

A

Executive Summary

A. EXECUTIVE SUMMARY

Like all mega projects, the Grand Parkway, Segments H, I-1 and I-2 Project will have its challenges. More than 10 million cubic yards of dirt will be moved, nearly 80 bridges/grade separations constructed, and the project will be designed and constructed within 56 months despite a 24-month right-of-way acquisition process. At its peak, the daily burn rate in construction will require some 1,500 workers. The design and construction teams must anticipate and resolve the multitude of technical issues associated with this more than 50-mile alignment — including minimizing impacts to neighbors and reducing the ecological footprint of the project with sustainable construction. Achieving successful implementation will require resolution of many issues including potential borrow shortages, design and constructability challenges, and community relations and coordination concerns inherent in a multi-jurisdictional, geographically extended project. The Grand Parkway Infrastructure (GPI) team has the experience, resources and commitment to successfully implement this project for the Texas Department of Transportation (TxDOT).

A. PROPOSAL ORGANIZATION AND CONTENTS

Our proposal is organized as requested in *Exhibit E* of the instructions to proposers and includes all forms and certifications, our project development plan and accompanying schedule and drawings, and our financial and price proposals.

B. CHANGES TO QUALIFICATIONS SUBMITTAL

We have no changes to our qualifications submittal beyond those described in *Section C*, below.

C. CHANGES IN ORGANIZATION, EQUITY MEMBERS, OTHER MAJOR PARTICIPANTS AND KEY PERSONNEL

We have no changes to our organization, equity members or other major participants beyond the addition of Ferrovial Internacional S.L.U. as the lead maintenance firm. Changes to key personnel (as approved by TxDOT) include the substitution of Miguel Alonso (for Luis Muñoz) as our project manager, Pete Flores (for Julio Yglesias) as our safety manager, Derek Ivie (for Christopher Tolar) as our environmental compliance manager, Javier Moïno (for Alfonso Diaz del Rio) as our utility manager, Pablo del Monte, PE (for Ignacio Navarro, PE) as our design manager, Jeff Love, PE, ENV SP (for Chris Hocate, PE) as our lead roadway design engineer and Albert Molne (for Pablo Molla) as our construction manager, and the addition of Craig Willsher as our maintenance manager.



COMMITMENT

Grand Parkway Infrastructure will deliver this project — design, construction and maintenance — with a focus on sustainability; economic, environmental and social aspects; and continual improvement. Our team includes:

Construction

- Ferrovial Agroman
- Granite Construction
- Webber

Maintenance

- Ferrovial Internacional

Design

- Bowman Consulting Group
- OTHON (DBE)
- Urban Systems

Additional Subconsultants/ Subcontractors

- Alliance Geotechnical Group (DBE)
- Cardno
- CivilTech Engineering
- Cox | McLain Environmental Consulting
- JLL Valuation & Advisory (formerly Integra Realty Resources)*
- Ninyo & Moore
- PSI Technologies



DESIGN-BUILD-MAINTENANCE EXPERTS

We are design-build and maintenance highway infrastructure project experts. We have completed or are working on more than \$25.7 billion of design-build projects in the U.S., including \$8.7 billion in Texas.

**JLL Valuation & Advisory acquired the assets of Integra Realty Resources effective October 1, 2016.*

D. MANAGEMENT, DECISION-MAKING AND DAY-TO-DAY OPERATION STRUCTURE

Day-to-day and operational decision-making authority and accountability will be vested in our project manager, Miguel Alonso. He is TxDOT’s sole point of contact for communication on all items, except those specifically assigned to others. A board of directors including senior management for the design-build joint venture will oversee the organization and major strategic decisions.

Commitment Statement

Each of the major participants on our team that are providing key personnel commit to providing their respective staff. This includes:

- **Ferrovial Agroman** – Project Manager Miguel Alonso, Lead Quality Manager Esteban Trigueros, Environmental Compliance Manager Derk Ivie, Construction Manager Albert Molne, Right-of-way Manager Dennis Sedlachek, Utility Manager Javier Moño, Design Manager Pablo del Monte, PE
- **Webber** – Safety Manager Pete Flores
- **OTHON** – Lead Roadway Design Engineer Jeff Love, PE, ENV SP, Lead Drainage Engineer Ken Fowler, PE
- **Ferrovial Internacional** – Maintenance Manager Craig Willsher

E. PROJECT DEVELOPMENT PLAN SUMMARY

Section C – Project Development Plan describes our approach to safe, efficient and high-quality services. Features of our plan include:

- **Project Management Plan** – An organizational approach that facilitates efficient project delivery including on-time completion, protection of the environment, safety for workers and the public, consistent and timely public communication and a commitment to exceed the disadvantaged business enterprise (DBE) goal
- **Quality Management Plan** – A commitment to a project quality management plan that can be certified under ISO 9001:2008 requirements and incorporates the construction quality acceptance firm and TxDOT’s owner verification processes
- **Technical Solutions** – Innovative design and construction solutions that deliver high-quality improvements and add value for TxDOT, the community, the project’s stakeholders and the traveling public

1 | PROJECT MANAGEMENT PLAN

Our project management plan serves as the team’s guiding document, clearly designating assumptions and decisions regarding management processes, approvals, dispute resolutions and overall project control. Addressing design, construction and maintenance, it provides a holistic management approach on a continuum as the project progresses. Following are highlights of our project management plan.

