities may remain, be adjusted in place, or be protected in place in these areas only if all other conditions of the UAR are met and the affected Utility Owners agree to and approve all corresponding proposed Utility Adjustment plans.

14.1.2 Certain Components of the Utility Adjustment Work

14.1.2.1 Coordination

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

All Utility Agreements must be approved by TxDOT prior to taking effect and prior to the commencement of any Utility Adjustment construction related activity.

14.1.2.2 **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 DB Contractor as part of a Utility Adjustment shall be deemed added to the Work, on the date the Utility Agreement becomes effective, as set forth in Section 4.5.2 of the General Conditions. DB Contractor shall perform all coordination necessary for Betterments.

14.1.2.3 **Protection in Place**

DB Contractor shall be responsible for Protection in Place of all Utilities impacted by the Project as necessary for the continued safe operation and structural integrity of each Utility, and to satisfy the requirements described in Section 14.2.1. For each impacted Utility, DB Contractor shall obtain Utility Owner's approval of DB Contractor's proposed Protection in Place prior to beginning Construction Work.

14.1.2.4 **Abandonment and Removal**

DB Contractor 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 14.2.1, 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 the work necessary to complete each abandonment or removal (and disposal) of such Utility. Utility facilities that will be abandoned in place must be clearly identified in the Utility Assembly plans and shall require approval by TxDOT. The Utility Assembly plans must detail the method of abandonment to be utilized for TxDOT to determine if UAR requirements are met. The plans must also detail the age, condition, material type, active status and size of each Utility. If a Utility is to be abandoned, the plans shall (i) state that the Utility Owner continues to own and maintain the abandoned Utility facility and keep records of its location, and (ii) include a certification from the Utility Owner stating that the facility doesn't contain nor is composed of hazardous/contaminated materials. Voids and abandoned pipe beneath the ROW are prohibited and only allowed at TxDOT's sole discretion. In accordance with jurisdictional requirements or as directed by TxDOT, all voids must be filled with cement slurry or backfilled, and any pipe to be abandoned in place must be grout filled and capped.

14.1.2.5 **Service Lines and Utility Appurtenances**

Whenever required to accommodate construction, operation, maintenance, or use of the Project, DB Contractor shall cause Service Line Adjustments and Utility Appurtenance Adjustments. Each Service Line shall have a definitive point of termination such as a meter or point of sale. On completion of adjustment to Service Lines and Utility Appurtenance Adjustment, DB Contractor 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 DB Contractor.

14.1.2.6 **Early Adjustments**

At TxDOT's sole discretion, there will be early Utility Adjustment Work accomplished by TxDOT through direct contracts with certain Utility Owners to coordinate Utility Adjustment Work that will progress the Project.

14.1.3 **Agreements Between DB Contractor and Utility Owners**

Except as otherwise stated in this Item 14 or in the DBC, DB Contractor shall address each Utility Adjustment in a PUAA or in a UAAA, as described elsewhere in this Item 14. DB Contractor is responsible for preparing, negotiating (to the extent allowed by this Item 14) 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 work consisting solely of Protection in Place of a Utility that is in its 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 UJUA or Utility Installation Request, Form 1082, as described in Section 14.2.4.5 and plans detailing UAR compliance are required pertaining to the Adjustment or Protection in Place work. If a Utility Owner requests that DB Contractor relocate a Utility and the cost of that Utility Adjustment is the Utility Owner's sole

responsibility in accordance with Transportation Code 203.092, then DB Contractor shall enter into a DB Contractor-Managed PUAA with the Utility Owner providing for the Utility Owner to be responsible for all costs of that Utility Adjustment Work.

14.1.3.1 **PUAA**

Except with respect to SAWS, DB Contractor 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, and to define DB Contractor's and the Utility Owner's respective responsibilities for Utility Adjustment costs and activities, including 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 UAAA.

DB Contractor shall prepare each PUAA using the TxDOT form DB-ROW-U-PUAA-OM (Owner-Managed) or DB-ROW-U-PUAA-DM (DB Contractor-Managed), included in Attachment 14-1 (Utility Adjustment Forms). DB Contractor shall not modify the forms except by approval of TxDOT.

Promptly following issuance of NTP1, DB Contractor shall begin negotiations with each affected Utility Owner to reach agreement on one or more PUAAs and UAAAs. DB Contractor shall finalize the necessary PUAAs with each affected Utility Owner within a reasonable time period after issuance of NTP1. DB Contractor shall include any proposed changes to the form (other than filling in the blanks specific to a particular Utility Owner) in a track-change format that clearly identifies the changes and the party requesting the change. Each PUAA (including the Utility Adjustment Plans attached thereto) shall be subject to TxDOT review and approval as part of a Utility Assembly.

DB Contractor shall obtain approval by TxDOT of any language modification to a PUAA by the Utility Owner and DB Contractor.

14.1.3.2 **UAAA**

Except where UAFM are permitted pursuant to Section 14.4.7, 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 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 parent Utility Agreement; otherwise, an additional PUAA will be required.

Each UAAA (including any Utility Adjustment Plans attached thereto) shall be subject to TxDOT approval. Except as otherwise directed by TxDOT or provided in an applicable Utility Agreement, DB Contractor shall prepare all UAAAs using the form included in Attachment 14-1 (Utility Adjustment Forms). DB Contractor shall include any proposed changes to the form (other than filling in the blanks specific to a particular Utility Owner) in a Utility Owner-specific addendum.

DB Contractor shall obtain TxDOT approval of all changes to a UAAA prior to execution by the Utility Owner.

14.1.4 **Recordkeeping**

DB Contractor shall maintain construction and inspection records in order to ascertain and demonstrate that Utility Adjustment Work is accomplished in accordance with the approved Utility Adjustment Plans and as required by the Contract Documents and the applicable Utility Agreement(s).

DB Contractor shall provide SAWS with copies of draw requests, payment applications, invoices and other documents requesting payment that are submitted by DB Contractor to TxDOT and pertain to the "Betterments" and "SAWS Cost Work", as such terms are defined in the SAWS Utility Agreement.

14.2 **Administrative Requirements**

14.2.1 **Standards**

All Utility Adjustment Work shall comply with all applicable Laws (including, but not limited to, 43 TAC, Part 1, Chapter 21, Subchapter C, UAR), requirements within the Contract Documents, including the TxDOT *ROW Utility Manual*, Section 4.5 of the General Conditions (as amended by Exhibit 23 to the DBA), and the requirements specified in this Item 14.

Additionally, all Utility Adjustment Work shall comply with the San Antonio District Utility Requirements.

14.2.2 Communications

14.2.2.1 Communication with Utility Owners

DB Contractor 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.

DB Contractor shall notify TxDOT of all meetings, and TxDOT may participate in these meetings if requested by the Utility Owner or DB Contractor or otherwise as TxDOT deems appropriate.

Before distribution of any mass mailings to Utility Owners, DB Contractor 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 Item 14, the term "mass mailing" means correspondence that is sent to 50% or more of Utility Owners within a three-week time period and contains substantially the same content with respect to each Utility Owner.

14.2.2.2 Meetings

At least three (3) Business Days in advance of each scheduled meeting, DB Contractor shall provide notice and an agenda for the meeting separately to TxDOT first and then to the appropriate Utility Owner. DB Contractor shall prepare minutes of all meetings and shall keep copies of all correspondence.

DB Contractor shall prepare meeting minutes within five (5) Business Days after the conclusion of each meeting. At a minimum, DB Contractor 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 or resolutions
- Description of remaining open issues and action items (including the person(s) responsible for follow-up and target date for resolution)

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

To the extent set forth in the SAWS Utility Agreement and as requested by TxDOT, DB Contractor shall participate in all meetings and dispute resolution procedures provided for under the SAWS Utility Agreement. DB Contractor shall give TxDOT reasonable notice of all meetings required under the SAWS Utility Agreement.

DB Contractor shall designate a "DB Contractor Utility Representative" in accordance with the SAWS Utility Agreement to serve as DB Contractor's representative for coordinating all matters with SAWS and TxDOT under the SAWS Utility Agreement.

14.2.3 Utility Adjustment Team

DB Contractor shall provide a Utility Adjustment team whose members have all appropriate qualifications and experience to perform the Utility Adjustment Work. DB Contractor shall provide a list of the names and contact details, titles, job roles and specific experience of the team members in the PMP. Specifically, DB Contractor shall provide a UM and a UDC to manage all aspects of the Utility Adjustment process. If DB Contractor assigns the construction activities to a Subcontractor or Affiliate, DB Contractor shall provide a DB Contractor Utility Coordinator (DUC) as described herein.

The UM's primary work responsibility shall be the performance of all DB Contractor's obligations with respect to Utility Adjustments. The UM shall have a bachelor's degree and have relevant experience in coordinating and solving complex Utility Adjustments on highway improvement projects. DB Contractor shall authorize the UM to approve all financial and technical modifications associated with Utility Adjustments and modifications to the Utility Agreement.

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

If applicable, the DUC shall hold a bachelor's degree and have relevant experience in ROW and Utility coordination activities involving large transportation projects. The DUC will be responsible for tracking and following DB Contractor's Affiliate's and Subcontractor's activities and communicating the progress to DB Contractor. The DUC will assist with developing good working relationships with the Utility Owners and assisting DB Contractor in all Utility coordination matters.

14.2.4 Real Property Matters

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

14.2.4.1 Documentation of Existing Utility Property Interests – Affidavits

For each Existing Utility Property Interest within the Project ROW claimed by any Utility Owner, DB Contractor 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 review as part of a Utility Assembly approval. Except as otherwise directed by TxDOT, DB Contractor shall prepare all Affidavits of Property Interest using the forms included at the following link: https://www.txdot.gov/government/processes-procedures/row-forms.html.

14.2.4.2 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. DB Contractor shall have the following responsibilities for each acquisition:

- DB Contractor 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; and
- If any DB Contractor-Related Entity assists a Utility Owner in acquiring a Replacement Utility Property Interest, such assistance shall be by separate contract outside of the Work, and DB Contractor shall ensure that the following requirements are met:
  - The files and records must be kept separate and apart from all acquisition files and records for the Project ROW;
  - 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; and
  - Any DB Contractor-Related Entity personnel negotiating the acquisition of Replacement Utility Property Interests must be different from those negotiating the acquisition of the Project ROW.

DB Contractor is not responsible for Utility Owner condemnation proceedings except for DB Contractor's cost share set forth in Section 4.5.6 of the General Conditions. The Utility Owner is responsible for utilizing its authority for condemnation proceedings for all Replacement Utility Property Interests.

14.2.4.3 Relinquishment of Existing Utility Property Interests

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

14.2.4.4 Quitclaim Deeds

Except as otherwise directed by TxDOT, DB Contractor shall prepare and record in the appropriate jurisdiction a Quitclaim Deed for each relinquishment of an Existing Utility Property Interest using the TxDOT form included at the following link: https://www.txdot.gov/government/processes-procedures/row-forms.html. Each Quitclaim Deed is subject to TxDOT's approval.

DB Contractor 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 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, with a copy of the unsigned Quitclaim Deed. In these cases, DB Contractor 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 DB Contractor recording such deed in the local real property records.

14.2.4.5 UJUAs and Utility Installation Request, Form 1082 Requirements

DB Contractor shall prepare a UJUA for each Utility that will remain within the boundaries of its Existing Utility Property Interest location within the Project ROW. DB Contractor shall prepare all UJUAs using the

TxDOT form included in Attachment 14-1 (Utility Adjustment Forms). DB Contractor also shall prepare all required documentation to be included with each UJUA.

DB Contractor shall arrange for the Utility Owner to execute each UJUA or Utility Installation Request, Form 1082, which shall be subject to TxDOT's written approval as part of a Utility Assembly.

DB Contractor shall assist the Utility Owner in preparing a Utility Installation Request, Form 1082, for each Utility that will remain or be relocated within the Project ROW and is not located within an Existing Utility Property Interest held by the Utility Owner.

14.2.4.6 Documentation Requirements

DB Contractor shall prepare, negotiate (to the extent permitted by this Section 14.2.4), and obtain execution by the Utility Owner of (and record in the appropriate jurisdiction, if applicable) all agreements and deeds described in this Section 14.2.4, 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.

14.2.5 Utility Management Plan

DB Contractor shall prepare and submit a Utility Management Plan in accordance with the requirements in Section 4.2.8 of the General Conditions.

14.3 Design

14.3.1 DB Contractor's Responsibility for Utility Identification

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

DB Contractor shall prepare and submit to TxDOT prior to the first Utility Assembly submission a utility strip map in 11x17 format showing the information obtained and confirmed pursuant to this Section 14.3.1. DB Contractor's Utility strip map shall show in plan view all Utilities within the Project ROW and those outside of the Project ROW which are otherwise impacted by the Project. The map shall detail the type of Utility facility (e.g., communication, gas, oil, water, etc.) size, material, and the Utility Owner's name and contact information. The scale of DB Contractor's Utility strip map shall be 1" = 100'. DB Contractor shall verify and update the information provided in the Utility Strip Map with SUE data obtained by DB Contractor and incorporate such information into DB Contractor's Utility strip map.

14.3.2 Technical Criteria and Performance Standards

DB Contractor shall ensure that all design plans for Utility Adjustment Work, whether furnished by DB Contractor or by the Utility Owner, are consistent and compatible with:

- the applicable requirements of the Contract Documents, including Section 14.2.1 and Exhibit 23 to the DBA;
- the Project design including the Ultimate Project Configuration;
- any existing and proposed Utility facility;
- all applicable Governmental Approvals; and
- approvals of all private sector third parties necessary for such Work.

DB Contractor shall be prohibited from hanging utilities affected by the Project onto any bridge structure.

14.3.3 Utility Adjustment Concept Plans

DB Contractor shall prepare and submit to TxDOT, a proposed conceptual Utility design (a Utility Adjustment Concept Plan) for the Project (or proposed Utility Adjustment Concept Plans for various segments of the Project, as appropriate), showing the approximate location of each existing Utility in accordance with Section 14.3.1, the existing Utilities to remain, the proposed location of each Utility, and DB Contractor's Utility Adjustment recommendations.

In accordance with the PMP, DB Contractor shall submit the proposed Utility Adjustment Concept Plan(s) to TxDOT for its review. The Utility Adjustment Concept Plan(s) shall be submitted in both tabular and plan formats. The tabular format shall identify and numerically list each Utility conflict and each associated Utility

and conform to the conflict matrix provided in the San Antonio District Utility Requirements. The plan(s) shall be color-coded and shall utilize a scale that clearly depicts all of the required information. DB Contractor shall coordinate with each affected Utility Owner as necessary to obtain its respective concurrence with the Utility Adjustment Concept Plan(s) and with any subsequent revisions. The Utility Adjustment Concept Plan is a working document, and DB Contractor shall modify the plan as more project information becomes available. DB Contractor shall make the updated Utility Adjustment Concept Plans available to TxDOT upon request. Each executed PUAA or UAAA will identify and approve the Utility location set forth in the Utility Adjustment Concept Plan.

14.3.4 Utility Adjustment Plans

DB Contractor shall ensure that all Utility Adjustment Plans, whether furnished by DB Contractor or by the Utility Owner, are signed and sealed by a PE unless such requirement is waived by TxDOT at its sole discretion and as allowed by governmental regulations and industry practice.

14.3.4.1 Plans Prepared by DB Contractor

In the event that DB Contractor and the Utility Owner have agreed that DB Contractor will furnish a Utility Adjustment design or as required in the SAWS Utility Agreement, DB Contractor shall prepare and obtain the Utility Owner's approval of plans, specifications and applicable 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 DB Contractor shall include in the appropriate Utility Assembly for TxDOT's approval. DB Contractor shall comply with the design submittal and approval process set forth in the SAWS Utility Agreement with respect to the approval, review and comment of plans for the SAWS Utility Adjustments. Additionally, with respect to the design submittal and approval process set forth in the SAWS Utility Agreement, TxDOT shall be provided by the DB Contractor a copy of all design submittal review comments as they are received from SAWS and responses as they are developed by DB Contractor.

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. DB Contractor 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.

14.3.4.2 Plans Prepared by the Utility Owner

For all Utility Adjustment Plans furnished by a Utility Owner, DB Contractor shall coordinate with the Utility Owner as necessary to confirm compliance with the applicable requirements as referenced in Section 14.2.1. Utility Owner-prepared Utility Adjustment Plans shall be attached to the applicable Utility Agreement, which DB Contractor shall include in the appropriate Utility Assembly for TxDOT's approval. DB Contractor shall transmit any TxDOT comments to the Utility Owner and shall coordinate any modification, review by DB Contractor, and re-submittal to TxDOT as necessary to obtain TxDOT's approval.

14.3.4.3 Design Documents

Each existing Utility and each proposed Utility Adjustment shall be shown in the Design Documents, regardless of whether the Utility Adjustment Plans are prepared by DB Contractor or by the Utility Owner.

14.3.4.4 Certain Requirements for Underground Utilities

Casing as specified in the 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 UAR are met and are at least 10 feet below proposed finished grade. 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 in writing the Barlow's Formula calculation(s) to be included in the Utility Assembly.

Underground communication facilities, including multiple conduits, that cross the roadway, including side roads, shall be encased in either steel, concrete, or one continuous piece of plastic pipe (Schedule 80 PVC or SDR 11 HDPE) as approved by the District, except that if horizontal directional drilling is used to place the casing, HDPE pipe shall be used.

Refer to Item 22 for design requirements for underground Utilities within the potential railroad corridor.

14.3.4.5 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 DB Contractor and submitted to TxDOT for its review and comment and for TxDOT's approval of any items for which this Item 14 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 such requirement 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 UAAA or Abbreviated Utility Assembly, as described below. DB Contractor 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 receipt 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 14.5.

All Utility Adjustments covered by the same parent PUAA, or in the case of SAWS Utilities, the SAWS Utility Agreement, can be addressed in a single full Utility Assembly.

Each Utility Assembly shall include the following:

(a) A transmittal memo recommending approval and detailing any unique characteristics or information pertaining to the Adjustment. The transmittal memo shall also describe any applicable amendment (UAAA) and explain why the amendment is necessary;

(b) A completed Utility Assembly Checklist;

(c) A TxDOT approved Utility Agreement;

(d) Plans which:

  (i) Show the existing and proposed Utility facilities;

  (ii) Show existing and proposed grades for all Utility crossings;

  (iii) Show the roadway centerline or baseline(s);

  (iv) Show the existing and Project ROW lines along with the control of access denial line;

  (v) Show an offset distance from the Project ROW line to all longitudinal Utilities within the Project ROW;

  (vi) 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; and

  (vii) Are folded to 8.5-inch by 11-inch size, unless waived by TxDOT.

(e) Estimate(s) from the Utility Owner (and also from DB Contractor, where DB Contractor 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), labor, and engineering. The estimate must list and identify the estimated amount of reimbursement to the Utility Owner, taking into consideration the Betterment credit calculation, salvage credit, and any applicable eligibility ratio. The estimated cost(s) associated with DB Contractor's internal coordination costs and overheads shall not be included in this estimate;

(f) A proposed UJUA or Utility Installation Request, Form 1082;

(g) "Statement Covering Utility Construction Work" form (form DB-ROW-U-48), if applicable;

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

(i) 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, unless otherwise approved by TxDOT; and

(j) All "Utility No Conflict Sign-Off Forms" (forms DB-ROW-U-USO-UDC and DB-ROW-USO-UM).

14.3.4.5.1 **UAAAs**

For each UAAA, DB Contractor shall prepare an additional Utility Assembly for the relevant initial PUAA (an Assembly), covering all Utility Adjustments addressed in the UAAA. The Assembly shall contain all requirements listed in (a) through (j) as identified in this Section 14.3.4.5.

14.3.4.5.2 **Abbreviated Utility Assemblies**

DB Contractor shall prepare an Abbreviated Utility Assembly for each Utility proposed to remain in 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 14.1.1. If DB Contractor is reimbursing a Utility Owner, other than SAWS, any of its costs, a PUAA or UAAA is required. Each Abbreviated Utility Assembly shall contain a transmittal memo recommending that the subject Utility(ies) remain in place, a set of plans detailing UAR compliance, a completed Utility Assembly Checklist, a certification from the Utility Owner approving leaving the Utility(ies) in place, as well as UJUA(s) or Utility Installation Request, Form 1082 as required by Section 14.2.4.5 and Affidavit(s) of Property Interest, if applicable. Each of the foregoing items shall comply with the requirements for same described in Attachment 14-1 (Utility Adjustment Forms).

14.4 **Construction Requirements**

14.4.1 **Reserved**.

14.4.2 **General Construction Criteria**

All Utility Adjustment construction performed by DB Contractor shall conform to the requirements listed below. DB Contractor shall conduct all Work necessary to meet the requirements for this Item 14 in accordance with the requirements of this Item 14 and TxDOT Standard Specifications.

In addition, DB Contractor is responsible for verifying that all Utility Adjustment construction performed by each Utility Owner conforms to the requirements described below. In case of nonconformance, DB Contractor 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:

- All criteria identified in Section 14.3.2;
- The Utility Adjustment Plans included in the Utility Agreement approved by TxDOT (other than UAFM complying with Section 14.4.7;
- All Project safety and environmental requirements;
- All pre-construction meeting requirements;
- The ROW acquisition schedule described in Item 15, “ROW,” and
- Utility(ies) standards provided in the Utility Agreement.

14.4.2.1 **Reinstatement of Utility Cuts**

After installation of drainage structures, storm sewers or any other public or private Utility facility by open cut across existing pavements, the pavement shall be restored and maintained to a normal satisfactory riding surface equal to or better than the existing riding surface.

14.4.3 **Inspection of Utility Owner Construction**

DB Contractor shall set forth procedures in the PMP for inspection of all Utility Adjustment Work performed by Utility Owners (and its contractors) to verify compliance with the applicable requirements described in Section 14.4.2. DB Contractor is responsible for quality control and quality assurance for all work performed by the Utility Owners and their contractors.

14.4.4 **Scheduling Utility Adjustment Work**

The Utility Adjustment Work (other than construction and execution of PUAAs) may begin at any time following issuance of NTP1. Refer to Section 8.1.2 of the General Conditions for the conditions to commence construction of Utility Adjustment Construction Work by DB Contractor. DB Contractor 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:

- 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);

- A pre-construction meeting, in accordance with Section 14.2.2.2, shall be required after execution of the Utility Agreement and prior to commencement of any construction activities, unless otherwise approved by TxDOT;
- Availability and access to affected Replacement Utility Property Interests have been obtained by the Utility Owner (and provided to DB Contractor, if applicable);
- If any part of the Utility Adjustment construction work will affect the Project ROW, availability and access to that portion of the Project ROW has been obtained in accordance with the applicable requirements of the Contract Documents;
- If applicable, the Alternate Procedure List has been approved by TxDOT, as authorized by the 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;
- The review and comment process has been completed and required approvals have been obtained for the Utility Assembly covering the Utility Adjustment;
- 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; and
- All other conditions to that work stated in the Contract Documents have been satisfied.

14.4.5 Standard of Care Regarding Utilities

DB Contractor 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 restored to existing condition.

14.4.6 Emergency Procedures

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

14.4.7 UAFM

DB Contractor shall establish a procedure in the Utility Management Plan to address a UAFM as proposed by either DB Contractor or a Utility Owner, after the Utility Assembly (which includes the Utility Adjustment Plans) has been approved. The procedure shall provide, at minimum, the following:

- The Utility Owner's review and approval of a UAFM proposed by DB Contractor, or DB Contractor's review and approval of a UAFM proposed by the Utility Owner. DB Contractor shall obtain all required approvals of the UAFM prior to commencement of construction. All revisions shall be signed and sealed by a PE, unless otherwise permitted by TxDOT in its sole discretion;
- Transmittal of UAFMs to the appropriate construction field personnel; and
- Inclusion of any UAFMs in the Record Drawings for the Project.

DB Contractor shall cause the procedure to be followed for all UAFMs, whether the construction is performed by DB Contractor or by the Utility Owner.

14.4.8 Switch Over to New Facilities

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

14.4.9 Utility Record Drawings

DB Contractor shall provide Utility Record Drawings to each Utility Owner for its adjusted Utilities where the Utility Adjustment Work was performed by DB Contractor. For the purpose of this Item 14, Utility Record Drawings means construction drawings and related documentation revised to show approved changes made during the construction process, usually based on marked-up Released for Construction Documents furnished by DB Contractor.

DB Contractor shall provide Utility Record Drawings to TxDOT regardless of whether design and/or construction of the subject Utilities was furnished or performed by DB Contractor or by the Utility Owner. Utility Record Drawings shall show the location of all abandoned Utilities, shall show and label all other Utilities (both remaining in place and relocated) that are located within the Project ROW or impacted by the Project, and shall comply with Item 4 of the General Conditions. DB Contractor shall provide the Utility Record Drawings for each Adjustment to TxDOT prior to Final Acceptance.

Prior to Final Acceptance, DB Contractor shall provide to TxDOT an overall inventory set of utility plans of all final Utility facility locations (both Owner-Managed and DB Contractor-Managed) that include Utilities that remained in place, were adjusted in place or relocated. The overall inventory set of plans must detail the Utility facility horizontal alignment with highway stationing, ROW lines, roadway features, Utility Owners' name, Utility facility type, size and Utility Assembly Number. This overall inventory set of plans is separate from the individual Utility Record Drawing plans required for each Utility Assembly.

14.4.10 Maintenance of Utility Service and Access

All Utilities shall remain fully operational during all phases of construction, except as specifically allowed and approved in writing by the Utility Owner. DB Contractor 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 during construction and after completion of the Project. All access and access locations to the Utility facility must be agreed to by the Utility Owner and approved by TxDOT.

14.4.11 Traffic Control

DB Contractor shall be responsible for the TMP. The TMP shall cover all traffic control made necessary for Utility Adjustment Work, whether performed by DB Contractor or by the Utility Owner. Traffic control for Utility 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 Item 26, "Traffic Control."

14.4.12 Substantial Completion and Final Acceptance Requirements for SAWS Utilities

DB Contractor shall be responsible for the maintenance of adjusted SAWS Utilities until SAWS delivers a "Certificate of Final Acceptance" for the applicable SAWS Utilities pursuant to the SAWS Utility Agreement. DB Contractor shall be responsible for meeting all requirements for substantial completion and final acceptance of adjusted SAWS Utilities under the SAWS Utility Agreement.

14.5 Utility Assembly Submittals

DB Contractor shall time all Submittals described in this Section 14.5 to meet the Project Schedule, taking into account the maximum number of Submittals set forth in this Section 14.5 or, if not stated therein, then as stated in Section 5.2.1 of the General Conditions. All Submittals shall conform to the standards required in the PMP. Any deliverable submitted by DB Contractor to TxDOT for review after 11:59 a.m. will be considered as submitted on the next business day.

All Submittals described in this Item 14 shall be in accordance with the schedule and for the purpose (approval, review and comment, for information) set forth in Table 14-1. Acceptable electronic formats include Microsoft Word, Microsoft Excel, and Adobe Acrobat files, unless otherwise indicated.

Table 14-1: Submittals to TxDOT

Submittals	Submittal Schedule	TxDOT Action	Reference Section
Any proposed changes to the provided TxDOT DB ROW Utility forms	As necessary	Approval	14.1
DB-ROW-U-1818 (Buy America Material Statement), if applicable	Prior to construction of the Utility Adjustment Work	Approval	14.1
Project Utility Adjustment Agreement	After NTP1, based on DB Contractor schedule	Approval	14.1.3.1

Table 14-1: Submittals to TxDOT

Submittals	Submittal Schedule	TxDOT Action	Reference Section
Utility Adjustment Agreement Amendments	After NTP1, based on DB Contractor schedule	Approval	14.1.3.2
Any mass mailings to Utility Owners	In advance of distribution	Review and comment	14.2.2.1
Meeting agendas	In advance of each scheduled meeting	For information	14.2.2.2
Meeting minutes	After the conclusion of the meeting and prior to final distribution	Review and comment	14.2.2.2
Names, contact details, etc. for the Utility coordination team	Prior to NTP2, in the applicable chapter of the PMP	Approval	14.2.3
Affidavit of property interest	In the applicable Utility Assembly	Approval	14.2.4.1
Draft Quitclaim Deeds	Prior to submission of Utility Assembly	Approval	14.2.4.4
Letter of Confirmation (relinquishment of interest once Adjustment completed) from Utility Owner and/or Utility Owner's authorized representative, if applicable	In the applicable Utility Assembly, including copy of unsigned Approved Draft Quitclaim Deed	Approval	14.2.4.4
Executed Quitclaim Deeds	1. Prior to recording deed in local real property records, and 2. After the completion of Utility Adjustment, or unless otherwise directed by TxDOT in writing	For information	14.2.4.4
Utility Joint Use Acknowledgments	In the applicable Utility Assembly	Approval	14.2.4.5
Utility Installation Request, Form 1082	In the applicable Utility Assembly	Approval	14.2.4.5
DB Contractor's Utility strip map	(i) After NTP2 or (ii) before the first assembly package submission	Review and information	14.3.1
Utility Adjustment Concept Plan(s)	(i) After NTP2 or (ii) before the first assembly package submission (this plan is a working document and shall be continuously updated and modified as more project information becomes available)	Review and, if applicable, comment	14.3.3
Utility Adjustment Plans	In the applicable Utility Assembly	Approval	14.3.4.1, 14.3.4.2
Utility Assemblies	Prior to start of the affected Utility Adjustment Work	Approval	14.3.4.5, 14.5
Temporary Adjustments	In the applicable Utility Assembly, if applicable, unless TxDOT waives/allows other method	Approval	14.3.4.5
Abbreviated Utility Assemblies	As necessary	Approval	14.3.4.5.2, 14.5.3

Table 14-1: Submittals to TxDOT

Submittals	Submittal Schedule	TxDOT Action	Reference Section
Quality control/Quality assurance procedures for Utility Adjustment Work	In the applicable chapter of the PMP and PSQMP	Approval	14.4.3, 14.4.4
Utility Adjustment Work emergency procedures and contact information	In the applicable chapter of the PMP and PSQMP, and prior to any construction activities	Approval	14.4.6
Set of Record Drawings and overall plan view maps of final Utility locations	1. After Utility Owner acceptance, Utility Adjustment completion, or prior to deadline specified elsewhere in the Contract Documents or by TxDOT 2. Preliminary overall plan view map upon completion of 50% of required Utility Adjustment Work	Review, comment, and if applicable, Approval	14.4.9, 14.5.3
Individual Record Drawing plans	In the applicable Utility Assembly, and at Project closeout	Approval	14.4.9, 14.5.3
Utility Tracking Report (UTR)	Monthly	For information	14.5.2
Utility Assembly Submittal log	With each Submittal or group of Submittals	For information	14.5.3
Closeout information and documentation	Within 90 days after each Utility has been relocated, fully reimbursed and accepted by the Utility Owner	For information	14.5.3
Alternate Procedure List	Prior to commencement of any demolition, removal or other construction work for any Utility Adjustment	Approval	14.5.4

14.5.1 Maximum Number of Submittals

DB Contractor shall coordinate all Submittals required pursuant to this Section 14.5. In each 10 Business Day period, DB Contractor shall not submit more than:

- Two Utility Assemblies (excluding Abbreviated Utility Assemblies and Utility Assemblies related to SAWS Utilities); and
- Two of any other Submittals required under this Item 14 and requiring TxDOT review and approval.

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

14.5.2 DB Contractor's UTR

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

- The name of the Utility Owner and the Utility Assembly Number;
- Utility size and type;
- Location of the Utility based upon station and offset;
- The proposed method of treatment;

- State whether the Utility Adjustment will be Owner or DB Contractor-Managed;
- Dates on which the Utility Agreement was executed by TxDOT, the Utility Owner and DB Contractor, as applicable;
- Dates on which the UJUA or Utility Installation Request, Form 1082, was executed by the Utility Owner and TxDOT;
- The Utility Owner's existing right of occupancy of the ROW for each Utility (e.g., UJUA, permit, easement or combination);
- Whether any Replacement Utility Property Interest will be necessary;
- Estimated cost approved in the PUAA/UAAA;
- Amounts and dates of payments made by DB Contractor to the Utility Owner, listing in each case the type of payment (final, partial or lump sum);
- Scheduled start and completion date for construction of each Utility Adjustment;
- Percent complete of construction;
- Whether any Betterment is included in the Utility Adjustment; and
- Whether TxDOT form 1818 (Buy America Material Statement) is required for each Utility Adjustment.

The UTR shall also include a separate section for Replacement Utility Property Interests 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. DB Contractor shall maintain this section of the UTR and submit it to TxDOT in the same manner as all other portions of the UTR.

14.5.3 Utility Assembly Submittals and Final Closeout Procedures

The following procedures shall govern submittal, review and final closeout of each Utility Assembly, including UAAA and Abbreviated Utility Assemblies:

- Before submitting a Utility Assembly to TxDOT, DB Contractor 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 DB Contractor in accordance with the PMP and the PSQMP; and
  - Resolve all comments made by the quality control/quality assurance entity, coordinating with the Utility Owner as appropriate.
- DB Contractor shall submit to TxDOT three identical and complete originals of each Utility Assembly, each of which shall be bound and labeled "DB Contractor 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 14.5.
- DB Contractor shall submit to TxDOT a Utility Assembly Submittal log with each Submittal or group of Submittals. The Utility Assembly Submittal log shall establish the review priority.
- TxDOT will review the Utility Assembly for compliance with the requirements of this Section 14.5.3, and within 10 Business Days will return the Utility Assembly to DB Contractor with the appropriate notations pursuant to Section 5.2.1 of the General Conditions to reflect its responses. DB Contractor 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 Item 14 requires TxDOT signature.

- DB Contractor shall provide closeout information and documentation within 90 days after each Utility has been relocated, fully reimbursed and accepted by the Utility Owner. The closeout information shall contain the following:
  - The Utility Agreement form (PUAA, UAAA, et al);
  - Utility Record Drawings ("as-built") plans;
  - UJUA or Form 1082;
  - Quitclaim deed (D-15-30);
  - Actual cost and summary of the Utility Adjustment; and
  - TxDOT form 1818 Buy America Material Statement.

DB Contractor shall address conditions of approval, if any, for each Utility Assembly prior to completing the final closeout procedure.

14.5.4 FHWA Alternate Procedure

DB Contractor shall develop the Alternate Procedure List that includes the Utility Owner's name, approximate station numbers and estimated cost of Utility Adjustments. TxDOT is authorized by the FHWA to utilize the Alternate Procedure process. Upon receipt of the required information, TxDOT shall then consider and approve the list and notify DB Contractor. Promptly upon determining that any additional Utility Owner not referenced on the Alternate Procedure List is impacted by the Project, DB Contractor must submit to TxDOT all documentation as referenced above in order to amend the Alternate Procedure List.

Item 15
Right of Way (ROW)

15.1 **General Requirements**

DB Contractor's obligations in respect of the acquisition of Project ROW are set forth in Section 4.4.1 of the General Conditions.

This Item 15 sets forth the ROW activities assigned to DB Contractor, including pre-acquisition and acquisition activities, and designates which ROW activities TxDOT will conduct. This Section 15.1 also sets forth the requirements applicable to the Work assigned to DB Contractor related to the acquisition of Project ROW. DB Contractor 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; relocate displacees; and clear/demolish improvements from the Project ROW, as more fully described in the following sub-sections.

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

DB Contractor shall provide TxDOT copies of all property agreements it obtains to facilitate design, construction or maintenance in relation to the Project. No conveyance documents shall be used for the purpose of Construction Work other than a PUA, a deed, or an award, unless otherwise approved by TxDOT.

15.2 **Administrative Requirements**

15.2.1 **Standards**

DB Contractor shall acquire all Project ROW in accordance with State and Federal Law and the practices, guidelines, procedures, and methods contained in the following:

- All TxDOT ROW manuals (available online at http://onlinemanuals.txdot.gov/manuals);
- TxDOT *Access Management Manual* (available online at http://onlinemanuals.txdot.gov/manuals); and
- TxDOT *Survey Manual* (available online at http://onlinemanuals.txdot.gov/manuals).

Pursuant to the applicable Federal regulations, DB Contractor 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) utilize the TxDOT ROW Manuals; (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 1,000 feet of an occupied dwelling.

DB Contractor shall maintain a complete set of the TxDOT ROW Manuals, TxDOT *Access Management Manual*, and a current approved Project ROW map for public use. DB Contractor's complete set of ROW Manuals shall be current as of the Effective Date. Any TxDOT forms referenced in this Item 15 may be found in the TxDOT ROW Manuals or will be provided by TxDOT.

All real estate activities of the Project ROW must be completed and documented in compliance with all applicable Laws, including the Uniform Act, the rules and regulations for implementing the Uniform Act, and 23 CFR Part 710 governing the use of Federal funds for acquisition, management and disposal of real property.

15.2.2 **Software Requirements**

DB Contractor shall utilize software that is fully compatible with the software in use by TxDOT, or fully transferable to TxDOT's systems, including TxDOT's interactive SharePoint site (for uploading, review, document retrieval, etc.). DB Contractor must supply and maintain a parcel-by-parcel status information database that incorporates the fields and information required by TxDOT's ROW tracking system: TxDOTConnect. DB Contractor must maintain and participate in any other required ROW tracking system required by the Contract Documents. The database shall be fully accessible to Persons authorized by TxDOT.

15.2.3 ROW Acquisition Management Plan

DB Contractor shall prepare a ROW Acquisition Management Plan in accordance with the requirements contained in Section 4.2.9 of the General Conditions.

15.2.4 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. DB Contractor shall advise TxDOT of all Additional Properties and temporary rights or interests in real property to be acquired by DB Contractor. In developing the Project Schedule, DB Contractor shall give priority to the acquisition of parcels that have significant impact on the Project Schedule or affect a Critical Path. The monthly Project Schedule Update required by Item 8 of the General Conditions shall provide updated projections for the acquisition date of each parcel.

In developing the Project Schedule, DB Contractor shall incorporate adequate time periods for TxDOT review and approval of Acquisition Packages and Condemnation Packages. TxDOT intends to review the completed Acquisition Packages and Condemnation Packages as expeditiously as possible; *however,* for the purposes of the Project Schedule, DB Contractor shall assume that the reviews performed by TxDOT will require 10 Business Days for Acquisition Packages and Condemnation Packages (collectively) that DB Contractor submits as final and complete in accordance with Section 15.3.6 and Section 15.4.4, up to a maximum of five Acquisition Packages and Condemnation Packages (collectively), unless otherwise directed by TxDOT. Any Submittals that would require TxDOT to review more than five Acquisition Packages and Condemnation Packages (collectively) within any given 10 Business Day period shall be considered excess, and TxDOT may defer its review of any such Acquisition Packages and/or Condemnation Packages to a subsequent 10 Business Day period (or periods as necessary). TxDOT will notify DB Contractor of its election to defer any excess Acquisition Packages and/or Condemnation Packages within 10 Business Days after receipt. The balance of Acquisition Packages and Condemnation Packages (collectively) in excess of five will be rolled over to the next 10 Business Day period and added to the Acquisition Package Submittals and Condemnation Package Submittals made by DB Contractor in that period. When DB Contractor submits more than five Acquisition Packages and Condemnation Packages (collectively) at any given time, DB Contractor shall indicate the priority of review.

DB Contractor shall also assume that the reviews performed by TxDOT will require 10 Business Days for the following Submittals: payment Submittals, relocation Submittals, administrative settlement Submittals, and closing Submittals, up to a maximum of five submissions for each type of Submittal noted above, in addition to the Acquisition Packages and Condemnation Packages. With the combination of the above, DB Contractor shall not submit more than 25 total Submittals, in any given 10 Business Day period.

If TxDOT notifies DB Contractor that any submitted Acquisition Package or Condemnation Package has a deficiency, DB Contractor shall correct such deficiency and resubmit the package to TxDOT. Resubmissions shall be treated as a new Acquisition Package or Condemnation Package, as applicable, for purposes of the limitations on the number of Submittals that may be submitted in a 10 Business Day period. An Acquisition Package or Condemnation Package shall be deficient, as determined by TxDOT, if any of its components fails to meet any of the criteria established by this Item 15 for such component, or contains any material errors or omissions. Schedule delays resulting from inadequate or incomplete submissions of Acquisition Packages and/or Condemnation Packages shall be the responsibility of DB Contractor and will not be eligible for treatment as a Change Order.

TxDOT shall have the right to undertake additional review and extend the review time for an additional 10 Business Days on Acquisition Packages and Condemnation Packages that contain or identify facts or issues of an unusual nature or which do not clearly fit within TxDOT Standards. In such event, TxDOT will notify DB Contractor in writing that the review period will be extended by an additional 10 Business Days before rendering a decision regarding approval of the package to DB Contractor.

DB Contractor may request TxDOT to perform a one-time preliminary review of a survey, Project ROW map, appraisal or any other Submittal listed in Section 15.2.4. TxDOT may elect in its sole discretion to review the preliminary submissions and notify DB Contractor of any deficiencies after TxDOT's receipt and review of such preliminary submission. There will be no time limits associated with these preliminary reviews.

15.2.5 DB Contractor's Project ROW Scope of Services

DB Contractor shall complete all administrative activities and prepare all documentation sufficient for DB Contractor to acquire the Project ROW. DB Contractor 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. For such Project ROW acquisition documentation, TxDOT will (a) approve and return the Submittal, (b) provide review comments for incorporation by DB Contractor in accordance with Section 15.2.4, or (c) in the case of an Acquisition Package that is deficient, notify DB Contractor of the deficiency(ies) to be corrected by DB Contractor prior to resubmission in accordance with Section 15.2.4. Except as otherwise authorized by applicable State and Federal policy and regulations for early acquisition and approved by TxDOT, DB Contractor shall not proceed with acquisition of the Project ROW until all applicable NEPA Approvals are 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 NEPA approved highway segment. Further, DB Contractor shall not commence any negotiations with the owner of a parcel, and TxDOT will not begin eminent domain procedures with respect to the parcel until after the Acquisition Package for that particular parcel is approved by TxDOT.

If DB Contractor and the landowner cannot negotiate an agreed-upon conveyance by deed acceptable to TxDOT, DB Contractor shall not recommend any condemnation action through the statutory "Special Deposit and Possession" procedure. TxDOT will not acquire any property through the condemnation process via the "Special Deposit and Possession" procedure.

Neither DB Contractor nor its Subcontractors shall begin construction of any type on any parcel of real estate unless and until all requirements under the Uniform Act have been met (including relocation assistance in accordance with Section 15.4.2) and (i) property rights for the parcel have been conveyed and recorded in favor of TxDOT, (ii) possession has been obtained through eminent domain or any other method provided for by the standards set forth in Section 15.2.1, or (iii) a PUA has been executed and delivered by all necessary parties in accordance with Section 15.4.1.

15.2.6 Acquisition Process Summary

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

- Project ROW surveying and mapping;
- Project ROW and Utility cost estimates and updates;
- Title services;
- Appraisal services;
- Appraisal review;
- Negotiations;
- Closing services;
- Relocation assistance;
- Condemnation support services;
- Clearance and demolition of Project ROW;
- Environmental due diligence;
- Documentation and document control;
- Progress reports;
- Project ROW administration and management;
- Project ROW quality management;
- Letter from DB Contractor's design engineer certifying that the required Project ROW acquisition is necessary and that any proposed alternatives are not feasible or are cost prohibitive; and
- Obtaining ROEs, as necessary.

15.2.7 ROW Personnel Qualifications

All ROW personnel shall be familiar with TxDOT policies and procedures and be compliant with the Uniform Act.

DB Contractor's ROW AM shall have at least ten 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 TREC, be familiar with appraisal

and appraisal report review pursuant to the USPAP, and be familiar with the Uniform Act and applicable Laws of the State of Texas.

Quality Control Specialist(s) – DB Contractor shall designate a specific person(s) responsible for internal quality control. This individual shall review all DB Contractor 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 reviewer 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. Each individual must have been actively and continuously engaged for at least three years immediately preceding their selection for this Project in appraisal work primarily in the county(ies) where the Project is located, and as approved and pre-certified 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 (one commercial, one residential and one vacant land appraisal). All appraisers preparing and signing appraisals must be approved and pre-certified by TxDOT before performing any appraisals on the Project. If required by TxDOT, the appraiser will be required to demonstrate his or 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. Each individual must have been actively and continuously engaged for at least three years immediately preceding selection for this Project in land planning work primarily in the county(ies) where the Project is located, or as approved and pre-certified by TxDOT. DB Contractor 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 five 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 as either a "Real Estate Sales Agent" or broker pursuant to the *Texas Real Estate License Act* or rules established by the TREC, and shall be familiar with appraisal and appraisal report review pursuant to the USPAP. The negotiator shall have a minimum of five years' experience in ROW 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 their representatives, and actively working toward a joint resolution to acquire the property with the property owner.

Other ROW personnel shall have at least five 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.

Eminent Domain Specialist – Each eminent domain specialist shall have a minimum of five years' experience with TxDOT procedures and policies as related to acquisition of property through the use of eminent domain. The eminent domain specialist must have demonstrated experience 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 hearings with all appropriate parties and ensuring that awards of Special Commissioners are 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.

15.2.8 DB Contractor Conflict of Interest

If at any time, to the best of DB Contractor's knowledge, any DB Contractor-Related Entity directly or indirectly (a) 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, (b) has any financial interest in any real property likely to be a Project ROW parcel, or the remainder of any such parcel that is not a whole acquisition, or (c) 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, DB Contractor shall promptly disclose the same to TxDOT. In the case of acquisitions, loans or mortgage purchases that occurred prior to the Effective Date, such disclosure shall be made within 10 days after the Effective Date.

In the event that DB Contractor, or any subsidiary, sister, or parent company of DB Contractor, 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.

DB Contractor shall not acquire or permit the acquisition by DB Contractor or any DB Contractor-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 15.2.1.

15.2.9 Meetings

DB Contractor shall coordinate, facilitate and attend meetings as requested by TxDOT. At such meetings DB Contractor shall provide exhibits, take minutes, and distribute the minutes to all attendees for review and comment. Minutes will not be finalized until all attendees have been given a reasonable opportunity to commnet on the content. DB Contractor shall provide meeting minutes to TxDOT within five (5) Business Days of the applicable meeting. TxDOT will respond within five (5) Business Days or at the next occurrence of the meeting. DB Contractor shall provide proposed agendas three (3) Business Days prior to each meeting.

15.2.10 Documentation and Reporting

DB Contractor 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):

- County;
- CCSJ number;
- RCSJ number;
- Federal Project Number (if applicable);
- Highway designation;
- Project limits;
- Parcel number; and
- Name of record owner(s).

DB Contractor shall utilize TxDOT's approved naming convention for all electronic files and reporting fields.

In administering and managing its Project ROW acquisition activities, DB Contractor shall:

- 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, FHWA, and TxDOT.
- 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 cost forecasting on an overall Project basis as requested by TxDOT.
- Maintain and electronically transmit to TxDOT, in a format acceptable to TxDOT, monthly status reports, including appraisal, acquisition, eminent domain and relocation status of all parcels and activities related to Project ROW, acquisition and disposition of Additional Properties, acquisition and disposition of temporary easements and other property interests, and provide weekly (unless directed otherwise) updates to TxDOT.

- Evaluate and report to TxDOT, ROW Subcontractor status and performance on a monthly basis or more frequently as requested.
- 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 TxDOTConnect tracking software program or as directed by TxDOT.
- Input and update parcel status in TxDOT approved web-based tracking system as directed by TxDOT.

15.2.11 **Responsibilities of DB Contractor**

As set forth in Section 4.4 of the General Conditions and as more fully described in this Section 15.2.11, DB Contractor shall be responsible for 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, relocation advisory assistance and determination of relocation benefits to be provided, procurement of title insurance, clearing of title, closing of acquisitions, and condemnation support including expert witnesses required by TxDOT or the Office of the Attorney General for all condemnation proceedings. DB Contractor shall also be responsible for all expert witness testimony, exhibits, transcripts, and photos associated with condemnation services and proceedings required by the Office of the Attorney General or TxDOT for Special Commissioner's hearings, jury trials and appeals, through Final Acceptance.

DB Contractor shall not contact the Office of the Attorney General 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.

DB Contractor acknowledges that subject to 18.2 it has incorporated the value of saleable improvements into DB Contractor's Project ROW acquisition costs, and DB Contractor shall concurrently, with conveyance of the real property interest to the State, and without the necessity of further documentation executed by the State, obtain the rights to said saleable improvements. TxDOT has received the benefit of the saleable value of the improvements by a reduced Price. DB Contractor shall not be entitled to a credit for any improvements retained by a property owner or TxDOT. Upon conveyance of the real property interest to the State, DB Contractor shall comply with all applicable Laws with respect to relocation assistance and demolition.

DB Contractor shall 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 DB Contractor deems advisable to acquire for work space, contractor lay-down areas, material storage areas, borrow sites, or any other convenience of DB Contractor. 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 DB Contractor'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.

DB Contractor shall be responsible for processing payment Submittals as described in Section 15.4.6 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 for which TxDOT is responsible.

DB Contractor is responsible for the payment of and all closing costs associated with the purchase of Project ROW in accordance with the Uniform Act and TxDOT policies. TxDOT shall be responsible for the purchase price of title insurance for Project ROW in accordance with Section 4.4.2 of the General Conditions.

DB Contractor's cost for Project ROW shall include all costs not paid by TxDOT.

DB Contractor shall be responsible for submitting to TxDOT the completed files in accordance with the closeout procedures as defined by TxDOT within 90 days of the completed ROW parcel activity. DB Contractor shall provide the following documentation including, but not limited to:

- Appraisal report(s) (initial appraisal and all other issued appraisal reports, approved and not approved, with most recent appraisal report on top);
- Original conveyance document(s) (PUA(s), deed(s), easement(s), judgment(s), Award of Special Commissioners);
- Original Title Insurance Policy or Attorney's Certificate;

- MOA; and
- Negotiator's Certificate.

