

TEXAS DEPARTMENT OF TRANSPORTATION
TECHNICAL PROVISIONS
FOR
LOOP 1604 WESTERN EXTENSION
DESIGN-BUILD PROJECT

ATTACHMENT 1-3

OPTION ENVIRONMENTAL SCHEMATIC
SCOPE OF WORK

JUNE 27, 2013

Option Environmental Schematic Scope of Work

The schematic design shall be prepared to meet TxDOT standards and practices as detailed in the *TxDOT Roadway Design Manual* and the *TxDOT Project Development Process Manual*, Chapter 2, Section 5. DB Contractor shall:

- A. Include ATCs requested by TxDOT into the design of the Option.
- B. Supplement geotechnical surveys and pavement design data provided by TxDOT, if needed.

Supplemental data shall meet the requirements of the Technical Provisions.

- C. Develop preliminary geotechnical report

The preliminary geotechnical report shall meet the requirements of Section 8.2.1 of the Technical Provisions.

- D. Supplement survey data provided by TxDOT, if needed.

Supplemental survey data shall meet the requirements of the Technical Provisions.

- E. Place title block at both ends of the schematic plots. The title blocks shall include the following elements:

- i. "Preliminary Design Schematic"
 - ii. Control-section-job number
 - iii. Project limits
 - iv. Station equations
 - v. County
 - vi. Design speeds
 - vii. Average daily traffic (current and projected years)
 - viii. Scale (graphic and written)
 - ix. Roll or sheet number
 - x. Responsible engineer office
 - xi. Signature block for responsible engineer/company and signatures
 - xii. Current date
 - xiii. Design exceptions
 - xiv. Highway/roadway classification(s)
 - xv. project location map

- F. Develop existing and proposed typical sections. The existing and proposed typical section shall contain the following elements:

- i. Number of lanes
 - ii. Pavement, shoulder and median widths
 - iii. Location of profile grade line and horizontal alignment line
 - iv. Existing and proposed ROW lines and border width

- v. Pavement cross slope
- vi. Type of pavement structure (graphical representation of layers or bridge)
- vii. Side slopes
- viii. Station limits (where applicable)
- ix. Curb, rail and/or barrier
- x. Sidewalks

G. Develop geometric layout

Utilize collected data and travel demand model to perform an existing and future-year transportation analysis. Employ approved traffic modeling software to verify acceptable (at a minimum, LOS, ramp separation, weaving distances) operations of ramp, main lane and frontage road configurations.

The horizontal alignment and vertical profile shall consider: existing terrain; utilities; roadway and roadway intersections; bicycle lanes; horizontal and vertical clearances; drainage structures and improvements, pedestrian facilities and ADA compliance; bus facilities; side street access improvements; aesthetic and landscape treatments; ROW boundaries; bridge and structure locations; guide signs, retaining, and/or noise wall locations and other pertinent design criteria elements.

The geometric schematic plan view shall contain the following design elements:

- i. Geopak calculated roadway alignments for mainlanes, ramps, direct connectors, frontage roads and intersecting streets at grade separations (including PC and PT points and bearings) and horizontal curve data shown in tabular format.
- ii. Pavement edges, curb lines, sidewalks for all roadway improvements
- iii. Proposed structure locations including abutment, bent and rail locations
- iv. Limits of retaining and/or noise walls
- v. Existing and proposed drainage structures
- vi. Existing and proposed major utilities
- vii. Existing property lines
- viii. ROW requirements provided by TxDOT
- ix. Control-of-access limits provided by TxDOT
- x. Limits of construction, pavement widening, pavement transitions, etc.
- xi. Existing and projected (design year) traffic volumes
- xii. Location and text of the proposed mainlane guide signs and the preliminary locations for changeable message signs
- xiii. Lane lines, shoulder lines, and direction of traffic flow arrows indicating the number of lanes on all roadways
- xiv. North arrow
- xv. Benchmark locations and elevations
- xvi. City limit lines

The geometric schematic profile view shall contain the following design elements:

- i. Calculated profile grade and vertical curve data including "K" values for the mainlanes, frontage roads, connectors, ramps, and intersecting streets

- ii. Existing ground line profiles along the mainlanes
- iii. Grade separations and overpasses
- iv. Calculated vertical clearances at grade separations and overpasses
 - v. Existing and proposed bridges and/or drainage structures (including design year and 100-year flood elevations)
- vi. Begin and end stations
- vii. Elevations on the vertical scale
- viii. Station numbers on the horizontal scale
- ix. Proposed and existing elevations of reference line

The calculated profile grade for frontage roads, connectors, ramps and intersecting streets can be shown on separate supplemental profile rolls.

H. Determine guide signing

After collecting and reviewing existing data, prepare a signing schematic for large signs including proposed wording, advance distance notification intervals and sign support structure type (roadside or overhead) for review. In lieu of a separate signing schematic, the signing information may be included in the geometric schematic plan.