Communication, Coordination and Documentation

Our approach is to maximize face-to-face meetings or teleconferences when possible, and then document decisions in writing using email or more formal communication methods. This preference for conversations facilitates open dialogue and exchange of ideas, optimal delivery of technical solutions and quick resolution of

HOUSTON AREA EXPERTS

Headquartered in Houston, Webber has completed projects valued at more than \$600 million in the area.

Granite has had a large local presence in Houston since 2007 while building the \$1.3 billion Houston METRO light rail project.

OTHON has successfully completed more than 57 projects in the Houston region and 70 projects within the State of Texas.

Ninyo & Moore maintains a full-service laboratory in Houston that is A2LA accredited and regularly performs construction materials testing in accordance with TxDOT and ASTM standards.



In addition to regular group meetings, our team will work one on one to discuss status and resolve issues.

TEAM CO-LOCATION

Co-location of our team with TxDOT staff, subconsultants, subcontractors, suppliers and third parties enhances coordination, promotes communication and streamlines decision-making.

issues — it also assures TxDOT the lowest possible life-cycle costs and best value. From our organizational philosophy to our execution plan, we use comprehensive interfaces to identify and address concerns, and honor contract commitments:

- **Co-location** – Key personnel and core team in central location to facilitate communication and streamline decision-making
- **Technical Working Groups** – Cross-functional teams focused on a single element (roadways, structures, utilities, etc.) for disciplinary collaboration and integration
- **Project Meetings** – Regular meetings with agendas, minutes and action items
- **Documentation** – Electronic document management system (Document Locator by ColumbiaSoft) enhanced with field tablets to facilitate timely document distribution, version control and work flow management
- **Railroad, Utility and Third-party Coordination** – Dedicated coordinators assigned to each stakeholder to establish solid relationships and information flow

Training Programs

Our quality program and corporate culture value continuous improvement. Training is one tool we will use to achieve quality, comply with the requirements and incorporate lessons learned. Our comprehensive training program starts upon arrival to the project with a project-specific new worker safety and environmental orientation and badging program for all employees as well as specialized trainings depending on roles and responsibilities. For training on site, we will use Webber’s dedicated training and mobile classroom.

Safety

The fundamental goal of our safety program is zero accidents. All management and workers are responsible for implementing safe practices, will be recognized for safety and will be part of the process for continually improving our safety program. The safety and health of our workers and the general public is our number one priority — we want everyone in the project area to go home safely every night!

Risk

We have already begun the process of anticipating problems and implementing solutions using our structured risk assessment and mitigation process that complies with ISO 3100 International Standards. Our risk matrix (on pages 19 and 20 in *Section C – Project Development Plan*) details our approach to the following anticipated risks:

- Borrow material shortages
- Right-of-way acquisition versus schedule challenges
- Utilities relocation and/or protection, especially with the numerous large pipelines
- Environmental
- Geotechnical

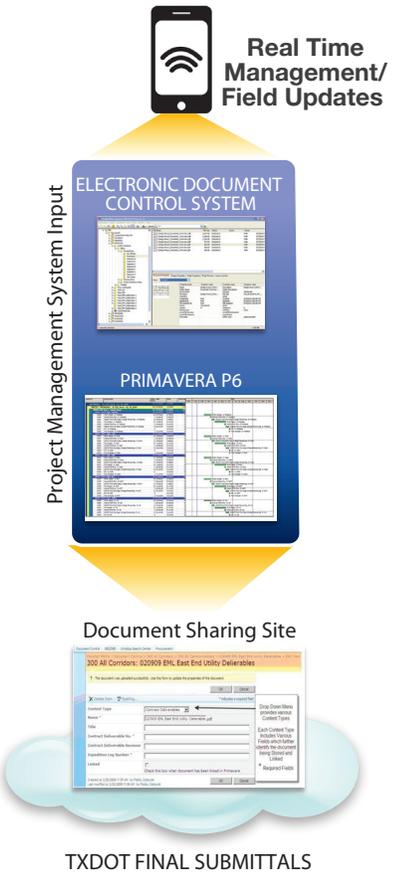
Cost/Schedule Control

Our schedule shows an on-time completion of the project within 1,674 days after notice to proceed and includes a 180-day window for installation and testing of the toll system infrastructure. Schedule and cost control is critical for success and tends to be dynamic, especially in a design-build environment. Our team must retain flexibility to respond to the inevitable changes that occur.




TABLET TECHNOLOGY SUPPORTS SUCCESS

On the North Tarrant Express Segment 3A project, our teams use field tablets, combined with Document Locator. Seen here, our senior inspector uses the tablet to document compliance with the quality management plan.