For relocation and general correspondence, the following shall be included:

- Relocation files (in chronological order);
- Offer Letters;
- Negotiator Reports and Contact Sheets;
- General correspondence; and
- All other documentation regarding the parcel.

15.2.12 **Responsibilities of TxDOT**

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

- Except as otherwise set forth in this Item 15, provide final approval for all Acquisition Packages, Condemnation Packages, payment Submittals, relocation eligibility, relocation appeals, relocation Submittals, administrative settlement Submittals, closing Submittals, court settlement requests, and other approvals required by the Contract Documents, by the State, or by applicable Law subject to submission requirements and timelines in Section 15.2.4.
- After receiving a complete Condemnation Package from DB Contractor in accordance with Section 15.2.4 and Section 15.4.4, 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 10 Business Days before the Commission's required deadline for eminent domain minute order requests.
- After receiving a complete payment Submittal from DB Contractor in accordance with Section 15.2.4 and Section 15.4.6, TxDOT will submit a payment request to the Comptroller's Office. Upon receipt of the State warrant, TxDOT will relay the State warrant to DB Contractor within five (5) Business Days.
- TxDOT will coordinate with the Office of the Attorney General to provide legal counsel to prepare and deliver to TxDOT the condemnation petition within 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 DB Contractor within 10 Business Days after receipt of the condemnation petition from the Office of the Attorney General. If e-filing is not applicable, DB Contractor shall follow the standard procedures as described in the TxDOT ROW Manuals.
- If applicable, TxDOT will provide all e-filed documents to DB Contractor as part of DB Contractor's support of the condemnation process and invoice DB Contractor for all e-filed charges. DB Contractor is responsible for reimbursing TxDOT all e-filed invoices. If e-filing is not applicable, DB Contractor shall follow the standard procedures as described in the TxDOT ROW Manuals.
- TxDOT will provide all coordination services between DB Contractor and the Office of the Attorney General for prosecution of jury trials.
- TxDOT will provide a ROW Administrator to serve as the point of contact for all Project ROW issues as set forth in 23 CFR § 710.309(d).
- TxDOT will review and approve the completed, final closeout files in accordance with the closeout procedures.

15.2.13 **TxDOT Project Monitor/Reviewer**

In addition to its review and approval authority as expressly set forth in other provisions of this Item 15, TxDOT may audit and monitor the ROW activities and services performed by DB Contractor. TxDOT may contract with independent entities to assist it in fulfilling the audit/monitoring function provided that the audit authority is not delegated. In addition to any Submittal components specifically required to be provided to TxDOT, DB Contractor shall provide information to TxDOT as requested to assist in its review and assessment of the progress, timeliness, adequacy and sufficiency of DB Contractor's Project ROW activities.

15.2.14 Responsibilities of the Office of the Attorney General

The Office of the Attorney General, with the assistance of DB Contractor and coordination of TxDOT, will 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:

- Represent TxDOT as the State's attorney of record;
- Preparation of complete petitions for condemnation with the appropriate court for a cause number to be assigned;
- If applicable, e-file condemnation documents and coordinate delivery of filed documents with TxDOT;
- Coordination with TxDOT on all legal matters concerning acquisition processes, including negotiated settlements;
- Analysis of recommended parcel values and/or appraisal issues;
- Additional legal advice and opinions as needed by TxDOT;
- Special Commissioners' hearings;
- Jury trials including determination of expert witnesses and all appeals; and
- Preparation, obtaining, and filing of all necessary legal documentation for eviction of property owners or tenants.

15.3 Pre-Acquisition Activities

15.3.1 Project ROW Surveying and Mapping

DB Contractor shall perform all Project ROW surveying and mapping and shall prepare Project ROW documents in accordance with applicable TxDOT Standards, including the TxDOT ROW Manuals, the "District Right of Way Map Checklist" as provided in the RIDs, and the TxDOT *Survey Manual*. DB Contractor shall refer to the current *Manual of Practice* by the Texas Society of Professional Land Surveyors and the *U.S. National Map Accuracy Standards*. DB Contractor shall refer to Item 17 for additional survey requirements.

The Project ROW map shall be prepared by DB Contractor 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 10 Business Days for review of each submitted ROW map, each containing up to a maximum of 25 parcels. Any Submittals that would require TxDOT to review more than 25 parcels within any given 10 Business Day period shall be considered excess, and TxDOT may defer its review of any such excess parcels to a subsequent 10 Business Day period (or periods as necessary).

DB Contractor may use Acquisition Survey Documents prepared by TxDOT, if available, for the purpose of performing ROW acquisition work at DB Contractor's risk.

DB Contractor shall assemble an Acquisition Survey Document to be included in the submission of the Acquisition Package. The Acquisition Survey Document shall include:

- Three half size ROW maps on paper, Scale 1 inch = 100 feet (11 inches X 17 inches);
- One separate set of originals signed and sealed by a RPLS, legal descriptions and parcel sketch, traverse closure sheets and a copy of the parent tract deeds and subdivision plat if tract is a platted lot;
- A USB with DGN Master file, map sheets, Excel point list, raw data file and/or field notes, and scanned copies of the instruments of record or other pertinent documents;
- One full size ROW map on paper, Scale 1 inch = 50 feet (22 inches X 34 inches);
- 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;
- Three copies (signed and sealed) of each legal description and sketch;
- One separate set (copies) of legal description and sketch of each parcel for TxDOT records;

- One separate set (copies) of legal description and sketch of each parcel for the title company; and
- One separate set of originals legal description and sketch signed and sealed by a RPLS to be kept in mapping files.

In addition to the foregoing, DB Contractor shall prepare all Project ROW surveying and mapping in accordance with the following:

- DB Contractor shall assemble an Acquisition Survey Document. The Acquisition Survey Document 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 8-1/2-inch by 11-inch bond paper. The Project ROW map sheets shall be on 22-inch by 34-inch 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.
- The ROW map sheet and plat shall show all areas of denied access for the parcel according to the current TxDOT *Access Management Manual* and amendments.
- The 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.
- The 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.
- 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 PC, PT, PI, PCC, and PRC, and for property line intersections (PLI) with the Project ROW line, and for any other monumentation points on the Project ROW line.
- 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.
- 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.
- Any existing ROW lines being incorporated into the proposed Project ROW, including intersecting ROW, shall be surveyed and monumented (if not previously monumented).
- 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, datum (NAD83) (2011), or as shown on the current ROW maps, and the Project grid-to-surface coordinate adjustment factor or refer to Project primary control provided by TxDOT (refer to Section 17.3).
- All Project ROW maps shall include a control sheet(s), to show the primary survey control points with their location relative to the Project.
- 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, and then the first page of the parcel description is denoted "Page 1 of 3" and the parcel plat is denoted "Page 3 of 3."
- Improvements within 100 feet outside of all proposed Project ROW shall be depicted on the Project ROW map sheets. All improvements shall be current as of the date of the on-the-ground property survey.
- 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.
- Calculated points shall be shown by a symbol on the drawing, which shall also identify the point relationship to the found reference points.

- 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.
- Upon final submittal from DB Contractor of the Project ROW documents to TxDOT, DB Contractor shall cause the surveyor to mark on the ground, using permanent and stable monuments as described in Section 663.17 of the General Rules of Procedures and Practices of the TBPELS, 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 1/2-inch iron rod, driven just below surface level, capped by a TxDOT-labeled aluminum cap (rod-and-cap monument).
- Prior to acceptance of the ROW maps and surveys by TxDOT, DB Contractor 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 under the direction of a Texas RPLS (construct according to the TxDOT ROW manuals and TxDOT *Survey Manual*), unless otherwise directed by TxDOT.
- As part of the survey process, DB Contractor shall cause a TxDOT Type II monument to be set at all significant points such as PCs, PTs, angle points and at 1,500-foot intervals along tangent sections on the Project ROW line and at intersections with existing Project ROW lines, replacing monuments as described above, unless otherwise directed by TxDOT. Project ROW line intersections with property lines shall remain monumented by a 1/2-inch iron rod with a TxDOT aluminum cap (rod-and-cap monument). A TxDOT Type II monument shall be set on the Project ROW lines, perpendicularly left and right of each significant centerline point, radial on curves, regardless of the relative orientation of the final Project ROW line.
- For any required revisions, DB Contractor 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 the briefly states the reason for the revision.
- Documents shall contain deed references (survey name, abstract number, volume and page or document number, grantee, and area) for all existing public ROW 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 ROW as shown hereon.”
- 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.
- DB Contractor 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. DB Contractor 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” iron rod with a TxDOT aluminum cap stamped “TxDOT ADL” the limits of the denial of access.
- 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 a Governmental Entity, shall be included on the Project ROW map.
- Within the proposed Project ROW, all property owned by a city, county, or other local public agency 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. DB Contractor 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.

- DB Contractor shall cause an independent RPLS to review the Acquisition Survey Document for consistency as to the information delineated thereon and for compliance with all applicable DB Specifications and survey documents. The boundary location and the survey methods remain the responsibility of DB Contractor and are not part of this review process. TxDOT will have no obligation to accept the Acquisition Survey Document as complete until the reviewing RPLS has signed and sealed the compliance certificate (compliance certificate form to be provided by TxDOT).
- Parcel numbering shall follow the TxDOT ROW Manuals. Parcels are to be numbered based upon the parent tract. DB Contractor 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 parent 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. DB Contractor shall not use the letter "E" to avoid confusion with easement designations. Parcel numbering shall be sensitive to the appraisal of the required parcels.
- 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. DB Contractor shall use the preferred solution unless TxDOT approves an alternate method.
- 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.
- 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.
- DB Contractor shall purchase all materials, supplies and all other items necessary for proper survey monumentation. DB Contractor may purchase Type II monuments from TxDOT. TxDOT shall make available for pick-up by DB Contractor Type II monuments within 75 days after TxDOT receives from DB Contractor 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 DB Contractor a written invoice. DB Contractor may use these monuments only for this Project and shall be responsible for proper storage thereof.
- DB Contractor, at the request of the property owner or TxDOT, shall re-stake the proposed ROW with a flagged wooden stake.

DB Contractor shall provide sufficiency of design to determine the ROW need and produce ROW maps that delineate the proposed ROW and potential impacts to the remaining ROW. DB Contractor shall provide a design certification of ROW 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 are cost prohibitive.

15.3.1.1 ArcGIS ROW Mapping Files

DB Contractor shall submit for review and approval GIS files of the Acquisition Survey Documents in accordance with the standards and required deliverables detailed in Chapter 4, Section 8 of the TxDOT "ROW Preliminary Procedures for the Authority to Proceed" manual. DB Contractor shall submit GIS files concurrent with the Acquisition Survey Document and prior to submitting the first Acquisition Package and provide updates as needed.

15.3.2 Additional Reporting Requirements

In addition to the Project ROW map, parcel description, and parcel plats, DB Contractor shall submit the following reports and electronic files:

- Monthly Parcel Report: a report, prior to the first of the month, listing all parcel deletions, parcel additions, and parcel splits;
- Monthly Progress Report: a report, prior to the first of the month, of all survey activity that occurred during the previous month, including a two-week look ahead of anticipated survey activity; and
- CADD files: digital CADD files in MicroStation format which include property lines and/or existing ROW lines, as surveyed, proposed ROW lines, parcel numbers, resource files, level assignments, and plot files. DB Contractor shall submit CADD files prior to submitting the first Acquisition Package and provide updates as needed.

15.3.3 Title Services

With respect to title services, DB Contractor shall comply with the applicable standards identified in Section 15.2.1, including the following requirements:

- Select and contract with one or more title companies approved by TxDOT and submit with the Acquisition Package for each parcel 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. DB Contractor shall, at its own cost, review each title report to ensure that it complies with the format required by the Contract Documents. DB Contractor 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. DB Contractor 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 are not included in the parcel to be acquired, and (b) are a burden on the parcel and not acceptable.
- 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.
- 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.
- Secure an owner's policy of title insurance in the amount of the total acquisition cost, to include the cost of the property, improvements and damages to the remainder of the property, 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. 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 Transportation Commission."

15.3.4 Introduction to Property Owners

DB Contractor shall provide TxDOT the current property owner list, with addresses, and shall pay for the distribution of initial contact letters of introduction to 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 DB Contractor's representative. TxDOT's ROW Administrator or designee will sign

the letters on TxDOT letterhead. The forms for these letters will be approved by TxDOT prior to use. DB Contractor shall provide translation for property owners or displacees unable to read or understand the notices.

DB Contractor shall furnish a copy of the State of Texas Landowner's Bill of Rights for each property owner for inclusion with the letter of introduction. The copy of the Bill of Rights shall be the latest version as shown on the Office of Attorney General website: http://www.texasattorneygeneral.gov/agency/Landowners_billofrights.pdf.

15.3.5 Appraisals

15.3.5.1 Appraisal Services

DB Contractor shall submit to TxDOT market value appraisals prepared by appraisers meeting the minimum qualifications established herein. DB Contractor shall ensure that all appraisals are 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. DB Contractor shall:

- Select appraisers from TxDOT's list of pre-certified fee appraisers meeting the requirements specified in Section 15.2.7. TxDOT shall have final approval of the selection of each appraiser and appraisal reviewers submitted by DB Contractor. DB Contractor must identify and receive written TxDOT approval of the appraiser who will be responsible for the appraisal work product and who will be signing the reports.
- Establish personal pre-appraisal contact with each owner of record title and each occupant, and document all contacts utilizing forms provided by TxDOT.
- If necessary, make a diligent effort to secure a written agreement between the record title owner and DB Contractor granting TxDOT, DB Contractor or assignees permission to enter the applicable parcel to be acquired (an "ROE Agreement"). DB Contractor may, at its sole discretion and expense, offer to pay reasonable compensation for any required ROE Agreements. If DB Contractor, after best efforts, is unable to secure a ROE Agreement from the property owner, DB Contractor shall provide documentation acceptable to TxDOT indicating conversations, correspondence, and efforts used to attempt to secure the ROE Agreement.
- 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 and attempts to contact in the parcel file.
- 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 15.3.5 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 USPAP 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, except for outdoor advertising signs which shall utilize TxDOT form ROW-A-5 OAS – Real Estate Appraisal Report. In very limited situations and with written permission from TxDOT on a per parcel basis, the appraiser may utilize TxDOT form ROW-A-6 for less complicated parcels. All appraisals must be performed utilizing guidance from the TxDOT ROW Manuals. All appraisals for condemnation proceedings shall utilize TxDOT form ROW-A-5 – Real Estate Appraisal Report.
- Obtain and provide TxDOT with copies of all written leases, licenses and other occupancy agreements, including outdoor advertising/sign agreements that are not already included in the title commitment.
- Perform an evaluation of all outdoor advertising signs, as required, utilizing the appropriate forms as instructed by TxDOT. The forms shall be completed and executed by the outdoor advertising sign owner.

For all parcels to be acquired that have off-premise outdoor advertising signs (sign structure), the preliminary appraisal package or the appraisal in the Acquisition Package, submitted for TxDOT approval, must include:

- Completed and executed appropriate TxDOT forms; and
- The value of the sign structure as a real property fixture.

DB Contractor shall:

- 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 in accordance with the TxDOT ROW Manuals and USPAP. DB Contractor shall also provide administrative and/or technical support for such proceedings as requested by TxDOT.
- Coordinate with the review appraiser regarding corrections and additional information that may be required for a particular appraisal.
- Cause a report to be prepared by an environmental professional that meets the qualifications set forth in ASTM E-1527-13, Standard Practice for Environmental Site Assessments: Phase I Environmental Site Assessment Process, documenting the environmental condition of each parcel, which may be used on field investigations and/or historical review, as appropriate for the particular parcel. As directed by TxDOT, DB Contractor shall submit a summary report of the Phase I site assessment. Upon completion, the report shall be made 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 and submitted with the Acquisition Package. If it is determined that there is a potential environmental risk based on the Phase I report or other reports, then a Phase II investigation shall be performed and submitted to TxDOT before a payment Submittal is submitted for the purchase of the parcel or a Condemnation Package is submitted for approval. 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. DB Contractor shall provide timely written notification to TxDOT of any environmental or other concerns associated with the Project ROW to be acquired that could require environmental remediation or other special attention or which would cause a report to be prepared. In the event that DB Contractor has exhausted all means possible and is unable to access the properties to perform a Phase II and/or III Environmental Site Assessment, DB Contractor may submit the Acquisition Package and Condemnation Package without the Environmental Site Assessment reports. However, DB Contractor shall be responsible for performing and receiving approval from TxDOT for all required Environmental Site Assessments after possession of the property has been obtained through condemnation before commencement of construction.
- Engage the services of, and cause, a land planner to assist in the preparation of, any and all appraisals. that involve a valuation analysis indicating a highest and best use that is other than the current use of such parcels, or as directed by TxDOT, for certain other appraisals. DB Contractor shall notify TxDOT in writing of each and every instance when the highest and best use of a parcel is different from its current use, in which event TxDOT will determine to what degree land planner services will be utilized by DB Contractor.
- 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. At a minimum, the updated appraisal report or new assignment 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 and TxDOT form ROW-A-5 OAS – Real Estate Appraisal Report 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 from 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 and current photographs of the subject property clearly showing the area being acquired, even though the original appraisal report contained photographs of the subject property 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 the TxDOT form ROW-A-5 – Real Estate Appraisal Report and TxDOT form ROW-A-5 OAS – Real Estate Appraisal Report. Appraisers shall refer to the TxDOT *ROW Appraisal and Review Manual* for additional guidance. DB Contractor shall follow these guidelines in producing updated appraisal reports or new assignments and shall discuss specific updating requirements for any complex appraisals with TxDOT before beginning the assignment.

- Prepare and deliver to TxDOT, upon request, a copy of all file documents, as formally requested in discovery motions or requests for production.
- Complete with the property owner and furnish, to the appraiser and Relocation Agent, TxDOT form ROW-A-9 – Property Classification Agreement, before the appraisal is completed.

15.3.5.2 **Appraisal Review**

In connection with appraisal review, DB Contractor shall:

- Select review appraisers from TxDOT's list of pre-certified fee appraisers meeting the requirements of Section 15.2.7. The review appraiser selected must follow the appraisal guidelines and procedures found in the TxDOT *ROW Appraisal and Review Manual*.
- Determine, in consultation with TxDOT, if additional appraisal reports or technical expert reports are required. Initiate, review, and reconcile each report required.
- Review all appraisal reports for each parcel to determine consistency of methodology, supporting documentation related to the conclusion reached, and compliance with standards set forth, as defined in Section 15.3.5.1 and this Section 15.3.5.2, the TxDOT *ROW Appraisal and Review Manual*, the *Uniform Appraisal Standards of 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 requirements of professional appraisal practice.
- Inspect the subject properties and the sale properties used in direct comparison for each appraisal being reviewed.
- Upon completion of the review outlined above, cause the review appraiser to certify in writing to TxDOT that all required standards have been met. This certification will occur by signing Page 1 of the TxDOT form ROW-A-5 – Real Estate Appraisal Report and TxDOT form ROW-A-5 OAS – 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.
- For appraisal updates or new assignments, cause the review appraiser to perform a complete review of the updated or new appraisal, re-inspecting the subject property and the comparable 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 or new assignment.
- Cause its Quality Control Specialist(s) as referred to in Section 15.2.7, to ensure that appraisal consistency and quality for the entire Project is monitored for Project-wide controls and consistency.

15.3.6 **Project ROW Acquisition Package Approval**

Acquisition Packages submitted by DB Contractor for TxDOT approval shall include the following items, prepared for each parcel in accordance with the requirements of this Section 15.3.6:

- A cover sheet setting forth the following information for each parcel:

  - Parcel number and number of parts;
  - Station number;
  - CSJ number;
  - Federal Identification Number (if applicable);
  - Project limits;
  - Name of owner;
  - County and/or other jurisdiction;
  - Extent of acquisition (partial or whole acquisition); and
  - Type of conveyance (fee, easement, etc.).
- A complete legal description of the parcel adequate to effect the desired acquisition of the parcel, signed and sealed by a RPLS. A legal description and parcel plat are 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.
- The parcel plat, as prepared by the RPLS, and a half-size (11 inches by 17 inches) copy of the ROW map sheet(s) pertaining to the parcel. The plat must include control of access designations.
- 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 DB Contractor's analysis of each preliminary title report or title commitment to determine potential problems and proposed methods to cure title deficiencies. DB Contractor shall perform title curative work. DB Contractor shall provide TxDOT with copies of all curative documents.
- A copy of the appraisal report with an effective date no earlier than 180 days prior to the date of submission of the Acquisition Package.
- A copy of the Environmental Site Assessment and all amendments as described in Section 15.3.5.1.
- A real/personal property report (TxDOT form ROW-A-9 – Property Classification Agreement) detailing the items making up each parcel that are classified as real estate, tenant-owned improvements or personal property. Particular attention shall be paid to items that have questionable classifications.
- 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. The calculations and replacement housing benefit package shall be prepared and reviewed by a qualified specialist, in conformance with TxDOT's standard relocation procedures and applicable State and federal Laws.
- The proposed initial offer letter, the State of Texas Landowner's Bill of Right, "State Purchase of Right of Way Booklet", "Relocation Assistance Booklet", MOA, deed, and any other documents, which shall be prepared by DB Contractor as required or requested by TxDOT, on DB Contractor's letterhead or as otherwise directed. TxDOT will provide the format for preparing these documents. Documents referred to in this Section 15.3.6 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.
- 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 prepared or submitted by appraisers or agents not previously approved by TxDOT for this Project.

Upon TxDOT's written approval of the Acquisition Package, DB Contractor may proceed with the offer to the property owner.

15.4 Acquisition Activities

15.4.1 ROW Negotiations

DB Contractor shall conduct all negotiations in accordance with the requirements of applicable Law. In conjunction with negotiations, DB Contractor shall:

- Within 10 Business Days of TxDOT approval of the Acquisition Package, in accordance with section 21.0111 of the Texas Property Code, send the initial offer letter and approved appraisal via certified mail, return receipt requested, to each property owner or owner's designated representative, and to meet in person where practical, to present the offer and deliver an appraisal report (not more than six months old) and appropriate brochures. A copy of the appraisal report for the subject property shall be provided to the property owner or authorized representative at the time of initial 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. DB Contractor shall also maintain a file record of receipt of appraisal signed by the property owner. DB Contractor shall also maintain follow-up contacts, secure necessary documentation and initiate title curative Work upon acceptance of the purchase offer.
- At the time of offer, produce and distribute to all property owners and displacees, TxDOT approved informational brochures and the State of Texas Landowner's Bill of Rights as updated on the Office of the Attorney General's website: http://www.texasattorneygeneral.gov/agency/Landowners_billofrights.pdf
- 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.
- 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 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 DB Contractor in accordance with standards, manuals and procedures as identified in Section 15.2.1. TxDOT shall determine whether to accept a settlement request. Delivery of the administrative settlement request and DB Contractor's recommendation to TxDOT must occur within 15 Business Days following DB Contractor's receipt of the administrative settlement request.
- Participate in the evaluation of the administrative settlement requests and attend the relevant TxDOT Administrative Settlement Committee meetings at the request of TxDOT or the TxDOT Administrative Settlement Committee or at its own option, provided TxDOT consents to such participation or attendance .
- Provide a letter stating the TxDOT Administrative Settlement Committee's response to the property owner, lessee, licensee, occupant, or other holder of a compensable interest, as applicable. DB Contractor shall deliver all settlement responses (if within reasonable proximity of the Project) by hand within three (3) Business Days after receipt. If this delivery method is not feasible, DB Contractor shall mail (return receipt requested) response letters not more than three (3) Business Days following any decision by the TxDOT Administrative Settlement Committee. If DB Contractor selects the mailing option, DB Contractor shall contact 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.
- Notwithstanding an unsuccessful completion of the formal administrative settlement process, engage in ongoing negotiations with the owners of compensable interests. DB Contractor shall develop and incorporate in its ROW Acquisition Management 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. DB Contractor shall submit its recommendation to TxDOT of a negotiated settlement and obtain TxDOT consent prior to acceptance of any settlement.
- Provide timely (i.e., not more than 10 Business Days after inquiry) response to the verbal or written inquiries of any property owner, lessee, licensee, occupant or other holder of a compensable interest, as applicable.

- Prepare a separate negotiator contact report for each meeting or conversation with any person (or other 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.
- Maintain a complete parcel file for each parcel. All original documentation related to the purchase of the real property interests shall be maintained (housed separately from the relocation files) in conformance with all standards identified in Section 15.2.1, manuals, and procedures, as defined in Section 15.2.1. All original Project ROW documents shall be retained and properly secured in DB Contractor's Project office or as otherwise approved by TxDOT. During the acquisition process, signed original documents shall be forwarded to TxDOT with a transmittal form periodically or as requested by TxDOT*;* provided, however*,* that all remaining original documents shall be forwarded to TxDOT upon completion of the acquisition of Project ROW for the Project.
- 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 State Laws.
- Pursue and obtain a PUA concurrently with the parcel negotiations. Except as otherwise set forth in this paragraph, each PUA shall include an incentive in the form of market rental consideration for the advance possession and use of the property and shall be in the form of Form ROW-N-PUAIC included in Attachment 15-1 (Form ROW-N-PUAIC). The amount of the market rental consideration shall be 10 percent (10%) of the approved value of the property, provided the minimum amount of the incentive shall be $3,000 per parcel and the maximum amount shall be $25,000 per parcel. For properties for which the Special Commissioners' hearing is within 30 days of the date of the PUA, the PUA shall not include market rental consideration and shall be in the form of Form ROW-N-PUA included in Attachment 15-2 (Form ROW-N-PUA). Such agreements shall be sought and negotiated by DB Contractor strictly in accordance with the Law and only with the prior written consent of TxDOT. If DB Contractor uses a PUA, DB Contractor shall obtain a deed or commence action on condemnation proceedings by submitting a Condemnation Package to TxDOT for approval within six months from the date of the PUA. No other conveyance documents shall be used for the purpose of Construction Work unless otherwise approved by TxDOT.
- Consider all reasonable settlement requests (that comply with the regulations as outlined in this Section 15.4.1) from the property owners, which are feasible and help expedite the Project ROW acquisition process. DB Contractor acknowledges and understands that TxDOT encourages all positive and creative solutions which satisfy the property owner and promote the success of the Project.
- Prepare and deliver a final offer letter to the property owners, lessees, licensees, occupants, or other holders of any compensable interest, as applicable. The letter shall be on DB Contractor's letterhead and shall be signed by the ROW AM. The final offer letter shall allow a property owner lessee, licensee, occupant or other holder of compensable interest at least 14 days as the consideration time period to review the final offer. DB Contractor shall submit to TxDOT, a copy of the final offer letter within two (2) days of delivery to the property owner.

If the final offer letter is not accepted, DB Contractor shall follow the procedures established for condemnation.

15.4.2 Relocation Assistance

DB Contractor shall coordinate and perform the administrative requirements necessary to relocate any occupants and personal property from Project ROW and certain remainders, as permitted by TxDOT. All Work prepared by DB Contractor 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 the DBC and these DB Specifications.

DB Contractor shall be available to all displacees for relocation services at the convenience of the displacees.

DB Contractor's major activities with respect to the relocation assistance of occupants from Project ROW include:

- Preparing a Relocation Plan in accordance with the TxDOT ROW Manuals within 90 days after receipt of NTP1, as part of an updated ROW Acquisition Management Plan.
- Monitoring relocation assistance activities and provide advisory services.
- Preventing fraud, waste and mismanagement.
- Assisting with all requests and being responsible for carrying out decisions made by TxDOT, the review/appeal process and judicial reviews.

DB Contractor shall provide relocation assistance strictly in accordance with the Law, and, in particular, the Uniform Act and TxDOT Standards. With respect to relocation assistance, DB Contractor shall:

- 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. DB Contractor shall perform relocation interviews, complete and maintain interview forms and discuss general eligibility requirements, programs, and services with potential displacees. DB Contractor shall maintain a written record of all verbal contacts.
- 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 the TxDOT ROW Administrator.
- Contact and provide relocation assistance to those parties affected by the Project ROW acquisition and complete forms for all displacees, as required.
- Locate, evaluate and maintain files on comparable available housing, commercial, retail and industrial sites.
- Calculate replacement supplement benefits.
- 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.
- Perform a DSS inspection for each replacement housing comparable, photograph the comparable and complete the DSS inspection form, TxDOT form ROW-R116 – Replacement Housing Inspection.
- Obtain at least two moving estimates from moving companies to effect relocation of personal property or consistent with the Uniform Act.
- Prepare moving plan with appropriate photos, sketches and inventory of personal property to be moved.
- Coordinate moves with displacees and moving companies in accordance with TxDOT Standards and the Uniform Act.
- Maintain relocation contact logs on a TxDOT form ROW-R96-R – Relocation Advisory Assistance – Parcel Record.
- Attend all closings on replacement properties, if requested by any party involved, and assure supplemental payments, if any, are properly distributed.
- Process and compute increased interest payments on the mortgage of owner-occupied dwellings, as required.
- Deliver to displacees a 90-day notice of eligibility letter simultaneously 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.
- Deliver a 30-day notice to displacees and property owners upon Possession of Project ROW.
- Notify TxDOT, in writing, when a displacee has vacated or abandoned the affected dwelling or structure. In addition, ensure that each displacee has removed all personal property from the Project ROW.
- Notify TxDOT ROW Administrator office immediately if a displacee has not moved after 30-day notice expires. Special effort and consideration should be extended to the displacees in the move out process. If the displacees have not moved from the State-owned ROW and

eviction is necessary, DB Contractor must provide a written request to TxDOT to begin eviction proceedings. The request must include written evidence of the due diligence efforts to vacate the displacees. Prepare a written recommendation to facilitate the displacee's move.

- Be available for any appeals or hearings.
- Prepare relocation payment claim submissions for all displacees and all relocation assistance benefits.
- Verify DSS dwelling criteria on all replacement housing as selected by the displacees.
- Secure dwellings and structures no later than 10 days after vacancy and protect the Project ROW following acquisition and relocation. It is DB Contractor's responsibility to ensure that all occupied and vacated improvements maintain insurance coverage or assume liability through completion of demolition.
- Maintain a complete file, separate from acquisition files, on each displacee and make available for inspection.
- 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 Office of the Attorney General for eminent domain also has a relocation issue. Relocation computations shall be adjusted based on the approved administrative settlement and court award.
- Prepare all correspondence to the displacees or their representative(s) on DB Contractor's designated relocation letterhead and have DB Contractor's correspondence signed by the Project ROW relocation agent.
- Deliver to each displacee the relocation assistance payments according to the TxDOT ROW Manuals.
- Assist TxDOT and the Office of the Attorney General 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.

15.4.3 Closing Services

For purposes of closing services, DB Contractor shall:

- Submit a closing Submittal to TxDOT for review a minimum of 24 hours prior to closing. Closing Submittals shall include the following:
  - A reference to the disposition of any environmental matters;
  - Updated title commitment, dated no more than 15 days prior, with notations indicating the disposition of all schedule "B" and "C" items;
  - A copy of the executed warranty deed to be delivered;
  - A proposed closing statement indicating disposition of all proceeds;
  - A copy of any and all release(s) of liens;
  - A copy of any miscellaneous documents and other curative matters required to be delivered at closing; and
  - A copy of the closing memorandum outlined in the bullet below.
- 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.
- Attend closings and 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.
- Obtain and submit to TxDOT a copy of the issued title insurance policy and recorded conveyance document based on the approved updated title commitment within 45 days following closing.

15.4.4 Condemnation Support

DB Contractor shall support condemnation efforts as directed by TxDOT and further delineated as follows:

- Conduct all applicable eminent domain-condemnation activities in accordance with the policies and procedures as described in the TxDOT ROW manuals; in Chapter 21 of the Texas Property Code; and Senate Bill 18.
- Communicate with TxDOT as to the parcel status on a monthly basis or as requested by TxDOT.
- Notify TxDOT of any potential condemnation and document the reason(s) for condemnation including recommendations for property closure.

15.4.4.1 **Condemnation Package Preparation**

DB Contractor shall support condemnation efforts as directed by TxDOT and further delineated as follows:

- 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.
- Provide to TxDOT, within 10 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.
- Use the information from the title report to join all parties having a property interest on the applicable TxDOT form. Spouses of property holders with compensable rights must also be joined.
- 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 30 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 the latest appraisal, complete minute order request form (form to be provided by TxDOT), any correspondence sent by DB Contractor, the owner of the compensable interest or any of their representatives, one copy of all the appraisal reports and evidence of a bona fide offer to the property owner. Submit two complete Condemnation Packages to TxDOT ROW Administrator for review and approval.

15.4.4.2 **Condemnation Support Upon Approval of a Condemnation Package**

DB Contractor shall support condemnation efforts as directed by TxDOT and further delineated as follows:

- 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.
- File the petition for condemnation with the appropriate court clerk after a determination that a timely settlement is not feasible. In counties that require e-filing, the Office of the Attorney General will e-file as appropriate and provide a copy of the petition to TxDOT. DB Contractor shall record the lis pendens in deed records with the appropriate county. No later than three (3) Business Days from the date of filing, DB Contractor shall send a copy of the petition and lis pendens, by certified mail, return receipt requested, to the owner, lessee, licensee, occupant or other holder of compensable interest. DB Contractor shall provide a copy of the petition and lis pendens to TxDOT.
- Coordinate and provide technical support to TxDOT, as required to facilitate filing the petition. The Office of the Attorney General will file petitions as required by Law. DB Contractor shall provide the location and setting of a hearing date.
- Make available to TxDOT on behalf of the Office of the Attorney General an agent who will be expected to assist in making arrangements for conferences with witnesses prior to trial, filing the condemnation petition, informing all parties 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.
- Notify TxDOT if market conditions have changed substantially since the date of the initial offer or if over six months have elapsed since the date of the initial offer. Upon such notification, TxDOT will contact the Assistant Attorney General 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, DB Contractor shall obtain such appraisal using the same procedures as described in Section 15.3.5.1. DB Contractor must also undertake appraisal review as described in Section 15.3.5.2.

- Submit the updated appraisal or new assignment to TxDOT for review and approval. Once approved, TxDOT shall transmit the approved appraisal to the Office of the Attorney General. TxDOT must approve any updated appraisals or new assignments. If an updated appraisal or new assignment is approved, notify the property owner or other holder of a compensable interest, as applicable, and submit a copy to TxDOT.
- Be responsible for coordinating the pre-hearing meeting with TxDOT on behalf of the Office of the Attorney General and all others required for testimony or exhibit preparation.
- Schedule all court reporter services, transcription services, expert witnesses, exhibits, and exhibit workbooks as directed by TxDOT.
- Serve in person, a "Notice of Hearing" not later than 20 days before the date of the Special Commissioners' hearing or other hearings. DB Contractor shall also comply with all over notice requirements as directed or authorized by the court.
- Call and send reminder letters two to three weeks in advance of any hearing to the assigned attorney, engineer, technical experts, appraiser, the commissioners, court reporter, and TxDOT ROW Administrator concerning hearing dates.
- Upon completion of the hearing, prepare TxDOT form ROW-E-73 – Data Sheet – Special Commissioner's Hearing, and Commissioners' time sheets. DB Contractor shall make payment to all commissioners involved in the hearing and include payment for commissioners as part of general Project ROW services.
- Timely file and provide proper service of citations if objections are filed after completion of the Special Commissioner's hearing and promptly submit evidence of filing and copies of all filed documents to TxDOT. As directed by TxDOT and the Office of the Attorney General, DB Contractor, at its cost, shall order transcripts of such hearing.
- Coordinate and provide support to TxDOT counsel, and facilitate distribution of copies of award, prepare requests for payment, and file notices of deposit.

15.4.4.3 Condemnation Support by an Expert Witness

DB Contractor shall support condemnation efforts as directed by TxDOT and further delineated as follows:

- 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 or individuals are 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.
- 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, DB Contractor shall provide all necessary expert witnesses including: engineers, land planners, real estate specialists, cost estimators, outdoor advertising sign experts, and environmental specialists, and DB Contractor shall appear as expert witness or fact witness, as requested. DB Contractor shall also make any Subcontractors available to appear as an expert witness or fact witness, as requested at the Special Commissioners' hearing or subsequent proceedings until Final Acceptance of the Project and through any maintenance agreement periods. The selection of all expert witnesses to be used for jury trials shall be determined by the Office of the Attorney General.
- Require expert witnesses to be present at a pre-hearing meeting with all exhibits and documents.
- The expert witness report, if required, shall be completed and forwarded to the appraiser before the updated appraisal is completed.

15.4.5 Clearance/Demolition of Project ROW

Prior to demolition of any improvements, DB Contractor shall provide to TxDOT photographs of the subject property and all improvements. If legal proceedings are initiated, all photos of personal property and any other items in dispute shall be in, and of a quality suitable for presentation as evidence in court. Following acquisition or possession of any parcel of Project ROW, DB Contractor shall:

- Within 10 days from vacancy of the property, secure and protect the buildings, improvements and fixtures on the Project ROW until they are disposed of or demolished. DB Contractor shall board-up, mow, fumigate and winterize as required by TxDOT or applicable Law.
- Coordinate with the owner and occupants to assure the clearance of personal property from the Project ROW, as applicable.
- Provide for any insect and rodent control and initiate extermination as required to protect the adjacent properties and rid the Project ROW from infestations.
- Secure Governmental Approvals required for demolition and environmental surveys or tests, notify TxDOT in writing of all such activities, and provide copies of such Governmental Approvals to TxDOT.
- To the extent required by Section 15.2.11, prepare necessary documentation for disposal of improvements, fixtures and buildings in accordance with applicable Laws and submit the same to TxDOT.
- Provide written notification to TxDOT of any abandoned personal property remaining on the Project ROW.
- Terminate all utility service(s) when appropriate.
- 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.
- Demolish and/or remove all improvements.
- Notify TxDOT upon completion of the demolition and clearance of the respective parcels within the Project ROW, as applicable.

15.4.6 Payment Submittal

DB Contractor must submit a payment Submittal for any item that is a TxDOT payment responsibility as outlined in this Item 15. A payment Submittal shall consist of:

- completed payment request forms for each type of payment;
- all required appropriate documents as shown on each payment request form; and
- Form AP-152 (Texas Identification Number).

The State's warrant will be returned to DB Contractor's ROW AM.

15.4.7 Property Fence

In connection with fences, DB Contractor shall comply with the policies and procedures of the TxDOT ROW Manuals, as well as TxDOT Standard Specifications. Fencing standards for DB Contractor-provided fencing shall conform to the overall aesthetics requirements in the Contract Documents and referenced standards.

15.4.8 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), DB Contractor shall construct similar like fence as in the preexisting condition or, at a minimum, construct a 6-foot-high chain-link fence with metal posts if no fence was in the preexisting condition. DB Contractor shall use Good Industry Practice in fencing public properties to control public access to the Project.

15.4.9 Property Fencing for Private Properties

DB Contractor 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(ies) 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, DB Contractor shall include the following clause in the MOA or the purchase agreement for such property:

"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."

DB Contractor 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, DB Contractor shall be responsible for providing temporary fencing in cases where the property owner refuses to fence the property within 30 days from the date of closing.

After the property owner's retention period has expired and if any existing fencing remains, DB Contractor shall remove the existing fences from the newly acquired Project ROW and will be responsible for all costs associated therewith.

15.5 Early ROW Acquisition

TxDOT will notify DB Contractor if certain Project ROW parcels are scheduled to be acquired by TxDOT or Governmental Entities prior to NTP2. TxDOT will update DB Contractor regularly on the status of the acquisition process for each parcel.

DB Contractor shall complete the acquisition process for Project ROW parcels not acquired by TxDOT, including early acquisition parcels, and coordinate the scheduling of all remaining Project ROW acquisitions.

15.6 Submittals

All Submittals described in this Item 15 shall be in accordance with the schedule and for the purpose (approval, review and comment, for information) set forth in Table 15-1. Acceptable electronic formats include Microsoft Word, Microsoft Excel, or Adobe Acrobat files, unless otherwise indicated. Any deliverable submitted by DB Contractor to TxDOT for review after 11:59 a.m. will be considered as submitted on the next Business Day.

Table 15-1: Submittals to TxDOT

Submittals	Submittal Schedule	TxDOT Action	Reference Section
Copies of all property agreements	As required	For information	15.4.3
Meeting Agendas	Three Business Days prior to each meeting	For information	15.2.9
Meeting Minutes	Within 5 Business Days after the date of the meeting	Review and comment	15.2.9
All specific reports and supporting documentation during acquisition process	1. Prior to Acquisition Package submission, Condemnation Package submission, and as often as requested by TxDOT 2. Final reports and supporting documentation to be provided with retirement of all acquisition, relocation, condemnation, and property management files	Approval	15.2.10
Project ROW Acquisition and Relocation Cost Summaries	Monthly	For information	15.2.10
Project ROW Status Reports	Monthly	For information	15.2.10

Table 15-1: Submittals to TxDOT

Submittals	Submittal Schedule	TxDOT Action	Reference Section
Project ROW Status Updates	Weekly or as requested	For information	15.2.10
Parcel Status	Monthly	For information	15.2.10
Subcontractor Status Report	Monthly or as requested	For information	15.2.10
TxDOTConnect compatible spreadsheet of Project ROW data	Monthly	For information	15.2.10
Completed closeout files	Within 90 days after the completed ROW parcel activity	Approval	15.2.11
Project ROW map	Part of the Acquisition Survey Document	Approval	15.3.1
Acquisition Survey Document	As part of any Acquisition Package	Approval	15.3.1
GIS Files	Concurrent with the Acquisition Survey Document and prior to submission of the first Acquisition Package and updates as needed	Approval	15.3.1.1
Monthly Parcel Report	Monthly	For information	15.3.2
Monthly Progress Report	Monthly	For information	15.3.2
ROW CAD Files	Prior to submission of the first Acquisition Package and updates as needed	For information	15.3.2
Title Reports, five-year sales history, copies of all underlying documents, plots of all easements	As part of Acquisition Packages	Approval	15.3.3
Title Policies	Within 45 days after closing	Approval	15.3.3, 15.4.3
Project ROW Property Owner List	After ROW Acquisition Management Plan approval	For information	15.3.4
TxDOT Introduction letter	After ROW Acquisition Management Plan approval	Approval	15.3.4
Appraisal Reports	Prior to submission of the first Acquisition Package, and as requested	Approval	15.3.5
Environmental Site Assessment Reports	As part of Acquisition Packages	Approval	15.3.5.1
Acquisition Packages	Prior to delivering the offer to each property owner	Approval	15.3.6
Administrative Settlement Submittals	As necessary	Approval	15.4.1
Relocation Assistance Submittals	As part of the respective parcel's Acquisition Package or separately	Approval	15.4.2
Relocation Plan	Within 90 days after NTP1, as part of a ROW Acquisition Management Plan update	Approval prior to commencement of Construction Work	15.4.2
Closing Submittals	Prior to closing	Approval	15.4.3
Condemnation Packages	Prior to TxDOT submission to TTC for a minute order	Approval	15.4.4.1
Updated Appraisals	As requested	Approval	15.4.4.2

Table 15-1: Submittals to TxDOT

Submittals	Submittal Schedule	TxDOT Action	Reference Section
Condemnation Support Submittals	Upon approval of condemnation package	For information	15.4.4.2
Photographs of properties/improvements to be demolished	Following acquisition or possession of any parcel and prior to demolition	For information	15.4.5
Documentation for disposal of improvements	Following acquisition or possession of any parcel	For information	15.4.5
Notification of abandoned personal property remaining in Project ROW	Following acquisition or possession of any parcel	For information	15.4.5
Notification of completion of demolition and clearance of Project ROW	Upon completion	For information	15.4.5
Payment Submittals	As necessary	Approval	15.4.6

Item 16
Geotechnical & Pavement

16.1 **General Requirements**

DB Contractor shall perform all investigations, testing, research, and analyses necessary to effectively determine and understand the existing surface and subsurface conditions within the Project ROW needed to carry out the Work.

DB Contractor shall ensure the geotechnical investigations and analyses are both thorough and complete, to provide accurate information for the design of roadways, pavements, foundations, structures, retaining walls, embankments, excavations, slopes, temporary special shoring, and other facilities that result in a Project that meet the requirements of the Contract Documents.

All geotechnical work shall be performed in accordance with the TxDOT *Geotechnical Manual* and the TxDOT *Pavement Manual*.

DB Contractor shall comply with the TxDOT *Pavement Manual* and this Item 16, for the pavement design and quality acceptance process. Where there is a conflict between the requirements of these documents, the requirements in these Design-Build Specifications shall take precedence.

16.2 **Geotechnical Investigation**

16.2.1 **Geotechnical Investigation for Pavement Design**

DB Contractor shall determine the specific locations, frequency, and scope of all subsurface investigations, testing, research, and analyses necessary to design a safe and reliable pavement foundation for the Project in accordance with TxDOT geotechnical requirements in the TxDOT *Pavement Manual* and this Item 16. DB Contractor shall take all soil borings within and along the proposed roadbed alignment, using the GPR data provided in the RIDs to determine boring locations. DB Contractor shall submit boring locations and traffic control plans prior to commencing any subsurface pavement investigations for review and approval. Traffic control plans shall be prepared in accordance with Item 26.

DB Contractor 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 work.

DB Contractor shall prepare and amend as needed its Geotechnical Engineering Reports documenting the assumptions, conditions, and results of the geotechnical investigation and analyses in accordance with the TxDOT *Pavement Manual*.

Each Geotechnical Engineering Report, upon completion and including any later supplements or amendments, shall be submitted to TxDOT for review and comment no later than 10 Business Days prior to commencement of the applicable Design Work.

DB Contractor shall submit the final Geotechnical Engineering Report and the Pavement Design Report to TxDOT for approval with the Released for Construction Documents no later than 10 Business Days prior to commencement of the applicable Construction Work. Each report shall be signed and sealed by a PE.

16.2.1.1 **Soil Testing Requirements**

DB Contractor shall use the TxDOT *Pavement Manual* and web soil survey maps to determine the frequency of subgrade soil survey exploration for use in determining plasticity index, liquid limit, moisture content, organic content, sulfate concentration, soil classification and calculating PVR (Tex-124-E) as it relates to pavement design. Borings shall terminate at the depth recommended in the PVR evaluation below the top of the proposed untreated subgrade elevation, and sampling shall be performed with Shelby tubes or a continuous sampler system.

DB Contractor shall develop the scope of testing and the evaluation for analyzing the subgrade and existing pavement structure to supplement the Pavement Design Report. DB Contractor shall use the TxDOT test procedures in Table 16-1 to characterize the subgrade soils or borrow material for pavement design:

Table 16-1: Soil Exploration & Testing

Testing	Properties
Dynamic Cone Penetrometer (DCP) (ASTM D6951)	Stiffness, estimated back calculated subgrade modulus
Falling Weight Deflectometer (FWD)	Modulus of elasticity (stiffness)
Soil Classification (Tex-103-106-E, Tex-110-E, Tex-142-E)	Moisture content, plasticity, particle distribution, percent binder and soil classification
Soil Mineralogy (Tex-145-E, Tex-148-E, Tex-128-E)	Sulfate content (ppm), organic content (%), and pH levels
Soil Treatment Design (Tex-120-E, Tex-121-E, Tex-127-E)	Target stabilizer content, compressive strength, max. dry density, and optimum moisture content

16.2.1.2 **PVR Requirements for Rigid and Flexible Pavement**

DB Contractor shall design the new pavement to have a PVR no greater than 1.5 inches for mainlanes and 2.0 inches for non-mainlane pavements as calculated in accordance with TEX-124-E.

DB Contractor shall calculate PVR using the Excel workbook in Tex-124-E and the default empirical volumetric swell curves in Tex-124-E or alternatively, by directly determining the percent volumetric swell for the in-situ soil column by measuring the volumetric swell properties at the associated depth and load (effective stress) of each soil strata in the soil column, in accordance to ASTM D4546. DB Contractor shall calculate PVR for a soil column 10 feet deep as measured from the top of the proposed untreated natural subgrade elevation.

If the PVR of the in-situ conditions exceed the maximum allowable levels, DB Contractor shall determine the depth of mitigation required to comply with PVR requirements. Any mitigation measures shall take into account fluctuations of the water table. At a minimum, DB Contractor shall utilize the following mitigation measures which may be used independently or in combination:

- Where chemical soil treatment is used, it shall be in accordance with TxDOT's Guidelines for Modification and Stabilization of Soils and Base for Use in Pavement Structures. Only material meeting the definition of treated subgrade or treated subbase in Section 16.3 shall be used to provide a permanently treated subgrade.
- Undercut, remove and replace expansive soils with select fill subbase. Only material meeting the definition of select fill subbase in Section 16.3 shall be used; all other unbound materials used as a pavement layer that do not meet this definition shall be considered untreated subgrade/embankment.

Adopting mitigation measures does not excuse DB Contractor from meeting Performance Requirements set forth in Section 27.3.

16.2.2 **Geotechnical Investigation for Other Elements**

The subsurface investigation shall include, but not be limited to, soil borings, test pits, rock coring and pavement coring. DB Contractor shall determine the specific locations, frequency, and depth of test holes in accordance with the guidelines in the TxDOT *Geotechnical Manual*. The scope of the subsurface geotechnical investigations shall include field and laboratory testing, research, and analysis that DB Contractor considers necessary to provide a safe and reliable roadway, embankment and cut slopes, bridge foundations, noise and sign structures, drainage structures, temporary and permanent retaining walls, excavation support systems, and any other facilities for the Project.