I. Perform preliminary planning for bridges

A bridge type evaluation shall be performed for the purpose of establishing structural depth and geometric conditions for the elevated structures. The bridge type shall be evaluated considering geometric constraints, environmental constraints, constructability limitations and construction cost evaluations and shall consider both the superstructure configuration and the necessary substructure configuration to meet constraints.

J. Establish preliminary retaining and/or noise wall locations

Proposed wall locations shall be identified as necessary in areas subject to constraints (space, sight distance, or other conditions) or where needs for noise mitigation measures have been identified. The retaining and/or noise wall locations shall be detailed in the geometric schematic plan.

K. Perform preliminary hydrologic and hydraulic studies

Conduct a comprehensive drainage study for the Option in conjunction with development of the schematic for limits of the Option. The study approach and findings shall be documented in a single report. A professional engineer registered in the state of Texas shall sign and seal five copies of the drainage analysis/preliminary report. Design of the work shall be prepared in accordance with applicable requirements of TxDOT Specifications, Standards and Manuals.

- i. Schedule and attend meetings on a regular basis for drainage coordination. Coordinate through TxDOT all communication with applicable government agencies.
- ii. Identify existing drainage outfalls along the project route.
- iii. Obtain available hydrologic and hydraulic data and computer models (HEC-1 and HEC-2) from FEMA (and/or applicable local drainage authorities to the extent possible) for use in analysis and determination of existing 2, 5, 10, 25, 50, 100 water surface elevations at creeks, and ditch crossings along the project.
- iv. Prepare a watershed map and identify existing drainage boundaries
 - v. Compute peak flows for the existing and proposed outfall drainage systems in accordance with TxDOT's Hydraulic Manual based on the rational method or other approved methodology.
- vi. Obtain the profile of natural ground along the proposed right-of-way from the mapping.
- vii. Superimpose the 2, 5, 10, 25, 50, and 100-year water surface elevations on the profile of the natural ground along each proposed right-of-way
- viii. Determine a hydraulic gradeline starting at the outfall channels for each proposed storm sewer system in order to obtain a design tailwater for each system.
- ix. Based on preliminary roadway vertical profile define proposed drainage system including storm sewer and outfall channel improvements.
 - x. Determine drainage areas and flows for any cross culvert drainage systems. Size proposed systems in accordance with TxDOT design criteria.
 - xi. Perform calculations and layouts for water quality treatment as required by the Water Pollution Abatement Plan (WPAP).
 - xii. Preliminary Impact Analysis - Impact analyses are required on creeks, and ditches as related to the TxDOT and FEMA criteria for 10-year and 100-year storms. The required approach for impact prediction is presented below:
- xiii. Compute right-of-way corridor 100-year floodplain volumes for proposed roadway elevations and calculate the quantity of the cut and fill within the 100-year floodplain, if any occur. No decrease in 100-year floodplain storage is allowed by TxDOT or other government agencies.
- xiv. Compute existing and proposed peak flows using hydraulic and hydrologic methodology and computer models.
 - xv. Compute mitigation volume required for the 100-year storm.
- xvi. Prepare conceptual 100-year sheet flow analysis for project utilizing existing and proposed conditions.
- xvii. Define a mitigation plan for development impacts as well as floodplain mitigation. Identify floodplain mitigation sites in coordination with environmental mitigation sites, to the extent practicable, and provide geometry.
- xviii. Determine final sizing of detention facilities and incorporate NPDES stormwater controls.
- xix. Prepare draft Preliminary Impact Analysis report for the project. If mitigation is needed, location of storage volume and/or approaches to satisfy government agencies shall be defined. The report shall include discussions of alternatives considered, a comparative cost associated with each alternative, and a recommended solution.

L. The DB Contractor shall use Geopak to generate preliminary cross-sections every one hundred (100) feet in conjunction with the Geometric Schematic. The DB Contractor shall prepare roll plots of the cross-sections.

M. Identify existing utilities

The existing utilities identified shall be included in the schematic drawings on a separate drawing level. Any known proposed utility corridors shall be shown on the typical sections of the schematic plan.

N. Conceptual traffic control and construction sequencing

A preliminary traffic control and sequence of construction plan shall be prepared to describe construction activities during each stage of construction. The sequence of construction shall be described primarily through the use of typical sections for the corridor in general, and with plan view exhibits showing how operations and access at typical intersections and typical driveways will be maintained. Handling of traffic shall be considered in the development of preliminary designs.

Deliverables

- Preliminary geotechnical report
- Two (2) draft copies of the Preliminary Drainage Study
- Two (2) copies of Technical Memorandum containing Traffic Modeling results and existing and future-year transportation analysis
- Eight (8) copies of the Geometric Schematic layouts (1 inch = 100 feet)
- Eight (8) copies of the Supplemental Profiles rolls
- Three (3) copy of the Preliminary Cross-Sections in a roll plot format
- Six (6) final copies of the Preliminary Drainage Study
- Eight (8) copies of the Preliminary Construction Sequence Layouts
- Native electronic files shall be furnished to TxDOT on a CD or DVD Recordable media