Field tablets linked with the document management system allow schedulers to update schedules quickly in the field. The tablets also allow field entry of quality activities, linked to the schedule by activity and location.

Document, Cost Control and Schedule Management

We will use collaborative cost, scheduling and document management software. While we will generate the reports and schedule updates required by TxDOT, the real benefit of the applications is that they are adaptable and contingency-focused; they track costs using the resource-loading feature; and they facilitate evaluation of production rates and what-if scenarios. Our schedule, cost and document management systems will be fully compatible with TxDOT systems.

Mitigating Potential TxDOT Cost Increases

We will proactively manage items that could result in cost increases to TxDOT:

- **Unknown Conditions** – Early identification and resolution of potential issues such as discovery of hazardous materials or other unforeseen conditions
- **Change Orders** – Where possible, offsetting any additional TxDOT requests into the project budget with value engineering concepts
- **Third-party Betterments** – Recognizing betterments and securing funding from the appropriate stakeholder before proceeding
- **Right-of-way Costs** – Offsetting right-of-way costs with lower capital element costs where possible (such as additional retaining walls to eliminate parcel takes)

Environmental Management

Respect for the environment and quality service are basic elements of our corporate culture. We will fulfill the environmental commitments, optimize the use of natural resources, prevent pollution and control the environmental impacts associated with our activities. Our environmental compliance team will lead our activities to achieve environmental compliance and integration of the commitments into our work. We will certify the project’s environmental program in compliance with ISO 14001:2004.

Ensuring Compliance with all Environmental Commitments

We will incorporate all planning commitments into the project using the comprehensive environmental protection program that is based on our overarching environmental management system (EMS). We will use the EMS to track ongoing issues, identify environmental compliances and noncompliances, and identify actions required/taken to correct any instances of noncompliance. Approvals defined in the EMS will be implemented and reflected during design, construction and maintenance phases, as shown in Figure ES-1. Elements of note include:

- **Environmental Compliance and Mitigation Plan** – Compliance strategies and procedures to meet all commitments, and ensure completion of corrective actions
- **Environmental Re-evaluation** – Triggers for initiating or re-initiating environmental compliance actions
- **Environmental Protection Training Plan** – Trains team to identify environmental resources and on actions to take to avoid, minimize and/or mitigate impacts
- **Hazardous Materials Management Plan** – Safe handling, storage, treatment and/or disposal of hazardous materials
- **Construction Monitoring Plan** – Protocols for monitoring and documenting environmental commitments and compliance including the inspection points program (witness and hold points) and field tablets that contain current documents, checklists and inspection forms

Figure ES-1: EMS for Each Project Phase



ENVIRONMENTAL PROGRAM CERTIFICATION

We will obtain certification for both the project’s environmental program in compliance with ISO 14001:2004 as well as its quality program in compliance with ISO 9001:2008.

Tolling Facility Infrastructure Coordination

TxDOT's goal is to have a completed, operational road — including the toll system elements provided by the systems integrator. Because our work elements are inter-reliant, it is vital to establish and maintain collaboration, coordination and excellent communication between our team and TxDOT's systems integrator. We will incorporate the tolling infrastructure and systems integrator's work into our schedule, ensuring that the activities, dependencies and durations are accurately represented and provide 180 days before substantial completion for toll infrastructure commissioning. We will establish early and regular coordination meetings and protocols; identify interface points (utility conduits, utility boxes, equipment cabinets and long-lead procurements); and manage shared right-of-way access during construction to facilitate on-time opening of the new roadway.

Maintenance Management Plan

Our objective is to provide the best possible experience to the user — one that entices drivers to use the safe, reliable and faster alternative of the toll lanes. We will apply best practices and experience gained from maintenance on more than 40,400 miles of roadways as the basis of our approach for maintaining the pavement, structures, earthwork and embankments. Use of field tablets by both the maintenance and quality teams allows close coordination for efficient allocation of resources with seamless integration into the asset maintenance management system.

2 | QUALITY MANAGEMENT PLAN

Our quality management plans will comply with ISO 9001:2008 for quality systems, quality plans and quality audits or most current version, as updated by the International Standards Organization and the requirements of TxDOT's *Design-Build Quality Assurance Program Implementation Guide*. We will also achieve ISO certification of our quality management system for this project.

Quality Program Overview and Commitment

We assume responsibility for the professional quality, technical accuracy and coordination of all services. Our quality management system follows the principles of ISO 9001, and includes comprehensive quality control and quality assurance functions that are independent of each other. The quality program is implemented at notice to proceed and maintained through completion of the maintenance period. The quality management plans will include quality procedures that fully and seamlessly integrate with the construction quality acceptance and TxDOT's independent verification processes.