DB Contractor shall ensure the depth of the test hole is adequate for the anticipated structure foundation type and loading, excavation depths, and scour.

DB Contractor shall ensure that the groundwater monitoring methods and durations are adequate to determine groundwater levels and their impacts on the design and construction. DB Contractor shall employ field investigation measures that avoid groundwater contamination and shall be responsible for all mitigation and/or restoration associated with the geotechnical investigations.

DB Contractor shall prepare and amend, as needed, its Geotechnical Engineering Reports documenting the assumptions, conditions, and results of the geotechnical investigation and analyses, including the following:

- The geology of the Project area, including soil and/or rock types, and drainage characteristics.

- Descriptions of field investigations and laboratory test results used to characterize subsurface conditions. Boring logs shall be provided including descriptions of the soil/rock, Texas Cone Penetration test results, in-situ test results, and percent recovery and RQD for rock cores. TxDOT log form 513 shall be used as required by the TxDOT *Geotechnical Manual*.
- Laboratory testing shall include moisture content, plasticity index, gradations for each major soil strata change, levels of shrink/swell potential, soil corrosivity, soil compressibility, compaction characteristics (Proctor tests), and properties in accordance with TxDOT and ASTM geotechnical testing standards. Other field exploration and laboratory testing shall be performed as appropriate.
- A discussion of surface and subsurface site conditions and testing results with reference to specific locations on the Project.
- Design and construction parameters resulting from the geotechnical investigation and analysis.
- Discussions of structure foundation type selection considerations including suitability of subsurface conditions anticipated loads, scour, and construction staging. As required by the TxDOT *Geotechnical Manual*, bridge foundations shall consist of either drilled shafts or piling.
- Geotechnical analyses for foundations of drainage structures, bridge structures, noise and sign structures, retaining walls, sound walls and embankments. The analyses shall include recommended bearing strata, deep foundation length and evaluations of bearing capacities and predicted settlements.
- Slope stability analyses for embankment and excavation, including roadway section, 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 all slopes and retaining walls 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, as well as the possibility of rapid drawdown and specific recommendations shall be provided to minimize their occurrence.
- Evaluation of applicable retaining wall types including design and constructability considerations. Both temporary and permanent retaining walls shall be evaluated. DB Contractor shall ensure the design retaining walls are evaluated in accordance with the TxDOT *Geotechnical Manual* and the associated TxDOT Standards for the wall type considered. Analyses of global stability for each retaining wall shall be performed to ensure the minimum factors of safety for global stability required by the TxDOT *Geotechnical Manual* have been achieved.
- Quantitative settlement analyses are intended to predict the post-construction settlements at the finished ground surface. These analyses shall consider both total and differential settlements. Quantitative settlement analyses shall 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 shall consider, but not be limited to, primary consolidation, secondary compression, hydro-compression, and expansion. Settlement analyses shall be performed for all approach embankments to grade separation and other bridge structures.
- Recommendations for instrumentation and monitoring of settlement, stability, vibrations, etc. during construction as required to achieve safe and reliable construction staging and to ensure safety of existing facilities and travelling public.
- Plan view of field sampling locations (field test plan), boring logs and other field data, laboratory test results, calculations, and analyses that support design decisions.

The report shall:

- Document that adequate investigation, testing, analysis, design, mitigating measures and construction planning are applied to assess and provide for the effects of swell pressures from expansive soil and rock materials on foundations, pipes, and earth retaining structures.
- Provide design and construction parameters derived from geotechnical investigations for the design of structure foundations, pipes, pavements, slopes, embankments, detention ponds and earth retaining structures

- 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.

16.3 Pavement Materials Requirements

DB Contractor shall incorporate the following requirements into the pavement designs, plans, quality control and quality assurance programs, and the field construction procedures. DB Contractor shall conduct all Work in accordance with the requirements of this Item 16 and TxDOT Standard Specifications.

The DB Contractor shall also conduct all Work for this Item 16 in accordance with the following modifications to the TxDOT Standard Specifications:

- **Item 314**:
  - Emulsified asphalt, not less than 2 percent of the total mixture, shall be used in the final flexible base finishing process.
- **Item 316:**
  - When using latex asphalt, DB Contractor shall avoid drifting of asphalt onto traffic and adjacent properties.
  - DB Contractor shall ensure that the asphalt for precoating the aggregate and the asphalt used for the surface treatment will not result in a reaction that may adversely affect the bonding of the aggregate and asphalt during the surface treatment operation.
  - DB Contractor shall not add bag house fines in the production of precoated material.
  - DB Contractor shall clean all concrete curbs, islands, medians, etc. that get coated with asphalt.
- **Items 340 & SS3076**
  - When the Texas Gyrator Compactor is utilized, DB Contractor shall design all mixture types using a target laboratory-molded density of 96.5%. The target laboratory-molded density may be increased to 97.0% or 97.5% in the field.
  - When utilizing SGC, DB Contractor shall design all mixture types at 50 gyrations (N-Design) and a target laboratory-molded density of 96.0%. Gyrations may be reduced to no less than 35 in the field.
- **Items 340, 342, 346, 347, 348, SS 3076 & 3077:**
  - Table 10 in SS 3076 and Table 11 in SS 3077: Tex-242-F Hamburg Wheel Test Requirements for PG 64-22 or lower and PG 70-22 shall be as follows: Minimum number of passes at 1/2" Rut Depth, tested at 122 degrees F will be 5,000 and 10,000 respectively.
  - Crushing of aggregate for hot mix and immediate use for production of the mix is not allowed. DB Contractor shall stockpile the aggregate until enough material is available for five days of production.
  - DB Contractor shall not use diesel or solvents as asphalt release agents in production, transportation, or construction. A list of approved asphalt release agents is available from the District Laboratory.
  - The use of Recycled Asphalt Shingles (RAS) will not be allowed on the final riding surface.
- **Items 340, SS 3076 & 3077**
  - DB Contractor shall place mixture when the roadway surface temperature is equal to or higher than listed in Table 16-2 when measuring the roadway surface temperature with a hand-held thermal camera or infrared thermometer. Placement may begin prior to the roadway surface reaching the required temperature if conditions are such that the roadway surface will reach the required temperature within 2 hrs. of beginning placement operations.

Table 16-2: Minimum Pavement Surface Temperatures

	Minimum Pavement Surface Temperatures in Degrees Fahrenheit *	
High Temperature Binder Grade	Subsurface Layers or Night Paving Operations	Surface Layers Placed in Daylight Operations
PG 64	45	50
PG 70	55	60
PG 76	60	60

* Except for PG 64, DB Contractor may pave at temperatures 10º F lower than the values shown in Table 16-2 when utilizing a Material Transfer Vehicle that is capable of providing a remixing, and continuous flow of material from the haul truck to the paver, such as a Roadtec SM-2500e/ex, that eliminates thermal segregation. In these cases, use either an infrared bar attached to the paver, or a hand held thermal camera or infrared thermometer, or a hand held infrared thermometer operated in accordance with Text Method 244-F to demonstrate that the uncompacted mat has no more than 10º F of thermal segregation.

- DB Contractor may use a substitute PG binder listed below in Table 16-3 instead of the PG binder originally specified in Table 5 of the Standard Specification, if the substitute PG binder and mixture made with the substitute PG binder meet the following:
  - The substitute binder meets the specification requirements for the substitute binder grade in accordance with Section 300.2.10., "Performance-Graded Binders;"
  - The mixture has less than 10.0 mm of rutting on the Hamburg Wheel test (Tex-242-F) after the number of passes required for the originally specified binder. Use of substitute PG binders may only be allowed at the discretion of the Engineer if the Hamburg Wheel test results are between 10.0 mm and 12.5 mm, and
  - The substitute binder may not lower the PG binder for the surface mixture below 70-22.

Table 16-3: Allowable Substitute PG Binders and Maximum Recycled Binder Ratios

Originally Specified PG Binder	Allowable Substitute PG Binder for Surface Mixes	Allowable Substitute PG Binder for Intermediate and Base Mixes	Maximum Ratio of Recycled Binder[1] to Total Binder (%)		
			Surface	Intermediate	Base
76-22[4,5]	70-22	70-22	10.0	20.0	25.0
70-22[2,5]	N/A	64-22	10.0	20.0	25.0
64-22[2,3]	N/A	N/A	10.0	20.0	25.0
76-28[4,5]	70-28	70-28	10.0	20.0	25.0
70-28[2,5]	N/A	64-28	10.0	20.0	25.0
64-28[2,3]	N/A	N/A	10.0	20.0	25.0

1. Combined recycled binder from RAP and RAS. RAS is not permitted in surface mixtures .
2. Binder substitution is not allowed for surface mixtures.
3. Binder substitution is not allowed for intermediate and base mixtures.
4. Use no more than 10.0% recycled binder in surface mixtures when using this originally specified PG binder.
5. Use no more than 20.0% recycled binder when using this originally specified PG binder for intermediate mixtures. Use no more than 25.0% recycled binder when using this originally specified PG binder for base mixtures.

- **Item 342, 347 & 348**
  - Aggregate soundness values shall not vary by more than eight (8) percent between Surface Aggregate Class (SAC) A and B. This applies to all aggregate sources in each mix. The soundness value shall be dictated by BRSQC. The eight (8) percent shall be based on reported catalog values.

16.3.1 Subgrade Material Composition

DB Contractor shall analyze subgrade material composition and perform necessary construction procedures to address the following subgrade soil limitations.

- **Sulfate Content.** DB Contractor shall mitigate soluble sulfate induced heave by reducing soluble sulfate concentration to a level under 3000 ppm. DB Contractor shall follow Tex-145-E for measuring sulfate contents. When quantities of soluble sulfates detected are greater than 3000 ppm, DB Contractor shall determine the source of the sulfates and whether there are even greater concentrations in the general proximity or that would be created when materials are pulverized in and surrounding the sampled location. DB Contractor shall use the TxDOT *Guidelines for Treatment of Sulfate-Rich Soils and Bases in Pavement Structures* and Items 260, 265 and 275 of the TxDOT Standard Specifications for testing and detection and integrate these procedures with construction practices.
- **Organic Content.** DB Contractor shall evaluate subgrade soils for organic content using Tex-148-E and in accordance with general guidelines given in Chapter 3 of the TxDOT *Pavement Manual*, considering soil variability within the Project limits. If the organic content of the soils is greater than 1%, DB Contractor shall stabilize the subgrade as follows:
  - If cement is selected as the treatment for subgrade in accordance with Table 16-4, DB Contractor shall modify the treatment to lime-cement combination; or
  - If any other treatment for subgrade is selected, DB Contractor shall increase the chemical stabilizer 1%.
- **Density Control.** Subgrade layer shall be compacted using density control only.

16.3.2 Select Fill Material

For all embankment areas, DB Contractor shall furnish Type A (Density Control) fill material.

16.3.3 Treated Subgrade

DB Contractor shall meet the requirements of Tex-121-E, Part I to determine a target lime content to achieve a minimum unconfined compressive strength (UCS) shall be 50 psi and Part III to verify the target lime content achieves a pH of 12.4.

DB Contractor shall meet the requirements of Tex-120-E, Part I to determine a target cement content to achieve a minimum USC of 50 psi.

DB Contractor shall meet the requirements of Tex-127-E to determine a target lime fly ash content.

Any subgrade that does not conform to these treatment requirements shall not be included in the pavement design. To use the treated layer as part of the proposed pavement structure DB Contractor shall use the TxDOT Material and Tests Division's *Treatment Guidelines for Soils and Base in Pavement Structures*.

For rigid pavements, the treated subgrade shall extend a minimum 2 feet outside the edge of pavement, including shoulders, on each side to provide a stable area for the paving equipment.

The treated subgrade shall be compacted using density control only.

For fill, at grade, and cut sections, if the proposed structural pavement section exceeds the project PVR requirements in Section 16.2.1.2, then DB Contractor shall stabilize the moisture conditions in the pavement structure by extending the treated subgrade to at least four feet beyond the edge of the pavement.

16.3.4 Treated Base

Treated base may be modified with cement, lime, lime-fly ash, or asphaltic binders.

Base materials to be treated shall meet the specifications for the type and grade specified in accordance with TxDOT Standard Specification *Item 247* and shall meet the requirements set forth in the applicable TxDOT Standard Specification for the selected stabilizer.

Subgrade treatment shall be in accordance with the TxDOT Material and Tests Division's *Treatment Guidelines for Soils and Base in Pavement Structures*. DB Contractor shall use Table 16-4 for selecting subgrade treatments.

Table 16-4: Selecting Base Treatments

PI	Stabilizer Option
<12	Cement, Cement-asphalt, Lime-asphalt, Asphalt, or Fly ash (CS)
>12	Lime, Cement-asphalt, Lime-asphalt, Lime-fly ash (FS), or Cement

When cement is used to treat the base materials, DB Contractor shall designate a target cement content and optimum moisture content necessary to produce a stabilized mixture that meets the strength requirements and moisture susceptibility requirements shown in Table 16-5.

Table 16-5: Requirements for Cement Treatment

Description	Minimum	Maximum
Cement Content (by dry weight of base)	2%	5%
7-Day Unconfined Compressive Strength (min.)*	Tex-120-E, Part I	150 psi
Retained Strength after Moisture Conditioning (min.)	Tex-120-E, Part I (10 day capillary soak)	80% of 7-Day Unconfined Compressive Strength

*Microcracking is required in accordance with TxDOT Standard Specification Item 275.4.7.

When lime is used to treat the base materials, DB Contractor shall determine the required lime content using Tex-121-E, Part I to achieve a minimum UCS of 150 psi.

When lime-fly ash is used to treat the base materials, DB Contractor shall determine the required lime-fly ash content using Tex-127-E.

When asphalt is used to treat the base materials, DB Contractor shall determine the required asphalt content using Tex-126-E and an approved TxDOT Standard Specification.

For rigid pavements, the treated base shall extend a minimum 2 feet outside the edge of pavement to provide a stable area for the paving equipment.

Treated base layers shall be compacted using density control.

For fill, at grade, and cut sections, if the proposed structural pavement section exceeds the project PVR requirements in Section 16.2.1.2, then DB Contractor shall stabilize the moisture conditions in the pavement structure by extending the treated base and subbase for at least four feet beyond the edge of pavement.

16.3.5 Tack Coat

For flexible pavements, DB Contractor shall place a non-tracking tack coat (Tracking Resistant Asphalt Interlayer (TRAIL)) between hot-mix asphalt (HMA) pavement layers and directly beneath the final surface course in accordance with Special Specification Item 3085. TRAIL material used on the Project must be a pre-approved product from the TxDOT Material Producer List.

16.3.6 Surface Mix Type

Where flexible pavement structures are used, the mainlane surface mix shall be either PFC or TBPFC meeting Standard Specification Items 342 or Item 348. An impermeable dense graded SMA Type D intermediate layer meeting Standard Specification Item 346 shall be used directly beneath the surface mixture with a minimum layer thickness of 2.0 inches. DB Contractor's surface mix selection (PFC or TBPFC) for flexible pavement mainlanes shall be consistent for the limits of the Project with the exception of overlays on bridge structures. Where an overlay on bridge structures is required, the surface mixture shall be SMA.

The frontage road/cross street/u-turn surface mix shall be Superpave meeting Special Specification Item 3077.

DB Contractor shall obtain components for the surface mix material from a vendor listed at http://www.txdot.gov/business/resources/producer-list.html.

The performance-graded asphalt binder in the asphalt mixture directly beneath the surface mixture shall have the same high temperature performance grade as the asphalt surface layer.

16.3.7 **Underseal**

DB Contractor shall place an underseal course over any milled surface prior to all HMA overlays. For a surface of PFC, the underseal shall use a seal coat meeting Items 316 of the Standard Specifications. For TBPFC, the underseal shall be in accordance with Item 348. All other underseals shall comply with Special Specification 3085.

DB Contractor shall place a prime coat complying with TxDOT Standard Specification Item 310 to any untreated or treated flexible base layer.

When placing any hot mix asphalt directly on concrete pavement, DB Contractor shall place an underseal consisting of a seal coat using either Asphalt Rubber (AR) or AC20-5TR meeting Item 300 and Item 316 of the TxDOT Standard Specifications.

16.3.8 **Final Surface**

When HMA is used, level up shall not be considered part of the final surface course thickness.

16.4 **Design**

16.4.1 **New Pavement**

16.4.1.1 **Design Traffic Considerations**

The corridor traffic data has been provided in the RIDs and shall be deemed a minimum acceptable traffic volume and composition to be used by DB Contractor for the purpose of pavement design for the mainlanes and ramps. DB Contractor is responsible for determining appropriate traffic to be used as a minimum for the design of detour, temporary, cross street, frontage road, and driveway pavements. DB Contractor shall not be entitled to rely on the corridor traffic data the RIDs for the purpose of meeting the Performance Requirements of these DB Specifications or the CMA. The final pavement design shall be a DB Contractor risk regardless of whether the actual traffic volume and composition exceeds that identified in the RIDs.

16.4.1.2 **Subgrade Considerations**

For flexible pavement, DB Contractor shall be responsible for determining the design back calculated modulus value for subgrade using FWD testing.

For CRCP, DB Contractor will select the subgrade classification based on soil classification testing for the input in the design program. The subgrade K value for the inputted subgrade classification is hard-coded in the design program.

The IQF shall ensure the Final Design subgrade modulus is achieved during construction using methods in Section 16.5.

16.4.1.3 **Pavement Type Requirement**

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

16.4.1.3.1 Mainlanes

Continuously Reinforced Concrete Pavement (CRCP) shall be used for the new mainlane pavement. The pavement shall have minimum thicknesses shown below in Table 16-6:

Table 16-6: Minimum New Mainlane Pavement Thicknesses

Pavement Location		**SL-1604**		**I-410**	
Service Life (years)		30			
Material Type	**TxDOT Item**	**Material Thickness, Inches**			
		Opt. 1	**Opt. 2**	**Opt. 1**	**Opt. 2**
CRCP	360	12.0	13.0	13.0	13.0
DG HMA[1] Type D (PG 64-22)	SS3076	1.5	-	1.5	-
DG HMA[1] Type B (PG 64-22)	SS3076	-	4.0	-	4.0
Cement Treated Base[2]	275	6.0	-	6.0	-
Lime-Treated Subgrade[2]	260	-	12.0	-	12.0
Estimated[3] PVR, inches		≤2.5		≤2.75	

1. A Tack Coat (TxDOT Standard Specification Item 300) should be applied between each lift of HMA.
2. Prime coat [MC-30 or AEP (asphalt emulsion prime)] (Item 310) should be placed above cement treated base and lime treated subgrade layers.
3. The above pavement designs have not considered PVR mitigation.

16.4.1.3.2 Ramps

For ramps connecting mainlanes with elevated lanes, pavements shall be constructed with the same section (materials and depths) as the adjacent mainlane pavement.

For ramps connecting frontage roads with mainlanes or elevated lanes, pavements shall be constructed with the same section (materials and depths) as the adjacent frontage road pavement.

16.4.1.3.3 Frontage Roads, Cross Streets, U-turns and Park & Ride #4

A flexible pavement structure shall be used for the new frontage road, cross street, u-turn and Park & Ride #4 pavement. The pavement shall have minimum thicknesses as shown below in Table 16-7:

Table 16-7: Minimum New Frontage Road, Cross Street, U-turn and Park & Ride #4 Pavement Thicknesses

Pavement Location	**I-35**		**I-410, S. of IH-35**		**I-410, N. of IH-35**		**SL-1604**	
Service Life (years)	20							
Material Type	**Material Thickness, Inches**							
	Opt. 1	Opt. 2	Opt. 1	Opt. 2	Opt. 1	Opt. 2	Opt. 1	Opt. 2
HMA[1,3]	9.0	15.0	8.0	15.0	8.5	14.0	7.5	15.0
Prime Coat	Yes							
Flexible Base	6.0	-	6.0	-	6.0	-	6.0	-
Treated Subgrade	12.0	-	12.0	-	12.0	-	12.0	-
Estimated[2] PVR, inches	≤4.0	≤4.5	≤3.0	≤3.25	≤3.0	≤3.5	≤2.5	≤3.0

1. A Tack Coat (TxDOT Standard Specification Item 300) shall be applied between each lift of HMA.
2. The above pavement designs have not considered PVR mitigation.
3. The surface layer HMA material must comply with Section 16.3.6. Lower layer HMA material types are at the discretion of the DB Contractor so long as the requirements of this Item 16 and the TxDOT Pavement Manual are met.

Park & Ride #4 pavement shall match the I-35 frontage road pavement.

TxDOT form 2088 will be required when determining the minimum Surface Aggregate Classification of the final surface.

16.4.1.3.4 Shoulders

Pavement for the shoulders of all roadways shall be the same section (materials and depths, including treated subgrade) as the adjacent roadway pavement.

16.4.1.3.5 Driveways

For replaced driveways, pavement type (flexible or rigid) shall match the type of the existing driveway being replaced. For new driveways, pavement type shall be rigid (concrete).

Concrete driveways shall be a minimum of 6 inches of High Early Strength (HES) concrete using #4 rebar reinforcement at 12" X 12" spacing.

16.4.1.4 **Required Pavement Design Reports**

The pavement designs developed by DB Contractor shall be signed and sealed by a PE.

In addition to those requirements in the TxDOT *Pavement Manual*, Pavement Design Report(s) shall document the assumptions, considerations, and decisions contributing to DB Contractor's pavement designs, including the following:

- Pavement design details by location, including structural layer materials, general specifications, and thicknesses;
- Basic life-cycle cost considerations as described in Chapter 2 of the TxDOT *Pavement Manual*. Use an LCCA tool that allows for input of essential cost items; at a minimum consider future maintenance, resurfacing, reconstruction and other rehabilitation measures, describing what these activities are likely to entail. Do not include user costs.
- Relevant pavement evaluation data (structural and functional) and condition information on adjacent roads; include analysis of the GPR data provided by TxDOT in the RIDs;
- Site conditions which might influence the design and performance of pavements;
- Relevant geotechnical data and drainage requirements, including boring logs, laboratory soil test results, and active or passive drainage system design;
- Design criteria used in determining the pavement design(s), including traffic loads, pavement material characterization, environmental conditions, and pavement design life;
- Form 2088 as part of flexible pavement design only for determining the appropriate Surface Aggregate Classification (SAC) of the aggregate used for the final HMA riding surface
- Other considerations used in developing the pavement design(s), including subgrade preparations and stabilization procedures; and
- Description for selection of material types and grades.

DB Contractor shall include the proposed permanent, detour, temporary, transition pavement (from concrete to flexible) and rehabilitated pavement designs for the Project in its Final Design and shall indicate the applicable roadway and station limits for each pavement design. DB Contractor shall provide a tabulation of all pavement design software input values for each pavement layer, falling weight deflectometer (FWD) data, or other basis for the pavement thickness designs, and include station limits.

16.4.1.5 **Flexible Pavement Design Requirements**

DB Contractor shall use FPS 21 software as the sole design methodology for flexible pavements. DB Contractor shall check all pavement thickness designs using the Modified Texas Triaxial design method, and other analyses methods necessary to prevent premature failure from subgrade rutting and fatigue. DB

Contractor shall use design values recommended by the TxDOT *Pavement Manual*, Chapter 5 except as noted below.

16.4.1.5.1 **Minimum Layer Thickness**

Minimum layer thickness for all unbound materials used in flexible pavement designs shall be 6.0 inches.

16.4.1.5.2 **Pavement Design Life**

DB Contractor shall use 30 years for mainlane flexible pavement types and 20 years for frontage road flexible pavement types.

16.4.1.5.3 **Minimum Time to First Overlay**

DB Contractor shall use 15 years for all perpetual flexible pavement designs and 20 years for all non-perpetual flexible pavement designs.

16.4.1.5.4 **Reliability Level**

DB Contractor shall use Level C (95%) for flexible pavement designs.

16.4.1.5.5 **Design Moduli**

Design moduli shall not exceed the maximum values in Table 16-8, as established from methods and criteria stated below, and in accordance with layer thickness specified in Table 16-8.

Table 16-8: Design Structural Values for HMA Pavements

Material Type	TxDOT Standard Specifications	Modulus for TxDOT FPS 21
Dense-Graded HMA	Special Specification (SS) 3076	Combined HMA thickness: ≤ 4.0" use 500 ksi 4.0" < T ≤ 8.0" use 650 ksi > 8.0" use 850 ksi
PFC	Item 342	300 ksi
Superpave Mixtures	SS 3077	Combined HMA thickness: ≤ 4.0" use 650 ksi 4.0" < T ≤ 6.0" use 750 ksi > 6.0" use 850 ksi
SMA	Item 346	Same as SS 3077
TOM	Item 347	TOM-C: 650 ksi TOM-F: 500 ksi
Thin Bonded Friction Courses	Item 348	TBWC-C: 650 ksi
Flexible Base (Unbound Base)	Item 247, Grades 1-2 or 5	50 ksi
Treated Base	Item 260	*65 ksi
	Item 265	*65 ksi.
	Item 275, 276	*130 ksi
	Foam or Emulsion	*230 ksi
	Item 292	*400 ksi
Treated Subgrade or Subbase	Item 314	*20 ksi
	Item 260	*3 times the modulus of the subgrade **
	Item 275	*40 ksi**
Natural Subgrade	Existing	Back-Calculated. Value should not be larger than 25 ksi

* Maximum design values.
**Minimum modulus value for perpetual pavement design must be 35 ksi

16.4.1.6 **Rigid Pavement Design Requirements**

DB Contractor shall use the design procedures outlined in the TxDOT *Pavement Manual* as the design methodology for all rigid pavement design. TxCRCP-ME is the required design procedure for CRCP and the 1993 AASHTO Guide for Design of Pavement Structures is the approved design method for CPCD. DB Contractor shall use design values recommended by the TxDOT *Pavement Manual*, Chapter 8, and the TxDOT Standard Specifications for joint and reinforcement design. CRCP design will require a maximum of 10 punch outs per mile. DB Contractor shall select one of the two base layer combinations in the TxDOT *Pavement Manual*, Chapter 8.

Pavement Design Life: DB Contractor shall use a 30 year pavement design life for all rigid pavement types and locations.

For CRCP design: DB Contractor shall use 570 psi for the 28-day modulus of rupture for concrete.

The maximum modulus of base layer shall be 500 ksi for cement treated base (CTB) and 400 ksi for asphalt treated base (ATB) or HMA.

16.4.2 **Reserved.**

16.4.3 **Resurfaced Pavement Areas**

The Project includes areas of pavement, the maximum extents of which are defined within Exhibit 1 to the DBA as the "Resurfaced Pavement and Base Repair Areas", within which DB Contractor may retain some or all of the existing pavement cross section in place, provided that:

- A new surfacing course be provided meeting or exceeding the smoothness requirements of Section 16.5.2;

- The resurfaced pavement design meets or exceeds the design criteria specified in Section 16.4.3.1 below.

Within the resurfaced pavement areas, the DB Contractor shall construct up to 75,000 square yards of full-depth (10-inch) pavement base repair for the mainlanes and 133,000 square yards of full depth (8-inch) pavement base repair for the ramps and frontage roads. The minimum extents of base repair are defined within Exhibit 1 to the DBA and depicted in RID Exhibit "Resurfaced Pavement and Pavement Base Repair Areas".

During the implementation phase, TxDOT will confirm any additional areas of pavement base repair, provided that the total area of base repair work does not exceed the total square yardage amount specified above. The timing of the pavement base repairs will be based on DB Contractor's construction sequencing. DB Contractor is responsible for maintaining the existing pavement—which includes Resurfaced Pavement and Base Repair Areas—in accordance with Item 27. DB Contractor shall meet the smoothness requirements in Section 16.5.2 at Substantial Completion.

16.4.3.1 Resurfaced Pavement Areas Design Criteria

In the resurfaced pavement areas, DB Contractor shall meet or exceed the following criteria:

- With the exception of areas on concrete bridges, the milling depth shall be based on an analysis of the GPR data provided in the RIDs, the results of which shall be included in the Pavement Design Report.
- For milling of asphalt on concrete bridge structures, the existing asphalt shall be milled down to 0.5 inches.
- Overlay materials shall be in accordance with Section 16.3.6 as follows:
  - PFC/TBPFC on top of 2" SMA (Type D) for mainlane (with the exception of concrete bridge structures),
  - 1.5" SMA (Type D) on the 0.5" of existing asphalt (2" overall) on concrete bridge structures, and
  - Superpave for frontage roads.
- With the exception of bridge decks and bridge transitions, thicknesses for overlay sections shall be equal to the milling depth. Layer thicknesses not specified above shall be in accordance with the applicable TxDOT Standard Specification or Special Specification Item for the surface mix selection. If the overlay thicknesses dictated by the applicable TxDOT Standard or Special Specification are greater than the milling depth indicated by the GPR data, the milling depth shall be increased to order to maintain the existing vertical profile.
- Bridge deck overlays shall be 2" (0.5" of existing asphalt and 1.5" of new SMA-D, as described above). DB Contractor shall utilize a 50:0 taper mill to level-up on bridge transitions.
- Park & Rides #1, #2, and #3 shall have a Superpave overlay consistent with the overlay constructed on the frontage roads.
- Both the 10-inch and 8-inch base repair pavement sections shall consist of HMA Type B (PG 64-22) complying with Special Specification (SS) 3076. The surface layer materials in base repair areas shall be as required for the overlay sections described above.

16.4.4 Use of Shoulders to Carry Construction Traffic

DB Contractor shall perform a structural evaluation of all shoulders proposed to carry mainlane traffic during construction utilizing FPS 21. DB Contractor shall use the non-destructive testing and field sampling described above for this structural evaluation. The pavement design report shall include the results of a shoulder evaluation.

16.4.5 Pavement Widenings

For widening of existing pavement sections, DB Contractor shall provide documentation of criteria and rationale for the construction approaches selected to widen sections. Pavement type selection for widenings (flexible or rigid) shall match the type of the existing pavement that is being widened. DB Contractor shall comply with the TxDOT Pavement Manual, historical performance, and TxDOT District guidelines when designing the widened sections and selecting construction approaches. If DB Contractor's pavement design of the widened section does not match the existing travel lane section, DB Contractor shall submit an

analysis to address concerns about blocking subsurface moisture flow and to minimize the risk of failure of the construction joint between the different pavement structures.

For widened section areas that will be used as a travel lane, DB Contractor shall develop a full pavement design report for that lane following the guidelines given in the pavement design section.

Longitudinal construction joints along the existing and new pavement sections shall be placed within six inches from the final in-service lane stripe or the center of the lane. Geotextiles or stress absorbing membrane interlayer (SAMI) may be placed over the widening joint to delay reflective cracking prior to performing asphalt overlays only.

For all widened sections, the interface between the new widened pavement and the existing pavement shall provide a uniform surface of the same material type across all adjacent lanes. In areas where an existing asphalt surface is in place and widening is required, a new surface course overlay will be required over the existing and widened pavements, with the surface HMA longitudinal joint offset from the underlying layers' longitudinal joint by at least 6 inches.

16.5 Construction Quality

The IQF shall perform independent material testing, inspection, and audits of the CQMP.

When performing construction activities under or adjacent to existing structures or Utilities, DB Contractor 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, DB Contractor shall coordinate excavation activities with Item 13 and Item 14. For those occurrences involving TxDOT's structures and Utilities, DB Contractor shall coordinate excavation activities with TxDOT.

All testing required in the TxDOT Standard Specifications and the Guide Schedule of Sampling and Testing for DB Projects by the IQF (DB Guide Schedule) shall be conducted for each pavement layer, except where superseded by these Design-Build Specifications. DB Contractor shall also ensure that the design assumptions are met by the testing requirements described in this Section 16.5.

16.5.1 Field Verification of Design Subgrade Modulus for Flexible Pavement

The IQF shall perform the following field testing.

16.5.1.1 100% Coverage Testing

The following two options are permitted for coverage testing of the compacted subgrade (both treated and untreated) layer. For untreated subgrade, the IQF shall complete the testing within 24 hours of the completion of compaction. On treated subgrade layers, the IQF shall allow the compacted material to cure a minimum of three (3) days before testing.

Option 1 Proof Rolling: IQF shall follow the requirements of Item 216 of the TxDOT Standard Specifications. All areas which are determined as unstable or that rut more than 0.5 inch shall be considered as failures and require corrective action.

Option 2 Intelligent Compaction (IC): to be performed on top of the compacted subgrade or treated subgrade. The IQF shall develop a color-coded "proof-mapping" chart in accordance with criteria listed in Table 1 from TxDOT *Special Specification* 2304 provided in the RIDs. Red-mapped areas constituting locations not achieving at least 25% of the Intelligent Compaction Measured Value (ICMV) shall be further evaluated by the IQF with the DCP to determine depth of weak material for corrective action.

16.5.1.2 Point Specific - Testing

When using proof rolling, the IQF shall perform one DCP test in accordance with ASTM D6951 for every 250-linear foot section of roadbed to estimate M_R. The IQF shall use ASTM D 3665 to select one random location for each 250-foot section. All locations shall be greater than 1 foot from the future edge stripe.

When using proof-mapping IC data of the compacted layer, the IQF shall perform one DCP test in accordance with ASTM D6951 for every 250 linear foot section of roadbed for those locations classified as "red-mapped," or as directed by TxDOT. The IQF shall perform one DCP test for every 1000-linear foot section of roadbed for non-"red-mapped" locations. The IQF shall use ASTM D 3665 to select one random location for each test section. All locations shall be greater than 1 foot from the future edge stripe.

The process for the IQF shall be as follows:

- Perform DCP tests to a depth of 3 feet. If a test location meets refusal, then select an alternate location within 2 to 5 feet to begin a new test. Refusal is defined as slow or no penetration progress where the penetration rate is less than 1 inch in a 10-blow set anywhere within the top 1 foot of subgrade material. If refusal is met after penetrating at least 1 foot, then the results to the depth of refusal shall be used.
- Convert the DCP data for each test to an estimated M_R for each 6-inch interval of penetration using the equations given in the TxDOT *Pavement Manual*.
- Compare M_R for each 6-inch interval of penetration in the section to the design value.
- If M_R for each 6-inch interval of penetration in the section meets or exceeds the design value, then review proof rolling. If proof rolling passes, then accept section.
- If no estimated M_R result for any 6-inch interval of penetration is below 50% of the design value, take the average of results for all 6-inch intervals and compare to design value. If the average M_R for all intervals is computed to be higher than the design value, then accept the section provided proof rolling passes. If the computed average is less than the design value, perform two additional DCP tests (one on either side) 10 feet longitudinally from the original test to determine the extent of the weak area. Continue testing at additional 10-foot increments until results no longer show weakness. DB Contractor shall determine a course of action to correct the weak areas. The IQF shall reevaluate following DB Contractor's corrective action.
- If M_R for any 6-inch interval of penetration in the section is below 50% of design value, take two additional DCP tests (one on either side) 10 feet longitudinally from the original test to determine the extent of the weak area. Continue testing at additional 10-foot increments until results no longer show weakness. DB Contractor shall propose options to address these failed areas. The IQF shall reevaluate following DB Contractor's corrective action.

If corrective action is required, DB Contractor shall develop options for consideration. These could include:

- Calcium-based treatment;
- Reworking failing areas;
- Excavating existing subgrade and replacing with material meeting requirements in Section 16.3, to a depth that meets requirements; or
- Other options as recommended by DB Contractor with TxDOT approval.

Additional pavement thickness shall not be considered corrective action.

16.5.2 Smoothness Specification

Smoothness of the pavement constructed shall conform to the requirements of Item 585 of the TxDOT Standard Specifications, amended as cited below:

Article 585.3.4. Acceptance Plan and Pay Adjustments. The DB Contractor will evaluate profiles for determining acceptance and corrective action. The entire section is voided and replaced by the following:

Surface Test Type A. Use diamond grinding or other approved work methods to correct surface areas that have more than 1/8-inch variation between any two contacts on a 10-foot straightedge. For flexible pavements, fog seal the aggregate exposed from diamond grinding. Following corrective action, retest the area to verify compliance with this Item 16.

Surface Test Type B. IRI values will be calculated using the average of both wheel paths using Department software. A Construction Deficiency Report (CDR) and a corrective action acceptable to TxDOT is required, at DB Contractor's sole expense, for any 0.1-mile section that measures an average IRI in excess of 75 inches per mile for rigid pavements, in excess of 65 inches per mile for flexible pavements, or for correction of local roughness. After making corrections, re-profile the pavement section to ensure that corrections have achieved the required level of smoothness. It is recommended to conduct profiler measurements when an HMA layer is directly below the final surface to identify need for corrective action prior to final HMA lift in order to obtain desired IRI on final surface.

When diamond grinding is used on concrete pavements, ensure thickness and clear cover requirements are met in conjunction with corresponding specification. For flexible pavements, DB Contractor shall fog seal the aggregate exposed when diamond grinding is used.

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

All travel lanes constructed within the project limits and areas identified as travel lanes in the facility's ultimate configuration shall be tested in accordance with TxDOT Standard Specifications as travel lanes. Exceptions include ramps, resurfaced frontage road areas, and pavement described in articles 585.3.2.1.2 thru 585.3.2.2.

16.6 Uniformity of Support Layers

For both rigid and flexible pavements, DB Contractor shall collect FWD data for information about both the adequacy and uniformity of support layers. FWD testing shall be performed on the outside wheel paths and the data shall be stored in raw format (.FWD files), including GPS coordinates for each drop. DB Contractor shall provide the FWD data in the required format to TxDOT within 48 hours of test completion.

For rigid pavements, FWD testing shall be conducted on top of the asphalt base or asphalt bond breaker prior to placement of any concrete. For flexible pavements, FWD testing shall be conducted on top of the base layer prior to placement of any hot mix asphalt. For treated bases, DB Contractor shall allow a minimum of three (3) days following final compaction before testing. Testing shall be conducted at 100-foot intervals in each travel lane.

The FWD shall conform to TxDOT Standard Specifications as described in the TxDOT *Pavement Manual* (seven sensors at 1-foot spacing). The test load shall be as close as possible to 9000 pounds.

16.7 Construction Requirements

DB Contractor shall conduct all Work in accordance with the requirements of this Item 16 and TxDOT Standard Specifications.

The DB Contractor shall also conduct all Work for this Item 16 in accordance with the requirements of the following TxDOT special specifications and special provisions:

- SS3076
- SS3077
- SS3084
- SS3085

16.8 Submittals

All Submittals described in Item 16 shall be in accordance with the schedule and for the purpose (approval, review and comment, for information) set forth in Table 16-9. Acceptable electronic formats include Microsoft Word, Microsoft Excel, or Adobe Acrobat files, unless otherwise indicated.

Table 16-9 Submittals to TxDOT

Submittals	Submittal Schedule	TxDOT Action	Reference Section
Boring plan and traffic control plans associated with subsurface pavement investigations	Prior to performing any investigations	Approval	16.2.1
Preliminary Geotechnical Engineering Reports	Prior to commencement of applicable Design Work	Review and comment	16.2.1, 16.2.2
Final Geotechnical Engineering Report	Prior to commencement of applicable Construction Work	Approval	16.2.1, 16.2.2
Preliminary Pavement Design Reports	Prior to commencement of applicable Design Work	Review and comment	16.2.1, 16.4.1.4
Final Pavement Design Report	Prior to commencement of applicable Construction Work	Approval	16.2.1, 16.4.1.4
FWD data	As part of the daily QC inspection and test reports described is the TxDOT QAP for DB Projects and upon TxDOT request	For information	16.6

Item 17
Land Surveying

17.1 **General Requirements**

DB Contractor shall provide accurate and consistent land surveying and mapping necessary to support ROW acquisition, design, and construction of the Project.

DB Contractor shall review existing survey data and determine the requirements for updating or extending the existing survey and mapping data as required to complete its Work. DB Contractor is responsible for the precision, accuracy, and comprehensiveness of all survey and mapping.

17.2 **Administrative Requirements**

17.2.1 **Standards**

DB Contractor shall ensure that all surveying conforms to the TxDOT *Survey Manual,* and the *General Rules of Procedures and Practices* of the TBPELS. DB Contractor shall ensure that any person in charge of a survey field party is proficient in the technical aspects of surveying.

17.2.2 **ROE**

DB Contractor shall secure written permission from the property owner prior to entering any private property outside the Project ROW. It shall be DB Contractor's sole responsibility to negotiate and obtain this permission and DB Contractor shall be responsible for any and all damages and claims resulting from that ingress. DB Contractor shall maintain proper documentation of ROE maintained at all times.

17.2.3 **Survey by TxDOT**

In performing surveys for other adjoining projects, TxDOT may need to verify and check DB Contractor's survey work. DB Contractor shall coordinate with the adjoining project regarding planned construction activities. DB Contractor shall notify TxDOT within two (2) Business Days if TxDOT stakes and marks are altered or disturbed.

17.3 **Design Requirements**

17.3.1 **Survey Control Requirements**

DB Contractor shall base all additional horizontal and vertical control on the Level 2 and Level 3 control provided by TxDOT. DB Contractor shall be responsible for tying into TxDOT CORS vertical control and local monumentation. DB Contractor shall verify owner provided survey control.

DB Contractor shall establish and maintain additional survey control, as needed, and Project ROW monumentation throughout the Term. DB Contractor 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 DB Contractor chooses to use GPS methods, DB Contractor shall meet the accuracy of the appropriate level of survey as defined in the TxDOT *Survey Manual* and shall utilize the primary survey control provided by TxDOT.

All survey control points shall be set and/ or verified by a Register Professional Land Surveyor licensed in the State of Texas.

DB Contractor shall establish and maintain a permanent survey control network. The control network should consist of, at a minimum, monuments set in indivisible pairs at spacing of no greater than two miles.

Monuments shall be TxDOT bronze survey markers installed in concrete and marked as directed by the TxDOT *Survey Manual*. DB Contractor shall replace all existing survey monuments and control points disturbed or destroyed during execution of the Work. DB Contractor shall make all survey computations and observations necessary to establish the exact position of all other control points based on the primary control provided.

17.3.2 **Conventional Method (Horizontal & Vertical)**

If DB Contractor chooses to use conventional methods to establish additional horizontal control, DB Contractor shall meet the accuracy of the appropriate level of survey as defined in Tables 17-1 and 17-2.

17.3.2.1 Horizontal Accuracy Requirements for Conventional Surveys

Horizontal control is to be established (at a minimum) according to the appropriate level of survey as defined below in Table 17-1.

Table 17-1: Horizontal Accuracy Requirements

	TSPS First Order	TSPS Second Order	Remarks and Formulae
Error of Closure	1: 50,000	1:20,000	Loop or between monuments
Allowable Angular Closure	± 3” $\sqrt{N}$	± 8” $\sqrt{N}$	*N*= number of angles in traverse
Accuracy of Bearing in Relation to Course *	± 04”	± 10”	Maximum for any course
Linear Distance Accuracy (Minimum Length of Line)	1: 50,000 (2,500 feet)	1: 20,000 (1,000 feet)	
Positional Tolerance of Any Monument	*AC*/50,000	*AC*/20,000	*AC* = length of any course in traverse
Adjusted Mathematical Closure of Survey (No Less Than)	1:200,000	1:200,000	

Notes: TxDOT policy requires all bearings or angles to be based on the following source: Grid bearing of the Texas Coordinate System of 1983, with the proper zone and epoch specified.

17.3.2.2 Vertical Accuracy Requirements for Conventional Surveys

Vertical control shall be established (at a minimum) on the North American Vertical Datum of 1988 (NAVD 1988), (Geoid 12A) and according to the appropriate level of survey as defined below in Table 17-2.

Table 17-2: Vertical Accuracy Requirements

	First Order	Second Order	Third 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	

17.3.3 ROW Surveys

DB Contractor shall base all surveys on the horizontal and vertical control network provided by TxDOT.

DB Contractor shall coordinate with TxDOT regarding the assignment of RCSJ numbers for each new mapping project.

The documents produced by DB Contractor, or its Subcontractors, are the property of TxDOT, and release of any such document must be approved by TxDOT. All topographic mapping created by DB Contractor 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. DB Contractor shall provide two sets of all mapping to the TxDOT District office surveyors. DB Contractor shall provide the mapping so as to allow a minimum of 20 days for TxDOT review and comment. DB Contractor shall obtain and address all TxDOT District office comments to TxDOT's satisfaction prior to signing maps.

In preparing the property description, the following will be required:

- Scanned copies of the deeds on USB flash drive and a graphics file of the abstract map; and
- Scanned copies of the field notes, control sketches, and a graphics file of all field survey data.

The Surveyor shall submit the following interim mapping products:

- A Preliminary ROW layout to determine if there are any changes to the proposed ROW; and
- An initial copy of the ROW map for review purposes.

17.3.3.1 **Accuracy Standards**

In performing ROW surveys consisting of boundary locations, DB Contractor shall meet the accuracy standards of the appropriate level of survey as defined below in Table 17-3.

Table 17-3: 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	

NOTE: * TxDOT policy requires all bearings or angles to be based on the following source: Grid bearing of the Texas Coordinate System of 1983, with the proper zone and epoch specified.

17.3.4 **Survey Records and Reports**

DB Contractor 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. The report shall provide control from adjoining, incorporated, or crossed roadway projects that are currently in design, and show a comparison of the horizontal and vertical values. DB Contractor shall provide survey records and reports to TxDOT upon request.

DB Contractor may use an electronic field book to collect and store raw data. DB Contractor shall preserve original raw data and document any changes or corrections made to field data, such as station name, height of instrument, or target. DB Contractor 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 by DB Contractor 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.) DB Contractor shall deliver copies of any or all field notebooks to TxDOT upon request.

17.3.5 **Units**

All survey Work shall be performed in the U.S customary units system of measurement (U.S. Survey Foot). Work shall conform to Texas State Plane Coordinate System, South Central Zone (4204), NAD83 (2011) Epoch 2010. The surface adjustment factor for the Project is 1.00017.

17.4 **Construction Requirements**

17.4.1 **Survey Records**

DB Contractor shall deliver to TxDOT, for its review and comment, a listing of all primary, secondary control coordinate values, original computations, survey notes and other records including GPS observations and analysis made by DB Contractor prior to Final Acceptance.

17.4.2 **Construction Surveys**

DB Contractor shall perform all construction surveys in accordance with the design requirements set forth in the Contract Documents.

17.4.3 ROW Monuments

Upon final submittal of the ROW documents to TxDOT, DB Contractor shall set, using permanent and stable monuments as defined in Section 663.17 of the General Rules of Procedures and Practices of the TBPELS, all significant points along all ROW lines of the Project including the following:

- PCs;
- PTs;
- PIs;
- PCCs;
- PRCs;
- All permanent drainage easements at the intersection with the ROW line;
- All intersecting crossroad ROW lines and all property line intersections with the ROW line. These monuments shall be 1/2-inch iron rods, driven just below surface level, capped by a TxDOT-labeled aluminum cap (rod-and-cap monument); and
- All beginning and ending points of control of access (denied) lines.

DB Contractor shall ensure that upon completion of the ROW acquisition and all Construction Work, such that the final ROW lines will not be disturbed by construction, DB Contractor shall replace all rod-and-cap monuments located on the final ROW line at all PCs, PTs, PIs, PCCs, and PRCs, and all intersecting crossroad ROW lines, with TxDOT Type II monuments (constructed according to the TxDOT ROW Manuals and the TxDOT *Survey Manual*). DB Contractor shall monument with a TxDOT Type II monument all final ROW lines where the distance between such significant ROW line points exceeds 1,500 feet. ROW line intersections with property lines shall remain monumented by a 1/2-inch iron rod with a TxDOT aluminum cap (rod-and-cap monument). DB Contractor shall ensure that the ROW monuments shall be set by a survey crew working under the direction of a RPLS, licensed to practice in Texas.

DB Contractor shall purchase all materials, supplies, and other items necessary for proper survey monumentation.

DB Contractor shall submit updated maps with the ROW monumentation information. (This is for final monumentation set, for example, type II, and type of monuments set, etc.) DB Contractor shall add all deed recording information to the map sheets in the ownership blocks on the map sheets.

17.4.4 Record Documents

DB Contractor shall submit the following as part of the Record Documents and as a condition of Final Acceptance:

- A listing of all primary and secondary control coordinate values, original computations and other records, including GPS observations and analysis made by DB Contractor;
- Copies of all survey control network measurements, computations, unadjusted and adjusted coordinates, and evaluation values;
- Survey records and survey reports;
- Parcels for the ROW maps in GPK format;
- Electronic files and paper copies of the ROW maps; and
- The final ROW maps consisting of the graphics files and two sets of the paper copy of the ROW maps, exhibits showing the metes and bounds description and parcel plat, signed and sealed by the Surveyor. The required geo-referenced parcel data (features) for all existing and revised parcels shall be submitted in ArcGIS 10 format or the version in use by the TxDOT at the time of the submittal, and in the format of the TxDOT ROW Geo-Database Template "ROW_Parcels_Edits."

DB Contractor shall produce reports documenting the location of the as-built alignments, profiles, structure locations, utilities, and survey control monuments as part of the Record Documents as a condition of Final Acceptance. These reports shall include descriptive statements for the survey methods used to determine the as-built location of the feature being surveyed. DB Contractor'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 DB Contractor from TxDOT in an x, y, z only coordinate format,

or z only coordinate format, DB Contractor shall provide TxDOT with data in an x, y, z only coordinate format or z only coordinate format.

17.5 Submittals

All Submittals described in this Item 17 shall be in accordance with the schedule and for the purpose (approval, review and comment, for information) set forth in Table 17-4. Acceptable electronic formats include Microsoft Word, Microsoft Excel, or Adobe Acrobat files, unless otherwise indicated.

