Texas Department of Transportation

DESIGN-BUILD SPECIFICATIONS Items 10-28

Table of Contents

Item 10
General

10.1 **Offices, Equipment, and Vehicles**

Except where noted elsewhere in the Contract Documents, Design-Build (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 Design-Build Specifications that is within one mile of the Project Right of Way (ROW), or as approved by TxDOT. Co-location requirements for specified personnel are described in the General Conditions.

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

10.1.1 **Core Office**

DB Contractor shall provide all space, facilities, and support elements necessary to design, construct, and maintain the Project core office in accordance with the Contract Documents. DB Contractor shall provide separate office space for the exclusive use of TxDOT's design and Project management staff ("TxDOT facility area"). This TxDOT facility area shall be located within the same building or complex as DB Contractor's office staff, unless otherwise approved by TxDOT. TxDOT will be reasonable regarding re-use of existing space within DB Contractor's current office facility, provided that the TxDOT facility area is contiguous and workable in TxDOT's good faith discretion.

DB Contractor shall provide core office space for TxDOT (i.e., available for occupancy) within 60 days following issuance of Notice to Proceed 1 (NTP1), and prior to Notice to Proceed 2 (NTP2). The location, condition, and amenities of the TxDOT facility area 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 core 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 ten Business Days. DB Contractor shall submit a final TxDOT facility area layout plan within ten Business Days of receipt of TxDOT comments.

10.1.1.1 **Core Office Condition**

The TxDOT facility area of the core office, provided by DB Contractor, shall be in good and serviceable condition, at least of the same quality as that of DB Contractor's counterpart core 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 facility, except for reasonable wear and tear and except for alterations, loss, or damage caused by any member of a DB Contractor-Related Entity.

10.1.1.2 **Core Office Loss or Damage**

If core 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's personnel, DB Contractor shall, at its cost and within ten 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 provided by DB Contractor (e.g., computers, fax machines, copy machines, and printers) necessary for normal office operations, replacement shall occur within two Business Days. If loss or damage is caused as a direct result of willful misconduct of TxDOT's personnel, DB Contractor shall replace the items noted herein within the timeframes specified herein, and TxDOT will reimburse DB Contractor for actual, reasonable, and documented costs incurred.

10.1.1.3 **Core Office Facilities and Equipment**

For the core office 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 Occupational Safety and Health Administration (OSHA), building, electrical, and energy code requirements for similar office space (provide nominal 30-foot candles of light at 30 inches above finished floor). Each office space must have at least four duplex receptacles, with minimum circuit capacity of 20 amperes. In addition, each personal office area and conference room must have a 1,500 Volt-ampere (VA) uninterruptible power supply (UPS). All local area network (LAN), telephone system equipment, and appurtenances must 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 on Business Days and maintain trash containers and trash pickup service for the building and surrounding areas. Cleaning shall include cleaning and disinfecting all office spaces in accordance with Governmental Entities' guidelines. This shall include, but not be limited to, sweeping and mopping floors, cleaning restrooms and break rooms, emptying wastebaskets, and periodic dusting;
- 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, Americans with Disabilities Act (ADA) Accessibility Guidelines, ADA, as amended (42 USC § 12101, et seq.), and the applicable building code. Facility design plans shall be submitted to the Texas Department of Licensing and Regulation (TDLR) for review and approval as required by 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 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 a table, six chairs, refrigerator (minimum 23 CF) and 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 restrooms cannot be accessed from a common building entry/lobby, DB Contractor may provide separate restrooms for the TxDOT facility area. All restrooms shall be maintained with necessary supplies including toilet supplies and hand washing liquid soaps. All break room and entry spaces shall be provided with an alcohol-based hand rub containing at least 60% alcohol;
- Heating, Ventilation and Air Conditioning (HVAC). Provide electrical, HVAC systems capable of maintaining temperatures between 65- and 75-degrees Fahrenheit in all spaces, 24 hours per day/seven days per week, 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 core 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, ergonomic desk

chair, bookcase, file cabinet with lock, credenza, whiteboard (minimum 12 SF), and two guest desk chairs;

- Cubicles. Cubicle area spaces for administration staff (nominal 64 SF each), 15 total with L-shaped desk, ergonomic desk chair, and file cabinet with lock; 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 with a minimum 120-inch diagonal projected image and 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 to accommodate the total number of required chairs; one whiteboard for each conference room (minimum 150 SF and min 50 SF respectively)
- Reception Area. Receptionist space with waiting area with seating for two visitors (nominal 200 SF); minimum 46-inch 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 10 feet by 10 feet (100 SF);
- Secure Storage. One lockable space for Escrowed Proposal Documents (EPD) safe, nominal 6 feet by 6 feet (36 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 seven-foot by 19-inch 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 in Section 10.1.1.3;
- 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 eight-foot vehicle height. If covered parking is available, no fewer 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 two-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**

DB Contractor shall provide the following for the core office:

- 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. Dedicated electrical power circuits for copiers;
- Fire Extinguishers. Fire extinguishers, per fire code and fire marshal with jurisdiction;
- Insurance. Insurance (obtained and provided by DB Contractor) covering the use of the Project core 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. Access to a general building vending area;
- Utilities. Initial installation and monthly expense of all utilities;
- Monthly Services. Janitorial, trash, recycling, and secure document shredding services;
- Emergency Contacts. 24-hour emergency contact to DB Contractor;
- Additional 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. 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 staff including the TxDOT-designated Construction Manager and other TxDOT staff and/or consultants. 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 office may be combined with the core office described in Section 10.1.1 as long as the combined offices meet the requirements of this Section and Section 10.1.1.

Subject to TxDOT's prior written approval, DB Contractor shall provide separate facilities for TxDOT's field construction staff, to be located within the same complex as DB Contractor's field office. Should DB Contractor elect to construct the Work using additional 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 issues NTP2.

10.1.2.1 **Field Office Condition**

The DB Contractor-provided TxDOT facility area of 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 that of DB Contractor's counterpart management and field staff, respectively, 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 TxDOT facility to DB Contractor in essentially the same condition as when TxDOT first took occupancy of the facility, 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 field office spaces 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 ten 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 provided by DB Contractor (e.g., computers, fax machines, copy machines, printers) necessary for normal office operations, replacement shall occur within two 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 items 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 field facilities it provides, including the "Laboratory Facility", 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 eight foot by ten 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 building and electrical codes for all 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 on Business Days 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. Cleaning shall include cleaning and disinfecting all office spaces in accordance with Governmental Entities guidelines;
- 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 (42 USC § 12101, et seq.), 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 hours per day, seven days a week, 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;
- Disposal and Removal. Be responsible for disposal or removal of all DB Contractor-provided facilities and any site restoration Work as required; and
- Pest Control. Provide pest control service to prevent and resolve pest infestation inside the field office space.

10.1.2.4 **Field Office Space Requirements**

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

- Offices. Enclosed offices (ten offices at 150 SF each, unless otherwise approved by TxDOT) with lockable doors for TxDOT's management staff and other TxDOT or contract employees, with keyed door hardware, desk, ergonomic desk chair, bookcase, file cabinet with lock, credenza and guest chair;
- Offices/Cubicles. Offices or cubicles for up to sixteen field engineer/inspection/ administration staff (64 SF each); field office furniture shall include L-shaped desk, ergonomic desk chair, guest chair and filing cabinet with lock and a whiteboard for each office/cubicle (minimum 15 SF);
- 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; conference rooms shall have a 65-inch minimum flat panel monitor with VGA/HDMI accessibility, each conference room shall have one chair for every 24 SF of conference room space and a conference table of sufficient size to accommodate the total number of required chairs; whiteboards for each conference room (minimum 150 SF and minimum 50 SF respectively);
- Server room. One 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 (each 50 SF minimum);
- 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 field offices 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 two foot candles of lighting within the fenced field office sites;
- Window Security. Security bars on all exterior windows;
- Laboratory Facility. A completed facility suitable to accommodate a functioning portable lab (approximately 2,500 SF), including a separate temperature controlled cure room (approximately 850 SF) and a large trash container adequately sized for the sole disposal of laboratory generated waste materials; The laboratory facility must be located immediately adjacent to the Independent Quality Firm (IQF) laboratory as required in the TxDOT Quality Assurance Program for CDA/Design-Build Projects (QAP); laboratory facility furniture shall include two (L-shaped desks, ergonomic desk chairs, two guest chairs and filing cabinets with locks);
- Kitchen/Break Room. Each field office, including the "Laboratory Facility", 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. Each break room shall be provided with an alcohol-based hand rub containing at least 60% alcohol;
- Restrooms. Two permanent 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**

DB Contractor shall provide the following for the field offices:

- Flooring. Tiled flooring for field offices (nonstatic 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. 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 (e.g., workroom, storage room, etc.). All data/voice outlets shall be installed next to power outlets;
- HVAC. 24 hours per day, seven days per week HVAC as previously described above for the core office;
- Window Coverings. Horizontal mini-blinds (no drapes) for each exterior window;
- Power Circuits. Dedicated electrical power circuits for copiers
- Fire Extinguishers. Fire extinguishers, per fire code and fire marshal with jurisdiction;
- Insurance. Insurance (obtained and provided by DB Contractor) covering the use of the Project field 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;
- Emergency Contacts. 24-hour emergency contact to DB Contractor; and

- Additional 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 provide, furnish, install, operate, and maintain the following for the TxDOT office spaces (including laboratory facility), as described in Section 10.1.1 and Section 10.1.2:

- A local area network (LAN) with a minimum of 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 Institute of Electrical and Electronics Engineers (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 and cubicle 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;
- One laptop docking station compatible with TxDOT staff and/or TxDOT contractor employee's laptops with two flat panel monitors, including all necessary peripherals for each personnel office area, cubicle area, and the reception area in the Project core and field offices;
- Peripherals shall include at minimum, monitor stands, mouse, and keyboard, and 16 GB minimum thumb drive. For the core and field office, the DB Contractor shall provide one external Digital Video Disc (DVD) drive and one external hard drive with not less than two terabytes of memory per drive;
- High speed, highly reliable internet service(s) capable of providing a minimum download speed of 1 Gbps and a minimum upload speed of 20 Mbps per network drop, 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, cubicle area, and conference rooms, power assemblies, and other appurtenances needed to meet the requirements contained within these Design-Build Specifications;
- All hardware and software shall meet applicable industry standards and protocols;
- On-site technical support eight hours per day, five days per week until the completion and close out of the Project;
- Office equipment meeting the following requirements, or multipurpose piece of equipment capable of meeting multiple parts of the following requirements:
    - One color plotter capable of handling 36 inches by 24 inches plots for core office only;
    - One high-speed color printer capable of handling 11 inches by 17 inches prints for core office and one for field office;
    - One high-speed color photocopy machine capable of handling 11 inches by 17 inches prints for core office and one for field office; and

- One high-speed color scanner capable of handling 11 inches by 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 all times during the Term. 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.

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

- Twelve 11-inch iPad Pro (latest version available), or equal, with wi-fi + unlimited cellular, 512 GB capacity and provide 5G/LTE minimum cellular service and rugged protective case appropriate for construction field conditions with keypad;
- Three global positioning system (GPS) cameras (to include compass/GPS module, minimum 4 GB secure digital (SD) card, camera bag, additional battery, USB cable, neck strap, rechargeable lithium-ion battery, battery charger, instruction manuals, and warranty card); 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 version 10.10.1.3 or the most recent version of OpenRoads Designer utilized by TxDOT and shall submit its 3-D design files to TxDOT for use during the design and construction process.

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 utilize a level of detail (LOD) 300 for its 3-D design model. LOD 300 shall be interpreted as the modeled element being graphically within the 3-D model as a specific system in the XY and Z plane. Size, shape, orientation, and interfaces with other objects shall be able to be derived directly from the modeled element without the need for plan sheet notes or dimensions.

DB Contractor shall create an integrated 3-D model of the existing condition of the Project, using OpenRoads Designer, 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), subsurface utility engineering (SUE), field surveys, and existing plans (as-built) data collection; including currently available LiDAR or other existing ground surface data (digital terrain model (DTM), extensible markup language (XML), or triangulated irregular network (TIN) formats) provided in the Reference Information Documents (RID). 3-D model of the existing conditions shall be of the same level of accuracy as SUE information provided in RIDs, and the limits of Utility elements within the existing model shall be consistent with Project limits.

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 shall 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 from ROW to ROW 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 the Design-Build Specifications:

- Roadway: Sufficient detail to show top of pavement surface and adjacent features (e.g., curb and gutter, concrete safety barrier, 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 and all deck surface features (e.g., rail, curb, sidewalk), 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, structure type, and foundations (size and length); and
- Temporary structures: Including, but not limited to, temporary shoring, soil nails, temporary bridges, temporary drainage structures, 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, using OpenRoads Designer, to TxDOT and stakeholders at review meetings. DB Contractor shall utilize software that allows for interactive visualization of the 3-D design model's 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 that is 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 and 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 at least three Business Days before every review meeting:

- Adobe portable document format (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;
- Keyhole markup language (KMZ) file of the current design compatible with Google Earth; 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, using OpenRoads Designer with the following Submittal packages:

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

The integrated 3-D design model shall consist of TxDOT approved 3-D design software 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.

DB Contractor shall submit to TxDOT electronic design files, including:

- Software: TxDOT approved 3-D design software files containing civil data of alignments, profiles, pertinent geometry, terrain surfaces, civil cells, corridor models, and final surface in addition to other design software elements used in the creation of the corridor model such as point controls, corridor references, OpenRoads Designer files, etc.;
- Template libraries (ITL);
- XML: Output files of alignments, profiles, pertinent geometry, terrain surface and final surfaces;
- Drawing exchange format (DXF): Output files of 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. Any ICMs used by DB Contractor to transfer the 3-D model information to construction equipment;
- DTM data:
  - Original ground terrain file in XML, or DTM format;
  - 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.
- Electronic construction i-models: Compatible with DB Contractor's construction equipment to be utilized by TxDOT and Independent Quality Firm Manager (IQFM) to verify grading operations of subgrade and the final pavement surface, as well as construction of storm sewer systems and culverts; and
- 3-D PDF visualizations of 3-D design models.

DB Contractor shall provide, along with the Record Drawings, a 3-D 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. to provide complete compatibility between the DB Contractor and TxDOT.

10.3 **Required Software during Construction Work**

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. 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, specifications and documents in the field, automate Request for Information (RFIs) and punch lists for Construction Work, and to 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 software solution must be compatible with iOS, Windows and Android operating systems and devices;
- The software solution must be able to export an as-built set. This as-built set must be complete with documents, photos and hyperlinks embedded in the set;
- The software solution must be capable of being used during post construction operations and maintenance phases;
- After Final Acceptance, the software solution should be handed to the maintenance team for post construction coordination;
- The software 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 software solution must auto-tag sheet disciplines to distinguish different trade drawings;
- Vendor must be able to support the Project with a dedicated sales representative for rollout; and
- Vendor must offer training/consulting on the software solution as needed during the Project.

10.4 Design Visualization

DB Contractor shall provide 3-D design visualization files to TxDOT for use during the design and construction process. All visualization files shall provide accurate 3-D views that depict the identified areas of the Project. Completed models shall represent realism and aesthetic attributes of the existing conditions, including adjacent buildings and land features, and proposed Project.

10.4.1 Animations

Within 90 days after NTP2, DB Contractor shall provide one 3-D design visualization (animation) for the Project that provides a fly-through of the features noted below for TxDOT review and comment.

The design visualization models shall show existing and proposed design conditions either separately or combined in the same display. The final design visualization deliverables shall include photo-matched renderings for adjacent buildings and land features, in accordance with Section 10.4.2 and animated sequences for the Project limits.

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 TxDOT approved 3-D design files, OpenRoads Designer 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 Bentley applications, but do need to be capable of viewing on any device with minimal support to, or effort by TxDOT.

10.4.2 Design Visualization Services – Photo Renderings and Exhibits

DB Contractor shall provide photo renderings of no more than ten locations to be determined by TxDOT as part of the Preliminary and Final Design Submittal, or as directed by TxDOT, but not to exceed 20 renderings total. DB Contractor shall submit the completed renderings to TxDOT within 30 days of TxDOT's request.

DB Contractor shall coordinate with TxDOT the location of the photographs. DB Contractor shall take a minimum of two existing condition photographs at each of the ten locations. These photographs will serve as the basis for the photo-renderings.

DB Contractor shall provide two mounted "before" images and two mounted "after" static 3-D photo matched images of proposed design elements at each of the ten locations.

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

10.5 Aerial Imagery

DB Contractor shall take aerial imagery of the Construction Work and Utility Adjustment Work that covers the entire Project limits and shall provide the videos to TxDOT on separate drives no less frequently than monthly.

Should DB Contractor desire to utilize Unmanned Aerial Systems (UAS) on the Project, it shall comply with the requirements of the current version of the TxDOT UAS Flight Operations and User's Manual. In addition to the requirements within the TxDOT UAS Flight Operations and User's Manual, DB Contractor shall comply with the requirements of the Federal Aviation Administration, the State, and local Governmental Entities for UAS operations, including flight restrictions.

10.6 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 in 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	After NTP1	Review and comment	10.1.1
Final TxDOT facility area layout plan	Within 10 days after receipt of TxDOT comments	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
PDF file of Project 3-D model with proposed striping, all CADD files associated with the 3-D model, KMZ file of current design, and updated Utility Adjustment Concept Plan	Three Business Days 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 Designer, ITL, XML, DXF, ICM and DTM design files	As necessary	For information	10.2.3
Electronic construction i-models	Upon request	For information	10.2.3
3-D design visualization (animation)	Within 90 days after NTP2	Review and comment	10.4.1
Photo renderings and exhibits	As part of the Preliminary and Final Design Submittal, or as directed by TxDOT within 30 days	For information	10.4.2
Construction Work and Utility Adjustment Work aerial imagery	Monthly	For information	10.5

Item 11
Public Information and Communications

11.1 **General Requirements**

In coordination with TxDOT, Design-Build (DB) Contractor shall be responsible for developing and implementing a Public Information and Communication Plan (PICP) 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. All public information activities shall be performed in accordance with the TxDOT *Public Involvement Policy* and the TxDOT *Public Involvement Toolkit,* which can be found at http://www.txdot.gov.

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 provide to TxDOT complete copies of all materials to be presented to the public or the media as early as possible, but at least five Business Days prior to dissemination.

11.3 **Public Information and Communications Plan**

In addition to the PICP requirements listed in Section 4.2.2 of the General Conditions, DB Contractor shall implement the following public information and communication strategies:

- 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, highway construction reports (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 in-person and online 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 Right of Way (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 Barriers, 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. Seek to incorporate public input where possible.
    - 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 following TxDOT guidance:
  - TxDOT *Noise Policy and Implementation Guidance (Procedures for Analysis and Abatement of Roadway Traffic Noise and Construction Noise)*;
  - TxDOT *Brand Guidelines*;
  - TxDOT communications protocols; and
  - TxDOT tri-party website requirements.
- 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 and Project design for accommodation of pedestrians and bicyclists throughout the Project.
- Make available 3-D animations, renderings, and exhibits that are prepared in accordance with Section 10.4 on the Project website, in the public information office, and at meetings with the public.
- Compile, manage, and update as needed a database of all Customer Group contacts and make readily available to TxDOT in an easily accessible format.
- Provide immediate notification to TxDOT's public information officer of any media inquiries.
- Utilize existing TxDOT media resources if available to create and develop advertising messages, including graphics, and slogans.
- Place Project-related messages in the appropriate media.
- Develop public service announcements, paid advertising, news releases, news reports, and other communication materials as appropriate and as directed by TxDOT.
- 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 website/blog (http://txdotsanantonio.blogspot.com/)/twitter feed/Facebook/Nextdoor, etc.
- Support TxDOT in managing 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 day after discovery of the inaccurate information.
- Document and make available Project-specific media clips to the entire Project team.
- Identify methods of notifications, invitations, and advertisement of meetings organized and managed by DB Contractor with Customer Groups to maximize participation by members of the applicable Customer Group.
- 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.

11.4 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.
- Speak fluent English and 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.

11.5 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 ROW. 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 Americans with Disabilities Act (ADA) compliant, convenient to and accessible by Customer Groups, and appropriately supplied with electrical outlets, tables, 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. to 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 and email messages left after hours within 48 hours of receiving the voicemail or email message. DB Contractor's Public Information Coordinator shall log the messages, responses, day and time of message, and day and time of response.

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

To maximize public participation in meetings with the general public and Customer Groups, 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, 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, businesses, frontage roads, local streets, and utilities (including such issues as design and alignment refinements and changes, the Project ROW definition, the Project ROW acquisition process, grading, drainage, access, lighting, visual impacts, aesthetics, Noise Barriers, and retaining walls);
- Street and roadway detour design and implementation;
- Scheduling and duration of Work, including hours of Construction Work;
- Haul routes;
- Methods to minimize noise and dust;
- Environmental mitigation measures, including noise workshops; and
- Other environmental issues.

DB Contractor shall notify TxDOT a minimum of 15 Business Days in advance of any meetings with the general public and Customer Groups. 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.

11.7 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 using TxDOT's electronic content management system (ECMS). TxDOT comments shall be incorporated before distributing final versions to the meeting attendees and appropriate Customer Groups. DB Contractor shall also submit final versions of meeting summaries to TxDOT, which may be posted to www.txdot.gov when required. 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.

11.8 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: dynamic message signs (DMSs), TxDOT's HCR, email/web, text alerts, telephone notification, and social media account(s) notification(s), 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 knowledge 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 or other severe weather conditions, "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.

Procedures and protocols for Emergency communications and key staff Emergency contact information shall be provided by DB Contractor in the PICP.

11.9 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 for review and comment. TxDOT shall have a review and comment period of five Business Days 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 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 coordinate and manage website development of the Project under TxDOT's existing My35.org 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.

TxDOT will provide the DB Contractor with the appropriate credentials to coordinate and manage website development for the Project.

Website design and creative development shall be coordinated with TxDOT to ensure content is consistent with TxDOT brand management. 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. 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, 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.

11.10 Third Party Claims

11.10.1 Claims against Third Parties by DB Contractor

As part of the PICP, DB Contractor shall prepare policies related to its pursuit of claims against third parties for damage caused to the Project, including procedures for sensitive handling of claims in which there is death or injury, and process to keep TxDOT informed of the status of such claims against third parties.

11.10.2 Third Party Claims against DB Contractor

Other than the case of a Third Party Claim that DB Contractor has notified TxDOT to be, and TxDOT has accepted, as a shared liability in accordance with Section 7.12.2.8 of the General Conditions, in no case will TxDOT accept any liability for Third Party Claims in connection with damage to persons or property in connection with the Project.

In accordance with Section 7.12.2.1 of the General Conditions, TxDOT will forward to DB Contractor any claims or complaints it receives from the public in connection with the Project. DB Contractor shall be responsible for resolving all claims and complaints, 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. If DB Contractor determines that neither DB Contractor nor any DB

Contractor-Related Entity is responsible for the damage, DB Contractor shall notify the complainant of this position promptly by certified mail and shall retain a copy of all correspondence. All documentation, including a copy of logs and claims, shall be available for inspection by TxDOT upon request.

11.11 Project Milestone Events

DB Contractor shall provide an allowance of $50,000 in the Price for the expenses (non-labor charges) to be incurred for items listed below in the requirements of Section 11.11.1, Section 11.11.2, and Section 11.11.3 which shall be provided by DB Contractor as requested by TxDOT, and billed through DB Contractor.

11.11.1 Groundbreaking Event(s) and Activities

DB Contractor shall participate in groundbreaking events and activities to mark the beginning of the Construction Work of the Project. DB Contractor shall provide the following elements for the groundbreaking: tents, chairs, stage, podium, sound system, mementos, refreshments, invitations, and programs, as approved by TxDOT. DB Contractor shall work with TxDOT to identify the location of the ceremonial activities, assist with parking, logistics, and traffic control as needed and as directed by TxDOT.

11.11.2 Grand Opening Event(s) and Activities

DB Contractor shall participate in grand opening events and activities to mark the opening of the Project to traffic. DB Contractor shall provide the following elements for the grand opening: tents, chairs, stage, podium, sound system, mementos, refreshments, invitations, and programs, as approved by TxDOT. DB Contractor shall work with TxDOT to identify the location of the ceremonial activities, assist with parking, logistics, and traffic control as needed and as directed by TxDOT.

11.11.3 Additional Events

DB Contractor shall participate in up to 2 additional events throughout the Term as directed by TxDOT. These events may include milestones of the Project. DB Contractor shall provide the following elements for the additional events: one piece of heavy construction equipment, tents, chairs, stage, podium, sound system, mementos, refreshments, invitations, and programs, as approved by TxDOT. DB Contractor shall work with TxDOT to identify the location of the additional events, assist with parking, logistics, and traffic control for the subject events as directed by TxDOT.

11.12 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 in 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 coverage responses	Within one day after discovery of the inaccurate information	Approval	11.3
Draft meeting summaries	Upon request	Review and comment	11.7
Final meeting summaries (to TxDOT and meeting attendees)	Upon request	For information	11.7
Draft public website pages	Prior to website content development	Review and comment	11.9
Final website design elements	Prior to publishing	Approval	11.9
Drafts public information materials	At least five Business Days prior to final editing	Review and comment	11.9
Final copies of public information materials	At least three Business Days prior to dissemination	For information	11.9
Public comment/inquiry log	Bi-weekly	For information	11.9

Table 11-1: Submittals to TxDOT

Submittals	Submittal Schedule	TxDOT Action	Reference Section
Language assistance log and ADA accommodation log	Quarterly	For information	11.9
Copy of claims and complaints documentation, logs, and record of the actions	Upon request	For information	11.10.2

Item 12
Environmental

12.1 **General Requirements**

Design-Build (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 Comprehensive Environmental Protection Plan (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 of compliance are available to TxDOT and Other Governmental Entities for inspection at any time.

12.1.1 **Comprehensive Environmental Protection Plan**

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 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 Environmental Approvals, Environmental Commitments, and Environmental Laws including those set forth in these Design-Build Specifications. The CEPP shall also describe the processes that will be followed during the course of the Work to comply with those Environmental Approvals, Environmental Commitments, and Laws, as well as to prepare 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 Design-Build Agreement (DBA), the Environmental Approvals, Environmental Commitments and applicable Environmental Laws.

The CEPP shall 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 define 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, and coordination requirements with appropriate Governmental Entities. DB Contractor shall be responsible for all measures and activities required to rectify such violations.

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.

Subject to Section 5.2.6.4 of the General Conditions, 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, or where TxDOT, at its discretion, directs that TxDOT will perform the 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 Environmental Approvals, other TxDOT-Provided Approvals, and permit documents.

DB Contractor is responsible for assembling and providing supporting exhibits, cost estimates, field studies and other design and re-evaluation information applicable for TxDOT's use in coordinating with Governmental Entities to obtain New Environmental Approvals where TxDOT has agreement with the Governmental Entity to perform such coordination.

Only one re-evaluation, amendment, or supplement can be in process at any given time during the Term.

DB Contractor shall ensure compliance with the conditions and schedules set forth in amendments to any TxDOT-Provided Approvals or New Environmental Approvals.

12.2.3 **Responsibilities Regarding Environmental Studies**

DB Contractor is responsible for conducting continuing environmental studies based on the Environmental 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, or where TxDOT, at its discretion, directs that TxDOT will perform the coordination.

The environmental review and the documentation of the review shall at all times be conducted under the oversight of TxDOT and any federal agency acting as a lead agency and shall comply with all requirements of state and federal law, including National Environmental Policy Act (NEPA), if applicable.

12.2.3.1 **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.

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

Crossing Number	Crossing Name
3	Walzem Creek

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 document related to 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 U.S. Army Corps of Engineers (USACE) and Texas Commission on Environmental Quality (TCEQ), respectively. If required, DB Contractor shall prepare a Section 404 mitigation plan in accordance with 33 CFR Part 332, and implement all required Section 404 mitigation as determined by USACE.

If required, Project mitigation options shall be provided by DB Contractor in accordance with the TxDOT *Standard Operating Procedure: Acquiring and/or Purchasing Section 404 Compensatory Mitigation Credits* (320.01.SOP) or *Standard Operating Procedure: Section 404 Compensatory Mitigation via Permittee Responsible Mitigation (PRM)* (320.02.SOP), both regarding TxDOT's mitigation procurement policy, as

applicable. DB Contractor shall be responsible for the maintenance and monitoring of any permittee-responsible mitigation sites for the term stipulated within the USACE approved mitigation plan, if applicable. All coordination with USACE regarding Section 404 permitting and mitigation shall be disclosed to TxDOT, and any submittals required by this coordination shall be submitted to TxDOT for review and comment before submission to USACE.

DB Contractor shall document how it will identify Section 404 impacts, obtain the required Section 404 permit(s) and associated Section 401 certification, and comply with all the terms, conditions and special conditions of the Section 404 permit(s) and 401 certification issued to DB Contractor during the life of the Project, in accordance with any applicable parts of the TxDOT *Environmental Handbook for Water Resources* (900.01.GUI). 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 permit(s) and associated Section 401 certification;
- Process for communicating and complying with the terms, conditions and special conditions of all Section 404 permit(s) and Section 401 certification and other permits as necessary;
- Procedures for carrying out any required Environmental Commitments and mitigation;
- Procedures for incorporating additional properties outside the original NEPA approved Schematic Design and any off-right-of-way Project Specific Locations (PSLs) as required by the Section 404 permit(s) issued to either TxDOT or DB Contractor and other permits associated with the Section 404 permit(s); and
- A summary of all the final permit requirements based on the Final Design.

DB Contractor shall comply with all general and regional conditions set forth by authorized Section 404 permits.

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 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 the NEPA commitments and mitigation measures is provided in the folder labeled “Environmental” located in the RIDs.

12.2.5.1 Traffic Noise Mitigation

DB Contractor is responsible for implementing all noise mitigation measures to minimize construction and long-term impacts of the Work as prescribed in TxDOT-Provided Approvals and subsequent Environmental Approvals secured by DB Contractor.

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 Work 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 identify and discontinue all dust creating Construction Work when winds reach a constant velocity of 25 mph or more, or when wind conditions may create a dust concern, or as directed by TxDOT.

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 Work to the extent practicable.

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.

12.2.5.4 **Hazardous Materials**

DB Contractor shall test, identify, inspect, notify, amend notifications as necessary, pay notification fees, and abate for all Hazardous Materials encountered during construction. 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 in the Contract Documents.

DB Contractor shall prepare a Soil and Groundwater Management Plan and submit to TxDOT for approval.

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 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.

12.2.5.4.1 Phase II Environmental Site Assessment

DB Contractor shall not perform any Phase II environmental site assessments until the applicable Phase I environmental site assessment has been completed and the following conditions have been met:

(a) DB Contractor has delivered to TxDOT, and TxDOT has approved, a list of Hazardous Material sites on which DB Contractor proposes to perform Phase II environmental site assessments. For each test proposed, DB Contractor shall describe the type of testing proposed, justification of the need for the test, the extent of the testing needed, and the proposed costs associated with the testing;

(b) NTP2 has been issued, or if prior to NTP2, DB Contractor has delivered to TxDOT and TxDOT has approved the following:

i. The Safety and Health Plan in accordance with General Conditions Section 4.2.3;

ii. The Hazardous Materials Management Plan (General Conditions Section 4.2.4.4), the Investigative Work Plans if applicable (General Conditions Section 4.2.4.4.1);

iii. Any additional site-specific applicable components of the Comprehensive Environmental Protection Plan (General Conditions Section 4.2.4);

(c) Property rights, or Right of Entry Agreement, acceptable to TxDOT, in its sole discretion, for performing investigative work for the applicable Hazardous Material sites have been acquired or obtained in favor of TxDOT;

(d) DB Contractor has satisfied all applicable requirements contained in the Environmental Approvals and other Governmental Approvals that are applicable to the proposed Hazardous Material site investigation; and

(e) TxDOT has delivered notice acknowledging DB Contractor's satisfaction of the conditions above and authorizing DB Contractor to commence the proposed investigations.

Upon satisfactorily completing the investigative work, DB Contractor shall summarize the findings and make recommendations in accordance with General Conditions Section 4.2.4.4.1.

12.2.5.5 **Asbestos-Containing Material/Lead Based Paint**

DB Contractor shall test for asbestos-containing material (ACM) and lead based paint (LBP) on any existing bridge structures to be removed that require any work to be done, including, but not limited to, removals, rehabilitations, and widenings.

DB Contractor shall identify, inspect, notify TxDOT of, amend notifications as necessary, pay notification fees, and abate any ACM and LBP found on any structure, including, but not limited to, bridges, buildings, rails, girders, and retaining walls, in accordance with appropriate or relevant regulations or guidance.

DB Contractor shall provide TxDOT any inspection reports, proposed abatement plan, and/or report documenting abatement (as necessary). TxDOT has provided all available ACM and LBP inspection reports as of the Effective Date in the folder labeled "Environmental" located in the RIDs.

DB Contractor shall notify the Texas Department of State Health Services of bridge demolitions or building structures 10 Business Days prior to the scheduled demolition, including any required amendments to the notification.

12.2.5.6 **Project Specific Locations**

DB Contractor shall ensure regulatory compliance of all its PSLs.

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 **Karst Features**

The Project area may contain Karst Features. DB Contractor shall adhere to the USFWS conservation measures below for construction activities within karst zone 3 (the "Action Area" defined in the USFWS Informal Consultation Letter in the re-evaluation #1 of the 2015 Final EA and FONSI provided in the RIDs).

If previously unknown Karst Features are encountered during the construction process in karst zone 3, 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.

If the Karst Feature requires mitigation in accordance with Section 6.9 of the DBA, DB Contractor shall submit a Karst Feature mitigation plan for TxDOT review and approval. The Karst Feature mitigation plan shall include, at a minimum, a summary of the Released for Construction Documents impacted by the Karst Feature and a plan for how DB Contractor will mitigate the Karst Feature.

12.2.5.9 Federal Aviation Administration (FAA) Coordination

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.

12.3 Environmental Team (ET)

DB Contractor, acting through the Environmental Compliance Manager (ECM), shall designate an ET, as detailed in this Section 12.3, to prevent, minimize, and/or correct any violation of or noncompliance with Environmental Approvals and Environmental Commitments. The ET shall include staff meeting the qualification requirements as indicated in this Section 12.3. All 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 the ECM and all ET personnel; and
- ET staff response times during the Work.

12.3.1 Environmental Compliance Manager

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 Environmental Protection Training Plan and 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 for freeway construction.

12.3.3 **Environmental Compliance Inspectors (ECIs)**

The ECM shall designate as needed ECIs, who shall conduct on-site environmental monitoring, prepare documentation, and report to the ECM daily all violations, compliance, and non-compliance with Environmental Approvals.

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

The ECIs shall have at least one-year operational control experience with storm water pollution prevention plan (SWP3) 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;
- Maintain records of all incidents involving Hazardous Materials; and
- Notify the ECM, TxDOT, and appropriate authorities in writing of any incidents involving Hazardous Materials in accordance with the Contract Documents.

The Hazardous Materials Manager shall meet the certification requirements of TxDOT Work Category 2.13.1, "Hazardous Materials Initial Site Assessment", have a current 40-hour hazardous waste operations and emergency response (HAZWOPER) certification and at least five years of experience in similar projects in the following areas:

- Developing Investigative Work Plans (IWPs), Site Investigation Reports (SIRs), and remedial action plans or equivalent reports necessary and acceptable to TCEQ in material discovery and remediation efforts of Hazardous Materials; and
- Following 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 rule.

12.3.5 **Reserved**

12.3.6 **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 have, at a minimum, successfully completed a full four-year course of study in an accredited college or university leading to a bachelor's or higher degree with a major in biological sciences, natural resource management, wildlife science or management, ecology, zoology, botany, conservation biology, or a closely related field and have experience relevant to the species, habitat, or ecosystems that are being studied or described.

