



Texas Department of Transportation

DESIGN-BUILD SPECIAL SPECIFICATION

Item 10,000

November 9, 2018

Design-Build Special Specification Item 10,000

Skillman/Audelia Interchange



10000.1 **General Requirements**

The City of Dallas has planned for local enhancements associated with the proposed improvements to Skillman Street and Audelia Road (CSJ: 2374-01-171), herein referred to as the Skillman/Audelia Interchange. These local enhancements include roadway improvements, construction of a single-span tied-arch Skillman/Audelia bridge over I-635, and aesthetic improvements that are unique to the Skillman/Audelia interchange.

DB Contractor shall design and construct the interchange in conformance with the Contract Documents, current TxDOT policies and procedures, design manuals, TxDOT Standard Specifications and Special Specifications, applicable City of Dallas Codes and Ordinances, TxDOT Schematic Design, the approved I-635 LBJ East Aesthetic Technical Guidelines, Skillman-Audelia Hardscape and Landscape Aesthetic Concept Plan, which are included in the RIDs, the requirements set forth in this Item 10,000, and the requirements set forth in Items 19, 21, 23 and 28.

10000.2 **Roadways**

DB Contractor shall design and construct the Skillman/Audelia interchange roadway improvements in accordance with the TxDOT Schematic Design and the requirements set forth in Item 19 and as amended below by the clauses included with this Item 10,000.

10000.2.1 **Roadway Design Requirements**

DB Contractor shall design the elements of the Project related to the Skillman/Audelia interchange (as defined in Section 10000.1) to meet or exceed the geometric design criteria shown in Table 10000-1.

Table 10000-1: Skillman/Audelia Interchange Geometric Design Criteria

Items [1]	Skillman Street	Audelia Road (North)	Audelia Road (South)	Whitehurst Drive	Adleta Court	U-turn
Roadway Classification	Urban Arterial	Urban Arterial	Urban Arterial	Major Collector	Local Access	Urban Arterial
Type of Facility	Low-Speed	Low-Speed	Low-Speed	Low-Speed	Low-Speed	Low-Speed
Design Speed (mph)	40 mph	40 mph	35 mph	30 mph	30 mph	15 mph
Horizontal Alignment						
Stopping Sight Distance (ft)	305	305	250	200	200	80
Min Radius NC (w/o superelevation)	762	762	510	333	333	50
Min Radius RC	593	593	408	273	273	44
Superelevation Rate (%)	e(Max) = 4%	e(Max) = 4%	e(Max) = 4%	e(Max) = 4%	e(Max) = 4%	e(Max)=4%
Relative Grade for Super Transition	0.58% Relative Gradient	0.58% Relative Gradient	0.62% Relative Gradient	0.66% Relative Gradient	0.66% Relative Gradient	0.78% Relative Gradient
Vertical Alignment						
Type of Terrain	Level	Level	Level	Level	Level	Level
Longitudinal Gradient	0.35% Min 7% Max	0.35% Min 7% Max	0.35% Min 7% Max	0.35% Min 9% Max	0.35% Min 5% Max, 8% Max (Commercial)	0.35% Min 7% Max
K Value for Crest Curves, Min	44	44	29	19	19	3
K Value for Sag Curves, Min	64	64	49	37	37	10
Grade Change without a Vertical Curve	1.0 % Max	1.0 % Max	1.0 % Max	1.0 % Max	1.0 % Max	1.0% Max
Vertical Clearance						
Roadways	16'-6"	16'-6"	16'-6"	16'-6"	16'-6"	16'-6"
Cross-Sectional Elements						
Normal Cross Slope	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%
Width of Travel Lanes [2]	11' Min 14' Min Outside Shared Use	11' Min 14' Min Outside Shared Use	11' Min 14' Min Outside Shared Use	11' Min 14' Min Outside Shared Use	11' Min	20' Min
Width of Bike Lanes	N/A	5' Clear from Face of Curb	5' Clear from Face of Curb	N/A	5' Clear from Face of Curb	N/A
Buffer for the Bike Lane	N/A	2'	2'	N/A	2'	N/A
Width of Two Way Cycle Track	8'	N/A	N/A	N/A	N/A	N/A
Buffer for the Two Way Cycle Track [3]	5'	N/A	N/A	N/A	N/A	N/A
Shoulder Widths						
Inside	N/A	N/A	N/A	N/A	N/A	N/A
Outside	N/A	N/A	N/A	N/A	N/A	N/A
Width of Speed Change Lane	10' Min	10' Min	10' Min	10' Min	9' Min	N/A
Medians/Managed Lane Separation	Raised 6' Min	Raised 6' Min	Raised 6' Min	Raised 6' Min	Raised 6' Min	N/A
Offset to Face of Curb	1' Min, 2' Des	1' Min, 2' Des	1' Min, 2' Des	1' Min, 2' Des	1' Min, 2' Des	1' Min, 2' Des
Clear Zone Width	Curb: 4' Min, 6' Des Uncurbed: 10'	Curb: 4' Min, 6' Des Uncurbed: 10'	Curb: 4' Min, 6' Des Uncurbed: 10'	Curb: 4' Min, 6' Des Uncurbed: 10'	Curb: 4' Min, 6' Des Uncurbed: 10'	Curb: 4' Min, 6' Des Uncurbed: 10'
Side Slopes						
Within Clear Zone	4:1 Max	4:1 Max	4:1 Max	4:1Max	4:1 Max	4:1 Max
Outside Clear Zone	3:1 Max	3:1 Max	3:1 Max	3:1 Max	3:1 Max	3:1 Max
Sidewalk Width [4]	5' Min (with 4' to 6' buffer) 6' Min (Adjacent to Curb)	5' Min (with 4' to 6' buffer) 6' Min (Adjacent to Curb)	5' Min (with 4' to 6' buffer) 6' Min (Adjacent to Curb)	5' Min (with 4' to 6' buffer) 6' Min (Adjacent to Curb)	5' Min (with 4' to 6' buffer) 6' Min (Adjacent to Curb)	N/A
Border Width [7]	15' Min, 20' Des	15' Min, 20' Des	15' Min, 20' Des	15' Min, 20' Des	15' Min, 20' Des	N/A
Intersections						
Cross Streets Corner Radii Design Vehicles	WB-62	WB-62	WB-62	WB-62	WB-62	WB-62
Intersection Sight Distance	Intersection sight distance to be determined by the various cases shown in AASHTO.					
Driveways Corner Radii [5]	25'	25'	25'	25'	25'	25'