Table 17-4: Submittals to TxDOT

Submittals	Submittal Schedule	TxDOT Action	Reference Section
ROE documentation	Upon request	For information	17.2.2
Verification of owner provided survey control	After NTP2	For information	17.3.1
Interim mapping products	Prior to signing Final ROW maps	Review and comment	17.3.3
A horizontal and vertical control report	Upon request	For information	17.3.4
Survey records and reports	Upon request	For information	17.3.4
Copies of all field notebooks	Upon request	For information	17.3.4
Survey records as listed in Section 17.4.1	Prior to Final Acceptance	Review and comment	17.4.1
ROW Surveying and Mapping documents	Upon completion but prior to Final Acceptance	Approval	17.4.3
Updated mapping with any ROW monumentation information	Upon completion of the ROW acquisition and all Construction Work	For information	17.4.3
Record Documents	As a condition of Final Acceptance	For information	17.4.4

Item 18
Grading

18.1 **General Requirements**

DB Contractor shall conduct all Work necessary to meet the requirements for grading, including clearing and grubbing, excavation and embankment, removal of existing buildings, concrete slabs, pavement and miscellaneous structures, subgrade preparation and stabilization, dust control, aggregate surfacing, and earth shouldering in accordance with the requirements of this Item18.

18.2 **Preparation within Project Limits**

DB Contractor 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 be submitted to TxDOT for approval prior to NTP2.

DB Contractor shall demolish or abandon in place, all existing structures within the Project ROW no longer required for service, including, but not limited to: pavements, bridges, and headwalls. Any features that are abandoned in place shall be removed to an elevation at least the lower of two (2) feet below the final finished grade or one (1) foot below the pavement subgrade and drainage structures. DB Contractor shall ensure that abandoned structures are structurally sound after abandonment.

TxDOT reserves the right to require DB Contractor, at any time, to salvage and deliver to a location designated by TxDOT within the TxDOT District, in which the portion of the Project is located, any TxDOT-owned equipment and materials in an undamaged condition.

TxDOT reserves the right to require DB Contractor to salvage and deliver to a Project-specific 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 DB Contractor's property. All material removed shall be properly disposed of by DB Contractor outside the limits of the Project.

18.3 **Slopes and Topsoil**

DB Contractor shall follow TxDOT *Roadway Design Manual* and exercise Good Industry Practice regarding design limitations and roadside safety guidelines associated with the design of slopes along roadways.

DB Contractor shall perform finished grading and place topsoil to an adequate 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. DB Contractor 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. DB Contractor shall ensure ditch profile grade lines are sufficient to prevent hydraulic backflow into pavement structure. DB Contractor shall provide stable slopes.

For designated construction easements and other approved PSLs outside DB Contractor's limits of maintenance, DB Contractor shall provide stable slopes.

For slopes steeper than 4:1, DB Contractor shall submit to TxDOT a slope stability analysis that demonstrates the adequacy of DB Contractor's design. DB Contractor shall submit the slope stability analysis to TxDOT for approval prior to Final Design Submittal. DB Contractor shall pave slopes steeper than or equal to 2:1 with concrete riprap.

Slopes that are to remain unpaved must accommodate mower access from the frontage road. Where access for mowing and maintenance operations cannot be provided from the frontage road, slopes must be paved with concrete riprap unless DB Contractor receives prior approval from TxDOT for an alternative access point. DB Contractor shall pave areas less than 2-foot in width and areas below structures with less than 10-foot vertical clearance with concrete rip rap.

18.4 Sodding

Block sod shall be placed at all open disturbed areas within the Project ROW prior to completion of the Project. DB Contractor shall establish and maintain all erosion and sediment controls in accordance with the approved SW3P, and the condition of the erosion and sediment controls shall be in good working order throughout construction of the Project. DB Contractor shall stabilize disturbed areas on which construction activities have ceased temporarily or permanently, within 14 days unless they are scheduled to resume construction within 21 days. The areas adjacent to creeks and drainage ways have priority followed by devices protecting storm sewer inlets.

18.5 Construction Requirements

DB Contractor shall conduct all Work necessary to meet the requirements for this Item 18 in accordance with the requirements of this Item 18 and the TxDOT Standard Specifications.

18.6 Submittals

All Submittals described in this Item 18 shall be in accordance with the schedule and for the purpose (approval, review and comment, for information) set forth in Table 18-1. Acceptable electronic formats include Microsoft Word, Microsoft Excel, or Adobe Acrobat files, unless otherwise indicated.

Table 18-1: Submittals to TxDOT

Submittals	Submittal Schedule	TxDOT Action	Reference Section
Demolition and Abandonment Plan	Prior to NTP2	Approval	18.2
Slope stability analysis	Prior to Final Design Submittal	Approval	18.3

Item 19
Roadways

19.1 **General Requirements**

DB Contractor shall coordinate roadway design, construction, and maintenance with other elements of the Project to achieve the Project objectives of a safe, reliable, cost-effective, and aesthetically pleasing corridor for the traveling public. The requirements contained in this Item 19 provide the framework for the design and construction of the roadway improvements to help attain the Project objectives.

DB Contractor 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, DB Contractor 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. DB Contractor shall perform all ROW acquisition services that are necessitated by proposed changes in accordance with the Contract Documents.

19.1.1 **Lead Roadway Design Engineer**

DB Contractor shall employ a Lead Roadway Design Engineer responsible for ensuring the design of the roadway is completed and design criteria requirements are met. The Lead Roadway Design Engineer shall be a PE and be responsible for coordinating interdisciplinary design reviews in cooperation with leaders of other disciplines. The Lead Roadway Design Engineer or a PE reporting directly to the Lead Roadway Design Engineer shall be the engineer of record for the design of the roadway Elements.

19.2 **Design Requirements**

DB Contractor shall design the Project roadways in accordance with the Basic Configuration as defined in Exhibit 1 of the DBA and the Schematic Design. Deviations from the Schematic Design shall be requested in accordance with Section 5.2.2.2.1 of the General Conditions.

DB Contractor shall design roadways to be consistent with the design of all other elements 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*.

DB Contractor shall design all roadway Elements in accordance with the TxDOT *Roadway Design Manual,* AASHTO and TxDOT's policies*,* TxDOT Engineering Standard Sheets, applicable design criteria, and Good Industry Practice based on the Design Speeds as shown in the Contract Documents.

DB Contractor shall design the Project roadways to promote safety and to mitigate visual and noise impacts on neighboring properties.

All roadside safety devices used on the Project that are not MASH-compliant shall be upgraded or replaced to meet current crash test criteria in accordance with Section 19.2.3 and as specified in the AASHTO *Manual for Assessing Safety Hardware (MASH)*, TxDOT *Bridge Railing Manual*, and other safety requirements. All roadside safety devicesshall be installed and utilized in accordance with TxDOT Engineering Standard Sheets. If existing roadside safety devices used on the Project are MASH-compliant, then such devices are not required to be upgraded to meet current crash test criteria.

DB Contractor may also utilize NCHRP 350-compliant roadside safety devices to meet current crash test criteria. If a MASH-compliant crash cushion or barrier is available for a specific application per the "MASH Compliant Standards Listing" provided in the RIDs, then DB Contractor shall specify the MASH-compliant device and the specific application of the device in the plans. If there is not a MASH-compliant device available for a specific application per the "MASH Compliant Standards Listing", then DB Contractor may utilize NCHRP 350-compliant devices. DB Contractor shall specify the device and the specific application of the device in the plans.

TxDOT has performed a visual assessment of the existing roadside safety devices and has identified locations where the existing safety barriers do not comply with the current crash test criteria and safety

requirements specified above for roadside safety devices used on the Project. The approximate locations of the deficient barriers based on TxDOT's assessment are depicted on the exhibit "Existing Roadside Safety Devices Assessment – Safety Barriers" provided in the RIDs. DB Contractor shall perform an assessment of the existing barriers, including, but not limited to, concrete barriers/rails, crash cushions, metal beam guard fence, and transitions, and guardrail end treatments, to verify which safety devices are non-compliant and shall upgrade or replace all non-compliant existing barriers on the Project to comply with Project crash test criteria and safety requirements.

DB Contractor shall design and construct moment slabs for segments of the existing retaining walls at the I-35/LP 1604 interchange in accordance with the TxDOT Engineering Standard Sheet RW(TRF). TxDOT has performed an assessment of the existing retaining walls at the interchange and has identified locations where the existing wall coping requires the addition of a moment slab. The approximate locations of the existing wall coping requiring a moment slab based on TxDOT's assessment are depicted on exhibit "Existing Roadside Safety Devices Assessment – Safety Barriers" provided in the RIDs. DB Contractor shall perform an assessment of the existing retaining walls at the interchange to verify the segments of the walls that require moment slabs. The Work shall consist of cutting and restoring the existing pavement for the drilling of new moment slabs into the existing coping for the segments of the existing retaining walls that do not have moment slabs. The addition of a new moment slab is not considered a physical impact to the existing retaining wall.

19.2.1 Control of Access

DB Contractor shall maintain all existing property accesses, except where access will be denied due to the implementation by DB Contractor of the channelization requirements at the five ramps identified in Table 19-1.

The five locations where channelization is required must include channelization between the physical and theoretical gore, and from the theoretical gore for the distance as defined in Table 19-1. The required channelization method shall consist of a longitudinal channelizing raised curb system as shown on exhibit "Control of Access Channelization Method" provided in the RIDs. Where the channelization is implemented at these five locations, DB Contractor is not responsible for providing any additional control of access.

If DB Contractor changes the location of any exit or entrance ramp shown on the Schematic Design, DB Contractor shall design revised exit and entrance ramps, as applicable, to meet at least the minimum spacing requirements between ramps and driveways, side streets, or cross streets listed in the TxDOT *Roadway Design Manual* and TxDOT *Access Management Manual*. In locations where the minimum spacing cannot be achieved, DB Contractor shall submit documentation to TxDOT for approval as part of the Preliminary Design Submittal demonstrating why the spacing cannot be achieved and a request for permission to design and implement channelization methods per the TxDOT *Roadway Design Manual* and TxDOT *Access Management Manual*.

If only slight modifications are made to any exit or entrance ramp shown on the Schematic Design, DB Contractor shall submit documentation to TxDOT for approval as part of the Preliminary Design Submittal demonstrating that the modification results in equal or better access compared with the access provided on the Schematic Design.

DB Contractor shall comply with the control of access requirements in this Section 19.2.1 unless DB Contractor receives TxDOT approval to deviate from such requirements. DB Contractor shall coordinate access with landowners when tying-in to private property; shall replace necessary signs, mailboxes, fences, and landscape features.

Table 19-1: Control of Access Channelization Requirements

No.	Ramp Name	Station	Channelization Requirements
IH 35			
1	IH 35 Exit Ramp NB Evans Rd.	3816+00	250 ft channelization from theoretical gore ramp STA 18+00.00.
2	IH 35 Exit Ramp NB Schertz Pkwy.	3879+00	250 ft channelization from theoretical gore ramp PT STA 25+62.45 to deny access to Chelsea Place.

No.	Ramp Name	Station	Channelization Requirements
3	IH 35 Exit Ramp NB FM 3009	3931+00	250 ft channelization from theoretical gore ramp PT STA 23+37.09 to deny access to Cabana Drive.
IH 410			
4	IH 410 Exit Ramp EB Starcrest Dr.	80968+00	250 ft channelization from theoretical gore at ramp PT STA 23+24.53.
IH 35 Frontage Road			
5	IH 35 FR Exit Ramp SB Schertz Pkwy. Turnaround	3917+00	Extend barrier channelization to deny access to Journey's Way.

19.2.2 Design Criteria

19.2.2.1 Geometric Design Criteria

DB Contractor shall design the elements of the Project to meet or exceed the geometric design criteria in Table 19-2 (Geometric Design Criteria), with the exclusion of the roadway design Deviations listed in Section 19.2.2.4, in order to meet the Project objectives.

Table 19-2: Geometric Design Criteria

	Elevated Lanes	Mainlanes	Direct Connector Ramps	Mainlane Ramps
Functional Classification	Urban Freeway	Urban Freeway	Freeway Ramp	Freeway Ramp
Design Speed	70 mph	60 mph	45 mph	45 mph
Stopping Sight Distance	730 ft	570 ft	360 ft	360 ft
Horizontal Alignment Criteria:				
Maximum Curvature (Min Radius)	3390 ft	2195 ft	740 ft	810 ft
Superelevation – e(max)	6%	6%	8%	6%
Maximum Curvature (Min Radius) w/o Superelevation	14,100 ft	11,100 ft	6,710 ft	6,480 ft
Vertical Alignment Criteria:				
Maximum Gradient	4%	4%	6%	6%
Minimum Gradient	0.50%	0.50%	0.50%	0.50%
Crest (min K-Value)	247	151	61	61
Sag (min K-Value)	181	136	79	79
Maximum Algebraic Difference w/o Vertical Curve	0.5%	0.5%	1%	1%
Min Vertical Clearance – Roadway	18 ft 6 in	18 ft 6 in	18 ft 6 in	18 ft 6 in
Min Vertical Clearance – Railroad	23 ft 4 in	23 ft 4 in	23 ft 4 in	23 ft 4 in
Cross Section Criteria:				
Lane Widths	12 ft	12 ft	14 ft/ 12 ft (see note 2)	14 ft / 12 ft (see note 2)
HOV Buffer Width	2 ft	N/A	N/A	N/A
U-turn Width	N/A	N/A	N/A	N/A
Inside Shoulder Widths	4 ft	10 ft	4 ft	2 ft (rdwy) 4 ft (str)
Outside Shoulder Widths	10 ft	10 ft	8 ft	6 ft (rdwy) 8 (str)
Pavement Cross Slope	0.02 ft/ft	0.02 ft/ft	0.02 ft/ft	0.02 ft/ft
Side Slope Within Clear Zone	N/A	6:1	N/A	6:1
Side Slope Outside Clear Zone	N/A	4:1	N/A	4:1
Curb Offset	N/A	N/A	N/A	N/A
Clear Zone Width	N/A	30 ft	N/A	16 ft

Table 19-2: Geometric Design Criteria

	Elevated Lanes	Mainlanes	Direct Connector Ramps	Mainlane Ramps
Intersection Horizontal and Vertical Criteria:				
Corner Radii	N/A	N/A	N/A	N/A
Design Vehicle (Intersection)	N/A	N/A	N/A	N/A
Preferred Corner Geometry	N/A	N/A	N/A	N/A

Table 19-2: Geometric Design Criteria (Continued)

	Ramps to Elevated Lanes	Collector Distributors	Frontage Roads	Cross Streets
Functional Classification	Freeway Ramp	Urban Collector	Urban Collector	Low Speed Urban
Design Speed	60 mph	40 mph	40 mph	30 mph
Stopping Sight Distance	570 ft	305 ft	305 ft	200 ft
Horizontal Alignment Criteria:				
Maximum Curvature (Min Radius)	2195 ft	485 ft	485 ft	RDM, Table 2-5
Superelevation – e(max)	6%	6 %	6 %	
Maximum Curvature (Min Radius) w/o Superelevation	11,100 ft	5,230 ft	5,230 ft	
Vertical Alignment Criteria:				
Maximum Gradient	4%	6%	6%	6%
Minimum Gradient	0.50%	0.50 %	0.50 %	0.50 %
Crest (min K-Value)	151	44	44	19
Sag (min K-Value)	136	64	64	37
Maximum Algebraic Difference w/o Vertical Curve	0.5%	1%	1%	1%
Min Vertical Clearance – Roadway	18 ft 6 in	16 ft 6 in	16 ft 6 in	16 ft 6 in
Min Vertical Clearance – Railroad	23 ft 4 in	23 ft 4 in	23 ft 4 in	23 ft 4 in
Cross Section Criteria:				
Lane Widths	14 ft/ 12 ft (see note 2)	12 ft	12 ft (See note 3)	12 ft
U-turn Width (see note 4)	N/A	27 ft	27 ft	27 ft
Inside Shoulder Widths	4 ft	4 ft	N/A	N/A
Outside Shoulder Widths	8 ft	6 ft	N/A	N/A
Pavement Cross Slope	0.02 ft/ft	0.02 ft/ft	0.02 ft/ft	0.02 ft/ft
Side Slope Within Clear Zone	N/A	6:1	6:1	6:1
Side Slope Outside Clear Zone	N/A	4:1	4:1	4:1
Curb Offset	N/A	N/A	1 ft either side (see note 5)	1 ft either side
Clear Zone Width	N/A	10 ft	6 ft (curbed)	6 ft (curbed)
Intersection Horizontal and Vertical Criteria:				
Corner Radii / Turnarounds (see note 6)	N/A	N/A	75 ft	75 ft
Design Vehicle (Intersection)	N/A	N/A	WB-62	WB-62
Preferred Corner Geometry	N/A	N/A	Simple	Simple

Notes:

1. Any conflict between the TxDOT *Roadway Design Manual* and Table 19-2, then Table 19-2 shall govern.
2. Two-lane ramps shall have 12 ft lanes. Single lane ramps shall have 14 ft lanes. If the clear zone width requirement for ramps cannot be met and barrier protection is required, then the minimum shoulder widths for structures (str) shall be used. The minimum inside and outside shoulder widths on ramps may be interchanged to accommodate stopping sight distance.

3. See Table 19-7 for frontage road lane width deviations.
4. Turnaround at Schertz Parkway shall have a 1 ft inside barrier offset width and 2 ft outside barrier offset width for a total of 30 ft width between safety barriers.
5. DB Contractor may replace the existing frontage road shoulder width with curb and 1 ft curb offset.
6. The corner radii / turnaround requirement of 75 ft minimum radius applies to new turnaround construction at Schertz Parkway and the LP 1604 turnarounds at UPRR and Lookout Rd. Deviations to the 75' minimum radius are provided below in Table 19-8. For new intersection construction, the minimum intersection design radii shall be the radii shown on the Schematic Design (30 ft / 30 ft at Pasatiempo Drive, 40 ft / 50 ft at Evans Road and 60 ft / 60 ft at Chelsea Place).
7. For pavement widening and rehabilitation (resurfacing) areas, existing design values for cross slope and superelevation may be maintained and the lane striping shall be in accordance with the TxDOT Schematic Design. For such pavement widening and rehabilitation (resurfacing) areas, existing design values supersede the requirements in Table 19-2. The design values for transitions to existing facilities may utilize existing values at the transition.
8. For new bridges over roadways (excluding bridges to be widened) listed as part of TxDOT's Texas Highway Freight Network (both primary and secondary routes), the minimum vertical clearance shall be 18.5 feet.
9. To reduce sheet flow hazards, the mainlane pavement will require a cross slope break at the lane line between the second and third lane. The typical section cross slope break shall be .02 ft/ft to .025 ft/ft. The cross slope break requirement does not apply to the Elevated Lanes.
10. Any side slopes steeper than 4:1 must be approved by TxDOT in accordance with Section 18.3.
11. The design of ramp acceleration and deceleration lengths shall be in accordance with Table 3-36 of the TxDOT *Roadway Design Manual*. If the design length using the TxDOT *Roadway Design Manual* is less than the length shown on the Schematic Design, then the length shown on the Schematic Design shall be used.
12. For new ramp construction, DB Contractor shall provide a minimum design spacing of 1500 ft between the desirable control points (striped gores) of successive ramps with an auxiliary lane in accordance with the TxDOT *Roadway Design Manual*. DB Contractor may maintain the spacing between existing ramps if the spacing is not impacted by construction.
13. The minimum radius for the mainlane exit and entrance ramp baseline with the gore areas without superelevation shall be a 2-degree curve, in which case the mainlane cross slope or superelevation may control through the gore area when ramp and mainlane curvature are in the same direction, except for the I-35 northbound entrance ramps from Forum Pkwy/Olympia Pkwy and from FM 1518 (ENRPNBFORUM and ENRPNB1518), which shall be no less than the 2000 ft and 2400 ft used for the Schematic Design. DB Contractor shall use Table 3-22 in the TxDOT *Roadway Design Manual* for the maximum algebraic difference in pavement cross slope in the gore areas of connecting roadways when superelevation is required or when ramp and mainlane curvature are not in same direction.
14. The design speed of the portion of a mainlane ramp closer to the frontage road shall not be less than the design speed of the intersecting frontage road in accordance with Chapter 3, Section 6 – *Design Speed* of the TxDOT *Roadway Design Manual.*
15. A design deviation is provided by TxDOT for a reduction to the proposed inside LP 1604 mainlane shoulder width of 26 feet to accommodate placement of the proposed OSB columns in the LP 1604 median, as shown on the Schematic Design."

19.2.2.2 Future Roadway Design Envelopes

19.2.2.2.1 Cross Street Intersection Envelopes

DB Contractor shall not design and construct bridge bents in the center median of the intersecting streets. DB Contractor shall design and construct cross street improvements to accommodate the future cross street intersection envelopes in Table 19-3 as shown on "I-35 NEX Cross Street Exhibit" in the RIDs. The improvements shall include the modification of the turnaround islands for column placement and associated Work to accommodate the future cross street intersection envelopes.

Table 19-3: Future Cross Street Envelope Design Criteria

No.	Cross Street	Envelope Clear Span Width
1	Thousand Oaks Drive / Starlight Terrace	116 ft (58 ft each side of CL)
2	N. Weidner Road	116 ft (58 ft each side of CL)

No.	Cross Street	Envelope Clear Span Width
3	O'Connor Road / PA 1502	116 ft (58 ft each side of CL)
4	Judson Road	116 ft (58 ft each side of CL)
5	Toepperwein Road	116 ft (58 ft each side of CL)
6	I-35 Access Road	76 ft (38 ft each side of CL)
7	Pat Booker Road / TX 218	80 ft (40 ft each side of CL)
8	Loop 1604	116 ft (58 ft each side of CL)
9	Forum Parkway	116 ft (58 ft each side of CL)
10	Olympia Parkway	76 ft (38 ft each side of CL)
11	N. Evans Road	116 ft (58 ft each side of CL)
12	FM 1518 / Corporate Drive	116 ft (58 ft each side of CL)
13	Schertz Parkway	116 ft (58 ft each side of CL)
14	FM 3009	116 ft (58 ft each side of CL)

19.2.2.2.2 Future Wurzbach Parkway Design Envelope

DB Contractor shall accommodate the connection of the future Wurzbach Parkway as described in Section 21.2.2 within the limits defined below:

- NB Elevated Lanes STA 1585+00 to 1630+00
- SB Elevated Lanes STA 2585+00 to 2630+00

19.2.2.3 **Superelevation**

In areas where proposed roadways and ramps are to connect to existing pavement, DB Contractor's design may retain existing cross slope or superelevation if appropriate. Pavement widening shall be constructed by extending the existing pavement cross slope or superelevation. Superelevation transitions shall be designed and constructed such that zero percent cross-slopes will not occur on longitudinal grades flatter than 0.35 percent.

DB Contractor may maintain the existing pavement normal crown or superelevation in overlay sections. At normal crowns, pavement widening adjacent to existing pavement shall be constructed by extending the existing pavement cross slope.

Cross slopes and superelevation in the rehabilitated (resurfacing) pavement areas shall be equal to the existing condition.

19.2.2.4 **Roadway Design Deviations**

DB Contractor shall design the Project to meet the criteria in Table 19-2 with the exception of those identified in Tables 19-4,19-5, 19-6, 19-7, and 19-8.

DB Contractor shall design the curves identified in Table 19-4 to meet or exceed the stopping sight distance for the given Design Speed.

DB Contractor shall design the curves identified in Table 19-5 to meet or exceed the given minimum radii.

DB Contractor shall design the roadway elements identified in Table 19-6 to meet or exceed the given minimum Design Speed.

DB Contractor shall design the frontage road segments identified in Table 19-7 to meet or exceed the minimum frontage road lane widths.

DB Contractor shall design the turnaround curves identified in Table 19-8 to meet or exceed the given minimum radii.

Table 19-4: Design Deviations for Horizontal Stopping Sight Distance

Roadway	Curve	Design Speed
I-35 EL NB	CURVE I35_PNBML 5	60 MPH
I-35 EL NB	CURVE I35_PNBML 8	60 MPH
I-35 EL NB	CURVE I35_PNBML 15	65 MPH
I-35 EL NB	CURVE I35_PNBML 22	65 MPH
I-35 EL NB	CURVE I35_PNBML 37	65 MPH
I-35 EL SB	CURVE I35_PSBML 13	65 MPH
I-35 EL SB	CURVE I35_PSBML 26	65 MPH
I-35 EL SB	CURVE I35_PSBML 27	65 MPH
I-410 EB to I-35 EL NB Connector Ramp	CURVE N410-ELNB-7	40 MPH
I-410 EB to I-35 EL SB Connector Ramp	CURVE N410-ELSB-1	40 MPH
I-35 EL SB to I-410 WB Connector Ramp	CURVE ELSB-N410-6	40 MPH
I-35 EL NB to I-410 WB Connector Ramp	CURVE ELNB-N410-3	40 MPH
LP 1604 EB to I-35 EL SB Connector Ramp	CURVE 1604EB-ELSB-6	40 MPH
LP 1604 EB to I-35 EL NB Connector Ramp	CURVE 1604EB-ELNB-3	40 MPH
I-35 EL NB to LP 1604 WB Connector Ramp	CURVE ELNB-1604WB-5	40 MPH
I-35 EL SB to LP 1604 WB Connector Ramp	CURVE ELSB-1604WB-2	40 MPH
I-35 EL SB to LP 1604 WB Connector Ramp	CURVE ELSB-1604WB-1	40 MPH

Table 19-5: Design Deviations for Minimum Radius

Roadway	Curve	Minimum Radius
I-410 EB to I-35 EL NB Connector Ramp	CURVE N410-ELNB-7	R = 675 ft
I-410 EB to I-35 EL SB Connector Ramp	CURVE N410-ELSB-1	R = 670 ft
I-35 EL SB to I-410 WB Connector Ramp	CURVE ELSB-N410-6	R = 644 ft'
LP 1604 EB to I-35 EL SB Connector Ramp	CURVE 1604EB-ELSB-6	R = 650 ft
LP 1604 EB to I-35 EL NB Connector Ramp	CURVE 1604EB-ELNB-3	R = 644 ft
I-35 EL NB to LP 1604 WB Connector Ramp	CURVE ELNB-1604WB-5	R = 674 ft
I-35 EL SB to LP 1604 WB Connector Ramp	CURVE ELSB-1604WB-1	R = 700 ft

Table 19-6: Design Deviations for Design Speed

Element	Alignment	Design Speed
Mainlane Ramp	EXRPSB35-TO	30 MPH
Mainlane Ramp	ENRPSBNW-35	40 MPH
Mainlane Ramp	ENRPEBLO	40 MPH
Mainlane Ramp	EXRPEBRB	40 MPH
Elevated Lanes Ramp	EXRPNBELEV	50 MPH
Elevated Lanes Ramp	ENRPSBELEV	50 MPH
Frontage Road	1604FR EB2	35 MPH
Frontage Road	1604FR WB	30 MPH

Table 19-7: Design Deviations for Frontage Road Lane Widths

No.	Location	Description of Deviation
1	I-35 Southbound Frontage Road from approximately STA 3620+00 to STA 3625+50	Restripe existing 12 ft lanes to 11 ft lanes to accommodate 4 ft sidewalk in front of drainage structure extension.

No.	Location	Description of Deviation
2	I-35 Northbound Frontage Road from approximately STA 3829+50 to 3831+50	Restripe existing 12 ft lanes to 11 ft lanes to accommodate 6 ft sidewalk and combination rail.
3	I-410N Westbound Frontage Road from approximately STA 81050+00 to 81056+00	Restripe existing 12 ft lanes to 11 ft lanes to accommodate a 4 ft sidewalk.

Table 19-8: Design Deviations for Turnaround Minimum Radii

No.	Location	Minimum Radius
1	LP 1604 at UPRR – Eastbound approach to turnaround	60 ft
2	LP 1604 at UPRR – Westbound approach to turnaround	60 ft

19.2.2.5 Design Exceptions

The Design Exceptions provided by TxDOT for the Project for lane width and shoulder width on existing facilities are listed in Table 19-10 and described in "I-35 NEX Central Design Exceptions" provided in the RIDs.

Table 19-10: Design Exceptions

DESIGN EXCEPTIONS FOR SHOULDER WIDTH	
Facility	**Description of Design Exceptions for Shoulder Width**
I-35 Northbound and Southbound Mainlanes	Reduced inside and/or outside shoulder width at various locations on mainlanes identified in the RID exhibit entitled "I-35 NEX Central Design Exceptions" to accommodate placement of proposed bridge columns and proposed OSBs.
I-410N and Loop 1604 Eastbound and Westbound Mainlanes	
I-35, I-410N and LP 1604 Mainlane Entrance and Exit Ramps	Reduced inside shoulder width for several entrance/exit ramps at various locations identified in the RID exhibit entitled "I-35 NEX Central Design Exceptions" to accommodate placement of proposed columns between mainlanes and frontage road.
DESIGN EXCEPTIONS FOR LANE WIDTH	
Facility	**Description of Design Exceptions for Lane Width**
I-35 Northbound and Southbound Mainlanes	Reduced lane width at various locations identified in the RID exhibit entitled "I-35 NEX Central Design Exceptions" including an extension of the existing 11 ft northbound mainlanes to just south of FM 3009 and adding proposed 11 ft auxiliary/acceleration lanes
I-410N Eastbound Mainlanes	Reduced lane width consisting of an additional 11 ft mainlane and 11' auxiliary mainlane between Haskin Drive (East of FM 2252) and Goldstar Drive (East of Starcrest Drive).

19.2.3 Miscellaneous Design Requirements

The border width, measured from back of curb, along frontage roads and crossing streets shall be 15 feet minimum, to the greatest extent possible, unless specified otherwise in these DB Specifications. At locations where a border width of 15 feet cannot be attained, DB Contractor may use the border width provided on the Schematic Design at that location as a minimum border width.

Where traffic barrier is necessary for mainlane pavement in the permanent configuration, DB Contractor shall utilize anchored Single Slope Concrete Barrier (SSCB) along the centerline and Single Slope Traffic Rail (SSTR) along the outside edge of mainlane pavement. DB Contractor shall use SSTR along mainlane ramps and at the base of retaining walls, where needed, for protection. Only cast-in-place or new, unused pre-cast barrier is allowed.

DB Contractor shall use San Antonio District Standards. District standards can be found at:

https://www.txdot.gov/inside-txdot/district/san-antonio/specinfo.html

19.2.3.1 Driveways

DB Contractor shall design driveways to be functionally adequate for existing land use of adjoining property and permits approved prior to the Effective Date. This shall be in accordance with the guidelines specified in TxDOT *Roadway Design Manual* – Appendix C, "Driveways Design Guidelines," provisions of which will be requirements for use on this Project. DB Contractor shall design driveways to utilize consistent pavement to the existing driveway pavement, except for unpaved existing driveways which shall accommodate the applicable land use.

19.3 Construction Requirements

DB Contractor shall conduct all Work necessary to meet the requirements for this Item 19 in accordance with the requirements of this Item 19 and TxDOT Standard Specifications.

19.4 Submittals

All Submittals described in this Item 19 shall be in accordance with the schedule and for the purpose (approval, review and comment, for information) set forth in Table 19-11. Acceptable electronic formats include Microsoft Word, Microsoft Excel, or Adobe Acrobat files, unless otherwise indicated.

Table 19-11: Submittals to TxDOT

Submittals	Submittal Schedule	TxDOT Action	Reference Section
Control of Access Deviations	As part of the Preliminary Design Submittal for proposed changes to access requirements	Approval	19.2.1

Item 20
Drainage

20.1 General Requirements

In the design of the drainage facilities and the modification of existing drainage facilities, DB Contractor shall account for all existing sources of runoff that may reach the Project, whether originating within or outside the Project ROW.

Unless otherwise identified in the Item 20, in areas outside the Project ROW or areas within the Project ROW but not affected by the Work, DB Contractor is not responsible for upgrading the existing drainage system whether or not it is determined to meet the criteria in the current TxDOT *Hydraulic Design Manua*l in the existing condition, unless the existing drainage system is physically impacted by the Work.

"Physical impact" in the context of this Item 20 and Item 21 shall mean any modification to an existing drainage component as a result of the Work, including any extension, realignment, or adjustment that changes the hydraulic characteristics of the existing drainage component resulting in an "adverse impact." A "physical impact" shall also include the placement of any additional structural loads on the existing drainage structure that compromises the structural integrity of the existing drainage component, such as embankment that exceeds the original structural design capacity of the component, settlements, and/or other structural impacts associated with the Project as further described in Section 21.2.9.

DB Contractor shall design the Project, including all drainage facilities, such that the revised or newly constructed drainage system will not increase flooding to properties outside the Project ROW. If existing drainage patterns or flows are revised during the Project design, DB Contractor shall design and construct a solution that does not have adverse impacts to property owners outside the Project ROW.

"Adverse impacts" for the purposes of this Item 20 are defined as impacts that have the potential to increase risk to health and human safety, cause or exacerbate flooding of developed structures or increase the number of structures in the 100-year floodplain resulting from the Work. If DB Contractor changes existing drainage patterns or flows during the Project design, DB Contractor shall design and construct a solution to avoid any adverse impacts. DB Contractor's drainage design shall contain any increase in water surface elevation (WSE) within either a drainage easement or channel banks to avoid any adverse impact.

DB Contractor's drainage design shall include assessments of pre- and post-construction conditions, as well as assessments of conditions during construction staging. DB Contractor shall ensure and demonstrate by performing such assessments that its drainage design does not cause any adverse impact to off-site property owners in terms of developability or marketability of their property. DB Contractor shall obtain appropriate drainage easements at its own cost if such easements are deemed necessary and have not previously been obtained by TxDOT. Grading activities and cross drainage structures needed outside of the Project ROW may require the acquisition of additional ROW.

DB Contractor shall meet the requirements specified in this Item 20 along with the requirements of the TxDOT *Hydraulic Design Manual*.

20.2 Administrative Requirements

20.2.1 Data Collection

To establish a drainage system that complies with the requirements and accommodates the historical hydrologic flows in the Project limits, DB Contractor is responsible for collecting all necessary data, including those elements outlined in this Section 20.2.1.

DB Contractor shall collect all available and applicable 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; FEMA mapped floodplains; and official documents concerning the Project, such as the Environmental Assessment (EA) 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. DB Contractor shall also identify watershed

boundaries, protected waters, county ditches, floodplains, and boundaries between regulatory agencies (e.g., watershed districts and watershed management organizations) that pertain to the Project.

DB Contractor shall acquire all available and applicable municipal drainage plans, watershed management plans, and records of citizen concerns. DB Contractor shall acquire all available and pertinent existing storm drain plans and existing survey data, including data for all culverts, drainage systems, and storm drain systems within the Project limits. DB Contractor shall also identify existing drainage areas that contribute to the highway drainage system and the estimated runoff used for design of the existing system.

DB Contractor shall obtain photogrammetric and GIS data within the Project limits that depicts the "Outstanding National Resource Waters" (ONRW) and impaired waters as listed by the TCEQ. DB Contractor shall conduct surveys for information not available from other sources.

DB Contractor shall create an inventory of all existing drainage facilities including structures, culverts, ditches, and storm drains within the Project corridor. The inventory must include the condition, size, material, location, status, videotape or photographs, and other pertinent information.

DB Contractor shall verify that all existing drainage components that are physically impacted by the Work meet the hydraulic and structural capacity requirements as defined in this Item 20 and Item 21. If any elements of the existing system are physically impacted by the Work and do not comply with the requirements of this Item 20 or Item 21, DB Contractor shall upgrade or replace those elements to meet such requirements.

If existing drainage system components are not physically impacted by the Work, then DB Contractor is not responsible for upgrading or replacing those existing drainage system components to meet the requirements of this Item 20 and 21.

The data collected pursuant to this Section 20.2.1 shall be used in the design of the drainage facilities.

20.2.2 Coordination with Other Agencies

DB Contractor shall coordinate all water resource issues with affected stakeholders and regulatory agencies. DB Contractor shall document the resolution of water resource issues.

DB Contractor shall coordinate with the local floodplain administrator and provide information relating to all FEMA drainage crossings and outfalls.

Drainage areas and structures that fall under the jurisdiction of the USACE shall comply with all USACE requirements. DB Contractor shall coordinate review and approval of the design and construction, if necessary, with the USACE. DB Contractor shall be responsible for obtaining applicable USACE permits.

In areas surrounding railroad facilities, DB Contractor shall coordinate the drainage design with the TxDOT District Railroad Coordinator and the appropriate railroad owner in accordance with Item 22.

20.3 Design Requirements

DB Contractor shall design all elements of the drainage facilities in accordance with this Item 20, the applicable design criteria, Good Industry Practice and the TxDOT *Hydraulic Design Manual*.

The design of temporary and proposed drainage systems shall meet the performance requirements as defined in this Item 20. DB Contractor may make use of existing drainage facilities, provided overall drainage requirements for the Project are achieved and the combined drainage system functions as required. Should a temporary or proposed drainage system tie to an existing drainage system, the connected existing system shall also be designed and reconfigured, as necessary, to ensure the temporary or proposed system meets the performance requirements as defined in this Item 20 or Item 21 while maintaining or improving the performance of the connected existing drainage system.

DB Contractor shall provide drainage facilities compatible with existing drainage systems and all applicable municipal drainage plans or approved systems on adjacent properties. DB Contractor shall preserve existing drainage patterns wherever possible. Modifications to existing drainage patterns should be minimized. DB Contractor bears full responsibility for the Final Design and its effects on property owners outside the Project ROW.

DB Contractor shall base its design on design computations and risk assessments for all aspects of Project drainage.

DB Contractor shall design roadside open channels such that the profiles have adequate grade to minimize sedimentation.

DB Contractor shall provide a drainage system that maintains or improves the existing drainage.

DB Contractor shall utilize the TxDOT statewide precast drainage standard sheets for inlets, manholes, and additional details as shown in the TxDOT Engineering Standard Sheets.

DB Contractor shall make available to TxDOT, as part of the Submittals, all native design files used in the hydrologic and hydraulic analyses to prepare computations and plans. Such native files include input and output data from SWMM, HEC-HMS, HEC-RAS, or HY-8 models, culvert hydraulic computations, drainage area reports, and rational method. The native files for the models and analyses should represent the record set submitted.

20.3.1 Surface Hydrology

20.3.1.1 Design Frequencies

DB Contractor shall use the design frequencies listed in Table 20-1 below.

20.3.1.2 Hydrologic Analysis

DB Contractor shall ensure that no adverse drainage impacts will result from the construction of the Project. DB Contractor shall evaluate and document the analysis confirming that the temporary drainage system and proposed drainage improvements do not result in any adverse impacts. Flood damage potential for the Project, while under construction and when completed, shall not exceed pre-Project conditions.

DB Contractor shall design drainage structures that intercept and convey flow from off-site through the Project (e.g., cross-culverts). Such structures shall be designed with sufficient capacity to accommodate existing off-site conditions.

Existing cross-culvert drainage structures that are physically impacted by the Work must be upgraded or replaced to accommodate existing off-site conditions and meet the hydraulic and structural capacity requirements defined in this Item 20 and Item 21

If existing cross-culvert structures are not physically impacted by the Work, then DB Contractor is not required to upgrade or replace such structures.

DB Contractor shall use the following criteria for developing runoff calculations:

- Run-off Coefficients:
  - Pavement (Asphalt) = 0.9
  - Pavement (Concrete) = 0.9
  - Unpaved areas within the Project ROW = 0.7
  - For areas outside the Project ROW:
    - Undeveloped = 0.35
    - Residential = 0.50
    - Commercial = 0.65
- Minimum Time of Concentration, Tc = 10 minutes
- DB Contractor's base hydraulic model shall reflect the most current as-built conditions.

20.3.1.3 Hydrologic Calculations

DB Contractor shall use the National Weather Services' Atlas 14 rainfall data for hydrologic calculations.

For the temporal distribution of Atlas 14 rainfall data, DB Contractor shall use the Balanced Storm Method, also known as the Frequency Storm in HEC-HMS, for SWMM model calculations, instead of NRCS Type II and III distributions. NRCS Type II and III distributions are no longer allowed for use in hydrologic modeling.

20.3.1.4 Mitigation of Hydrologic Impacts

The City of San Antonio has established a 'Mandatory Detention Area' map identifying areas that require mandatory detention for future projects within San Antonio city limits. The map is located in Appendix D of the "I-35 NEX Drainage Analysis Report" in the RIDs. Detention storage shall be provided for all crossings

located within the San Antonio Mandatory Detention Area as required to mitigate runoff impact volumes at these crossings. See Section 20.3.4 for detention storage pond requirements.

The increase in runoff volumes due to the increase in impervious cover between existing and proposed conditions may be mitigated by adding storage volume in ponds, roadside ditches and underground storage facilities, including storm drain pipes, as described in Section 20.3.4. DB Contractor is permitted to use restrictor pipes for in-line detention facilities. The use of restrictor plates is not permitted.

Table 20-1: Drainage Design Summary Table

	Design Annual Exceedance Probability (AEP)				
Functional classification and structure type	50% (2-yr)	20% (5-yr)	10% (10-yr)	4% (25-yr)	2% (50-yr)
Freeways (mainlanes):					
Culverts					X
Bridges+					X
Principal arterials:					
Culverts				X	
Small bridges+				X	
Major river crossings+					X
Minor arterials and collectors (including mainlane ramps and frontage roads):					
Culverts			X		
Small bridges+				X	
Major river crossings+					X
Local roads and streets:**					
Culverts			X		
Small bridges+			X		
Storm drain systems on interstates and controlled access highways (mainlanes, ramps and elevated lanes):					
Inlets, drain pipe, and roadside ditches			X		
Inlets, drain pipe for depressed roadways*					X
Storm drain systems on other highways and frontage roads:					
Inlets, drain pipe, and roadside ditches			X		
Inlets, drain pipe for depressed roadways*					X

Table 20-1 notes:
All facilities, including storm drain systems, must be evaluated to the check flood/1% AEP (100-yr) flood event. The purpose of the check flood evaluation is to ensure the safety of the drainage structure and downstream development by identifying significant risk to life or property in the event of capacity exceedance.
All features of the roadway facility shall be assessed under the 2-, 5-, 10-, 25-, and 50-year storm events to ensure no significant adverse impacts.
For structures extending underneath both mainlanes and frontage roads the structure shall be designed to the mainlane design AEP.
As a tributary of Cibolo Creek, classified as a major river crossing, Selma Creek is classified as a major stream crossing with the frontage road drainage structures classified as small bridges with a 25-year design AEP.
* A depressed roadway provides nowhere for water to drain even when the curb height is exceeded.
**Drainage design for existing local roads and streets shall meet existing condition or better; however, the design shall meet at a minimum the 20% AEP (5-yr).
+ It may be necessary to calculate the 4% (25-yr), 2% (50-yr), 0.5% (200-yr), or 0.2% (500-yr) AEP for scour computations. See the TxDOT *Geotechnical Manual*: *Chapter 5.*

20.3.2 Storm Drain Systems

Where precluded from handling runoff with open channels by physical site constraints, or as directed in this Item 20, DB Contractor shall design enclosed storm drain systems to collect and convey runoff to appropriate discharge points.

DB Contractor shall prepare a storm drain drainage report encompassing all storm drain systems that contains, at a minimum, the following items:

- Detailed table of contents and narrative of design methodology;
- Drainage area maps for each storm drain inlet with pertinent data, such as boundaries of the drainage area, best available 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;
- Location and tabulation of all existing and proposed pipe and drainage structures. These include size, class and gauge, detailed structure designs, and all special designs;
- Specifications for the pipe bedding material and structural pipe backfill on all proposed pipes and pipe alternates;
- 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;
- Complete documentation of DB Contractor's assessment of the potential for the Project to cause adverse impacts, including how adverse impacts are mitigated (if needed), and reasonable substantiation that the Project will not cause any significant adverse impacts; and
- Demonstration that the drainage design does not cause any adverse material impact to offsite property owners or that DB Contractor has obtained appropriate drainage easements.

This report shall be a component of the Drainage Design Report.

DB Contractor shall design all storm drain systems such that the hydraulic grade line for the design frequency event is no higher than one foot below:

- Gutter depression for curb inlet;
- The top of grate inlet; and
- The top of manhole cover.

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

The gutter depression used for curb and grate combination inlets shall not encroach into the travel lane if the gutter depression exceeds the normal cross slope.

DB Contractor shall place manholes or combination manholes and inlets wherever necessary for clean-out and inspection purposes. See Chapter 10, Section 7 of the *TxDOT Hydraulic Design Manual* for the manhole spacing criteria.

The use of "T" connections and "Y" connections in storm sewer systems is not permitted unless approved in writing by TxDOT.

The use of slotted drains or trench drains will not be allowed unless approved by TxDOT.

The use of slotted barriers is permitted in both temporary and permanent conditions provided that storm water runoff does not flow into adjacent travel lanes or fall onto roadways, pedestrian facilities, into waterways, or onto railroad ROW. DB Contractor shall not be permitted to mitigate impacts by using restrictor plates for in-line detention facilities.

Refer to Section 21.2.7 for requirements for underdrains and storm sewer systems adjacent to MSE retaining walls.

DB Contractor shall comply with TxDOT standards and specifications for storm drain pipe bedding and structural pipe backfill material.

20.3.2.1 Storm Drain System Solutions

DB Contractor shall design and construct storm drain system solutions at the following locations, which are intended to improve the existing drainage conditions by preventing runoff from ponding on the existing roadways:

- DB Contractor shall design and construct a RCP storm drain system adjacent to the I-35 southbound frontage road from approximately I-35 mainlane STA 3941+00 to 3950+50 to prevent ponding on the southbound frontage road. An exhibit entitled "Area 2 – Ultimate Option" showing the proposed location of the storm drain line is provided in "I-35 NEX Storm Drain System Solutions" in the RIDs.
- DB Contractor shall design and construct a RCP storm drain system under an existing raised median along the I-35 northbound frontage road that begins south of FM 3009 and extends north of FM 3009 from approximately I-35 mainlane STA 3967+50 to 3975+00 to prevent ponding along the outside edge of the I-35 northbound mainlanes. The storm drain should terminate at approximately STA 3975+00 as shown on the figure entitled "Area 3 – Ultimate Option" in "I-35 NEX Storm Drain System Solutions" provided in the RIDs and include regrading of the existing channel from the outfall at approximately STA 3975+00 to convey the runoff to the outfall further to the north at approximately STA 3980+50.
- DB Contractor shall design and construct a RCP storm drain system under the embankment slope between the I-35 southbound frontage road and southbound mainlanes just north of FM 3009 from approximately STA 3970+50 to 3977+00 to prevent ponding along the outside edge of the southbound mainlanes. An exhibit entitled "Area 4 – Ultimate Option 1" showing the proposed location of the storm drain line is provided in "I-35 NEX Storm Drain System Solutions" in the RIDs.

20.3.2.2 Pipes

DB Contractor shall meet the requirements set forth in Chapter 10 of the TxDOT *Hydraulic Design Manual.*

Storm drain pipes shall be designed to maintain a minimum velocity of three feet per second whenever feasible. If design flow velocities less than three feet per second are unavoidable, pipes shall be designed for full flow at 80% of the internal diameter to account for sedimentation in the pipe.

Other storm drain pipes shall be designed using the full internal diameter. Storm sewers shall be designed to prevent surcharging of the system at the flow rate for the design year event.

Pipes shall be designed to achieve a maximum velocity of 12 feet per second in the pipe.

All storm drains shall be designed and constructed to sustain all external loads with zero deflection and shall have positive seals at the pipe joints.

All pipes shall be reinforced concrete pipe (RCP), with the exception of vertical pipe drains for mechanically stabilized earth (MSE) walls and bridge deck drains.

On mainlanes, ramps, frontage roads, driveways, and cross-streets, the minimum storm drain pipe size inside diameter shall be 24 inches in accordance with Chapter 10, Section 7 of the TxDOT *Hydraulic Design Manual*. The minimum pipe size inside diameter of a discrete drainage system may be less than 24 inches if the drainage system is tying to an existing system that is in good condition and is of adequate size to properly convey the flow. The existing system must meet the performance requirements in this Item 20 and Item 21.

Where possible, storm drain systems shall be "gravity flow" designs with the hydraulic grade line designed in accordance with Section 20.3.2. Pressure flow design may be used at locations where the DB Contractor can demonstrate pressure flow is unavoidable or may provide benefit to the Project.

Trunk lines may be designed through the inlets.

Storm drain pipe requirements include:

- Pipe depth of cover: 1 foot desirable; 6 inches minimum (top of pipe to bottom of treated subgrade)
- Pipe slope: ≥0.50% desirable; 0.30% minimum
- Pipe flow velocities: 3 fps minimum; 12 fps maximum

- Outfall velocity criteria: 6 fps desirable; > 8 fps provide outfall protection

Outfall protection is required when outfall velocities for pipes exceed 8 fps. If the existing system is not impacted by the Work, then no additional outfall protection is required. If flow is added to the existing system and velocities in the existing pipes increase beyond 8 fps, then velocity-reducing devices are required.

20.3.2.3 Ponding

DB Contractor shall design drainage systems to limit ponding to the widths defined in Table 20-2 below for the design frequency event:

Table 20-2: Allowable Ponding Widths by Roadway Classification

Roadway Classification	Design Storm Allowable
Interstate, Controlled Access Highways	Shoulder width
Elevated Lanes	10 feet
Ramps, Direct Connectors	Shoulder width
Frontage Roads	One travel lane width
Minor Cross Streets	One travel lane width

Maximum carryover is 0.5 cfs.