12.3.7 **Reserved**

12.3.8 **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 shall also assist 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".

12.3.9 **Water Quality Specialist**

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

The water quality specialist shall have verifiable experience implementing SWP3s and be able to demonstrate a working knowledge of the Texas Pollutant Discharge Elimination System and Municipal Separate Storm Sewer System (MS4) permit requirements applicable to the Project.

The water quality specialist shall meet the certification requirements of TxDOT Work Categories 2.3.1, "Wetland Delineation," 2.4.1, "Nationwide Permit," and 2.4.2, "Clean Water Act §404 (Title 33, United States Code §1344) Permits (including mitigation and monitoring)."

12.3.10 **United States Fish and Wildlife Service (USFWS) Permitted Karst Species Specialist**

The ECM shall designate an on-call USFWS permitted Karst Species Specialist (who 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 shall also conduct presence/absence surveys to determine if a Karst Feature is occupied or presumed occupied by endangered karst invertebrates.

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 in 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
Section 401 certification(s), Section 404 permit(s), other permits associated with the Section 404 requirements, and mitigation plan	As necessary, prior to commencement of Construction Work	Review and comment prior to submittal to USACE	12.2.3.1
Documentation of identification, permitting, and compliance with Section 404 permit(s), Section 401 certification(s) and other permits associated with the Section 404 requirements	As necessary, prior to commencement of Construction Work	For information	12.2.3.1
Soil and Groundwater Management Plan	As necessary, prior to commencement of Construction Work	For approval	12.2.5.4

Table 12-2: Submittals to TxDOT

Submittals	Submittal Schedule	TxDOT Action	Reference Section
Notifications and amended notifications of ACM, LBP and Hazardous Materials encountered during construction	As encountered and in accordance with the CEPP	For information	12.2.5.4, 12.2.5.5
Notifications and amended notifications to DSHS of bridge structure or building demolitions	10 working days prior to the scheduled demolition	For information	12.2.5.5
ACM / LBP Inspection Reports	Prior to demolition of applicable structures	Approval prior to demolition of applicable structures	12.2.5.5
ACM / LBP Abatement Plan	Prior to demolition of applicable structures	Approval prior to demolition of applicable structures	12.2.5.5
ACM / LBP Mitigation Report	Prior to demolition of applicable structures	Approval prior to demolition of applicable structures	12.2.5.5
Karst Feature mitigation plan	Prior to implementation of mitigation work, if required.	Approval	12.2.5.8
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
Investigative Work Plans (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
Site Investigation Reports (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 Coordination

13.1 **General Requirements**

TxDOT has existing Third Party Agreements with certain local, state and federal Governmental Entities with respect to the Project. These Third Party Agreements define additional requirements for the design, construction, operations, and maintenance of the Project. These Third Party Agreements do and will specify the Governmental Entities' responsibilities and TxDOT's responsibilities with respect to the requirements. 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-Build (DB) Contractor shall assume and execute TxDOT's responsibilities and duties stated in Third Party Agreements to the extent set forth in the Design-Build Contract (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 Governmental Entity under such agreements will need to be reimbursed by TxDOT for work performed, DB Contractor shall make payment of stated costs to the Governmental Entity within 30 days from receipt of request for payment. Alternatively, TxDOT may deduct the amount of such costs and expenses from any sums owed by TxDOT to DB Contractor pursuant to the DBC.

DB Contractor responsibilities and duties with respect to executed Third Party Agreements are described in Exhibit 8 to the Design-Build Agreement (DBA).

13.2 **Traffic Signals**

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

Some Governmental Entities may request additional traffic signals within the Project Right of Way (ROW) throughout the Term not identified in Item 24. Should this occur, additional agreements or modifications to existing agreements between TxDOT and the Governmental Entity will be required. DB Contractor, at its expense, shall coordinate with TxDOT and the appropriate Governmental Entity to define the scope of work for the additional traffic signals, including design and construction requirements, and oversight of DB Contractor's Work, if applicable. DB Contractor shall not be required to design or construct additional traffic signals requested by Governmental Entities except in accordance with Section 4.6 of the General Conditions.

13.3 **Roadway Illumination**

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

Some Governmental Entities may request additional illumination within the Project ROW throughout the Term not defined in Item 24. Should this occur, additional Third Party Agreements or modifications to existing agreements between TxDOT and the Governmental Entity will be required. DB Contractor, at its expense, shall coordinate with TxDOT and the appropriate Governmental Entity to define the scope of work for the additional illumination, including design and construction requirements and oversight of DB Contractor's Work, if applicable. DB Contractor shall not be required to design or construct additional illumination requested by Governmental Entities except in accordance with Section 4.6 of the General Conditions.

13.4 **Aesthetics and Landscape Enhancements**

Aesthetics and landscape enhancements shall comply with Item 23.

Some Governmental Entities may request additional aesthetics and landscape enhancements within the Project ROW throughout the Term not defined in Item 23. DB Contractor shall be responsible for coordinating with such Governmental Entities in accordance with Section 23.1.2.1.

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 ten Business Days after receipt of these permit applications. 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. An Affected Third Parties Plan shall be prepared by the DB Contractor in accordance with Section 4.2.6 of the General Conditions.

Item 14
Utility Adjustments

14.1 General Requirements

A number of existing Utilities are located within or in the vicinity of the Project Right of Way (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 Design-Build (DB) Contractor's use in Utility Adjustments. Forms not included in Attachment 14-1 (Utility Adjustment Forms) are available at https://www.txdot.gov/inside-txdot/forms-publications/consultants-contractors/forms/row.html. 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 14.1.4.

TxDOT form 1818 – Material Statement along with appropriate documentation (e.g. Mill Test Reports or written certification signed by the vendor on company letterhead) is required for all work performed for Utility Owners prior to the installation of the materials to document compliance with Buy America requirements per 23 CFR Part 645 Subpart A, 23 CFR § 635.410, if applicable. If the costs of all the Utility Adjustment Work included in a Project Utility Adjustment Agreement (PUAA) 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. DB Contractor's obligations regarding reimbursement to Utility Owners for eligible costs of Utility Adjustment Work, and DB Contractor's obligations regarding the accommodation of Utilities from and after the service commencement date, are set forth in this Item 14 and Section 4.5 of the General Conditions.

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 Utility, 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 TxDOT Utility

Accommodation Rules (UAR) are met and TxDOT and the affected Utility Owners agree to and approve all corresponding 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 and SAWS 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.

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 or on the date such Betterment work is incorporated into the scope of the SAWS ILA, in each case, as set forth in Section 4.5.2 of the General Conditions. DB Contractor shall perform all coordination necessary for Betterments, except for Betterments under the SAWS ILA.

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 the 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. Utilities 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 and keep records of its location, and (ii) include a certification from the Utility Owner stating that the Utility does not contain nor is composed of Hazardous 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 Utility 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, driveways, and landscaping, whether the Utility Adjustment Work is performed by the Utility Owner or by DB Contractor.

14.1.3 **Advance Utility Relocations**

At TxDOT's sole discretion, there will be early Utility relocations managed by TxDOT through an Advance Utility Relocation Agreement with a Utility Owner that will progress the Project, as more particularly described

in Section 6.4.4 of the Design-Build Agreement (DBA). Advance Utility Relocation Agreement(s) [*will be*] included in the Reference Information Documents (RIDs).

14.1.3.1 **CPS Energy**

TxDOT [*will*] enter into an Advance Utility Relocation Agreement with CPS Energy for the adjustment of certain CPS Energy transmission lines.

DB Contractor shall not schedule Construction Work activities that could affect the CPS Energy transmission lines or the adjustment of such lines at the locations shown below in Table 14-1 until the "Adjustment Completion Date" for the applicable location has occurred.

Table 14-1: CPS Energy Transmission Line Adjustment Completion Dates

Location	Adjustment Completion Date
Station 3295+00	NTP1 + 250 days
Station 3299+52	NTP1 + 350 days

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

Except as otherwise stated in this Item 14 or in the Design-Build Contract (DBC), DB Contractor shall address each Utility Adjustment in a Project Utility Adjustment Agreement (PUAA) or in a Utility Adjustment Agreement Amendment (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, Utility Adjustment 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 Utility Joint Use Agreement / Acknowledgement (UJUA) or Utility permit and plans detailing UAR compliance are required pertaining to the Utility Adjustment or Protection in Place work. The UJUA and Utility permit options are further described in Section 14.2.6. If a Utility Owner requests that DB Contractor adjust 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.

14.1.4.1 **Project Utility Adjustment Agreement**

Except with respect to SAWS and except with respect to CPS Energy transmission lines described in Section 14.1.3.1, 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 – PUAA (Owner-Managed) or DB-ROW-U-PUAA-DM – PUAA (DB Contractor-Managed), included in Attachment 14-1 (Utility Adjustment Forms). DB Contractor shall not modify the forms unless approved by TxDOT.

Promptly following issuance of Notice to Proceed 1 (NTP1), DB Contractor shall begin negotiations with each affected Utility Owner (except SAWS) to reach agreement on one or more PUAAs and UAAA. 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.

DB Contractor shall include with each PUAA Submittal to TxDOT a certification that (a) the PUAA does not include any material changes to the scope of the Utility Adjustment Work for the Utility Adjustment from the scope of the work agreed to by the Utility Owner in any relevant Pre-Proposal Utility Commitment(s), or (b) the PUAA includes one or more material changes to the scope of the Utility Adjustment Work for the Utility Adjustment from the scope of the work agreed to by the Utility Owner in the relevant Pre-Proposal Utility Commitment, along with a description of the material changes in the scope of the work and the reason for such material changes.

14.1.4.2 **Utility Adjustment Agreement Amendment**

Except where Utility Adjustment Field Modification (UAFM) are permitted pursuant to Section 14.4.6, modification or amendment 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 appropriate form included in Attachment 14-1 (Utility Adjustment Forms). DB Contractor shall include any proposed changes to the appropriate 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 form prior to execution by the Utility Owner.

DB Contractor shall include with each UAAA Submittal to TxDOT a certification that (a) the UAAA does not include any material changes to the scope of the work for the Utility Adjustment from the scope of the work agreed to by the Utility Owner in any relevant Pre-Proposal Utility Commitment(s), or (b) the UAAA includes one or more material changes to the scope of the work for the Utility Adjustment from the scope of the work agreed to by the Utility Owner in the relevant Pre-Proposal Utility Commitment, along with a description of each material change in the scope of the work and the reason for such material change(s).

14.1.5 **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) or the SAWS ILA.

DB Contractor shall comply with all requirements under the SAWS ILA with respect to recordkeeping, invoicing and providing information and documents to SAWS.

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), the TxDOT ROW *Utilities Manual,* requirements within the Contract Documents, including Section 4.5 of the General Conditions (as amended by Exhibit 24 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 format, 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 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, except for any special disputes resolution meetings under Section 6.B of the SAWS ILA which require notice and agendas at least five Business Days prior to such meetings. DB Contractor shall prepare minutes of all meetings and shall keep copies of all correspondence.

DB Contractor shall prepare and submit meeting minutes within five 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; and
- 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. DB Contractor shall ensure action items resulting from the meeting are resolved.

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

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

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 Project Management Plan (PMP). Specifically, DB Contractor shall provide a Utility Manager (UM) and a Utility Design Coordinator (UDC) to manage all aspects of the Utility Adjustment process. If DB Contractor assigns the Construction Work 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 or SAWS ILA.

The UDC shall be a Licensed Professional Engineer (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 TxDOT Form ROW U-Affidavit.

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, except with respect to acquisitions made by SAWS pursuant to the SAWS ILA:

- 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 Property Interest is allowed to remain in place pursuant to the SAWS ILA or the existing Utility occupying such interest is either (a) remaining in its original location through a UJUA or (b) being adjusted in a new location still subject to such interest.

14.2.4.4 **Quitclaim Deeds**

Except as otherwise directed by TxDOT or as otherwise provided for in the SAWS ILA, 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/business/right-of-way/right-of-way-forms.html. Each Quitclaim Deed is subject to TxDOT approval.

Except for Existing Utility Property Interests relinquished pursuant to the SAWS ILA, 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.

14.2.5 **Notice of Required Accommodation**

If requested by TxDOT, promptly following NTP1, DB Contractor shall prepare and fill out TxDOT Form DB-ROW-U-NORA – Notice of Required Accommodation with all required information and deliver as certified mail return receipt (CMRR) to each Utility Owner that requires a Utility Adjustment within the Project ROW. The Notice of Required Accommodation (NORA) should be sent utilizing TxDOT letterhead and signed by TxDOT. DB Contractor shall submit to TxDOT each draft of TxDOT Form DB-ROW-U-NORA – Notice of Required Accommodation for review and comment before sending the Utility Owner for TxDOT. A copy of each form and receipt of delivery shall be provided to TxDOT for information.

14.2.6 **UJUAs and Utility Permit 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 or for each Existing Utility Property Interest allowed to remain in TxDOT ROW pursuant to the SAWS ILA. DB Contractor shall prepare all UJUAs using the TxDOT Form ROW-U-JUA-Utility Joint Use Agreement, unless otherwise provided for under the SAWS ILA. 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, as applicable, 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 permit application through TxDOT's Utility Installation Review (UIR) system as required by TxDOT, 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. Such Utilities shall not be considered New Utilities.

DB Contractor shall arrange for the Utility Owner to submit for approval to TxDOT a complete Utility permit application prior to DB Contractor's inclusion of the required documentation as part of a Utility Assembly. DB Contractor shall analyze each application and provide to TxDOT a recommendation (together with supporting analysis) as to whether the request should be approved, denied, or approved subject to conditions. As part of the recommendation process, DB Contractor shall furnish to TxDOT Utility "No Conflict Sign-Off Forms", signed by both DB Contractor's UDC and DB Contractor's UM, using TxDOT Form DB-ROW-U-USO-UDC and TxDOT Form DB-ROW-U-USO-UM. DB Contractor shall limit the grounds for its recommendation to the grounds on which TxDOT is legally entitled to approve or deny the application or to impose conditions on its approval. However, TxDOT shall have the right to issue approval of the Utility permit in its sole discretion. Subject to Section 14.6, the ten Business Day review time for TxDOT approval of the Utility permit application shall begin after the DB Contractor provides its recommendation to TxDOT as to whether a Utility permit application submitted by a Utility Owner should be approved.

14.2.7 **Documentation Requirements**

DB Contractor shall prepare, negotiate (to the extent permitted by this Item 14), and obtain execution by the Utility Owner of (and record in the appropriate jurisdiction, if applicable) all agreements and deeds described in this Item 14, including all necessary exhibits and information concerning the Project (e.g., reports, Utility Adjustment 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.

14.2.8 **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.

14.2.9 **DB Contractor's Utility Tracking Report (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 was executed or Utility permit was approved by the Utility Owner and TxDOT, as applicable;
- 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, if applicable;
- 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 Material Statement is required for each 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 to TxDOT in the same manner as all other portions of the UTR.

14.2.10 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.

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 DB Contractor Utility Strip Map in 11x17 and in CAD format showing the information obtained and confirmed pursuant to this Section 14.3.1. The DB Contractor 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 (e.g., communication, gas, oil, water, etc.) size, material, subsurface utility engineering (SUE) level and the Utility Owner's name and contact information. The scale of the DB Contractor Utility Strip Map shall be 1 inch = 100 feet. 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 the DB Contractor 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;
- the Project design including the Ultimate Project Configuration;
- any existing and proposed Utility(ies);

- all applicable Governmental Approvals; and
- approvals of all private sector third parties necessary for such Utility Adjustment Work.

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 approved Utility Assembly will identify the approved Utility locations 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 ILA, DB Contractor shall prepare and obtain the Utility Owner's approval of 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 approval. DB Contractor shall comply with the design submittal and approval process set forth in the SAWS ILA 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 ILA, DB Contractor shall provide TxDOT with 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) or SAWS ILA, 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 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 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 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 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 such pipelines 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) signed and sealed by a PE 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 polyvinyl chloride (PVC) or standard dimension ratio (SDR) 11 high density polyethylene (HDPE) pipe) 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.

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

14.3.5 **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 approval of any items for which this Item 14 requires TxDOT approval. Temporary Adjustments that are installed within the Project ROW must also be included with a Utility Assembly for TxDOT prior approval, unless TxDOT waives such requirement or allows other approval methods concerning temporary Utility Adjustments. Each Utility Adjustment shall be addressed in a full Utility Assembly, unless it is appropriate for a 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 Work for the affected Utility Adjustment Work.

Provisions governing the procedure for and timing of Utility Assembly Submittals are in Section 14.6.

All Utility Adjustments covered by the same parent PUAA, or in the case of SAWS Utilities, the SAWS ILA, 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 Utility 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, if applicable;

(d) Utility Adjustment Plans which:

  (i) Show the existing and proposed Utility(ies);

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

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

  (iv) Show the roadway centerline or baseline stationing;

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

  (vi) Show the existing Utility conflict;

  (vii) 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

(viii) 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 Work), which estimates shall, without limitation:

(i) 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;

(ii) Identify materials subject to the Build America, Buy America Act (BABA Act), Buy America Act provisions of 23 U.S.C. § 313 and 23 CFR 635.410;

(iii) 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; and

(iv) Not include the estimated cost(s) associated with DB Contractor's internal coordination costs and overheads.

(f) A proposed UJUA or Utility permit, in accordance with Section 14.2.6;

(g) TxDOT Form ROW-U-48 – "Statement Covering Utility Construction Contract Work", 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(ies) 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 utilizing TxDOT Forms DB-ROW-U-USO-UDC and DB-ROW-USO-UM.

14.3.5.1 **Utility Adjustment Agreement Amendment (UAAA) Utility Assemblies**

For each UAAA or an amendment to the SAWS ILA, DB Contractor shall prepare an additional Utility Assembly for the relevant initial PUAA or SAWS ILA (an Assembly), covering all Utility Adjustments addressed in the UAAA or SAWS ILA amendment, as applicable. The Assembly shall contain all requirements listed in (a) through (j) as identified in this Section 14.3.5.

14.3.5.2 **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 a Utility 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;

(b) Set of plans detailing UAR compliance;

(c) Completed Utility Assembly Checklist;

(d) Certification from the Utility Owner approving leaving the Utility(ies) in place

(e) UJUA(s) or Utility permit, as required by Section 14.2.6; and

(f) Affidavit(s) of Property Interest, if applicable.

If a Utility proposed to remain in its original location is wholly within existing TxDOT ROW where there is no additional ROW acquisition and has an existing permit for that Utility for the original location in the UIR system, then the UJUA or Utility permit is not required.

DB Contractor shall include with each Abbreviated Utility Assembly submitted to TxDOT a certification that (a) the Abbreviated Utility Assembly does not include any material changes to the scope of the work for the Utility Adjustment from the scope of the work agreed to by the Utility Owner in any relevant Pre-Proposal Utility Commitment(s), or (b) the Abbreviated Utility Assembly includes one or more material changes to the scope of the work for the Utility Adjustment from the scope of the work agreed to by the Utility Owner in the

relevant Pre-Proposal Utility Commitment, along with a description of each material change in the scope of the work and the reason for such material change(s).

14.3.6 Utility Assembly Submittals

TxDOT will review the Utility Assembly for compliance with the requirements of Section 14.6, and within ten 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 approval, as applicable. Upon (a) TxDOT approval of any Utility Assembly components for which TxDOT 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.

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 Professional Services Quality Management Plan (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 one electronic copy of each Utility Assembly, as appropriate. The Utility Assembly shall be color-coded and shall include the Project ROW map with the existing and proposed Utility(ies) identified on a plan view. These Submittals shall be made through TxDOT's electronic content management system (ECMS) for the Project, unless otherwise approved by TxDOT, in PDF text-searchable format with bookmarks for each Utility Assembly. These Submittals shall be for TxDOT review and comment, except for any components of the Utility Assembly for which TxDOT approval is required by Section 14.6.

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.

14.4 Construction Requirements

14.4.1 General Construction Criteria

All Construction Work performed by DB Contractor for Utility Adjustments shall conform to the requirements listed below. DB Contractor shall conduct all Construction Work necessary to meet the requirements for this Item 14 and the 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 or the SAWS ILA, as applicable (other than UAFM complying with Section 14.4.6);
- All Project safety and environmental requirements;
- All pre-construction meeting requirements;
- Document compliance with 23 CFR Part 645 Subpart A, 23 CFR § 635.410 (Buy America), in accordance with Section 14.1;
- The Project Schedule; and
- Utility(ies) standards provided in the Utility Agreement or SAWS ILA, as applicable.

14.4.1.1 **Reinstatement of Utility Cuts**

After installation of drainage structures, storm sewers or any other public or private Utility 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.

14.4.1.2 **Utility Locate Requirements (SAWS)**

DB Contractor shall submit locate requests for SAWS water and sewer to TXDOTlocates@saws.org.

14.4.1.3 **Sanitary Sewer Overflow Requirements (SAWS)**

If a sanitary sewer overflow (SSO) occurs, the DB Contractor shall:

- Attempt to eliminate the source of the SSO;
- Contain sewage from the SSO to the extent possible to prevent contamination of waterways; and
- Call SAWS at (210) 233-2015.

14.4.1.4 **Private Water Meter Construction Requirements (SAWS)**

DB Contractor shall comply with all SAWS construction standards relating to private water meters. To perform the work necessary to adjust the private water meters, DB Contractor shall:

- Obtain necessary City of San Antonio general construction permit(s) by contacting David Rohde, City of San Antonio Plumbing Inspections Supervisor, at (210) 207-8279;
- Allow for the City of San Antonio inspector(s) to be onsite to inspect all onsite work; and
- Cause a licensed master plumber to install or move the private water meters.

DB Contractor shall be responsible for all required fees for the installation of the private water meters.

14.4.1.5 **Construction near CPS Energy Electric Lines**

A horizontal boom or equivalent equipment is required for construction in the vicinity of the CPS Energy electric lines to provide vertical clearance of equipment during construction. DB Contractor shall contact CPS Energy Utility Coordination Group sixteen (16) weeks in anticipation of pole bracing. The estimated duration for pole bracing is 6 to 10 weeks (or longer if temporary construction easements are required) after invoice is paid. For de-energizing or sleeving of the overhead electrical lines depicted on the plans, DB Contractor shall contact CPS Energy Utility Coordination Group sixteen (16) weeks in anticipation of needed de-energization. The estimated duration for de-energizing is approximately 4 to 6 weeks (after invoice is paid) but could vary on system scenario and back feed requirements. De-energizing may not be possible in all instances or may be restricted during specific periods of time due to load demand.

14.4.2 **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 14.4.1. DB Contractor is responsible for quality control and quality assurance for all Utility Adjustment Work performed by the Utility Owners and their contractors.

14.4.3 **Scheduling Utility Adjustment Work**

The commencement of Utility investigations and negotiation of Utility Agreements with Utility Owners are subject to Section 8.1.1 of the General Conditions.

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 Work 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 Utility Adjustment Work stated in the Contract Documents have been satisfied.

14.4.4 **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.

14.4.5 **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 the Utility Owner's Utility facilities.

14.4.6 **Utility Adjustment Field Modification (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 TxDOT and the appropriate Utility Owner's and DB Contractor's 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.

14.4.7 **Switch Over to New Facilities**

After a newly adjusted Utility has been accepted by the Utility Owner, except SAWS, 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. For SAWS Utilities, DB Contractor shall coordinate with SAWS regarding the procedure and timing for placing the newly adjusted Utilities into service and terminating service of the Utilities being replaced in accordance with the terms of the SAWS ILA.

14.4.8 **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 Work, 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. For each Utility Adjustment covered by a Utility Assembly, DB Contractor shall provide individual Utility Record Drawings which show the plan and profile location of all adjusted, remain-in-place, and abandoned Utilities as constructed, and shall comply with Item 4 of the General Conditions. DB Contractor shall provide the individual Utility Record Drawings for each Utility Adjustment to TxDOT prior to Substantial Completion and in accordance with this Section 14.4.8.

Prior to Substantial Completion, DB Contractor shall provide to TxDOT a color-coded composite Utility plan set in plan view of all final Utility locations (both owner-managed and DB Contractor-managed) that include Utilities that remained in place, were adjusted in place or relocated. The color-coded composite Utility plan set in plan view must detail the Utility horizontal alignment with highway stationing, ROW lines, roadway features, Utility Owners name, Utility type, size and Utility Assembly Number. This color-coded composite Utility plan set in plan view is separate from the individual Utility Record Drawing plans required for each Utility Assembly and shall be signed and sealed by a PE.

14.4.9 **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 the Construction Work and after completion of the Project. All access and access locations to the Utility(ies) must be agreed to by the Utility Owner and approved by TxDOT.

14.4.10 **Traffic Control**

DB Contractor shall be responsible for the Traffic Management Plan (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 Texas Manual on Uniform Traffic Control Devices (TMUTCD) and of Item 26.

14.5 **Final Closeout Procedures**

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

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:

- Utility Agreement form(s), if applicable (PUAA, UAAA, et al);
- Utility Record Drawings (“as-built”) plans;
- UJUA or Utility permit approval;
- TxDOT Form ROW-N-30 – Quitclaim Deed, if applicable;
- Estimated and actual cost comparison of the Utility Adjustment showing any cost variance along with an explanation of the variance. The cost comparison shall be in a format compatible with and allowing direct comparison to the estimate contained in each applicable Utility Assembly;
- Summary of the Utility Adjustment; and
- TxDOT Form 1818 – Material Statement and applicable attachments (e.g. mill test reports).

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

14.5.1 **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 ILA. DB Contractor shall be responsible for meeting all requirements for substantial completion and final acceptance of adjusted SAWS Utilities under the SAWS ILA.

14.6 **Submittals**

DB Contractor shall coordinate all Submittals required pursuant to this Section 14.6. 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.

DB Contractor shall time all Submittals described in this Section 14.6 to meet the Project Schedule, taking into account the maximum number of Submittals set forth in this Section 14.6 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.

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
Form 1818 – Material Statement, if applicable	Prior to the installation of materials	For information	14.1
Project Utility Adjustment Agreement(s)	After NTP1, based on DB Contractor schedule	Approval	14.1.4.1
Utility Adjustment Agreement Amendment(s)	After NTP1, based on DB Contractor schedule	Approval	14.1.4.2
Any mass mailings to Utility Owners	21 days in advance of distribution	Review and comment	14.2.2.1
Meeting agendas	At least three Business Days in advance of each scheduled meeting	For information	14.2.2.2
Draft meeting minutes	Prior to final distribution to the meeting attendees and appropriate Customer Groups	Review and comment	14.2.2.2
Final meeting minutes	Within five Business Days after the conclusion of each meeting	Review and comment	14.2.2.2
Names, contact details, etc. for the Utility coordination team	Prior to Notice to Proceed 2 (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	With the submission of Utility Assembly	Approval	14.2.4.4

Table 14-1: Submittals to TxDOT

Submittals	Submittal Schedule	TxDOT Action	Reference Section
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
Notice of Required Accommodation, if applicable	Promptly following NTP1	For information	14.2.5
Utility Joint Use Acknowledgments	In the applicable Utility Assembly	Approval	14.2.6
Utility permit	Prior to DB Contractor's inclusion as part of a Utility Assembly	Approval	14.2.6
Utility Management Plan	In accordance with requirements of Section 4.2.8 of the General Conditions	Approval	14.2.8
Utility Tracking Report	Monthly	For information	14.2.9
Alternate Procedure List	Prior to commencement of any demolition, removal or other construction work for any Utility Adjustment	Approval	14.2.10
DB Contractor Utility Strip Map	(i) After NTP2 or (ii) before the first assembly package submission	Review and comment	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	14.3.5, 14.3.6
Temporary Adjustments	In the applicable Utility Assembly, if applicable, unless TxDOT waives/allows other method	Approval	14.3.5
Abbreviated Utility Assemblies	As necessary	Approval	14.3.5.2
Utility Assembly Submittal log	With each Submittal or group of Submittals	For information	14.3.6

Table 14-1: Submittals to TxDOT

Submittals	Submittal Schedule	TxDOT Action	Reference Section
Utility Adjustment Work emergency procedures and contact information	In the applicable chapter of the PMP and PSQMP, and prior to any construction activities	Approval	14.4.5
Set of Utility Record Drawings and color-coded composite Utility plan set in plan view of all final Utility locations	Prior to Substantial Completion	For information	14.4.8
Individual Record Drawing plans	In the applicable Utility Assembly, and at Project closeout	Approval	14.4.8
Closeout information and documentation	After each Utility has been relocated, fully reimbursed and accepted by the Utility Owner	For information	14.5

Item 15
Right of Way (ROW)

15.1 General Requirements

Design-Build (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 Design-Build Agreement (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 Possession and Use Agreement (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 available at http://onlinemanuals.txdot.gov/manuals:

- All TxDOT ROW manuals;
- TxDOT *Access Management Manual*; and
- TxDOT *Survey Manual*.

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*, TxDOT *Survey 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 are available at https://www.txdot.gov/inside-txdot/forms-publications/consultants-contractors/forms/row.html.

All real estate activities of the Project ROW must be completed and documented in compliance with all applicable Laws, including the Texas Property Code, Title IV Chapter 21, 49 CFR Part 24 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 electronic content management system (ECMS) (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 web-based technology 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 the 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 ten 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 ten 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 ten 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 ten Business Days after receipt. The balance of Acquisition Packages and Condemnation Packages (collectively) in excess of five will be rolled over to the next ten 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 ten 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 ten Business Day period.

If TxDOT notifies DB Contractor that any ROW related Submittal has a deficiency, DB Contractor shall correct such deficiency and resubmit the package to TxDOT. Resubmissions shall be treated as a new ROW related Submittal, as applicable, for purposes of the limitations on the number of Submittals that may be submitted in a ten Business Day period. A ROW related Submittal 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 ROW related Submittals 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 ten Business Days on ROW related Submittals 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 ten Business Days before rendering a decision regarding approval of the package to DB Contractor.

DB Contractor may request TxDOT to perform a preliminary review of the survey, Project ROW map and appraisal before the complete Acquisition Package is submitted. TxDOT may elect in its sole discretion to review the preliminary submission of the survey, map and appraisal, 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 a ROW related Submittal 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 the National Environmental Policy Act (NEPA) Approval is issued, public involvement procedures have been completed, and ROW maps and legal descriptions for the applicable constructible segment as established by the logical termini of the Project have been prepared and approved by TxDOT. TxDOT will provide a separate release for each 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 recommend for TxDOT to commence acquisition of the property through eminent domain procedures. TxDOT will initiate eminent domain procedures at its discretion.

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 Right of Entry (ROE) Agreements, as necessary.

15.2.7 **ROW Personnel Qualifications**

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

DB Contractor's Right of Way Acquisition Manager (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 Texas Real Estate Commission (TREC), be familiar with appraisal and appraisal report review pursuant to the Uniform Standard of Professional Appraisal Practices (USPAP), and be familiar with the Uniform Act and applicable Laws of the State.

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 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.

Eminent Domain Specialist – Each eminent domain specialist shall have a minimum of three 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 TxDOT Form ROW-E-49 – Request for Eminent Domain Proceedings, filing the eminent domain forms, coordinating the hearing with all appropriate parties and ensuring that the Award of Special Commissioners is deposited into the registry of the court and all notices sent to the appropriate parties.

Real Estate Attorney – Each real estate attorney shall be licensed by the State of Texas and shall have at least five years' experience in title review and curative matters. The following responsibilities can be handled

by either the real estate attorney or qualified Other ROW Personnel: coordinating and clearing all title issues, and compliance assistance with State and Federal acquisition requirements for the properties acquired for the Project.

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

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 ten 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 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. DB Contractor shall provide proposed agendas three Business Days prior to each meeting. 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 comment on the content. DB Contractor shall provide meeting minutes to TxDOT within five Business Days of the applicable meeting. TxDOT will respond within five Business Days or at the next occurrence of the 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, including inputting and updating parcel status in TxDOTConnect.

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;
- Control section job (CSJ) number;
- ROW CSJ (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 or as directed by TxDOT.
- Input and update parcel status in TxDOTConnect as required 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 Section 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 workspace, 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 for such costs.

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 Project 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;
- Memorandum of Agreement (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 (TTC) meeting; provided the completed Condemnation Package is submitted ten Business Days before the ROW Division'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 notify DB Contractor that the State warrant is available for pickup within five 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 ten 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 TxDOT ROW Project Manager to serve as the point of contact for all Project ROW issues as set forth in 23 CFR § 710.313(d)(7).
- 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 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 ten Business Days for review of each submitted Project 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 ten 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 activities at DB Contractor's risk.

DB Contractor shall assemble an Acquisition Survey Document to be included in the submission of the Acquisition Package. Unless otherwise specified by TxDOT, the Acquisition Survey Document shall include:

- A universal serial bus (USB) with PDF half size ROW maps, scale 1 inch = 100 feet (11 inches by 17 inches);
- Three half size ROW maps on paper, scale 1 inch = 100 feet (11 inches by 17 inches);
- One separate set of originals signed and sealed by a Registered Professional Land Surveyor (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 MicroStation format (DGN) master file and associated reference files, PDF and Word or other text file of signed and sealed legal descriptions, closure reports, Excel point list, raw data file and/or field notes, and scanned PDF copies of the instruments of record or other pertinent documents;
- One full size ROW map on paper, Scale 1 inch = 50 feet (22 inches by 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 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 point of beginning (POB) shall be located on the proposed Project ROW line and shown in all documents with its centerline (survey baseline) station and offset or as reviewed and approved by TxDOT.
- The point of commencing (POC), where applicable, shall be a well-defined monument or monument of record, and shall be tied to the POB by measured bearing and distance. The POC shall not be located on any proposed Project ROW line, or existing Project ROW line within the proposed Project ROW.
- The centerline (survey baseline) station and offset shall be shown on the Project ROW map sheets for all significant points along the Project ROW line such as point of curvature (PC), point of tangency (PT), point of intersection (PI), point of compound curvature (PCC), and point of reverse curvature (PRC), 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 with zone, North American Datum of 1983 (NAD83) (2011 adj), or as shown on the current ROW maps, and the Project grid-to-surface coordinate adjustment factor or refer to Project primary controls provided by TxDOT (refer to Section 17.3).
- A Project ROW map title sheet with signature blocks shall be produced for each portion of the Project. DB Contractor shall sign the Project ROW map.
- 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, with their relationship to the found reference points.
- All property, city, county, abstract, section and survey lines shall be indicated appropriately. A map legend shall clearly define the line styles and symbols used.
- DB Contractor shall cause the surveyor to set ROW monuments in accordance with Section 17.4.4.
- 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 to state briefly 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, and all research has been exhausted, 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-inch 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 Design-Build 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 five-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.
- DB Contractor, at the request of the property owner or TxDOT, shall re-stake the proposed ROW with a flagged wooden stake.

15.3.1.1 Design Certification

DB Contractor shall provide sufficiency of design to determine the Project ROW need and produce ROW maps that delineate the proposed ROW and potential impacts to the remaining existing ROW. DB Contractor shall provide a design certification of ROW for each parcel which confirms that the proposed Project 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.