Notes:

[1] References: TxDOT *Roadway Design Manual* (April 2018); AASHTO *A Policy on Geometric Design of Highways and Streets* (2004); TxDOT *Bridge Project Development Manual* (December 2012); AASHTO *HOV Guide* (2004); AASHTO *A Policy on Geometric Design of Highways and Streets* (2011); AASHTO *Guide for the Development of Bicycle Facilities* (2012).

[2] If dedicated bicycle lanes are utilized in lieu of shared-use lanes, the bike lane should provide 5 ft. clear from face of curb plus a 2-foot buffer to the nearest travel lane. The 14-foot outside share use lane is measured from the longitudinal joint of the gutter pan to lane stripe. The gutter pan/curb offset is not included as part of the usable width.

[3] A traffic barrier or railing should be provided between the cycle track and the roadway if a 5-foot buffer cannot be provided.

[5] Sidewalk designs including street and driveway crossing should be ADA compliant.

[6] Driveway corner radii shall not be less than the existing radii.

[7] Border width less than the minimum requirement of 15 feet will be allowed only at locations shown on TxDOT Schematic Design.

10000.3 Structures General Requirements

DB Contractor shall design and construct the Skillman/Audelia bridge in accordance with the requirements set forth in Item 21, this Item 10,000, current TxDOT policies and procedures, design manuals, and TxDOT Standard Specifications and Special Specifications. Fracture critical members shall not be used unless approved by TxDOT. The design of the Skillman/Audelia bridge shall meet the aesthetic and visual intent of the requirements set forth below and the preliminary set of plans located in the RIDs.

10000.4 Structures Design Requirements

Deviations from requirements in this Item 10,000 shall not be permitted unless review and approved by TxDOT at its sole discretion.

DB Contractor shall design and construct the Skillman/Audelia bridge to be comprised of two exterior arches with two exterior arch bottom chords, a partial center arch with a center girder, beam bracings and a series of arch cables as shown in Figure 1 and Figure 4.

The alignment of the Skillman/Audelia bridge shall not deviate more than 10 feet from the centerline at any point along the entire length of the alignment shown on the TxDOT Schematic Design.

DB Contractor shall design the arches to address the vehicular collision force requirements as described in the TxDOT *Bridge Design Manual – LRFD*, Chapter 2, Section 2. DB Contractor shall fabricate all tension steel members subject to live loads using a fracture control plan in accordance with American Welding Society (AWS) *D1.5, Bridge Welding Code*.

The hanger cables shall be protected from vehicular impacts.

10000.4.1 Bridge Deck and Superstructures

The Skillman/Audelia bridge over I-635 shall be designed as a single-span structure with an appearance of a tied-arch structure. The bridge shall span all general purpose lanes, ramps, and managed lanes from center-to-center of bearing and maintain a minimum 16'-6" vertical clearance below the bridge low chord to the proposed roadway below.

The total width of the bridge, with the inclusion of a traffic rail along the left and right edges, shall be designed to include all travel lanes, including both u-turns, bicycle lanes, two-way cycle tracks, and sidewalks as shown on the TxDOT Schematic Design and in accordance with the requirements set forth in Item 19, Item 28 and Item 10,000. The total width of the bridge shall increase near the abutments to accommodate the turning radius of the design vehicle listed in the specifications.