20.3.3 Miscellaneous Drainage Design Requirements

DB Contractor shall design mainlane cross structures (culverts and bridge openings) in accordance with the TxDOT *Hydraulic Design Manual.*

DB Contractor shall examine water surface elevations to assure that the Project will not cause any adverse impacts to adjacent properties. A rise in water surface elevation can be considered as having no adverse impact if the rise is contained within either a drainage easement or channel banks.

20.3.3.1 Inlet Design Criteria

DB Contractor shall use TxDOT Statewide Standards for the design of curb inlets and drop inlets.

Curb extensions are limited to one 10' maximum curb extension.

Grate inlets within a roadway or driveway are not allowed.

DB Contractor shall design inlets in accordance with the criteria shown below in Table 20-3 and the TxDOT *Hydraulic Design Manual.*

Table 20-3: Inlet Design Criteria

Storm Drain Inlets	
Inlet Locations	1. On-grade: Place inlets to keep gutter ponding less than or equal to maximums, as defined in Section 20.3.2.2 Carryover is acceptable. 2. Low points: Inlet shall be located at low point of vertical curve, not at P.I. Place flanking inlets on both sides of low point at a maximum spacing of 100' from low point. 3. Redundant inlets: Inlets may be located at ends of curb returns at intersections if needed. 4. 100% flow interception: On pavement at end of retaining walls, at ramp gores, at intersections. 5. Inlets shall be placed outside the travel lanes.

Design drop inlets for the following criteria:

- Maximum ponding depth shall be 1 foot for the design frequency

- Area Reduction Factor = 0.5
- Perimeter Reduction Factor = 0.5

20.3.4 Stormwater Storage Facilities

DB Contractor shall complete design of the Stormwater Storage Facilities (SWSF) to meet State requirements for water quantity, and rate control.

DB Contractor shall comply with Chapter 13, Section 4 of the TxDOT *Hydraulic Design Manual* which shall be considered requirements to the extent they are not superseded by the requirements of this Item 20.

Types of SWSF include ponds, basins, and any other facilities including roadside channels and underground facilities including in-line detention facilities employed to detain quantities of storm water for a given period of time. Roadside ditches that are used as SWSF are not required to meet the minimum roadside ditch grade requirements.

A preliminary analysis was performed to determine the proposed detention storage for the proposed improvements and the recommended preliminary number of SWSF. The results are reported in the "I-35 NEX Drainage Analysis Report" contained in the RIDs.

DB Contractor shall be responsible for determining the size, number and locations of SWSF and shall ensure the SWSF comply with State requirements.

DB Contractor shall perform analyses including a detailed routing analysis for SWSF affected by significant environmental issues, such as hazardous waste or groundwater concerns.

20.3.4.1 SWSF Locations

DB Contractor shall analyze all applicable SWSF information and develop a "Storm Water Management Plan" for the Project incorporating the proposed SWSF locations. DB Contractor shall coordinate the proposed locations with TxDOT. DB Contractor shall design the Storm Water Management Plan to account for any regional SWSF.

20.3.4.2 Inlets and Outlets

DB Contractor shall design and construct the SWSF inlets to be above the vertical limits of the dead sediment storage volume. DB Contractor shall design and construct SWSF to prevent circuiting and discharge of floating debris (e.g., have a skimmer baffle). The maximum available outflow shall be limited to the existing 1% peak flow.

20.3.4.3 SWSF Depth and Shape

DB Contractor shall design and construct the SWSF in accordance with TxDOT design criteria.

The length-to-width ratio for SWSF shall be 3:1. Any length-to-width ratio variation shall require review and concurrence by TxDOT prior to completion of 100% design. A 10-foot bench, with a 10:1 slope or flatter, must be provided at the normal water level for safety and maintenance. In addition, DB Contractor shall comply with the rules contained in the Aggregate Quarry and Pit Safety Act which can be viewed at: http://www.txdot.gov/inside-txdot/division/maintenance/quarry.html

20.3.4.4 Freeboard and Spillway

A minimum of two (2) feet of vertical freeboard above the design flood elevations shall be provided on SWSF. All SWSF must have an emergency spillway sized to carry events beyond the 100-year event.

20.3.4.5 Design Details

DB Contractor shall include all inlet and outlet details, skimmers, and emergency spillway designs in the design. DB Contractor's drainage design must address safety and measures to secure access to SWSF.

20.3.4.6 Flood Routing

DB Contractor shall perform flood routing analyses and submit calculations to the reviewing authorities, such as municipalities, TCEQ, and USACE for approval.

20.3.4.7 Environmental Issues

DB Contractor shall include special analysis and documentation for SWSF affected by environmental issues in the Final Design, such as hazardous waste or groundwater concerns.

20.3.4.8 Documentation

DB Contractor shall include a graphic display (both paper and electronic format) showing what areas are treated by each SWSF with the design calculations provided to TxDOT. The display must also show those areas not treated.

20.3.5 Hydraulic Structures

20.3.5.1 Culverts

DB Contractor shall analyze existing and proposed culverts and drainage-ways physically impacted, replaced, or created by the Project 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.

The design year AEP water surface elevation for culvert structures physically impacted by the Work shall be no higher than the top of treated subgrade at the upstream end of the culvert, with the exception of the crossings listed below for which the design year AEP water surface elevation shall be no higher than the edge of pavement at the upstream end of the culvert.

- SAL-10 (2-7'x4' MBC @ Station 3546+80) for the 10-yr frontage road WSE and 50-yr mainlane WSE
- SAL-12 (4-6'x4' MBC @ Station 3622+84) for the 50-yr mainlane WSE.

Culverts shall be designed to maintain a minimum velocity of two feet per second if feasible. If design flow velocities less than two feet per second are unavoidable, DB Contractor shall design the culvert for full flow at 80% of the internal diameter to account for sedimentation in the culvert. Culverts shall be designed to achieve a maximum velocity of 8 feet per second in the culvert. If design flow velocities of greater than 8 feet per second are unavoidable, then DB Contractor shall provide a shear analysis and proposed mitigation strategies for TxDOT review and approval.

As feasible, culverts shall be designed to achieve a minimum tailwater velocity of two (2) feet per second, or a maximum tailwater velocity of eight feet per second. In the event the maximum desirable tailwater velocities are exceeded, velocity-reducing devices and outfall channel erosion protection shall be included in the design in order to reduce erosion at the culvert outlets. DB Contractor shall submit concepts for velocity-reducing devices for TxDOT approval prior to the first design submittal package. DB Contractor may request deviations for TxDOT approval during final design if it can be demonstrated that velocity-reducing devices are not required.

Culverts are classified as major or minor, as follows:

- Major Culvert: A culvert that provides an opening of more than 35 SF in single or multiple installations. A major culvert may consist of a single round pipe, pipe arch, open or closed-bottom box, bottomless arch, or multiple installations of these structures placed adjacent or contiguous as a unit. Culverts are classified as bridges when they provide an opening measured along the center of the roadway of more than 20 feet between spring lines of arches, or extreme ends of the openings for multiple box culverts; such culverts shall be included in the bridge inventory. Bridge class culverts shall have a minimum rise of 5 feet and design shall include drop-off protection. Major culverts should be analyzed using HEC-RAS.
- Minor Culvert: Any culvert not classified as a major culvert.

The minimum inside box culvert height dimension for all proposed box culverts shall be 3 feet. Existing box culverts that have inside height dimensions of less than 3 feet but that meet all other hydraulic requirements may be extended at their existing height.

Bridge class culverts shall be analyzed and designed using HEC-RAS. Minor culverts shall be analyzed and designed using HY8. DB Contractor shall analyze and design any culvert located in the floodplain using HEC-RAS.

The culvert hydraulic analysis shall include a thorough investigation of field conditions and appropriate survey data to develop hydraulic models to: evaluate water surface elevations, velocities and floodplain boundaries. DB Contractor shall coordinate the analysis and hydraulic models with the local floodplain administrator.

20.3.5.2 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.

20.3.5.3 Ditches

DB Contractor shall be responsible for the design of both normal and special ditch sections, as needed. When necessary, ditch linings shall be designed by DB Contractor according to Hydraulic Engineering Circular (HEC)-15. Open channels shall be designed to minimize sedimentation.

DB Contractor shall use the following drainage ditch design criteria:

Ditches between roadways:

- Design AEP = 10-year
- Flat-Bottom Ditch = 6-foot bottom width, 4:1 side slopes
- V-Ditch = 6:1 side slopes
- Minimum Ditch Slope = 0.5% (0.25% for concrete-lined ditches)

Ditches next to Project ROW line:

- Design AEP = 10-year
- Flat Bottom Ditch = 6-foot bottom width, 4:1 side slopes
- V-Ditch = 6:1 side slopes
- Minimum Ditch Slope = 0.5% (0.25% for concrete-lined ditches)

Roadside ditches shall be designed for the 10-year AEP irrespective of the design AEP of upstream drainage structures. DB Contractor shall design ditches for the 10-year AEP and mitigate any potential downstream impacts as needed to avoid adverse impacts.

All ditch lining types will be determined by the shear stress calculations for the design discharge procedure as contained in the TxDOT *Hydraulic Design Manual*.

Minimum 0.5 feet of freeboard shall be provided to the bottom of treated subgrade or to top of ditch, whichever is lower. For concrete-lined ditches with rip-rap slopes up to the top of the ditch bank, the design AEP WSE shall be lower than top of ditch bank.

20.3.5.4 Method Used to Estimate Flows

DB Contractor shall use methods outlined in the TxDOT *Hydraulic Design Manual* for flow determination. DB Contractor shall not use the regional regression method.

DB Contactor shall use Atlas 14 rainfall data for hydraulic analysis.

20.3.5.4.1 Design Frequency

Major waterway crossings, bridges, culverts, and storm drain systems shall be designed for the frequency corresponding to the roadway classification shown in Section 20.3.1.1. The functional classification for each roadway is shown in Item 19.

DB Contractor shall evaluate bridges for contraction scour and pier scour concerns in accordance with FHWA Hydraulic Engineering Circular No. 18 (HEC-18) – *Evaluating Scour at Bridges* and incorporate protection in accordance with Good Industry Practice. DB Contractor shall provide a scour analysis in accordance with TxDOT *Geotechnical Manual*, Chapter 5, Section 6 for all bridges. If necessary, DB Contractor shall provide countermeasures for any instability and scour problems in accordance with FHWA HEC-23 – *Bridge Scour and Stream Instability Countermeasures Experience Selection and Design Guidance*.

DB Contractor shall calculate the peak discharge for both existing and proposed conditions. Water surface profiles for design and check flood conditions shall be determined.

20.3.5.4.2 **Hydraulic Analysis**

DB Contractor shall use the most comprehensive available hydraulic models as design base models. For waterways mapped as FEMA Special Flood Hazard Area (SFHA), DB Contractor must comply with TxDOT *Hydraulic Design Manual* procedures, including coordination with the local floodplain administrator(s) and use of the current FEMA effective models to create revised effective and proposed effective models.

DB Contractor shall revise the FEMA effective model and shall include: any corrections for identified errors in the effective model if applicable, any more accurate surveyed data to be used, and any major developments that are not incorporated in the existing FEMA model but resulting in impacts to the model. The proposed effective model shall be based on the revised effective model as the baseline model by adding the proposed designs or changes to the baseline model.

DB Contractor shall coordinate with major adjacent developments that are pursuing a LOMR during the initial development period.

All mitigation measures to offset hydraulic impacts at cross drainage structures shall be located within the Project ROW. DB Contractor shall coordinate the proposed effective model and any mitigation measures for floodplain impacts with the local FEMA floodplain administrator.

DB Contractor shall design riprap at abutments in accordance with the procedures outlined in HEC-23. For bridge abutments in urban areas, DB Contractor shall install protection in accordance with the Project's aesthetic plan.

20.3.5.4.3 **Bridge/Culvert Waterway Design**

For existing crossings, DB Contractor shall analyze the existing structure using the proposed flows to ensure the headwater does not exceed allowable headwater elevations, as defined in Section 20.3.5.1. If the proposed drainage produces headwater elevations greater than those allowed by Section 20.3.5.1, DB Contractor shall design and construct a replacement structure with sufficient capacity to pass the required design-frequency flows and ensure the maximum headwater for the required 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.

When designing a bridge over waterways, DB Contractor design shall minimize changes to the existing channel. Bridge waterway design shall maintain the existing channel morphology through the structure. An existing bridge spanning a waterway shall not be replaced with a structure of a lesser total span than the original structure. New bridges spanning a waterway shall not result in a narrowing of the existing channel.

20.3.5.4.4 **Bridge Deck Drainage**

DB Contractor shall design bridge drainage systems in accordance with Chapter 9 Section 7 of the TxDOT *Hydraulic Design Manual* and TxDOT San Antonio District Standards.

Storm water flowing toward the bridge shall be intercepted upstream from the approach slab.

If ponding width limits are exceeded on the new bridges, then the runoff must be conveyed in a closed system within the bridge columns to the roadway drainage system below. The bridge deck drainage system shall outlet at the bottom of the substructure either into a storm drain system or into an open channel. In no case shall storm water be discharged against any part of the structure.

If inlets are located outside of the bent locations as a result of insufficient shoulder width, super elevation transitions or where sags in the roadway do not coincide with bridge bent locations, DB Contractor shall design inlets to drain into a suspended conduit between the bridge deck beams in order to improve the aesthetics of the bridge deck inlet system. For minimal maintenance intervention and ease of cleanout, any closed system conduit shall be designed to promote sufficient water velocities to be self-cleaning and avoid debris accumulation.

Open deck drains and slotted rail may be used to minimize the amount of bridge deck inlets in certain locations, provided runoff from the open deck drains or slotted rail do not fall onto roadways, pedestrian facilities, waterways, or railroad ROW below/under the open deck drains or slotted rail.

Deck drain pipes shall be a minimum of 8 inches. The use of "Y" connections is permitted for pipe drain connections for bridge deck drainage.

20.3.5.4.5 **Drainage Report for Major Stream Crossings**

DB Contractor shall prepare a drainage report for each major stream crossing. Major stream crossings are defined as waterways listed as a FEMA SFHA or requiring a bridge class structure, as defined in Section 20.3.5.1. Any other waterway will be a minor stream crossing.

The report shall include the detailed calculations, electronic and printed copies of the computer software input and output files, a discussion about hydrologic and hydraulic analysis, and reasons for the design recommendations. The report shall follow the Hydraulic Report Guidelines referenced and outlined in the TxDOT *Hydraulic Design Manual,* Chapter 3.

The report shall be a component of the Drainage Design Report.

Each major stream crossing report shall include, at a minimum:

- FEMA SFHA
  - FIRMette;
  - Discussion of SFHA and implications; and
  - Documentation of DB Contractor's coordination with the local floodplain administrator.
- Hydrology
  - Drainage area maps with watershed characteristics/parameterization including topography, both hardcopy and GIS format;
  - Hydrologic calculations (where computer software is used, both hardcopy and electronic input and output files); and
  - Historical or Site data used to review computed flows.
- Hydraulics and Recommended Waterway Opening and/or Structure
  - Photographs of the 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, as well as summary of the basis of the models;
  - Cross-sections of waterway (DB Contractor shall provide a hard copy plot, plus any electronic data used); and
  - 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; and
  - Recommendation for abutment protection.

DB Contractor shall provide bridge hydraulic summary sheets and bridge scour envelope sheets with projected scour calculation summaries for every bridge crossing a waterway in the Drainage Design Report.

DB Contractor shall provide a scour analysis report that is signed and sealed by a PE for each bridge class structure crossing a waterway. DB Contractor shall submit the scour analysis report for TxDOT review and comment in addition to including the report as a component of the Drainage Design Report.

20.4 **Drainage Design Report**

A preliminary Drainage Design Report shall be submitted with the Preliminary Design Submittal. The preliminary Drainage Design Report shall include at a minimum everything included in the Drainage Design Report as described in this Item 20.

Prior to construction of any drainage element, DB Contractor shall submit with the Final Design Submittal a final Drainage Design Report for each drainage element to TxDOT.

DB Contractor shall submit to TxDOT, as part of the Record Documents, a revision to the final Drainage Design Report, which shall be a complete documentation of all components of the Project's drainage system. The revision to the final Drainage Design Report shall document all changes to the drainage design made during construction. At a minimum, the Drainage Design Report shall include:

- Record set of all drainage computations, both hydrologic and hydraulic, and all support data including all geospatial data. If computations are in electronic format, the original format in which the computations were executed shall be submitted, such as XLSX for Microsoft Excel or XMCD for Mathcad.
- Hydrology/Hydraulic notes, models, and tabulations. Models are to be submitted in the original electronic format (e.g., GEOPAK drainage file – GDF, HEC-RAS – PRJ, Hydrologic Engineering Center's Hydrologic Modeling System (HEC-HMS)). Please note some programs such as HEC-HMS generate multiple files which are essential to the overall model. All files shall be included with the Submittal to ensure the results match those in the record set.
- Storm drain drainage reports.
- Bridge and culvert designs and reports for major stream crossings.
- Open channel design data.
- SWSF designs, including graphic display of treatment areas and maintenance guidelines for operation.
- Complete documentation of DB Contractor's assessment of the potential for the Project to cause adverse impacts, including how adverse impacts are mitigated (if needed), and reasonable substantiation that the Project will not cause or increase to damage to properties outside the Project ROW.
- Demonstration that DB Contractor has obtained appropriate drainage easements.
- Correspondence files that include:
  - Meeting minutes pertaining to drainage
  - Email and letter correspondence with all Governmental Entities pertaining to drainage and drainage studies
  - Letters to all Governmental Entities pertaining to drainage
- Drainage system data (location, type, material, size, and other pertinent information) in a GIS data format for the existing system to remain in place and the proposed system constructed in conjunction with this Project.

20.5 Construction Requirements

DB Contractor shall design drainage to accommodate construction staging. The design shall include temporary erosion control measures and other BMPs needed to satisfy the NPDES and other regulatory requirements. DB Contractor shall conduct all Work necessary to meet the requirements for this Item 20 in accordance with the requirements of this Item 20 and the TxDOT Standard Specifications, supplemented as needed by local governmental requirements.

The water resources notes in the plans shall include a description of the drainage design for each stage of construction, including temporary drainage elements.

20.6 Submittals

All Submittals described in this Item 20 shall be in accordance with the schedule and for the purpose (approval, review and comment, for information) set forth in Table 20-4. Acceptable electronic formats include Microsoft Word, Microsoft Excel, or Adobe Acrobat files, unless otherwise indicated.

Table 20-4: Submittals to TxDOT

Submittals	Submittal Schedule	TxDOT Action	Reference Section
All native design files used in the hydrologic and hydraulic analyses to prepare computations and plans	Upon request	Review and comment	20.3

Table 20-4: Submittals to TxDOT

Submittals	Submittal Schedule	TxDOT Action	Reference Section
Calculations of flood routing analyses	Prior to submittal of the applicable design submittal package	Approval	20.3.4.6
Shear analysis and proposed mitigation strategies for design flow velocities greater than 8 fps	Prior to submittal of the applicable design submittal package	Review and approval	20.3.5.1
Concepts for velocity-reducing devices	Prior to the first design submittal package	Approval	20.3.5.1
Hydraulic summary sheets and bridge scour envelope sheets with projected scour calculation summaries for every bridge crossing a waterway	As part of the Drainage Design Report	Review and comment	20.3.5.4.5
Scour analysis report	As part of the Drainage Design Report	Review and comment	20.3.5.4.5
Preliminary Drainage Design Report	Concurrent with the Preliminary Design Submittal	Review and comment	20.4
Final Drainage Design Report	Concurrent with the Final Design Submittal	Review and comment	20.4
Revision to the final Drainage Design Report	As part of Record Documents	Review and comment	20.4

Item 21
Structures

21.1 General Requirements

The structural Elements of the Project, including bridges, culverts, drainage structures, signage supports, illumination assemblies, traffic signals, retaining walls, and noise barriers, shall be designed and constructed in conformance with the requirements of the Contract Documents, TxDOT Engineering Standard Sheets, and AASHTO *LRFD Bridge Design Specifications,* except where directed otherwise by the TxDOT *Bridge Design Manual – LRFD,* TxDOT *Bridge Project Development Manual,* TxDOT *Geotechnical Manual* and TxDOT bridge design policy and information listed at http://www.txdot.gov/inside-txdot/division/bridge.html.

DB Contractor shall design bridges, retaining walls, noise barriers, and sign structures in conformance with the approved aesthetic schemes, guidelines, and standards as identified in Item 23.

Throughout the Term, DB Contractor shall allow access to TxDOT bridge inspectors performing National Bridge Inspection Standards (NBIS) inspections. DB Contractor shall coordinate with TxDOT 90 days prior to opening any portion of a new bridge to traffic to allow for the initial NBIS inspection by TxDOT.

21.1.1 Lead Structural Engineer

DB Contractor shall employ a Lead Structural Engineer responsible for overseeing the design and construction of all structural elements of the Project such that each element is complete and design requirements are met. The Lead Structural Engineer shall be a PE responsible for coordination of interdisciplinary design reviews in cooperation with leaders of other disciplines. The Lead Structural Engineer or PEs reporting directly to the Lead Structural Engineer shall be the Engineer of Record for the design of all structural elements on the Project.

21.2 Design Requirements

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. The Corridor Structure Type Study and Report shall clearly define DB Contractor's action to achieve a durable structure compatible with the AASHTO *LRFD Bridge Design Specifications* (or extended life if otherwise called for in the Contract Documents) for new Project bridges, walls, culverts and miscellaneous structures. Evaluation of existing structures within the Project limits that will be retained shall be included in the Corridor Structure Type Study and Report.

Bridges crossing over the Project shall, at a minimum, be designed to accommodate the configurations described in Item 19, including location of abutments, retaining walls, foundations, and substructures. DB Contractor shall design bridge structures required for the Project, if applicable, to the total length and span arrangement required, including spanning lanes that will be constructed below the structure.

21.2.1 NBI Reporting Procedures

Upon completion of the bridge layout during the design phase, DB Contractor shall coordinate with the TxDOT San Antonio District Bridge Engineer to obtain permanent structure numbers for all bridges and bridge class culverts. This will require an approved bridge layout and completion of the permanent structure number request form. The NBI numbers shall be shown on the applicable layout sheets of the Final Design Submittal.

DB Contractor shall stencil NBI numbers on all bridge structures consistent with the TxDOT San Antonio District Standard Sheet for Bridge NBI Number Stencil. DB Contractor shall stencil NBI numbers and bent numbers on all bridges with four or more spans. The NBI numbers and bent numbers shall be placed at locations directed by TxDOT.

21.2.2 Design Parameters

Unless otherwise noted, design for all roadway structural elements shall be based on the LRFD methodology included in the TxDOT *Bridge Design Manual – LRFD*, TxDOT bridge design policy and information listed at http://www.txdot.gov/inside-txdot/division/bridge.html, and the AASHTO *LRFD Bridge Design Specifications*.

Design of Project structures, foundations, embankments, walls, excavations, retained structures, slopes, bridges, and other related design features as well as soil exploration frequencies, and boring requirements shall be in compliance with provisions of the TxDOT *Geotechnical Manual* and in accordance with the provisions of Item 16. Where design requirements are not specified in the TxDOT *Geotechnical Manual*, the following FHWA manuals and guidance provided at https://www.fhwa.dot.gov/engineering/geotech/library_listing.cfm shall be used in their entirety:

- Geotechnical Engineering Circular No. 7 - *Soil Nail Walls*
- Geotechnical Engineering Circular No. 10 - *Drilled Shafts: Construction Procedures and LRFD Design Methods*
- Geotechnical Engineering Circular No. 11 - *Design and Construction of Mechanically Stabilized Earth Walls and Reinforced Soil Slopes*
- Geotechnical Engineering Circular No. 12 - *Design and Construction of Driven Pile Foundations*

For areas with potential for karstic subsurface conditions under foundations and retaining walls, DB Contractor shall provide sufficient testing frequency and testing methods to account for karstic subsurface conditions and to facilitate the design and construction of foundations and retaining walls. In accounting for karstic subsurface conditions, DB Contractor shall incorporate testing and design that includes geophysical investigation, conformance to environmental requirements, consideration of both lateral and vertical load carrying capacity, impact to construction methods, and a mitigation plan for foundations and retaining walls in, over and around karstic subsurface condition.

If a Karst Feature is discovered, DB Contractor shall follow the karst protocol found in Attachment 21-1: San Antonio Karst Protocol for Structural Elements.

DB Contractor shall design, rehabilitate and modify existing bridge structures not originally designed to LRFD specifications to the design requirements and specifications described in the AASHTO *Standard Specifications for Highway Bridges* that applied to the original design of such existing bridge structures. In no event shall any modified or rehabilitated bridge structure fail to meet HS-24 operating rating for a condition state of 5 or better. The HS-24 load is depicted on the exhibit "HS-24 Design Truck" provided in the RIDs. Design of widening of existing bridge structures shall be based on the LRFD methodology included in the TxDOT *Bridge Design Manual - LRFD*, HL-93 loading and the AASHTO *LRFD Bridge Design Specifications,* and adhere to the TxDOT *Bridge Design Guide*, unless noted otherwise.

DB Contractor is prohibited from using segmental superstructure construction of the northbound and southbound elevated lanes, within the station ranges defined in Section 19.2.2.2.2, in order to accommodate the future connection to Wurzbach Parkway.Bridge span lengths shall span the typical section widths of the roadways below, including appropriate clear distance unless otherwise shown on the Schematic Design or approved by TxDOT.

Steel bridge design shall comply with TxDOT *Preferred Practices for Steel Bridge Design, Fabrication, and Erection*.

Corrosion protection measures shall be in accordance with TxDOT Bridge Division and San Antonio District's practices. Specific corrosion protection measures can be found at http://www.txdot.gov/inside-txdot/division/bridge/specifications/super-corrosion.html and District-specific requirements can be found at http://ftp.dot.state.tx.us/pub/txdot-info/library/pubs/bus/bridge/district-corrosion.pdf. DB Contractor shall adhere to additional corrosion requirements outlined in Section 21.2.4.

Segmental bridges shall conform to the requirements of the AASHTO *LRFD Bridge Design Specifications* except where directed otherwise by the TxDOT *Bridge Design Manual – LRFD*.

Hydraulic design shall be in accordance with the provisions of Item 20.

DB Contractor shall provide structural design of signs, luminaires, and traffic signals in accordance with the AASHTO *Standard Specifications for Structural Supports for Highway Signs, Luminaires, and Traffic Signals*.

Falsework, shoring, and other temporary supports shall be designed in accordance with the AASHTO *Guide Design Specifications for Bridge Temporary Works* and shall be compliant with OSHA and local jurisdictional standards and requirements.

Load ratings shall be in accordance with the AASHTO *Manual for Bridge Evaluation* and the TxDOT *Bridge Inspection Manual*.

DB Contractor shall design bridge units without any uplift at supports under all load conditions.

DB Contractor shall ensure that bridges crossing over waterways shall meet the structural load and resistance requirements for a 100-year frequency event as outlined within the AASHTO *LRFD Bridge Design Specifications* with design for flood scour in accordance with TxDOT *Geotechnical Manual*, Chapter 5, Section 6. DB Contractor shall ensure all applicable requirements of FHWA *HECs* are met for bridge structures.

Unless otherwise directed, DB Contractor shall ensure at least 1 foot of clearance between the design-year frequency water surface elevation described in Item 20 and the low chord of bridges crossing over waterways for bridges physically impacted by the Work. For existing bridges over waterways identified to be widened, the widened portion shall meet or exceed the 1 foot of clearance between the design-year frequency water surface elevation and the low chord of bridges. The requirement to provide 1 foot of clearance between the design-year frequency water surface elevation and the low chord of the widened portion of the northbound frontage bridge over Selma Creek is not required.

At TxDOT's request during the Term, all electronic and hard copies of files and design calculations shall be made available with the Preliminary Design Submittal of elements related to the request. All files and calculations (bridge design notes) shall be submitted with the Record Documents in accordance with the TxDOT Bridge Division's Procedure for Archiving Bridge Design Notes in Chapter 6 of the TxDOT *Quality Control and Quality Assurance Guide* and other requirements of the Contract Documents. DB Contractor shall submit load rating calculations, including input and output files, for TxDOT review and comment, for all new or widened bridges and all new or widened bridge class culverts no later than the start of construction of those structures.

Sidewalks and bicycle lanes shall be provided on bridge structures as shown on the Schematic Design and in accordance with the provisions of Item 19 and Item 28. DB Contractor shall design sidewalks to meet the criteria of the AASHTO *A Policy on Geometric Design of Highways and Streets* and the AASHTO *Guide for the Planning, Design, and Operation of Pedestrian Facilities*. Pedestrian bridges shall additionally conform to the requirements of AASHTO *LRFD Guide Specifications for the Design of Pedestrian Bridges*.

21.2.3 Bridge Design Loads and Load Ratings

All roadway bridges and bridge class culverts shall be designed to accommodate the following live loads:

- New Construction: A vehicular design load designated HL-93 consisting of the design truck or the design tandem, and the design lane load as defined in the AASHTO *LRFD Bridge Design Specifications* shall be utilized for bridges. Sidewalks of vehicular bridges shall be loaded in accordance with requirements in the AASHTO *LRFD Bridge Design Specifications*.
- Existing Bridge Structures: Load rating with a rating factor of 1.0 for all Texas legal loads. Structures failing to meet this standard shall be rehabilitated to an operating load rating of rating factor of 1.0 for all Texas legal loads at the operating level or replaced using LRFD design and HL-93 loading.
- Existing Bridge Class Culverts: Load rating with a rating factor of 1.0 for all Texas legal loads. Structures failing to meet this standard shall be rehabilitated to an operating load rating of rating factor of 1.0 for all Texas legal loads at the operating level or replaced using LRFD design and HL-93 loading.
- Existing Bridge Widenings: HL-93 for widening and a minimum rating factor of 1.0 for all Texas legal loads for existing portion (designate both existing and widening loading on bridge layouts). Existing structures with an operating load rating exceeding rating factor of 1.0 for all Texas legal loads at the operating level shall not have their existing capacity reduced in the process of widening. Neither shall the service nor inventory load rating of any existing bridge components be reduced in the process of widening.

To meet requirements of Texas legal loads, load ratings for existing structures shall achieve an operating rating of 1.0 for HL-93 or HS-24 loading.

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 the 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*, to account for maintenance and emergency vehicles.

21.2.4 Bridge Decks and Superstructures

Fracture critical members shall not be used for bridge superstructures.

The type of bridge substructure and superstructure shall be restricted to those identified within the TxDOT *Bridge Design Manual – LRFD*.

Type A joints and armor joints are not permitted. If sealed expansion joints are used, only Type M joints is permitted.

DB Contractor shall minimize the number of bridge deck joints. DB Contractor shall locate joints to provide for maintenance accessibility and future replacement. Joints for all grade separation structures shall be sealed.

DB Contractor shall provide reinforcing steel in accordance with TxDOT provisions for corrosion protection measures.

For bridge widenings in Districts requiring corrosion resistant reinforcing (or equivalent measures), existing uncoated reinforcing in the bridge deck exposed during bridge deck removal shall receive an abrasive blast cleaning followed closely by an application of BASF Emaco P25, Sika Armatec 110 EpoCem, or Euclid Duralprep A.C. DB Contractor shall perform all cleaning Work in accordance with manufacturer's specifications. Cleaning and coating operations must be performed no more than seven (7) days prior to placement of the concrete. In the event more than seven (7) days is required between initial coating and bridge deck placement, DB Contractor shall apply a second coat of the same material used initially to the bars approximately one (1) day prior to placement of the concrete.

DB Contractor shall incorporate the following additional superstructure corrosion protection measures:

- 8.5-inch minimum concrete bridge deck thickness with 2.5-inch clear cover to the top mat of reinforcing steel; and
- High performance concrete or fiber reinforced concrete in the bridge deck.

In addition, DB contractor shall not waive the air entrainment requirement for bridge decks, approach slabs, and rails except as permitted by TxDOT in accordance with the District's corrosion protection measures.

DB Contractor shall make bridge superstructures, joints, and bearings accessible for long-term inspection and maintenance. DB Contractor shall make open-framed superstructures accessible with walkways or by use of ladders or an under-bridge inspection truck.

DB Contractor shall embed all conduits within bridge structures, with the exception that conduits shall not be embedded in bridge beams unless specifically approved by TxDOT. No exposed conduit will be allowed on bents, columns, outer face of exterior bridge beams, bridge slab overhangs, retaining walls, or any other visible surface unless specifically approved by TxDOT.

Box girders and caps (substructure) shall be accessible without impacting traffic below. DB Contractor shall make concrete box girders and caps (substructure) with a minimum inside depth of six feet to facilitate interior inspection. DB Contractor shall include a minimum access opening of 3-foot 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). Steel tub girders shall meet the guidelines in the TxDOT *Preferred Practices for Steel Bridge Design, Fabrication, and Erection*.

Cast-in-place slab spans widened with cast-in-place slab spans shall use a breakback detail that provides a full lap splice for the top and bottom transverse mats and shall not use a dowel detail for connection. Cast-in-place slab spans widened with prestressed concrete slab beams shall develop a shear key or other positive connection in the edge of beam in addition to connection details employed in the slab.

Prestressed I-beam spans widened with prestressed I-girders shall adhere to the following:

- Slab breakback line shall be located at the centerline or 4 inches outside of the centerline of existing beam;

- Existing transverse steel shall be cleaned and extended full length and lapped with transverse steel in widening. Pattern of reinforcing steel shall match that of the existing bridge and grade 60 reinforcing shall be used. The empirical deck allowances within the TxDOT *Bridge Design Manual – LRFD* do not apply to the widened deck;
- Thickened end slab may be used in the widened construction; and
- Proper bedding and strand extension for prestressed concrete panels used in the first beam bay shall be evaluated. If insufficient room exists, timber or permanent metal deck forms shall be used as forming in this bay.

Expansion joint systems in widenings shall have a water resistant seal and match the expansion joint system of the existing structure unless it has been retrofit with a header joint. DB Contractor shall evaluate the condition of the existing joint and replace full width if damage exists.

Bridge approach slabs shall be added to widenings with existing approach slabs. The widened approach slab details shall be thickened to the current standard thickness.

Segmental bridges shall additionally conform to the following:

- Segmental bridge decks shall use deck protection systems to prevent infiltration of corrosive agents into reinforcing steel in the superstructure. The deck protection system used shall minimize cracking and develop adequate bond strength with the superstructure.
- If monolithically cast overlay is used as part of the deck protection system, DB Contractor 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.
- The surface deck of a completed segmental unit shall achieve the desired ride quality using Surface Test Type A as specified in Item 585 of the TxDOT Standard Specifications. Grinding depth shall not exceed more than one inch to achieve correction.
- All expansion joints shall be sealed or drained.
- External tendons, if used, shall be protected with welded high-density polyethylene joints.
- The design, detail and construction of segmental bridges shall provide additional ducts or other means to allow for future post-tensioning. Flexible fillers are not permitted.

21.2.5 Bridge Substructure

Integral abutments, where the superstructure is structurally framed (either completely or partially) into the abutment, shall not be used unless approved by TxDOT. 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 or other settlement mitigation measures, if approved by TxDOT, shall be designed and constructed to mitigate settlement immediately behind abutment backwalls.

At cross streets, overpass bridge structures shall clear span all intersection pavement including through lanes, turn lanes on the Project and proposed future expansion configurations as identified in Item 19, “Roadway.” Bridge foundations and columns may be located between the cross street pavement and U-turns.

Spread footing foundations are not allowed.

Mono-shaft foundations are permitted and design of mono-shafts shall adhere to the requirements within AASHTO *LRFD Bridge Design Specifications*. For round columns to drilled shaft transitions in mono-shafts, DB Contractor shall adhere to the requirements in AASHTO *LRFD Bridge Design Specifications* Section 5.10.8.4.2a for non-contact splices. For rectangular columns to drilled shaft transitions in mono-shafts, DB Contractor shall adhere to the following requirements:

- Avoid non-contact splices where possible;
- If non-contact splices cannot be avoided, the λ_{rc} factor (reinforcement confinement factor) within AASHTO *LRFD Bridge Design Specifications* Section 5.10.8.2.1a shall not be used to reduce the required splice length; and
- If non-contact splices are employed with distances greater than 6 inches, the additional transverse reinforcement in non-circular columns must meet the following requirement:

$$S_{tr,col} = \frac{(n_{tr}) \times (A_{tr}) \times (f_{ytr}) \times (l_s)}{(A_{Tl}) \times (f_{ul})}$$

where, $S_{tr,col}$ is the spacing of column transverse reinforcement (in.); n_{tr} is the number of legs of column transverse reinforcement; A_{tr} is the area of column transverse reinforcement (in^2); f_{ytr} is the specified minimum yield strength of column transverse reinforcement (ksi); l_s is the standard required splice length (in.); A_{Tl} is the total area of longitudinal reinforcement in tension (in^2); and f_{ul} is the ultimate strength of longitudinal reinforcement (ksi).

DB Contractor may consider both skin friction and point bearing in drilled shaft design.

DB Contractor shall include groundwater elevations on bridge layouts when groundwater is present in the boring logs.

DB Contractor is permitted to conduct drilled shaft load testing for drilled shaft foundations based upon LRFD methodology. Pursuant to the TxDOT *Geotechnical Manual's* approach to deep foundation design, DB Contractor is not permitted to use load testing to refine skin friction and point bearing curves. Foundation load testing shall conform to the requirements of Item 405 of the TxDOT Standard Specifications for foundations designed using TxDOT methodology. For foundations designed using LRFD methodology, foundation load testing shall conform to the requirements within the AASHTO *LRFD Bridge Design Specifications*. Drilled shaft load testing results shall be consistent with recommendations from DB Contractor's Geotechnical Engineering Report and shall be submitted to TxDOT for approval as part of the Preliminary Design Submittal.

For each mono-shaft and each drilled shaft larger than 60-inch diameter, DB Contractor shall employ Thermal Integrity Profiler (TIP) testing of drilled shafts in accordance with TxDOT Special Specification 4021 to determine the integrity of drilled shafts. DB Contractor is permitted to use crosshole sonic logging (CSL) testing in place of TIP testing when the testing method is consistent with recommendations from DB Contractor's geotechnical report. DB Contractor shall submit drilled shaft TIP testing results to TxDOT for approval as part of the quality assurance procedure.

DB Contractor shall designate a substructure concrete element as mass concrete when any of the following apply:

- Least dimension of a concrete element is 5 feet or greater using non-high performance concrete;
- Least dimension of a concrete element is 6 feet or greater using high performance concrete; or
- Substructure concrete element uses Class H concrete with a concrete strength greater than 6,000 psi for post-tensioned straddle bent caps.

For a substructure concrete element designated as mass concrete, DB Contractor shall perform an analysis in TxDOT ConcreteWorks, or an equivalent method approved by TxDOT, to verify if mass concrete protocols are needed for a specific element. DB Contractor shall verify the mix design meets the criteria for temperature differential and maximum temperature for the pour. DB Contractor shall utilize the maximum cementitious content allowed for Class I cement and without fly ash for post-tensioned straddle bent caps.

DB Contractor shall construct elements designated as mass concrete in accordance with Items 420 and 421 of the TxDOT Standard Specifications.

DB Contractor may use reinforced concrete, prestressed concrete, or structural steel for straddle bents for bridge substructure design and construction. Control of service level cracking is required in reinforced concrete straddle bents to avoid appearance issues or long-term deterioration. Structural steel straddle bents shall not be fracture critical.

Fracture critical members shall not be used for bridges substructures. Steel box and plate substructure caps are typically considered fracture critical by the definition of load path redundancy. DB Contractor may use steel box or plate substructure caps only if DB Contractor submits to TxDOT and FHWA prior to construction, for review and approval, sufficient criteria and analytical methods to demonstrate the bridge substructure will have structural redundancy to achieve the goal of avoiding in-service fracture critical inspections. Demonstration of structural redundancy shall use criteria and analytical methods developed by the DB Contractor. DB Contractor shall meet the requirements set forth in AASHTO *Guide Specifications for Analysis and Identification of Fracture Critical Members and System Redundant Members*. Non-load path redundant steel tension members with structural redundancy shall conform to the fracture control plan

requirements of AASHTO and AWS. Provisions for durability that demonstrate a minimum 100 year service life are required.

Foundations of widened bridge sections are permitted to be of different type than the existing foundation for the widened bridge. Foundations shall be installed to the same depth or deeper than the existing foundation. DB Contractor shall provide a minimum clearance between the new foundation and the existing foundation of two times the least dimension of the new foundation and three times the least dimension of the new foundation measured center to center. If a foundation element is outside of the bounds of supporting the substructure due to adherence to the minimum clearance requirements, then DB Contractor shall design the new foundation considering group effect between the interaction of the existing foundations and the new foundations.

If the immediate adjacent substructure of a widened bridge section employs a tie beam or web wall, the tie beam or web wall shall be incorporated into the substructure widening, except if the existing bridge inspection report indicates that these components will cause measurable negative impacts to scour, debris accumulation, or excess stream force.

Abutment substructure components of widenings shall adhere to the following criteria:

- Widened cap shall match the width of the existing cap and connected with one or more foundations using a bent cap shear connection consisting of 4 ~ #6 dowels minimum using an epoxy post-installed connection, or larger as necessary; and
- If there is an existing backwall and if bearing area is sufficient for new superstructure, the widened backwall shall match the face of the existing backwall and connected by breaking back and providing a minimum splice length of horizontal steel.

Interior bents of widenings may consist of the following:

- Independent non-connected bents with one or more supporting columns;
- A connected bent with one or more columns using a bent cap shear connection consisting of 4 ~ #6 dowels minimum using an epoxy post-installed connection, or larger as necessary. Where column collision force evaluation is required, such a shear connection will not qualify for the use of two shear planes for column resistance unless the widening consists of more than two columns; or
- A connected bent with one or more columns using a bent cap shear and moment connection with mechanically coupled longitudinal reinforcing. DB Contractor shall verify that localized removal of end concrete in the existing bent cap does not compromise the existing bent's resistance relative to existing structural loads. Where column collision force evaluation is required, such a connection will qualify for the use of two shear planes for column resistance, regardless of the number of columns in the widening.

21.2.6 Bridge Railing and Barriers

All barrier systems used on the Project shall meet current crash test criteria as specified in the AASHTO *Manual for Assessing Safety Hardware* (MASH), TxDOT *Bridge Railing Manual,* and other safety requirements as determined by TxDOT. All testing and associated costs for non-standard railings shall be the sole responsibility of DB Contractor and shall be accomplished through a third party acceptable to TxDOT. A current list of standard railing is provided in the TxDOT *Bridge Railing Manual*. SSTR shall be utilized on bridge structures. DB Contractor shall protect sidewalks on high speed bridges from vehicular impact by using TxDOT-approved bridge railings.

DB Contractor shall not utilize traffic rails with steel elements unless required for compliance with Item 22 and Item 28.

For barrier on top of retaining walls, DB Contractor shall utilize a moment slab design in accordance with TxDOT Engineering Standard Sheet RW(TRF).

21.2.7 Retaining Walls

DB Contractor shall design and construct components of the Project to provide embankments without the use of retaining walls. Where earthen embankments are not feasible, DB Contractor may use retaining walls.

If DB Contractor's Work does not include wall impacts to an existing retaining wall, then DB Contractor is not required to reconstruct any portion of the existing retaining wall.

If an existing retaining wall is impacted by the Work, including disturbances to backfill, foundation soils, earth reinforcement, or soil excavated in front of a retaining wall, then DB Contractor shall perform a global stability analysis for that retaining wall to ensure the minimum factors of safety for global stability required by the TxDOT *Geotechnical Manual* have been maintained.

Existing retaining walls to be reconstructed and the limits of reconstruction, based on existing retaining wall conflicts with the Schematic Design, are identified in Table 21-1. If DB Contractor's Work includes wall impacts to an existing retaining wall greater than 10% of its length, measured parallel to the ground, then DB Contractor shall reconstruct the retaining wall in its entirety, with the exception of retaining wall nos. 11, 12, 20, 29, and 48. If DB Contractor's Work includes wall impacts to an existing retaining wall less than or equal to 10% of its length, measured parallel to the ground, then DB Contractor is only required to reconstruct the part of the retaining wall experiencing the wall impact. "Wall impact" in the context of this Item 21 shall include wall modifications, including changes to the front face of the retaining wall, removal of wall panels, removal of concrete elements, removal of foundations, or addition of notched sections.

If DB Contractor's Work results in impacts only within the Work limits provided in Table 21-1 for retaining wall nos. 11, 12, 20, 29 and 48, then DB Contractor is only required to reconstruct the part of the retaining wall experiencing the wall impact within those limits regardless of the percentage of wall impacted. If DB Contractor's Work results in impacts greater than the Work limits provided in Table 21-1 for retaining wall nos. 11, 12, 20, 29, and 48, then DB Contractor shall reconstruct the retaining wall in its entirety.

For all full and partially reconstructed retaining walls, DB Contractor shall identify the existing type of retaining wall to be reconstructed and provide a plan of removal for TxDOT review and approval as part of the Preliminary Design Submittal. DB Contractor shall reconstruct full and partially reconstructed retaining walls with approved wall types identified in the TxDOT *Geotechnical Manual* and in accordance with this Item 21.

DB Contractor shall design and construct new retaining walls, partial, and fully reconstructed retaining walls in accordance with the approved Aesthetic and Landscaping Plan and the requirements of Item 23. For existing retaining walls that are impacted by the Work, DB Contractor shall clean and paint portions of the partially reconstructed retaining walls that are not being reconstructed.

Existing bridge abutments are not required to be reconstructed due to impacts to adjacent existing retaining walls. DB Contractor shall clean and paint these existing bridge abutment walls in accordance with the approved Aesthetic and Landscaping Plan and the requirements of Item 23.

Table 21-1: Existing Retaining Walls to be Reconstructed that are Impacted by the Schematic Design

Retaining Wall No.	Roadway	Orientation	Alignment	Approximate Alignment Begin Station	Approximate Alignment End Station
1	I-35	I-35FR SB-I-35ML SB LT	CL I-35 ML	3456+69	3458+59
2	I-35	I-35FR SB-I-35ML SB RT	CL I-35 ML	3456+68	3458+79
3	I-35	I-410ML WB	CL I-35 ML	3491+20	3493+08
4	I-35	I-35ML NB	CL I-35 ML	3506+66	3523+51
5	I-35	I-35ML SB	CL I-35 ML	3516+25	3523+25
6	I-35	I-35ML SB	CL I-35 ML	3520+15	3531+96
7	I-35	I-35 SB EXIT @ THOUSAND OAKS/STARLIGHT RD	CL I-35 ML	3534+12	3537+95
8	I-35	I-35ML SB	CL I-35 ML	3534+12	3545+80
9	I-35	I-35ML SB	CL I-35 ML	3543+30	3551+25
10	I-35	I-35ML SB	CL I-35 ML	3558+25	3562+75

Table 21-1: Existing Retaining Walls to be Reconstructed that are Impacted by the Schematic Design

Retaining Wall No.	Roadway	Orientation	Alignment	Approximate Alignment Begin Station	Approximate Alignment End Station
11	I-35	I-35ML SB	CL I-35 ML	3560+10*	3563+00*
12	I-35	I-35ML SB	CL I-35 ML	3582+00*	3585+50*
13	I-35	EXRPSB35-NW	CL I-35 ML	3583+20	3593+16
14	I-35	I-35ML NB & NB I-35 EXIT @ O'CONNOR RD.	CL I-35 ML	3593+67	3606+65
15	I-35	SB I-35 ENT @ O'CONNOR RD.	CL I-35 ML	3597+05	3602+41
16	I-35	I-35ML NB	CL I-35 ML	3603+23	3610+00
17	I-35	I-35ML NB	CL I-35 ML	3610+00	3623+11
18	I-35	I-35ML SB	CL I-35 ML	3601+22	3617+84
19	I-35	I-35ML NB	CL I-35 ML	3633+13	3640+08
20	I-35	SB I-35 ENT @ JUDSON RD. & I-35ML SB	CL I-35 ML	3654+00*	3655+81*
21	I-35	I-35FR NB	CL I-35 ML	3648+40	3653+22
22	I-35	I-35ML NB	CL I-35 ML	3656+48	3661+25
23**	I-35	I-35ML SB	CL I-35 ML	3655+10	3658+00
24**	I-35	I-35ML SB	CL I-35 ML	3658+00	3672+67
25	I-35	I-35FR SB	CL I-35 ML	3667+93	3674+13
26	I-35	NB I-35 ENT @ TOEPPERWEIN RD.	CL I-35 ML	3689+82	3697+06
27	I-35	NB I-35 EXIT @ PAT BOOKER RD.	CL I-35 ML	3692+44	3696+20
28	I-35	NB I-35 EXIT @ PAT BOOKER RD.	CL I-35 ML	3693+31	3695+14
29	I-35	1604FR EB-I-35FR SB	CL I-35 ML	3747+25*	3747+90*
30	I-35	I-35FR NB	CL I-35 ML	3737+26	3742+37
31	I-35	I-35CD NB-1604CD EB	CL I-35 ML	3742+39	3746+76
32	I-35	I-35ML NB	CL I-35 ML	3772+88	3781+80
33	I-35	I-35ML SB	CL I-35 ML	3774+22	3783+70
34	I-35	I-35ML NB & EXRPNB3009	CL I-35 ML	3910+20	3935+04
35	I-35	I-35ML SB	CL I-35 ML	3910+97	3930+19
36	LP 1604	1604FR-WB	CL LP 1604 ML	4908+40	4915+50
37	LP 1604	1604FR-EB2	CL LP 1604 ML	4912+90	4922+41
38	LP 1604	1604UPEBTA	CL LP 1604 ML	4915+50	4922+41
39	LP 1604	1604FR-WB	CL LP 1604 ML	4923+00	4929+95

Table 21-1: Existing Retaining Walls to be Reconstructed that are Impacted by the Schematic Design

Retaining Wall No.	Roadway	Orientation	Alignment	Approximate Alignment Begin Station	Approximate Alignment End Station
40	LP 1604	1604FR-EB2	CL LP 1604 ML	4926+50	4929+71
41	LP 1604	1604UPWBTA	CL LP 1604 ML	4923+00	4926+50
42	LP 1604	1604EB-ELSB	CL LP 1604 ML	4933+43	4933+94
43	LP 1604	EXRPEBRB	CL LP 1604 ML	4937+30	4942+00
44	LP 1604	EXRPEBRB	CL LP 1604 ML	4944+40	4950+08
45	LP 1604	EXRPEBRB	CL LP 1604 ML	4944+41	4948+12
46	LP 1604	ELSB-1604WB	CL ELSB-1604WB	108+58	115+87
47	I-35	1604EB-ELNB	CL I-35 ML	3765+55	3771+10
48	I-410	1604EB-ELNB	CL I-410 ML	80965+00*	80966+65*

* The station limits provided are the retaining wall reconstruction limits.