15.3.1.2 **ArcGIS ROW Mapping Files**

DB Contractor shall submit for review and approval GIS files of the Acquisition Survey Documents in accordance with the requirements 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 Survey Reporting Requirements**

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

- Survey monthly parcel report: a report, prior to the first of the month, listing all parcel deletions, parcel additions, and parcel splits;
- Survey 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
- Computer aided drafting and design (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, 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 representative. TxDOT ROW Project Manager 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 copies of the State of Texas Landowner's Bill of Rights, the TxDOT *State Purchase of Right of Way Booklet*, and the TxDOT *Relocation Assistance Brochure* (Spanish versions to be included, as necessary) for each property owner for inclusion with the letter of introduction. The copy of the State of Texas Landowner's Bill of Rights shall be the latest version as shown on the Office of Attorney General website: https://www.texasattorneygeneral.gov/sites/default/files/files/divisions/general-oag/landowners-bill-of-rights.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 USPAP), 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 and 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 (a "ROE Agreement"). DB Contractor may, at its 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 USPAP in effect at the time the appraisal is submitted. Special analyses, studies or reports, as necessary, shall be 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 – Real Estate Appraisal Report 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, and identify all impacted signs utilizing the appropriate forms as instructed by TxDOT. The forms shall be completed and executed by the outdoor advertising sign owner.
- Prepare, 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 for TxDOT approval, which must include:
    - Completed and executed appropriate TxDOT forms; and
    - The value of the sign structure as a real property fixture.
- 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 American Society for Testing and Materials (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 an Environmental Site Assessment Phase II and/or III, 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 Work.
- Engage the services of, and cause, a land planner to perform or otherwise assist in the preparation of, any and all appraisals. The land planner shall be involved with all parcels with 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, or TxDOT Form ROW-A-5 OAS – Real Estate Appraisal Report, if applicable, 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, or TxDOT Form ROW-A-5 OAS – Real Estate Appraisal Report, if applicable. 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.
- If requested by TxDOT, prepare an additional appraisal report complying with Section 15.3.5.

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 that meet 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 TxDOT 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, or TxDOT Form ROW-A-5 OAS – Real Estate Appraisal Report if applicable, 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 ID;
  - Project ID;
  - Parcel number and number of parts;
  - Station number;
  - CSJ number;
  - RCSJ number;
  - Federal Identification Number (if applicable);
  - Location of parcel;
  - 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 shall 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.
- Any appraisal reports produced or acquired by TxDOT relating specifically to the owner's property in the last ten years prior to the offer being made must be included in the initial offer and sent by certified mail return receipt.

- A copy of the Environmental Site Assessment and all amendments as described in Section 15.3.5.1.
- A real/personal property report, including 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 latest version of the State of Texas Landowner's Bill of Rights, TxDOT *State Purchase of Right of Way Booklet*, TxDOT *Relocation Assistance Brochure*, MOA, deed, required brochures, 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.
- TxDOT Form ROW-N-PUAIC - Possession and Use Agreement for Transportation Purposes with Additional Payment of Independent Consideration (PUAIC).
- 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 ten Business Days of TxDOT approval of the Acquisition Package, contact each property owner or owner's designated representative, in person where practical, to present the offer and deliver an appraisal report (not more than six months old) and appropriate brochures. The approved appraisal shall be sent by certified mail, return receipt requested. A copy of the appraisal report for the subject property shall be provided to the property owner or authorized representative at the time of initial offer. All appraisal reports produced or acquired by TxDOT relating specifically to the property owner's property and prepared in the ten 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 and secure the necessary documentation and 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 including a copy of the TxDOT *Relocation Assistance Brochure* (Spanish version to be included, as necessary) and the State of Texas Landowner's Bill of Rights as updated on the Office of the Attorney General's website: https://www.texasattorneygeneral.gov/sites/default/files/files/divisions/general-oag/landowners-bill-of-rights.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 the 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, at its request or the request by TxDOT or the TxDOT Administrative Settlement Committee, in the evaluation of the administrative settlement request and attend the committee meeting.
- 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 Business Days after receipt. If this delivery method is not feasible, DB Contractor shall mail (return receipt requested) response letters not more than three 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 ten Business Days after inquiry) response to the verbal or written inquiries of any property owner, lessee, licensee, occupant or other holder of a compensable interest, as applicable.
- 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 TxDOT Standards, 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 TxDOT Form ROW-N-PUAIC. The amount of the market rental consideration shall be 10 percent 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 TxDOT 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 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 Design-Build Contract (DBC) and these Design-Build 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 Notice to Proceed 1 (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 decent safe and sanitary (dwelling) (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 – 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 vacate to displacees and property owners upon Possession of Project ROW.
- Notify TxDOT, in writing, when 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 the 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 ten 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 weekly basis or as requested by TxDOT.
- Notify TxDOT of any potential parcels requiring condemnation actions and document the reason(s) for failure to close by deed such as title or compensation issues, 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 ten days following non-response or rejected certified mailing, notification thereof together with a signed and sealed parcel description and parcel plat, and a bisection clause and access clause, if necessary, with the clauses attached to a property exhibit containing the parcel description and parcel plat.
- 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 (or plat), 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 the 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 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 the 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 holders 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 other notice requirements as directed or authorized by the court.
- Call and send reminder emails or 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 Commissioners 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 CMC Term. 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 and bring all exhibits and documents.
- Coordinate with TxDOT on behalf of the Office of the Attorney General as to expert witnesses as required by the Office of the Attorney General. DB Contractor shall provide the expert witnesses at the request of TxDOT or the Office of the Attorney General. The expert witness report, if required, shall be completed and forwarded to the appraiser before the updated appraisal is completed.
- Appear or provide for the appearance of expert witness(es) or fact witness(es) when requested by TxDOT or the Office of the Attorney General. The appearances may include pre-commissioner's hearing preparations, Special Commissioner's hearings, subsequent proceedings including jury trials and related proceedings and as other needs arise.

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 ten 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, and provide to TxDOT photographs of the subject property(ies).

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 – including Form W-9 – Request for Taxpayer Identification Number and Certification; and
- Form AP-152 – Application for 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 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.

15.4.10 **Temporary Easements**

DB Contractor shall, at a minimum, restore the temporary easement construction area to its existing condition, unless the temporary easement agreement includes betterment(s).

15.5 **Reserved**

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.

Table 15-1: Submittals to TxDOT

Submittals	Submittal Schedule	TxDOT Action	Reference Section
Copies of all property agreements	Upon Request	For information	15.1
Three samples of previous appraisal work for each appraiser	Prior to performing any appraisals on the Project	For information	15.2.7
Meeting Agendas	Three Business Days prior to each meeting	For information	15.2.9
Draft Meeting Minutes	Within five 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 updates	As required by TxDOT	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 Maps	Part of the Acquisition Survey Document	Approval	15.3.1
Acquisition Survey Document	As part of any Acquisition Package	Approval	15.3.1
Design certification	As part of any Acquisition Package	For information	15.3.1.1
GIS Files	Concurrent with the Acquisition Survey Document and prior to submission of the first Acquisition Package and updates as needed	Approval	15.3.1.2
Monthly parcel report	Monthly	For information	15.3.2
Monthly progress report	Monthly	For information	15.3.2
ROW CADD 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, or at the time of submission of the first Acquisition Package, and as requested	Approval	15.3.5.1
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, within 15 Business Days following receipt of the administrative settlement request	Approval	15.4.1
Final offer letter	Within two days of delivery to the property owner	For information	15.4.1
Relocation assistance Submittals	As part of the respective parcel's Acquisition Package or separately	Approval	15.4.2

Table 15-1: Submittals to TxDOT

Submittals	Submittal Schedule	TxDOT Action	Reference Section
Relocation Plan	Within 90 days after NTP1, as part of a ROW Acquisition Management Plan update	Approval	15.4.2
Closing Submittals	Minimum of 24 hours 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
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 with photographs of the subject property(ies)	Upon completion	For information	15.4.5

Item 16
Geotechnical & Pavement

16.1 **General Requirements**

Design-Build (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 Right of Way (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**

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

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. DB Contractor shall submit boring locations and traffic control plans prior to commencing any subsurface pavement investigations for review and approval by the SAT Pavement Engineer. 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.

16.2.1.1 **Soil Testing Requirements for Pavement Design**

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

DB Contractor shall develop the scope of testing, evaluation, and analysis of the subgrade and the existing pavement structure for inclusion in 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
Falling Weight Deflectometer (FWD) (ASTM D4694 and ASTM D4695)	Deflections and derived pavement layer moduli
Dynamic Cone Penetrometer (DCP) (ASTM D6951)	Stiffness, estimated back calculated subgrade modulus
Soil Classification (Tex-103-E, Tex-104-E, Tex-106-E, Tex-110-E, Tex-142-E)	Moisture content, liquid limit, 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-114-E, Tex-117-E, 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 (excluding widenings) to have a PVR no greater than 1.5 inches for main lanes and ramps 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 with American Society for Testing and Materials (ASTM) D4546. DB Contractor shall calculate PVR for a 10 feet deep soil column as measured from the top of the proposed untreated 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. A minimum of six inches of treated subgrade shall be used for all new or full reconstruction pavements. 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 16.3.1 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, and pavement coring. If rock is encountered, rock coring shall be performed. 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 perform other field testing as appropriate, however, other field test methods such as ASTM D5778 cone penetrometer testing shall only be used in addition to, and not in place of, soil borings with Tex-132-E *Texas Cone Penetration* testing as required by the TxDOT *Geotechnical Manual*.

DB Contractor shall incorporate testing and design that includes geological investigation, consideration of local geophysical conditions, conformance to environmental requirements, consideration of both lateral and vertical load carrying capacity, appropriate construction methods, and a plan to address karstic subsurface conditions identified during construction.

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. If a Karst Feature is discovered, DB Contractor shall follow the karst protocol found in Attachment 16-1: San Antonio Karst Protocol for Structural Elements.

DB Contractor shall ensure the depth of all test holes are adequate for the anticipated structure foundation type and loading, such as retaining wall design and embankment design, 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.

Laboratory testing on samples from each boring shall be in accordance with TxDOT and ASTM geotechnical testing standards. DB Contractor shall perform:

- Classification: For each major soil stratum in each boring, tests sufficient to determine classification per TxDOT *Geotechnical Manual* including in clay and silt moisture content (Tex-103-E), Atterberg Limits (Tex-104-E to Tex-106-E), and percent passing the No. 200 (Tex-111-E) sieve and in sand and gravel gradation (Tex-110-E). For the purposes of this section, a major soil stratum is considered any soil stratum thicker than 5 feet.
- Undrained shear strength: Tests in each boring in each major stratum classified as cohesive (i.e., Unified Soil Classification System classification CL, CH, OL, or OH) by either unconfined compression (ASTM D2166) or unconsolidated-undrained triaxial tests (Tex-118-E or ASTM D2850).
- Drained shear strength: Where embankments, cut slopes, retaining walls, or other structures requiring global stability analysis are planned, laboratory testing in each major stratum classified as cohesive (i.e., Unified Soil Classification System classification CL, CH, OL, or OH) shall include drained shear strength testing by direct shear (ASTM D-3080) or consolidated-undrained triaxial (Tex-131-E or ASTM D4767) tests at a range of stress levels representative of those expected pre- and post-construction. This testing shall be performed in the vicinity of each structure, but it is not required in each boring.
- Soil Compressibility/Swell: Where embankments and/or retaining walls are planned near bridge structures supported on deep foundations, laboratory testing in each major stratum classified as cohesive (i.e., Unified Soil Classification System classification CL, CH, OL, or OH) shall be performed to determine soil compressibility/swell testing properties by consolidation (ASTM D2435) and/or swell (ASTM 4546) testing as appropriate. Such testing shall also be performed where structures supported by shallow foundations are planned. Consolidation tests shall include a rebound/reload loop starting a pressure near the current effective overburden pressure suitable for determining the recompression index. This testing shall be performed in the vicinity of each structure, but it is not required in each boring.
- Soil Corrosivity: Where structural members will be in contact with soil or groundwater, testing to determine soil corrosivity shall be performed in each major soil stratum planned to be in contact and within 10 feet below the bottom of the member. Testing shall include soil pH (Tex-128-E), soil resistivity (Tex-129-E), soil organic content (Tex-148-E), and soil sulfate and chloride (Tex-620-J). Where groundwater will be in contact, testing shall include sulfate and chloride (Tex-619-J). This testing shall be performed in the vicinity of each structure, but it is not required in each boring.
- Sieve Analysis: Sieve analysis for scour analysis shall be performed and include grain size distribution curves with D50 value in each boring within or adjacent to water crossings within each major soil stratum located between the 100-year flood elevation and 20 feet below the bottom elevation of the current channel. Perform gradation analysis (Tex-110-E) for all soils and also perform hydrometer analysis (ASTM D422) for all silt and clay soils.
- Other: Other laboratory testing as appropriate.

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 the TxDOT Standard Specifications.

DB Contractor shall also conduct all Work for this Item 16 in accordance with the following modifications to the requirements of the TxDOT Standard Specifications and special specifications (SS):

- **TxDOT Standard Specification Item 316:**
  - 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.
- **TxDOT SS items 3076, 3077, 3079, 3080, 3081, & 3082:**
  - Table 10 in SS 3076 and Table 11 in SS 3077: Hamburg Wheel Test Requirements tested in accordance with Tex-242-F are changed for PG 64-22 or lower and PG 70-22. Minimum number of passes at 12.55 mm rut depth, tested at 50 degrees C will be 5,000 and 10,000 respectively.
  - DB Contractor shall submit a copy of the Tex-233-F production charts on a weekly basis. DB Contractor shall submit all original of these charts at the end of ACP work.
  - DB Contractor shall stockpile the aggregate until enough material is available for five days of production. Crushing of aggregate for hot mix and immediate use for production of the mix is not allowed.
  - DB Contractor shall hold a pre-paving meeting one month prior to the placement of the hot mix. The date and time of pre-paving meeting should be coordinated with the DB Contractor's Quality Control staff, the IQF, and relevant TxDOT QAP quality staff prior to scheduling.
  - 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 San Antonio TxDOT district laboratory.
  - DB Contractor shall not open more than one hot mix lot for any specific type of hot mix, unless authorized. After a lot is open and the Contractor gets approval to change plants, the previous lot will be closed, and a new lot will be opened. The numbering for the lots produced at the new plant will start with No. 1. If allowed to switch back to the original or previous plant, the next lot from that plant will resume numbering sequentially from the last lot produced by that plant.
  - DB Contractor shall use the minimum application rate listed on Table 16-2. The DB Contractor may adjust the application rates taking into consideration the existing pavement surface conditions with TxDOT approval.

Table 16-2: Minimum Underseal Application Rates

Material	Minimum Application Rate (gal. per square yard)
TRAIL – Hot Asphalt	0.15
Spray Applied Underseal Membrane	0.20
Seal Coat – Emulsion (CHFRS-2P, CRS-2P)	0.25
Seal Coat – Asphalt (AC-15P, AC-20-5TR, AC-20XP, AC10-2TR)	0.23
Aggregate for Seal Coat Options TY PB GR 4(AC) or TY B GR 4(Emulsion)	1 CY:120 SY

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 *Treatment Guidelines for Soils and Base in Pavement Structures*, web soil survey maps, and Items 260, 265 and 275 of the TxDOT Standard Specifications for testing and detection and integrate applicable 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%.
- **Select Fill.** For all embankment areas under pavement, DB Contractor shall furnish Type C (Density Control) fill material meeting the requirements of Table 16-3 below:

Table 16-3: Embankment Material

Item	Description	Percent Retained-Sieve				LL Max	PI Max	PI Min
		3"	3/8"	#4	#40			
132	Embankment (Density Control) (TY C)	0	-	30-75	50-85	45	25	8

- **Density Control.** Subgrade layer shall be compacted using density control only.
- **Proof Rolling.** When treated/untreated subgrade is used on concrete pavements, DB Contractor shall proof roll the untreated subgrade layer in accordance with Item 216 of the TxDOT Standard Specifications prior to continuing with subsequent layer. Areas which are determined as unstable or that rut more than ½-inch shall be considered as failure and require corrective action.

16.3.2 **Treated Subgrade**

DB Contractor shall use Table 16-4 for selecting subgrade treatments.

Table 16-4: Selecting Subgrade Treatments

PI	Stabilizer Option
≤ 15	Cement
15 < PI < 30	Lime, Cement, or Combination
30+	Lime

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) of 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-121-E, Part I to determine a target lime-cement combination content to achieve a minimum unconfined compressive strength (UCS) of 50 psi.

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

Subgrade treatment shall be in accordance with the TxDOT *Treatment Guidelines for Soils and Base in Pavement Structures.* Any subgrade that does not conform to these treatment requirements shall not be included in the pavement design as a structural layer.

For rigid pavements, DB Contractor shall extend the treated subgrade to at least two feet beyond the edge of pavement, including shoulders, on each side.

The subgrade treatment depth shall be a minimum of six inches and designed to support anticipated construction traffic.

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.

16.3.3 **Treated Base**

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

Base materials to be treated shall meet the specifications for the type and grade specified in accordance with Item 247 of the TxDOT Standard Specifications.

Base 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 16-5 for selecting base treatments.

Table 16-5: Selecting Base Treatments

PI	Stabilizer Option
< 12	Cement or Asphalt
>12	Lime or Cement

Cement treatment (plant-mixed) wet and dry strengths shall meet the strength requirements in Table 16-5. For other stabilizers, DB Contractor shall meet the requirements set forth in the applicable TxDOT Standard Specifications.

When Item 276 of the TxDOT Standard Specifications is used, DB Contractor shall determine the target cement content meeting the minimum and maximum UCS and 24-hour submerged strength requirements shown in Table 16-6 when tested in accordance with Tex-120-E, Part I.

Table 16-6: Item 276 of the TxDOT Standard Specifications, Cement Treatment (plant-mixed), Minimum and Maximum Strength Values to be Achieved by Pavement Type

Pavement Type	Minimum 24-hour submerged strength (psi)	Minimum 7-day UCS (psi)	Maximum 7-day UCS (psi)
Flexible pavement	240	300	500
Rigid pavement	400	500	No maximum

When Item 275 of the TxDOT Standard Specifications is used, DB Contractor shall determine the required cement content using Tex-120-E, Part I to achieve a minimum seven-day UCS of 250 psi. Minimum cement content shall not be less than 2% or more than 5% by total dry weight of base.

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 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, DB Contractor shall extend the treated base at least two feet beyond the edge of pavement, including shoulders, on each side.

For flexible pavement, DB Contractor shall extend the treated base at least eight inches beyond the edge of pavement, including shoulders, on each side.

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.

16.3.4 Tack Coat

For any flexible pavements (including widenings, rehabilitations, and overlays of both flexible and rigid pavements), DB Contractor shall place a non-tracking tack coat (Tracking Resistant Asphalt Interlayer (TRAIL)) between all lifts of hot-mix asphalt (HMA) and directly beneath the final surface course in accordance with TxDOT special specification 3084. TRAIL material used on the Project must be a pre-approved product from the TxDOT Material Producer List.

Tack coat will not be required where underseal is used in accordance with Section 16.3.6 below and the underseal has not been subjected to traffic.

16.3.5 Surface Mix Type

Where flexible pavement structures are used (including widenings, rehabilitations, and overlays of both flexible and rigid pavements), the surface mix for main lanes, elevated lane ramps, and direct connector lanes shall be either PFC or TBPFC meeting TxDOT special specification Items 3079 or Item 3082. An impermeable dense graded stone matrix asphalt (SMA) (except SMA-F) PG 76-22, intermediate layer, meeting the requirements of TxDOT special specification 3080 shall be used directly beneath the surface mixture. The minimum compacted thickness of this SMA layer shall be in accordance with TxDOT special specification 3080 for the SMA type being used. DB Contractor's surface mix selection (PFC or TBPFC) for flexible pavement main lanes 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.

No binder substitution is allowed for the final riding surface mix.

16.3.6 Underseal

DB Contractor shall place a one course surface treatment as an underseal directly on top of any asphalt base prior to placement of all HMA pavement layers. A prime coat of either MC-30 or AEP (asphalt emulsion prime) complying with Item 310 of the TxDOT Standard Specifications shall be applied directly on top of any granular layer (flexible base or subgrade) prior to placement of the HMA pavement layer. For a surface of PFC, the underseal shall use a seal coat meeting Item 316 of the TxDOT Standard Specifications. For TBPFC, the underseal membrane shall be in accordance with TxDOT special specification 3072.

When placing any hot mix asphalt directly on concrete pavement, DB Contractor shall place an underseal consisting of a seal coat using AC-20-5TR meeting Item 316 of the TxDOT Standard Specifications.

16.3.7 Final Surface

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

16.4 Pavement Design

16.4.1 New Pavement

16.4.1.1 Design Traffic Considerations

The corridor traffic data has been provided in the Reference Information Documents (RID) 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 main lanes 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 in the RID for the purpose of meeting the Performance Requirements of these Design-Build Specifications or the Capital Maintenance Agreement (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 RID.

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 continuously reinforced concrete pavement (CRCP), DB Contractor will select the subgrade classification of "CH" for the input in the design program unless otherwise approved by TxDOT. The composite K-value for the inputted subgrade classification is hard-coded in the design program. DB Contractor may propose to use a different subgrade classification based on project specific conditions, the use of which shall be subject to TxDOT's approval. Composite K-value used in TxCRCP-ME program is used for thickness design purposes only and shall not be used for field verification of subgrade design during construction.

The Independent Quality Firm (IQF) shall ensure the Final Design subgrade modulus for the flexible pavement is achieved during the Construction Work using methods in Section 16.6.

16.4.1.3 Pavement Type Requirement

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

16.4.1.3.1 Main Lanes

CRCP shall be used for the new (non-widened) main lane pavement. The pavement shall have minimum thicknesses shown below in Table 16-7

Table 16-7: Minimum New Main Lane Pavement Thicknesses

Pavement Location		**I-410**	
Service Life (years)		30	
Material Type	**TxDOT Item**	**Material Thickness, Inches**	
		Opt. 1	**Opt. 2**
CRCP	360	13.0	13.0
DG HMA[1] Type D (PG 64-22)	SS3076	1.5	-
DG HMA[1] Type B (PG 64-22)	SS3076	-	4.0
Cement Treated Base[2]	275, 276	6.0	-
Lime-Treated Subgrade[2]	260	-	12.0
Estimated[3] PVR, inches		≤2.75	

1. A Tack Coat (TxDOT Standard Specification Item 300) should be applied between each lift of HMA.

2. Prime coat [either MC-30 or AEP (asphalt emulsion prime)] (Item 310) shall be placed on top of 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 that connect main lanes to frontage roads, pavements shall be constructed with the same section (materials and depths including treated subgrade) as the adjacent main lane pavement.

For ramps that connect elevated lanes to frontage roads, pavements shall be constructed with the same section (materials and depths including treated subgrade) as the adjacent frontage road pavement.

16.4.1.3.3 **Reserved**

16.4.1.3.4 **Reserved**

16.4.1.3.5 **Shoulders**

Pavement for the shoulders of all roadways shall be the same section (materials and depths including treated subgrade) as the adjacent roadway pavement, unless otherwise approved by TxDOT. Pavement joints must be in a location that does not adversely impact the integrity of the adjacent structure, such as a center median barrier, by either dead loads or live loads from adjacent traffic in either direction. The location of joints shall not be in the wheel path in the final pavement configuration.

16.4.1.3.6 **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 **Flexible Pavement Design Requirements**

DB Contractor shall use Flexible Pavement System (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.

16.4.1.4.1 **Minimum Layer Thickness**

Minimum layer thickness for all unbound materials used in flexible pavement designs shall be 6 inches.

16.4.1.4.2 **Pavement Design Life**

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

16.4.1.4.3 **Minimum Time to First Overlay**

DB Contractor shall use 15 years for all perpetual flexible pavement designs, and 20 years for all nonperpetual flexible pavement designs.

16.4.1.4.4 **Reliability Level**

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

16.4.1.4.5 **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
Permeable Friction Course (PFC)	SS 3079	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	SS 3080	Same as SS 3077
TOM	SS 3081	Same as SS 3077 (maximum thickness of 1.0")
Thin Bonded Friction Courses	SS 3082	Same as SS 3077
Flexible Base (Unbound Base)	Item 247, Grades 1-2 or 5	*50 ksi (or 3X the untreated subgrade modulus, whichever is less)
Treated Base	Items 260 and 263	*65 ksi
	Item 275	*130 ksi.
	Item 276	*130 ksi
	Foam or Emulsion	*230 ksi
	Item 292	*400 ksi
Treated Subgrade or Subbase	Item 260	*35 ksi or three times the modulus of subgrade, whichever is less**
	Item 275	*40 ksi**

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

16.4.1.5 **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. TxDOT's TxCRCP-ME is the required design procedure for CRCP and the 1993 American Association of State Highway and Transportation Officials (AASHTO) Guide for Design of Pavement Structures is the approved design method for Concrete Pavement Contraction Design. DB Contractor shall use design values recommended by the TxDOT *Pavement Manual*, Chapter 8, and the applicable TxDOT Standard Specifications for joint and reinforcement design. DB Contractor shall select one of the two base layer combinations in Section 3.2.8 of 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 the design input values specified in Table 16-9:

Table 16-9: Design Input Values for CRCP

Design Criteria	Input Value
28-day Modulus of Rupture	570 psi
Maximum Number of Punch Outs per mile	10
Maximum Modulus of Layer	500 ksi for cement treated base (CTB) 400 ksi for asphalt treated base (ATB) or HMA

16.4.2 **Reserved**

16.4.3 **Rehabilitated 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:

- At minimum, a new surfacing course shall be provided meeting or exceeding the smoothness requirements of Section 16.6.2; and
- The rehabilitated pavement design meets or exceeds the design criteria specified in Section 16.4.3.1 below.

If either of the above conditions are not met, DB Contractor shall perform further rehabilitation or shall design and construct New Pavement in accordance with Section 16.4.1, as necessary to achieve the specified conditions before Substantial Completion.

Base Repair Areas: Within the rehabilitated pavement areas, the DB Contractor shall construct up to 400 square yards of full-depth pavement base repair for the main lanes and 55,000 square yards of full depth (10-inch) pavement base repair for the ramps and frontage roads. The minimum extents of base repair areas 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 mainlane pavement base repairs shall be in accordance with Section 27.1.2.1. The timing of the frontage road pavement base repairs shall be based on DB Contractor's construction sequencing.

Spot surface repair areas: Within the rehabilitated pavement areas, TxDOT has identified certain areas with surface layer distresses. DB Contractor shall construct up to 500 square yards of spot surface repairs, the minimum extents of which are depicted in RID Exhibit "Resurfaced Pavement and Pavement Base Repair Areas." Spot surface repairs shall be constructed in accordance with Section 16.4.3.1 below and the timing of the spot surface repairs shall be in accordance with Section 27.1.2.1.

DB Contractor is responsible for maintaining the existing pavement—which includes Resurfaced Pavement and Base Repair Areas—in accordance with Item 27.

16.4.3.1 **Rehabilitated Pavement Areas Design Criteria**

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

- Existing flexible main lane pavement (or existing rigid pavement with an asphalt overlay greater than 6"):
  - Milling depth shall be based on DB Contractor's analysis of the depth of the existing surface layer and the relevant distresses, the results of which shall be included in the Pavement Design Report; and
  - Overlay shall be PFC/TBPFC on top of SMA (PG 76-22), with overall thickness equal to the milling depth.
- Existing rigid main lane pavement with an asphalt overlay 6" or less:
  - Milling shall be the full depth of existing asphalt;
  - An AC-20-5TR seal coat shall be placed on the existing concrete in accordance with Section 16.3.6; and
  - Overlay shall be PFC/TBPFC on top of SMA (PG 76-22), with overall thickness equal to the milling depth.
    - If the existing asphalt overlay is so thin that both the SMA layer and the PFC/TBPFC layer cannot be placed within the milling depth while complying with minimum lift thickness described in the TxDOT *Pavement Manual*, then the requirement for the SMA layer may be waived.
    - If there is a situation where milling down to the concrete results in a depth too thin for both pavement layers and too thick for a single lift of PFC/TBPFC, then DB Contractor shall submit a proposed solution for TxDOT approval.

- Concrete bridge structures with an asphalt overlay:
  - Milling shall be down to 0.5" of existing asphalt; and
  - Overlay shall be SMA (Type D, PG 76-22) with thickness of 1.5" (overall asphalt thickness of 2"). DB Contractor shall utilize a 50:1 taper mill to level-up on bridge transitions.
- Existing flexible non-main lane pavement:
  - Milling depth shall be based on DB Contractor's analysis of the depth of the existing surface layer and the relevant distresses, the results of which shall be included in the Pavement Design Report; and
  - Overlay shall be Superpave with overall thickness equal to the milling depth.
- Layer thicknesses not specified above shall be in accordance with the TxDOT *Pavement Manual*, and the applicable TxDOT Standard Specification or special specification Item for the surface mix selection. For existing flexible pavement, if the overlay thicknesses dictated by the applicable TxDOT Standard or special specification are greater than the milling depth indicated by the GPR data/contractor's analysis, the milling depth shall be increased to order to maintain the existing vertical profile.

In the base repair areas, base repair shall be as follows:

- Mainlanes:
  - Base repair shall be the full pavement structure depth;
  - For flexible pavement base repair, the pavement shall consist of HMA Type B (PG 64-22) complying with Special Specification (SS) 3076 and surface layer(s) consistent with adjacent resurfacing; and
  - For areas where there is a concrete section under an existing asphalt overlay, concrete repair shall be in accordance with RID document: "Item 361 Repair of Concrete Pavement Presentation," followed by flexible pavement surface layer(s) consistent with adjacent resurfacing.
- Frontage Roads:
  - Base repair shall be to a depth of 10 inches (measured from the top of the surface layer);
  - For flexible pavement base repair, the pavement shall consist of HMA Type B (PG 64-22) complying with Special Specification (SS) 3076 and surface layer(s) consistent with adjacent resurfacing; and
  - For areas where there is a concrete section under an existing asphalt overlay, concrete repair shall be in accordance with RID document: "Item 361 Repair of Concrete Pavement Presentation," followed by flexible pavement surface layer(s) consistent with adjacent resurfacing.

In spot surface repair areas, spot surface repair shall be as follows:

- Mainlanes:
  - Repair depth shall be down to the concrete surface; and
  - Repair shall consist of flexible pavement surface layer(s) consistent with adjacent resurfacing.

16.4.4 **Use of Shoulders to Carry Construction Traffic**

DB Contractor shall perform a structural evaluation of all shoulders proposed to carry main lane traffic during construction utilizing FPS 21. DB Contractor shall use the non-destructive testing and field sampling described in Chapter 4, Section 4 of the TxDOT *Pavement Manual* for this structural evaluation. The Pavement Design Report shall include the results of a shoulder evaluation. Shoulders carrying traffic shall be designed, strengthened or rehabilitated to provide continuous service to traffic without requiring intermittent maintenance during the in-service period.

16.4.5 **Pavement Widenings (including shoulder reconstruction)**

For widening of existing pavement sections, DB Contractor shall provide documentation of criteria and rationale for the construction approaches selected to widen sections. DB Contractor shall comply with the TxDOT *Pavement Manual*, historical performance, and San Antonio District Pavement Standard Operating Procedures (provided in the RID) when designing the widened sections and selecting construction approaches. The widened pavement section shall match the existing travel lane pavement section (materials and depth). 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. DB Contractor shall maintain positive pavement drainage between the existing section and widened section.

Longitudinal construction joints for all pavement layers 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 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.

16.4.6 **Required Pavement Design Reports**

The Pavement Design Report developed by DB Contractor shall be signed and sealed by a Licensed Professional Engineer (PE). Each preliminary Pavement Design Report shall include all information and analyses and upon completion and including any later supplements or amendments, shall be submitted to TxDOT for review and comment no later than the date related Design Work is provided for TxDOT review.

DB Contractor shall submit each final Pavement Design Report to TxDOT for approval with the Released for Construction Documents submitted for review and no later than ten Business Days prior to commencement of the applicable Construction Work.

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;
- Relevant pavement evaluation data (structural and functional) and condition information on adjacent roads (all frontage roads and cross streets);
- 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, and resulting ESAL projections documenting all assumed input values, pavement material characterization, environmental conditions, and pavement design life;
- Include TxDOT Form 2088 – Surface Aggregate Selection Form as part of flexible pavement design only for determining the appropriate 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, TxDOT MODULUS outputs, calculated values and relationships, or other basis for the pavement thickness designs, and include station limits.

16.5 Geotechnical Design of Other Elements

The scope of the DB Contractor subsurface geotechnical investigations shall include 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, high mast lighting foundations, drainage structures, temporary and permanent retaining walls, excavation support systems, and any other facilities for the Project. Structural design requirements are described in Item 21.

DB Contractor may deviate from the TxDOT *Geotechnical Manual*, provided that the design requirements and methodology included in the AASHTO LRFD Bridge Design Specifications and the following FHWA manuals (provided at https://www.fhwa.dot.gov/engineering/geotech/library_listing.cfm) regarding geotechnical design are used in their entirety, unless otherwise approved by TxDOT:

- Geotechnical Engineering Circular No. 4 – Ground Anchors and Anchored Systems (FHWA-IF-99-015);
- Geotechnical Engineering Circular No. 7 – Soil Nail Walls (FHWA-NHI-14-007);
- Geotechnical Engineering Circular No. 9 – Design and Analysis of Laterally Loaded Deep Foundations (FHWA-NHI-18-031);
- 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 Volume I (FHWA-NHI-10-024) and Volume II (FHWA-NHI-10-025);

DB Contractor shall design all bridge foundations in accordance with a consistent methodology (i.e., TxDOT *Geotechnical Manual* or AASHTO LRFD Bridge Design Specifications). Mixing of design methodologies within a single bridge is not acceptable. Using different design methodologies for different structure types or components is acceptable (i.e., AASHTO LRFD Bridge Design Specifications for bridge foundations and TxDOT *Geotechnical Manual* for overhead sign structure foundations).

16.5.1 Foundations

Structure foundation type selection considerations shall be evaluated including suitability of subsurface conditions anticipated loads, scour, and construction staging. Bridge foundations shall consist of drilled shafts.

Geotechnical analyses for foundations of drainage structures, bridge structures, sign structures, lighting structures, retaining walls, Noise Barriers, embankments, and any other structures, shall be performed. The analyses shall include recommended bearing strata, deep foundation length and evaluations of bearing capacities and predicted settlements.

16.5.2 Retaining Walls

Applicable retaining wall types shall be evaluated for each location to be used including geometry, site constraints, aesthetics, and constructability considerations. DB Contractor shall perform this evaluation for temporary and permanent retaining walls. DB Contractor shall ensure the retaining walls are evaluated and designed in accordance with the TxDOT *Geotechnical Manual* and the associated TxDOT Standards for the wall type considered.

All retaining walls shall be provided with drainage behind the wall to control groundwater levels. Where pavement drainage in front of the wall is provided by storm sewer system the retaining wall drainage shall tie into the storm sewer system.

Retaining wall analyses shall include external stability, global stability, and settlement analysis. Analyses shall include computation of the factor of safety for bearing capacity, global stability, overturning and sliding. Global stability shall be evaluated for short term (undrained) and long term (drained) conditions and for rapid drawdown conditions if the base of wall is below the 100-year frequency event water surface elevation. If required, the drawdown assumed shall be the greater of three feet or the height of the water surface elevation of the 100-year frequency event above the base of the wall. The design minimum factors of safety required for short-term and long-term global stability of all slopes and retaining walls shall be in accordance with the TxDOT *Geotechnical Manual*.

In addition, DB Contractor shall include allowable bearing pressure, passive earth pressure, friction factor, settlement and lateral earth pressure in the analysis of the retaining walls. All backfill shall meet the requirements of Section 2.4 of Item 423 of the TxDOT Standard Specifications. For non-select backfill, the wet unit weight shall be consistent with the material used and shall not be assumed less than 115 pounds per cubic foot. Bearing capacity analysis shall account for the presence of utility trench excavations or slopes in front of the wall. Where retaining walls are used for cut sections the p-y curve type and related parameters for each major stratum shall be provided.

Additional requirements for retaining walls are described in Item 21.