The bridge shall consist of two exterior tied arches and a center partial arch. The exterior arches shall be sloped inward from a minimum of 10° to a maximum of 20° from the vertical and measure a minimum of 60'-6" from the profile grade line (PGL) to the crown. The center partial arch shall measure a minimum of 60'-6" from the PGL to outside crown and have a minimum vertical clearance of 32'-0" above the PGL at each end. DB Contractor shall design the partial arch to support a center girder via hanger cables and determine the number of cables required.

The depth of the superstructure shall be limited to:

- 6' below the top of finished deck at the centerline of the center girder
- 6'-5" above the top of finished deck at the centerline of the exterior girders
- a maximum of 33" for the floor beams

The cross slope of the bridge deck shall be designed to a maximum of 2%.

The geometry of the arch structural elements is described below in Figure 2. All steel arches and girders shall have a typical box section as shown in Figure 3 below.

10000.4.1.1 Hanger Cables

Cables shall be arrayed as described in the sections, figures, and tables below.

10000.4.1.2 West and East Arches

DB Contractor shall design and construct the west and east arches with a series of hanger cables. Half of the total hangers shall be located inside the arch centerline and the other half shall be located outside the arch centerline. Each hanger cable shall have a minimum of an equivalent outside diameter of a cable consisting of 22 ~ 0.6" diameter tendons. The hanger geometry is detailed below. The inside hangers shall all slope in the same general direction and the outside hangers shall all slope in the opposite direction. The west and east arches shall be constructed with hangers that match the geometry described in this section and Figure 1 through Figure 4.

10000.4.1.3 Center Arch

Each hanger cable at the partial arch shall be vertical and have a minimum of an equivalent outside diameter of a cable consisting of 43 ~ 0.6" diameter tendons. The hangers shall be located symmetrically along the length of the partial arch and shall be spaced evenly across the partial center arch. The partial arch and center girder shall be constructed with hangers that match the geometry described in this section and Figure 1 through Figure 5.