Continuous Improvement Program

Train. Do. Audit. Refine. Our corporate culture is one of continuous improvement. Annually, lead partner Ferrovial Agroman will establish quality objectives that contribute to the quality of what is delivered — in this case, providing a safe and quality roadway. The four cornerstones of our quality management system (Figure ES-2 on the next page) demonstrate our continuous improvement process.



VALUE ADDED – PROJECT CERTIFICATION

In addition to complying with ISO 9001: 2008 (exceeding TxDOT's ISO 9001:2000 requirement), we will achieve ISO certification of our quality management system for this project.

Quality Management Plan

A living document that is updated to reflect opportunities and changed conditions, the quality management plan (QMP) will be structured with regard to decision-making and operations, yet flexible enough to foster continual improvement. Our integrated quality management system, and the resulting ISO-compliant QMP, has proven effective on previous TxDOT projects (such as the North Tarrant Express Segments 1 and 2 and the I-635 LBJ Express projects) and is ready to implement. The QMP consists of the design, construction and maintenance quality management plans, each of which defines the specific procedures for quality and quality improvement for its element of work. All subconsultants and subcontractors will use our QMP.

Design Quality

Design deliverables go through a rigorous in-house quality process to verify that they consider contract requirements and design standards, constructability, usability, reliability, availability, maintainability, operability, safety, life-cycle costs and aesthetics. All plans, final submittals, specifications, calculations and reports for design changes will be stamped, signed and dated by a registered professional engineer. In all cases, the design quality manager will certify in writing that the design (or change) has been made in accordance with the requirements of the contract documents, applicable law and governmental approvals; checked in accordance with our approved design quality management plan; and consistently prepared. He will certify compliance of every package, including changes.

Construction Quality

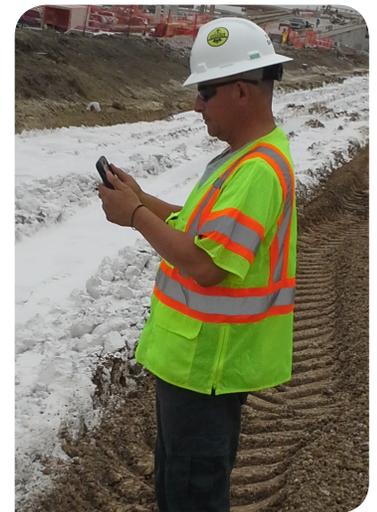
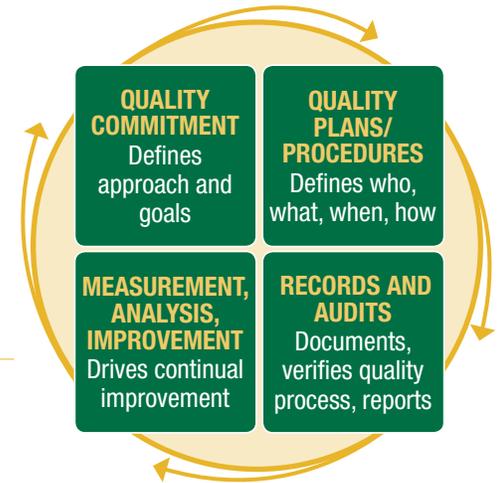
During construction, witness inspection or hold points will be identified in our daily look-ahead and four-week rolling schedules. Our production teams will conduct quality control testing and inspection, and our construction quality manager will verify construction forces and suppliers comply with the quality plan and that work is ready for acceptance inspection. The construction quality acceptance firm will verify compliance with the design specifications, details and drawings, applicable TxDOT specifications and other requirements. Inspection and testing plans will provide procedures and criteria for testing and sampling, and will set out competency and certification requirements for personnel performing testing and inspection. Our construction quality manager will provide quality assurance and identify areas for continuous improvement by auditing the process for frequency of testing and inspection, trending of test results, closure of nonconformance reports, certification of laboratories and consistency of daily inspection reports.

Maintenance Quality

Our maintenance quality assurance process includes audit and analysis of data to provide continual improvement in our services. On a daily basis, our maintenance quality manager will conduct quality assurance as follows:

- Promote and ensure the quality and environmental commitments are met and training is conducted
- Implement and ensure maintenance and compliance with the maintenance quality management plan
- Develop and recommend quality procedures and corrective actions
- Conduct management reviews and other audits

Figure ES-2: Four Cornerstones of Our Quality Management System



Field tablets with uploads to our document control system (similar to those used here on North Tarrant Express Segment 3A) will be used by our quality control team and the construction quality acceptance firm.

Quality Documentation

Quality management documentation will be shared and archived in an electronic document management system that is compatible with TxDOT’s. The construction and maintenance quality teams will use field tablets that contain the current versions of the approved drawings and checklists for each inspection program point (both witness and hold points). Forms accessible on the tablets result in better consistency of inspection between personnel, and avoid gaps. The tablets also eliminate delays in transmitting information from the field to the office, the construction quality acceptance firm, TxDOT and the asset management system — the forms upload wirelessly. Photos contain global positioning system locations along with date and time stamps. The system is also used for tracking nonconformance detection, reporting and resolution.