16.5.3 **Slope Stability Analysis**

Slope stability analyses shall be performed by the DB Contractor for embankment and excavation, including roadway cut and fill sections, bridge end slopes, 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. If the base of embankment or excavation is below the 100-year frequency event water surface elevation, the slope shall be evaluated for rapid drawdown conditions. If required, the drawdown assumed shall be the greater of three feet or the height of the 100-year frequency event water surface elevation above the base of the slope. The design minimum factor of safety required for short-term and long-term global stability of all slopes shall be in accordance with the TxDOT *Geotechnical Manual*. The analysis shall consider the potential for long-term surficial slide failures common to high plasticity clays in Texas, and specific recommendations shall be provided to minimize their occurrence.

16.5.4 **Settlement**

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, the weight of proposed structures, and any permanent lowering of the groundwater table that may result from the Construction Work. These evaluations shall consider, but not be limited to, immediate settlement, primary consolidation, secondary compression, hydro-compression, and expansion.

DB Contractor shall perform settlement analyses for all embankments and retaining walls. Where differential settlement between retaining walls or embankments and adjacent bridge structures exceeds one inch, measures to reduce settlement of the retaining wall and approach embankment shall be provided such that differential settlement is reduced to one inch or less at the interface with the bridge abutment.

Allowable total and differential settlement of retaining walls and other structures shall be determined for each structure based on guidance provided in the AASHTO *LRFD Bridge Design Specifications*.

16.5.5 **Corrosion**

DB Contractor shall 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. DB Contractor shall provide recommendations to mitigate the effects of corrosion.

16.5.6 **Ground Improvement**

DB Contractor shall design and construct ground improvements as needed to bring discrete and differential settlements within tolerances, to control swelling and expansive soils, and to protect structures for both a design life and service life as required in applicable sections of these Design-Build Specifications. Calculated movements with the potential to damage or cause a failure to meet the performance standards of these Design-Build Specifications for Project retaining walls, Noise Barriers, pavement, embankment, and other structures shall be mitigated with ground improvements. Movement calculations for walls shall include vertical, horizontal, and rotational displacement, and movement calculations for embankments and roadbeds shall include vertical displacement.

To the extent that ground improvements are required or recommended, DB Contractor's design shall conform to the AASHTO *LRFD Bridge Design Specifications* and to the relevant FHWA *Geotechnical Engineering Circular. 13 – Ground Modifications Methods Reference Manual*.

16.5.7 **Instrumentation and Monitoring**

DB Contractor shall provide recommendations for instrumentation and monitoring of settlement, stability, vibrations, etc. during Construction Work as required to achieve safe and reliable construction staging and to ensure safety of existing facilities and travelling public.

16.5.8 **Geotechnical Reports for Other Elements**

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:

- 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 rock quality designation (RQD) for rock cores.
- Plan view of field sampling locations (field test plan) with proposed structures and project centerline shown, boring logs and other field data, laboratory test results, calculations, and analyses that support design decisions. DB Contractor shall provide state plane coordinates and elevations of every coring or boring location.
- The geology of the Project area, including soil and/or rock types, and drainage characteristics.
- 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. For major strata classified as cohesive (i.e., Unified Soil Classification System classification CL, CH, OL, or OH) parameters shall be determined based on laboratory testing including unit weight, moisture content, plastic limit, liquid limit, plasticity index, undrained shear strength, drained cohesion and angle of internal friction (if tested), consolidation properties (including initial void ratio, pre-consolidation pressure, over-consolidation ratio, compression index, recompression index, and coefficient of consolidation, if tested), and swell properties (including free swell and swell pressure, if tested). For major strata classified as cohesionless (i.e., Unified Soil Classification System classification ML, MH, SW, SP, SM, SC, GW, GP, GM or GC) parameters shall include estimated unit weight, angle of internal friction based on correlation with Texas Cone Penetrometer tests results, and D50 value based on laboratory test results for scour analysis (if tested). For major strata classified as rock parameters shall include unit weight, percent recovery, RQD, and drilling rate based on field data and unit weight and UCS based on laboratory test results.
- Documentation showing 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.
- WinCore skin friction and end bearing tables and design capacity curves including skin friction and end bearing shall be presented at all structure locations requiring drilled shaft foundations when designing based on TxDOT *Geotechnical Manual*. This requirement is waived if LRFD is being used.
- Geotechnical engineering analyses performed and the recommendations for design and construction of the facilities addressed in the report.
- Provide recommendations to mitigate the effects of corrosion.

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

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

16.6 Construction Quality

The IQF shall perform independent material testing, inspection, and audits of the Construction Quality Management Plan (CQMP).

When performing Construction Work 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 in accordance 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 TxDOT Guide Schedule of Sampling & Testing for Design-Build Projects by the Independent Quality Firm (IQF) 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 16.6.

16.6.1 Field Verification of Design Subgrade Modulus for Flexible Pavements

The IQF shall perform the following field testing for field verification of the design subgrade modulus.

16.6.1.1 100 Percent 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 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 shall be further evaluated by the IQF with the DCP to determine depth of weak material for corrective action.

16.6.1.2 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 the subgrade elastic modulus (E) using the equation listed in the TxDOT *Pavement Manual*. The IQF shall use ASTM D 3665 to select one random location for each 250-foot section. All locations shall be greater than one 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 within and greater than one foot from the future edge stripe.

The process for the IQF shall be as follows:

- Perform DCP tests to a depth of three feet. If a test location meets refusal, then select an alternate location within two to five feet to begin a new test. Refusal is defined as slow or no penetration progress where the penetration rate is less than one inch in a ten-blow set anywhere within the top one foot of subgrade material. If refusal is met after penetrating at least one foot, then the results to the depth of refusal shall be used.
- Convert the DCP data for each test to an estimated subgrade E for each six-inch interval of penetration using the equations given in the TxDOT *Pavement Manual*.
- Compare E for each six-inch interval of penetration in the section to the design value.

- If the E 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 subgrade E result for any six-inch interval of penetration is below 50% of the design value, take the average of results for all six-inch intervals and compare to design value. If the average subgrade E 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) ten feet longitudinally from the original test to determine the extent of the weak area. Continue testing at additional ten-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 subgrade E for any six-inch interval of penetration in the section is below 50% of design value, take two additional DCP tests (one on either side) ten feet longitudinally from the original test to determine the extent of the weak area. Continue testing at additional ten-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.

16.6.2 **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 Payment Adjustments. DB Contractor shall 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 ten-foot straightedge. For flexible pavements, fog seal the aggregate exposed from diamond grinding in accordance with Item 315 of the TxDOT Standard Specifications and apply the mixture when precipitation is not expected within the first three hours after opening to traffic. Following corrective action, retest the area to verify compliance with this Item 16. Diamond grinding is not allowed on the final HMA riding surface except for localized areas as approved by TxDOT.

Surface Test Type B. International roughness index (IRI) values will be calculated using the average of both wheel paths using Department Ride Quality software. A Nonconformance Report (NCR) 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 95 inches per mile for flexible pavements, or for correction of localized roughness. After making corrections, 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. For flexible pavements, DB Contractor shall fog seal the aggregate exposed when diamond grinding is used in accordance with Item 315 of the TxDOT Standard Specifications and apply the mixture when precipitation is not expected within the first three hours after opening to traffic. Diamond grinding is not allowed on the final HMA riding surface except for localized areas as approved by TxDOT.

When diamond grinding is used on concrete pavements, ensure thickness and clear cover requirements are met in conjunction with corresponding specification. Diamond grinding on concrete pavements is only

allowed for correction of localized areas. 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 (including newly constructed or rehabilitated) 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 pavement described in articles 585.3.2.1.1 thru 585.3.2.2.

16.7 **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 Global Positioning System (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 or prime material. For treated bases, DB Contractor shall allow a minimum of three 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 one-foot spacing). The test load shall be as close as possible to 9000 pounds.

16.8 **Submittals**

All Submittals described in this Item 16 shall be in accordance with the schedule and for the purpose (approval, review and comment, for information) set forth in Table 16-10. Acceptable electronic formats include Microsoft Word, Microsoft Excel, or Adobe Acrobat files, unless otherwise indicated.

Table 16-10: 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 Pavement Design Reports	No later than the date related Design Work is provided to TxDOT for review	Review and comment	16.4.6
Final Pavement Design Reports	With the Released for Construction Documents submitted for review and no later than ten Business Days prior to commencement of the applicable Construction Work	Approval	16.4.6
Preliminary Geotechnical Engineering Reports	No later than ten Business Days prior to commencement of the applicable Design Work	Review and comment	16.5.8
Final Geotechnical Engineering Reports	With the Released for Construction Documents provided for review and no later than ten Business Days prior to commencement of the applicable Construction Work	Approval	16.5.8

Table 16-10: Submittals to TxDOT

Submittals	Submittal Schedule	TxDOT Action	Reference Section
FWD data	As part of the daily Quality Control (QC) inspection and test reports described is the TxDOT Quality Assurance Program for CDA/Design-Build Projects (QAP) and upon TxDOT request	For information	16.7

Item 17
Land Surveying

17.1 **General Requirements**

Design-Build (DB) Contractor shall provide accurate and consistent land surveying and mapping necessary to support Right of Way (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,* the Texas Board of Professional Engineers and Land Surveyors (TBPELS) *General Rules of Procedures and Practices*, the Texas Society of Professional Surveyors (TSPS) *Manual of Practice,* and the Professional Land Surveying Practices Act. 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 **Right of Entry (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 and shall provide ROE documentation to TxDOT upon request.

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 Work. DB Contractor shall notify TxDOT within two 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 continuously operating reference stations (CORS) vertical control and local monumentation. DB Contractor shall verify owner provided survey control and provide verification results to TxDOT upon request after Notice to Proceed 2 (NTP2).

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 Global Positioning System (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 or verified, as applicable, by a Registered Professional Land Surveyor (RPLS) 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 condition of survey as defined in the TSPS *Manual of Practice* and shown in Table 17-1.

Horizontal and vertical control is to be established (at a minimum) according to the appropriate condition of survey as defined below in Table 17-1. Vertical control shall also be established (at a minimum) on the North American Vertical Datum of 1988 (NAVD 1988), (Geoid 12A).

Table 17-1: Survey Accuracy Requirements

Condition	1	2	3	Remarks and Formulae
Positional Standards				
Relative horizontal positional precision	0.07’	0.08’	0.10’	2σ (95% confidence level)
Relative vertical positional precision	0.03’	0.08’	0.20’	2σ (95% confidence level)
Traverse Standards				
Traverse error of closure (horizontal)	1: 50,000	1:40,000	1:20,000	Loop or between monuments
Angular error of closure	3” $\sqrt{N}$	4” $\sqrt{N}$	6” $\sqrt{N}$	N = number of angles in traverse
Minimum horizontal survey methods	Static traverse	Static traverse	Rapid static RTN traverse	

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 ROW control section job (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. Subject to Section 15.2.4 and Section 15.3.1, DB Contractor shall provide two sets of all mapping to TxDOT, unless otherwise directed by TxDOT. DB Contractor shall obtain and address all TxDOT 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 universal serial bus 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.

DB Contractor 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 **ROW Survey 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 in the TSPS *Manual of Practice* and shown below in Table 17-2.

Table 17-2: ROW Survey Accuracy Requirements

	Urban	Suburban	Rural	Remarks and Formulae
Positional Standards (at the 95% confidence level)				
Relative positional precision	0.10’	0.14’	0.20’	Plus 50 parts per million (PPM)
Traverse Standards				
Traverse error of closure	1:20,000	1:15,000	1:10,000	Loop or between control monuments
Angular error of closure	6” $\sqrt{N}$	8” $\sqrt{N}$	10” $\sqrt{N}$	N = number of angles in traverse
Elevation for boundaries	+/- 0.05’	+/- 0.10’	+/- 0.15’	By tides, contours, rivers
Location of improvements	+/- 0.05’	+/- 0.10’	+/- 0.15’	Measurement ties to boundary

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 and for review and approval prior to Final Acceptance.

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) utilizing TxDOT approved county-wide scale factors or another scale factor approved by the State. Work shall conform to Texas State Plane Coordinate System, South Central Zone (4204), NAD83 (2011) Epoch 2010. The TxDOT approved surface adjustment factor for the Project is 1.00017.

17.4 **Construction Requirements**

17.4.1 **Construction Surveys**

DB Contractor shall perform all construction surveys in accordance with the applicable TxDOT Standards, TxDOT *Survey Manual*, TSPS *Manual of Practice*, and as set forth in the Contract Documents.

17.4.2 **ROW Monuments**

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

- Point of curvature (PC)s;
- Point of tangency (PT)s;
- Point of intersection (PI)s;
- Point of compound curvature (PCC)s;

- Point of reverse curvature (PRC)s;
- 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; 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*), unless otherwise directed by TxDOT. 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 intersecting crossroad ROW lines shall be monumented by 1/2-inch iron rods, driven just below surface level, capped by a TxDOT-labeled aluminum cap (rod-and-cap monument). ROW line intersections with property lines shall remain monumented by a 5/8-inch iron rod with a TxDOT aluminum cap (rod-and-cap monument). A TxDOT Type II monument shall be set on the Project ROW lines, perpendicularly left and right of each significant centerline point, regardless of the relative orientation of the final Project ROW line. 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 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 shall use these monuments only for this Project and shall be responsible for proper storage thereof.

Subject to the requirements in Section 15.3.1, DB Contractor shall submit updated ROW maps with the ROW monumentation information. (This is for final monumentation set, for example, type II, and type of monuments set, etc.).

17.5 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 Geopak (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.

17.6 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 17-3. Acceptable electronic formats include Microsoft Word, Microsoft Excel, or Adobe Acrobat files, unless otherwise indicated.

Table 17-3: 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 Notice to Proceed 2 (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 and prior to Final Acceptance	For information upon request, review and approval prior to Final Acceptance	17.3.4
Copies of all field notebooks	Upon request	For information	17.3.4
Updated mapping with any ROW monumentation information	Upon completion of the ROW acquisition and all Construction Work	For information	17.4.2
Record Documents	As a condition of Final Acceptance	For information	17.5

Item 18
Earthwork

18.1 General Requirements

Design-Build (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 Item 18 and the TxDOT Standard Specifications.

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 Notice to Proceed 2 (NTP2).

Subject to Section 15.4.5, DB Contractor shall demolish or abandon in place, all existing structures within the Project Right of Way (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 feet below the final finished grade or one 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 to, at any time, salvage and deliver TxDOT-owned equipment and materials, including Intelligent Transportation System (ITS) equipment and materials, in an undamaged condition to a location designated by TxDOT. The location shall be within the TxDOT District in which the Project is located.

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 comply with the TxDOT *Roadway Design Manual* and roadway design criteria in Item 19 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 a minimum depth of four inches 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, and DB Contractor shall stabilize these slopes in accordance with Section 18.4. 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 provide stable slopes.

For designated construction easements and other approved Project Specific Locations (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 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 Project roadways. 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 two-foot in width, shaded areas below structures where vegetation is not easily established and areas below structures with less than 10-foot vertical clearance with concrete rip rap.

18.4 **Stabilizing Disturbed Areas**

DB Contractor shall establish and maintain all erosion and sediment controls in accordance with the approved SWP3, 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 Work has 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. Block sod must be placed at all grate inlets, manholes and culvert headwalls and along sidewalks and back of curbs.

Block sod shall be placed at all open disturbed areas within the Project ROW prior to completion of the Project.

18.5 **Construction Requirements**

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

Subject to approval by TxDOT, alternate material specifications and construction requirements may be proposed by DB Contractor provided the objectives of the Project are met and equivalent requirements to this Item 18 are provided.

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 Notice to Proceed (NTP2)	Approval	18.2
Slope stability analysis	Prior to Final Design Submittal	Approval	18.3

Item 19
Roadways

19.1 General Requirements

Design-Build (DB) Contractor shall coordinate roadway design, construction, and maintenance with other elements of the Project to achieve the Project objectives. 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.

Where changes to the roadway geometrics result in revisions to the Project Right of Way (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 Licensed Professional Engineer (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.

19.1.2 Technical Editor

When engineering reports and/or Design Exceptions are required to be developed by DB Contractor to be submitted to TxDOT, DB Contractor shall employ a technical editor capable of providing a well-written, grammatically correct report that is technically accurate throughout the report including any appendices.

19.2 Design Requirements

DB Contractor shall complete the design of 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, but not limited to, 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 Elements in accordance with the TxDOT *Roadway Design Manual,* American Association of State Highway and Transportation Officials (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 incorporate roadway appurtenances, including but not limited to fences, barriers, and hazard protections as necessary to promote safety and to mitigate visual and noise impacts on neighboring properties.

All roadside safety devices and barrier systems used on the Project and as needed for Construction Work beyond the Project limits 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 and in accordance with TxDOT Engineering Standard Sheets. Existing roadside safety devices used on the Project that are not impacted by the Work do not have to meet current crash test criteria and safety standards provided that the device meets the minimum rail height requirements in Chapter 4 of the TxDOT *Bridge Railing Manual*. In addition, DB Contractor is required to upgrade all metal beam guard fence (MBGF) that do not meet the TxDOT 31" MBGF height standard. All roadside safety devices shall be installed and utilized in

accordance with TxDOT Engineering Standard Sheets. MBGF shall only be used as protection end treatments for concrete barriers and shall not be used as the primary barrier system.

DB Contractor may 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 as documented in the exhibit "Existing Roadside Safety Devices Assessment – Safety Barriers" provided in the RIDs. DB Contractor shall perform a visual assessment of the existing safety devices for safety and crash worthiness and replace or upgrade any devices that are not functioning as intended. If an existing roadway safety device requires an upgrade or replacement and does not meet current clear zone and length requirements, DB Contractor shall upgrade or replace the existing safety device, and extend the safety device as needed, to comply with such requirements.

19.2.1 Control of Access

Unless identified in and shown to be denied in the Schematic Design, DB Contractor shall maintain all existing property accesses, including those not shown on the Schematic Design, and shall not revise control of access without TxDOT review and the written agreement of the affected property owner. DB Contractor shall design new and revised exit and entrance ramps to meet the desirable spacing requirements between ramps and driveways, side streets, or cross streets listed in TxDOT *Roadway Design Manual* and TxDOT *Access Management Manual*. In locations where the desirable spacing cannot be achieved, DB Contractor shall submit to TxDOT for approval a demonstration 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. Slight modifications shall mean adjustments to the Schematic Design ramp alignments that are made to accommodate the placement of adjacent bridge columns. If the ramp alignment shown on the Schematic Design is adjusted for any reason other than to avoid the placement of adjacent bridge columns, then the new ramp location must meet minimum spacing requirements.

DB Contractor shall coordinate with landowner when tying-in to private property; shall replace necessary signs, mailboxes, fences, landscape features, and any other appurtenance; and shall coordinate all access.

19.2.2 Design Criteria

19.2.2.1 Geometric Design Criteria

DB Contractor shall design the elements of the Project to meet the geometric design criteria in this Section 19.2.2.1, with the exclusion of the roadway design criteria deviations listed in Section 19.2.2.4 and Section 19.2.2.5 in order to meet the Project objectives.

Table 19-1: Geometric Design Criteria

	Elevated Lanes	Main Lanes	Mainlane Ramps
Functional Classification	Urban Freeway	Urban Freeway	Freeway Ramp
Design Speed	70 mph	60 mph	45 mph (see note 11)
Stopping Sight Distance	730 ft	570 ft	360 ft
Horizontal Alignment Criteria:			
Maximum Curvature (Min Radius)	3,390 ft	2,195 ft	810 ft
Superelevation – e(max)	6%	6%	6%
Maximum Curvature (Min Radius) w/o Superelevation	14,100 ft	11,100 ft	6,480 ft
Vertical Alignment Criteria:			
Maximum Gradient	4%	4%	5%
Minimum Gradient	0.50%	0.50%	0.50%

Crest (min K-Value)	247	151	61
Sag (min K-Value)	181	136	79
Maximum Algebraic Difference w/o Vertical Curve	0.5%	0.5%	1.00%
Min Vertical Clearance – Roadway (see note 5)	18 ft 6 in	18 ft 6 in	18 ft 6 in
Cross Section Criteria:			
Lane Widths	12 ft	12 ft	14 ft
HOV Buffer Widths	2 ft	N/A	N/A
U-turn Widths (see note 10)	39 ft	N/A	N/A
Inside Shoulder Widths	4 ft / 6 ft (see note 9, 15)	4 ft (I-410) 10 ft (I-35)	2 ft (RDWY) 4 ft (STR) (see note 3)
Outside Shoulder Widths	10 ft	10 ft	6 ft
Pavement Cross Slope	2.0%	2.0% (see note 6)	2.0%
Side Slope Within Clear Zone	N/A	6:1	6:1
Side Slope Outside Clear Zone (see note 7)	N/A	4:1	4:1
Offset to Face of Curb	N/A	N/A	N/A
Clear Zone Width	N/A	30 ft	16 ft
Intersection Horizontal and Vertical Criteria:			
Corner Radii	N/A	N/A	N/A
Design Vehicle (Intersection)	WB-62	N/A	N/A
Preferred Corner Geometry	N/A	N/A	N/A

Table 19-1: Geometric Design Criteria (continued)

	Direct Connectors Ramps	Frontage Roads	Cross Streets
Functional Classification	Freeway Ramp	Urban Collector	Low Speed Urban
Design Speed	45 mph (see note 14)	40 mph (see note 11)	30 mph
Stopping Sight Distance	360 ft	305 ft	200 ft
Horizontal Alignment Criteria:			
Maximum Curvature (Min Radius)	740 ft	485 ft	RDM, Table 2-3
Superelevation – e(max)	8%	6%	
Maximum Curvature (Min Radius) w/o Superelevation	6,710 ft	5,230 ft	
Vertical Alignment Criteria:			
Maximum Gradient	5% (see note 14)	6%	6%
Minimum Gradient	0.50%	0.50%	0.50%
Crest (min K-Value)	61	44	19
Sag (min K-Value)	79	64	37
Maximum Algebraic Difference w/o Vertical Curve	1.00%	1.00%	1.00%
Min Vertical Clearance – Roadway (see note 5)	18 ft 6 in	16 ft 6 in	16 ft 6 in
Cross Section Criteria:			
Lane Widths	14 ft / 12 ft (see note 2)	12 ft	12 ft
HOV Lane Buffer Width	N/A	N/A	N/A
U-turn Width (see note 10)	N/A	27 ft	27 ft
Inside Shoulder Widths	4 ft (see note 2)	3 ft (uncurbed) N/A (curbed)	3 ft (uncurbed) N/A (curbed)
Outside Shoulder Widths	8 ft (see note 2)	3 ft (uncurbed) N/A (curbed)	3 ft (uncurbed) N/A (curbed)

Pavement Cross Slope	2.0%	2.0%	2.0%
Side Slope Within Clear Zone	N/A	6:1	6:1
Side Slope Outside Clear Zone (see note 7)	N/A	4:1	4:1
Offset to Face of Curb	N/A	1 ft	1 ft
Clear Zone Width	16 ft	10 ft (uncurbed) 6 ft (from face of curb)	10 ft (uncurbed) 6 ft (from face of curb)
Intersection Horizontal and Vertical Criteria:			
Corner Radii	N/A	75 ft	75 ft
Design Vehicle (Intersection)	N/A	WB-62	WB-62
Preferred Corner Geometry	N/A	Simple	Simple

Notes:

1. In the event of any conflict between the TxDOT *Roadway Design Manual* and Table 19-1, Table 19-1 shall govern.
2. Two-lane direct connector ramps shall have 12-foot lanes. Single lane ramps shall have 14-foot lanes. The minimum inside and outside shoulder widths on ramps may be interchanged to accommodate stopping sight distance.
3. On mainlane ramps, 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. If sight distance restrictions are present due to horizontal curvature, the shoulder width on the inside of the curve may be increased to 8 ft and the shoulder width on the outside of the curve decreased to 2 ft (RDWY) or 4 ft (STR).
4. For pavement widening and rehabilitation areas, existing design values for cross slope and superelevation may be maintained and the lane striping shall be in accordance with the Schematic Design. For such pavement widening and rehabilitation areas, existing design values supersede the requirements in Table 19-1. The design values for transitions to existing facilities may utilize existing values at the transition.
5. For new bridges over roadways listed as part of TxDOT's Texas Highway Freight Network (both primary and secondary routes), the minimum vertical clearance shall be 18.5 feet. For new sign structures and signals over roadways listed as part of TxDOT's Texas Highway Freight Network (both primary and secondary routes), the minimum vertical clearance shall be 19.5 feet.
6. To reduce sheet flow hazards, the main lane pavement will require a cross slope break at mid-point or at the lane line. The typical section cross slope break shall be 2% to 2.5%.
7. Any side slopes steeper than 4:1 must be approved by TxDOT in accordance with Section 18.3.
8. For ramps with grades less than 3%, the design of acceleration lane lengths for entrance ramps and the deceleration lane lengths for exit ramps shall be in accordance with Tables 3-13 and 3-23, respectively, of the TxDOT *Roadway Design Manual*. Speed change lane lengths shall be adjusted using the adjustment factors shown in Table 3-14 of the TxDOT *Roadway Design Manual* when ramp grades deviate from 3%. If, however, 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.
9. DB Contractor shall provide a 6-foot wide inside shoulder in locations where there is not a 2-foot buffer between the HOV lane and express lanes.
10. If the Work impacts only one end of an existing U-turn, then DB Contractor is required to upgrade only that end of the U-turn impacted by the Work in accordance with the U-turn requirements specified in Table 19-1.
11. 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*.
12. For new ramp construction, DB Contractor shall provide a minimum design spacing between the desirable control points (painted gore noses) of successive ramps in accordance with the TxDOT *Roadway Design Manual* Figure on *Arrangements for Successive Ramps*. DB Contractor may maintain the spacing between existing ramps if the ramps are not impacted by a DB Contractor's revised design.
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. DB Contractor shall use *Table Maximum Algebraic Differences in Pavement Cross Slope at Connecting Roadway Terminals* 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 following direct connector ramps may use the maximum gradient criteria for 40 mph design speed: (i) S410-ELNB Direct Connector from Station 127+30 to 132+10, (ii) ELSB-S410 Direct Connector from Station 128+20 to Station 148+85, and (iii) ELSB-GB Direct Connector from Station 110+85 to Station 120+75.
15. The inside shoulder width for I-35EL NB shall be 11 feet from Station 1300+21 to Station 1320+50.

DB Contractor shall design the emergency crossover ("Crossover 1") per the horizontal and vertical geometry in the Schematic Design and Exhibit 1 to the DBA to accommodate emergency vehicular traffic.

19.2.2.2 **Future Roadway Design Envelopes**

19.2.2.2.1 Cross Street Intersections

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 19-2 as shown in "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 19-2: Future Cross Street Intersection Envelopes

No.	Cross Street	Envelope Clear Span Width
1	Rittiman Rd.	116 ft. (58 ft. each side of centerline)
2	Eisenhauer Rd.	116 ft. (58 ft. each side of centerline)
3	Walzem Rd.	128 ft. (64 ft. each side of centerline)

19.2.2.2.2 CPS Energy Transmission Crossings

DB Contractor shall not raise the vertical alignment of the northbound and southbound elevated lanes as shown on the Schematic Design at the following locations in order to accommodate the design and construction of the CPS Energy transmission crossings as further described in Section 14.1.3.1:

- ML Station 3295+00
- ML Station 3299+52

19.2.2.3 **Superelevation**

In areas where proposed roadways and ramps are to connect to existing pavement at the Project limits or at connections to existing cross streets, DB Contractor's design may retain existing plan superelevation or cross slope to achieve transition to existing pavement. Pavement widening may 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%.

When existing pavement is being widened, DB Contractor shall design to prevent hydroplaning.

19.2.2.4 **Roadway Design Criteria Deviations**

DB Contractor shall design the Project to meet the criteria in Table 19-1 with the exception of those identified in Table 19-3. Table 19-3 reflect permitted deviations to Table 19-1 that are not considered Design Exceptions.

DB Contractor shall design the curve identified in Table 19-3 to meet or exceed the given minimum horizontal curve radius in Table 19-3.

Table 19-3: Design Criteria Deviations for Minimum Horizontal Curve Radius

Roadway	Curve	Minimum Radius
I-410 EB to I-35 EL SB Direct Connector Ramp	CURVE N410-ELSB-1	R = 670 ft

19.2.2.5 **Design Exceptions**

The Design Exceptions provided by TxDOT for the Project for shoulder widths on existing facilities are listed in Table 19-4 and described in "I-35 NEX South Design Exceptions" provided in the RIDs. Design Exceptions have been approved by FHWA for the Schematic Design at the locations identified in Table 19-4 where shoulder widths can be reduced in order to incorporate the proposed barrier protection.

Table 19-4: Approved Design Exceptions for Shoulder Width

Facility Type	Design Exception Element	Location		Existing Value	Proposed Value
		Begin STA	End STA		
I-35 NB Ramp	Inside Shoulder Width	3289+87	3295+42	4 ft.	2 ft.
I-35 NB Main Lane	Inside Shoulder Width	3302+75	3309+75	6-9 ft.	5 ft.
I-35 SB Main Lane	Inside Shoulder Width	3302+75	3309+75	9 ft.	5 ft.
I-35 NB Ramp	Inside Shoulder Width	3359+34	3361+02	4 ft.	2 ft.
I-35 SB Ramp	Inside Shoulder Width	3359+70	3369+53	4 ft.	2 ft.
I-35 NB Main Lane	Inside Shoulder Width	3413+65	3417+35	10 ft.	8 ft.
I-35 SB Main Lane	Inside Shoulder Width	3413+65	3417+35	10 ft.	8 ft.
I-35 SB Ramp	Inside Shoulder Width	3449+49	3452+91	4 ft.	2 ft.

19.2.3 **Miscellaneous Design Requirements**

Where traffic barrier is necessary for main lane pavement in the permanent configuration, DB Contractor shall utilize anchored Single Slope Concrete Barrier (SSCB) along the centerline and Single Slope Traffic Rail (SSTR) on the outside edge of main lane pavement. DB Contractor shall use SSTR along main lane 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 the TxDOT San Antonio District standards. District standards can be found at:

https://www.txdot.gov/content/txdotreimagine/us/en/home/about/districts/san-antonio-district/standards-forms.html

19.2.3.1 **Driveways**

DB Contractor shall design and construct driveways impacted by the Work that are existing or permitted as of the Proposal Due Date. The design and construction of driveways shall be functionally adequate for existing land use of adjoining property and approved permits. This shall be in accordance with the guidelines specified in TxDOT *Roadway Design Manual* – Appendix C, "Driveways Design Guidelines" and the TxDOT San Antonio District standards, provisions of which will be requirements for use on this Project. DB Contractor shall design and construct driveways to utilize consistent pavement to the existing driveway pavement, except for unpaved existing driveways which shall utilize asphalt pavement.

19.3 **Construction Requirements**

DB Contractor shall conduct all Work necessary to meet the requirements for this Item 19 and the 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 19-5. Acceptable electronic formats include Microsoft Word, Microsoft Excel, or Adobe Acrobat files, unless otherwise indicated.

Table 19-5: Submittals to TxDOT

Submittals	Submittal Schedule	TxDOT Action	Reference Section
Control of Access Channelization	As part of the Preliminary Design Submittal, if applicable	Approval	19.2.1
Documentation demonstrating that the modification (of exit or entrance ramps) results in equal or better access compared with the access provided in the Schematic Design	As part of the Preliminary Design Submittal, if applicable	Approval	19.2.1

Item 20
Drainage

20.1 **General Requirements**

In the design of the drainage facilities, Design-Build (DB) Contractor shall account for all sources of runoff that may reach the Project, whether originating within or outside the Project Right of Way (ROW).

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 modified during the Term, DB Contractor shall design and implement 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:

(i) have the potential to increase risk to health and human safety,

(ii) cause or exacerbate flooding of developed properties or structures,

(iii) increase water surface elevations (WSEL) on undeveloped properties, or

(iv) for proposed discharges added to existing drainage systems, result in a hydraulic grade line (HGL) that exceeds the maximum allowable design HGL defined in Section 20.3.2.1 or exceed the allowable headwater defined in Section 20.3.2.2.

With respect to item (iv) above, if the HGL of the existing system, without adding any proposed discharges, complies with the HGL requirements in Section 20.3.2.1, then DB Contractor may add proposed discharges to the system and shall provide mitigation for any adverse impacts, which as defined in item (iv) are increases in WSEL that exceed the maximum allowable design HGL. If the existing drainage system does not comply with the HGL requirements in Section 20.3.2.1, then DB Contractor shall not add proposed discharges to the existing system.

Unless otherwise identified in this 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 Manual* in the existing condition, unless the existing drainage system is physically impacted by the Work.

"Physical impact" in the context of this Item 20 shall mean:

(i) 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, that results in an "adverse impact," as defined above, or

(ii) 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 21.2.10.

DB Contractor's drainage design shall include assessments of pre- and post-construction conditions, as well as assessments of conditions during all phases of construction. Assessments shall include identification of existing and proposed flow patterns, ponding widths, and temporary drainage requirements based on the Traffic Control Plans.

Upon performing such assessments, and prior to submittal of the first Preliminary Design Submittal package, DB Contractor shall prepare and submit an existing conditions baseline drainage model and a preliminary proposed conditions drainage model in order to demonstrate material differences between existing and proposed conditions and to ensure that its drainage design does not cause any material impact to off-site property owners in terms of increases to WSEL or peak runoff onto their properties. Any such material impacts caused by the drainage design shall not make worse any current drainage condition. DB Contractor shall identify and obtain any necessary drainage easements at its own cost if such easements are deemed

necessary and have not previously been obtained by TxDOT. Grading activities and drainage structures needed outside of the Project ROW require a temporary easement or perpetual drainage easement as appropriate.

DB Contractor designated perpetual drainage easements shall be considered DB Contractor-Designated ROW in accordance with the terms and conditions of the Design Build Contract. Any temporary easements shall be subject to Section 4.4.1.4 of the General Conditions. Should DB Contractor be unable to obtain temporary or perpetual easements, DB Contractor shall design and construct the Project such that requirements of this Item 20 are fulfilled without improvements necessary beyond the Project 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 of this Item 20, DB Contractor is responsible for collecting all necessary data, including those elements outlined in this Section 20.2.1.

DB Contractor shall collect all applicable data identifying all water resource related issues, including water quality requirements as imposed by State and federal government regulations; national wetland inventory and other wetland/protected waters inventories; in Federal Emergency Management Agency (FEMA) floodplains; and official documents concerning the Project, such as Environmental Approvals or other drainage and environmental studies. Water resource related issues include areas with historically inadequate drainage evidenced by frequent flooding or citizen complaints, environmentally sensitive areas (e.g., wetland and wildlife habitat), localized flooding, groundwater seepage onto the roadway, maintenance problems associated with drainage, and areas with potential to pollute surface water and groundwater resources. DB Contractor shall also identify watershed boundaries, protected waters, locations of all outfalls from Project ROW, floodplains, and boundaries between regulatory agencies (e.g., watershed districts and watershed management organizations) that may impact the Project.

DB Contractor shall acquire all available and applicable municipal or other local drainage plans, watershed management plans, and records of citizen concerns. DB Contractor shall acquire all 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 obtain photogrammetric and Geographic Information Systems (GIS) data within the Project limits that depicts the “Outstanding National Resource Waters” (ONRW) and impaired waters as listed by the Texas Commission on Environmental Quality (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, year built, material, location, status, videos or photos, and other pertinent information of the facilities, including a CCTV survey of every cross-culvert structure in the Project limits. DB Contractor shall utilize the CCTV survey video to perform a visual assessment of the structural integrity of every storm drain conduit, parallel drain culverts, cross-culverts, and bridge class culvert structures. DB Contractor shall submit the inventory, condition assessment, and recommendations regarding replacement or rehabilitation to TxDOT for review no later than 60 days prior to NTP2. TxDOT will make a determination whether the drainage facilities are fit for use by DB Contractor or if the facilities require rehabilitation prior to use, based on the inventory, assessment, and recommendations submitted by DB Contractor. Notwithstanding the requirements of Section 21.2.12, if the drainage facilities require rehabilitation and are not physically impacted by the Work, TxDOT may either perform the rehabilitation work or direct DB Contractor to perform the work by means of a Change Order.