** Wall nos. 23 and 24 comprise one continuous wall which is split into two separate walls to provide for separate allowable lane closures in Exhibit 15 of the DBA.

DB Contractor shall not use interlocking blocks for modular walls where surcharge loads from vehicular traffic are present.

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

Perched retaining walls (i.e. retaining walls founded in non-in situ soil, embankment fill, or manmade subgrade) are permitted, provided the walls adhere to the geometric revisions set forth on TxDOT Engineering Standard Sheet RW(MSE)DD and DB Contractor has demonstrated the design provides an adequate level of safety through a global stability analysis performed in accordance with Section 16.2.2.

The design of wall structures shall take into account live load surcharges. DB Contractor shall apply the appropriate live loading condition (vehicular, heavy rail, transit, etc.) to which each wall is subjected. These live load surcharges shall be based on AASHTO *LRFD Bridge Design Specifications*, AREMA *Manual for Railway Engineering*, or the requirements of the specific railroad and transit owner/operator.

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

DB Contractor shall use Type DS fill material as specified in Item 423 of the TxDOT Standard Specifications for retaining wall backfill material.

If pipe culverts are to extend through the retaining walls, the pipe shall be installed so that no joints in the pipe are located within two (2) feet of face of wall. Slip joints shall be placed on either side of the pipe and a headwall shall be placed over the portion of the pipe exiting the wall when any portion of the pipe exits the wall above finished ground.

Pipe for storm drain systems shall not run longitudinally within MSE retaining wall earth reinforcement zones unless approved by TxDOT.

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

Underdrains are required and shall be a minimum of six inches with cleanouts at a maximum of 300-foot spacing unless an alternative is approved by TxDOT. Underdrains shall be sloped to drain to permanent outfalls. The bottom of the retained fill shall be constructed with a 5% slope from front to back and have a longitudinal underdrain at the back of the straps/retaining wall fill. Outfalls, minimum slope, and flowlines shall be shown on the retaining wall layouts. During underdrain placement DB Contractor shall confirm the minimum slope shown on the retaining wall layouts is maintained from end to end of pipe.

The top of the retaining wall leveling pad shall be located a minimum of two feet below finished ground, unless approved by TxDOT.

DB Contractor shall use Attachment 21-2: MSE Retaining Wall Design Data for the design of MSE retaining walls. The length of earth reinforcements for MSE retaining walls shall be a minimum of either 8 feet or 70% of the wall height, whichever is greater. Earth reinforcement length shall be measured perpendicular to the wall. DB Contractor shall adjust skewed earth reinforcements as necessary to obtain the length required by this Item 21 and Section 16.2.2. Wall height shall be measured from the distance from the top of the leveling pad to the finished grade at the top of the wall.

Unless otherwise set forth in this Section 21.2.7, DB Contractor shall use approved MSE panel systems found at https://www.txdot.gov/business/resources/specifications/mse-wall.html, except for wall systems utilizing extensible earth reinforcement, which are not permitted.

DB Contractor shall provide specific minimum lengths of soil reinforcement. Soil reinforcement shall be properly modeled for global stability analysis. DB Contractor shall not model the reinforcing zone as infinite strength.

If verification load tests or proof load tests for soil/rock nail walls do not meet design criteria, DB Contractor shall notify TxDOT and stop installation of new nails until further instruction from TxDOT.

Retaining walls shall end as close as practical to proposed grade within limits of fabrication heights of wall panels. Riprap shall be used to channel water from flume behind walls to outlets and to avoid soil erosions at ends of walls.

21.2.8 Noise Barriers

DB Contractor shall design and construct all noise barriers to achieve the decibel reduction requirements in the NEPA Approvals and meet the aesthetic requirements in Item 23.

DB Contractor shall design and construct all noise barriers for 115 mph wind speed and exposure category C in accordance with AASHTO *LRFD Bridge Design Specifications*.

Any damage to noise barriers caused by DB Contractor-Related Entities shall be repaired in accordance with TxDOT Standard Specifications. Damage caused by third parties shall be repaired in accordance with the Contract Documents.

Panel design and construction shall limit the risk of falling debris resulting from traffic impacting the noise wall.

Timber noise barriers are not allowed.

If any portion of the existing noise barrier needs to be temporarily disassembled for any reason during construction, the noise barrier shall be reassembled and restored to its existing condition. DB Contractor shall repair all existing noise barriers that are damaged during construction within the Project limits.

If pipe culverts are to extend through the noise barriers, the pipe shall be installed so that no joints in the pipe are located within two feet of face of wall.

21.2.9 Drainage Structures

In developing the design of drainage structures, DB Contractor shall account for maximum anticipated loadings for the Project.

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

DB Contractor shall analyze existing drainage structures that are physically impacted by the Work for capacity and condition and as necessary retrofit or replace elements to accommodate required hydraulic capacity, and any additional structural loads, such as embankment that exceeds the original structural design capacity, settlements, and/or other structural impacts associated with the Project in accordance with TxDOT Standards and TxDOT Standard Specifications.

21.2.10 Sign, Illumination, and Traffic Signal Supports

DB Contractor shall provide structural design of signs, luminaires, and traffic signals in accordance with the AASHTO *Standard Specifications for Structural Supports for Highway Signs, Luminaires, and Traffic Signals*. DB Contractor shall design overhead and cantilever sign supports to accommodate the Project. Cantilever and sign bridge supports shall be placed outside the clear zone or shall be otherwise protected by

appropriate safety measures. Sign supports shall be provided at locations necessary to meet the signing requirements of the Project. Type O signs shall not be attached to the face of a bridge or otherwise attached to the bridge deck or rail at underpasses or overpasses. DB Contractor shall place bridge lighting brackets no more than ten feet from abutments or bents; however, in special circumstances, including conflicts with a physical feature of the bridge that does not permit typical attachment methods, the bridge lighting brackets may be placed a maximum of 20 feet from abutments and piers.

"Large guide signs," as defined by the TxDOT SHSD, shall not be mounted on bridges unless approved by TxDOT.

For overhead sign supports on bridges, DB Contractor shall indicate on bridge layouts a cantilever-type overhead sign support (COSS) founded on a bent cap or on an isolated concrete column on drilled shaft, or an overhead sign bridge (OSB) attached directly to the bridge superstructure. The location of any overhead sign support on bridges requires special design to be reviewed and approved by TxDOT.

21.2.11 Rehabilitation of Structures to be Widened, Extended, or Reused

Unless otherwise identified in Table 21-2, rehabilitation of existing bridges and bridge class culverts and widening of existing bridges and bridge class culverts will not be allowed, unless approved by TxDOT.

The following structures are to be widened, extended, or reused and shall be rehabilitated:

Table 21-2: Bridges to be Rehabilitated

Structure Number (NBI Number)	Feature Crossed	Facility Carried
15-015-0521-04-325	Perrin Beitel Road	IH 410 ML WB
15-095-0016-06-192	Cibolo Creek	IH 35 ML NB
15-095-0016-06-193	Cibolo Creek	IH 35 ML SB
15-015-0016-07-183	Selma Creek	IH 35 FR NB
15-015-0521-04-301	Salado Creek	IH 410 EB FR

The Bridge Condition Rating Summary provided in the RIDs contains a table that provides the most current condition ratings for structures.

DB Contractor shall rehabilitate any bridge component of an existing bridge or bridge class culvert identified in Table 21-2, or otherwise approved by TxDOT, that has a condition rating less than 7 as determined in the condition survey or upon DB Contractor discovery of any other defects. Rehabilitation must achieve a minimum condition rating of 7 for each structural component at Substantial Completion. Pier protection shall be added to existing two-column bents for structures to be reused. For any structures that will be reused, DB Contractor shall upgrade any substandard or obsolete rail.

DB Contractor shall clean and repair existing expansion joints and provide new full width seals for existing and widened structures including all existing open joints.

DB Contractor shall inspect all existing bridge bearings. As necessary, DB Contractor shall rehabilitate, repair, or replace existing bridge bearings to accommodate design loads and expansion.

DB Contractor shall patch and repair concrete spallings and concrete delaminations, clean and repair exposed reinforcing, seal cracks and repair or replace structurally damaged elements of existing structures.

DB Contractor shall perform concrete repair work in accordance with TxDOT's *Concrete Repair Manual*.

DB Contractor shall remove rust, clean, and paint all existing steel bridge superstructures and associated steel bridge bearings. DB Contractor shall perform a paint condition assessment for all painted structures prior to any rehabilitation activities. Recommendations to leave any existing coatings intact shall be submitted to TxDOT for approval prior to any rehabilitation activities.

Full bridge deck replacements shall consist of a minimum of 8.5-inch-thick Class S concrete bridge deck. Bridge beams/girders and substructures shall be rehabilitated or replaced as required to support the new bridge deck load in combination with live load specified in Section 21.2.3. Bridge widenings shall utilize an 8.5-inch-thick deck regardless of the deck thickness of the existing bridge. Existing decks less than 8.5-inch-

thick may only remain in place if the deck meets the bridge design load and rating criteria set forth in Section 21.2.3.

21.3 Construction Requirements

DB Contractor shall conduct all Work necessary to meet the requirements for this Item 21 in accordance with the requirements of this Item 21 and TxDOT Standard Specifications.

DB Contractor shall also conduct all Work for this Item 21 in accordance with the requirements of the following TxDOT special specifications and special provisions:

- TxDOT Special Specification Item 4021

21.3.1 Concrete Finishes

All concrete surfaces of new structures and structures to be reconstructed, widened, extended, or reused that do not have aesthetic treatments shall have a uniform texture and appearance. Painting or coating, where required as an aspect of the aesthetic treatment of the concrete, shall be uniform in appearance. Where the following do not have aesthetic treatments as identified in Item 23, Ordinary Surface Finish as defined by Sections 420.4.13 and 427.4.1.1 of the TxDOT Standard Specifications shall be applied as a minimum:

- Inside and top of inlets;
- Inside and top of manholes;
- Inside of sewer appurtenances;
- Inside of culvert barrels;
- Bottom of bridge decks between girders or beams;
- Vertical and bottom of surfaces of interior concrete beams or girders;
- Wingwalls and headwalls;
- Riprap, mowstrips and flumes; and
- Traffic railing.

21.3.2 Steel Finishes

If weathering steel is used, DB Contractor shall protect all components of the structure (superstructure and substructure) that are susceptible to corrosion and/or staining from weathering steel run-off.

21.3.3 Structure Metals

Welding shall be in accordance with the requirements of the AASHTO/American Welding Society D1.5 *Bridge Welding Code* and Item 448 of the TxDOT Standard Specifications.

21.3.4 Steel Erection

Steel erection shall be in accordance with AASHTO/NSBA Steel Bridge Collaboration S10.1-2014.

DB Contractor shall prepare steel erection drawings in accordance with the requirements of Item 441 of the TxDOT Standard Specifications for and shall submit the drawings for approval prior to steel erection.

DB Contractor shall use structural metal components in accordance with the requirements in Item 442 of the TxDOT Standard Specifications.

21.4 Submittals

All Submittals described in this Item 21 shall be in accordance with the schedule and for the purpose (approval, review and comment, for information) set forth in Table 21-3. Acceptable electronic formats include Microsoft Word, Microsoft Excel, or Adobe Acrobat files, unless otherwise indicated.

Table 21-3: Submittals to TxDOT

Submittals	Submittal Schedule	TxDOT Action	Reference Section
Corridor Structure Type Study and Report	Prior to the design of bridges, walls, bridge class culverts, sign structures and other miscellaneous structures	Review and comment	21.2
Design calculations and bridge structural details for future widened typical sections	As part of the Preliminary Design Submittal	Approval	21.2.2
Load rating calculations	Upon request and no later than the start of construction of elements related to the request	Review and comment	21.2.2
All electronic and paper copies of files and design calculations for requested elements	Upon request as part of the Preliminary Design Submittal	For information	21.2.2
Drilled shaft load testing results	As part of the Preliminary Design Submittal	Approval	21.2.5
Drilled shaft TIP testing results	After drilled shaft installation and before column placement	Approval	21.2.5
Criteria and analytical methods to demonstrate substructure structural redundancy	As part of the Preliminary Design Submittal	Approval	21.2.5
Type of existing retaining wall and plan of removal	As part of the Preliminary Design Submittal	Approval	21.2.7
Recommendations to leave any existing coatings intact	Prior to any rehabilitation activities	Approval	21.2.11
Steel erection drawings	Prior to steel erection	Approval	21.3.4

Item 22
Rail

22.1 **General Requirements**

This Item 22 defines the criteria required to design and construct rail corridors, rail facilities, rail structures, and rail line crossings within the Project ROW.

If the Project includes a rail corridor crossing within the Project ROW, DB Contractor shall prepare a geometric design for the rail corridor. DB Contractor'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.

DB Contractor shall ensure that the Project does not negatively impact the safety of railroad operations. DB Contractor shall coordinate the Work with the railroad to avoid impacts to railroad operations, except as specifically approved by the railroad.

DB Contractor shall be responsible for all fees, flagging charges, and inspection charges required by the railroad.

22.1.1 **Insurance Requirements**

If any railroad impacted by the Project requires insurance in addition to that required by the Contract Documents, DB Contractor shall procure such additional insurance at its own cost and submit copies of insurance policies to TxDOT prior to any entry upon operating railroad property.

22.2 **Railroad Design Standards**

The design for all railroad elements of the Project shall be based on the AREMA *Manual for Railway Engineering* and the requirements of the operating railroad. DB Contractor's design shall minimize service interruptions to existing rail lines.

All Work involving railroad companies, Work on railroad ROW, and the development and execution of railroad programs shall be in accordance with:

- The respective railroad;
- State and federal Law; and
- The practices, guidelines, procedures, and methods contained in TxDOT *Rail-Highway Operations Manual*.

Additionally, the requirements of the owner of each facility crossed shall be compared to the requirements in the TxDOT *Rail-Highway Operations 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 for 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 DB Contractor and crossing a rail line, shall be in accordance with the operating railroad's design criteria. DB Contractor shall coordinate with the operating railroad the design and construction of the construction staging, including any shooflies.

22.2.1 **Design Criteria**

DB Contractor shall avoid placement of temporary or permanent Project components inside railroad ROW to the extent possible. Any such placements inside railroad ROW require approval of the operating railroad. DB Contractor shall be responsible for obtaining required approvals.

22.3 **Administrative Requirements**

22.3.1 **Railroad Agreements**

TxDOT will obtain Preliminary Engineering Agreement(s) and the License to Cross and Construction and Maintenance Agreement(s) ("License Agreement") with the appropriate railroad company for all crossings

shown in the Schematic Design. DB Contractor shall be responsible for obtaining any other required approvals, permits, and agreements required for the Work, including any railroad-related Work or temporary haul roads, if needed.

DB Contractor shall be responsible for executing any required payment agreements with the railroad to reimburse the railroad for required activities during construction, such as license fees, flagging, and inspection. These agreements shall be between DB Contractor and the railroad.

For any preliminary activities on railroad ROW, DB Contractor shall be responsible for executing any necessary agreements with the railroad to enter railroad property and authorize the railroad to provide flagging or to pay for a railroad approved flagging vendor.

Construction and maintenance agreements shall be between TxDOT, the appropriate railroad company and appropriate Governmental Entities. TxDOT will reimburse the railroad for the C&M license fee, preliminary engineering costs and construction inspection costs only.

Current approved templates for TxDOT/railroad company agreements are available from the TxDOT Rail Division at Robert.Travis@txdot.gov.

The following agreements may be required based upon the railroad's requirements:

- Preliminary Engineering Agreement – Most railroads require preliminary engineering agreements in order to proceed with the development and review of plans. These agreements will be between TxDOT and the railroad. TxDOT will prepare and be responsible for executing any required preliminary engineering agreements with the railroad to reimburse the railroad for preliminary engineering and estimating performed by the railroad or its representative(s) attending project meetings, reviewing and approving designs, and developing any necessary cost estimates;
- License to Cross and Construction and Maintenance Agreement ("License Agreement") – TxDOT will prepare the draft License Agreement to be executed between the railroad, and TxDOT. A license to cross railroad ROW is normally required for any work in railroad ROW, including but not limited to when the highway project involves a new crossing or grade separation of the railroad, modification of existing structures or work on the common ROW. TxDOT will prepare all the documents required to obtain the License Agreement, including preparation of the plans and specifications and estimates,. TxDOT will prepare a complete and final License Agreement to for the DB Contractor prior to performing any work within the affected railroad ROW. DB Contractor shall provide a final ready to construct/ 100% planset to TxDOT and to Railroad for Railroad review and approval. The License Agreement shall provide for each party's access to the applicable facilities for regular inspection, and maintenance, as well as emergency repairs as required; and
- Railroad's Contractor ROE Agreements (Texas-approved versions only) – In order to enter the railroad's ROW to perform the Work, DB Contractor or its Subcontractor shall secure a railroad ROE agreement and shall coordinate the arrangements of the agreement directly with the railroad.
- Temporary Haul Road. If the DB contractor desires a temporary haul road across the railroad track(s), the DB Contractor will be solely responsible for acquiring the railroad approval including any and all fees.

All executed agreements shall be submitted in their entirety as part of the Record Documents.

22.3.2 Operation Safety

DB Contractor shall arrange with the operating railroad for railroad flagging as required. DB Contractor 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 and shall maintain current registration prior to working on railroad property.

If not detailed in the respective railroad's Right of Entry agreement, or if not directed otherwise by the respective railroad, DB Contractor shall notify the respective railroad representative at least ten Business Days in advance of DB Contractor commencing its Work and at least 30 Business Days in advance of any Work by DB Contractor in which any person or equipment will be within 25 feet of any track, or will be near enough to any track that any equipment extension such as, but not limited to, a crane boom will reach within 25 feet of any track. No Work of any kind shall be performed, and no person, equipment, machinery, tool(s),

material(s), vehicle(s), or thing(s) shall be located, operated, placed, or stored within 25 feet of any track(s) unless authorized by the railroad. Upon receipt of such 30-Business Day notice, the railroad representative will determine and inform DB Contractor whether a flagman need be present and whether DB Contractor needs to implement any special protective or safety measures.

22.3.3 DB Contractor ROE Agreement

DB Contractor shall cooperate and coordinate with all operating railroads for access by the operating railroad and/or their agents to the railroad ROW as necessary for rail maintenance and operations activities, inspection, repair and emergency responses.

22.4 Construction Requirements

DB Contractor shall comply with all construction requirements and specifications set forth by the operating railroad and shall invite the appropriate railroad company to pre-construction meetings for work to be performed within the railroad's ROW.

DB Contractor shall be responsible for scheduling the work to be completed by the operating railroad, as well as the work to be completed by its own forces. DB Contractor shall be responsible for all costs associated with its performance of the obligations in the railroad agreements, including any amendments, change orders, or force account work under such agreements.

The operation of the railroad and the affiliated railroads (those running through the railroad property in particular), and the operations of the lessees, licensees, and other lawful occupants of the railroad property, shall have absolute priority over the performance of construction for the Project. DB Contractor shall coordinate with the railroads to coordinate the Work with the operations of the railroads.

DB Contractor shall comply with the TxDOT Engineering Standard Sheets for railroad work found at the following link:

https://www.txdot.gov/inside-txdot/division/rail/requirements.html

22.4.1 Flagging

DB Contractor shall arrange for railroad flagging, as required by the railroad company, to ensure the safe passage of rail traffic throughout the Project limits affecting railroad ROW.

22.5 Submittals

All Submittals described in this Item 22 shall be in accordance with the schedule and for the purpose (approval, review and comment, for information) set forth in Table 22-1. Acceptable electronic formats include Microsoft Word, Microsoft Excel, or Adobe Acrobat files, unless otherwise indicated.

Table 22-1: Submittals to TxDOT

Submittals	Submittal Schedule	TxDOT Action	Reference Section
Copies of all additional or modified insurance policies	Prior to any entry upon operating railroad property	For Information	22.1.1
Draft License Agreement and documentation	Prior to TxDOT submitting the Draft License Agreement to the railroad	Review and comment	22.3.1
Final License Agreement for execution	Prior to performing any work within the affected railroad ROW	Approval	22.3.1
Fully executed railroad agreements	As part of the Records Documents	For information	22.3.1

Item 23
Aesthetics and Landscaping

23.1 General Requirements

This Item 23 defines requirements with which DB Contractor shall design and construct 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 settings.

This Item 23 presents minimum aesthetics and landscape design requirements for Project designs. For purposes of this Item 23, the following list of items will be considered the aesthetics elements of the Project design:

- Material, finish, color, shape, and texture of bridge elements;
- Materials, finish, and color of barriers and railings;
- Paved slope treatments;
- Finish, color, and texture of retaining and noise/sound walls;
- Contour grading, slope rounding, channel treatments, and drainage;
- Sculptural and artistic features of other structures;
- Sidewalks, medians, or pedestrian specialty paving, including material, finish, and color;
- Hardscape at interchanges and intersections;
- Gateway and wayfinding markers;
- Fencing;
- Signage – overhead, attached, and ground-mounted;
- Any permanent building construction within the Project, including ancillary and operational support; and
- Light fixture, ambient light colors, and general layout conditions.

23.1.1 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.

It shall be understood that, with TxDOT approval, the aesthetic concepts for components of the Project corridor may need to be adapted to the site-specific conditions of the Project.

DB Contractor shall adhere to the approved San Antonio District Urban Design Themes for Bexar and Outlying Counties dated December 2005 presented in the RIDs, which are hereby incorporated by this reference in preparing the preliminary Aesthetics Concept and subsequent Aesthetics and Landscaping Plan.

DB Contractor shall prepare a preliminary Aesthetics Concept of the Project that incorporates the design intent of the San Antonio District Urban Design Themes for review and comment by TxDOT. The preliminary Aesthetics Concept shall incorporate the proposed transition from the Mission Region Theme to the Hill County Region Theme as presented in Attachment 23-1: I-35 NEX Urban Design Theme Transition.

The preliminary Aesthetics Concept shall also use San Antonio District Standards:

- Hill Country Theme Cantilever Overhead Sign Bridge (COSB) and Overhead Sign Bridge (OSB), and
- Mission Theme COSB and OSB

which supersede the design details for overhead sign bridges included in the San Antonio District Urban Design Themes.

DB Contractor shall prepare a final Aesthetics Concept and submit it to TxDOT for approval within 60 Days of issuance of NTP2. The approved Aesthetics Concept shall be incorporated into the Aesthetics and Landscaping Plan.

23.1.2 Aesthetics and Landscaping Plan

DB Contractor shall prepare an Aesthetics and Landscaping Plan in conformance with the Project's approved final Aesthetics Concept which provides guidelines and requirements for the aesthetics and landscaping design of the Project. DB Contractor shall submit the Aesthetics and Landscaping Plan to TxDOT for review and approval within 120 Days of issuance of NTP2. The Aesthetics and Landscaping Plan shall provide guidelines and requirements for the aesthetics and landscaping design of the Project.

The Aesthetics and Landscaping Plan shall include all elements to fully describe the aesthetic and landscaping treatment that will apply to each element of the Project, shall meet the requirements of all standards and documents identified or otherwise specified within this Item 23, and shall address the following requirements.

23.1.2.1 Aesthetics

The Aesthetics and Landscaping Plan shall include:

- 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);
- All plans, sections, elevations, perspectives, isometrics, etc., as needed to fully communicate the aesthetic treatment and approach to aesthetic elements, including walls, noise/sound walls, bridges, traffic rail, landscape pavers, and signage structures;
- Drawings showing locations of site-specific elements (i.e., fences, signage, colored lighting, potential locations of TxDOT approved community improvement opportunity areas, gate way markers, bridge enhancements, and landscaping); and
- Drawings showing color schemes and identifying the locations where such color schemes will be applied throughout the Project.

23.1.2.2 Landscaping

This section is omitted since this project does not include landscaping.

23.1.3 Personnel

DB Contractor shall provide a landscape architect, registered in the State of Texas, with experience in designing aesthetics and landscaping elements for roadway projects of similar scope and size to develop the Aesthetics Concept and the Aesthetics and Landscaping Plan.

Prior to commencing DB Contractor's aesthetics concept and aesthetics and landscape design, DB Contractor's landscape architect shall request and participate in a "kick-off" meeting at the District offices with the District's landscape architect, or District-appointed designee. DB Contractor's landscape architect shall coordinate with the District's landscape architect, or the District-appointed designee, throughout the design process to ensure compliance with the plans, guidelines, and standards set forth in this Item 23. DB Contractor's landscape architect shall coordinate in advance with the District landscape architect, or the District-appointed designee, the scheduling of design reviews of the Aesthetics and Landscaping Plan and subsequent aesthetic and landscape construction activities.

23.2 Design Requirements

23.2.1 Aesthetics Principles and Strategies

DB Contractor shall follow the guidelines and requirements of the approved Aesthetics and Landscaping Plan, as well as the aesthetics principles, requirements, and strategies established by TxDOT for the Project design, including the following:

- Aesthetics shall not interfere with safety, constructability, or maintenance requirements;
- The Project design shall minimize impact on the existing natural environment to the extent possible;
- The Project design shall emphasize and enhance the existing natural context and landscape to the fullest extent possible;

- Simple geometric shapes for structures shall be used to the extent possible for continuity along the entire length of the Project;
- All bridges and other structures shall be simplified in their design, and to the greatest extent possible, kept small in size, bulk, and mass;
- All structures shall be carefully detailed so as to achieve the greatest level of aesthetic quality and conform to the approved Aesthetic and Landscaping Plan;
- Color, texture, and form shall be used appropriately for all structures;
- Graphics, signage, and lighting shall be consistent along the entire length of the Project;
- Existing native trees and established naturalized trees and natural features shall be preserved to the greatest extent possible;
- Tree pruning and removal shall be consistent with San Antonio District Standard for Tree Pruning and Removal;
- TxDOT consent will be required in order to use a natural feature for erosion control;
- All unpaved areas and areas not covered by permanent structures shall be sodded;
- Aesthetic elements shall be fully integrated with the overall structure and landscape design;
- Aesthetic elements shall be easy to maintain and resistant to vandalism and graffiti; and
- Aesthetic elements shall conform to the approved Aesthetics and Landscaping Plan.

23.2.2 Walls and Sign Columns

DB Contractor shall design noise/sound walls to be similar in color, texture, style, and aesthetic treatment to retaining walls consistent with the approved Aesthetics and Landscaping Plan. DB Contractor shall apply aesthetic treatments to the vertical surfaces of retaining and noise/sound walls where the surface is visible from the roadway or adjacent residential dwelling units. Consistent aesthetic treatments that reflect the established design themes shall be used for retaining and noise/sound walls and exposed concrete column sign support structures. DB Contractor shall clearly detail and identify how wall patterns shall be incorporated into the chosen design solution in the Aesthetics and Landscaping Plan.

The roadside face of noise/sound walls shall have a consistent appearance throughout their length. The side of the noise/sound walls facing away from the roadway may vary based the approved Aesthetics and Landscaping Plan and, if so directed by TxDOT, community input gathered by DB Contractor.

23.2.3 Bridges and Other Structures

All aesthetic treatments for structural elements shall be coordinated with DB Contractor's structural design team to facilitate constructability and maintain safety requirements. All substructure columns, abutments, bridge rails, and other structures shall be consistent in form and texture with similar shapes and details used for all bridges and shall be designed in accordance with the approved Aesthetics and Landscaping Plan.

DB Contractor may use SSTR at Cross-over #1 in lieu of TxDOT Type T411 Traffic Railing (Texas Classic) required under the Mission Region Theme for mainlanes under a cross street.

DB Contractor shall ensure that an appearance of constant superstructure depth is maintained throughout each length of bridge consisting entirely of steel girders or concrete beams. To maintain this appearance of constant superstructure depth, DB Contractor shall maintain a constant superstructure depth for bridge units of at least four consecutive spans with no more than a two-step increase in beam type (i.e. TX40 to TX54) between bridge units of differing superstructure depth. For superstructures where both steel girders and concrete beams are used, the transition from concrete beams to steel girders may be accomplished by dapped end girders.

23.2.4 Trees, Shrubs, and Other Plant Materials

This section is omitted since this project does not include landscaping.

23.2.5 Riprap, Paving, and Pavers

Concrete paving, landscape pavers, and/or rock riprap shall be used in areas that are not accessible to tractor mowing equipment, are hard-to-reach mowing areas (typically less than two foot in width), or are adjacent to or under structures. These areas include, but are not limited to, areas of low sunlight, areas between, near, or next to guard fence posts, bent columns, retaining walls, freeway ramp gores, paved ditches, flumes, and ditch inlets. Concrete paving, landscape pavers, and/or rock riprap are to be used to

improve roadway appearance and maintenance. Landscape pavers shall be used in accordance with San Antonio District Standards for Colored Textured Concrete and Landscape Pavers for the Mission/Downtown Theme and the Hill Country Theme. Rock Riprap (Special) (Dry) and Rock Riprap (Special) (Grout) shall be used in accordance with the Miscellaneous Paving Details for both Hill Country and Mission Themes.

Concrete paving, landscape pavers, and rock riprap shall be applied per the approved Aesthetic and Landscaping Plan.

23.2.6 Color Palette

DB Contractor shall submit a plan that indicates where each color is to be applied to elements of throughout the Project in the Aesthetics Concept. This plan can be diagrammatic in nature but shall list each element and its colors. In addition to integrated colors, painting, and staining, DB Contractor may use colored lighting in selected areas to add color.

23.2.7 Lighting Aesthetics

This section omitted since this Project is using standard lighting.

23.3 Construction Requirements

DB Contractor shall conduct all Work necessary to meet the requirements for this Item 23 in accordance with the requirements of this Item 23 and the TxDOT Standard Specifications.

DB Contractor shall submit to TxDOT for review and approval, sample panels 30 days in advance of starting construction of textured concrete surfaces and landscape pavers. DB Contractor shall construct sample panels in accordance with Section 427.4.3.5 of the TxDOT Standard Specifications that comply with the principles, requirements, and strategies established by TxDOT and the approved Aesthetics and Landscaping Plan and San Antonio District standards. The sample panels must be reviewed and approved by TxDOT before any construction form liners, paint, or landscape pavers may be ordered, obtained, or used. DB Contractor shall provide sample panels equivalent to the size of the panels that will be installed when constructed with a representative un-textured surrounding surface. The approved sample panel shall be the standard of comparison for the production concrete surface texture.

For textured panels or concrete surfaces to be finished with a coating of paint or stain, DB Contractor shall prepare a corresponding coated panel or coat the surface area of an in-place element for TxDOT approval prior to the coating operation.

All sample panels shall be representative of the actual panel that will be placed. Primary, secondary, and accent colors shall be displayed on the sample panel.

23.4 Aesthetic and Landscaping Enhancements

If requested by TxDOT, DB Contractor shall provide adjacent Governmental Entities the opportunity to enhance aesthetic and landscaping features consistent with the requirements herein. The capital and maintenance costs of any TxDOT approved adjacent Governmental Entity improvements (aesthetic and landscaping enhancements) shall be the responsibility of the adjacent Governmental Entity. At TxDOT's request, DB Contractor shall coordinate the necessary arrangements directly with the appropriate local Governmental Entity for aesthetic enhancements within the local Governmental Entity's jurisdiction. DB Contractor shall coordinate with the Utility Owner(s) and ensure power service is initiated and provided/maintained for all irrigation controllers and aesthetic lighting within the Project during the Term.

Aesthetic enhancements shall be incorporated into the Aesthetics Concept.

23.5 Submittals

All Submittals described in this Item 23 shall be in accordance with the schedule and for the purpose (approval, review and comment, for information) set forth in Table 23-1. Acceptable electronic formats include Microsoft Word, Microsoft Excel, or Adobe Acrobat files, unless otherwise indicated.

Table 23-1: Submittals to TxDOT

Submittals	Submittal Schedule	TxDOT Action	Reference Section
Preliminary Aesthetic Concept	Prior to developing the Aesthetics and Landscaping Plan	Approval	23.1.1
Final Aesthetic Concept	Within 60 days of NTP2	Approval	23.1.1
Aesthetics and Landscaping Plan	Within 120 days of NTP2	Approval	23.1.2
Panel samples	30 days prior to starting construction of textured concrete surfaces and landscape pavers	Approval	23.3

Item 24
Signing, Delineation, Pavement Marking, Signalization, and Lighting

24.1 **General Requirements**

This Item 24 includes requirements with which DB Contractor shall design, construct, and maintain, all signs, delineation, pavement markings, signals, and lighting for the Project.

24.2 **Administrative Requirements**

24.2.1 **Meetings**

DB Contractor shall arrange and coordinate all meetings with local Governmental Entities that will assume responsibility for maintaining and operating traffic signals and roadway lighting. DB Contractor shall provide TxDOT with notification of such meetings a minimum of 48 hours prior to the start of the meeting. TxDOT may attend such meetings.

DB Contractor shall arrange and coordinate all meetings with Governmental Entities or other Persons requesting special signs.

24.3 **Design Requirements**

DB Contractor shall design all signing, delineation, pavement marking, and signalization in accordance with the TMUTCD and TxDOT SHSD, TxDOT *Freeway Signing Handbook,* TxDOT *Sign Crew Field Book,* TxDOT *Traffic Signals Manual,* TxDOT Engineering Standard Sheets, TxDOT Standard Specifications, and Good Industry Practice. DB Contractor shall design all illumination (lighting) in accordance with the TxDOT *Highway Illumination Manual*, NEC, AASHTO *Roadway Lighting Design Guide*, TxDOT Engineering Standard Sheets, TxDOT Standard Specifications, TxDOT Departmental Material Specifications, and Good Industry Practice.

DB Contractor shall also comply with the TxDOT *Sign Guidelines and Applications Manual*, the TxDOT *Pavement Marking Handbook*, and all applicable standards and forms published by the TxDOT San Antonio District at https://www.txdot.gov/inside-txdot/district/san-antonio/specinfo.html.

DB Contractor shall not use the wedge anchor system shown on TxDOT Statewide Standard SMD(TWT)-08.

DB Contractor shall only use approved products on TxDOT's Material Producer List (MPL) for "Triangular Slipbase Systems." Refer to "Crashworthy Small Roadside Sign Supports" category at https://www.txdot.gov/business/resources/producer-list.html.

24.3.1 **Preliminary Layouts**

DB Contractor shall submit, for TxDOT approval, a preliminary operational signing schematic prior to commencing Final Design. Design of the signing, delineation, pavement marking, signalization, and lighting shall be based on the approved preliminary operational signing schematic. Before placing any signs, delineation, non-standard sign structures, pavement markings, traffic signals, and lighting, DB Contractor shall provide TxDOT a schematic layout indicating the proposed location of such items. DB Contractor shall provide TxDOT advance notice of changes or revisions to sign locations included in the preliminary operational signing schematic. DB Contractor shall prepare a preliminary lighting layout, in a roll type format with photometric curves, and submit this to TxDOT for approval prior to commencing Final Design.

24.3.2 **Signing and Delineation**

DB Contractor shall design and install all signs as shown on the Released for Construction Documents. The term "signs" as used in this Item 24 includes new signs, as well as modifications to existing sign panels and structures. The use of existing sign structures by DB Contractor shall be subject to TxDOT approval. DB Contractor shall confirm the suitability of existing sign structures considered for use and shall be responsible for necessary modifications. DB Contractor's design shall include the locations of ground-mounted and overhead signs, graphic representation of all signs, proposed pavement markings, 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, DMS, lighting, and structures.

DB Contractor shall ensure that signs are located in a manner to provide adequate sight distance for legibility and proper response, provide clear direction and information for users, and comply with all applicable TMUTCD requirements.

Subject to Section 24.3.4, DB Contractor shall review with TxDOT all requests for new signs, including traffic generators, or modifications of existing sign legend. Such requests are subject to TxDOT approval.

DB Contractor's design and placement of delineators and object markers shall comply with the requirements of the TMUTCD, TxDOT SHSD, and TxDOT Engineering Standard sheets.

Signs on rails shall comply with TxDOT San Antonio District Standard, Special Sign Mount Details (1) (MOD).

DB Contractor shall replace signs, including school signs and flashers, affected by any local street improvements.

DB Contractor shall ensure all existing street name signs for cross streets are replaced or relocated and proposed street name signs are installed according to TMUTCD requirements.

24.3.3 Project Signs – Outside the Project ROW

For signs located outside the Project ROW but within a public ROW, DB Contractor shall install the signs in existing ROW controlled by local Governmental Entities or other State Governmental Entities. DB Contractor shall coordinate with appropriate Governmental Entities for DB Contractor's design and installation of such signs.

24.3.4 Third-Party Signs

TxDOT or Governmental Entities may request that third-party signs, including logo signs, be installed by a third party. DB Contractor shall coordinate and cooperate with any third party performing such work. TxDOT may solicit input from DB Contractor 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 will be borne by the sign applicant. If approved by TxDOT, TxDOT may require DB Contractor to fabricate and/or install these signs as a TxDOT-Directed Change.

DB Contractor shall maintain existing third-party signs and shall not remove, adjust, or relocate third-party signs without approval of the third party and TxDOT.

The company currently under contract with TxDOT for logo signs only is LoneStar Logos (512) 462-1310.

24.3.5 Sign Support Structures

DB Contractor shall determine foundation types and design sign foundations based upon geotechnical surveys/tests using Good Industry Practice. Designs for sign supports shall also comply with requirements in Item 21 and Item 23.

DB Contractor shall design sign support structures to provide a vertical clearance of not less than 25 feet from the highest point of the roadway to the centerline of the truss. Additionally, there shall be a vertical clearance of not less than 19 feet 6 inches between any point on the roadway and the bottom of the sign.

DB Contractor shall design all overhead sign structures for Zone 3, 80 mph wind zone, as shown in the TxDOT Wind Velocity and Ice Zones Standard.

Guide signs, except supplemental and traffic generator signs, shall not be ground-mounted alongside roadways with more than two lanes in a given direction.

If multiple signs are placed on a sign support structure and the vertical size difference among the signs is two feet or less, DB Contractor shall bottom justify the signs.

24.3.6 Pavement Markings

DB Contractor shall ensure that the design and installation of all pavement markings comply with applicable TMUTCD requirements, Item 666 of the TxDOT Standard Specifications, and TxDOT Engineering Standard Sheets.

DB Contractor shall use shadow markings for skip lines on the controlled access mainlanes where light-colored pavement does not provide sufficient contrast with the markings. Shadow markings consist of black

background in combination with standard TMUTCD marking colors as indicated in the TxDOT Contrast and Shadow Pavement Markings Standard CPM (1)-14.

DB Contractor shall design all pavement markings according to TxDOT San Antonio District Typical Pavement Marking Standard Details TPMD (1-3) -18, HSPM-08, and PMSD(1-2)-08, and Statewide Standards PM (1-3)-12 and FPM (1-4)-12.

24.3.7 Signalization

Traffic signal designs and modifications to existing traffic signals shall be completed in accordance with TxDOT Standard Specifications, the TMUTCD, the TxDOT San Antonio District Standards, including Miscellaneous Traffic Signal Details MTS-18, and the requirements of the appropriate Governmental Entity.

24.3.7.1 Traffic Signal Requirements

DB Contractor shall design and install new or modified existing fully actuated temporary and permanent traffic signals at all TxDOT-authorized intersections within Project limits that are impacted by the Traffic Control Plans and/or Final Design. DB Contractor shall coordinate with TxDOT and the appropriate Governmental Entities to define appropriate traffic signal design requirements, local agency oversight of DB Contractor's Work, and final acceptance of traffic signals. DB Contractor shall coordinate with the appropriate Governmental Entities for synchronization of traffic signal networks. DB Contractor shall comply with TxDOT *Traffic Signals Manual*, TxDOT Standards and TxDOT San Antonio District Standards for the design and installation of all traffic signals. If the City of San Antonio is responsible for maintaining the signal, the design shall meet the standards of the City of San Antonio.

DB Contractor shall provide both vehicle detection and pedestrian detection at all traffic signals within the Project. Pedestrian signals and detection shall comply with TxDOT's Traffic Signals Manual: Accessible Pedestrian Signal Guidelines. The pedestrian push button shall be raised or flush and a minimum of two inches in the smallest dimension. The force to activate the control shall be no greater than 5 lb/f. The button placement shall be coordinated with the concrete pad to access the button.

DB Contractor's design shall also incorporate the following requirements:

- Design mast arms, poles, heads and foundations in accordance with TxDOT Engineering Standard Sheets and TxDOT Standard Specifications;
- Use yellow polycarbonate signal heads (no fewer than one signal head per lane) with LED signal indications and black, non-vented backplates. All signal heads shall be from the same manufacturer;
- Use timber poles and span wire only for temporary signals;
- Install radar presence and advance detection systems, with advance detection only required for approaches with posted speed limits greater than or equal to 45 mph and presence detection required for all approaches;
- Comply with the UAR and 2014 TxDOT Standard Specification Item 618 for proper cover of conduit;
- Comply with Electrical Detail (ED) sheets of the TxDOT Engineering Standard Sheets;
- Use LED illumination on traffic signal poles. All illumination mounted on traffic signal poles shall be from the same manufacturer;
- Comply with TxDOT San Antonio District Standard 'MTS-18' for traffic signal controller foundation details. DB Contractor shall not build traffic signal controller foundation per TxDOT San Antonio District Standard 'TS-CF-04'.
- For TxDOT operated and maintained signals, DB Contractor shall provide an extra ten feet for each cable terminating in the controller cabinet. All cables shall be continuous without splices from terminal point to terminal point. All proposed signal cable shall be #12 AWG stranded copper for vehicular signal heads and #14 AWG stranded copper for pedestrian APS buttons.
- All pedestrian signal faces shall be single section LED type and from the same manufacturer. Die cast polycarbonate is acceptable in lieu of die cast aluminum. All mounting attachments shall be constructed of steel pipe; and
- DB Contractor shall provide CCTV cameras at all proposed and modified signals on the Project. CCTV cameras shall comply with the requirements set forth in Item 25.

DB Contractor shall purchase and install traffic signals that meet the requirements of TxDOT and the City of San Antonio, as appropriate. DB Contractor shall furnish and install controller cabinets, controller cabinet assemblies, cellular modems, radar detection panels, and power supplies. For signals maintained by the City of San Antonio, DB Contractor shall include battery backup units. DB Contractor shall purchase and install any additional signal equipment necessary for traffic signal operation. DB Contractor shall use conduits and conductors for electrical and communications as required by design and recommended by TxDOT and the City of San Antonio Transportation and Capital Improvements.

- TxDOT intersections requiring new (or full replacement) permanent traffic signals are:
  - IH-35 Frontage Road and O'Connor Road
  - IH-35 Frontage Road and Judson Road
  - IH-35 Frontage Road and Topperwein Road
  - Loop 1604 and Lookout Road

- City of San Antonio intersections requiring new (or full replacement) permanent traffic signals are:
  - IH-35 Frontage Road and Thousand Oaks/Starlight Terrace
  - IH-35 Frontage Road and N. Weidner Road
- DB Contractor shall modify existing signals including the addition of pedestrian signals, when appropriate and as necessitated by the Project. New or modified traffic signal equipment shall be compatible with existing equipment currently used by TxDOT and the City of San Antonio, as appropriate;
- TxDOT intersections requiring modifications to include pedestrian signals are:
  - IH-35 Frontage Road North and Pat Booker Road (SH 218)
  - IH-35 Frontage Road South and Pat Booker Road (SH 218)
  - IH-35 Frontage Road and Forum Parkway
  - IH-35 Frontage Road and N. Evans Road
  - IH-35 Frontage Road and FM 1518/Corporate Drive
  - IH-35 Frontage Road and Schertz Parkway
  - IH-35 Frontage Road and FM 3009/Roy Richard Drive

24.3.7.2 Traffic Signal Timing Plans

DB Contractor shall design signal timing plans for all new and modified traffic signals. DB Contractor shall coordinate and implement signal timing plans that optimize traffic flows and provide signal coordination with adjacent intersections and arterials for all new and modified signals. Unless timing maintenance is otherwise provided by a Governmental Entity pursuant to a Third Party Agreement, DB Contractor 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. DB Contractor shall submit its signal timing plan design for all new and modified traffic signals to TxDOT or the City of San Antonio, as appropriate, for review.

DB Contractor shall provide copies of all final implemented signal timing plans to TxDOT , the City of San Antonio, or the appropriate Governmental Entity responsible for maintaining the signal, As appropriate.

24.3.7.3 Traffic Signal Warrants

As part of the Final Design process, DB Contractor shall collect traffic data and prepare traffic warrant studies for proposed signalized intersections not signalized at the time of NTP1, including all intersections requiring new (or full replacement) permanent traffic signals listed in Section 24.3.7.1 and shall submit these signal warrant studies to TxDOT for review. The warrant studies shall address all signal warrant criteria in the TMUTCD. DB Contractor 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 shall be subject to TxDOT approval. Requests for signals shall include supporting signal warrant studies and traffic signal plans prepared in accordance with the TMUTCD, TxDOT Engineering Standard Sheets and TxDOT Standard Specifications.

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, DB Contractor shall use the procedure in Chapter 3 of the TxDOT *Traffic Signals Manual* to determine the volumes to be analyzed. If additional signals or modifications to existing signals are warranted, based on the traffic volumes obtained through these studies, DB Contractor 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.

24.3.7.4 Traffic Signal Support Structures

DB Contractor shall coordinate with TxDOT and the appropriate Governmental Entities to determine the type of traffic signal support structures. DB Contractor shall obtain TxDOT's or the appropriate Governmental Entities' approval of traffic signal support structures to be used on new and modified signal installations.

Designs for traffic signal support structures shall also comply with the requirements in Item 21.

24.3.7.5 Traffic Signal Systems

DB Contractor shall provide interconnection systems between any new or modified signals and any other signal system within the Project meeting the requirements of TxDOT or the maintaining local Governmental Entity, as appropriate. DB Contractor shall make existing signal systems compatible with proposed interconnections. DB Contractor shall ensure continuous communication of the traffic signal system within the Project and shall provide all communication hardware/equipment necessary for TxDOT or the appropriate local Governmental Entity to communicate with the signal systems on the Project. For TxDOT signals, DB Contractor shall ensure that all Traffic Management System (TMS) equipment furnished and installed is completely compatible with the existing hardware and software located within the TransGuide operations center (i.e. TransGuide central software). DB Contractor shall contact TransGuide's traffic management engineer for details on the system network architecture. Traffic signals shall connect to the ITS duct bank via 12-strand single mode fiber optic cable. DB Contractor shall be responsible for integrating and testing all new TMS equipment and any existing TMS equipment that is relocated into the existing network management system. DB Contractor shall be responsible for maintaining all TMS equipment furnished and installed on this Project until Final Acceptance.".

For all TxDOT maintained signals, DB Contractor shall furnish and install a new eight-phase NEMA TS2 Type 2 controller and cabinet, meeting the requirements of Departmental Materials Specifications DMS-11170. DB Contractor shall provide detector panel toggle switches that additionally permit the user to disconnect the detector. For both ground and pole-mount cabinets, DB Contractor shall provide cabinet configurations with a 16 position load bay.

DB Contractor shall integrate the proposed TxDOT maintained traffic signal(s) into the existing Advanced Traffic Management System (ATMS). Centracs ATMS software, which utilizes Econolite controllers, is currently in use in the San Antonio District. DB Contractor shall provide controllers on this Project that fully communicate with the existing ATMS software.

DB Contractor shall provide at least two weeks advance notice to theTxDOT San Antonio District Signal Shop prior to installing any cabinet equipment.

City of San Antonio signals are connected wirelessly to the City of San Antonio's Traffic Management Center (TMC). The City of San Antonio or one of its contractors will provide a wireless modem, antenna, and Ethernet switch for each cabinet on the Project maintained by the City of San Antonio. The DB Contractor shall coordinate signal installations with the City of San Antonio. Any existing signal controllers and supporting equipment shall be returned to the City of San Antonio in its documented existing condition.

DB Contractor shall provide to TxDOT an ATP for all traffic signals as part of the Final Design Submittal. The ATP shall include demonstration of cellular modem functionality and connectivity/the ability to operate and monitor TxDOT maintained signals from TransGuide and City of San Antonio maintained signals from the City of San Antonio's TMC. This ATP shall also be submitted to the appropriate Governmental Entity. DB Contractor shall conduct testing in accordance with the ATP and document those results to show conformance.

24.3.8 Lighting

DB Contractor shall provide new continuous illumination, including new conduit and copper wiring, throughout the Project utilizing conventional or high mast lighting as appropriate. Conventional lighting shall be used on cross streets impacted by the Project.