Audits

Our quality team or our corporate quality departments will conduct audits of our team compliance with the QMP. Audits are scheduled on the basis of the status and importance of the activity to be audited, and will include internal departments, suppliers, consultants and subcontractors, and, in particular, our project management plan implementation.

3 | TECHNICAL SOLUTIONS

Added Value Components

Summarized on our project map (Figure ES-5) on page 10, our team developed alternative technical concepts (ATC) and other innovative design and construction solutions that provide added value  to the project for TxDOT, the community, the project’s stakeholders, and/or the traveling public. Our high-quality design exceeds TxDOT’s requirements  in many areas and provides benefits including:

- Improved safety (both during and after construction)
- Reduced environmental impacts
- Reduced future work for TxDOT to accommodate the Ultimate Configuration
- Reduced impacts to area residents
- Reduced right-of-way acquisition
- Accelerated construction
- Reduced cost

Project Schedule and Construction Sequencing Approach

The schedule has been divided into four different segments, following the project segmentation, with work starting concurrently in all segments. We begin with the right-of-way acquisition process to allow work areas for construction activities. As right-of-way becomes available, utility relocations will begin. At locations with no utility conflict, we will start bridge construction and water crossings. At the same time, earthwork activities in areas between bridges will start concurrently with the ditch excavation, eliminating the need for temporary longitudinal drainage. Almost all the embankments within the bridge approach areas consider settlement waiting time before finalizing the abutment embankments, given the geotechnical requirements.

QUALITY AND THE ENVIRONMENT

Our quality process for implementing and maintaining erosion control best management practices calls for starting with sensitive areas and working towards less sensitive areas. This approach allows for the more sensitive areas to be maintained first and, in periods of significant rain, more often.



Stormwater pollution prevention and protection best management practices placed on the Trinity River in Dallas



ATC 18 eliminates environmental impacts to Wetland D and Water C since no change to the exterior slopes is required.

MAINTAINING MOBILITY AT I-10

On I-10, all beams will be placed during a single night for minimal disruption.

Effective Traffic Management

Our team developed construction sequencing and traffic management plan solutions that minimize disruption and impacts to the traveling public, stakeholders and the surrounding communities. Strategies include:

- Working within TxDOT’s existing right-of-way in Segment I-2
- Limiting cross street closures to brief, off-peak closures for bridge construction
- Covering truck loads, requiring vehicle speed reductions and using watering and chemical stabilization to control dust and debris
- Establishing and enforcing emissions and noise control standards
- Minimizing or eliminating night work adjacent to communities
- Testing plans for using portable lights for night work
- Monitoring and limiting work hours for activities that might disturb local residents
- Verifying equipment muffler systems are in effect and properly maintained
- Planning work to prevent damage to adjacent properties

In addition to minimizing disruption, our construction staging was driven by several important constraints:

- Right-of-way availability
- Utility relocations
- Meeting settlement rates for abutments in the greenfield areas
- Logistical rates for moving material from one area to another without having to cross canals until bridges are built

Proven Right-of-way Acquisition Approach

Having performed three similar project for TxDOT’s Special Projects Division, our team has researched and developed the least obtrusive right-of-way acquisition plan. Our plan includes co-location with TxDOT’s right-of-way team to maximize efficiency of the acquisition package submittal process for the 372 properties. We also made key adjustments to our design and construction approach based on right-of-way availability. For example, we provided access roads to landlocked parcels (reducing TxDOT’s exposure to possible damages costs) and reduced the amount of right-of-way needed in two areas by re-aligning ramps. We also prioritized parcels to be used for bridge abutments to meet the required settlement durations.

Utilities

Our goal is to avoid relocation of the large number of utility lines on this project whenever possible by designing the roadway around the utilities and, for areas where that is not possible, constructing bridges or protecting the utilities in place. We have met with most of the major utility owners (with TxDOT approval), have developed a thorough understanding of the existing data and have used the Barlow Equation to calculate the factor of safety for several pipelines. Our experienced utility team will implement best practices from past TxDOT projects and develop collaborative relationships with each utility owner focused on schedule needs, resource allocation and problem-resolution to avoid delays that could impact the overall project.



SCHEDULE INNOVATION

Our dual-path approach to right-of-way acquisitions will expedite the condemnation process, should it become unavoidable. This approach mitigates potential schedule impacts (by up to 90 days) created by right-of-way possession delays.