The data collected 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.

All requests for a Conditional Letter of Map Revision (CLOMR) or Letter of Map Revision (LOMR) shall meet FEMA requirements and the required documentation to be submitted with the request shall be signed and sealed by a Professional Engineer (PE) and a Registered Professional Land Surveyor (RPLS), as applicable. DB Contractor shall be responsible for submitting and obtaining CLOMR/LOMR approval from FEMA. DB Contractor shall coordinate with the local floodplain administrator and provide information related to all drainage crossings and outfalls for their information, in accordance with TxDOT *Hydraulic Design Manual*.

DB Contractor shall obtain all stormwater related permits applicable to the Project. Environmental Approvals and requirements are described in Item 12.

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

20.2.3 **Third Party Coordination**

DB Contractor shall coordinate with adjacent property owners and assist TxDOT in coordination activities in accordance with Section 5.8 of the General Conditions. Any references in this Item 20 to existing conditions and existing drainage includes proposed third-party drainage infrastructure described in Section 5.8 of the General Conditions.

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, the TxDOT *Hydraulic Design Manual*, TxDOT *Roadway Design Manual*, TxDOT *Bridge Project Development Manual,* TxDOT Standard Specifications, and applicable FHWA *Hydraulic Engineering Circulars (HEC)*.

DB Contractor's base hydrologic model shall reflect the existing development condition or pre-Project condition.

DB Contractor shall evaluate drainage features of the roadway facility and confirm no adverse impacts will result from the construction of the Project to adjacent and surrounding properties, both upstream and downstream of the Project. The flood damage potential (e.g., flow and/or WSEL) for the Project, while under construction and when completed, shall not exceed pre-Project conditions for flood frequency events up to and including the 100-yr event. At a minimum, adverse impacts shall be assessed and documented in the Drainage Design Report using the following processes for each Project outfall:

- Hydrologic impacts: The hydrologic impacts at each outfall shall be evaluated by comparing the pre-Project and post-Project peak flows at a junction at the downstream Project ROW and/or easement limits.
- Hydraulic impacts: The hydraulic impacts at each outfall shall be evaluated by comparing the pre-Project and post-Project WSELs at the upstream and downstream Project ROW and/or easement limits. A rise can usually be considered as having no impact if it is contained within the Project ROW and/or easement limits. A rise which extends outside of the Project ROW may be considered insignificant if no insurable structures are impacted, there is no increased inundation of adjacent properties, and the roadway has equivalent or better hydraulic performance. DB Contractor shall mitigate any rise in WSEL outside of the Project ROW and/or easement limits that results in adverse impacts as defined in Section 20.1.
- Sheetflow impacts: Sheetflow impacts to natural drainage patterns shall be evaluated and mitigated within the Project limits. The roadway design and the drainage design shall provide accommodations to maintain the existing drainage patterns. The roadway shall not limit the ability of adjacent property to drain. Impacts due to rerouting of sheetflow shall be mitigated to existing or pre-Project conditions.
- Impacts to outfalls: Outfalls shall be assessed to ensure they do not increase local erosion; otherwise DB Contractor shall provide erosion and/or energy dissipation treatments to physically impacted outfalls.
- Floodplain storage impacts: The loss of effective floodplain storage volume shall be quantified and offset with compensatory storage for each outfall, consistent with federal requirements. See 23 CFR 650A Attachment 2 "Procedure for Coordinating Highway Encroachments of Floodplain with Federal Emergency Management Agency (FEMA).

- Other Impacts: The following impacts shall be assessed, and narrative description shall be provided: impacts to adjacent properties and the receiving stream and impacts to developed properties and structural improvements.

The design of 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. DB Contractor shall upgrade or replace any existing drainage components that are physically impacted by the Work and do not meet the hydraulic and structural capacity requirements as defined in this Item 20 and Item 21. 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 Item 21.

Modifications to existing drainage patterns should be minimized and shall not create adverse impacts to receiving outfalls and adjacent to properties. DB Contractor bears full responsibility for the Final Design and its effects on property owners outside the Project ROW.

While coordinating design with TxDOT, DB Contractor shall ensure the Project is designed in a manner that does not require CLOMR and LOMR. DB Contractor shall submit to TxDOT calculations and documentation to demonstrate that the Project design does not warrant a CLOMR/LOMR. If a CLOMR/LOMR is found to be warranted, DB Contractor shall prepare the required documentation, perform the necessary calculations and design, and submit the information to FEMA for its approval of a CLOMR/LOMR as described in Section 20.2.2. The local floodplain administrator(s) can be a source of valuable data and may have the knowledge of a CLOMR submitted to FEMA by others, or other changes to the area.

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

DB Contractor shall provide a drainage system that maintains or improves the existing drainage and meets the hydrologic and hydraulic design criteria specified in TxDOT *Hydraulic Design Manual* and this Item 20.

DB Contractor shall identify and delineate existing and proposed condition drainage areas that contribute to the highway drainage system and the estimated runoff used for design of the system. DB Contractor shall calculate the peak discharge for both existing and proposed conditions and determine water surface profiles for design and check flood per requirements in this Item 20.

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.

20.3.1 Hydrology

20.3.1.1 Design Frequencies

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

Table 20-1: Design Criteria Summary for Drainage Facilities

	Design Annual Exceedance Probability (AEP) (Design Annual Recurrence Interval (ARI))				
Functional classification and structure type	50% (2-yr)	20% (5-yr)	10% (10-yr)	4% (25-yr)	2% (50-yr)
Freeways (main lanes):					
Culverts					X
Bridges[1]					X
Principal arterials:					
Culverts				X	
Small bridges[1]				X	

Major river crossings+					X
Minor arterials and collectors (including frontage roads):					
Culverts			X		
Small bridges[1]				X	
Major river crossings[1]					X
Local roads and streets: [2]					
Culverts			X		
Small bridges[1]			X		
Storm drain systems on Freeways (main lanes, elevated lanes and ramps): [4]					
Inlets, drain conduit, and roadside ditches			X		
Inlets, drain conduit for depressed roadways[3]					X
Storm drain systems on other highways and frontage roads:[4]					
Inlets, drain conduit, and roadside ditches			X		
Inlets, drain conduit for depressed roadways[3]					X

Table 20-1 notes:

All facilities, including storm drain systems, must be evaluated for the 1% AEP (100-yr) flood event as a check flood. The purpose of the check flood evaluation is to ensure the safety of the drainage structure and off-site (outside Project ROW) 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-, 50-, and 100-year storm events to ensure no adverse impacts.

Major river crossings, bridges, culverts, and storm drain systems shall be designed for the frequency corresponding to the roadway classification shown above. The functional classification for each roadway is shown in Item 19.

For structures extending underneath both main lanes and frontage roads the structure shall be designed to the main lane design AEP.

Structures and roadways should be serviceable (not inundated) up to the design standard.

[1] Calculate the 4% (25-yr), 2% (50-yr), 0.5% (200-yr), or 0.2% (500-yr) AEP as necessary for scour analysis. See the TxDOT Geotechnical Manual for required scour calculations.

[2] 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).

[3] A roadway in a sag vertical curve is classified as 'depressed' where no overland drainage route is available, even when flood levels exceed the curb height or highest pavement surface within the sag. Not applicable to elevated lanes.

[4] The design frequency storm applied to design of storm drain systems is for non-pressure/gravity conduit flow (i.e., the stated design frequency is NOT for pressure flow computations), unless approved by TxDOT.

20.3.1.2 **Hydrologic Analysis**

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

DB Contractor shall follow Chapter 4 of the TxDOT Hydraulic Design Manual in developing runoff calculations, including, but not limited to, its policies and standards, study requirements, and method selection and application.

DB Contractor shall obtain and use design rainfall data sourced from National Oceanic and Atmospheric Administration (NOAA) Atlas 14. Exceptions must be approved by the District Hydraulic Engineer (DHE) or Design Division Hydraulics and Hydrology Section Director (DES HYD) and noted on applicable plans or Drainage Design Report. DB Contractor shall use the following criteria in developing rational method runoff calculations:

- Run-off Coefficients:
  - Pavement (Asphalt) = 0.95
  - Pavement (Concrete) = 0.95
  - Unpaved areas within the Project ROW
    - Grass = 0.35
    - Other = 0.70
  - For areas outside the Project ROW, use the methods in Chapter 4 of the TxDOT *Hydraulic Design Manual* for calculating the Run-off Coefficients
- Minimum Time of Concentration, Tc = 10 minutes; Note: Actual Tc should be used in the modeling programs, and the user should allow the program to default to the minimum Tc to allow for correct rational method computations and sizing.

20.3.2 **Hydraulic Analysis and Design**

DB Contractor shall use available hydraulic models which best represent pre-Project conditions as design base models. For areas mapped as FEMA Special Flood Hazard Area (SFHA), DB Contractor shall comply with TxDOT *Hydraulic Design Manual* procedures, including coordination with the local floodplain administrator(s) and use of FEMA effective models to develop corrected effective, existing, and proposed (post-Project) models. DB Contractor shall coordinate with designers of any adjacent developments that are pursuing a LOMR which would revise FEMA effective models affecting the Project.

DB Contractor shall design cross structures (culverts and bridges) in accordance with the TxDOT *Hydraulic Design Manual.* Existing cross-culvert drainage structures that are physically impacted by the Work shall 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 design main lanes and shoulders such that each is above the WSEL of the design year flood.

DB Contractor shall examine water surface elevations to ensure 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 the Project ROW and drainage easements.

20.3.2.1 **Storm Drainage Systems**

Where precluded from handling runoff with ditches 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 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 shall be conveyed in accordance with applicable Laws and permits.

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

DB Contractor shall place access holes (manholes) or combination access holes and inlets to current design standards. Refer to Chapter 10 of the TxDOT *Hydraulic Design Manual* for access hole spacing criteria.

The use of “T” connections and “Y” connections in storm sewer systems is not permitted unless approved in writing by TxDOT, except as described in Section 20.3.2.1.2.

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

The use of slotted drains will not be allowed unless approved by TxDOT. Existing slotted and trench drains may remain if not impacted by the Work.

The use of slotted barriers is allowed 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 unless approved by TxDOT.

Refer to Section 21.2.8 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.

20.3.2.1.1 Inlets

20.3.2.1.1.1 Inlet Design Criteria

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

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.

Table 20-2: Inlet Design Criteria

Storm Drain Inlets	
Inlet Locations	▪ On-grade: Place inlets to keep gutter ponding less than or equal to maximums, as defined in Section 20.3.2.1.1.2. Maximum carryover is 1 cfs. ▪ Low points: Inlet shall be located at low point of vertical curve, not (necessarily) at PI station. Place flanking inlets both sides of low point at a maximum spacing of 100 feet from low point. ▪ Redundant inlets: Inlets shall be located at ends of curb returns at intersections. Redundant inlets are not required at residential and commercial driveways. ▪ 100% flow interception: On pavement at end of retaining walls, at ramp gores, and upgrade from intersections. ▪ Inlets shall be placed outside the travel lane pavement.

Design sag or low point inlets in pavement sections using the following criteria:

- Maximum ponding depth shall be a function of the allowable ponding width for the design frequency
- Area reduction factor = 0.5
- Perimeter reduction factor = 0.5 (for grate inlets)

Design drop inlets in ditches using the following criteria:

- Maximum ponding depth shall be a function of the minimum freeboard requirement described in Section 20.3.2.1.3
- Area Reduction Factor = 0.5

- Perimeter Reduction Factor = 0.5

20.3.2.1.1.2 Gutter Ponding

DB Contractor shall design drainage systems to limit ponding to the widths defined in Table 20-3 below for the design frequency event:

Table 20-3: 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 (with multiple lanes)	One travel lane width
Minor Cross Streets	One travel lane width

20.3.2.1.2 Conduits

Storm drain conduits shall be designed and constructed to sustain all external loads in accordance with Chapter 14 of the TxDOT *Hydraulic Design* Manual and shall have positive seals at the pipe joints.

All conduits shall be reinforced concrete pipe (RCP) or reinforced concrete box (RCB), except for retaining wall and bridge deck drain pipes.

On main lanes, ramps, frontage roads, driveways, and cross-streets, the minimum RCP size inside diameter shall be 24 inches and minimum RCB inside depth shall be three feet. If the system is connecting to an existing downstream system that is 18 inches, the minimum RCP size inside diameter may be 18 inches, however the downstream system shall be in good condition and of adequate size to convey the flow.

Storm drain conduit design will be non-pressure flow (i.e., gravity-flow system), with full flow conduit capacity ≥ design flow unless otherwise approved by TxDOT.

Other storm drain conduit design criteria includes:

- Conduit depth of cover: two feet minimum outside of pavement; six inches minimum (top of conduit to bottom of treated subgrade) if underneath pavement.
- Conduit slope: ≥0.50% desirable; 0.30% minimum.
- Conduit flow velocities: three fps minimum; 12 fps maximum.
- Conduit outfall velocity criteria: </= 6 fps desirable; If > 6 fps provide outfall protection. For existing velocities greater than 6 fps but not increased, DB Contractor shall check shear stress in accordance with the TxDOT *Hydraulic Design Manual* for outfall protection requirements, and provide outfall protection for physically impacted outfalls.

Storm drain conduit connections and joints criteria:

- Match soffit elevations at conduit size changes, if possible. Matching flowlines is acceptable if grade is limited.
- RCP lateral stub-in to RCB requires two inch minimum diameter to depth differential.
- RCP to RCP stub-in requires three inch minimum size differential.
- RCP lateral stub-in connections not meeting the above depth differentials can utilize a concrete collar or special detail of the connection.
- Other conduit connections require inlet, manhole, or junction box.
- Bends acceptable up to 30° angle.
- “T” connections may be used for lateral stub-ins only.

For any existing storm drain conduits considered for expansion, extension, modification, or reuse, DB Contractor shall investigate and verify structural integrity and suitability of use per current design loading standards, and submit a report, as part of the Drainage Design Report, summarizing the findings for TxDOT

review and approval. Conduit liners are not allowed, such as plastic or Kevlar liners, that reduce internal friction to increase the capacity or increase the longevity of the culvert.

20.3.2.1.3 Ditches

DB Contractor shall be responsible for the design of normal and special ditch sections, as needed. When necessary, ditch linings shall be designed by DB Contractor according to FHWA HEC-15 and the TxDOT *Hydraulic Design Manual*. Ditches shall be designed to minimize erosion and sedimentation.

DB Contractor shall use the following drainage ditch design criteria:

Ditches between roadways:

- Design ARI = ten year
- Flat-Bottom Ditch = six-foot bottom width, 4:1 side slopes
- V-Ditch = 6:1 side slopes
- Minimum ditch slope = 0.25% concrete-lined, 0.5% grass-lined

Ditches next to ROW line:

- Design ARI = ten year
- Flat Bottom Ditch = six-foot bottom width, 4:1 side slopes
- V-Ditch = 6:1 side slopes
- Minimum Ditch Slope = 0.25% concrete-lined, 0.5% grass-lined

In constrained locations where the drainage ditch design criteria are too restrictive to accommodate the proposed design, DB Contractor may submit a proposal to use an alternate ditch geometry at the constrained location to TxDOT for approval. DB Contractor shall include in each proposal the location, a description of the constrained conditions and reasons for initiating the request for consideration by TxDOT of alternate ditch geometry at that location, and the proposed ditch configuration.

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.

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

Roadside ditch restrictors are allowed only at ditch outfall locations and only as needed for rate control to mitigate increased run-off from the Project and avoid any adverse impacts.

Minimum 0.5 feet of freeboard shall be provided to the top of ditch.

20.3.2.2 **Culverts**

DB Contractor shall analyze existing and proposed culverts physically impacted, replaced, or created by the Project, for any localized flooding. The culvert hydraulic analysis shall include an investigation of field conditions and survey data to develop hydraulic models to: evaluate WSELs, velocities and floodplain boundaries. DB Contractor shall coordinate with the local floodplain administrator and FEMA to ensure compliance with applicable floodplain requirements as described in Section 20.2.2.

Where culvert design is influenced by upstream storage, the analysis of the storage shall be incorporated into the hydrologic analysis and hydraulic design of the culvert.

DB Contractor shall use the following criteria for culvert design:

- Allowable headwater:
  - The Design AEP headwater elevation shall be no higher than the top of the treated subgrade, at the lowest roadway elevation within the area served by the culvert.
- Culvert outlet velocity: Culverts shall be designed to maintain a minimum outlet velocity of three feet per second. Culverts shall be designed to achieve a maximum outlet velocity of 8 feet per second in the culvert.

- DB Contractor shall submit concepts for velocity-reducing approaches for TxDOT approval prior to the submission of the first relevant design submittal package. DB Contractor may request Deviations in accordance with Section 4.1.2.2.4 of the General Conditions during final design if velocity-reducing approaches are not required.

- Minimum culvert dimension: The minimum box culvert inside height dimension for all proposed box culverts shall be three feet. Existing box culverts that have inside height dimensions of less than three feet but that meet all other hydraulic requirements may be extended at their existing height. The minimum RCP culvert inside diameter shall be 24 inches.

For existing culvert crossings physically impacted by the Work, DB Contractor shall analyze the existing structure using the proposed flows to ensure upstream WSEL does not exceed allowable headwater elevation, as defined in this Section 20.3.2.2. If the proposed flows at an existing structure do exceed the allowable headwater elevation, DB Contractor shall design and construct a replacement structure with sufficient capacity to pass the required design frequency flows. DB Contractor shall ensure the maximum headwater elevations for the Design AEP and 1% AEP events do not exceed the corresponding allowable headwater.

For any existing culverts considered for expansion, extension, modification, or reuse, DB Contractor shall investigate and verify culvert structural integrity and suitability of use per current design loading standards and submit a report, as part of the Drainage Design Report, summarizing the findings for TxDOT review and approval. Structural analysis and design requirements for existing bridge class culverts are described in Item 21. Conduit liners are not allowed, such as plastic or Kevlar liners that reduce internal friction to increase the capacity or increase the longevity of the culvert.

Bridge class culverts hydraulic analysis shall be performed using HEC-RAS. Other culverts may be analyzed and designed using HY8, HEC-RAS, or other modeling tool approved by TxDOT. DB Contractor shall analyze and design any culvert located in a FEMA-studied floodplain using HEC-RAS.

20.3.2.3 **Bridges**

All bridge hydraulic computations, designs, and recommendations shall be consistent with previous studies and projects in the area by the USACE and other State or federal agency studies and projects and use the available hydraulic models most representative of pre-Project conditions as base models for design of the Project.

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

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, unless the reduced bridge length is outside 100-year floodplain limits of the waterway, and/or unless approved by TxDOT. New bridges spanning a waterway shall not result in a narrowing of the existing channel.

DB Contractor shall design abutment protection in accordance with the procedures outlined in FHWA HEC-23. For bridge abutments in urban areas, DB Contractor shall install protection in accordance with the Project's aesthetic plan.

20.3.2.3.1 **Bridge Deck Drainage Systems**

DB Contractor shall design bridge deck drainage systems in accordance with Chapter 9 of the TxDOT *Hydraulic Design Manual.* Pavement drainage flowing toward the bridge shall be intercepted upgrade from the approach slab.

Controlled free fall drainage through open deck drains or slotted rail is preferred if drainage does not fall onto roadways, pedestrian facilities, waterways, or railroad ROW.

If a closed bridge deck drainage system is required, DB Contractor shall ensure the system is in compliance with the following requirements:

- Bridge deck inlet locations shall provide gutter drainage meeting allowable ponding requirements in this Item 20 and as presented in Table 20-3.
- Use PVC pipe for bridge deck drain pipe assemblies and downspouts, and subsurface connections to RCP or RCB storm drain conduits. Subsurface PVC pipe connections shall be 12" minimum diameter and shall include cleanouts at ground level. Deck drain pipes shall be 8" minimum diameter.
- The use of "Y" connections is allowed for pipe drain connections for bridge deck drainage.
- Promote minimal maintenance intervention and ease of cleanout.
- Have long-term durability considering corrosion, ultraviolet exposure, and thermal effects.
- Be hidden from direct view where possible for aesthetics.
- Promote sufficient water velocities to be self-cleaning and avoid debris accumulation.
- Outlet at the bottom of the substructure either into a storm drain system or into a ditch with erosion protection at the outlet. In no case shall storm water be discharged against any part of the structure.
- Runoff from bridge deck drainage shall be treated as required by TCEQ and other applicable regulation prior to discharge to the natural waters of the State.

20.3.2.3.2 **Bridge Scour**

DB Contractor shall conduct scour evaluations in accordance with the TxDOT *Scour Evaluation Guide* and TxDOT *Geotechnical Manual*. Detailed scour evaluations for span bridges must consider the scour design flood frequency and scour design check flood frequency. If both of these frequencies result in overtopping, DB Contractor shall also consider the flood frequency associated with incipient overtopping. The governing flood frequency for scour is that which results in the most severe calculated scour depths at the bridge opening. If necessary, DB Contractor shall provide countermeasures for any instability and scour problems in accordance with FHWA HEC-23 – *Bridge and Scour and Stream Instability Countermeasures Experience Selection and Design Guidance* and Good Industry Practice. DB Contractor shall design scour countermeasures for the governing flood frequency for scour or the 100-year flood, whichever event is less extreme.

20.3.3 **Stormwater Quantity Mitigation and Quality Management**

20.3.3.1 **Stormwater Storage Facilities (SWSF)**

DB Contractor shall complete design of the SWSF to meet requirements for water quantity, and flow rate control, as set forth in the Design-Build Specifications. Types of SWSF include detention or retention ponds, basins, and any other facilities employed to detain or retain storm water.

An analysis was performed to determine preliminary mitigation needs for the number and sizing of SWSF to mitigate for anticipated impacts. The results are reported in the hydrologic and hydraulic (H&H) Report contained in the Reference Information Documents (RIDs).

DB Contractor shall be responsible for determining the size, number and locations of SWSF.

DB Contractor shall perform analyses including a hydrologic routing analysis within hydrologic computer models such as stormwater management model (SWMM) and/or HEC-HMS as the basis for SWSF design.

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.

DB Contractor shall mitigate the increase in runoff volumes due to the increase in impervious cover between existing and proposed conditions. The increase may be mitigated by adding storage volume in ponds, roadside ditches and underground storage facilities, including in-line detention facilities. DB Contractor is permitted to use restrictor pipes for in-line detention facilities. In-line detention facilities that are also used for conveyance conduits are subject to storm drain conduit requirements in Section 20.3.2.1.2. The use of restrictor plates is not permitted. Notwithstanding the inclusion of over-sized storm drains as in-line detention,

other use of underground SWSF for mitigation of adverse impacts is prohibited, unless approved by TxDOT. Roadside ditches that are used as SWSF are not required to meet the minimum roadside ditch grade requirements in Section 20.3.2.1.3.

20.3.3.1.1 Design Criteria

DB Contractor shall analyze and identify SWSF locations and all applicable SWSF information and coordinate these with TxDOT. DB Contractor shall develop SWSF designs that manage Project storm water in accordance with applicable State and federal regulations.

DB Contractor shall design and construct the SWSF inlets to be above the vertical limits of the sediment dead storage volume. DB Contractor shall design and construct SWSF to prevent bypassing and discharge of floating debris (e.g., skimmer baffle).

The maximum outflow rate shall be limited to no more than the existing peak inflow for the same AEP.

SWSF side slopes shall not be steeper than 4(H):1(V), and depth shall not exceed 15 ft. In addition, DB Contractor shall comply with the rules contained in the Aggregate Quarry and Pit Safety Act.

A minimum of two feet of vertical freeboard shall be provided on SWSF and shall be measured from the 1% AEP WSEL to the lowest top of the basin bank. All SWSF shall have an overflow spillway sized to convey events for and/or in excess of the 1% AEP.

DB Contractor shall include all inlet and outlet details, overflow spillway designs, and other appurtenances in the design. Design shall address safety and measures to secure access to SWSF. Once required storage is estimated and facility shape is determined, DB Contractor shall develop an inflow hydrograph, a stage vs. storage curve, and a stage vs. discharge curve (i.e., performance curve), as part of preliminary design computations.

Design Criteria for Detention & Retention Facilities:

- Design criteria for retention facilities are the same as those for detention facilities. The design frequency, and rainfall data shall be consistent with TxDOT standards.
- Retention facilities, typically designed to provide the dual functions of stormwater quantity and quality control, may exist as impoundments, collection and conveyance facilities (swales or perforated conduits), and on-site facilities such as parking lots and roadways using pervious pavements.
- The size, shape, and depth must provide sufficient volume to satisfy the Project storage requirements. The bottom shall be designed with a low flow channel.
- Wet-bottom retention pond facilities must provide sufficient depth and volume below the normal pool level consistent with any multiple use activity included in the Project.

Maintenance and Accessibility:

- Every effort shall be made to minimize the amount and frequency of regular maintenance at the SWSF. All efforts shall be made to eliminate the need for emergency or extraordinary maintenance.
- In order for proper maintenance to be performed, SWSF components shall be accessible to both maintenance personnel and their equipment and materials.

20.3.3.1.2 Regulatory Requirements and Documentation

DB Contractor shall perform flood routing analyses and submit calculations in the Drainage Design Report prepared in accordance with Section 20.4 to TxDOT and applicable reviewing authorities.

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

DB Contractor shall include a graphic showing the drainage areas from which flow outfalls to SWSF and may receive treatment. DB Contractor shall provide design calculations to TxDOT. The display must also show drainage areas from which flow is not treated, if applicable.

20.4 Submittal Requirements

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 design files shall include the following:

- Hydrologic analysis computations and supporting data,
- Hydraulic analysis computations and supporting data,
- Input and output data from design and modeling software including but not limited to SWMM, HEC_HMS, HEC-RAS, or HY-8 models, and
- Drainage area maps, drainage structure layouts, and drainage reports.

The native files for the models and analysis should represent the record set submitted.

20.4.1 Drainage Design Report

DB Contractor shall submit a preliminary Drainage Design Report with the Preliminary Design Submittal. The preliminary Drainage Design Report shall include at a minimum:

- Detailed table of contents and narrative of design approach and methodology;
- 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., HEC-RAS – PRJ, Project files for HEC-HMS and HEC-RAS). 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 drainage design report;
- Stream crossing drainage report;
- 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;
- Documentation that DB Contractor has obtained appropriate drainage easements;
- Correspondence files including but not limited to:
  - Meeting minutes pertaining to drainage and floodplain; and
  - Documentation of coordination with the local floodplain administrator and Governmental Entities, as applicable, pertaining to drainage and drainage studies;
- Drainage system data (location, type, material, size, and other pertinent information) in an GIS data format for the existing system to remain in place and the proposed system constructed in conjunction with this Project; and
- Exhibits demonstrating the compatibility of the drainage design with the future expansion configurations as depicted in the RID entitled "I-35 NEX Cross Street Exhibit" and the Ultimate Project Configuration.

Prior to construction of any drainage element, DB Contractor shall submit a final Drainage Design Report to TxDOT. The final Drainage Design Report shall address preliminary Drainage Design Report review comments provided by TxDOT.

As part of the Record Documents, DB Contractor shall submit a supplement to the final Drainage Design Report to TxDOT, which shall be a complete documentation of all components of the Project's drainage system, including photos of the constructed drainage elements. The supplement to the final Drainage Design Report shall document all changes to the drainage design made during construction.

20.4.2 **Storm Drainage Design Report**

DB Contractor shall prepare a storm drainage design report, signed and sealed by a PE, encompassing all storm drain systems that contains, at a minimum, the following items:

- Detailed table of contents and narrative of design approach and methodology;
- Drainage area maps for each storm drain inlet with pertinent data, such as boundaries of the drainage area, best available topographic contours (including source and resolution of data), time of concentration values, soil types, and land use descriptions, design runoff coefficients (i.e., C), and/or design curve number (CN), and computed discharges for design and check flood storm events;
- Storm drain inlet and conduit hydraulic design data including, but not limited to design runoff, inlet and conduit sizes, types, and capacities, inlet carryover, velocity, allowable design and gutter ponding, and hydraulic grade line data;
- Tabulation of all existing and proposed conduit and drainage structures, including location, size, class and gauge, detailed structure designs, and all special designs;
- Specifications for the conduit bedding material and structural backfill on all proposed conduits and conduit alternates, or reference to applicable TxDOT Standard Construction Specifications;
- Complete conduit profiles, including conduit size, type, and gradient; station offsets from the controlling alignment of the roadway; length of conduit; class/gauge of RCP; TxDOT Standard Reference for RCP; and numbered drainage structures with station/offset location and elevations; and
- Ditch design data and hydraulic design supporting calculations.

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

20.4.3 **Stream Crossings Drainage Report**

DB Contractor shall prepare a drainage report containing hydrology and hydraulic design data for each stream crossing. Major stream crossings are defined as those crossings over waterways listed as a FEMA SFHA or requiring a bridge or bridge class structure. Any other waterway crossing will be a minor stream crossing.

The report shall include detailed calculations, electronic and printed copies of the computer software input and output files, a discussion about hydrologic and hydraulic analysis, description of adverse impacts and mitigation, summary of conclusions, and reasons for the design recommendations. The report shall follow the hydraulic report documentation guidelines referenced and outlined in Chapter 3 of the TxDOT *Hydraulic Design Manual*. At a minimum, the stream crossings drainage report shall include:

- Detailed table of contents and narrative of design approach and methodology;
- Description of existing and proposed conditions;
- Description of FEMA SFHA
  - Floodplain map displaying floodway width, federal insurance rate map (FIRMette), and LOMR;
  - FEMA flood insurance study (FIS);
  - Discussion of SFHA and implications; and
  - Documentation of coordination with the local floodplain administrator.
- Hydrology
  - Drainage area maps with watershed characteristics/parameterization including topography (including source and resolution of data), both hardcopy and electronic (computer aided drafting and design (CADD), GIS, etc.) format;
  - Hydrologic calculations, including discharge (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

- Photos of the waterway opening and/or structure (pre-Project);
- General plan, profile, and elevation of proposed waterway opening and/or structure;
- Water surface profiles and velocity data;
- Calculations – hardcopy and electronic input and output files for computer models used for analysis, and summary of modeling results;
- Cross-sections of waterway; and
- Channel profiles.

- Scour Evaluation
  - Identification of non-erodible channel materials, if present (refer to Chapter 3 of the TxDOT Scour Evaluation Guide). If the foundations are adequately protected by non-erodible channel materials (refer to Chapter 6 of the TxDOT Scour Evaluation Guide), the DB Contractor may elect to use the TxDOT Form 538 - Scour Vulnerability Screening in lieu of a detailed scour evaluation;
  - Channel cross-sections at the upstream face of bridge and upstream of the contraction zone leading to the bridge, each showing demarcation of overbank areas, ineffective flood areas, roughness coefficients, and WSELs;
  - Identification of method(s) and equation(s) used for calculating scour depths, detailed calculations, clearly stated assumptions, and justification for all assumptions;
  - Table summarizing calculated contraction and pier scour depths for each flood frequency considered;
  - Channel cross-section at bridge showing calculated scour envelope and/or a table summarizing calculated contraction and pier scour depths (only for the governing flood frequency for scour) for each abutment and bent;
  - Completed of Scour Summary Sheet (TxDOT Form 2605 for span bridges; TxDOT Form 2606 for culverts). It is permissible to assume zero observed scour for the as-built condition;
  - Discussion of review of long-term degradation/aggradation and effects;
  - Recommendation for abutment protection (refer to Chapter 10 of the TxDOT *Scour Evaluation Guide)*; and
  - Recommendations for pier protection and/or channel protection, if warranted.

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

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 Record Documents.

20.5 Construction Requirements

DB Contractor shall design drainage to accommodate construction staging. The design shall include temporary erosion control measures and other Best Management Practices (BMPs) needed to satisfy National Pollutant Discharge Elimination System (NPDES) and other regulatory requirements. DB Contractor shall conduct all Work necessary to meet the requirements for this Item 20 and the TxDOT Standard Specifications.

20.5.1 Temporary Drainage

DB Contractor shall provide all temporary drainage facilities during construction. The plans shall include a description of the drainage design for each phase and stage of construction, including temporary drainage elements.

DB Contractor shall maintain positive drainage, ensure all roadways comply with the allowable ponding width requirements in Table 20-3 and maintain all travel lanes free of sediment, debris and ponding water for each phase or stage of construction. Temporary drainage facilities shall not cause any increase in flood level or flooding potential to existing roadways within Project ROW or to properties outside Project ROW.

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
Existing and preliminary proposed conditions drainage models	Prior to submittal of the first Preliminary Design Submittal package	Review and comment	20.1
Inventory, condition assessment, recommendations regarding replacement or rehabilitation of existing drainage facilities, including CCTV video and visual assessment of the structural integrity of every storm drain conduit, parallel drain culverts, cross-culverts, and bridge class culvert structures	No later than 60 days prior to NTP2	Review and comment	20.2.1
All native design files used in the hydrologic and hydraulic analyses to prepare computations and plans	Upon request	Review and comment	20.4
Structural integrity and suitability report for any existing storm-drain conduits considered for expansion, extension, modification, or reuse	As part of the preliminary Drainage Design Report	Approval	20.3.2.1.2
Structural integrity and suitability report for any existing culverts considered for expansion, extension, modification, or reuse	As part of the preliminary Drainage Design Report	Approval	20.3.2.2
Calculations of flood routing analyses	As part of the Preliminary Design Submittal	Approval	20.3.3.1.2
Preliminary Drainage Design Report	As part of the Preliminary Design Submittal	Review and comment	20.4.1
Final Drainage Design Report, including supporting calculations	Prior to construction of any drainage element	Review and comment	20.4.1
Supplement to the final Drainage Design Report	As part of Record Documents	Review and comment	20.4.1
Hydraulic summary sheets and bridge scour data sheets and forms with projected scour calculation summaries for every bridge crossing a waterway	As part of the Record Documents	Review and comment	20.4.3

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, American Association of State Highway and Transportation Officials (AASHTO) *Load and Resistance Factor Design (LRFD) Bridge Design Specifications* except where directed otherwise by the TxDOT *Bridge Design Manual – LRFD*, TxDOT *Geotechnical Manual,* TxDOT *Bridge Project Development Manual*, TxDOT *Bridge Design Guide*, TxDOT *Bridge Detailing Guide,* TxDOT *Structure Design - Corrosion Protection Guide* and TxDOT bridge design policy and information listed at http://www.txdot.gov/inside-txdot/division/bridge.html.

Design-Build (DB) Contractor shall design bridges, retaining walls, Noise Barriers, and sign structures in conformance with the approved aesthetic schemes, requirements, and standards as identified in Item 23.

Throughout the Term, DB Contractor shall allow access to TxDOT and TxDOT contracted 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 or rehabilitated bridge to traffic to allow for the initial NBIS inspection by TxDOT or TxDOT contractors.

21.1.1 **Lead Structural Engineer**

DB Contractor shall provide a Lead Structural Engineer, who is employed by the DB Contractor, Lead Engineering Firm, or a firm contracted to the Lead Engineering Firm, and who is 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 Licensed Professional Engineer (PE) responsible for coordination of interdisciplinary design reviews in cooperation with leaders of other disciplines. The Lead Structural Engineer or a PE under the direct supervision of 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 Contract Documents) for new Project bridges, walls, culverts and miscellaneous structures. A durable structure shall achieve both a 75-year design life and 75-year service life for Project bridges, retaining walls, Noise Barriers, 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.

The Complex Structures Criteria Report described in Section 21.2.1.1 shall be a separate report from the Corridor Structure Type Study and Report.