DB Contractor shall provide illumination to both the upper deck (proposed elevated section) and lower deck (existing mainlanes) of the Project. Illumination fixtures used to provide lighting to the lower deck of the project shall be mounted to the upper deck and subject to the requirements set forth in Item 21 and Item 23.

DB Contractor shall provide new LED fixtures at all locations throughout the Project. Underpass lighting will be limited to locations with existing underpass lighting or to locations with new structures (or widened structures).

DB Contractor shall design the lighting, where necessary, throughout the Project to prevent measurable spillage outside the Project ROW and onto the adjacent properties by designing for appropriate mounting height and using either cut-off shields or tightly-controlled photometrics. DB Contractor shall submit a lighting plan including light spillage measurements and a photometric study for high mast lighting for the entire Project to TxDOT for review and approval as part of the Final Design Submittal. In addition, the overflow of light onto any surface area outside of the Project ROW shall not exceed 10 percent of the average horizontal illumination as defined in the TxDOT Highway Illumination Manual.

DB Contractor shall prepare lighting plans that consider illumination levels, uniformity, and sources for the roadways, interchanges, and special areas. DB Contractor shall maintain an average horizontal luminance on the roadways as described below. DB Contractor shall submit the photometric data results for all lighted areas within the Project limits to TxDOT for review and approval as part of the Final Design Submittal. The Submittal shall include all input data.

New lighting along cross streets shall be provided in locations where lighting systems are currently provided within the Project limits. All third-party requests for lighting within the Project limits shall be subject to the requirements of Item 13 and TxDOT approval, including lighting agreements covering responsibilities for operation and maintenance of the finished lighting.

DB Contractor shall provide lighting designs that meet the criteria listed in Table 3-5a of the AASHTO *Roadway Lighting Design Guide* on all traveled roadways to be illuminated. Traveled roadways include: mainlanes, interchanges, ramps, ramp terminals, and frontage road, and frontage road intersections with cross streets.

DB Contractor shall design lighting systems, including safety lighting where warranted, in accordance with the TxDOT *Highway Illumination Manual*. All design and construction shall comply with the latest TxDOT Engineering Standard Sheets, TxDOT Departmental Material Specifications, and TxDOT Standard Specifications. Should nonstandard illumination fixtures and support structures be required to be mounted to the upper deck to provide illumination to the lower deck of the Project, DB Contractor shall design such fixtures and support structures in accordance with AASHTO *Standard Specifications for Structural Supports for Highway Signs, Luminaires, and Traffic Signals,* NEC, and the requirements set forth in Item 21 and Item 23. At all times between NTP2 and Final Acceptance, DB Contractor shall maintain safe lighting conditions along the Project roadway.

Conventional luminaire poles and breakaway bases shall be designed in accordance with AASHTO *Standard Specifications for Structural Supports for Highway Signs, Luminaires, and Traffic Signals,* and TxDOT Engineering Standard Sheets. For all poles located within the clear zone of the roadways, DB Contractor's design shall incorporate breakaway devices that are pre-qualified by TxDOT. Any high mast lighting poles shall meet the requirements of TxDOT Engineering Standard Sheets and TxDOT Standard Specifications. Existing high mast poles at IH-35 and State Loop 1604 may be reused/relocated provided they have passed internal and external inspection conducted by the DB Contractor, with documentation of such inspection submitted to TxDOT. DB Contractor shall provide inspection criteria to TxDOT for review and comment prior to conducting such inspections.

DB Contractor shall place all understructure lighting in a configuration that minimizes the need for Lane Closures during maintenance.

DB Contractor shall determine and design appropriate foundation types and lengths for permanent lighting structures.

DB Contractor shall not place ITS cables, fiber-optic lines, traffic signal conductors, or any other non-lighting related cables or conductors in the lighting conduit, ground boxes, or junction boxes.

DB Contractor shall minimize the potential hazards of lighting poles through the careful consideration of mounting options and pole placements, including the following options:

- Placing luminaire 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

DB Contractor shall ensure that lighting structures comply with Federal Aviation Administration (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, DB Contractor 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, DB Contractor shall find alternative ways of providing the required level of lighting. DB Contractor must coordinate with the FAA regarding the installation of obstruction lights, if any, on a case-by-case basis.

DB Contractor shall provide to TxDOT an ATP for all illumination as part of the Final Design Submittal. This ATP shall also be submitted to the appropriate Governmental Entity. DB Contractor shall conduct testing in accordance with the ATP and Item 616 of the TxDOT Standard Specifications and document those results to TxDOT to show conformance with the requirements of the ATP.

24.3.8.1 Lighting Infrastructure

At a minimum, all underground conduit shall be a minimum two inches in diameter. Schedule 80 PVC shall be used in bore locations and Schedule 40 PVC shall be used in trench locations. The conduit depth for illumination conduit under the City of San Antonio streets is 36 inches. Aboveground conduit used to provide service to the illumination fixtures mounted on the upper deck shall be placed inside of the upper deck concrete railing.

The minimum conductor size shall be #8 AWG copper on roadway and #12 AWG on underpass lights. DB Contractor shall not use duct cable for illumination purposes. DB Contractor shall design illumination circuits in a manner that confines the circuit within the limits of the local Governmental Entity in which it originates; circuits shall not cross city limits.

DB Contractor shall place bridge lighting brackets no more than ten feet from abutments or bents; however, in special circumstances, the bridge lighting brackets may be placed a maximum of 20 feet from abutments and piers.

Non-standard light pole design shall be submitted to TxDOT for approval as a part of Final Design. For light poles with a base 25 feet above the elevation of surrounding terrain, DB Contractor shall electronically submit design calculations and shop drawings to TxDOT San Antonio District and Bridge Division.

Minimum dimensions for ground boxes shall be as shown on TxDOT Engineering Standard Sheet ED(4)-14.

Ground box covers shall be 2-inch-thick (nominal), made of non-conducting material and labeled "Danger High Voltage Illumination".

Riprap aprons shall be provided around all ground boxes and high mast light poles not otherwise protected with concrete.

Lights shall have an identification tag denoting a contact person or office in case of emergency or for maintenance, and the address and telephone number.

Electrical part of the installation shall be designed and installed in conformance with the NEC, TxDOT Standard Specifications, and TxDOT Engineering Standard Sheets.

DB Contractor shall seal all conduit ends with lighting circuits with at least three feet of polyurethane foam approved by the Engineer that will not adversely affect other plastic materials or corrode metals. DB Contractor may submit alternate methods of wire theft prevention for TxDOT approval.

DB Contractor shall seal ground boxes for lighting circuits with polyurethane foam approved by the Engineer that will not adversely affect other plastic materials or corrode metal. DB Contractor may submit alternate methods of wire theft prevention for TxDOT approval.

24.3.9 Visual Quality

Notwithstanding the requirements of Section 24.3.8, DB Contractor shall provide luminaires of equal height along the roadway.

DB Contractor shall not use timber poles for permanent installation.

DB Contractor shall re-sod or re-seed areas of construction disturbed by the installation of signs, traffic signal systems, or lighting systems after final installation.

24.4 Construction Requirements

DB Contractor shall conduct all Work necessary to meet the requirements for this Item 24 in accordance with the requirements of this Item 24 and the TxDOT Standard Specifications.

DB Contractor shall properly dispose unsalvageable materials in accordance with local, state, and federal regulations.

24.4.1 Maintenance of Existing Signals During Construction

DB Contractor shall operate and maintain all signals modified by DB Contractor from the time at which the signal is modified through Final Acceptance. Any temporary signals, if required by the Project, shall be installed, operated, and maintained according to the standards of the Governmental Entity responsible for the signal. Temporary signals shall be subject to the same requirements of minimum vertical clearance as permanent signals. All existing signal interconnections shall be maintained during construction. Temporary wireless connections to achieve maintenance of existing signal connections or existing connectivity to TransGuide are acceptable.

As a part of maintenance responsibilities during construction, DB Contractor shall assume responsibility for signal phasing and timing during construction for traffic signals within the Project. DB Contractor shall coordinate with TxDOT and the City of San Antonio according to which jurisdiction is responsible for operations and maintenance of the signal. DB Contractor shall provide a minimum of 30 days advance notice to each entity prior to assuming responsibility for signal phasing and timing during construction.

DB Contractor shall coordinate with TxDOT and the City of San Antonio, and provide a minimum of 30 days advance notice to each entity prior to relinquishing responsibility for signal phasing and timing at Final Acceptance.

If at any time TxDOT determines in its discretion that signal phasing or timing plans need to be modified, DB Contractor shall use revised signal phasing or timing plans as determined by TxDOT.

All maintenance activities requiring traffic control are subject to the requirements set forth in Item 26.

24.4.2 Maintenance of Existing Lighting During Construction

DB Contractor shall be responsible for the operations and maintenance of all illumination infrastructure within the Project limits from NTP2 until Final Acceptance, regardless of whether or not the infrastructure is impacted by the Project. DB Contractor may survey and document existing lighting conditions prior to assuming responsibility for lighting on the Project. DB Contractor may use existing lighting as temporary lighting during construction. Operations and maintenance responsibilities include all activities necessary to maintain a functional lighting system on the Project, such as coordination with Utility Owners to provide electrical service, fixture replacement, and wire replacement as needed. All maintenance activities requiring traffic control are subject to the requirements set forth in Item 26.

If LED fixtures currently maintained by CPS Energy are replaced during the period between NTP2 and Final Acceptance, DB Contractor shall return the replaced fixtures to CPS Energy.

24.4.3 Permanent Signing and Delineation

DB Contractor 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. DB Contractor shall stake each sign location in the field and provide TxDOT 72 hours' notice prior to the installation of any overhead sign structure.

DB Contractor 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 motorists. DB Contractor shall replace any other removed signs before the end of the work day.

DB Contractor shall affix a sign identification decal to the back of all signs for inventory purposes and shall submit inventory information (sign identification record) to TxDOT in a TxDOT-compatible format for inclusion into the MMS.

All installed signs are required to meet the minimum retroreflectivity values specified in TMUTCD Table 2A-3 (Minimum Maintained Retroreflectivity Levels). Signs located adjacent to the existing frontage roads are not

subject to the minimum retro-reflectivity values specified in TMUTCD Table 2A-3 (Minimum Maintained Retroreflectivity Levels) unless they are impacted by construction.

DB Contractor shall deface and dispose of all signs removed from the Project such that they are not reused as roadway signs.

24.4.4 Permanent Pavement Marking

DB Contractor shall meet the following minimum retroreflectivity values for edge line markings, centerline/no passing barrier line markings, and lane line markings when measured any time after three (3) days, but not later than 10 days, after application:

- Type I, thermoplastic pavement markings
  - White markings: 250 millicandelas per square meter per lux (mcd/m2/lx)
  - Yellow markings: 175 mcd/m2/lx
- Type II, paint and beads
  - White markings: 175 mcd/m2/lx
  - Yellow markings: 125 mcd/m2/lx

DB Contractor shall use TY II markings as the sealer for TY I markings. DB Contractor shall allow at least 14 Days of cure time prior to placing the TY I markings. DB Contractor shall not be permitted to use acrylic or epoxy pavement markings.

DB Contractor shall place all adhesive materials for raised pavement markers directly from the heated dispenser to the pavement. DB Contractor shall not use portable or non-heated containers unless pre-approved by TxDOT. DB Contractor shall ensure that a minimum of 1/8 inch of adhesive will remain under 100% of the raised pavement marker. The adhesive shall extend beyond the perimeter of the marker within the following range: between ½ inch and 1 - 1/2 inch.

24.4.5 Permanent Signalization

DB Contractor shall coordinate with the Utility Owner(s) and ensure necessary power service is initiated and maintained for permanent signal systems. DB Contractor shall ensure power is provided to all DB Contractor-installed signals.

DB Contractor shall provide TxDOT with copies of all signal warrant studies as required in this Item 24. DB Contractor shall also provide copies of all final signal timing.

Before placing any permanent traffic signals, DB Contractor shall provide TxDOT a layout indicating the proposed location of such items. DB Contractor shall stake each traffic signal pole location in the field and provide TxDOT 72 hours' notice prior to the installation of any traffic signal drilled shaft. DB Contractor shall use Class C Concrete for drilled shafts.

DB Contractor shall provide all signal poles from the same manufacturer; pedestrian poles may be from a different manufacturer.

DB Contractor shall provide conduit and cable from material producers listed in TxDOT's Construction Division web site under the category, "Roadway Illumination and Electrical Supplies."

DB Contractor shall use LED lamps from the prequalified material producer lists as shown on the Texas Department of Transportation (TxDOT) – Construction Division's material producer list: https://www.txdot.gov/business/resources/producer-list.html.

For signals operated and maintained by TxDOT, the following wiring sequence shall be used when connecting the signal sections to the cabinet:

No.	Color	Stripe Color	Signal Face
1	Black		Yellow Ball
2	White		Neutral
3	Red		Red Ball

4	Green		Green Ball
5	Orange		Yellow Arrow
6	Blue		Green Arrow
7	White	Black	Spare

DB Contractor shall provide at least two weeks advance notice to TxDOT San Antonio District Signal Shop prior to installing any cabinet equipment. DB Contractor shall cover all signal faces until placed in operation. DB Contractor shall set any new signal to flashing operations for a minimum of seven days prior to full operation. During the test period, DB Contractor must provide a contact that can handle emergency calls 24 hours/day for all new signals.

24.4.6 Permanent Lighting

DB Contractor 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, DB Contractor shall provide temporary lighting. DB Contractor may maintain existing lighting as temporary lighting during construction and replace the existing lighting prior to Substantial Completion. At all times during the period between NTP2 and Final Acceptance, safe lighting conditions shall be maintained along the Project roadway.

DB Contractor shall provide conduit and cable from material producers listed in TxDOT's Construction Division web site under the category, "Roadway Illumination and Electrical Supplies." Refer to https://www.txdot.gov/business/resources/producer-list.html.

DB Contractor shall remove and dispose of all existing illumination-related cable and conduit that is not in use. DB Contractor may abandon in place any existing illumination-related conduit not in use that is under the existing pavement or within the median barrier.

DB Contractor shall place all bore pits safely away from traffic, provide positive barrier protection, and provide necessary signs to warn of the construction area.

DB Contractor shall contact Utility Owners regarding their specific required working clearance requirements.

DB Contractor shall affix an identification decal on each electrical service indicating service address as well as all required information shown on the Electrical Detail (ED) sheets of the TxDOT Engineering Standard Sheets.

DB Contractor shall be responsible for proper disposal of any high-pressure sodium lamps removed on the Project. DB Contractor shall refer to Item 12 and comply with all Federal, State, and local laws, ordinances, and regulations regarding the management of these high-pressure sodium lamps. DB Contractor shall prevent the breakage of the high-pressure sodium lamps and at a minimum package all high-pressure sodium lamps removed from the Project in a container that minimizes breakage. DB Contractor shall store any broken high-pressure sodium lamps in a resealable plastic bag in a separate container from unbroken lamps. DB Contractor shall furnish a suitable container labeled "Universal Waste Lamp" in a conspicuous location on the container.

. DB Contractor shall stencil each new illumination assembly with the service circuit number and pole number as referenced on the plans in black paint on the roadway side of the pole at a 45 degree angle. The numbers shall be 3" tall and begin 6' from the top of the foundation.

24.4.7 Reference Markers and Reference Location Signs

DB Contractor shall place reference markers at approximately one mile apart in accordance with the TRM system and Texas Reference Marker System Manual. DB Contractor shall set reference markers according to the TMUTCD. DB Contractor shall install intermediate reference location signs at approximately one-half mile increments on the upper and lower levels of I-35 designed and placed in accordance with the TMUTCD Section 2H.05. The sign design shall be non-standard and sign panels shall be identified by upper level (UL) and lower level (LL) designations. DB Contractor shall place the UL or LL legend above the word MILE and UL, LL, and MILE shall be clearview-6W font and be the same size. DB Contractor shall mount all reference markers on the right side of roadway. Once placed, DB Contractor shall inventory and record reference markers with GPS. DB Contractor shall provide this information to TxDOT in Microsoft Excel format.

24.5 Submittals

All Submittals described in this Item 24 shall be in accordance with the schedule and for the purpose (approval, review and comment, for information) set forth in Table 24-1. Acceptable electronic formats include Microsoft Word, Microsoft Excel, or Adobe Acrobat files, unless otherwise indicated.

Table 24-1: Submittals to TxDOT

Submittals	Submittal Schedule	TxDOT Action	Reference Section
Notification of meetings with local Governmental Entities	48 hours prior to the start of Governmental Entity meeting	For information	24.2.1
Preliminary operational signing schematic	Prior to commencing Final Design	Approval	24.3.1
Preliminary lighting layout	Prior to commencing Final Design	Approval	24.3.1
Copies of all final implemented signal timing plans	With Record Drawings	For information	24.4.5
Signal warrant studies	As part of the Final Design Submittal	Review and comment	24.3.7.3
ATP for all traffic signals	As part of the Final Design Submittal	Review and comment	24.3.7.5
Lighting plan and photometric study with light spillage measurements	As part of the Final Design Submittal	Approval	24.3.8
Third Party requests for lighting within Project limits, including lighting agreements for operations and maintenance	As part of the Final Design Submittal	Approval	24.3.8
Inspection criteria and results for existing high mast poles	As part of the Final Design Submittal	Review and comment	24.3.8
ATP for all illumination	As part of the Final Design Submittal	Review and comment	24.3.8
Non-standard light pole design	As part of the Final Design Submittal	Approval	24.3.8.1
Electronic design calculations for light poles with a base 25 feet above the elevation of surrounding terrain to TxDOT, Bridge Division	As part of the Final Design Submittal	Approval	24.3.8.1
Electronic shop drawings for light poles with a base 25 feet above the elevation of surrounding terrain to TxDOT, Bridge Division	Prior to construction	Approval	24.3.8.1
Alternate methods of wire theft prevention	As part of the Final Design Submittal	Approval	24.3.8.1
Sign identification record	After placement of all signs	For information	24.4.3
Reference marker record	After placement of all markers	For information	24.4.7

Item 25
Intelligent Transportation Systems

25.1 **General Requirements**

An ITS is necessary for monitoring the Project's traffic flow and performance both temporarily during construction and as a permanent installation after roadway opening to traffic. 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 Users.

DB Contractor shall connect the Project ITS that it provides to the existing ITS network while fulfilling all requirements herein. The Project ITS must be compatible with such in-place system(s) that TxDOT and other entities (government or private) are currently operating. DB Contractor shall coordinate the ITS planning and implementation with TxDOT and other Governmental Entities that have roadways within or intersecting the Project.

DB Contractor shall maintain and protect any existing ITS functionality, including communications networks within the Project, until Final Acceptance, except during Force Majeure Events, periods of system maintenance or system crossovers, or other periods approved by TxDOT.

The functionality of the ITS shall be such that command and control of appropriate field devices is shared and exchanged with appropriate Governmental Entities.

DB Contractor shall be responsible for the planning, design, installation, testing, and operations support of safe and functional ITS for the Project using Good Industry Practice in compliance with TxDOT Standard Specifications and the TxDOT Engineering Standard Sheets. All components of the ITS shall conform to the provisions of the NTCIP, and the TxDOT Transportation Systems Management and Operations (TSMO) Strategic Plan, available at https://www.txdot.gov/inside-txdot/division/traffic/tsmo.html.

The Project ITS shall operate under the San Antonio Regional ITS Architecture, including the Regional Data and Video Communications System, and have physical connections with the existing TxDOT ITS communications network on major freeways. TransGuide shall be the main Traffic Management Center (TMC) for this Project, and DB Contractor shall maintain ITS interoperability with the TMC and other Governmental Entities from NTP2 to Final Acceptance. DB Contractor shall perform all hardware integration work in the field and at TransGuide as necessary to achieve field device operations from the TMC, including but not limited to the installation and configuration of CCTV encoders, device switches, and other integration activities typical of an ITS project. Communication and interoperability shall be achieved with other TMCs in the region, such that with appropriate privileges, access to data, command, control, and information sharing can occur among centers. Any integration activities between TransGuide and other TMCs in the region shall be the responsibility of TxDOT. All communication and access of information shall occur in near real-time (within logistical constraints).

DB Contractor shall furnish and install ITS equipment in conformance with Attachment 25-1, ITS Equipment Specifications. DB Contractor shall design and construct the Project ITS subject to TxDOT Standard Specifications and applicable special specifications (SS) and special provisions, including, but not limited to, ITS elements with the most recent special specifications and their associated special provisions:

- ITS System Support Equipment – SS6003;
- Networking Intelligent Transportation Systems (ITS) Communications Cable – SS6004;
- Testing, Training Documentation, Final Acceptance, and Warranty – SS6005;
- Electronic Components – SS6006;
- Intelligent Transportation System (ITS) Fiber Optic Cable – SS6007;
- Intelligent Transportation System (ITS) Ground Mounted Cabinet – SS6008;
- Rack Mounted Electronic Equipment Cabinets – SS6009;
- Closed Circuit Television (CCTV) Field Equipment – SS6010;
- Multi-Duct Conduit System – SS6016;

- Preparation of Existing Conduits, Ground Boxes, or Manholes – SS6027;
- Dynamic Message Sign System – SS6028;
- Radar Vehicle Sensing Device – SS6304;
- ITS Pole with Cabinet – SS6064;
- High Bandwidth Coaxial Cable – SS6181;
- Low Loss Coaxial Cable – SS 6182;
- ITS Media Converter – SS6183;
- Fiber Optic Transceiver – SS6184;
- Intelligent Transportation System (ITS) Ground Box - SS6186;
- Temporary Travel Time System – SS6344; and
- Temporary Incident Detection and Surveillance System – SS6348.

25.2 Design Requirements

DB Contractor 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 the systems of TxDOT and those of other affected Governmental Entities. The ITS network shall be resistant to weather encountered in the Project area, and place components in locations that are not hazardous to Users. Design shall conform to the *San Antonio District Intelligent Transportation Systems (ITS) Planning Guidance Document, General ITS Guidelines* provided within the RIDs.

Prior to beginning ITS efforts, DB Contractor shall conduct an ITS workshop with TxDOT and affected Governmental Entities (per TxDOT's direction) within 120 Days of NTP 2 to:

- Confirm TxDOT's operational requirements;
- Review DB Contractor's survey of existing ITS infrastructure and condition assessment;
- Discuss concepts and identify potential resolutions for Site-specific issues (as identified by DB Contractor);
- Determine communication requirements;
- Determine requirements for design;
- Determine requirements for construction including security considerations (burying of ground boxes, welding ground boxes shut, etc.);
- Determine requirements for construction and coordination of activities with adjacent roadways;
- Confirm requirements of other affected parties and Governmental Entities; and
- Address other topics as needed to ensure the design meets all requirements herein.

Following the ITS workshop and prior to submitting the Preliminary Design Submittal package, DB Contractor shall prepare preliminary ITS layouts for TxDOT review and comment to ensure adequate planning of the ITS implementation. DB Contractor's preliminary ITS layout shall include temporary ITS during construction and permanent ITS installations on separate roll-plots. Subject to the specific requirements of this Item 25, DB Contractor shall determine the number and specific locations of all ITS components. The ITS shall consist of all equipment necessary to implement the ITS described in this Section 25.2.

DB Contractor shall provide safe ingress/egress areas and structures to accommodate authorized personnel access to ITS components for maintenance and operation activities. Unless approved by TxDOT, ITS components shall be placed in locations that allow maintenance without a Lane Closure.

All components of the ITS shall conform to the provisions of the NTCIP and be compatible with the latest version of TxDOT's Lonestar software and any other software that is operational at TransGuide.

DB Contractor shall not make any recommended modifications to the specifications without TxDOT's approval.

DB Contractor is responsible for designing and constructing lightning protection, grounding, and surge suppression for each ITS structure and equipment cabinet.

DB Contractor shall be responsible for the design, installation, and provision of power required to operate the ITS devices, including all utility costs, until Final Acceptance by TxDOT. DB Contractor shall provide metered service to ITS field devices and cabinets consistent with TxDOT's Engineering Standard Sheets and TxDOT Standard Specifications.

All ITS devices and associated mountings, with the exception of CCTV cameras, shall meet the 90-mph wind load design standards as shown in the AASHTO *Standard Specifications for Structural Supports for Highway Signs, Luminaires, and Traffic Signals, 6th edition*, and the TxDOT Engineering Standard Sheet WV &IZ(LTS2013)-14. Refer to Section 25.2.3.4 for CCTV camera requirements. ITS devices may be co-located on the same ITS pole, provided that they can function independently for the portion of the facility for which they are intended (i.e. existing mainlanes or proposed elevated structure).

The installed ITS equipment shall provide TxDOT accurate and reliable data, quality video images, and accurate control of field devices from TransGuide on a real-time basis 24 hours a day, 7 days a week. Real-time is defined as correct data being available at TransGuide within 30 seconds of being processed or the correct response of a field component within one millisecond of the command being sent.

DB Contractor shall be responsible for ensuring the CCTV, DMS, and vehicle detection systems meet the reliability requirements specified in the TxDOT Standard Specifications, special specifications, as well as any standard publications provided by TxDOT. The Item 25 design and construction requirements, together with the ITS design criteria presented in the most current TxDOT statewide and/or TxDOT San Antonio District specifications, as well as any standard publications provided by TxDOT, define the minimum standards and scope for the ITS that must be met by DB Contractor.

25.2.1 DB Contractor ITS Communications Requirements

The communications network shall serve the highway ITS components along the highway Elements of the Project. Where necessary, as determined by TxDOT, DB Contractor shall provide communication node HUBs/cabinets to support the communications network.

Each field network switch shall provide a primary and secondary fiber path of two fibers each from the field cabinet to a fiber HUB. The maximum number of Layer 2 field network switches forming a network path between an end device (TxDOT ITS) and a HUB- based data aggregating Layer 3 network switch shall not exceed 12. The calculated data throughput assigned to any sub-network path shall not exceed 50% of the path's throughput capacity. DB Contractor shall provide calculations for bandwidth usage as a part of the Preliminary Design Submittal.

New devices and any existing devices interconnected during Project implementation shall not be assigned within the same network path or otherwise daisy-chained to avoid possible inconsistencies in communication protocols.

DB Contractor shall install a 144-strand single mode fiber optic cable in the duct bank. The ITS duct bank fiber shall connect communication between HUB/ITS control cabinets. The ITS duct bank fiber connection shall be a home-run connection with no splices with the exception of necessary backbone splices (reel to reel). Field devices shall be connected with 12-strand single mode fiber optic cable at the communication HUB/ITS to control cabinet(s); this connection shall also be a home-run connection with no splices. DB Contractor shall provide 100 feet of fiber optic cable slack at each HUB/ITS control cabinet and 50 feet of fiber optic cable slack at each ITS ground box. DB Contractor is responsible for confirming that 144 strands of fiber can support the proposed ITS deployment and providing additional fiber at no cost to TxDOT, as needed, to ensure that no more than 50% of the throughput capacity of a sub-network path is exceeded.

Pull boxes shall be placed at each ITS device location, local HUB/ITS cabinet, and spaced at a maximum of every 700 feet along the Project corridor. DB Contractor shall provide Type 1 or Type 2 ground boxes as appropriate along the ITS duct bank to accommodate bend radius and slack requirements. At locations where the Project trunk line terminates, at IH-35 and CR 3009 and at Loop 1604 and Nacogdoches, DB Contractor shall provide a TY 2 Ground Box with a 60-inch depth. Interchanges on the Project shall serve as system aggregation points to provide the physical network redundancy consistent with TransGuide installations. The following locations will serve as system aggregation points: 1) IH-35 and Loop 1604; 2) IH-35 and IH-410. DB Contractor shall use Type A or Type D ground boxes for lateral runs to ITS field devices. DB Contractor shall provide closed-bottom ground boxes for all ITS ground boxes on the Project.

DB Contractor shall provide terminal servers, video encoders, media converters, Ethernet switches and modems to establish communications as required. Video encoding shall meet MPEG-4 standards and be compatible with TxDOT's traffic management system software requirements for TxDOT CCTV.

DB Contractor shall submit proposed fiber termination charts to TxDOT for approval.

25.2.2 Conduit

DB Contractor shall submit, for TxDOT's approval, the type, quantity, and design of the conduit above and below ground, ground boxes, all communication cables, and electrical conductors to support the ITS network and operations as part of the Final Design Submittal. Except as specifically cited within this Item 25, conduit design shall be consistent with *San Antonio District Intelligent Transportation Systems (ITS) Planning Guidance Document, General ITS Guidelines.* ITS devices shall be powered by dedicated metered services that are separate from traffic signals, illumination, or other devices. Conduit for ITS power shall be separate from the ITS duct bank. No exposed conduit sections will be permitted. ITS duct bank conduit shall be concrete encased. All sections shall have a minimum cover consistent with TxDOT Engineering Standard Sheets except:

- Where boring is required to cross under intersections; and
- In the case of large bridge crossings, conduit built into the bridge structure.

DB Contractor shall install bored conduit below the base layer of pavement structure. TxDOT approval will be required for any placement of conduit on existing structures.

ITS duct bank conduit shall consist of two three-inch diameter concrete encased conduits installed on one side of the corridor. A #14 insulated electrical conductor wire for detection shall be placed in trunk lines. All conduit shall have end to end pull tape.

Within the proposed concrete encased ITS duct bank, the ITS conduit shall support a minimum of 144-strand fiber optic cable. DB Contractor shall maintain separation between proposed conduits and any existing TxDOT or other entity's installation for construction, maintenance, and repair as depicted in the TxDOT Engineering Standard Sheets.

DB Contractor shall provide materials and use construction methodology for conduit installation that, at a minimum, meets the most current or applicable TxDOT Standard Specifications, TxDOT Engineering Standard Sheets, and TxDOT San Antonio District Standards, including placement of a trace wire within the conduit, placing locator tape and installing above ground markers, and providing the required 42 inches or more of cover. DB Contractor may provide alternatives to TxDOT that improve upon TxDOT's current practices for securing ground box lids. DB Contractor's use of any such alternatives are subject to TxDOT approval.

25.2.3 CCTV Cameras

DB Contractor shall provide CCTV cameras for Incident or Emergency verification and traffic management. 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 by the camera to a user's command to pan/tilt/zoom.

25.2.3.1 Equipment

DB Contractor shall provide all necessary CCTV equipment, including cameras, camera controls, cables, and connections. DB Contractor shall provide all the equipment necessary for TxDOT control of all CCTV cameras. The method of control shall be in accordance with TxDOT Engineering Standard Sheets and TxDOT Standard Specifications.

DB Contractor shall provide a digital video format and communications protocol at all connections compatible with existing TxDOT systems.

25.2.3.2 Placement

DB Contractor shall provide overlapping roadway coverage by CCTV cameras for all highway lanes and intersecting cross streets within the Project limits to provide redundant camera fields of view. CCTV cameras shall be placed to enable TxDOT to monitor traffic conditions on highway lanes, access roads, connecting facilities, entrance and exit ramps, and messages displayed on any DMS in the Project area. To provide a stable video image, DB Contractor shall mount cameras on ITS poles unless otherwise approved by TxDOT.

Distance between CCTV cameras shall not exceed 1 mile for the upper deck of the Project and 0.75 miles for the lower deck; however, DB Contractor is responsible for placing cameras to ensure 100% coverage. 100% coverage shall be defined as no blind spots for any reason, including, but not limited to: trees, bridge structures, horizontal or vertical alignment, and overhead or side mounted sign structures. Additionally, each

CCTV camera shall be able to view the CCTV camera immediately upstream and downstream from itself unless otherwise approved by TxDOT. CCTV cameras shall not share coverage of the lower deck (existing IH-35 mainlanes) and the upper deck (proposed elevated section).

CCTV camera poles shall be placed as close as possible to the high point of overpasses. CCTV camera poles along the existing mainlanes (i.e. "lower deck") shall be at least 55 feet in height when no elevated section is present and as high as practical when proposed elevated section is present and conform to TxDOT Standards. CCTVs for monitoring the proposed upper deck shall be located at least 40 feet above the proposed pavement.

25.2.3.3 Video Requirements

DB Contractor shall provide CCTV cameras that meet the requirements of the applicable TxDOT Engineering Standard Sheets, TxDOT Standard Specifications, TransGuide operating requirements, or other requirements in this Item 25. If at any time prior to Final Acceptance, should any CCTV cameras fail to meet the latest TxDOT Engineering Standard Sheets, TxDOT Standard Specifications, TransGuide operational requirements, or other requirements identified in this Item 25, in effect at proposal due date, DB Contractor shall replace such cameras within 24 hours of discovery of lack of compliance.

25.2.3.4 Operating Requirements

DB Contractor shall provide cameras with built-in heaters, mounting structure, and related equipment capable of operating within the following weather conditions:

- Wind load of 100 mph without permanent damage to mechanical and electrical equipment;
- Ambient temperature range of -35 degrees Fahrenheit to +140 degrees Fahrenheit;
- Relative humidity range not to exceed 95 percent within the temperature range of +40 degrees Fahrenheit to +110 degrees Fahrenheit; and
- Humidity range of 0 to 100 percent condensing.

25.2.3.5 Control Requirements

DB Contractor shall supply CCTV equipment on this Project which is fully compatible with the existing CCTV control systems operated from TransGuide. DB Contractor shall provide CCTV equipment specifications as a part of the Final Design Submittal. 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, the equipment must, at a minimum, correctly respond to the following commands:

- Pan left
- Pan right
- Focus near
- Focus far
- Tilt up
- Tilt down
- Iris open
- Iris close
- Iris override
- Zoom in
- Zoom out
- Camera power (latching)
- Pan tilt position preset

Upon completion of installation, DB Contractor shall test the communications link installed between the satellite building and the CCTV field equipment locations. DB Contractor shall perform the test at all CCTV locations on the Project.

DB Contractor shall use a test signal generator and a video monitor to demonstrate the ability of the video signal link to transmit a National Television System Committee compliant video signal from the CCTV cabinet to the satellite building. After completion of testing with the signal generator, DB Contractor shall connect the

CCTV camera to the link and use a video monitor at the satellite building to verify the presence of a National Television System Committee compliant video signal. No degradation of the video signal shall be discernible using the video monitor.

DB Contractor shall connect a laptop computer containing TxDOT-supplied CCTV control software on the link and use to demonstrate the ability to control all CCTV functions outlined in the specifications.

DB Contractor shall supply all test equipment, cabling, and connectors necessary for performing the tests by DB Contractor.

The equipment must be fully operational using the existing control system from TransGuide. Equipment which in any manner is not fully operational with the control system will be considered as not passing the test. DB Contractor shall be permitted one opportunity to retest equipment that does not pass the initial test. The retest must occur within 30 days after the initial test. All issues of non-compliance and all discrepancies shall be resolved prior to commencing the second test. Equipment that is not able to be retested within 30 days, or which does not pass the second test, shall not be used on the Project. DB Contractor shall not be entitled to additional time or compensation on account of 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 CCTV equipment testing is successfully completed.

DB Contractor shall submit the CCTV secondary control equipment, which includes all hardware and related equipment required to operate the CCTV, and design to TxDOT for approval a minimum of six months prior to Substantial Completion.

25.2.4 Vehicle Detection

DB Contractor shall provide permanent, high definition microwave radar detection in each highway lane of the Project that measures vehicle classification, vehicular volume, lane occupancy, and vehicle 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 two miles in each highway lane in the Project, and, at a minimum, provide detection for all highway lanes at one location between interchanges. DB Contractor shall locate the devices on the side of the Project nearest the largest shoulder so as to limit the potential interference by the concrete traffic barrier on detecting vehicles and collecting information. Vehicle detection devices are not required for the frontage roads.

Vehicle detection sensors shall determine vehicle speed for each vehicle passing the sensor. The sensors shall provide raw speed data (volume, speed, lane occupancy, and vehicle classification counts) and direction of travel for all lanes. Additionally, the sensors (or the software controlling the sensors) shall be capable of determining vehicles traveling in the wrong direction. For sensors that collect data across multiple lanes of traffic, data shall be collected and provided by lane. In areas where a sensor would have to collect data on more than 12 lanes of traffic, including shoulders or over distances/widths greater than 250 feet, DB Contractor shall provide additional detectors as required. DB Contractor shall provide detectors that allow TxDOT to adjust the frequency rates that the data files are provided by device.

DB Contractor shall also install Bluetooth readers every one mile on both the upper and lower decks of the Project, and/or at locations the DB Contractor may propose if approved by TxDOT. These readers will be used to determine average speeds and travel times. The Bluetooth readers must be compatible with existing systems at TransGuide. DB Contractor shall place Bluetooth readers and microwave radar detection on the Project such that TransGuide staff the ability to distinguish the traffic volumes between the upper and lower decks of the Project.

DB Contractor may attach detection units to existing sign structures or ITS structures with prior approval by TxDOT. Where an existing structure is not available, or in lieu of attaching the detection unit to an existing structure, DB Contractor shall install a mounting pole solely for the vehicle detector. Any mounting poles placed specifically for ITS items shall conform to the TxDOT Standard Specifications and Good Industry Practice for CCTV mounting poles and must adhere to minimum clear zone requirements. DB Contractor shall provide all necessary support structures and equipment, including, but not limited to, vehicle detection system devices, controls, cables, and connections.

25.2.5 DMS

DB Contractor shall provide a comprehensive network of electronic DMS as needed to satisfy the operational requirements using only LED display technology. DB Contractor shall replace all existing DMS within the

Project. The DMS shall operate as part of an overall regional system. DB Contractor shall provide TxDOT with full control of DMS messaging prior to Final Acceptance.

DB Contractor shall position each DMS to allow motorists to safely view the messages being displayed. DB Contractor shall locate the DMS to comply with the large guide sign spacing requirements set forth in the TMUTCD.

Location and placement of DMS shall be approved by TxDOT. A preliminary concept with DMS locations has been provided in the RID, ITS Schematic Layout. DB Contractor shall note that this concept is preliminary and the DB Contractor shall meet all requirements within Item 25, including the requirement to replace all existing DMS.

DMS may be mounted using T-mount or OSB. On elevated sections, a catwalk shall be provided on DMS structures for maintenance access. DMS sites shall be accessible in all weather conditions. Access pads shall be provided, if necessary, to support DMS and cabinet maintenance. DMS on elevated sections shall be walk-in DMS with the controller located within the sign. DB Contractor shall provide full color DMS that use LED display technology and support full matrix graphics. DMS used shall conform to the NTCIP and TxDOT special specifications for DMS and shall demonstrate compliance to TxDOT therewith prior to installation of DMS by DB Contractor.

DB Contractor shall provide all necessary DMS, support structures and equipment, including, but not limited to, DMS devices, controls, cables, and connections.

DB Contractor shall maintain any existing DMS functionality within the Project during construction and shall not impact the operation of any existing DMS within the Project during construction absent approval from TxDOT.

All DMS shall be visible and legible via CCTV cameras.

DMS shall have the ability to be controlled using the latest TxDOT DMS operating system being used at TransGuide.

25.2.6 Communications Hub Enclosures and Communications Cabinets

DB Contractor shall coordinate with TxDOT the connection of all new ITS components to any existing ITS HUB, communication enclosures, and communication cabinets covering the Project.

DB Contractor shall provide new ITS HUBs/ITS control cabinets as needed to accommodate field devices. Cabinets shall be ground mounted Type 4, 5, or 6 as needed to accommodate design and allow for future expansion of at least two additional field devices. Ground mounted ITS cabinets shall include both front and back doors. For elevated field devices, all cabinets shall be ground mounted or pole mounted, provided that the following conditions for pole mounted cabinets are met: 1) it is attached using a unistrut-type connection to the bridge columns; 2) it is 3 feet off the ground/above grade; 3) it is hidden from traffic flow (refer to ITS Equipment Cabinet Mounting Detail provided in the RID). For all other field devices, pole mounted cabinets may be used, provided that access to the cabinet can be provided at finished grade on foot without requiring a mainlane Lane Closure. The bottom of the pole mounted cabinet shall not be placed in excess of three feet above the base plate of the device. DB Contractor shall not place cabinets within locations with slopes in excess of 4:1. DB Contractor shall provide a level pad for maintenance access at all ITS cabinet locations.

25.2.7 Wrong Way Detection System (WWDS)

DB Contractor shall design, furnish, install and test wrong way detection systems at all ramps on the Project.

Before installation of any equipment, DB Contractor shall perform a site survey of the proposed locations to determine the optimal positioning of the wrong way driver thermal imaging camera and equipment to achieve proper operation based on the manufacturer's recommendations. DB Contractor shall test wireless links to assure they provide optimal communication between transmitters and receivers and shall adjust locations if necessary.

DB Contractor shall ensure the mechanical execution of work complies with NEC, Article 110.12.

DB Contractor shall provide a thermal imaging camera for each ramp, two LED signs per ramp (one at each side of the ramp), and all mounting hardware and cabling necessary to install and make operational all WWDS equipment. DB Contractor shall provide only new and corrosion resistant materials.

DB Contractor shall design all elements of the WWDS as an integral part of the overall ITS and shall ultimately connect the WWDS via the ITS duct bank to TransGuide. The WWDS shall operate using line power; solar power is not permitted. Additional sign attachment hardware, mounting components and

hardware for wrong way driver thermal imaging cameras and equipment, support brackets, and appurtenances, such as conduit, etc., and or adjustments to said items may be necessary for compatibility with specified positioning recommended by the manufacturer.

DB Contractor shall have the manufacturer's representative on site to assist with the installation of all equipment before any work begins.

Once installation is complete, DB Contractor shall coordinate with the equipment manufacturer to ensure the wrong way driver thermal imaging camera and equipment are properly positioned and the wrong way driver detection zones are accurate. DB Contractor shall ensure that all equipment is functioning properly and communicating with manufacturer's equipment software and compatible with the Lonestar system. DB Contractor shall begin testing once proper system functionality is proven.

25.2.8 Flood Stations

DB Contractor shall provide all infrastructure and communications interconnects necessary to replace existing flood stations impacted by the Project. For reference, existing flood stations are located at:

- IH-410 and Salado Creek

25.2.9 Access Control System (ACS)

DB Contractor shall design and construct an access control system (ACS) on the elevated section (upper deck) of the Project. The intent of the ACS is to limit access to emergency vehicle turn-arounds on the Project to emergency vehicles only. The ACS shall be connected to the ITS duct bank and TransGuide and shall have the ability to be controlled from TransGuide. The ACS shall also operate using emergency vehicle preemption equipment currently installed on vehicles used by emergency services providers (police, fire, and EMS) within the Project limits. The ACS shall also provide an option for on-site manual control for opening/closing. ACS shall be in full view via a dedicated CCTV so that it can be monitored by TransGuide staff. DB Contractor shall be responsible for ensuring the ACS meets the requirements outlined in Attachment 25-1, ITS Equipment Specifications.

25.3 Construction Requirements

25.3.1 General

DB Contractor shall conduct all Work necessary to meet the requirements for this Item 25 in accordance with the requirements of this Item 25 and the TxDOT Standard Specifications.

DB Contractor shall notify TxDOT 30 days in advance of making connections to the existing TxDOT ITS system.

DB Contractor shall maintain any existing ITS communications functionality during construction activities. Required functionality can be accomplished by phasing construction to establish new equipment locations prior to removal of equipment at existing locations, or by use of portable equivalents for ITS devices, such as trailer mounted DMS, sensors or CCTV cameras, positioned to allow removal of devices while new locations are constructed, allowing minimal service interruption of no more than four hours for any disruption associated with communications and 72 hours for any disruption associated with the transfer of devices from existing to new locations..

DB Contractor shall repair each existing communication cable, wireless communications functionality, or electrical conductor that is severed or otherwise rendered not usable within:

- 4 hours if it is a major backbone/trunkline
- 8 hours if it is a minor cable/fiber drop line

DB Contractor shall coordinate with Utility Owner(s) and ensure that power service is available for permanent ITS systems.

DB Contractor shall contact TxDOT TransGuide to coordinate the salvage of any existing ITS equipment removed during construction of the Project, and deliver to the TxDOT TransGuide facility if requested, or stockpile as requested by TxDOT. Salvaged equipment shall be delivered in its documented existing condition.

25.3.2 Maintenance of Existing ITS During Construction

DB Contractor shall be responsible for maintenance of the ITS during construction. DB Contractor shall perform testing of all field devices and equipment prior to assuming responsibility of the existing ITS. DB Contractor shall allow TxDOT TransGuide staff to be present and shall provide 48 hours' notice prior to testing. DB Contractor shall submit all testing documentation to TxDOT. DB Contractor 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. Any activities performed by the DB Contractor to maintain existing ITS connectivity during construction are subject to the requirements set forth in Item 26, Traffic Control.

Temporary fiber, splices, and wireless connections may be used for interim ITS to maintain existing connectivity during construction provided that the requirements for permanent ITS contained within this Item 25 are met. TxDOT has provided within the RIDs the ITS Schematic Layout to provide the DB Contractor a preliminary concept for maintenance of existing ITS during construction while phasing in any proposed ITS. DB Contractor shall note that the referenced schematic is preliminary and the DB Contractor shall be responsible for meeting requirements set forth in Item 25.

25.3.3 Existing ITS Relocation

DB Contractor 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. DB Contractor shall remove and dispose of existing lane control signals (LCS) on the Project, disconnecting and isolating all power supplies to the LCS prior to removal. DB Contractor shall refer to TxDOT Special Specification 6305 for requirements concerning LCS removal. DB Contractor shall also phase out the use of existing loop detection traffic monitoring equipment in favor of the radar and Bluetooth vehicle detection equipment noted in Section 25.2.4. DB Contractor shall perform such removals and relocations as needed in a manner that prevents damage to existing overhead structures to be reused. DB Contractor 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, DB Contractor 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.

25.3.4 ITS Implementation Plan

DB Contractor shall provide an ITS Implementation Plan for approval as part of the Final Design Submittal to demonstrate system interoperability with other TMCs in the region, as well as compatibility with the operational procedures for command and control of devices, sharing of data, and priority control that various parties will assume under different operating conditions of the corridor and surrounding roadway system. The ITS Implementation Plan shall include the following:

- Functional design plan;
- Communications analysis report;
- Operational and requirements report;
- Applicable updates to the regional ITS architecture; and
- ATP.

The functional design plan shall show each device's relationship in the overall functional design of the ITS and proposed roadway system. This functional design plan shall include the location of devices, technology and functional specifications of devices, and any unique design elements that are necessary to achieve the desired functionality or address space restrictions.

The communications analysis report shall document the communications design. This report shall show all ITS field devices, their flow through all communications mediums, and throughput within the ITS. This shall include communications between any involved Governmental Entities. The report shall contain a narrative describing the information to be transmitted, as well as a high-level plan for its use. Communications diagrams shall be provided showing the location of any communication hubs (existing or proposed), any planned fibers (source as well as identification tag), modem/transceiver equipment planned at field equipment cabinets, and other equipment deemed necessary to functionally operate the ITS.

The operational and requirements report for the ITS shall describe the functional capability of the system and the method and level of integration. The document shall describe in detail the design of the system, hardware and software to be utilized, functional capabilities, command and control, data sharing capabilities, and priority use of devices by multiple agencies. In developing the operational and requirements report, DB Contractor is required to hold scoping meetings with TxDOT, such that requirements are defined to achieve interoperability with other TMCs, and priority logic and information for command, control, and data sharing is created to enable effective management and Incident response along the corridor, as well as regionally.

The DB Contractor shall document the existing regional ITS architecture and document applicable updates to the regional ITS architecture within the ITS Implementation Plan. The DB Contractor, as a part of Final Design, shall update the regional ITS architecture in the format used by TxDOT (such as turbo architecture) for this Project.

For each component of the ITS, an ATP shall assure proper operation, control, and response of each device meeting the functional requirements. DB Contractor shall implement the ATPs and provide certified documentation that each component meets the requirements prior to operational use of the ITS.

As part of each ATP, DB Contractor shall prepare a system acceptance procedure prior to the start of construction to assure proper operation, control, and response of each device as part of the overall ITS, including the overall operating system and software. DB Contractor shall conduct the procedure and provide certification that the ITS effectively meets the required functional requirements. DB Contractor shall submit this certification to TxDOT prior to Substantial Completion.

25.3.5 End-to-End Testing

DB Contractor shall provide notice and coordinate with TxDOT, including TransGuide, to allow for end-to-end testing of the ITS. Testing will occur during the 21 Day period prior to Substantial Completion. During the testing period, DB Contractor shall provide TxDOT and TransGuide staff the opportunity to conduct full system tests and daily operations tests to confirm operation plans and standard operating procedures, and to otherwise prepare for operational use of the facility. End-to-end testing shall only occur after hours and on weekends.

DB Contractor shall not commence end-to-end testing until the following conditions have been met: DB Contractor and TxDOT shall have successfully completed all their ATP testing, DB Contractor has completed training of all relevant TxDOT staff, and DB Contractor has met all acceptance requirements for DB Contractor installed ITS devices, satellite buildings, communication and electrical networks, and generators.

DB Contractor shall be responsible, at a minimum, for the following:

- Coordinating the end-to-end testing with TxDOT to ensure that there will be no schedule conflicts among TxDOT, its affiliated contractors, and DB Contractor's staff;
- Providing temporary advance signing (if needed) stating that the facility is closed and testing is occurring;
- Providing MOT/traffic control at all necessary locations for a maximum of five (5) full days, which could include evenings and weekends and are not required to be consecutive;
- Providing access to the facility for authorized TxDOT staff and contractors; and
- Repairing any issues found with DB Contractor's work within one (1) day unless otherwise approved by TxDOT.

DB Contractor shall not expect to have access to, nor conduct Work within, the Project during the end-to-end testing, with the exception of providing the services as described above. TxDOT may, at its sole discretion, provide DB Contractor access to the Project to conduct Work outside the services described above.