UTILITY COORDINATION IS CRITICAL

Utility impacts can have a significant impact on schedule and cost. We will implement proven strategies such as:

- Assigning dedicated utility staff members to serve as single points of contact with utility owners
- Interacting early with the utilities
- Meeting often with the utilities
- Using modern utility locating tools to locate impacted utilities early in the schedule



ACCOMMODATING THE ULTIMATE CONFIGURATION



- Our design anticipates future direct connectors at both the SH 99/U.S. 59 and SH 99/ I-10 intersections
- In areas where channel improvements are needed, our design exceeds requirements by constructing the channels to accommodate the SH 99 Ultimate Configuration footprint, reducing TxDOT’s future construction costs
- Locating ditches outside of the footprint of the Ultimate Configuration saves TxDOT time and money in the future

F. DBE, MENTORING AND JOB TRAINING APPROACH

We will establish programs to maximize the utilization of both DBE firms and a diverse workforce through comprehensive outreach, training and compliance. We commit to exceeding the 10 percent DBE participation goal for design, construction and maintenance. Through the small business capacity-building mentoring program, we will train, utilize and aspire to build capacity in DBE firms. We will also establish and maintain a comprehensive job training program.

Areas Where DBE Firms Could Be Utilized

Our team already includes several DBE firms that have proven track records of supporting complex design-build infrastructure projects. While we will self-perform work that is critical to the project — such as traffic control, construction of certain structures, routine maintenance, erosion control and concrete paving — we plan to subcontract work in the categories shown in Figure ES-4.

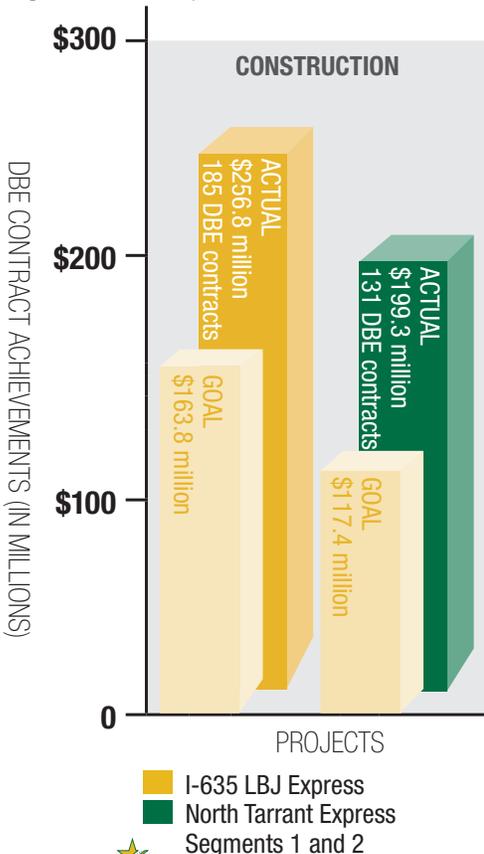
Mentoring DBE Firms

Our goal is project success — and that means we need successful DBE and other small business firms that completely understand their role, the physical completion of the work and the administrative and reporting requirements. To address the need, we will conduct a small business capacity-building mentoring program.

Bid Packages Sized for Small Business Participation

We will create appropriately sized trade packages by identifying work packages small businesses can perform or breaking larger packages into smaller ones. We will target selected procurements for only small businesses and require larger

Figure ES-3: Example DBE Performance



subcontractors to meet the DBE goal for their portions of the work. We will also use flexible bonding requirements, help firms buy specialized equipment and employ other similar strategies to overcome some of the barriers to entry.

Job Training Plan

Our goal is to maintain and grow a diverse, skilled workforce. We are committed to providing development opportunities for women and minorities in the skilled construction trades. To identify candidates, we will conduct systematic and direct recruitment with minority and women organizations such as the Urban League and the local chambers. As members of the Associated General Contractors of Texas, our team members will use the comprehensive on-the-job training program accepted by TxDOT and will customize it by trade to focus on workforce concerns and increase participation.

EXCEEDING THE DBE GOAL

We commit to exceeding the DBE goal of 10 percent. Our team currently includes four DBE partners:

- Lead engineering team member OTHON
- Drainage consultant CivilTech
- Construction quality acceptance firm Alliance Geotechnical
- Environmental consultant Cox | McLain