Bridges crossing over the Project shall, at a minimum, be designed to accommodate the future expansion configurations as depicted in the Reference Information Documents (RID) entitled, "I-35 NEX Cross Street Exhibit" 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 future lanes that will be constructed below the structure.

21.2.1 **Complex Structures**

DB Contractor shall provide Submittals as described in Section 21.2.1.1 for structures defined as Complex Structures in accordance with Section 1.2.2 of the General Conditions.

The following structures shall be considered Complex Structures:

- [List of structures considered to be Complex Structures for this Project will be updated prior to contract execution based on Alternative Technical Concepts submitted by Proposers or elements contained within the Proposal. Designation as a Complex Structure is at the discretion of TxDOT.]

21.2.1.1 **Complex Structures Submittals**

DB Contractor shall submit the following Submittals for Complex Structures:

- Draft of Complex Structures Criteria Report shall be provided a minimum of three Business Days in advance of the initial Complex Structures workshop in accordance with Section 21.2.1.2. DB Contractor shall utilize the workshop to demonstrate progress and content of the Complex Structures Criteria Report in advance of submittal to TxDOT.

- Complex Structures Criteria Report that describes design methods, analytical approaches, and tolerances including but not limited to loads, geometrics, fabrication, and erection, includes a list of software and design tools to be used for each member and model, and provides sufficient details to analyze DB Contractor's design. DB Contractor shall list all applicable AASHTO, TxDOT, and FHWA references to be used. DB Contractor may propose other written references backed by research for implementation for TxDOT approval, in its sole discretion. DB Contractor shall submit the Complex Structures Criteria Report for approval. DB Contractor shall not submit the Preliminary Design Submittal for the Complex Structures until the Complex Structures Criteria Report has been approved by TxDOT. Preliminary Design Submittals for Complex Structures may be submitted separately from Preliminary Design Submittals for other Elements of the Project.

- Complex Structures Modeling Data that includes complete inputs of structure geometry, section properties, member sizes, plate thicknesses, material properties, joint coordinates, boundary conditions, eccentricities, and erection sequence, and provides sufficient details to analyze DB Contractor's structural model for the Complex Structures Plans. Complex Structures Modeling Data shall be submitted to TxDOT for review and comment prior to submitting the Complex Structures Plans. DB Contractor shall provide data and sketches in spreadsheets, pdf, or other formats mutually agreed upon by TxDOT and DB Contractor. If TxDOT determines data and sketches are insufficient for TxDOT to prepare a Complex Structures analytical model, DB Contractor shall submit additional information requested by TxDOT.

- Complex Structures Plans that include complete construction and erection plans with specifications and an erection manual conforming to the Complex Structures Criteria Report, Contract Documents, Governmental Approvals, Law, and in accordance with the PSQMP. Complex Structures Plans for separate Complex Structures shall be submitted a minimum of 30 days apart. Complex Structures Plans shall be subject to TxDOT approval. TxDOT will respond to each complete Complex Structures Plans submittal by the later of (i) 60 days after submitting the Complex Structures Plans or (ii) 90 days after the Submittal of the Complex Structures Modeling Data. [Durations shown to be updated based on final list of Complex Structures included in Section 21.2.1.] DB Contractor shall not incorporate Complex Structures Plans into Final Design Submittals until approval of the Complex Structures Plans. Final Design Submittals for Complex Structures may be submitted separately from Final Design Submittals for other Elements of the Project.

21.2.1.2 **Complex Structures Workshops**

DB Contractor shall conduct an initial Complex Structures workshop a minimum of ten Business Days before submission of the Complex Structures Criteria Report. DB Contractor shall submit a draft of Complex Structures Criteria Report and an agenda a minimum of three Business Days in advance of the initial workshop.

DB Contractor shall continue to conduct Complex Structures workshops at least monthly until approval of all Complex Structures Plans. DB Contractor shall present structural responses, loads, erection sequences, progression of models, comparative parameters, progressed work products, and other key structural design elements. TxDOT may request other pertinent information that TxDOT deems appropriate which may include DB Contractor progressed design products in accordance with the Complex Structures Criteria Report, clarification of Complex Structures Modeling Data, and clarification of content provided within Complex Structures Plans. DB Contractor shall prepare an agenda for each workshop at least three Business Days in advance of workshop and incorporate content requested by TxDOT.

21.2.2 **National Bridge Inventory (NBI) Reporting Procedures**

Upon completion of the bridge layout during the design phase, DB Contractor shall coordinate with the appropriate TxDOT District Bridge Engineer or Bridge Inspection Coordinator 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 bridges and bridge class culverts consistent with the TxDOT San Antonio District Standard Sheet "Bridge NBI Number Stencil". DB Contractor shall also stencil bent numbers on all bridges with four or more spans. The NBI numbers and bent numbers shall be placed at locations as directed by TxDOT.

21.2.3 **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 https://www.txdot.gov/business/resources/highway/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.

Bridge widths shall meet the typical sections shown on the Schematic Design. Bridge span lengths shall span the typical section widths of the roadways below including appropriate horizontal 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*. DB Contractor shall design bridge units without uplift at supports under all load conditions.

Corrosion protection measures shall be in accordance with TxDOT Bridge Division and the respective District's practices. Specific corrosion protection measures can be found at https://www.txdot.gov/business/resources/highway/bridge.html and District-specific requirements can be found in the TxDOT *Structure Design - Corrosion Protection Guide*.

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.

Segmental bridges shall not be permitted.

Falsework, shoring, and other temporary supports shall be designed in accordance with the AASHTO *Guide Design Specifications for Bridge Temporary Works.*

Compliance with the requirements of National Fire Protection Association (NFPA) 502 – *Standard for Road Tunnels, Bridges, and Other Limited Access Highways* is not required for this project.

DB Contractor shall ensure that bridges crossing over waterways shall meet the structural load and resistance requirements for a 100-year frequency event as required by the AASHTO *LRFD Bridge Design Specifications* and design for flood scour in accordance with the TxDOT *Geotechnical Manual*, Chapter 5, Section 6. DB Contractor shall ensure all requirements of FHWA hydraulic engineering circulars (HECs*)* are met for bridge structures.

Unless otherwise directed, DB Contractor shall ensure at least two feet of clearance between the design-year frequency water surface elevation described in Item 20 and the low chord of bridges crossing over waterways. Hydraulic design shall be in accordance with Item 20.

At TxDOT's request during design and construction, all electronic and paper copies of files and design calculations shall be made available no later than the start of construction of Elements related to the request. All files and calculations (bridge design notes) shall be submitted with the Record Documents in accordance with Bridge Division's Procedure for Archiving Bridge Design Notes in Chapter 6 of the TxDOT *Bridge Design Manual - LRFD* and other requirements of the Design-Build Agreement (DBA). DB Contractor shall submit load rating calculation including input and output files for all new or widened bridges and all new or widened bridge class culverts.

Sidewalks, bicycle lanes, and shared use paths 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*.

Fracture critical members shall not be permitted.

DB Contractor shall embed all conduits within the structure. DB Contractor shall not embed conduit 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. Rigid metal conduits hung between girders and only visible from a location under a bridge are not considered to be exposed.

DB Contractor shall provide two three-inch conduits embedded within the bridge structure, bent cap and column, at or closest to overhead sign bridges mounted on the elevated lanes for future ITS infrastructure connectivity. The conduit shall begin at the outside edge of the top of the bent cap and terminate at a Type A ground box placed adjacent to the column, with the top of the ground box at proposed finished grade.

21.2.4 Bridge Design Live Loads and Load Ratings

All roadway bridges, pedestrian bridges, and bridge class culverts shall be designed to accommodate the following live loads:

- New Construction: Design load designated HL-93 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 and Bridge Class Culverts: Load rating with an operating rating factor of 1.0 for all Texas and Federal legal loads. Structures failing to meet this standard shall be rehabilitated to an operating rating factor of 1.0 for all Texas and Federal legal loads or replaced using LRFD design and HL-93 loading.
- Existing Bridge Widenings: HL-93 as described in the TxDOT *Bridge Design Manual - LRFD* for widening and an operating rating factor of 1.0 for all Texas and Federal legal loads for existing portion. Designate both existing and widening loading on bridge layouts. Existing structures with load rating exceeding operating rating factor of 1.0 for all Texas and Federal legal loads shall not have their existing load rating reduced in the process of widening.
- Pedestrian Bridges: Load 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.

For load rating, legal loads shall meet the requirements of 23 CFR 658.17, Texas Transportation Code §621.101, the AASHTO *Manual for Bridge Evaluation* and the TxDOT *Bridge Inspection Manual*.

21.2.5 **Bridge Decks and Superstructures**

The type of bridge substructure and superstructure shall be restricted to those identified within the TxDOT *Bridge Design Manual – LRFD*. DB Contractor shall not use non-standard elements such as, but not limited to, non-standard modified prestressed girders with extended top flanges for elimination of overhang formwork. For bridge superstructures with I-girders, the minimum number of girders in any roadway width is four if the span is over a lower roadway and the vertical clearance is less than 20 feet. Otherwise, a minimum of three I-girders per span may be used.

Joints shall be in compliance with the TxDOT Engineering Standard Sheets. All grade separation, main lane, ramp, and direct connector bridges shall use TxDOT Engineering Standard Sheet SEJ-M for joints on concrete beam superstructures. Modular joints shall not be used without TxDOT approval. DB Contractor shall minimize the number of bridge deck joints subject to a maximum deck unit length of 500 feet for concrete superstructure units. DB Contractor shall evaluate the applicability of all TxDOT Engineering Standard Sheets as necessary to accommodate larger spacing between joints and other design considerations necessary for those longer units. DB Contractor shall locate joints to provide for maintenance accessibility and future replacement.

DB Contractor shall provide reinforcing steel in accordance with TxDOT provisions for 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 by walkways, ladders, or under-bridge inspection trucks.

Steel tub girders shall meet the guidelines in the TxDOT *Preferred Practices for Steel Bridge Design, Fabrication, and Erection*. Twin steel tub girders shall meet the system redundancy requirements in Chapter 3 Section 17 of the TxDOT *Bridge Design Manual*.

21.2.6 **Bridge Substructure and Foundation**

Integral abutments, where the superstructure is structurally framed (either completely or partially) into the abutment, shall not be used unless approved by TxDOT. Mechanically stabilized earth (MSE) walls shall not serve as structural foundations for bridges on the Project and shall not be subjected to vertical loads from the bridges. Bridge approach slabs 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 and turn lanes on the Project and proposed future expansion configurations as depicted in the RIDs entitled, “I-35 NEX Cross Street Exhibit”. 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:

  $S_{tr},col = \underline{(n_{tr}) \times (A_{tr}) \times (f_{ytr}) \times (l_s)}$

(A_{Tl}) x (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 shall construct mono-shaft foundations in accordance with Item 416 of the TxDOT Standard Specifications, with the following additional requirements and modifications:

- DB Contractor shall suspend drilled shaft reinforcement in place until concrete has achieved 2,500 psi compressive strength or at TxDOT's sole discretion 24 hours after completion of drilled shaft pour. DB Contractor may support drilled shaft reinforcement at shaft tip elevation only when drilled shaft is founded in rock.
- DB Contractor shall extend the steel reinforcement cage to the bottom of the shaft for drilled shafts that are lengthened more than 15% from the drilled shaft length shown in the Plans.
- Acceptable upward or downward movement of steel reinforcement cage shall be limited to a maximum of 6 inches difference between Plan elevation, confirmed prior to concrete pour, and elevation recorded after concrete placement and extraction of any casing.
- DB Contractor shall not splice mono-shaft drilled shaft steel reinforcement cage within the top 30 feet of the drilled shaft length.

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.

DB Contractor shall employ Thermal Integrity Profiler (TIP) testing for drilled shafts greater than 60-inch diameter at a minimum frequency of one shaft per bent. DB Contractor shall use testing methods 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 concrete element as mass concrete in the Plans when any of the following apply:

- Least dimension of a concrete element, or the diameter of drilled shafts, is five feet or greater using non-high performance concrete;
- Least dimension of a concrete element, or the diameter of drilled shafts, is six feet or greater using high performance concrete; or
- Concrete element uses Class H concrete with a concrete strength greater than 6,000 psi.

For a concrete element designated as mass concrete, DB Contractor shall perform an analysis using TxDOT ConcreteWorks, or an equivalent method approved by TxDOT, to verify if mass concrete protocols are needed. 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.

DB Contractor shall construct elements designated as mass concrete in accordance with Items 416, 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. Non-standard straddle bent cap designs shall be subject to TxDOT approval. Control of service level cracking is required in reinforced concrete straddle bents to avoid

appearance issues or long-term deterioration. DB Contractor shall not use precast straddle bent cap designs that include voided regions. 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 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 American Welding Society (AWS).

21.2.7 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*.

DB Contractor shall utilize SSTR on bridge structures, except as described in the "San Antonio District Urban Design Themes for Bexar and Outlying Counties", provided in the RIDs. DB Contractor shall not utilize traffic rails with steel elements unless required for compliance with Item 22 and Item 28.

For railing on top of retaining walls, DB Contractor shall utilize a moment slab design in accordance with TxDOT Engineering Standard Sheet RW(TRF) or develop rebar into adjacent concrete pavement.

21.2.8 Retaining Walls

DB Contractor shall design and construct components of the Project to provide earthen embankments without the use of retaining walls. Where earthen embankments are not feasible, DB Contractor shall use retaining walls.

Retaining walls shall be located and designed to accommodate the future expansion configurations as depicted in the RIDs entitled, "I-35 NEX Cross Street Exhibit".

The type of retaining wall shall be restricted to those pre-approved by TxDOT, unless DB Contractor requests and is granted approval of an alternative system by TxDOT.

Modular walls employing interlocking blocks shall not be used 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.

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*, American Railway Engineering and Maintenance-of-Way Association (AREMA) *Manual for Railway Engineering*, or the requirements of the specific railroad and transit owner/operator.

If DB Contractor's Work does not include a wall impact to an existing retaining wall, then DB Contractor is not required to reconstruct any portion of the existing retaining wall.

If Work includes disturbances to backfill, foundation soils, earth reinforcement, or soil excavation in front of an existing 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.

If DB Contractor's Work includes a wall impact to an existing retaining wall where the wall impact length is greater than 10% of the length of retaining wall, then DB Contractor shall reconstruct the retaining wall in its entirety, with the exception of retaining walls listed in Table 21-1. If DB Contractor's Work includes a wall

impact to an existing retaining wall where the wall impact length is less than or equal to 10% of the length of retaining wall, then DB Contractor is only required to reconstruct the part of the retaining wall experiencing the wall impact.

If DB Contractor's Work includes a wall impact to an existing retaining wall listed in Table 21-1 where the wall impact length is greater than 80% of the length of retaining wall, then DB Contractor shall reconstruct the retaining wall in its entirety.

Table 21-1: Existing Retaining Walls at Eisenhauer Rd. and Rittiman Rd.

Roadway	Orientation	Alignment	Approximate Begin Sta.	Approximate End Sta.
I-35	Northbound Mainlane	I-35ML	3338+27	3347+09
I-35	Southbound Mainlane	I-35ML	3342+82	3346+89
I-35	Northbound Mainlane	I-35ML	3348+88	3354+42
I-35	Southbound Mainlane	I-35ML	3348+69	3354+42
I-35	Northbound Mainlane	I-35ML	3387+07	3393+00
I-35	Southbound Mainlane	I-35ML	3388+12	3392+85
I-35	Northbound Mainlane	I-35ML	3394+97	3397+75
I-35	Southbound Mainlane	I-35ML	3394+75	3399+04

"Wall impact" in the context of this Item 21 shall include all wall modifications to a single existing retaining wall, including any changes to the front face of the retaining wall, removal of wall panels, removal of concrete elements, or removal of foundations. "Wall impact region" of a single existing retaining wall shall be one of the following locations within a retaining wall where a wall impact occurs: a single interior region (distinct begin and end locations within a retaining wall), a single end region (encompassing the begin or end of a retaining wall), or multiple end regions (encompassing both the begin and end of a retaining wall). "Wall impact length" of a single existing retaining wall shall be the distance encompassing the entirety of a wall impact, measured station to station, calculated dependent upon the wall impact region where the wall impact occurs, as follows:

- Single interior region: From the begin to the end of the wall impact;
- Single end region: From the beginning of a retaining wall to the end of a wall impact, or from the beginning of a wall impact to the end of a retaining wall; or
- Multiple end regions: The combination of a single end region at both ends of a retaining wall.

For all full and partially reconstructed retaining walls, DB Contractor shall identify the existing type of retaining wall to be reconstructed, and if wall is to be removed, 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 Aesthetics 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 the entire retaining wall.

Existing retaining walls impacted by the Work shall be restored to as-new condition including detailing standards and re-painted in accordance with the "San Antonio District Urban Design Themes for Bexar and Outlying Counties", contained in the Reference Information Documents (RID). Flumes above retaining walls shall be restored to as-new condition meeting drainage requirements and capacity consistent with the requirements of Item 20. Existing retaining wall anchorage systems and structural supports shall be left in

place or retrofit to accommodate the Work. Temporary walls, shoring, and permanent walls shall be engineered by structural and geotechnical designs compliant with TxDOT standards and AASHTO *LRFD Bridge Design Specifications*.

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 Aesthetics and Landscaping Plan and the requirements of Item 23.

The retaining wall layout shall address slope maintenance above and below the wall by detailing surface drainage, underdrain locations, directions of flow and ground surface treatments on each side of the wall. DB Contractor shall re-direct water away from the base of the retaining walls at the finished grade to prevent ponding at base of retaining wall. Riprap shall be used to channel water from flume behind wall to outlets and to avoid soil erosion at ends of walls. Retaining wall design shall capture storm water flow to prevent flow from passing over the retaining wall coping, free-falling down the face of the retaining wall, seeping through face of wall, or seeping through wall appurtenances. The retaining wall layout shall also address access for performance of maintenance activities including debris pick-up.

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 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 grade.

Pipe for storm drain systems shall not run longitudinally within the MSE retaining wall earth reinforcement zone 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, underdrain minimum slope, and underdrain 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 grade, unless approved by TxDOT.

Unless otherwise set forth in this Section 21.2.8, DB Contractor shall use approved MSE panel systems found at https://www.txdot.gov/business/resources/highway/bridge/approved-systems/mechanically-stabilized-earth.html, except for wall systems utilizing extensible earth reinforcement, which are not permitted.

The length of earth reinforcements for MSE retaining walls shall be a minimum of either eight feet or 70% of the wall height (top of leveling pad to top of wall), whichever is greater. Earth reinforcement length is measured perpendicular to the wall. Adjust skewed earth reinforcements as necessary to obtain required length in accordance with the requirements of this Item 21 and Item 16. Wall height is the distance from the top of the leveling pad to the finished grade at the top of the wall.

DB Contractor shall use Type DS select backfill material for all MSE retaining walls meeting the requirements in Item 423 of the TxDOT Standard Specifications.

DB Contractor shall provide specific minimum lengths of soil reinforcement for MSE retaining walls. Soil reinforcement shall be properly modeled for global stability analysis. FHWA *Geotechnical Engineering Circular (GEC) No. 11*, Chapter 4, should be followed when performing global and compound stability analysis for simple structures. DB Contractor shall not model the reinforcing zone as infinite strength for complex MSE walls. DB Contractor shall provide detailed global and compound stability analysis for complex MSE wall structures as defined in FHWA *GEC No. 11*, Chapter 6.

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 finished grade within limits of fabrication heights of wall panels.

21.2.9 **Noise Barriers**

There are no Noise Barriers on this Project.

21.2.10 **Drainage Structures**

In developing the design of drainage structures, DB Contractor shall account for maximum anticipated loadings for both the Project and future expansion configurations as depicted in the RIDs entitled, "I-35 NEX Cross Street Exhibit".

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

DB Contractor shall analyze existing drainage systems for structural capacity and condition, including third party drainage infrastructure described in Section 5.8 of the General Conditions. As necessary, retrofit or replace elements to accommodate required hydraulic capacity, and any additional loads, settlements, and/or other structural impacts associated with the Project. Drainage requirements are described in Item 20.

21.2.11 **Sign, Illumination, and Traffic Signal Supports**

Requirements related to signs, luminaires, and traffic signals are described in Item 24. DB Contractor shall provide structural design of signs, luminaires, and traffic signals shall be in accordance with the AASHTO *Standard Specifications for Structural Supports for Highway Signs, Luminaires, and Traffic Signals*.

DB Contractor shall design foundations for signs, luminaires, and traffic signals using the Texas Cone Penetrometer method as shown in the TxDOT Engineering Standard Sheets. DB Contractor shall design overhead and cantilever sign supports to accommodate both the Project and future expansion configurations as depicted in the RIDs entitled, "I-35 NEX Cross Street Exhibit". 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 (overhead) signs shall not be mounted on bridges. DB Contractor shall place bridge mounted illumination poles in accordance with the bridge lighting details in the TxDOT Engineering Standard Sheets.

Large signs as defined by the TxDOT Standard Specifications 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 substructure. The location of any overhead sign support on bridges requires special design to be reviewed and approved by TxDOT.

21.2.12 **Rehabilitation of Structures to be Widened, Extended, or Reused**

Rehabilitation, modification, or widening of existing bridges and bridge class culverts will not be allowed unless approved by TxDOT.

Bridge Condition Rating Summary located in the RIDs contains a table that provides the most current condition ratings for structures.

Any component with a condition rating less than 7 and any other defects discovered by DB Contractor shall be rehabilitated for existing bridge class structures that are widened, extended or modified. DB Contractor shall notify TxDOT of defects discovered that are not included within the bridge inspection reports or the Baseline Element Condition Report in accordance with Section 27.4. Rehabilitation must achieve a minimum condition rating of 7 for each structural component at Substantial Completion for existing bridge class structures that are widened, extended or modified. Mill and overlay are not considered modifications to an existing bridge class structure.

For existing bridge class structures to be reused within pavement reconstruction limits that are widened, extended or modified or bridge class structures identified to be widened, extended, or modified outside the reconstruction limits, the following shall apply:

- DB Contractor shall add vehicle deflection walls to existing two-column bents for structures to be reused, in accordance with the TxDOT *Bridge Design Manual* and AASHTO *LRFD Bridge Design Specifications*.

- DB Contractor shall provide pier protection for existing substructures using load and load combinations for vehicular collision force in accordance with AASHTO *LRFD Bridge Design Specifications* and in accordance with the TxDOT *Bent (Pier) Protection Guide.*
- DB Contractor shall upgrade any superseded rail or barrier.
- DB Contractor shall clean and repair existing expansion joints and provide new full width seals, including adding seals to all existing open joints.
- DB Contractor shall provide a full width seal matching original gland type, or approved equal, and accommodating original joint movement. DB Contractor shall retrofit with bonded gland instead of an original mechanical seal and bonded seal shall have a minimum 15-year proven performance life and minimum 15-year proven bonding material.
- 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 spalls, and concrete delaminations, clean and repair exposed reinforcing, seal cracks and repair or replace structurally damaged elements as identified in the bridge inspection reports. This work shall be performed in accordance with the TxDOT *Concrete Repair Manual.*

DB Contractor shall remove rust, clean, and paint all existing steel bridge superstructures and associated steel bridge bearings to remain. 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.

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 21.2.4. Bridge widenings shall utilize 8.5-inch-thick deck regardless of the deck thickness of existing bridge. Existing decks less than 8.5-inch-thick may only remain in place when meeting bridge design load and rating criteria specified in Section 21.2.4.

Regardless of the rehabilitation, DB Contractor shall maintain, at minimum, the existing vertical clearance.

21.3 Construction Requirements

DB Contractor shall conduct all Work necessary to meet the requirements for 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:

- TxDOT Special Specification 4021

21.3.1 Concrete Finishes

All concrete surfaces 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;
- Vertical and bottom of surfaces of exterior concrete beams or girders;
- Wingwalls and headwalls;
- Riprap, mowstrips and flumes; and
- Traffic railing.

21.3.2 **Steel Finishes**

Steel girders shall be unpainted weathering steel, except if DB Contractor determines location or environment is unsuitable for weathering steel, then an alternative steel and protective coating system shall be selected in coordination with TxDOT. Unpainted weathering steel is permissible for straddle bent caps provided the cap is not a fracture critical element.

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/National Steel Bridge Alliance (NSBA) Steel Bridge Collaboration *Steel Bridge Erection Guide Specification*. Inspection of steel erection will include oversight by the Independent Quality Firm. TxDOT reserves the right to perform oversight of steel erection in accordance with the TxDOT Standard Specifications.

DB Contractor shall prepare steel erection drawings in accordance with the requirements in Item 441 of the TxDOT Standard Specifications and shall submit the drawings to TxDOT for approval prior to steel erection. DB Contractor shall ensure comprehensive design and erection engineering is performed for steel bridges. The steel bridge designer shall provide comprehensive design calculations for final design conditions and evaluation of loading conditions under their proposed erection sequence. The DB Contractor's erection contractor shall provide evaluation of the structural adequacy and stability of construction of the bridge system for each stage and step of steel erection and concrete slab placement. Prior to construction, both design and erection engineering calculations shall be submitted to TxDOT. Signed and sealed plans and calculations shall clearly specify the responsible engineer for both design and erection engineering prior to any field erection activities. Should the erection contractor's sequencing result in different loading conditions for the final in-place structure, the Design Firm shall affirm under sign and seal that the Record Drawings are fully compliant with AASHTO LRFD requirements.

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 21-1. Acceptable electronic formats include Microsoft Word, Microsoft Excel, or Adobe Acrobat files, unless otherwise indicated.

Table 21-2: 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 expanded configurations	As part of the Preliminary Design Submittal	Approval	21.2
Draft of Complex Structures Criteria Report	Three Business Days in advance of initial Complex Structures workshop	For information	21.2.1.1
Complex Structures Criteria Report	Must be submitted so that review and comment process is completed in advance of submittal of Preliminary Design Submittal	Approval	21.2.1.1
Complex Structures Modeling Data	Prior to submittal of Complex Structures Plans	Review and comment	21.2.1.1

Table 21-2: Submittals to TxDOT

Submittals	Submittal Schedule	TxDOT Action	Reference Section
Complex Structures Plans	After submittal of Complex Structures Modeling Data	Approval	21.2.1.1
Complex Structures workshop agenda	Three Business Days in advance of each workshop	Review and comment	21.2.1.2
All electronic and paper copies of files and design calculations	Upon request and no later than the start of construction of Elements related to the request	For information	21.2.3
Load rating calculations	Upon request and no later than the start of construction of Elements related to the request	Review and comment	21.2.3
Bearing design	As part of the Preliminary Design Submittal	Approval	21.2.5
Bridge deck joint design	As part of the Preliminary Design Submittal	Approval	21.2.5
Foundation testing	Prior to performing testing activities	Review and comment	21.2.6
Drilled shaft TIP testing results	After drilled shaft installation and before column placement	Approval	21.2.6
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, facilities, structures, and rail line crossings within the Project Right of Way (ROW).

The Project includes a rail corridor within the Project limits as depicted on the Schematic Design. DB Contractor's Project Management Plan (PMP) shall set forth an approach, procedures, and methods for any Work within 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.

22.2 **Administrative Requirements**

22.2.1 **Railroad Agreements**

Railroads may require an executed preliminary engineering agreement, also known as a "Letter of Authority", which is executed between TxDOT and the railroad. TxDOT has obtained a preliminary engineering agreements with the appropriate railroad for all railroad impacts shown in the Schematic Design. DB Contractor shall be responsible for cooperating and coordinating with TxDOT, including by providing any schematics, plans or other information within 14 days of a request by TxDOT or the railroad for such schematics, plans or other information. DB Contractor shall be responsible for obtaining any other required approvals, permits, and agreements as required for the Work, including any railroad-related Work or temporary haul roads, if needed.

DB Contractor shall be responsible for obtaining approved C&M Agreement(s) or modifications thereto, as applicable, necessary to incorporate or address any DB Contractor's changes to the Schematic Design, or necessary to implement an ATC included in Appendix 2 to Exhibit 2 of the Design-Build Agreement. DB Contractor shall coordinate all communications with the railroad through TxDOT. Additional information regarding C&M Agreements can be found in the TxDOT *Rail-Highway Operations Manual*.

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 to authorize the railroad to provide flagging or to pay for a railroad approved flagging vendor.

Current approved templates for TxDOT/railroad agreements are available from the TxDOT Rail Division at https://www.txdot.gov/business/resources/railroad-highway-crossing.html.

The following railroad agreements may be required based upon the railroad's requirements:

- Preliminary Engineering Agreement or "Letter of Authority" – Most railroads require preliminary engineering agreements in order to proceed with the development and review of Preliminary Exhibit As. These agreements shall be between TxDOT and the railroad. TxDOT has obtained the required preliminary engineering agreement with the railroad. After the Effective Date, a revised preliminary engineering agreement will be executed between TxDOT and the applicable railroad in which the DB Contractor is identified, if applicable. This revised agreement describes reimbursement for all costs incurred by the applicable railroad with respect to the Work not covered by other railroad agreements.
- C&M Agreement – A C&M Agreement 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, State owned Utility Adjustments within railroad ROW, or work on the common right of way. The C&M agreement shall include provisions for each party's access to the applicable facilities for regular inspection and maintenance, as well as emergency repairs as required. A C&M Agreement will be needed for

each location there is an impact to the railroad. DB Contractor shall be responsible for reimbursing TxDOT for construction and maintenance license fee(s).

- Railroad's Contractor Right of Entry (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. Railroad insurance requirements will be outlined within the railroad's contractor ROE agreement and shall be incorporated into the Railroad Protective Liability Insurance described in Section 3.5.4.8 of the General Conditions. DB Contractor shall be responsible for all right of entry fees, inspection and flagging costs associated with the ROE agreement.
- Temporary Haul Road Approval – If the DB contractor desires a temporary haul road across the railroad track(s), the DB Contractor shall be solely responsible for acquiring the railroad approval including any and all fees.
- Joint Use Agreement - Typically used for constructing and maintaining a common ditch or other drainage work that benefits both the railroad and TxDOT. This agreement shall be between TxDOT and the railroad. DB Contractor shall be responsible for reimbursing TxDOT for the costs paid to the railroad pursuant to this agreement, including fees associated with the Maintenance Consent Letter and DB Contractor Endorsement Letter. TxDOT has an existing encroachment drainage joint use agreement, which is included in the RIDs, for the railroad drainage channel scope of Work described in Section 2.2.7 of Exhibit 1 to the DBA.
- Pipe/ Wireline License Agreement: Used to allow for the installation and maintenance of TxDOT utilities such as storm drains, wireline crossings for lighting, intelligent transportation systems (ITS) or preemption, etc. This agreement shall be between TxDOT and the railroad. DB Contractor shall be responsible for reimbursing TxDOT for the costs paid to the railroad pursuant to this agreement.

DB Contractor shall comply with all terms of any railroad agreements. No changes to the Final Design plans applicable to the Work within the railroad ROW shall be made without the prior written approval of such changes by both TxDOT and the railroad. DB Contractor shall not perform any Construction Work within the affected railroad ROW until the required railroad agreements have been executed.

All executed agreements shall be submitted to TxDOT in their entirety as part of the Record Documents.

22.2.2 **Review of DB Contractor Submittals**

DB Contractor shall prepare and submit to TxDOT for review and comment all railroad required documentation, including plan Submittals, applicable to Work related to the railroad drainage channel located within railroad ROW and Work adjacent to railroad ROW (i.e., straddle bents). TxDOT will transmit Submittals to the railroad for review after all comments have been incorporated and satisfactorily resolved. Submittals to be reviewed by UPRR are anticipated not to exceed 60 days, which includes review time by TxDOT and UPRR. Partial, incomplete, or inadequate Submittals will be rejected, thus delaying the review. Revised Submittals shall follow the same procedure as the initial Submittal until all issues are resolved. The review time described above shall apply to each Submittal, including resubmission of incomplete Submittals. Schedule delays resulting from inadequate or incomplete submissions shall be the responsibility of DB Contractor and will not be eligible for treatment as a Change Order.

Submittals applicable to Work within the railroad ROW will require UPRR approval. Submittals applicable to Work adjacent to railroad ROW will be submitted to UPRR for review and comment.

22.2.3 **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.

22.2.4 **Additional Insurance Requirements**

If any railroad impacted by the Project requires insurance in addition to that required by the Contract Documents as described in Section 3.5.4 of the General Conditions, 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 and shall maintain such insurance until Final Acceptance and through any Capital Maintenance Contract Term.

22.2.5 **Utilities Within Railroad Right of Way**

Investigation activities for locating Utilities within the railroad ROW will need to be coordinated with TxDOT. Utilities located within the railroad ROW are identified in the Utility Strip Map. Requirements for Utility Adjustments are described in Item 14.

22.3 **Design Requirements**

DB Contractor shall avoid placement of temporary or permanent project components inside railroad ROW to the extent possible, unless covered by an approved railroad agreement. Any such placements inside railroad ROW require approval by the operating railroad. DB Contractor shall be responsible for obtaining required approvals.

22.3.1 **Railroad Design Standards**

The design for all railroad elements of the Project shall be based on the American Railway Engineering and Maintenance-of-Way Association (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 impacted shall be compared to the requirements in the TxDOT *Rail-Highway Operations Manual* and the most restrictive criteria shall be utilized.

The following references provide Union Pacific Railroad (UPRR) guidelines:

- UPRR Public Projects Manual (https://www.up.com/cs/groups/public/@uprr/@corprel/documents/up_pdf_nativedocs/pdf_up_public_projects_manual.pdf);
- Guidelines For Railroad Grade Separation Projects (https://www.up.com/cs/groups/public/documents/up_pdf_nativedocs/pdf_rr_grade_sep_projects.pdf); and
- Guidelines For Temporary Shoring (https://www.bnsf.com/bnsf-resources/pdf/in-the-community/bnsf-up-shoring-guide.pdf).

Due to the proximity of some of the foundations for the elevated lanes to the UPRR tracks, DB Contractor shall comply with the UPRR guidelines, as applicable.

DB Contractor shall comply with the TxDOT railroad requirement sheets and railroad scope of work sheets, which can be found here: https://www.txdot.gov/inside-txdot/division/rail/requirements.html.

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 railroad tracks.

The structural design of any Utilities, including drainage structures, installed by DB Contractor and crossing a railroad ROW, 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.

22.4 **Construction Requirements**

DB Contractor shall comply with all construction requirements and specifications set forth by the operating railroad and shall invite the appropriate railroad 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

22.4.1 **Operation Safety**

DB Contractor shall arrange with the operating railroad for railroad flagging as required, to ensure the safe passage of rail traffic throughout the Project limits. 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 contractor ROE, C&M 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.

22.5 **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
Fully executed railroad agreements	As part of the Record Documents	For information	22.2.1
Copies of all additional or modified insurance policies	Prior to any entry upon operating railroad property	For information	22.2.4

Item 23
Aesthetics and Landscape Development

23.1 General Requirements

This Item 23 defines requirements with which Design-Build (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, and be consistent with TxDOT policies and guidelines from the TxDOT *Landscape and Aesthetics Design Manual*.

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 walls and Noise Barriers;
- Contour grading, slope rounding, channel treatments, and drainage;
- Sculptural and artistic features of structures;
- Sidewalks, medians, or pedestrian specialty paving, including material, finish, and color;
- Hardscape at interchanges and intersections;
- Gateway and wayfinding markers;
- Fencing;
- Signage – structure and signs including 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.

DB Contractor shall adhere to the aesthetics concepts described in the approved "San Antonio District Urban Design Themes for Bexar and Outlying Counties", contained in the Reference Information Documents (RIDs) which are hereby incorporated by this reference. It shall be understood that with TxDOT approval, the concepts for components of the Project corridor may need to be adapted to the Site-specific conditions of the Project.