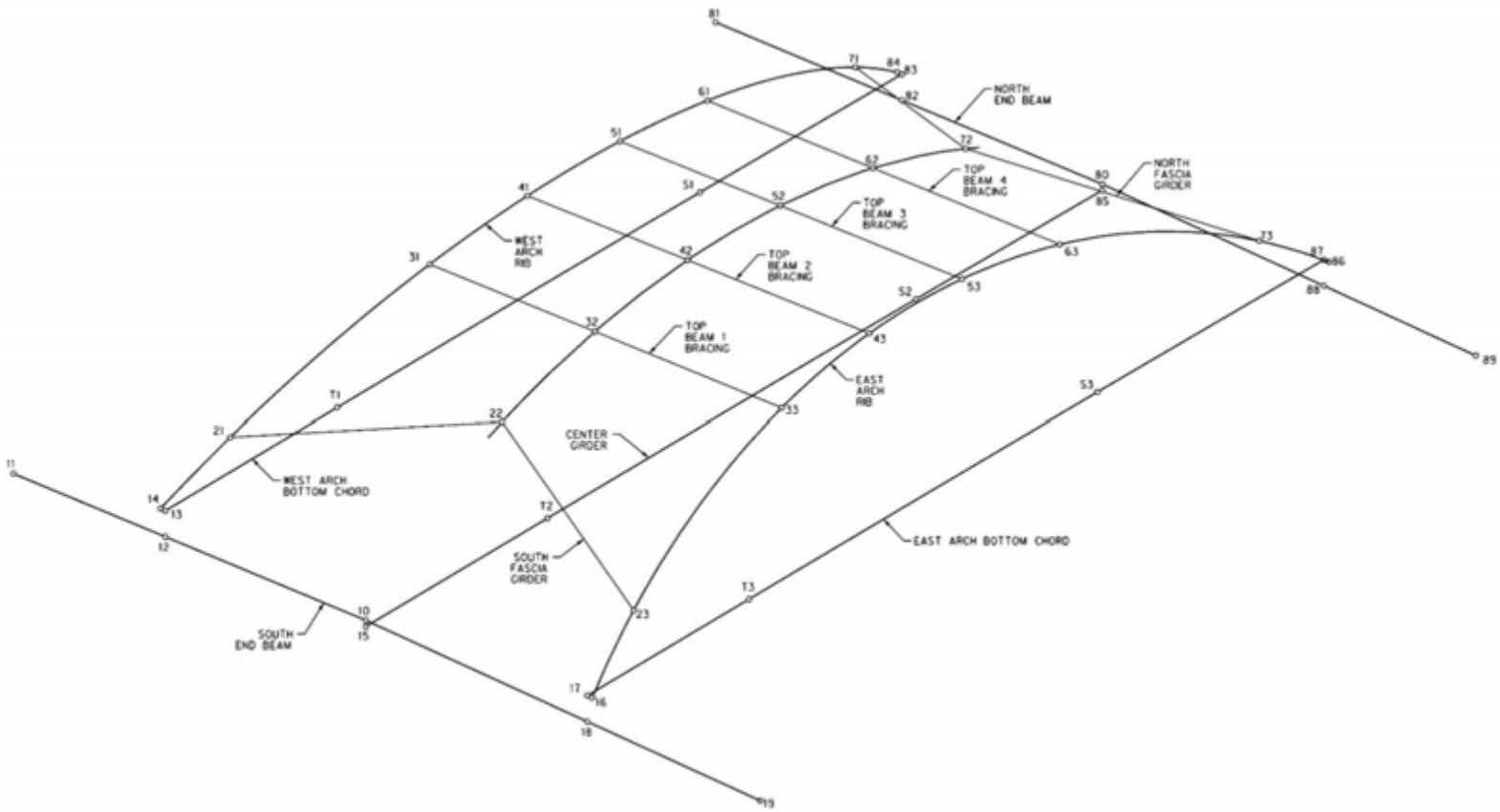


Figure 1: Bridge Frame

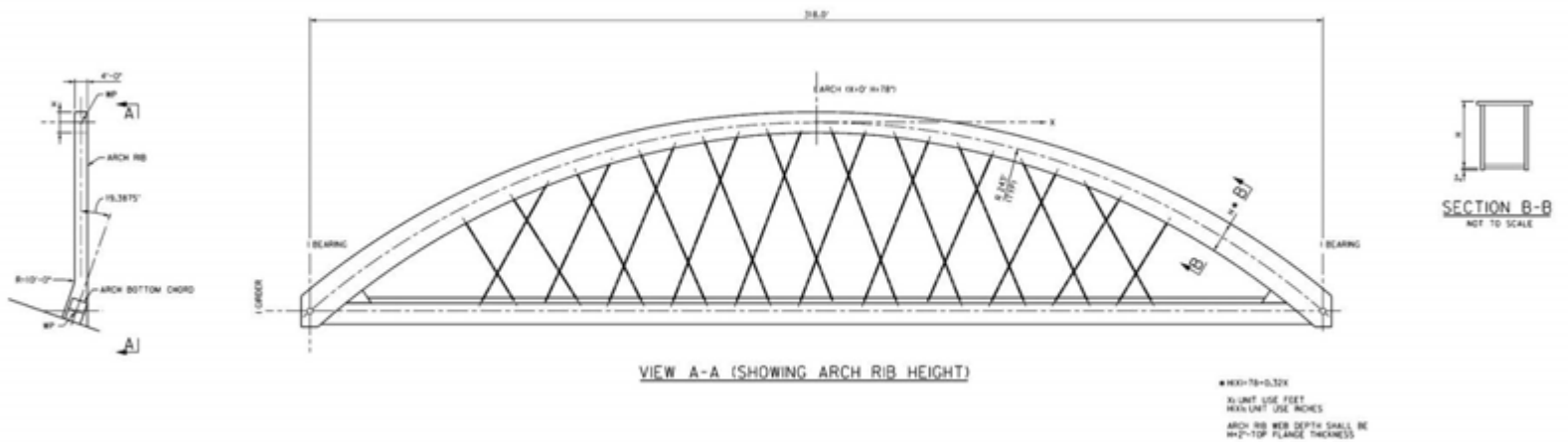


Figure 2: Arch Framing Geometry

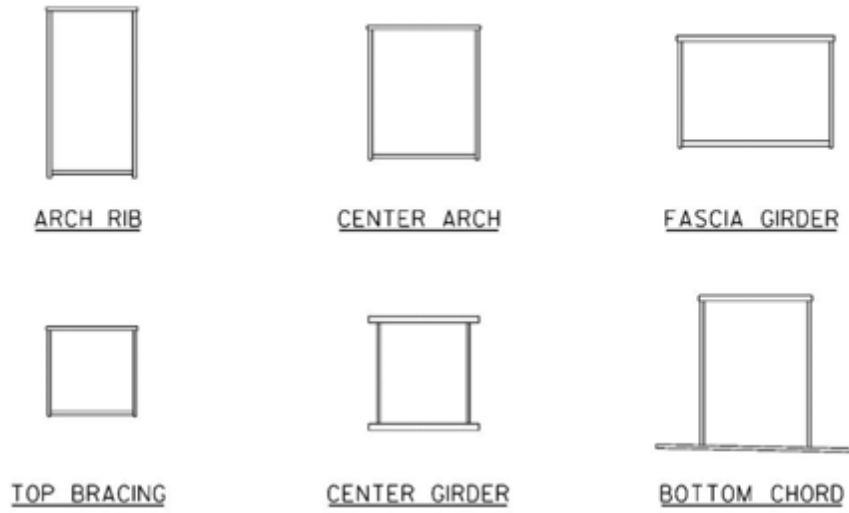


Figure 3: Typical Arch and Girder Sections

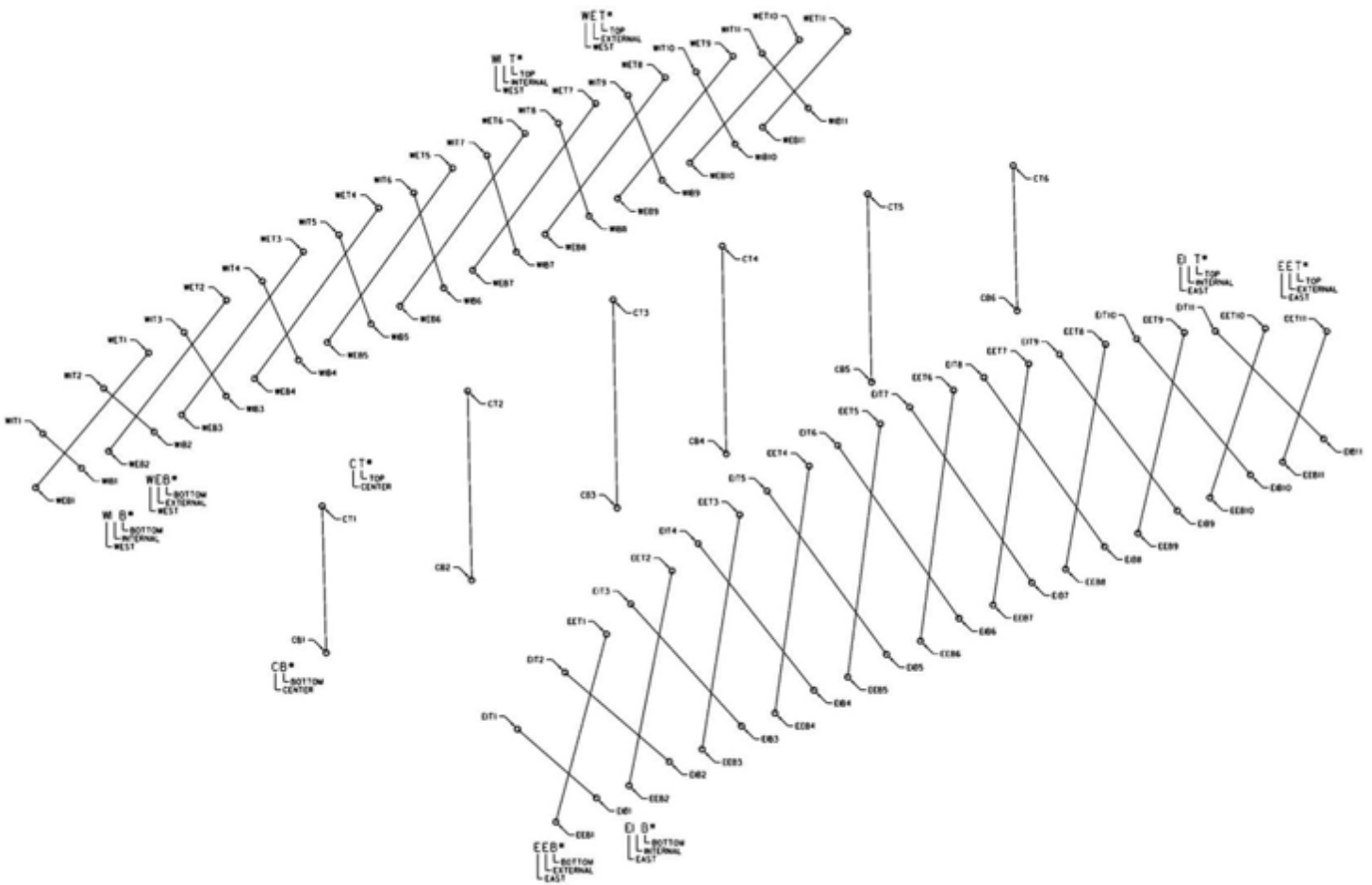


Figure 4: Isometric Hanger Cable View

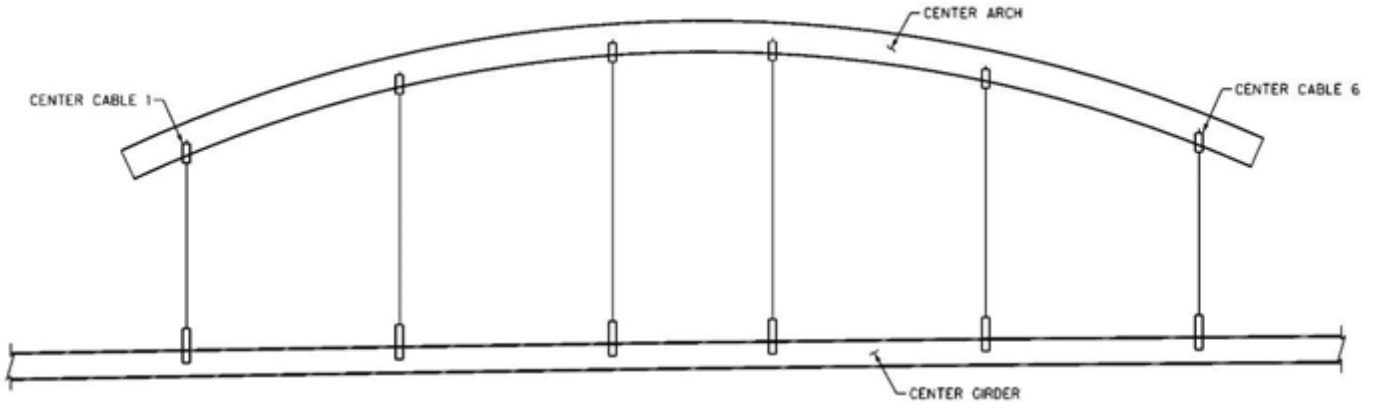


Figure 5: Center Arch Hanger Cables

10000.4.2 **Concrete Design**

Concrete design shall be in accordance with Item 21.

10000.4.3 **Post-Tensioning Design**

Post-Tension strands shall be designed in accordance with TxDOT Standard Specification Item 426.

10000.4.4 **Bridge Substructure**

10000.4.4.1 **Abutments**

Each bridge abutment shall be a vertical abutment. DB Contractor shall design and construct retaining walls in accordance with Item 21.

10000.4.5 **In-Service Design Documentations**

DB Contractor shall develop, engineer and submit the design calculations for the in-service structure. Design documentations shall include, but is not limited to, the following design calculations:

- Minimum and maximum vertical and horizontal reactions at all support locations
- The expected maximum bearing, shear, compression and tensile stresses in the arch as produced by the in-service condition.
- Design of arch and deck camber curves
- Cable design loads and stressing sequence
- Vortex shedding investigation and potential dynamic amplification

10000.5 **Construction Requirements**

Construction shall be in accordance with Item 21, TxDOT Standard Specifications, and is supplemented by the following:

10000.5.1 **Erection Manual**

DB Contractor shall develop, engineer, and submit a detailed erection manual for the fabrication and erection of the following:

- Arch and temporary column foundations
- Arches
- Longitudinal girders
- Floor beams and bracing
- Precast concrete panels
- Cast-in-place concrete deck
- Bearings
- Cables

The erection manual shall follow the applicable portions of the current TxDOT Standard Specifications and this Item 10,000.