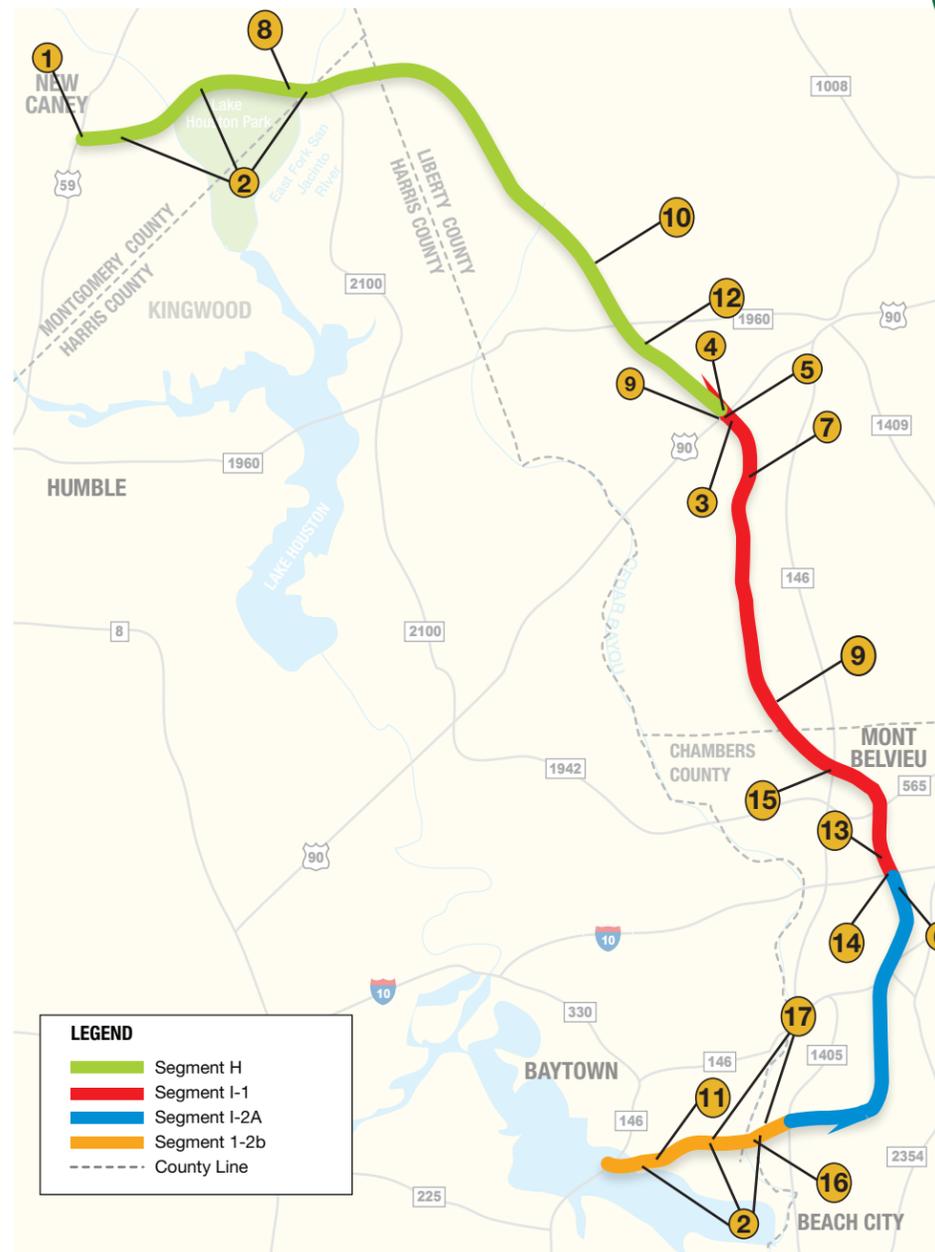


Indus Construction (DBE) working on I-635 LBJ Express to install soil nail walls

Figure ES-4: Projected Areas for DBE Utilization

WORK CATEGORIES
• Bridge construction work
• Construction survey
• Concrete flatwork/pavement
• Demolition and removal
• Drainage
• Electrical, lighting, signalization
• Environmental
• Erosion and sediment control
• Excavation/earthwork
• Ground maintenance services
• Guardrail
• Landscaping
• Material testing
• Metal and precast material supply
• Quality control
• Rebar/reinforcing steel
• Technical design and engineering
• Towing
• Trucking
• Utility construction

Figure ES-5: Project Map



VALUE ADDED COMPONENTS

- 1 Vertical Clearance to/from U.S. 59 Connectors**
Modified vertical alignment at U.S. 59 to ensure that vertical clearance is maintained to and from direct connectors under construction and proposed for the Ultimate Configuration
- 2 Recycled Pavement**
Re-using demolished concrete for base, sub-base and fill material reduces cost while also enhancing the project's overall sustainability
- 3 Cross Culvert at Station 2310+00**
Reduced the high skew of a more than 1,000-foot-long culvert crossing the alignment at station 2310+00 to perpendicular and provided a side ditch parallel to the alignment resulting in reduced future maintenance and construction cost
- 4 Sustainable Approach to Balancing Earthwork**
Shallow borrow pits in the U.S. 90 interchange loops and ramps that we will build to improve earthwork balance will do double-duty as detention ponds, meeting TxDOT's air quality goal by reducing truck emissions
- 5 U.S. 90 Interchange**
Increased radius at U.S. 90 interchange ramps 11A and 11D to achieve a 50-mile-per-hour design speed along the entire ramp with transition curves before and after the 35-mile-per-hour radii for added safety
- 6 New Barrel at Watercrossing #69 (Station 3090+07)**
A 177-foot new barrel (36-inch reinforced concrete pipe) will be designed parallel to the existing one, to avoid flooding impacts in the road