DB Contractor shall compile and provide the results of the end-to-end testing to TxDOT as a submittal within 10 Days of completing the end-to-end testing.

25.3.6 Record Documents

The Record Documents shall include the construction drawings in digital format (pdf and dgn), as-built drawings with GIS locates, documentation of end-to-end testing as well as catalog sheets for all equipment and components. The DB Contractor shall also submit a complete ITS record, in Microsoft Excel format, containing the following information: location description, device type, roadway, direction of travel, device latitude, device longitude, device HUB, device make, device model, device serial number, device IP address,

and device installation date. An example of the requested format, ITS Record Document Example for Design Build, is provided in the RID.

DB Contractor shall maintain until Final Acceptance records of all updates and modifications to the system.

For each component of the ITS, all computer codes and software shall be available to TxDOT.

25.4 Additional Requirements

DB Contractor shall refer to Attachment 25-1, ITS Equipment Specifications, for ITS device and cabinet equipment requirements for the Project.

25.5 Submittals

All Submittals described in this Item 25 shall be in accordance with the schedule and for the purpose (approval, review and comment, for information) set forth on Table 25-1. Acceptable electronic formats include Microsoft Word, Microsoft Excel, or Adobe Acrobat files, unless otherwise required.

Table 25-1: Submittals to TxDOT

Submittals	Submittal Schedule	TxDOT Action	Reference Section
Preliminary ITS Layouts	As a part of the Preliminary Design Submittal package	Review and comment	25.2
Bandwidth Usage Calculations	As a part of the Preliminary Design Submittal package	Review and comment	25.2.1
Fiber termination charts	Prior to implementation	Approval	25.2.1
Type, quantity, and design of the conduit above and below ground, ground boxes, all communication cables, and electrical conductors to support the ITS network and operations	As part of the Final Design Submittal	Review and comment	25.2.2
CCTV equipment specifications	As part of the Final Design Submittal	Approval	25.2.3.5
CCTV secondary control equipment and design	Six months prior to Substantial Completion	Approval	25.2.3.5
ITS Testing Documentation for DB Contractor Maintenance During Construction	Prior to DB Contractor assuming responsibility for the project	For information	25.3.2
ITS Implementation Plan	As part of the Final Design Submittal	Approval	25.3.4
Certification that the ITS effectively meets the required functional requirements	Prior to Substantial Completion	For information	25.3.4
Notice of end-to-end testing	Prior to implementation	For information	25.3.5
Documentation of end-to-end testing	10 days after testing is completed	For information	25.3.5
ITS Record Documents	Prior to Final Acceptance	Approval	25.3.6

Item 26
Traffic Control

26.1 **General Requirements**

DB Contractor shall design, construct, and maintain the Project, in conformance with the requirements stated in this Item 26, 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. In addition, DB Contractor shall maintain safe travelling conditions of all roadways used outside the Project limits including routes to fabrication facilities, plants and haul roads.

DB Contractor is responsible for gaining approval from TxDOT, the appropriate Governmental Entity and property owner for each intersecting street or driveway closure.

During all phases, temporary, new and existing ITS equipment, street lights, and traffic signals shall be interconnected and interoperable per District and local governmental requirements and practices.

DB Contractor shall provide and maintain temporary illumination throughout the duration of construction for all roadways and intersections that have existing illumination. All temporary illumination shall meet or exceed existing illumination levels.

DB Contractor shall install permanent illumination during construction as soon as practicable to enhance safety and benefit the traveling public but in no event later than opening to traffic.

DB Contractor shall phase construction of the Work in such a way as to install and utilize, to the greatest extent possible, permanent drainage facilities to address drainage needs during construction; otherwise temporary drainage facilities shall be provided until the permanent facilities are available for use. All temporary and permanent drainage utilized during construction shall be in accordance with Item 20.

26.1.1 **Lead MOT Design Engineer**

DB Contractor shall employ a Lead MOT Design Engineer responsible for ensuring the Traffic Control Plans (TCPs) are prepared in accordance with the Contract Documents. The Lead MOT Design Engineer shall be a PE with relevant experience overseeing the development of TCPs during the design and construction phase of highway projects similar in size and scope as the Project. The Lead MOT Design Engineer shall be responsible for signing and sealing the TCPs, including details, and all revisions to the TCPs in accordance with the plan submittal requirements. The Lead MOT Design Engineer shall be available through the duration of the Project and work with the Lead MOT Implementation Manager to coordinate implementation of the MOT plans with TxDOT, DB Contractor, and appropriate Governmental Entities.

26.1.2 **Lead MOT Implementation Manager**

DB Contractor shall employ a Lead MOT Implementation Manager responsible for: ensuring the TCP are adhered to during their implementation, supervising the MOT QC personnel, and working closely with the Lead MOT Design Engineer to implement and manage Project MOT, including identifying and coordinating design changes to the MOT plans. The Lead MOT Implementation Manager shall be available through the duration of the Project and report jointly to TxDOT and the Construction Manager. The Lead MOT Implementation Manager shall have the authority to stop Work. The Lead MOT Implementation Manager shall have relevant experience overseeing the implementation of TCPs during the construction phase of highway projects similar in size and scope as the Project. The Lead MOT Implementation Manager shall coordinate with TxDOT, DB Contractor, and appropriate Governmental Entities. Refer to Section 2 of Attachment 4-2 of the General Conditions for a detailed description of the responsibilities of the Lead MOT Implementation Manager.

26.2 **Design Requirements**

26.2.1 **Traffic Control Plans**

DB Contractor shall use the procedures in the TMP, TxDOT Engineering Standard Sheets, and TMUTCD requirements to develop detailed TCPs that provide for all construction phasing, as well as all required switching procedures. TCPs are required for the Work during the Term and for the duration of the Warranty Term.

DB Contractor shall provide to TxDOT for approval a TCP concept presentation at or near 30% design status prior to TCP plan sheet development. DB Contractor shall utilize Microsoft PowerPoint and roll plots to convey this concept at the TCP concept presentation meeting. Approval of the concept does not indicate automatic approval of the subsequent plan sheets, nor does it authorize DB Contractor to implement the concept in the field.

DB Contractor shall produce a TCP for every phase of Work that impacts traffic and shall coordinate with appropriate Governmental Entities on the development of the plan. DB Contractor is responsible for obtaining all necessary permits required to implement the plans. TCPs shall be designed, signed, sealed, and dated by the Lead MOT Design Engineer, or designee.

26.2.1.1 Traffic Control Plan Requirements and Restrictions

Each TCP shall be submitted to TxDOT for review and approval a minimum of 14 days prior to implementation. This requirement is increased to 21 days for Full Roadway Closures. The TCP shall include details for allowable time and duration of Lane Closures, all detours, traffic control devices, striping, and signage applicable to each phase of construction.

Information included in the TCPs shall be of sufficient detail to allow verification of design criteria and safety requirements, including typical sections showing lane width, concrete traffic barrier and barrel placement, alignment, striping layout, drop off conditions, clear zone, and temporary drainage.

DB Contractor shall design an entrance and departure lane for work-zone traffic to enter and leave work-zone in accordance with Section 26.2.1.2 and TxDOT Standards.

The TCPs 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. DB Contractor should have no expectation that speed limit reductions will be granted and should design the Project in such a way as to allow for existing posted speed limits to remain in place during construction, except as allowed by Section 26.2.1.2. DB Contractor shall use advisory speed plaques as appropriate.

DB Contractor shall utilize appropriate traffic control devices to ensure that opposing traffic on a divided roadway is separated with appropriate traffic control devices in accordance with Good Industry Practice and the TMUTCD based on roadway Design Speed**.** Approved traffic control devices can be found in the TxDOT *Compliant Work Zone Traffic Control Device List*. Traffic control that involves the physical separation of contiguous lanes of the same roadway component (i.e., general purpose or access road lanes) traveling in the same direction will not be allowed.

DB Contractor shall identify a designated route for trucks/hazardous cargo.

DB Contractor shall maintain signing and striping continuity on all active roadways within or intersecting the Project at all times. DB Contractor shall maintain existing overhead signing within the Project throughout the Term. DB Contractor shall use temporary overhead signing structures when existing overhead signing structures cannot be maintained.

Throughout the Term, DB Contractor shall ensure that all streets and intersections remain open to traffic to the greatest extent possible by constructing the Work in phases except as shown on a pre-approved TCP. DB Contractor shall maintain access to all adjacent streets and shall provide for ingress and egress to public and private properties at all times during the Term.

DB Contractor shall notify adjacent neighborhoods and adjacent property owners of anticipated traffic delays. DB Contractor shall coordinate with the respective landowners and tenants and also secure written permission prior to disrupting access to parking facilities, unless the written permission is previously provided by TxDOT.

DB Contractor shall prepare Lane Closure Notices (LCNs) in accordance with Exhibit 15 of the DBA in advance of the implementation of any Lane Closures, detours, or traffic switches. The PIO shall coordinate these notices with city and local public safety officials. DB Contractor shall also notify the traveling public by placing changeable message signs a minimum of seven (7) days in advance of any roadway closure or major traffic modifications. Where available and when possible, DB Contractor shall coordinate and utilize DMS on the regional ITS system.

DB Contractor shall utilize uniformed police officers with jurisdiction in the area to effect Lane Closures. DB Contractor is responsible for noting the requirement for uniformed police officers in the TCPs. DB Contractor is responsible for the costs associated with the use of uniformed police officers.

DB Contractor shall provide VIA Metropolitan Transit (VIA) a minimum of 30 days notice prior to performing construction operations that will impact existing VIA bus stops.

26.2.1.2 Design Parameters for Traffic Control Plans

Design Vehicle. Turning movements on all local streets and driveways shall, at a minimum, provide the same operational characteristics as their existing conditions or better.

Design Speed. On Interstate and US Highways, the minimum Design Speed shall be 10 miles per hour (mph) under the existing posted speed limit, except for major alignment transitions utilizing existing alignment geometry, where the Design Speed may match that of the existing alignment geometry. TCPs meeting this Design Speed standard do not require a change in the posted speed limit.

Number of Lanes. See Exhibit 15 of the Design Build Agreement for the minimum number of lanes and allowable roadway closure requirements for each facility.

Lane Widths. During construction, the minimum lane width for the mainlanes, ramps, direct connectors, frontage roads and crossing streets shall be 11 feet. For locations where the existing lane width is less than 11 feet, DB Contractor may use the existing lane width.

Shoulders. A minimum 1-foot offset from the edge of travel way to the edge of pavement or traffic barrier is required. Work on shoulder without positive protective barriers during peak hours, including setting of barrier during peak hours, constitutes a Lane Closure and requires TxDOT approval.

Minimum Vertical Clearance. The temporary minimum vertical clearance during construction for new construction activities shall be 16'-6" unless otherwise approved by TxDOT. DB Contractor may maintain the existing vertical clearances for existing structures not impacted by the Work.

26.2.2 Traffic Modeling Requirements

DB Contractor shall analyze the anticipated impact on traffic flow as a result of construction activities. TxDOT has developed calibrated VISSIM base models for the Project. DB Contractor shall update the base concept in the models using VISSIM to reflect DB Contractor's design and assess impacts to the traffic operations as a result of the proposed traffic control.

DB Contractor shall analyze proposed Lane Closures in VISSIM and summarize the results in a technical memo submitted with the applicable TCP package. The technical memo should include a comparison of the existing and proposed traffic conditions and operations, and a summary of the traffic control impacts that clearly demonstrates how the impacts were determined by providing appropriate model input and output parameters including, but not limited to, travel time, speed, delay and queue data, as applicable, to assess the impacts to a particular facility.

26.3 Construction Requirements

DB Contractor shall ensure construction of the traffic control Elements is in accordance with DB Contractor's TMP, the manufacturer's directions or recommendations where applicable, and the applicable provisions of the TMUTCD.

DB Contractor shall conduct all Work necessary to meet the requirements for this Item 26 in accordance with the requirements of this Item 26 and TxDOT Standard Specifications.

See Item 24, "Signing, Delineation, Pavement Marking, Signalization, and Lighting" for additional lighting and signal requirements during construction.

See Item 25, "Intelligent Transportation Systems" for additional ITS requirements during construction.

26.3.1 DB Contractor Responsibility

If at any time TxDOT determines DB Contractor's traffic control operations do not meet the intent of the TMP or the specific TCP, DB Contractor shall immediately revise or discontinue such operations to correct the deficient conditions.

DB Contractor shall provide TxDOT the names of the Lead MOT Implementation Manager and support personnel, including a backup coordinator in the event the primary coordinator is unavailable, and the phone number(s) where they can be reached 24 hours per day, seven (7) days per week.

26.3.2 IQF Responsibility

The IQF shall designate a qualified individual to be responsible for inspecting, documenting and reporting on the placement, maintenance, and application of traffic control devices. The individual shall oversee QC inspections and the implementation of MOT plans by the DB Contractor, identifying and reporting on any instances of nonconformance with contract requirements, and ensuring that the DB Contractor's MOT activities, including implementation of design changes during construction, are performed in accordance with the Contract Documents. The individual shall have relevant experience overseeing inspections or implementation of MOT plans during the construction phase of highway projects similar in size and scope as the Project. The individual shall be available through the duration of the Project and shall report to the IQFM. The IQFM shall have the authority to stop Work. Refer to Section 3 of Attachment 4-2 of the General Conditions for a detailed description of the responsibilities of the IQF for MOT.

26.3.3 Bicycle and Pedestrian Access

DB Contractor shall maintain existing bicycle and pedestrian access and mobility. DB Contractor shall address any impacts to existing bicycle and pedestrian facilities in each TCP in accordance with Item 28. The TCP designs must account for potential increases in pedestrian traffic due to adjacent development in the area. DB Contractor shall maintain access to existing transit stop locations during construction or shall coordinate with transit operators for their approval of reasonable alternative locations.

26.3.4 Detours

DB Contractor shall maintain all detours in a safe and traversable condition. DB Contractor shall provide a pavement transition, suitable for the posted speed and accounting for the vertical and horizontal geometry of the section at all detour interfaces. Transition pavements shall be hot mix, not seal coat.

DB Contractor shall use State routes for detour routes, wherever applicable. If State routes are unavailable, DB Contractor shall use local streets provided that DB Contractor has obtained the necessary permits from the Governmental Entity having jurisdiction. DB Contractor shall take necessary action to restore or rebuild all detour routes to as good as or better than pre-construction condition in accordance with the requirements of TxDOT or the Governmental Entity having jurisdiction, as applicable.

DB Contractor shall provide detour signs to guide the traffic 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 and changeable message signs to divert traffic around the Project. Motorist guidance to and along detour routes shall be provided, together with regional guidance.

26.3.5 Local Approvals

DB Contractor shall communicate all roadway and ramp closures and staging analyses with each Governmental Entity having jurisdiction for roads that may be affected by the Project. When roadway and ramp movements are diverted or detoured along existing roads, DB Contractor shall be responsible for any and all costs and schedule risk . This may include traffic operation analysis, temporary traffic control devices, and road user costs. DB Contractor is responsible for obtaining the necessary approvals from any Governmental Entity having jurisdiction over the routes used. At DB Contractors request, TxDOT will reasonably assist the DB Contractor in meetings with a Governmental Entity to coordinate closures or detours necessary along existing roads for completion of the Work.

26.3.6 Traffic Signals

DB Contractor shall assume responsibility for signal phasing and timing during construction for traffic signals within the Project limits as further described in Section 24.3.7.2.

26.3.7 Temporary Traffic Barrier

DB Contractor shall meet the requirements of Item 512 for Portable Traffic Barrier and the TxDOT Engineering Standard Sheets for providing portable traffic barrier, in addition to the following requirements**:**

- DB Contractor shall pin portable traffic barrier if the Work Zone (WZ) is less than 2 ft behind barrier (if applicable).
- DB Contractor shall avoid mixing portable steel traffic barrier with portable concrete traffic barrier due to connection issues

- Single Slope CTB (SSCTB) shall be used on the inside shoulder and inside median of the interstate main lanes. In all other areas, either SSCTB or F-Shape CTB may be used.
- Moveable barrier may be used as portable traffic barrier. The barrier must be unanchored and capable of being moved on or off the road daily. Barrier must meet NCHRP 350 TL3 with deflection of 24" or less, or MASH TL3 with deflection of 39" or less.
- Low profile concrete traffic barrier may be used on facilities with posted speeds of 45 mph or less.

26.3.8 Pavement Markings and Signing

DB Contractor shall remove existing pavement markings and/or signs that conflict with temporary or permanent pavement markings. These pavement markings and signs shall be removed by any method that does not materially damage the existing elements or facilities. Pavement marking removal by over-painting is prohibited. DB Contractor shall not use temporary tape at any time during the Term.

DB Contractor is responsible for temporary signing, both within the Project limits and outside of the Project limits as required for the Project.

DB Contractor shall utilize existing, temporary, or proposed overhead sign structures to mount temporary or proposed guide signs above freeway main lanes where there are at least three main lanes in a given direction, per TMUTCD requirements. DB Contractor shall maintain existing overhead signing within the Project throughout the construction duration.

For major traffic switches, DB Contractor is responsible for providing temporary guide and trailblazing signage of the same type and size, including font size, to replace the existing permanent signage.

26.3.9 Smart Work Zone Technology and Traffic Management System Requirements

DB Contractor shall implement smart WZ technologies and traffic management systems to assist with traffic management and operations during construction, including dynamic lane management and incident management technologies, and speed monitoring systems.

DB Contractor shall implement the following:

- A "Work Zone Intelligent Transportation System" in accordance with Standard Specification 6254, Work Zone Intelligent Transportation System, provided in the RIDs, and Work Zone Intelligent Transportation Systems (ITS) Standard Sheets - Temporary Queue Detection Systems (WZ-ITS(1)-19, WZ-ITS(2)-19 and WZ-ITS(3)-19).
- A "Temporary Queue Detection System" in accordance with Standard Specification 6302, Temporary Queue Detection System, provided in the RIDs.
- A "Truck Entering Highway Warning System" in accordance with Special Specification 6297, Truck Entering Highway Warning System. The Truck Entering Highway Warning Systems is a portable, automated, real-time intelligent traffic system that warns oncoming traffic of trucks re-entering the highway.

DB Contractor shall describe the technologies and systems intended for use during construction in order to meet the requirements of this Section 26.3.9 in the Traffic Management Plan (TMP) submitted as part of the PMP.

26.3.10 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, DB Contractor shall restore the pavement to a structure acceptable to TxDOT or the Governmental Entity having jurisdiction over the affected area and restore it to a riding surface equal to or better than the existing surface.

26.3.11 Hauling Equipment

DB Contractor 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.

DB Contractor shall use rubber-tired equipment for moving dirt or other materials along or across paved surfaces. Excess dirt or debris shall be swept or removed from the job site with regular cleaning and sweeping at least twice a day.

In the event that DB Contractor moves any equipment not licensed for operation on public highways on or across any pavement, DB Contractor shall protect the pavement from all damage caused by such movement. Damage caused by DB Contractor shall be repaired at the expense of DB Contractor.

DB Contractor shall only use haul routes utilizing any street of an adjacent Governmental Entity after coordinating with the appropriate Governmental Entity.

26.3.12 Final Clean-Up

DB Contractor shall clear and remove from the Project all surplus and discarded materials and debris of every kind and leave the entire Project in a clean, smooth, and neat condition after each construction process.

26.3.13 Stockpiles

DB Contractor shall place barricades and warning signs at stockpiles to adequately warn motorists of a hazard in accordance with TxDOT Engineering Standard Sheets and the TMUTCD. DB Contractor shall not locate any material stockpiles within the clear zone of any traveled lane, unless positive protection is provided.

26.4 Submittals

All Submittals described in this Item 26 shall be in accordance with the schedule and for the purpose (approval, review and comment, for information) set forth in Table 26-1. Acceptable electronic formats include Microsoft Word, Microsoft Excel, or Adobe Acrobat files, unless otherwise indicated.

Table 26-1: Submittals to TxDOT

Submittals	Submittal Schedule	TxDOT Action	Reference Section
TCP concept presentation (meeting)	Prior to TCP plan sheet development	Approval	26.2.1
Traffic Control Plans (TCP)	Minimum 14 days prior to implementation (21 days for Full Roadway Closures)	Approval	26.2.1, 26.2.1.1
Lane Closure VISSIM analysis technical memo	Concurrent with submittal of applicable TCP	For information	26.2.2
Names and phone numbers of the Lead MOT Implementation Manager and support personnel, including a backup coordinator	Prior to start of any construction activities	For information	26.3.1

Item 27
Maintenance

27.1 General Requirements

27.1.1 General Maintenance Obligations

Throughout the period between NTP2 and Final Acceptance, DB Contractor shall be responsible for and shall carry out the Maintenance Work as set forth in this Section 27.1.1 within the Maintenance Limits. DB Contractor shall conduct all Maintenance Work necessary to meet the requirements for this Item 27 in accordance with the requirements of this Item 27 and TxDOT Standard Specifications.

DB Contractor shall establish and maintain an organization that effectively manages all Maintenance Work in a manner set forth in the approved Maintenance Management Plan (MMP) and the requirements of the Contract Documents. DB Contractor shall:

- coordinate activities of other entities with interests or activities within the Maintenance Limits;
- conduct daily patrols of all lanes of the Project within the Maintenance Limits to identify conditions that are unsafe or have the potential to become unsafe, and conditions that could threaten the infrastructure, and to attend to existing or changing conditions;
- minimize delay and inconvenience to Users and, to the extent DB Contractor is able to control, users of related transportation facilities;
- develop, maintain and implement a Maintenance Management System to record the category, status, intended action and repair for all Defects;
- facilitate access to the Maintenance Management System by TxDOT to allow the notification and categorization by TxDOT of Defects that TxDOT identifies in the course of its maintenance inspections;
- mitigate hazards and permanently repair all Defects, including those identified by TxDOT, the DB Contractor and third parties within the specified periods;
- identify and correct all Defects and damages from Incidents;
- monitor and observe weather and weather forecasts to proactively deploy resources to minimize delays and safety hazards due to high winds, severe thunderstorms, tornadoes, heavy rainfall and flooding, hail, snow, ice, or other severe weather events;
- remove debris, including litter, graffiti, animals, and abandoned vehicles and equipment from the Project ROW;
- minimize the risk of damage, disturbance, or destruction of third-party property during the performance of Maintenance Work;
- report to TxDOT the status of its Maintenance Work including Nonconforming Work;
- 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;
- perform Maintenance Work, including inspections, Incident response, traffic control, and routine maintenance in accordance with the MMP and the Contract Documents; and
- promptly investigate reports or complaints received from all sources.

Subject to approval by TxDOT, alternate material specifications and construction requirements may be proposed by the DB Contractor provided the objectives of the Project are met and equivalent requirements to this Item 27 are provided.

27.1.2 Scope of Maintenance Work and Interfaces with TxDOT and Third Parties

The Maintenance Work shall apply to all Elements as identified in Attachment 27-1 (Baseline Performance and Measurement Table During Construction). TxDOT will retain maintenance responsibilities for Elements in place or operating prior to the Proposal Due Date within the Maintenance Limits (the “existing Elements”) until NTP2.

TxDOT's maintenance responsibilities from the Proposal Due Date until NTP2 will be limited to routine maintenance of each existing Element and will not include preventive maintenance or major maintenance as such items are defined in TxDOT *Maintenance Management Manual*.

DB Contractor shall coordinate with TxDOT to achieve a smooth transition of maintenance activities from TxDOT in the period between NTP1 and NTP2. Starting at NTP2, DB Contractor shall perform all necessary Maintenance Work to comply with the Performance Requirements.

DB Contractor shall coordinate Maintenance Work with TxDOT and other Governmental Entities having adjacent maintenance responsibilities to minimize disruption to Users. DB Contractor shall coordinate with TxDOT to ensure a smooth transition of the maintenance responsibilities to relevant parties after Final Acceptance.

27.1.3 Maintenance Limits

DB Contractor shall prepare and submit Maintenance Limits drawings consistent with DB Contractor's then-current design as part of the MMP. The Maintenance Limits drawings shall be consistent with the principles and extents shown in Attachment 27-3 (Maintenance Limits). DB Contractor shall periodically validate that the Maintenance Limits are correctly and clearly identified by physical delineation and shall liaise with TxDOT and Governmental Entities as necessary to review the Maintenance Limits, identify any jurisdictional gaps or inefficiencies and recommend solutions to TxDOT. Within the Maintenance Limits, DB Contractor shall allow adjacent landowners to cross under bridges at breaks in control of access.

27.2 Maintenance Management

27.2.1 Maintenance Management Plan

DB Contractor shall prepare and submit the MMP in accordance with Section 4.2.11 of the General Conditions, update the MMP as required, and shall submit it to TxDOT for approval in TxDOT's discretion. The requirements for the MMP are set forth in Attachment 27-4 (MMP Template).

27.2.2 Reserved.

27.2.3 Maintenance Manager

DB Contractor shall assign a Maintenance Manager who shall be responsible for:

- implementing the maintenance obligations in this Item 27 and the MMP;
- causing the Maintenance Work to be performed in accordance with the Contract Documents;
- causing all maintenance personnel and resources performing Maintenance Work to be available and properly trained;
- the health and safety of personnel delivering the Maintenance Services and the general public affected by the Project; and
- coordinating with TxDOT and other entities during Incidents and Emergencies

The Maintenance Manager shall meet or exceed the qualifications and experience established in the Contract Documents, and:

- must have experience on maintenance projects; and
- must have managerial experience in design, construction, or maintenance on any road project of similar size, scope and complexity.

The Maintenance Manager shall have an active role in the review of Design Work to ensure that maintenance activities can be safely and efficiently performed for the Project and that necessary life cycle activities have been taken into consideration. The Maintenance Manager shall be available whenever Maintenance Work is performed.

27.3 Performance Requirements

27.3.1 Performance and Measurement Table

DB Contractor's performance of the Maintenance Work shall be governed by the Performance and Measurement Table as it may be updated in accordance with Section 27.3.4. The Performance and Measurement Table shows for each Element:

- Performance Objectives that each Element is required to meet or exceed;

- the Defect Repair Periods for each Defect;
- Inspection and Measurement Methods that DB Contractor shall use to determine compliance; and
- Measurement Records that DB Contractor shall establish and maintain based upon inspections and measurements.

DB Contractor shall record a separate Defect upon failure to achieve any of the requirements set forth in the Performance Objective or Measurement Record. DB Contractor shall address each Defect within the specified Defect Repair Period as further described in this Item 27.

27.3.2 Defect Identification, Recording and Categorization

27.3.2.1 Definitions

For Defects shown on the Performance and Measurement Table:

- hazard mitigation is an action taken by DB Contractor with respect to a Category 1 Defect to mitigate a hazard to Users or imminent risk of damage or deterioration to property or the environment such that the Category 1 Defect no longer exists; and
- permanent repair is an action taken by DB Contractor with respect to any Defect to restore the condition of an Element to a condition such that no Defect exists.

27.3.2.2 Sources of Defects and Status

DB Contractor shall identify and record Defects through inspections described in Section 27.4 and reports or complaints by third parties. DB Contractor shall accurately record the status of Defects from all sources in the MMS. Where multiple instances of Defects exist in an Element (for example simultaneous failure to repair damaged guardrail in multiple locations), a separate Defect shall be recorded for each instance where the Performance Objective or Measurement Record requirements for the applicable Element are not achieved.

Where Defects are identified in the field during the course of any inspection that DB Contractor is required to attend, DB Contractor shall upload information related to such Defects from handheld devices to a storage system accessible by TxDOT. Information shall include the description, date-time of identification and categorization for each identified Defect. Any such upload of Defect information with Category 1 Defect status shall trigger immediate automatic e-mail notification to TxDOT and the Maintenance Manager.

27.3.2.3 Defects Identified by DB Contractor, TxDOT or Third Party

Whenever DB Contractor identifies, becomes aware of or is notified by TxDOT or a third party of a Defect, DB Contractor shall create within the MMS a Maintenance Record containing details of the associated Element, the nature and categorization of the Defect and the proposed timing and details of hazard mitigation and permanent repair of the Defect. DB Contractor shall categorize each Defect, based upon its determination as to whether:

- it represents an immediate or imminent health or safety hazard to Users or road workers;
- there is a risk of immediate or imminent structural failure or deterioration;
- there is an immediate or imminent risk of damage to a third party's property; or
- there is an immediate or imminent risk of damage to the environment.

Should a Defect meet any of the above criteria, DB Contractor shall record it as a Category 1 Defect. DB Contractor shall provide training to all relevant personnel on the categorization of Defects. DB Contractor shall maintain a record of the circumstances of the Defect and how it was categorized. DB Contractor shall facilitate the review by TxDOT of Maintenance Records in the MMS associated with DB Contractor-categorized Defects and shall enable TxDOT to flag any Defect where TxDOT disagrees with any attribute or categorization assigned by DB Contractor.

27.3.3 Baseline Inspections and Performance and Measurement Table

27.3.3.1 Baseline Inspections

DB Contractor shall perform inspections and / or tests to determine the condition of each Element (the "Baseline Inspections") and the preparation of the Baseline Element Condition Report (BECR). DB Contractor shall perform the inspections and/or tests in accordance with Attachment 27-2 (Baseline Inspection Requirements).

DB Contractor shall submit to TxDOT for approval the proposed scope of Baseline Inspections and the methodology proposed for the inspections and/or tests.

Upon TxDOT approval of the scope of the Baseline Inspections, DB Contractor shall provide to TxDOT a minimum of 14 Days' notice to witness the inspections and/or tests.

27.3.3.2 Baseline Element Condition Report

DB Contractor shall prepare the BECR and shall submit it to TxDOT for approval as part of the MMP no later than 60 days prior to NTP2. The BECR shall comply with the following requirements:

- The BECR shall include a record of the condition of each Element shown in Attachment 27-2 (Baseline Inspection Requirements).
- Each photographic record and /or measurement shall be associated with a location accurate to the nearest 10 feet.
- The condition of each Element shall be recorded such that there is a minimum of one record for each Performance Section within which the Element is represented.
- Where the condition of an Element varies within a Performance Section, the BECR shall include sufficient records to demonstrate the range of conditions and a reference condition for the Element shall be recorded for each Performance Section.

DB Contractor shall cause the BECR to include the results of the most recent specialist inspections undertaken by TxDOT, including the results of the annual survey of pavement condition for the entire Project, including main lanes, ramps, frontage roads, cross streets and direct connectors as applicable undertaken using automated condition survey equipment.

27.3.3.3 Use of BECR to Establish Performance and Measurement Table Requirements

The results of the BECR shall be used to establish the Performance Objective and Measurement Record for each Element in Attachment 27-1 (Baseline Performance and Measurement Table During Construction). The use of the BECR to establish these requirements is demonstrated in the following example: Referring to Element Ref. 1.2 "edge drop-off," the Performance Objective is that "all roadways shall be free from edge drop-offs exceeding the measurement record thresholds". Measurement Record 1.2.1 requires no edge drop off greater than the reference condition (on a location-specific basis) in the BECR." If, within a given Performance Section, the maximum edge drop-off recorded in the BECR is 2.5" and an edge drop-off of 3.0" is measured within the same Performance Section after NTP2, the requirement of the Measurement Record would not be achieved, resulting in a Defect. If the Defect is a Category 1 Defect, this would trigger a 24-hour hazard mitigation period and a 28-day permanent repair period.

27.3.3.4 Defects between Baseline Inspections and NTP2

No later than 14 days after NTP2, DB Contractor shall submit details (if any) of instances of damage or deterioration that, in the opinion of DB Contractor, occurred between the completion of the Baseline Inspections and NTP2. DB Contractor shall identify the Maintenance Work required to cause each such Element to be in compliance with the applicable Performance Objective and Measurement Record, including an estimate of the cost of performing such Maintenance Work. TxDOT may implement one or more of the following: (a) cause Elements to be in compliance with the requirements using its own forces; (b) instruct DB Contractor to perform Maintenance Work that would cause Elements to be in compliance with applicable requirements by means of a Change Order; or (c) agree to a revision to certain Performance Objectives or Measurement Records in Attachment 27-1 (Baseline Performance and Measurement Table During Construction).

27.3.4 Updates of Baseline Performance and Measurement Table During Construction

DB Contractor may propose changes to the Performance and Measurement Table for TxDOT approval. DB Contractor shall propose for TxDOT approval amendments to the Inspection and Measurement Methods and Measurement Records as necessary to cause such items to comply with Good Industry Practice and this Item 27. TxDOT may, at any time, require DB Contractor to adopt amendments to the Inspection and Measurement Method and Measurement Record where such updates are required to comply with Good Industry Practice and this Item 27. In this case, the new Inspection and Measurement Method or Measurement Record shall be determined using the principle that it shall achieve no less than the standard of maintenance that would have been achieved through DB Contractor's compliance with the original Inspection and Measurement Method and Measurement Record.

27.3.5 Permanent Repair of Defects

Where action is proposed to repair any Defect, DB Contractor shall promptly create a Maintenance Record that identifies the nature of the proposed repair.

The Defect Repair Period set forth in the Performance and Measurement Table shall commence upon the earlier of: (i) the date and time DB Contractor became aware of the Defect; or (ii) the date and time DB Contractor should have known of the Defect. DB Contractor shall take necessary action to prevent any recorded Defect that is not currently a Category 1 Defect from becoming a Category 1 Defect. DB Contractor shall monitor all Defects to verify the condition of the affected Element prior to permanent repair and shall inform TxDOT immediately should any such Defect deteriorate to a Category 1 Defect.

For all Defects not recorded as Category 1 Defects, DB Contractor shall complete the permanent repair within the Defect Repair Period unless an earlier repair is required to prevent deterioration to a Category 1 Defect.

27.3.6 Hazard Mitigation of Category 1 Defects

DB Contractor shall immediately implement hazard mitigation of any Category 1 Defect in an Element of which it is aware through its own inspections, from a third party or through notification by TxDOT to DB Contractor (through the MMS or by other means) that TxDOT requires DB Contractor to perform hazard mitigation for a Category 1 Defect.

For Category 1 Defects, DB Contractor shall take necessary action such that any hazard to Users is mitigated within the Defect Repair Periods specified in the Performance and Measurement Table. DB Contractor shall continue hazard mitigation until a permanent repair has been completed.

27.4 Inspections

27.4.1 General Inspections by DB Contractor

DB Contractor shall establish inspection procedures and frequency as well as a plan to implement a program of inspections necessary for the Maintenance Work. Inspection procedures shall ensure:

- the Project is safe for Users;
- Category 1 Defects are identified and repaired such that the hazard to Users is mitigated within the applicable Defect Repair Period; and
- all Defects are identified and permanently repaired within the applicable Defect Repair Period.

In performing inspections to identify Defects, DB Contractor shall ensure that each Element at a minimum complies with the inspection standards set forth for that Element in the column entitled “Inspection and Measurement Method” in Attachment 27-1 (Baseline Performance and Measurement Table During Construction).

DB Contractor shall perform general inspections in accordance with the MMP so that the repairs of all Defects are included in planned programs of work.

DB Contractor shall record details of the manner of inspection (e.g. center Lane Closure or shoulder), the weather conditions, and any other unusual features of the inspection on inspection records in respect of general inspections.

DB Contractor shall submit to TxDOT Nonconformance Reports within seven Days of issuance and shall notify TxDOT of Nonconforming Work within two Days of discovering the Nonconforming Work. TxDOT will issue a Nonconformance Report if TxDOT discovers any Nonconforming Work. DB Contractor’s responsibility to correct Nonconforming Work is set forth in the Contract Documents.

27.4.2 Performance Sections

As part of the MMP, DB Contractor shall prepare drawings identifying the Performance Sections and shall submit and update these drawings with the applicable part of the MMP. The drawings shall identify the boundaries of each Performance Section and shall cross reference to an inventory describing each Element of the Project contained within each Performance Section. Where Performance Sections need to be revised to take into consideration the progression from an existing facility to the then-current design, DB Contractor shall phase in the new Performance Sections in a logical manner so that new Performance Sections are in place as the Work progresses.

DB Contractor shall implement the Texas Reference Marker (TRM) system used by TxDOT to establish Performance Sections for inspection and maintenance records in accordance with the MMP. DB Contractor shall use the existing TRM system established on existing sections of the Project. DB Contractor shall coordinate with TxDOT to establish the TRM system on newly constructed sections of roadway.

27.4.3 Inspections by TxDOT

TxDOT may undertake specialist inspections as follows during the Term and if such inspections are performed will make the results available to DB Contractor.

- Annual survey of pavement condition for the entire Project, including main lanes, ramps, and frontage roads, undertaken using automated condition survey equipment to measure all necessary criteria including: ruts, skid resistance and ride quality according to the "Inspection and Measurement Method" set forth in the Performance and Measurement Table.
- Routine biennial inspections, to the extent required, for all structures within the Maintenance Limits in compliance with the latest FHWA / NBIS and TxDOT requirements.

Upon receipt of TxDOT specialist inspections, DB Contractor shall use the results of specialist inspections to prioritize Maintenance Work and immediately identify all Defects within each Performance Section established by the inspections and enter these Defects in the MMS with the appropriate Defect Repair Period.

27.5 Maintenance Management System (MMS)

27.5.1 MMS Attributes

DB Contractor shall implement an MMS to store all the following Maintenance Records:

- description, location, date-time of identification and categorization of Defects;
- planned actions and date-time for permanent repair of all Defects;
- details including date-time of actual repairs performed;
- complaints and reports received from TxDOT and third parties; and
- accidents and incidents relating to the Maintenance Work.

Maintenance Records shall be organized by Performance Section. When an Element is constructed, installed, maintained, inspected, modified, replaced or removed, DB Contractor shall create and store a Maintenance Record no later than three days after completion of such Work. Category 1 Defects shall be recorded in the MMS immediately upon the DB Contractor becoming aware of the Defect either by direct upload to the MMS by DB Contractor's inspection personnel in the field or by upload of the information to the MMS when TxDOT or a third party notifies DB Contractor of a Category 1 Defect. All other Defects shall be recorded in the MMS after coming to the attention of DB Contractor. All other recording requirements shall be recorded on the MMS within 15 days of completion or occurrence of the relevant activity.

27.5.2 MMS Interfaces with TxDOT

DB Contractor shall provide TxDOT real-time, remote access to the Maintenance Records for the duration of the Term.

DB Contractor shall hand over the Maintenance Records to TxDOT, or other entity as directed by TxDOT, upon expiration of the Warranty Term.

Requirements for the storage, retention and transfer to TxDOT of Maintenance Records are provided in Section 27.6.4.

27.6 Maintenance Obligations

27.6.1 Incident and Emergency Management

As part of the MMP for Maintenance Work, DB Contractor shall prepare and implement an Incident and Emergency Management Plan (IEMP). Refer to Attachment 27-4 (MMP Template) for the required contents of the IEMP.

Where an Incident or Emergency has an effect on the operation of the Project, DB Contractor shall clear obstructions and repair damage to the Project under the supervision of the relevant Emergency Services if necessary, such that the Project is returned to normal operating standards and safe conditions as quickly as possible in accordance with the requirements of Section 4.2.3 of the General Conditions.

Where liquid or soluble material spills are involved, DB Contractor shall take all necessary measures to minimize pollution of watercourses or groundwater. Where structural damage to structures is suspected, DB Contractor shall ensure that a suitably qualified bridge engineer or specialist inspector is available to evaluate the structure and to advise on temporary repairs and shoring needed to provide safe clearance of the Incident or Emergency. Where such an Incident or Emergency involves a personal injury, DB Contractor shall not remove any vehicle or other item that may assist a potential investigation by Emergency Services until authorized to do so by such agency or agencies.

27.6.2 Snow and Ice Control

DB Contractor shall report to TxDOT information on weather-related events which may cause unsafe driving conditions such as ice, sleet, snow, floods or high winds and shall use DB Contractor's resources to maintain the roadway in as safe a condition as possible during winter events.

DB Contractor shall maintain the travel way free of snow and ice in compliance with the Performance Requirements and shall implement the requirements of the Snow and Ice Control Plan (SICP) which shall be consistent with the TxDOT *Snow and Ice Control Operations Manual* and San Antonio District – Snow and Ice Control Plan referenced in the RIDs. Requirements for the SICP are contained in Attachment 27-4 (MMP Template). The presence or forecast of snow or ice shall be assessed as a Category 1 Defect (Hazard Mitigation) and shall be addressed immediately by DB Contractor upon detection or upon being informed of the condition(s).

27.6.3 Severe Weather Evacuation

DB Contractor shall prepare and train its staff for evacuation and shall assist TxDOT in the event that an evacuation is implemented, in accordance with the Severe Weather Evacuation Plan (SWEP). Requirements for the SWEP are contained in Attachment 27-4 (MMP Template).

27.6.4 Maintenance Document Management

For all Maintenance Records, DB Contractor shall follow the document storage and retrieval requirements set forth in Section 4.2.1.2 of the General Conditions. DB Contractor's document management system shall be compatible with SharePoint.

DB Contractor shall cause all Maintenance Records and Project-related documents to be stored, along with accurate information, on the location consistent with reference markers in accordance with the TRM system, so that all data and records can be retrieved by reference marker and Performance Section.

Maintenance Records shall be kept throughout the Term. Such records shall be provided to TxDOT upon Final Acceptance. All records obtained during the Warranty Term shall be kept and provided to TxDOT at the end of the Warranty Term.

Unless otherwise directed by TxDOT, DB Contractor's record retention shall comply with the requirements of the Texas State Records Retention Schedule.

27.6.5 Safety

DB Contractor shall establish and implement safety and health procedures for Maintenance Work in compliance with Section 4.2.3 of the General Conditions and in accordance with the Maintenance Safety Plan. Refer to Attachment 27-4 (MMP Template) for the required contents of the Maintenance Safety Plan.

27.6.6 Communication

DB Contractor shall establish and implement communication procedures for Maintenance Work in compliance with Sections 4.2.5 of the General Conditions, Item 11 and Item 26.

27.6.7 Hazardous Materials Management

DB Contractor shall establish and implement Hazardous Materials Management procedures for Maintenance Work in compliance with Section 4.2.4.4 of the General Conditions and in accordance with the Hazardous Materials Management Plan (HMMP). Refer to Attachment 27-4 (MMP Template) for the required contents of the HMMP.

27.6.8 **Environmental Compliance and Mitigation**

DB Contractor shall establish and implement environmental compliance and mitigation procedures for Maintenance Work in compliance with Section 4.2.4.2 of the General Conditions and Item 12 and shall follow the requirements described in Attachment 27-4 (MMP Template).

27.6.9 **Traffic Management**

DB Contractor shall establish and implement traffic management procedures for Maintenance Work in compliance with Item 26 and shall follow the requirements described in Attachment 27-4 (MMP Template).

27.7 **Submittals**

All Submittals described in this Item 27 shall be in accordance with the schedule and for the purpose (approval, review and comment, for information) set forth on Table 27-1. Acceptable electronic formats include Microsoft Word, Microsoft Excel, or Adobe Acrobat files, unless otherwise required.

Table 27-1: Submittals to TxDOT

Submittals	Submittal Schedule	TxDOT Action	Reference Section
Maintenance Limits Drawings	After NTP1	Review and Comment	27.1.3
Maintenance Management Plan (MMP)	After NTP1	Approval	27.2.1
MMP Updates	As required	Approval	27.2.1
Proposal scope and methodology of Baseline Inspections	Prior to the Baseline Inspections	Approval	27.3.3.1
Notice of Baseline Inspections and/or tests	14 days prior to the Baseline Inspections	For information	27.3.3.1
BECR	60 days prior to NTP2	Approval	27.3.3.2
Details of the Maintenance Work to cause each Element to be in compliance with applicable requirements	No later than 14 days after NTP2	Review and comment	27.3.3.4
Updates to Performance and Measurement Table	As required	Approval	27.3.4
Notification of Nonconforming Work	Within 2 Days of discovering the Nonconforming Work	For information	27.4.1
Nonconformance Report	Within seven Days of notification issuance	Review and comment	27.4.1
Performance Section Drawings	After NTP1	Review and comment	27.4.2
Incident and Emergency Management Plan	After NTP1	Approval	27.6.1
Information on weather-related events	As required	For information	27.6.2
Maintenance Records kept throughout the Term	Upon Final Acceptance	For information	27.6.4
Maintenance Records during Warranty Term	At end of Warranty Term	For information	27.6.4

Item 28
Bicycle and Pedestrian Facilities

28.1 **General Requirements**

This Item 28 includes requirements pursuant to which DB Contractor shall design and construct all bicycle and pedestrian facilities for the Project as shown on the Schematic Design. DB Contractor shall design and construct all bicycle and pedestrian facilities consistent with TxDOT policies and guidelines described in this Item 28. DB Contractor 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.

28.2 **Administrative Requirements**

DB Contractor shall maintain connectivity equivalent to existing conditions on all bicycle and pedestrian facilities during construction and throughout the Term.

28.3 **Design Requirements**

28.3.1 **Bicycle Facilities**

DB Contractor shall design bicycle facilities to be consistent with TxDOT's and Governmental Entities' bicycle requirements and accommodate existing bicycle paths and crossings, and on-street bicycle facilities. DB Contractor shall coordinate with Governmental Entities and TxDOT to ensure the bicycle facility design results in consistency between existing and proposed bicycle facilities. A five-foot shoulder on the frontage roads as depicted on the Schematic Design shall be provided to accommodate bicycles.

Facilities shall meet the requirements of the AASHTO *Guide for the Development of Bicycle Facilities* and shall incorporate the following elements, where applicable, relating to bicycle facilities into the design:

- Alignment, profile, cross-section, and materials;
- Points of connection to existing and proposed bicycle facilities;
- Crosswalk and pedestrian ramp locations and details;
- Signing, signalization, and pavement markings;
- Separation between bicycle facilities and the nearest travel lane;
- Methods of illumination indicating light fixture locations and types;
- Methods of separation, including barrier and/or fence type and height; and
- Requirements of the Aesthetics and Landscaping Plans.

28.3.2 **Pedestrian Facilities**

DB Contractor shall design, construct, and maintain pedestrian facilities where required by state and federal regulations. Sidewalks and pedestrian facilities shall comply with ADA, the *Public Right-of-Way Accessibility Guidelines* (PROWAG), and TDLR. DB Contractor's Work shall also include any necessary modifications to existing driveways along the frontage roads for the sidewalks to comply with ADA, PROWAG, and TDLR, including but not limited to the locations shown on the Schematic Design. DB Contractor shall coordinate with Governmental Entities and TxDOT to ensure the pedestrian facility design results in consistency between existing and proposed pedestrian facilities.

DB Contractor shall design and construct new concrete sidewalks or remove and replace existing concrete sidewalks, as applicable, along frontage roads and cross streets, including but not limited to the locations shown on the Schematic Design; and where any existing sidewalk is not in compliance with ADA, PROWAG, and TDLR.

DB Contractor shall install pedestrian signals and curb ramps at new (or full replacement) signalized intersections and intersections requiring modification within Project limits as identified in Section 24.3.7.1. In areas along the frontage road or cross streets where only mill and overlay is required, DB Contractor shall remove and replace any pedestrian signals and curb ramps not in compliance with ADA, PROWAG, and

TDLR. DB Contractor shall coordinate with Governmental Entities and TxDOT to ensure consistency with existing and proposed pedestrian facilities.

DB Contractor shall provide a box crosswalk wherever feasible (except at diamonds or T intersections) and shall provide channelized right turn median islands for pedestrian refuge. DB Contractor shall not utilize yield triangles for pedestrian crossings [except for high-intensity activated crosswalk (HAWKS) beacon or pedestrian hybrid beacon (PHB) crossings].

DB Contractor's facilities shall meet the requirements of the AASHTO *Guide for the Planning, Design, and Operation of Pedestrian Facilities*, and shall include the following elements, where applicable, relating to pedestrian facilities:

- Alignment, profile, cross-section, and materials;
- Points of connection to existing and proposed pedestrian facilities;
- Crosswalk and pedestrian ramp locations and details;
- Signing, signalization, and pavement markings;
- Separation between pedestrian facilities and the nearest travel lane;
- Methods of illumination indicating light fixture locations and types;
- Methods of separation, including barrier and/or fence type and height; and
- Requirements of the Aesthetics and Landscaping Plans.

In addition, all facilities shall be designed and constructed in accordance with TxDOT San Antonio District Standards. TxDOT San Antonio District standards can be found at https://www.txdot.gov/inside-txdot/district/san-antonio/specinfo.html. The six-foot usual sidewalk width may be reduced only in areas where ROW is insufficient, so long as ADA, PROWAG, and TDLR requirements are still met.

DB Contractor is responsible for obtaining TDLR reviews and approvals of pedestrian facility design and construction.

28.4 Construction Requirements

DB Contractor shall conduct all Work necessary to meet the requirements for this Item 28 in accordance with the requirements of this Item 28 and TxDOT Standard Specifications.

In areas of conflict between pedestrians and construction, DB Contractor shall provide for the installation, maintenance, and removal of temporary sidewalk along alternate routes during construction in accordance with TxDOT Standard Specification *Item 531*. The temporary sidewalk along the alternate route shall be ADA compliant with a minimum width of 36" and have 60" x 60" passing zones every 200 feet. Temporary sidewalks shall be constructed with 3 in. thick Type B concrete (unreinforced, any class) or Type D hot mix. All material testing requirements are waived for temporary sidewalk construction. Orange construction fence along the edge of the sidewalk is required if a drop-off condition exists adjacent to the path. DB Contractor shall provide a box crosswalk wherever feasible (except at diamonds or T intersections) and shall provide channelized right turn median islands for pedestrian refuge. DB Contractor shall not utilize yield triangles for pedestrian crossings (except for HAWKS or PHB crossings).