A Professional Engineer licensed in the State of Texas (DB Contractor's erection engineer) is required to prepare and seal all design calculations, plans, methods and procedures to be used in the submitted erection manual for approval. The DB Contractor's structural engineer shall have proven experience in the erection engineering of arch bridges or other cable supported structures.

Submit the erection manual to the Engineer of Record for approval prior to fabrication and construction of the Skillman/Audelia bridge. The erection manual will outline the intended methods of constructing the bridge components.

Any deviation from the approved construction loads and erection sequence shall be submitted to the Engineer of Record for review prior to those steps occurring. Work shall not start prior to receipt by the DB Contractor of the Engineer of Record's review and approval of the proposed changes to the erection manual.

10000.5.1.1 **Erection Design Details**

The erection manual shall include, but not be limited to, the following design details:

- Complete sequence of erection for temporary and permanent structures
- All erection equipment to be used on site
- All shored excavations
- Installation procedures and schedules for all temporary falsework supports, including any proposed limits of required excavation and subsequent recompaction of the temporary staging work areas
- Crane mats and other temporary foundations including size and locations
- Temporary falsework supports of the steel superstructure
- Temporary bracing and falsework as required for the erection of the arch
- Cable system, including bridge cables, anchors, HDPE pipes and jacks
- All proposed bolting procedures
- All proposed field welding procedures
- Falsework removal plan
- Deck and Arch required camber
- Traffic Control Plan for all construction phases

10000.5.1.2 **Methods and Procedures for Erection**