- 7 ATC 24 – Segment I-1 Culverts on Ramps at FM 1413**
Replaced two ramp bridges over Big Ditch Canal with multiple barrel culverts (while maintaining canal capacity) for a safer connection, reduced future bridge maintenance costs for TxDOT, improved constructability, accelerated schedule and reduced construction cost
- 8 Efficient Structure Design**
Moved the frontage road turn alignments from station 1390+00 to station 1395+00 closer together to reduce the structure crossing over them
- 9 Avoid Utility Conflicts**
Place bridge bents so that pipelines can remain in place, avoiding their relocation
- 10 Efficient Structure Design Around Station 2000+00**
Optimized the vertical profile between CR 621 and the Union Pacific Railroad tracks so the long bridge can be shortened into two smaller bridges (one for each crossing)
- 11 ATC 18 – Widen Goose Lake Bridges Toward the Inside**
Widening the bridges over Goose Lake toward the inside rather than the outside resulting in:
 - ✓ Minimized wetland impacts
 - ✓ Elimination of the need to relocate a water pipeline
 - ✓ A reduction in the amount of retaining walls in the area
- 12 ATC 21 – Bridge Design Efficiency**
Replaced bridge structure with a culvert structure for crossing number 28 located at approximately station 2136+00 for reduced future maintenance cost, accelerated construction and reduced cost now and when the Ultimate Configuration is constructed

- 13 Transition Four Lanes to Two Lanes**
Adjusted horizontal alignment of the transition from four to two lanes at Future Thoroughfare #6 to avoid extra bridge widening (southbound inside edge) not used in the Ultimate Configuration
- 14 Frontage Road Locations**
Locating horizontal alignment of frontage roads from Future Thoroughfare #6 to I-10 closer to proposed right-of-way to minimize the length and height of retaining walls between the mainlanes and frontage roads
- 15 SH 146 Crossing and Utility Corridors**
Several refinements to geometry and extension of bridge over SH 146 (beyond requirements) to accommodate turn-around and avoid impacts to utility pipelines
- 16 Ramp Re-alignments**
Re-aligning the roadway and ramps to eliminate the need to relocate existing facilities including the CenterPoint Energy transmission towers and the Crown Castle communications towers, reducing impacts to adjacent facilities
- 17 Adjacent Projects Coordination**
Providing seamless coordination with Webber's team constructing TxDOT's Cedar Bayou Bridge project

- Enhanced Geotechnical Investigation**
Performing our own geotechnical investigation during the proposal phase enabled us to produce a more accurate design and reduce risk, and will also result in accelerated mobilization upon notice to proceed (elements affected by this include embankment settlement analysis, bridge foundation design, pavement subgrade strength and treatment needs)
- No Lane Closures**
Our traffic control plans include only limited overnight closures for bridge construction, minimizing impacts to daily users and exceeding TxDOT requirements
- Shoulder Cross Slope**
Increased shoulder cross slope to increase pavement drainage rate, reduce hydroplaning hazard and minimize embankment footprint where compatible with Ultimate Configuration
- Extra Wide Shoulders**
Increased required shoulder to improve stopping sight distance deficiencies (approximate stations: 1015+00, 1192+00, 1235+00, 2244+00, 2295+00, 3118+00, 202+00, 482+00)

- Minimum Vertical Grade**
Increased mainlane and frontage road minimum grade to 0.35 percent (instead of allowed 0.1 percent) to facilitate drainage and reduce hydroplaning hazard
- Access to Land-locked Parcels**
Providing access roads to parcels that are landlocked by the project right-of-way which are beyond what is shown on the reference concept plans
- Detention and Erosion Control**
In addition to providing stormwater detention storage, oversized roadside ditches will be used to provide added water quality treatment capabilities (as required by the Texas Commission on Environmental Quality)
- Optimization of Vertical Profile**
While the roadway alignment is designed to be above the required water elevation, the vertical alignment has been improved to reduce the earthwork deficit within the right-of-way

- ATC 7 – Precast Beam Strength**
Increased the prestressed concrete girder release strength from 6,000 psi to 6,500 psi to maximize efficiency of the standard Tx girder shape resulting in reduced overall maintenance costs and improved ease of structure maintenance
- Retaining Wall Reductions**
Moved ramp alignment away from the centerline to allow for embankment in between, reducing the need for retaining walls
- Horizontal Geometry Refinements**
Increased horizontal radius to meet stopping sight distance requirements within the right-of-way without the need for extra wide shoulder (13 locations at approximate stations: 1145+00, 1295+00, 1375+00, 1442+00, 1490+00, 1685+00, 1750+00, 1995+00, 2038+00, 2073+00, 2122+00, 2295+00)
- On-site Batch Plants**
Having multiple on-site batch plants along the alignment reduces schedule and cost risk while also reducing truck traffic, improving air and noise quality and minimizing traffic impacts
- Re-using Cleared Material**
Chipping cleared material on site and using it for added erosion control and temporary haul road slope stabilization reduces truck traffic and enhances sustainability

We have provided numerous — more than 25! — features that provide TxDOT and stakeholders with added value. Benefits of these elements include reduced future work for TxDOT to accommodate the Ultimate Configuration, reduced impacts to area residents, improved sustainability, reduced need to acquire right-of-way, accelerated construction and reduced cost.