Additional aesthetics concepts are included in the following San Antonio District standards:

- "Mission Theme Cantilever Overhead Sign Bridge (COSB)"; and
- "Overhead Sign Bridge (OSB)".

These standards shall supersede the design details for these elements that are included in the "San Antonio District Urban Design Themes for Bexar and Outlying Counties."

23.1.2 Aesthetics and Landscape Plan

DB Contractor shall prepare and submit an Aesthetics and Landscape Plan for review and approval by TxDOT within 120 Days of issuance of NTP2. The Aesthetics and Landscape Plan shall provide guidelines and requirements for the aesthetics design of the Project that incorporate the aesthetics concepts described in Section 23.1.1. The Aesthetics and Landscape Plan shall include all elements to fully communicate the

proposed aesthetic treatment to TxDOT. The Aesthetics and Landscape Plan shall meet the requirements of all standards and documents identified or otherwise specified within this Item 23.

The Aesthetics and Landscape Plan shall serve as the primary standard guidance necessary to produce the intended aesthetic form, function, and appearance of this Project. TxDOT approval of the Aesthetics and Landscape Plan is required prior to construction of any elements affected by this plan.

23.1.2.1 **Aesthetics and Landscape Enhancements**

If requested by TxDOT, DB Contractor shall provide adjacent Governmental Entities the opportunity to enhance aesthetics and landscape features consistent with the requirements herein. The capital and maintenance costs of any TxDOT approved adjacent Governmental Entity improvements (aesthetics and landscape 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 aesthetics and landscape enhancements within the local Governmental Entity's jurisdiction.

Aesthetics and landscape enhancements shall be incorporated into the Aesthetics and Landscape Plan to be submitted to TxDOT for approval.

23.1.2.2 **Aesthetics**

DB Contractor shall provide:

- All plans, sections, elevations, perspectives, isometrics, etc., as needed to fully communicate the aesthetic treatment and approach to aesthetic elements, including: walls, Noise Barriers, bridges, traffic rail, landscape pavers, and signage structures; A master plan that will convey the layout of the various roadway conditions (e.g., depressed sections, elevated sections, at-grade roadways, bridges, cantilevered structural sections);
- Drawings showing locations of Site-specific elements (e.g., fences, signage, aesthetics lighting, potential locations of TxDOT approved community improvement opportunity areas, gateway markers, bridge enhancements, and landscaping); and
- Drawings showing color schemes and their locations.

23.1.2.3 **Landscape Development**

This section is omitted since this the Project does not require landscaping.

23.1.3 **Personnel**

DB Contractor shall provide a landscape architect that meets the requirements of TxDOT Work Category 16.3.1, 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 and Landscape Plan, in coordination with lead design engineers for the various disciplines (e.g., roadway, structures, illumination, drainage).

23.2 **Design Requirements**

23.2.1 **Aesthetics Principles and Strategies**

DB Contractor shall follow the guidelines and requirements of the approved Aesthetics and Landscape 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 Landscape 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 "Tree Pruning and Removal";
- TxDOT approval shall be required in order to use a natural feature for erosion control;
- 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 Landscape Plan.

23.2.2 **Noise Barriers, Retaining Walls and Sign Columns**

DB Contractor shall design Noise Barriers to be similar in color, texture, style, and aesthetic treatment to retaining walls and consistent with the approved Aesthetics and Landscape Plan. DB Contractor shall apply aesthetic treatments to the vertical surfaces of retaining walls and Noise Barriers where the surface is visible from the roadway or adjacent residential dwelling units. Consistent treatments shall be used for retaining walls, Noise Barriers and exposed concrete column sign support structures that articulate the design themes established. T-mount sign support structures for DMS shall be exempt from aesthetic requirements herein. DB Contractor shall clearly detail and identify how wall patterns shall be incorporated into the chosen design solution in the Aesthetics and Landscape Plan.

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, in accordance with the approved Aesthetics and Landscape Plan.

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**

See Item 18 for sodding and seeding requirements.

23.2.5 **Riprap, Paving, and Pavers**

Concrete riprap or landscape pavers shall be used in hard-to-reach mowing areas as described in Section 18.3, Section 21.2.3 and in this Section 23.2.5, in areas less than two feet in width, such as, but not limited to, areas between, near, or next to guard fence posts, bent columns, retaining walls, freeway ramp gores, paved ditches, flumes, cable barrier, and ditch inlets, or under structures with less than 10-foot vertical clearance. Concrete paving, landscape pavers, and rock riprap shall 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". "Rock Riprap (Special) (Dry)" and "Rock Riprap (Special) (Grout)" shall be used in accordance with the "Miscellaneous Paving Details for Mission Theme".

Concrete riprap and landscape pavers shall be applied per the approved Aesthetic and Landscape Plan, approved Geotechnical Report, approved Drainage Report, and in conformance with the Released for Construction Documents.

23.2.6 **Color Palette**

DB Contractor shall submit a plan that indicates where each color is to be applied. This plan can be diagrammatic in nature, but shall list each element and its colors. In addition to integrated colors, painting, and staining, DB Contractor may use colored lighting in selected areas to add color.

Newly constructed or modified concrete surfaces shall be painted or stained in accordance with the "San Antonio District Urban Design Themes for Bexar and Outlying Counties". Anti-graffiti coating will not be required for painted or stained surfaces.

23.2.7 **Aesthetics Lighting**

This section is omitted since the Project is using standard lighting.

23.3 **Construction Requirements**

DB Contractor shall conduct all Work necessary to meet the requirements for 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 Landscape Plan and TxDOT District standards. TxDOT must review and approve the sample panels before any construction form liners, paint, or landscape pavers may be ordered, obtained, or used. DB Contractor shall provide sample equivalent to the size of the panels that will be installed when constructed with a representative un-textured surrounding surface. The approved sample panel shall be the standard of comparison for the production concrete surface texture.

For textured panels or concrete surfaces finished with a coating of paint or stain, DB Contractor shall prepare a corresponding coated panel or 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.

DB Contractor shall coordinate with the Utility Owner(s) and ensure power service is initiated and provided/maintained for all irrigation controllers and aesthetics lighting within the Project during the Term.

23.4 **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
Aesthetics and Landscape Plan	Within 120 days of NTP2	Approval	23.1.2
Color Palette Plan	As needed	Review and comment	23.2.6
Panel samples	Prior to starting construction of textured concrete surfaces and landscape pavers	Approval	23.3
Coating samples	Prior to start of coating operation	Approval	23.3

Item 24
Lighting, Signing, Markings, and Signals

24.1 **General Requirements**

This Item 24 includes requirements with which Design-Build (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 markings, and signalization in accordance with the *Texas Manual on Uniform Traffic Control Devices* (TMUTCD), TxDOT *Standard Highway Sign Designs for Texas* (SHSD), TxDOT *Freeway Signing Handbook,* TxDOT *Sign Crew Field Book,* TxDOT *Procedures for Establishing Speed Zones,* TxDOT *Traffic Signals Manual,* TxDOT Engineering Standard Sheets, TxDOT Standard Specifications, TxDOT special specifications, and Good Industry Practice.

DB Contractor shall design all illumination (lighting) in accordance with the TxDOT *Highway Illumination Manual*, National Electrical Code (NEC), American Association of State Highway and Transportation Officials (AASHTO) *Roadway Lighting Design Guide*, TxDOT Engineering Standard Sheets, TxDOT Standard Specifications, TxDOT special 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/content/txdotreimagine/us/en/home/about/districts/san-antonio-district/standards-forms.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.

DB Contractor shall incorporate into its design the wrong-way driving countermeasure concepts shown in the "ITS Schematic Layout" located in the Reference Information Documents (RIDs) and in accordance with the requirements of Section 25.2.7.

24.3.1 **Preliminary and Final Layouts**

DB Contractor shall submit, for TxDOT approval, a preliminary operational signing schematic that includes signing, delineation, pavement markings, and signalization. The design of these elements shall be based on the approved Schematic Design, "I-35 NEX Central Project Striping Plan", and the "I-35 NEX Ultimate 100% Signing Schematic" located in the RIDs. DB Contractor shall additionally incorporate into its design all signs labeled as either "new", "changed", or "moved" as shown in the "I-35 NEX South Schematic Design – Sign Assessment" located in the RIDs. 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.

Before placing any signs, delineation, sign structures, pavement markings, traffic signals, and lighting infrastructure, DB Contractor shall provide TxDOT final layouts 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.

24.3.2 **Signing and Delineation**

DB Contractor shall design and install all signs as shown on the Released for Construction Documents. Signs include new sign panels and sign structures, as well as modifications to existing sign panels and sign structures. The use of existing sign structures shall be subject to TxDOT approval. DB Contractor shall perform an in-depth inspection of sign structures in accordance with Section 8.0 of FHWA *Guidelines for the Installation, Inspection, Maintenance and Repair of Structural for Highway Signs, Luminaires, and Traffic Signals* and submit documentation of the inspection to TxDOT for review and comment.

DB Contractor shall confirm the suitability, structural sufficiency and vertical clearance of existing sign structures with new or modified sign panels. If an existing sign structure with new or modified sign panels exceeds the limits of the original design and published standards, the existing sign structure may be reused only if the components of the existing sign structure are structurally evaluated and sufficient to carry the loads using the AASHTO *Standard Specifications for Structural Supports for Highway Signs, Luminaires, and Traffic Signals*.

Existing sign structures with no new or modified sign panels will not require structural evaluation. DB Contractor shall verify that the required minimum vertical clearance is satisfied for existing structures with new or modified sign panels. 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, dynamic message signs (DMSs), lighting, and structures.

DB Contractor shall ensure that signs are located in a manner to provide adequate sight distance for legibility and proper driver 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)".

Signs shall meet the requirements of TxDOT SHSD.

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 Right of Way (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**

In addition to the warning, regulatory, and guide signs within the Project ROW, TxDOT or Governmental Entities may request that third party signs, including logo signs, be installed by a third party. 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 TxDOT 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 in accordance with Section 4.6 of the General Conditions.

DB Contractor shall maintain existing third party signs in the Project ROW and shall not remove, adjust, or relocate third party signs without approval of the third party and TxDOT. Existing third-party signs that must be relocated due to the DB Contractor's design shall be the responsibility of the DB Contractor, and the Price shall include the costs of such relocations, including new sign mounts, if required.

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, light fixture, or walkway.

DB Contractor shall design all overhead sign structures for Zone 3, 80 mph wind zone as shown in the Wind Velocity and Ice Zones of the TxDOT Engineering Standard Sheets.

Guide signs, except supplemental and traffic generator signs, shall not be ground-mounted alongside roadways with more than two lanes in a given direction.

Guide signs shall not be mounted to bridges without TxDOT approval (this excludes signs shown as bridge-mounted on the Schematic Design).

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, TxDOT Standard Specifications, TxDOT special specifications, and TxDOT Engineering Standard Sheets.

DB Contractor shall use shadow markings for skip lines on the controlled access main lanes where light-colored pavement does not provide sufficient contrast with the markings. Contrast markings consist of black background in combination with standard TMUTCD marking colors as indicated in the Contrast and Shadow Pavement Markings CPM (1)-14 of the TxDOT Engineering Standard Sheets.

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)-20" 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.

DB Contractor shall perform locates on existing, temporary and proposed traffic signal infrastructure after NTP2. TxDOT will not perform any locates after NTP2. Any future locates after NTP2 will be the responsibility of the DB Contractor.

24.3.7.1 Traffic Signal Warrants

DB Contractor shall collect traffic data for all intersections within the Project ROW and prepare signal warrant studies for all proposed signalized intersections not signalized at the time of Notice to Proceed 1 (NTP1), including intersections requiring new permanent traffic signals listed in Section 24.3.7.2 and shall submit these signal warrant studies to TxDOT for review prior to advancing to Final Design and prior to submitting traffic signal plans for review. The warrant studies shall address all signal warrant criteria in the TMUTCD. DB Contractor shall make recommendations for new traffic signal installations, modifications to existing traffic

signals, as well as removal of existing traffic signals, based on the traffic data and warrant studies in consultation with TxDOT and the appropriate Governmental Entities. TxDOT will reasonably determine if a new traffic signal, modification or removal is required, based upon the traffic data and 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.
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.

24.3.7.2 **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 the Project limits that are impacted by the Traffic Control Plan and/or Final Design. DB Contractor shall maintain all signals from NTP2 through Final Acceptance. 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 may propose alternative intersection designs to be reviewed and approved at TxDOT's sole discretion.

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 will be responsible for operating and maintaining the signal after Final Acceptance, the design shall meet the standards of the City of San Antonio.

DB Contractor shall prepare traffic signal plans in accordance with the TMUTCD, TxDOT *Traffic Signals Manual*, TxDOT Engineering Standard Sheets and TxDOT Standard Specifications and submit to TxDOT for review and comment.

DB Contractor shall provide both vehicle detection and pedestrian and detection at all traffic signals within the Project limits. Pedestrian signals and detection shall comply with TxDOT's *Traffic Signals Manual: Accessible Pedestrian Signal Guidelines*.

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 aluminum signal heads (no fewer than one signal head per lane) with light emitting diode (LED) signal indications and black aluminum backplates with a yellow fluorescent reflective border in accordance with the TxDOT Engineering Standard Sheets;
- Use timber poles and span wire only for temporary signals;
- Install radar presence and advance vehicle detection systems, with advance detection only required for approaches with posted speed limits greater than or equal to 35 mph and presence detection required for all approaches;
- Use LED safety lighting where required on traffic signal poles;
- Design electrical system powering the signal equipment in accordance with the Utility Accommodation Rules (UAR) for proper cover of conduit;
- Comply with Electrical Detail (ED) sheets of the TxDOT Engineering Standard Sheets, TxDOT Standard Specifications, TxDOT Departmental Material Specifications, and NEC;
- Use new or modified traffic signal equipment that is compatible with existing equipment currently used by the City of San Antonio;
- For TxDOT operated and maintained signals, comply with TxDOT San Antonio District standard "MTS-18" for traffic signal controller foundation details. For City of San Antonio operated and maintained signals, comply with City of San Antonio traffic signal controller foundation details. DB Contractor shall not build traffic signal controller foundations 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 for TxDOT operated signals shall be #12 AWG stranded copper for vehicular signal heads and #14 AWG stranded copper for pedestrian APS buttons. Proposed signal cable for City of San Antonio operated signals shall be #14 AWG stranded copper for vehicular signal heads and #16 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 provide training for city staff on all new accessible pedestrian signal units.

TxDOT authorized intersections which are operated by the City of San Antonio requiring new (or full replacement) permanent traffic signals are:

- IH-35 Frontage Road and Walzem Road (FM 1976)
- IH-35 Frontage Road and Eisenhauer Road
- IH-35 Frontage Road and Rittiman Road

24.3.7.3 **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 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 requirements in Item 21.

24.3.7.4 **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.

For all City of San Antonio maintained signals, DB Contractor shall furnish and install a new 2070-L controller and Model 332 style cabinet, meeting the requirements of City of San Antonio specification 615 dated 02/03/2020 or later. All cabinets shall be capable of displaying 18 output channels and shall include controller, conflict monitors, load switches, A/C and D/C isolators, power supply, and other components as outlined in the City of San Antonio specification.

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 the TxDOT 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 acceptance test plan (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.

24.3.7.5 **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 for approval.

DB Contractor shall provide copies of all final implemented signal timing plans to TxDOT.

24.3.8 **Lighting**

DB Contractor shall perform locates on existing, temporary and proposed illumination infrastructure. TxDOT will not perform any locates after Notice to Proceed 2 (NTP2).

DB Contractor shall provide lighting designs, including safety lighting where warranted, to meet criteria listed in the TxDOT *Highway Illumination Manual* on all traveled roadways to be illuminated. Traveled roadways include: main lanes, interchanges, ramp terminals, and frontage road intersections with cross streets. All design and construction shall comply with the NEC, latest TxDOT Engineering Standard Sheets, TxDOT Departmental Material Specifications, and TxDOT Standard Specifications. At all times between NTP2 and Final Acceptance, DB Contractor shall maintain safe lighting conditions along the Project roadway. DB Contractor shall develop temporary illumination plans as part of the Final Design process that demonstrate that lighting conditions will be maintained throughout construction.

DB Contractor shall provide illumination to both the upper level (proposed elevated section) and lower level (existing main lanes) of the Project. DB Contractor may utilize existing median luminaire poles. If there is any damage to existing luminaire poles or arms, other than normal scrapes and scratches, DB Contractor will be responsible for replacing the damaged pole(s) and/or arm(s). Illumination fixtures used to provide lighting to the lower level of the project shall be subject to the requirements set forth in Item 21 and Item 23.

DB Contractor shall provide lighting along cross streets 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 TxDOT approval including a Third Party Agreement covering responsibilities for operation and maintenance of the finished lighting, in accordance with Item 13.

DB Contractor shall provide LED fixtures for high mast lighting, conventional roadway lighting and under bridges at underpass/overpass locations throughout the Project. Underpass lighting will be limited to locations with existing underpass lighting or to locations with new structures (or widened structures) greater than or equal to 100 feet in width. Existing non-LED light fixtures shall be replaced with LED light fixtures.

DB Contractor shall prepare lighting plans that consider illumination levels, uniformity, and sources for the roadways, interchanges, and special areas. DB Contractor shall meet the luminance requirements listed in the TxDOT *Highway Illumination Manual*.

DB Contractor shall design the lighting, where necessary, through the entire Project limits to minimize measurable spillage outside the Project ROW and onto the adjacent properties using either cut-off shields or tightly-controlled photometrics combined with appropriate mounting height. DB Contractor shall submit a lighting plan and photometric data results (light spillage measurements/contours) for the entire Project limits to TxDOT for review and approval as part of the Final Design Submittal, including information required in Section 23.2.7. In addition, the overflow of light onto any surface area outside of the Project ROW shall be designed in accordance with the TxDOT *Highway Illumination Manual* and ANSI/IES *RP-8 Recommended Practice for Design and Maintenance of Roadway and Parking Facility Lighting*. The Final Design Submittal shall include all input data for the photometric analysis.

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 conventional luminaire poles located within the clear zone of the roadways, DB Contractor's design shall incorporate breakaway devices that are pre-qualified by TxDOT. All high mast lighting poles to be used within the Project limits shall meet the requirements of TxDOT Engineering Standard Sheets and TxDOT Standard Specifications. Existing high mast poles at IH-35 and IH 410 (south interchange) 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, relocate, or redesign 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 shall coordinate with the FAA regarding the installation of obstruction lights, if any, on a case-by-case basis. DB Contractor shall submit to TxDOT records of documentation of coordination with FAA.

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 show conformance.

24.3.8.1 Lighting Infrastructure

At a minimum, all underground conduit that is under paved surfaces shall be Schedule 80 polyvinyl chloride (PVC) and not less than two inches in diameter. All other underground conduit may be Schedule 40 PVC and not less than two inches in diameter. The conduit depth for illumination conduit under the City of San Antonio streets is 36 inches. Above ground conduit used to provide service to the illumination fixtures mounted on the upper level shall be placed inside of the upper level concrete railing.

The conductor minimum size shall be #8 AWG copper on roadway lighting and #12 AWG on underpass lighting. All wire gage must be calculated based upon electrical load design. DB Contractor shall not use duct cable for illumination purposes.

DB Contractor shall place bridge mounted illumination poles in accordance with the bridge lighting details in the TxDOT Engineering Standard Sheets.

For additional information concerning lighting and its associated conduit attached to structures, see Item 21.

Non-standard light pole design shall be submitted to TxDOT for approval. 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.

Dimensions for ground boxes shall be as shown on TxDOT Engineering Standard Sheet ED (4)-14.

Ground box covers shall be two-inch-thick (nominal), 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.

All proposed illumination electrical services shall be metered electrical services. Any existing non-metered illumination systems to remain shall be converted to a metered electrical service. Illumination related electrical service meters 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 Engineering Standard Sheets and TxDOT Standard Specifications.

DB Contractor shall seal all conduit ends with lighting circuits with at least three feet of polyurethane foam approved by TxDOT that will not adversely affect other plastic materials or corrode metals – alternate methods of wire theft prevention may be submitted for approval.

Existing high mast light poles within the Project limits may be relocated by the DB Contractor, subject to TxDOT approval. DB Contractor shall perform an in-depth inspection of existing high mast poles to be relocated in accordance with Section 8.0 of FHWA *Guidelines for the Installation, Inspection, Maintenance and Repair of Structural for Highway Signs, Luminaires, and Traffic Signals* and submit documentation of the inspection to TxDOT for review and comment.

24.3.9 Visual Quality

Notwithstanding the requirements of Section 24.3.8, DB Contractor shall provide luminaires of equal height along the roadway when using conventional poles.

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 and the TxDOT Standard Specifications.

Subject to approval by TxDOT, alternate material specifications and construction requirements may be proposed by DB Contractor provided the objectives of the Project are met and equivalent requirements to this Item 24 are provided.

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 from the NTP2 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 traffic signal conduit locates, 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.

As a part of maintenance responsibilities during construction, DB Contractor shall assume responsibility for the maintenance of the existing Wrong-Way Detection (WWD) systems within the Project limits. The following location have WWD systems:

1. IH 35 SB at Exit 165 (Walzem Rd)
2. IH 35 NB at Exit 166A (Randolph Blvd)
3. IH 35 NB at Exit 165 (Walzem Rd)
4. IH 35 SB at Exit 164B (Eisenhauer Rd)
5. IH 35 BB at Exit 164B (Eisenhauer Rd)
6. IH 35 SB at Exit 164A (Rittiman Rd)
7. IH 35 SB at Exit 162 (Brooke Army Medical Center)
8. IH 410 EB at Exit 30 (Binz-Engleman Rd)

DB Contractor shall be responsible for the operation and maintenance of all WWD system 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 WWD system conditions prior to assuming responsibility for WWD infrastructure on the Project. Note some WWD system devices are located on existing sign posts and overhead sign supports. Operations and maintenance responsibilities include all activities necessary to maintain a functional WWD system per existing exit ramps listed above on the Project, such as coordination with Utility owners to provide electrical service, device relocation or replacement, and wire replacement as needed.

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 the commencement of the Construction Work until Final Acceptance, regardless of whether or not the infrastructure is impacted by the Project. DB Contractor shall 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 functional 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 the motorist. DB Contractor shall replace any other removed signs before the end of the workday.

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 Maintenance Management System (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 retroreflectivity 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 days, but not later than ten 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

The Independent Quality Firm (IQF) shall measure retroreflectivity values for all pavement markings in accordance with the TxDOT Standard Specifications and TxDOT special specification "Mobile Retroreflectivity Data Collection for Pavement Markings": SS 6291 confirm the compliance.

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 thickness 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 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/materials/material-producer-list.html.

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 maintain existing lighting during construction and restore or replace prior to Substantial Completion. At all times during the Term, safe lighting conditions shall be maintained along the Project roadway.

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/materials/material-producer-list.html.

DB Contractor shall remove all unused existing illumination-related cable and conduit that does not have existing pavement or riprap above it; any unused existing illumination-related conduit that is under the existing pavement or riprap may be abandoned.

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 label 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 and TxDOT Departmental Material Specifications.

DB Contractor shall affix an identification decal on each luminaire, ground box, and electrical service maintained and/or operated by DB Contractor for inventory purposes and shall submit inventory information to TxDOT in a TxDOT-compatible format for inclusion in the Maintenance Management System (MMS). The identification decal shall denote a contact name, phone number, and address in the event of Emergency or necessary maintenance.

Existing conductors shall be removed from abandoned conduit.

DB Contractor shall be responsible for proper disposal of any high-pressure sodium (HPS) 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 HPS lamps. DB Contractor shall prevent the breakage of the HPS and at a minimum package all HPS lamps removed from the Project in a container that minimizes breakage. DB Contractor shall store any broken HPS 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**

DB Contractor shall place reference markers at approximately one mile apart in accordance with the Texas reference marker (TRM) system. 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 Global Positioning System (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
Signs, delineation, sign structures, pavement markings, traffic signals, and lighting infrastructure final layouts	Prior to placement	Review and comment	24.3.1
Documentation of inspection of existing sign structures and high mast poles	Prior to commencing Final Design	Review and comment	24.3.2 and 24.3.8.1
Signal warrant studies	Prior to advancing Final Design and prior to submitting traffic signal plans for review.	Review and comment	24.3.7.1
Traffic signal plans	As part of the Final Design	Review and comment	24.3.7.2
ATP for all traffic signals	As part of the Final Design Submittal	Review and comment	24.3.7.4
Signal timing plans	As part of the Final Design	Approval	24.3.7.5
Copies of all final implemented signal timing plans	With Record Drawings	For information	24.3.7.5
Temporary illumination plans	As part of the Final Design Submittal	Review and comment	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
Lighting plan and photometric results (light spillage measurements/contours)	As part of the Final Design Submittal	Approval	24.3.8
Photometric analysis input files	As part of the Final Design Submittal	Approval	24.3.8
Records of documentation of coordination with FAA	As part of the Final Design Submittal	For information	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
Alternate methods of wire theft prevention	As part of the Final Design Submittal	Approval	24.3.8.1

Table 24-1: Submittals to TxDOT

Submittals	Submittal Schedule	TxDOT Action	Reference Section
Sign identification record	After placement of all signs Submittal	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 Intelligent Transportation System (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.

Design-Build (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 to include 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.

DB Contractor shall abide by TxDOT's information security standards:

- Access to the TxDOT network can be granted to DB Contractor where there is a demonstrated business need;
- TxDOT follows the principals of "least privilege," where the access granted should be the minimum necessary to perform legitimate business functions; and
- Access to the TxDOT network or system for DB Contractor is granted by issuing each individual that requires such access a unique email address, requiring the individual to certify that they understand and agree to abide by TxDOT acceptable use standards, and authenticating the user through TxDOT's active directory system.

During construction, DB Contractor shall maintain the existing fiber or wireless ITS communication network. DB Contractor shall perform testing of all field devices and equipment prior to assuming responsibility of the existing ITS. DB Contractor shall allow TxDOT and 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.

DB Contractor shall produce temporary ITS plans detailing how connectivity and functionality will be maintained throughout construction, including connectivity with other appropriate Governmental Entities which have existing connections. DB Contractor shall submit the temporary ITS plans to TxDOT for approval. DB Contractor may propose to use temporary aerial fiber to maintain ITS connectivity during construction. DB Contractor shall not use a temporary wireless network in areas with an existing fiber communication network without prior approval by TxDOT. Temporary fiber and splices 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. Temporary wireless connections requiring an IP address within the TxDOT network shall not be used unless approved by TxDOT, or as otherwise described in Section 25.3.1.

TxDOT has provided the "ITS Schematic Layout" located in the RIDs 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 "ITS Schematic Layout" is preliminary, and the DB Contractor shall be responsible for meeting all requirements set forth in Item 25.

The Project ITS shall conform to TxDOT Engineering Standard Sheets, San Antonio Regional ITS Architecture, and with the "Regional Data and Video Communications System" and have physical

connections with the existing TxDOT ITS communications network on major freeways. The functionality of the ITS shall be such that command and control of appropriate field devices is shared and exchanged with appropriate Governmental Entities.

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. The Project ITS shall be planned and designed using a systems engineering approach, including the performance of a systems engineering analysis for the Project as required by 23 CFR § 940.11. All components of the ITS shall conform to the provisions of the National Transportation Communications for ITS Protocol (NTCIP), San Antonio District Transportation Systems Management and Operations (TSMO) plan, and the statewide TSMO Strategic Plan, available at https://www.txdot.gov/business/resources/materials/material-producer-list.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 will 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 closed circuit television (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 restraints).

DB Contractor shall furnish and install ITS equipment in conformance with Attachment 25-1 (ITS Equipment Specifications).

DB Contractor shall perform locates on existing, temporary and proposed ITS infrastructure. TxDOT will not perform any locates after NTP2. Any future locates after NTP2 will be the responsibility of the DB Contractor.

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 in the manner described in this Section 25.2 and the other affected Governmental Entities, resistant to weather encountered in the Project area, and places components in locations that are not hazardous to Users. 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 and within 120 days prior to issuance of NTP2, DB Contractor shall conduct an ITS workshop with TxDOT, and affected Governmental Entities (per TxDOT's direction) to:

- Confirm TxDOT's operational requirements;
- Review DB Contractor's survey of existing ITS infrastructure and condition assessment;
- Discuss concepts, 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 both temporary ITS during construction

and permanent ITS installations. These layouts shall be 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 advanced traffic management system LoneStar™ software that is operational at, TransGuide.

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 main lanes or proposed elevated structure).

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. DB Contractor shall provide metered service to ITS field devices and cabinets consistent with TxDOT's Engineering Standard Sheets, TxDOT Standard Specifications and TxDOT special specifications.

DB Contractor shall not deviate from all ITS-applicable TxDOT Standard Specifications or TxDOT special specifications without TxDOT's approval.

ITS devices on the "upper level" (proposed elevated sections) within the Project will need separate conduits within proposed columns to provide electrical power cables and data connectivity cables that are required to tie ITS devices to the fiber trunk system on the "lower level" (existing I-35 main lanes).

In accordance with Section 21.2.3, DB Contractor shall also provide conduits embedded within the bridge structure at or closest to overhead sign bridges mounted on the "upper level" for future ITS infrastructure connectivity. The conduits for future ITS infrastructure connectivity shall not be required to connect to the fiber trunk system, however the conduits shall terminate at a Type A ground box located next to the column.

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. DB Contractor shall refer to Section 25.2.3.4 for CCTV camera requirements.

The installed ITS equipment shall provide TxDOT accurate and reliable data and quality video images, and accurate control of field devices from TransGuide on a real-time basis, 24 hours a day, seven 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, dynamic message sign (DMS), and vehicle detection systems meet the reliability requirements specified in the TxDOT Engineering Standard Sheets and/or San Antonio District Standards, as well as any standard publications provided by TxDOT at the time of actual Design Work. The design and construction requirements, together with the design criteria presented in the most current TxDOT Standard Specifications and/or TxDOT San Antonio District specifications, special specifications, as well as any standard publications provided by TxDOT at the time of the actual Design Work, define the minimum standards and scope that must be met by DB Contractor.

New ITS electrical services shall use stainless steel enclosures.

25.2.1 **DB Contractor ITS Communications Requirements**

DB Contractor shall provide a communications network that has redundant routing capabilities. The communications network shall serve the highway ITS components along the highway Elements of the Project. Where necessary, as determined by TxDOT, DB Contractor shall provide cabinets to support the communications network.

The current TxDOT communications network backbone is a 10 GB multiple protocol label switching ethernet network / single-mode fiber optic cable network.

Each field network switch shall provide a primary and secondary fiber path of two fibers each from the fiber HUB to TransGuide. 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. Calculations for band usage shall be provided during the preliminary design efforts for review and comment.

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 IH-410 (VIA park & ride) and at IH-35 and IH 410 (south interchange), DB Contractor shall provide a Type 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) IH35 and IH-410 (VIA park & ride) and 2) IH 35 and IH 410 (south interchange). 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, and modems to establish communications as required. Video encoding shall meet MPEG-4 standards and be compatible with TxDOT's advanced traffic management system Lonestar™ 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 review and comment, 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" located in the RIDs. ITS devices shall be powered by dedicated services which are separate from traffic signals, illumination, and other devices. No exposed conduit sections will be permitted. Rigid metal conduits hung between girders and only visible from a location under a bridge are considered not to be exposed. All sections shall have a minimum of 42 inches of cover over all ITS conduit except:

- Where boring is required to cross under intersections; and
- In the case of large bridge crossings, 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 on existing structures.

New 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.

DB Contractor shall repair each existing communication cable or electrical conductor that is severed or otherwise rendered not usable within 48 hours.

DB Contractor shall provide materials and use construction methodology that, at a minimum, meets the most current or applicable TxDOT Standard Specifications and TxDOT San Antonio District specifications, 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 shall provide alternatives to TxDOT to improve TxDOT's current practices for securing ground box lids and are subject to TxDOT approval.

25.2.3 Closed Circuit Television (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 of the camera pan/tilt/zoom by a user.

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, TxDOT Standard Specifications and TxDOT special specifications.

DB Contractor shall provide a digital video format and communications protocol at all connections with 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 field of view. CCTV cameras shall be placed to enable TxDOT to monitor traffic conditions on highway lanes, frontage roads, connecting facilities, entrance and exit ramps, and messages displayed on any remotely controlled DMS in the Project area. To provide a stable video image, DB Contractor shall mount cameras on ITS poles unless otherwise approved by TxDOT. Permanent locations of CCTV camera poles shall be submitted prior to commencing Final Design and subject to TxDOT approval.

Distance between CCTV cameras shall not exceed one mile for the "upper level" within the Project and 0.75 miles for the "lower level" within the Project; however, DB Contractor is responsible for placing cameras to ensure 100% coverage of the main lanes and elevated lanes. 100% coverage shall be defined as the CCTV cameras having 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 level" and the "upper level".

CCTV camera poles shall be placed as close as possible to the high point of overpasses. CCTV camera poles along the lower levels shall be at least 55 feet in height when no elevated sections are present and as high as practical when proposed elevated sections are present and shall conform to TxDOT standards. CCTVs for monitoring the proposed "upper level" shall be located at least 40 feet above the proposed elevated sections.

The CCTV site shall be accessible in all weather conditions. Access pads shall be provided.

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 and TxDOT special 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 San Antonio District standards, TxDOT Engineering Standard Sheets, TxDOT Standard Specifications and TxDOT special specifications or TransGuide operational requirements in effect at the time of design, 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% within the temperature range of +40 degrees Fahrenheit to +110 degrees Fahrenheit; and
- Humidity range of 0 to 100% 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 by the Lonestar software system. In order to prove compatibility and operability of CCTV systems submitted for use on this Project, DB Contractor shall deliver one complete set of CCTV equipment to TxDOT for testing by TransGuide information technology personnel as part of the equipment submittal and approval process. DB Contractor shall test CCTV equipment prior to installation. A minimum of 30 days prior to testing, provide to TxDOT the proposed test procedure for review and comment. DB Contractor shall invite TxDOT to observe testing and shall coordinate with TxDOT personnel schedules to enable TxDOT observation. The equipment being tested must be fully assembled and in a fully operational condition. DB Contractor shall configure all equipment being tested as is intended for use on the Project. Prototype equipment is not permitted. 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 CCTV equipment being tested. 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 to the video signal link and use the laptop 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 which 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 which 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 control equipment manufacturer's design specifications, which includes all hardware and related equipment required to operate the CCTV, and design specifications to TxDOT for approval a minimum of 12 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.

DB Contractor shall also install Bluetooth readers every one mile on both the "upper and lower levels" 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 will have the ability to distinguish between the traffic volumes between the "upper and lower levels" of the Project.

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 may attach detection units to existing or proposed structures or ITS poles with prior concurrence from 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 Engineering Standard Sheets and the TxDOT Standard Specifications for CCTV mounting poles and must adhere to minimum vertical clearance requirements. DB Contractor shall provide all necessary support structures, equipment, including, but not limited to, vehicle detection system devices, controls, cables, cabinets and connections. Permanent locations of vehicle detector poles shall be subject to TxDOT approval.

25.2.5 Dynamic Message Sign (DMS)

DB Contractor shall provide a comprehensive network of electronic DMS as needed to satisfy the operational requirements using only light emitting diode (LED) display technology. 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 replace or relocate existing DMS within the Project with the exception of entrance Ramp DMS (Type 3) systems, which the DB Contractor shall remove.

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 large guide sign spacing stated in the TMUTCD.