The erection manual shall include, but not be limited to, the following methods and procedures:

- Details and limits of any structures including temporary falsework supports and open excavations
- Sequence for installing temporary falsework supports, permanent bearings, removing temporary falsework supports and transferring loads to permanent bearings at the abutments
- Sequence and manner of erecting arch segments and supporting components prior to installation of cables including details indicating provisions for stability of the partially erected arches
- Sequence and schedule for erection of the composite concrete and steel deck system including all intermediate procedures relating to staging of steel erection, placement of precast deck panels and concrete slab pouring sequence
- Sequence and manner for performing, testing and inspecting all bolted connections
- Sequence and manner for performing, testing and inspecting all field welding procedures including provisions for protecting welding operations from exposure to inclement weather conditions
- Sequence and manner of installing and stressing cables including details of cable fabrication, stressing monitoring, cable lengths, shims, stressing order as well as a complete history of the initial jacking force, any supplemental jacking forces and incremental loads for each cable
- Details of the disposition and use of special erection equipment, falsework, temporary supports, including all loads or reactions from such equipment applied to the structure during erection and sequences and timings of these effects in accordance with the erection schedule; details shall address method of attachments to any permanent structure element and subsequent removal of attachments

10000.5.1.3 **Factors of Safety**

The erection manual shall include the factors of safety for all applicable equipment and procedures to be used as agreed upon by the Engineer of Record. These factors of safety shall be specified by the DB Contractor's erection engineer.

10000.5.1.4 **Erection Design Calculations**

The erection manual shall include, but not be limited to, the following design calculations:

- Design and details of any temporary falsework support foundations and shored excavations
- Design and details of all temporary falsework supports and temporary bracing and subsequent temporary connections to the permanent structures

- Minimum and maximum vertical and horizontal reactions at all temporary falsework support locations
- The expected maximum bearing, shear, compression and tensile stresses in the steel arch as may be produced with the Contractor's proposed sequences and methods of erection
- Verification that the permanent structure is not overstressed during erection including computations of moments, shears, axial loads and other forces in the arches and composite superstructure at a sufficient number of points to demonstrate that the load demand will not exceed the capacity and allowable stresses for erection
- Design of arch and deck camber curves
- Methods and procedures for verifying and correcting any discrepancies in the arch alignment; absolute tolerance in arch alignment is $\pm 0.02\%$
- Methods and procedures for verifying and correcting any discrepancies in the elevations of the deck after completion of erection; absolute tolerance in deck elevation cable attachment points shall follow, within a tolerance of ± 0.05 ft., a smooth parabolic curve passing through the final deck elevation at the centerline of bridge
- Methods and procedures for verifying and correcting any discrepancies in the cable loads after completion of erection; cables shall be adjusted for the dead load condition such that each individual cable shall not exceed values at $\pm 5\%$ of the cable dead load computed from approved working drawings (it is possible that one individual cable may have to be adjusted to lesser tolerances to prevent stress in other cables from exceeding the $\pm 5\%$ tolerance)
- Final cable adjustments, if required, shall be performed after all other dead loads are in place

10000.6

Cable Assemblies

Cable assemblies shall be constructed in a manner that will allow the force in the cable to be adjusted at the live end and allow the cable to be completely de-tensioned and removed during the service life of the bridge without damaging the surrounding structure.

10000.6.1

Strand Fabrication

Strands shall be made on machines of sufficient size to ensure good workmanship and shall be fabricated in the greatest length possible. Once the manufacture of the strand has been started, no changes shall be made to the grade of wire, construction, or lay of strand, or other factors which affect the uniformity of the product.

Strand and assemblies shall show a well-defined and uniform elastic stretch and recovery under stressing as measured during proof loading operations.

10000.6.2

Anchorage Fabrication

All anchorages shall be designed to meet or exceed the specified minimum strand breaking strength and allow for addition of damping as necessary.

10000.6.3

Installation

Install strands and anchorages in accordance with the approved shop drawings.

10000.6.4

Cable Testing

DB Contractor shall develop cable testing criteria and procedures, and acceptance and rejection criteria and submit to the Engineer of Record for review and approval prior to fabrication of cable anchorages or installation of cable assemblies. This work shall consist of the furnishing of all materials, anchors, cable specimens, strand specimens and all labor and equipment for fatigue, ultimate fatigue strength, ductility and static load testing as follows:

- Fatigue and ultimate strength of fully assembled cables for acceptance of the anchorage system
- Ductility and fatigue strength of individual strand for acceptance of strand to be incorporated into the final structure

The testing shall include but not be limited to the following:

- Cable Acceptance Test

- Fatigue Acceptance Test
- Quality Control Testing of Cable Materials
- Tensile Fatigue and Static Testing
- Ductility Testing

10000.6.5

Painting

Paint all structure using color "09010" per the RAL color chart in accordance with TxDOT Standard Specifications Item 441, Item 446 and Item 427 depending on the material selected.

DB Contractor shall coat steel components in accordance with following:

- Paint all steel structural elements, except the arch and box girders using protective System IV paint in accordance with TxDOT Standard Specifications Item 446. There is no Federal Standard 595b color that matches the architectural color requirement; use color "09010" per the RAL color chart.

Paint the arch and box girders with the following paint specification:

- Outside of arch and box girders only:
 - 3 mils DFT - Zinc rich primer
 - 5 mils DFT - Polysiloxane appearance coat
- Inside of arch and box girders only:
 - 3 mils DFT - Zinc rich primer

After all concrete placement has been completed, DB Contractor shall remove any concrete or other contaminate from the structural steel members by hand cleaning methods so as not to damage the primer and then water blast/ wash with a minimum of 2,500 psi pressure.

Faying surfaces shall have a Class B slip coefficient. If this cannot be achieved with the selected prime coat, DB Contractor shall leave faying surfaces unpainted and blast clean to achieve a Class B slip coefficient.