Location and placement of DMS shall be approved by TxDOT. A preliminary concept with DMS locations has been provided in the "ITS Schematic Layout" located in the RIDs. 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 DB Contractor 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, cabinets, 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, Communications Cabinets, Environmentally Controlled Communications Buildings**

DB Contractor shall coordinate with TxDOT the connection of all new ITS components to any existing ITS communication hub 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:

- it is attached using a unistrut-type connection to the bridge columns;
- it is three feet off the ground/above grade;
- it is hidden from traffic flow (refer to "ITS Equipment Cabinet Mounting Detail" provided in the RIDs).

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 main lane Closure. The bottom of the pole mounted cabinet shall not be placed in excess of three feet above the base plate of the pole. 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**

DB Contractor shall design, furnish, install and test new wrong way detection systems (WWDS) for ramps ELSB-GB and 410S-EXNB-RIT meeting the requirements of TxDOT special specification 6414, Wireless Wrong Way Driver System.

Before installation of any equipment, DB Contractor shall perform a site survey of the proposed location 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 the WWDS equipment location if necessary.

DB Contractor shall ensure the mechanical execution of work complies with National Electrical Code (NEC), Article 110.12.

DB Contractor shall provide a thermal imaging camera, two LED signs (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.

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 camera 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. DB Contractor shall begin testing once proper system functionality is proven.

All existing solar powered WWDS within the Project limits shall be converted to operate using line power and retain their current functionality.

25.2.8 **Access Control System (ACS)**

DB Contractor shall design and construct an access control system (ACS) on the "upper level" 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 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).

25.2.9 **Reserved**

25.3 **Construction Requirements**

25.3.1 **General**

DB Contractor shall conduct all Work necessary to meet the requirements for this Item 25 and the TxDOT Standard Specifications.

DB Contractor shall notify TxDOT 30 days in advance of making connections to the existing TxDOT 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 existing location, allowing minimal service interruption of no more than four hours for any disruption associated with communications and 72 hours for the transfer of devices from existing to new locations, or by use of portable equivalents for ITS devices, such as trailer mounted DMS, sensors or CCTV, positioned to allow removal of devices while new locations are constructed. To maintain detection accuracy, DB Contractor shall reconfigure vehicle detectors throughout the duration of the Project to correspond with any changes in roadway geometry. DB Contractor shall not mount existing CCTV cameras on trailers at any time during the Term. Additional temporary trailer mounted CCTV cameras can be used to supplement CCTV coverage.

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 such equipment to the TxDOT TransGuide facility if requested, or stockpile the equipment as requested by TxDOT. Salvaged equipment shall be delivered in its documented existing condition.

Subject to approval by TxDOT, alternate material specifications and construction requirements may be proposed by DB Contractor provided the objectives of the Project are met and equivalent requirements to this Item 25 are provided.

The following list includes, but is not limited to, ITS elements with the most recent TxDOT special specifications (SS):

- ITS System Support Equipment – SS6003;
- Networking Intelligent Transportation Systems (ITS) Communications Cable – SS6004;
- Testing, Training Documentation, Final Acceptance, and Warranty – SS6005;
- Electronic Components – SS6006;
- Fiber Optic Cable – SS6007;
- 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; and
- Intelligent Transportation System (ITS) Ground Box - SS6186.

25.3.2 **Existing ITS Relocation**

DB Contractor shall relocate any existing ITS components, including communication hubs, environmentally controlled communication buildings, satellite buildings, CCTV cameras, DMSs, detection devices, and fiber-links, as required to continue service from the existing components. 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.

DB Contractor may reuse during construction existing vehicle detection devices and CCTV cameras that are operational and meet current TxDOT requirements, but DB Contractor shall replace these components with new equipment prior to the Substantial Completion Deadline, unless otherwise noted on the ITS Schematic Layout.

DB Contractor shall perform such removals and relocations as needed in a manner that prevents damage to existing overhead structures to be reused.

25.3.3 **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
- Acceptance test plan (ATP).

The functional design plan shall show each device's relationship in the overall functional design of the ITS and proposed roadway system. This functional design plan shall include the location of devices, technology and functional specifications of devices, and any unique design elements that are necessary to achieve the desired functionality or space restrictions.

The communications analysis report shall document the communications design. This report shall show all ITS field devices, their flow through all communications mediums, and throughput within the ITS. This shall include communications between any involved Governmental Entities. The report shall contain a narrative describing the information to be transmitted, as well as a high-level plan for its use. Communications diagrams shall be provided showing the location of any communication hubs (existing or proposed), any planned fibers (source as well as identification tag), modem/transceiver equipment planned at field equipment cabinets, and other equipment deemed necessary to functionally operate the ITS.

The operational and requirements document for the ITS shall describe the functional capability of the system and the method and level of integration. The document shall describe in detail the design of the system, hardware and software to be utilized, functional capabilities, command and control, data sharing capabilities, and priority use of devices by multiple agencies. In developing the operational and requirements document, 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 its requirements have been met prior to operational use of the ITS.

As part of the ATP, DB Contractor shall prepare a system acceptance procedure prior to start of construction to assure proper operation, control, and response of each device as part of the overall ITS, including the overall operating system and software. 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.

25.3.4 **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 for ITS fiber will occur during the 21 Day period prior to Substantial Completion and DB Contractor shall provide TxDOT, and TransGuide staff with an opportunity to conduct full system tests, conduct daily operations to confirm operation plans and standard operating procedures, and to otherwise prepare for operational use of the facility. End-to-end testing will also occur after hours and on weekends. DB Contractor shall coordinate to ensure that there will be no conflicts between TxDOT, and their affiliated contractors, and DB Contractor's staff.

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 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 conflicts between TxDOT, their affiliated contractors, and DB Contractor's staff;
- Providing temporary advance signing (if needed) stating that the facility is closed and testing is occurring;
- Providing maintenance of traffic (MOT)/traffic control at all necessary locations for a maximum of five 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 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, or to meet other maintenance safety or emergency requirements of the Design-Build Contract (DBC). 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.

25.3.5 Record Documents

The Record Documents shall include the construction drawings with Global Positioning System (GPS) locates and a keyhole markup language (KMZ) file, 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, to TxDOT prior to Final Acceptance 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 RIDs.

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
ITS Testing Documentation for DB Contractor Maintenance During Construction	Prior to DB contractor assuming responsibility for the Project	For Information	25.1
Temporary ITS plans	Prior to commencing construction activities	Approval	25.1

Table 25-1: Submittals to TxDOT

Submittals	Submittal Schedule	TxDOT Action	Reference Section
Preliminary ITS Layouts	Following the ITS workshop and prior to submitting the Preliminary Design Submittal package	Review and comment	25.2.
Bandwidth Usage Calculations	As a part of the preliminary design efforts	Review and comment	25.2.1
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 camera pole locations	Prior to commencing Final Design	Approval	25.2.3.2
Proposed CCTV equipment test procedure	30 days prior to testing	Review and comment	25.2.3.5
CCTV Control Equipment	12 months prior to Substantial Completion	Approval	25.2.3.5
ITS Implementation Plan	As part of the Final Design Submittal	Approval	25.3.3
Certification that the ITS effectively meets the required functional requirements	Prior to Substantial Completion	For information	25.3.3
Notice of end-to-end testing	Prior to implementation	For information	25.3.4
Results of the end-to-end testing	Within ten days after testing is completed	For information	25.3.4
ITS Record Documents	Prior to Final Acceptance	For information	25.3.5, General Conditions Attachment 4-1

Item 26
Traffic Control

26.1 **General Requirements**

Design-Build (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. All road users including bicyclists and pedestrians must be considered in the development of the Traffic Control Plans (TCPs). DB Contractor is responsible for gaining approval from TxDOT, the appropriate Governmental Entity and property owner for each intersecting street or driveway closure.

26.1.1 **Lead MOT Design Engineer**

DB Contractor shall employ a Lead Maintenance of Traffic (MOT) Design Engineer responsible for ensuring the TCPs are prepared in accordance with the Contract Documents. The Lead MOT Design Engineer shall be a Licensed Professional Engineer (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. Lead MOT Design Engineer shall be responsible for signing and sealing the TCPs, details, and all revisions to the TCPs in accordance with the plan submittal requirements. Lead MOT Design Engineer shall be available through the duration of the Project and work with the Lead MOT Implementation Manager to coordinate 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 TCPs are adhered to during their implementation;
- Ensuring quality control (QC) of the TCPs is performed;
- Working closely with the Lead MOT Design Engineer to implement and manage Project TCPs; and
- Identifying and coordinating design changes to the TCPs.

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. Lead MOT Implementation Manager shall have relevant experience overseeing the implementation of TCP during the construction phase of highway projects similar in size and scope as the Project. 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 Traffic Management Plan (TMP), to develop detailed TCPs that provide for all construction phasing, as well as all required switching procedures, in accordance with the *Texas Manual on Uniform Traffic Control Devices* (TMUTCD), the TxDOT *Smart Work Zone Guidelines*, the TxDOT Engineering Standard Sheets, and the TxDOT Standard Specifications. TCPs are required for the Work during the Term and for the duration of the Warranty Term. The TMP requirements are described in Section 4.2.10 of the General Conditions.

DB Contractor shall provide to TxDOT for approval a TCP concept presentation at or near preliminary design status but prior to TCP plan sheet development. DB Contractor shall utilize Microsoft PowerPoint and roll plots to convey this concept at a 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 involves traffic control details 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 a PE.

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 Closure, all detours, traffic control devices, striping, and signage applicable to each phase of construction. DB Contractor shall request approval for each Lane Closure before being implemented, regardless of whether or not the Lane Closure is shown in the TCP, as further described in Exhibit 15 to the Design-Build Agreement (DBA). 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, and temporary drainage.

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. 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 TMUTCD based on roadway design speed**.** Approved traffic control devices can be found in 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 use the registry from the Federal Motor Carriers Safety Administration under the National Hazardous Materials Route Registry. DB Contractor shall place required signage for the purpose of rerouting the traffic away from restricted roads.

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 or the use of existing overhead signing structures would result in signs not being above the travel lanes. DB Contractor shall design and install signing compliant with TMUTCD, TxDOT *Freeway Signing Handbook*, and Item 24.

Throughout the Term, DB Contractor shall ensure that all streets and intersections remain open to traffic except as shown on the pre-approved TCPs by constructing the Work in phases. 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 maintain access to all existing VIA Metropolitan Transit (VIA) bus stop facilities except when temporary closure or detours are approved by TxDOT. DB Contractor shall submit a TCP to TxDOT for review and approval prior to implementation of detours or closures impacting any VIA bus stop facilities.

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 public information notices, in accordance with Item 11, in advance of the implementation of any Lane Closures, detours, or traffic switches. These notices shall be referred to as traffic advisories. DB Contractor shall also notify the traveling public by placing changeable message signs a minimum of seven days in advance of any roadway closure or major traffic modifications. Where available and when possible, DB Contractor shall coordinate and utilize dynamic message signs (DMS) on the regional intelligent transportation system (ITS).

DB Contractor shall utilize law enforcement personnel to effect Lane Closures. DB Contractor shall meet the requirements for law enforcement personnel as described in Item 7 of the TxDOT Standard Specifications. DB Contractor is responsible for noting the requirement for law enforcement personnel in the TCPs when Lane Closure is applied. DB Contractor is responsible for the costs associated with the use of law enforcement personnel.

DB Contractor shall provide 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 be designed to provide the same operational characteristics as their existing conditions or better.

Design Speed. On all roadways, interstate and U.S. highways, for all alignments, including the general purpose lanes, elevated lanes, frontage roads, and cross streets, the minimum design speed shall be 10 mph under the existing posted speed limit if utilizing the TxDOT *Roadway Design Manual* for horizontal and vertical alignments or the posted speed if utilizing National Cooperative Highway Research Program (NCHRP) Report 581 for horizontal and vertical alignments, except for major alignment transitions, 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.

Lane Widths. During construction, the minimum lane width shall be 11 feet. TxDOT may, in its sole discretion, allow 10 foot lanes on frontage roads in limited circumstances, for short distances, after reviewing DB Contractor's proposed TCP. For locations where the existing lane width is less than 11 feet, DB Contractor may use the existing lane width. When DB Contractor shifts lane alignments through intersections, DB Contractor shall use shifting tapers corresponding to the width of offset and the required design speed for the roadway.

Shoulders. DB Contractor shall provide shoulder widths in accordance with Table 19-1 to the greatest extent possible and where feasible. DB Contractor shall, at a minimum, provide the following shoulder widths in areas where the travel lane is adjacent to portable traffic barrier or a permanent barrier system:

Mainlanes:

- Minimum two feet inside shoulder
- Minimum four feet outside shoulder

Frontage roads and cross streets:

- Minimum one foot inside shoulder
- Minimum two feet outside shoulder

DB Contractor may provide shoulder widths less than the minimum widths described above in the following areas:

- Where space is limited due to adjacent temporary or permanent retaining walls, temporary shoring, or drainage structures,
- Where length of barrier is less than 2000' with minimum 250' feet before next barrier,
- On bridges when temporary widening would be required,
- On bridge class culverts when temporary widening or lengthening would be required,
- If clearly shown in the Schematic Design and associated Design Exceptions, or
- In locations near overhead sign bridges where inside shoulder width is already reduced.

In no case shall the shoulder width be less than one foot offset from the edge of travel way to the edge of pavement or traffic barrier. Work on shoulder without positive protective barriers during a Holiday, a Special Event, or Time Period A, including setting of barrier during a Holiday, a Special Event, or Time Period A, constitutes a Lane Closure and requires TxDOT approval.

Minimum Temporary Vertical Clearance. DB Contractor shall provide and maintain the existing vertical clearance along all roadways throughout the duration of construction. For new construction over existing roadways, DB Contractor shall maintain a minimum temporary vertical clearance of 16 feet – 6 inches, or as approved by TxDOT.

26.2.1.3 **Lane Closure Requirements**

Requirements regarding the following elements are set forth in Exhibit 15 to the DBA:

- Non-Chargeable Lane Closures and Chargeable Lane Closures
- General requirements for Lane Closures
- Liquidated Damages for Lane Closures and Lane Rental Charges
- Lane Rental Bank
- Minimum Number of Lanes and Allowable Lane and Roadway Closures
- Holidays
- Special Events
- Incidents and Emergencies
- Time Periods

26.2.2 **Driveway Closures**

DB Contractor is responsible for coordinating with the affected property owner(s) on driveway closures. DB Contractor shall maintain a minimum of one driveway per business at all times. For businesses with multiple driveways, when driveway closure is necessary to progress Work, no driveway may be closed for more than 30 consecutive days or more than 45 days in a 90-day period.

26.3 **Construction Requirements**

DB Contractor shall ensure implementation of the traffic control elements is in accordance with DB Contractor's TMP, the approved TCP, the manufacturer's directions or recommendations where applicable, and the applicable provisions of the TMUTCD.

DB Contractor shall ensure traffic control elements are inspected, maintained and replaced in accordance with the TMP and the Construction Quality Management Plan (CQMP).

DB Contractor shall conduct all Work necessary to meet the requirements for this Item 26 and the TxDOT Standard Specifications.

For the duration of the Construction Work, temporary, new and existing ITS equipment, illumination, and traffic signals shall be functional, interconnected and interoperable per District and local governmental requirements and standards and specifications. DB Contractor shall develop and adjust temporary traffic signal timing per Item 24.

DB Contractor shall provide and maintain temporary illumination throughout the duration of Construction Work for all roadways and intersections that have existing illumination, in accordance with Section 24.3.8. All temporary illumination shall meet or exceed existing illumination levels.

DB Contractor shall install permanent illumination during Construction Work as soon as practicable to enhance safety and benefit the traveling public but in no event later than Substantial Completion.

26.3.1 **Work Zone Safety**

DB Contractor shall incorporate specific additional safety measures, as described in this Section 26.3.1, into the Project.

26.3.1.1 **Temporary Traffic Barrier**

DB Contractor shall meet the requirements of TxDOT Standard Specifications Item 502, Barricades, Signs and Traffic Handling, Item 512, 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 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. CTB meeting NCHRP 350 TL3 requirements may also be used as approved by TxDOT. DB Contractor is allowed to utilize in place the existing center barrier during construction.
- 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.
- Temporary traffic barrier shall be installed across the back of all gore stub-outs where the bridge ends to protect drop offs. Temporary barrier shall also be pinned across the front of gore stub-outs in the direction of travel at the following locations:
    - I-35ELSB to future I-35ELSB as further described in Exhibit 1 to the DBA
    - Future I-35ELNB to I-35ELNB as further described in Exhibit 1 to the DBA

  The barrier shall be pinned adjacent to the travel way in order to maintain a constant shoulder width to prevent vehicles from entering the gore area.

26.3.1.2 **Smart Work Zone (SWZ) Technology and Traffic Management System Requirements**

DB Contractor shall implement SWZ 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 "Temporary Queue Detection System" in accordance with TxDOT Special Specification (SS) 6302, Temporary Queue Detection System, 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 Incident Detection and Surveillance System" in accordance with SS 6348, Temporary Incident Detection and Surveillance System.
- A "Temporary Travel Time System" in accordance with SS 6344, Temporary Travel Time System.
- A "Truck Entering Highway Warning System" in accordance with SS 6297, Truck Entering Highway Warning System, provided in the RIDs. 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.
- A "Temporary Speed Monitoring System" in accordance with SS 6307, Temporary Speed Monitoring System.

DB Contractor shall describe the technologies and systems intended for use during construction in order to meet the requirements of this Section 26.3.1.2 in the Traffic Management Plan (TMP) submitted as part of the PMP.

DB Contractor shall obtain approval of the locations of the SWZ technology elements as part of the TCP concept described in Section 26.2.1. The specific layout and locations of the SWZ technology elements shall be included in the TCPs submitted by the DB Contractor for approval. DB Contractor shall relocate the system as necessary to accommodate the construction phasing. TxDOT may request, without additional cost to TxDOT, DB Contractor to relocate each system during Construction Work up to three times per year. Any additional relocations requested by TxDOT, beyond those permitted by the previous sentence, shall be subject to payment through the safety Allowance.

A safety Allowance of $50,000 has been established for this Project for the sole use by TxDOT. TxDOT may request in writing work zone enhancements to improve the effectiveness of the TCP. DB Contractor shall account for the cost of Work performed under the safety Allowance in accordance with either (i) unit prices approved by TxDOT, (ii) the requirements to Force Account Change Orders set forth in Section 4.6.8 of the General Conditions or (iii) a negotiated price for the Work approved by TxDOT.

TxDOT shall be entitled to a reduction in the Price for any unused amounts in the safety Allowance.

26.3.1.3 **Equipment Noise**

During the hours of 9:00 p.m. to 5:00 a.m., DB Contractor shall utilize a non-intrusive, self-adjusting noise level back-up signal alarm on all heavy equipment used in close proximity to residential areas. Any applicable local noise ordinances regarding noise control measures for equipment for night work take precedence over this requirement. This requirement is not applicable to hot mix or seal coat operations.

26.3.2 **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 days per week.

DB Contractor shall provide training for workers involved with traffic control using TxDOT approved traffic control training as shown on the TxDOT *Traffic Control Training Material Producer List*.

DB Contractor shall establish and implement safety procedures for Construction Work in compliance with Section 4.2.3 of the General Conditions. All personnel within an active construction area shall wear hard hats. For Construction Work not protected by positive barrier, then type 3 reflective gear shall be required to be worn by all personnel. When performing nighttime Construction Work, all personnel shall be required to wear type 3 reflective gear. Flaggers shall additionally wear hard hat halos when performing nighttime Construction Work.

26.3.3 **Access**

DB Contractor shall maintain existing bicycle and pedestrian access and mobility. Access to existing transit stop locations shall be maintained during construction or reasonable alternative locations shall be coordinated with and approved by transit operators.

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.

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 the Governmental Entity having jurisdiction.

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 detour signs and changeable message signs to divert traffic around the Project.

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 Contractor's request, TxDOT will

reasonably assist 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 **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. DB Contractor shall remove pavement markings in accordance with TxDOT Standard Specifications Item 677, Eliminating Existing Pavement Markings and Markers. DB Contractor shall not remove pavement markings by over-painting. DB Contractor shall not use grinding or flailing to remove pavement markings on permeable friction course (PFC) or concrete pavement. DB Contractor shall not use temporary tape at any time during the Term.

DB Contractor shall install work zone pavement markings in accordance with TxDOT Standard Specification Item 662, Work Zone Pavement Markings, and the TxDOT Engineering Standard Sheets.

DB Contractor is responsible for temporary signing outside of the Project limits 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.

DB Contractor shall maintain safe travelling conditions of all roadways used outside the Project limits including routes to fabrication facilities, plants and haul roads.

26.3.7 **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.

26.3.8 **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.

26.3.9 **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.

26.3.10 **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.

26.3.11 **Adjacent Project Coordination**

DB Contractor shall be responsible for coordination with adjacent projects, including lane closures as described in Exhibit 15 to the DBA. DB Contractor shall attend regularly scheduled coordination meetings as requested by TxDOT and provide the following information in advance of the meetings:

- Preliminary TCPs and updates;
- Proposed lane closure requests;
- Construction schedule and look-ahead schedules;
- TCP implementation schedule; and
- Other information as requested by TxDOT.

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 26-2. Acceptable electronic formats include Microsoft Word, Microsoft Excel, or Adobe Acrobat files, unless otherwise indicated.

Table 26-2: 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	At least 14 days prior to implementation, except for full closures which required TCPs be submitted 21 days prior to implementation	Approval	26.2.1, 26.2.1.1
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	26.3.2

Item 27
Construction Maintenance

27.1 **General Requirements**

27.1.1 **General Maintenance Obligations**

Throughout the period between Notice to Proceed 2 (NTP2) and Final Acceptance, Design-Build (DB) Contractor shall be responsible for and shall carry out Maintenance Work within the Maintenance Limits. DB Contractor shall conduct all Maintenance Work necessary to meet the requirements for this Item 27 and the 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;
- Coordinate with the Highway Emergency Response Operator (HERO) patrol service that will continue running along the corridor;
- 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 (MMS) to record the category, status, intended action and repair for all Defects;
- Facilitate access to such 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, 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 or equipment from the Project Right of Way (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. DB Contractor shall follow standard process for acquiring accident/incident reports from the Crash Reporting and Analysis for Safer Highways (CRASH) system. DB Contractor shall not request accident/incident reports from HERO patrol service nor Department of Public Safety (DPS);
- Utilize IQF for quality assurance of Maintenance Work; 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 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 (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 Notice to Proceed 1 (NTP1) and NTP2. Starting at NTP2, DB Contractor shall perform all necessary Maintenance Work within the Maintenance Limits, 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.

27.1.2.1 **Additional Maintenance Work**

During the first winter period (December 1 and February 15) after NTP1, DB Contractor shall perform the maintenance work described below:

- DB Contractor shall place crack seal using materials complying with the requirements of TxDOT Standard Specifications Item 300 on all existing pavement within the Project limits with an existing flexible surface layer, except permeable friction courses (PFC).
- Once crack sealing is complete, DB Contractor shall restripe all pavement within the Project limits, in accordance with the requirements described in Item 24.

If NTP1 occurs during a winter period, DB Contractor may perform the maintenance work described above during the following winter period.

During the first 365 days after NTP1, DB Contractor shall perform the maintenance work described below:

- DB Contractor shall perform the pavement base repairs on the I-410 mainlanes in accordance with Section 16.4.3.1 and as depicted in the exhibit "Resurfaced Pavement and Pavement Base Repair Areas" located in the RIDs.
- DB Contractor shall perform spot surface repairs in accordance with Section 16.4.3.1 and as depicted in the exhibit "Resurfaced Pavement and Pavement Base Repair Areas" located in the RIDs.

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 good faith discretion. The requirements for the MMP are set forth in Attachment 27-4 (MMP Template).

27.2.2 **Reserved**

27.2.3 **D&C Maintenance Manager**

DB Contractor shall make a D&C Maintenance Manager available on an as-needed basis 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 D&C Maintenance Manager shall meet or exceed the following qualifications and experience:

- Must have a minimum of ten years of experience performing maintenance on projects; and
- Must have a minimum of two years of managerial experience in design, construction, or maintenance on any road project of similar size, scope and complexity.

The D&C 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 D&C Maintenance Manager shall be available whenever Maintenance Work is performed.

27.3 **Performance Requirements**

27.3.1 **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 use the applicable TxDOT reference markers system to establish Performance Sections.

27.3.2 **Performance and Measurement Table During Construction**

DB Contractor's performance of the Maintenance Work shall be governed by the Performance and Measurement Table During Construction as may be updated in accordance with Section 27.3.3. The Performance and Measurement Table During Construction 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 columns of the Performance and Measurement Table During Construction. DB Contractor shall address each Defect within the specified Defect Repair Period as further described in this Item 27.

The Defect Repair Period set forth in the Performance and Measurement Table During Construction 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.

27.3.2.1 **Baseline Inspections**

DB Contractor shall perform the 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, 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.

27.3.2.2 **Baseline Element Condition Report**

DB Contractor shall prepare the BECR and shall submit to TxDOT for approval as part of the MMP no later than 60 days prior to NTP2. DB Contractor shall not add items to the BECR once it is submitted to TxDOT. The BECR shall comply with the following requirements:

- The BECR shall include a 1080p at a minimum video recording of each traffic lane, shoulder, parkway, and border width for its full length within the Project limits, at a resolution and speed sufficient for TxDOT to discern the condition of the Project.
- 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 ten 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. DB Contractor shall include existing pavement Defects, identified by TxDOT and shown in Attachment 27-3, in the BECR and repair them. Any maintenance required on the existing pavement Defects shall be performed by the DB Contractor until the permanent repair is made. If the BECR is prepared before the Work described in Section 27.1.2.1 is completed, then the BECR shall be updated to incorporate the revised conditions associated with this work.

27.3.2.3 **Use of BECR to Establish Performance and Measurement Table During Construction Requirements**

The results of the BECR shall be used to establish the Performance Objective and Measurement Record for each Element in Attachment 27-1 (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 inches and an edge drop-off of three inches 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.

27.3.2.4 **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 enable 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 (Performance and Measurement Table During Construction).

27.3.3 **Updates of Performance and Measurement Table During Construction**

DB Contractor may propose changes to the Performance and Measurement Table During Construction for TxDOT approval. DB Contractor shall propose for TxDOT approval such amendments to the Inspection and Measurement Method and Measurement Record as necessary to cause these 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.

DB Contractor shall annually perform a video recording of each traffic lane within the Project. The video shall be at the same resolution, and speed, and of the same Elements as described in Section 27.3.2.2

27.4 **Defect Identification, Recording and Categorization**

27.4.1 **Definitions**

For Defects shown on the Performance and Measurement Table During Construction:

- 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;
- 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.

27.4.2 **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 in accordance with Section 27.6. 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 to a storage system accessible by TxDOT. Information shall include description, date-time of identification and categorization. Any such upload of Defect information with Category 1 Defect status shall trigger immediate automatic e-mail notification of TxDOT and the D&C Maintenance Manager.

27.4.3 **Defects Categorization**

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.

27.4.4 **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 and submit the repair approach to TxDOT for approval.

DB Contractor shall take necessary action to avoid 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.

27.4.5 **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 During Construction. DB Contractor shall continue hazard mitigation and/or temporary repair until a permanent repair has been completed.

27.5 **Inspections**

27.5.1 **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, for any Element, conform at a minimum to the inspection standards set forth for that Element in the column entitled “Inspection and Measurement Method” in Attachment 27-1 (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 Non-conformance 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 Non-conformance Report if TxDOT discovers any Nonconforming Work. DB Contractor’s responsibility to correct Nonconforming Work is set forth in the Contract Documents.

27.5.2 **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 During Construction.

- Routine inspections, to the extent required, for all structures within the Maintenance Limits in compliance with the latest FHWA / National Bridge Inspection Standards (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.

27.6 Maintenance Management System (MMS)

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 located 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. All 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.

DB Contractor shall provide TxDOT real-time, remote access to the Maintenance Records for the duration of the Term.

27.7 Maintenance Obligations

27.7.1 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.

27.7.2 Weather-related Events

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. DB Contractor shall use available resources to maintain the roadway in as safe a condition as possible during weather-related events. DB Contractor shall be responsible for removing debris and water from the roadway resulting from weather-related events in accordance with Attachment 27-1 (Performance and Measurement Table). DB Contractor shall set up and maintain traffic control to shut down any Project roadways that are flooded in accordance with Attachment 27-1 (Performance and Measurement Table). DB Contractor shall not be responsible for traffic control or installing road closures in support of snow or ice events. DB Contractor shall be responsible for ensuring construction equipment and any work areas are protected or cleared from potential incident during a snow and ice events. TxDOT will not be responsible for any damage to DB Contractor equipment during snow and ice events.

27.7.3 **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).

27.7.4 **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.

27.7.5 **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.

27.7.6 **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.

27.7.7 **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).

27.7.8 **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).

27.8 **Maintenance Records**

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 electronic content management system (ECMS) shall be compatible with TxDOT's ECMS.

DB Contractor shall cause all Maintenance Records and Project-related documents to be stored in a manner that allows retrieval of such data and records by reference to the applicable TxDOT reference marker system and Performance Section.

Maintenance Records shall be kept and shall be provided to TxDOT in accordance with Section 5.13.4 of the General Conditions. All records obtained during the Warranty Term shall be kept and provided to TxDOT at the end of the Warranty Term.

27.9 **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
Performance Section Drawings	After NTP1	Review and comment	27.3.1

Table 27-1: Submittals to TxDOT

Submittals	Submittal Schedule	TxDOT Action	Reference Section
Proposal scope and methodology of Baseline Inspections	Prior to the Baseline Inspections	Approval	27.3.2.1
Notice of Baseline Inspections and/or tests	14 days prior to the Baseline Inspections	For information	27.3.2.1
BECR	60 days prior to NTP2	Approval	27.3.2.2
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	27.3.2.4
Updates to Performance and Measurement Table During Construction	As required	Approval	27.3.3
Notification of Nonconforming Work	Within two days of discovering the Nonconforming Work	For information	27.5.1
Nonconformance Report	Within seven days of notification issuance	Review and comment	27.5.1
Information on weather-related events	As required	For information	27.7.2

Item 28
Bicycle and Pedestrian Facilities

28.1 **General Requirements**

This Item 28 includes requirements with which Design-Build (DB) Contractor shall design and construct all bicycle and pedestrian facilities for the Project. DB Contractor shall coordinate the Elements of this Project with the existing and planned trails and other facilities of Governmental Entities for pedestrians and cyclists.

28.2 **Design Requirements**

DB Contractor shall design and construct all bicycle and pedestrian facilities consistent with TxDOT policies and guidelines, the TxDOT *Roadway Design Manual*, the American Association of State Highway and Transportation Officials (AASHTO) *Guide for the Development of Bicycle Facilities*, the AASHTO *Guide for the Planning, Design, and Operation of Pedestrian Facilities*, the Federal Highway Administration (FHWA) *Bikeway Selection Guide*, FHWA's *Separated Bike Lane Planning and Design Guide* and the FHWA *Bicycle and Pedestrian Planning, Program and Project Development* guidance.

Any variation from the location and limits of the bicycle and pedestrian facilities shown on the Schematic Design will be subject to the approval of both TxDOT and any Governmental Entities with jurisdiction. Any deviation from the minimum design criteria for a bicycle or pedestrian facility will require a Design Exception, Design Waiver, or Design Variance as specified in the TxDOT *Roadway Design Manual*.

DB Contractor shall maintain connectivity or provide approved detour routes for bicycle and pedestrian movements during construction and throughout the Term. All proposed bicycle and pedestrian detours, temporary routes or temporary facilities to maintain connectivity of existing bicycle and pedestrian facilities or routes shall be submitted to TxDOT for approval as part of the TCP concept presentation prepared in accordance with Section 26.2.1. DB Contractor shall ensure that all bicycle and pedestrian proposed detours, temporary routes or temporary facilities are intuitive, Americans with Disabilities Act (ADA)-compliant, feasible and reasonable, and have equal or better accessibility than any existing bicycle and pedestrian facilities.

Final Design of each detour or temporary facility for bicycle and pedestrian connectivity shall be submitted to TxDOT for approval a minimum of 21 days prior to implementation and DB Contractor shall not implement any detour or temporary facility until TxDOT approval is obtained. The Submittal shall include details for time of detour or temporary facility operation, all detours, striping, and signage applicable to each phase of construction. The Submittal shall include sufficient detail to allow verification of design criteria and safety requirements, including typical sections, facility widths, barrier or fencing, wayfinding devices, alignment, striping layout, drop off conditions, and temporary drainage.

DB Contractor shall refer to Item 24 for additional information regarding requirements for signals, pavement markings, and lighting related to pedestrian and bicycle facilities.

28.2.1 **Bicycle Facilities**

DB Contractor shall design bicycle facilities to be consistent with TxDOT's and Governmental Entities' requirements for bicycle facilities 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.

DB Contractor's design of bicycle facilities shall incorporate the following elements, where applicable:

- Alignment, profile, cross-section, and materials;
- Points of connection to existing and proposed bicycle facilities;
- Bicycle movements through intersections and conflict points and intersection treatment 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 buffer, barrier and/or fence type and height; and
- Requirements of the Aesthetics and Landscape Plans.

28.2.2 **Pedestrian Facilities**

Sidewalks and pedestrian facilities shall comply with the Americans with Disabilities Act (ADA) Standards (2010) adopted by the U.S. Department of Justice (DOJ), the ADA Standards (2006) adopted by the U.S. Department of Transportation (DOT), the Proposed Accessibility Guidelines for Pedestrian Facilities in the Public Right-of-Way (PROWAG) and Texas Department of Licensing and Regulation (TDLR) Texas Accessibility Standards (TAS). DB Contractor shall coordinate with Governmental Entities and TxDOT to ensure consistency with existing and proposed pedestrian facilities.

DB Contractor shall design and construct new concrete sidewalks as shown in the Schematic Design provided in the RIDs.

DB Contractor shall remove, replace, or modify existing concrete sidewalks within the Project limits, including the locations shown on the Schematic Design, and where any existing sidewalk within the Project ROW is not in compliance with ADA, PROWAG, and TDLR requirements. The Work shall also include any necessary modifications to existing driveways along the frontage roads for the sidewalks to comply 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 24.3.7.2. 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 use enhanced visibility measures at intersections, including FHWA *Proven Safety Countermeasures*. 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 crosswalks (HAWKS) beacon or pedestrian hybrid beacon (PHB).

DB Contractor's design of pedestrian facilities shall meet the requirements of the PROWAG AASHTO *Guide for the Planning, Design, and Operation of Pedestrian Facilities* and the National Association of City Transportation Officials (NACTO) *Urban Bikeway Design Guide*, and shall include the following elements, where applicable:

- Alignment, profile, cross-section, and materials;
- Points of connection to existing and proposed pedestrian facilities;
- Crosswalk and curb 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 buffer, barrier or fence type and height; and
- Requirements of the Aesthetics and Landscape 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/content/txdotreimagine/us/en/home/about/districts/san-antonio-district/standards-forms.html.

The six-foot usual sidewalk width may be reduced only in areas where ROW is insufficient or where a six-foot sidewalk would require widening of an existing structure not otherwise impacted by the Work, so long as ADA, PROWAG, and TDLR requirements are met.

DB Contractor is responsible for obtaining TDLR reviews and approvals of pedestrian facility design and construction.

28.3 Construction Requirements

DB Contractor shall conduct all Work necessary to meet the requirements for this Item 28 and the TxDOT Standard Specifications.

In areas of conflict between pedestrian facilities 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 inches and have 60-inch x 60-inch passing zones every 200 feet. Temporary sidewalks shall be constructed with 3-inch 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).

If there is evidence of pedestrian traffic, such as unpaved pedestrian paths (also known as “worn paths”), that are shown to become fully paved sidewalks in the Schematic Design and conflict between pedestrian facilities and construction, DB Contractor shall provide for the installation, maintenance, and removal of temporary sidewalk along alternate routes during construction in accordance with this Section 28.3.