DB Contractor shall coat concrete components, except the deck, with silicone based paint in accordance with TxDOT Standard Specification Item 427 using the color indicated above.

Finish concrete structures surface area "I" with an opaque sealer of RAL color "09010" in accordance TxDOT Standard Specification Item 427.

DB Contractor shall ensure that surfaces are free of weak surface material, curing compounds and other surface contaminants prior to coating.

DB Contractor shall provide a sample panel(s) with the specified color and paint system for review and approval prior to the painting of the bridge. The panel(s) will be a minimum of 2' x 2' on the same steel grade selected for fabrication.

10000.7

Maintenance and Inspection

An owner's manual shall be developed to include maintenance and inspection procedures and frequencies of all components of the bridge, and submitted to TxDOT. The inspection procedures shall follow the National Bridge Inspection requirements.

10000.8

Shop Drawings

DB Contractor shall submit shop drawings for review and approval to the Engineer of Record prior to any fabrication. Shop drawings must be signed and sealed by a Professional Engineer licensed in the State of Texas and provide the following:

- Specification of the structural strands and anchors to be used
- Connection details between the strand to the structure including boots, spacers, bands/fasteners, and other accessories
- Initial and final tensioning methods
- Sequencing for cable erection

DB Contractor shall provide documents demonstrating that the manufacturer has satisfactory experience in fabricating and erecting the structural strand assembly in at least five projects during the past ten years and capability in performing the work.

DB Contractor shall provide a twelve-inch (12") sample of the structural strand as well as hardware assemblies required for the project for review and approval to the Engineer of Record.

DB Contractor shall provide test reports from an independent laboratory certifying that the structural strand assemblies proposed for use have been tested and met all requirements shown on the plans and set forth in this specification. Structural strand testing shall meet requirements of ASTM A 416. All costs for testing will be borne by the DB Contractor.

Once the shop drawings are approved, DB Contractor shall include manufacturer's manuals for installation, inspection, and maintenance as part of the owner's manual to TxDOT for review and approval.

10000.9

Utilities

The existing 24" water pipe elevated on a utility bridge adjacent to the Skillman/Audelia bridge shall be relocated to underground across the proposed I-635 mainlanes and managed lanes. The existing 24" water pipe shall be upgraded to a 36" water pipe and designed to meet the design requirements set forth in Item 21 and Dallas Water Utilities (DWU) design standards. DWU will be responsible for the cost of the betterment to upgrade the water pipe from the existing 24" to 36".

10000.10

Aesthetic Concepts General Requirements

DB Contractor shall design and construct the Skillman/Audelia interchange aesthetic treatments for the roadway, illumination, structures and landscaping elements in accordance with this Item 10,000 and Item 23 along with the approved I-635 LBJ East Aesthetic Technical Guidelines, Skillman-Audelia Hardscape and Landscape Aesthetic Concept Plan, and Skillman-Audelia Lighting Concept and Fixtures located in the RIDs.

10000.10.1

Landscaping

DB Contractor shall reserve the following areas at the Skillman/Audelia Interchange as shown on the Skillman-Audelia Hardscape and Landscape Aesthetic Concept, located in the RIDs, for City of Dallas's future landscaping

- Southeast corner of the proposed Skillman Street/Audelia Road intersection, south of I-635
- Northwest corner of the proposed Skillman Street/Audelia Road intersection, north of I-635, and
- Along proposed Skillman Road and Audelia Road 30 feet from back of curb or ROW line from back of curve, whichever one is smaller

DB Contractor is not anticipated to be responsible for the actual planting in the reserved areas for future planting by City of Dallas other than the sodding requirements of Item 18, Item 23 and TxDOT Standard Specifications.

DB Contractor shall install irrigation sleeves within the Project's ROW for City of Dallas' future planting as shown in the Skillman-Audelia Hardscape and Landscape Aesthetic Concept, located in the RIDs. DB Contractor shall not be responsible for irrigation sleeves that fall outside of the Project ROW.

10000.10.2

Walls and Sign Columns

DB Contractor shall design noise/sound walls and retaining walls located within the limits of the Skillman/Audelia interchange with the color, texture, style and aesthetic treatment presented in the approved I-635 LBJ East Aesthetic Technical Guidelines. DB Contractor shall apply aesthetic treatments to the vertical surfaces of retaining and noise/sound and the retaining walls where the surface is visible from the roadway or adjacent residential dwelling units. Consistent treatments shall be used for retaining and noise/sound walls and exposed concrete column sign structures that articulate the design themes established. DB Contractor shall clearly detail and identify how wall patterns shall be incorporated into the chosen design solution.

The roadside face of noise/sound walls and the side of the noise/sound walls facing away from the roadway shall follow the aesthetic appearance in the approved I-635 LBJ East Aesthetic Technical Guidelines.

Large sign columns shall be designed with the color, texture, style and aesthetic treatment presented in the approved I-635 LBJ East Aesthetic Technical Guidelines.

10000.10.3 **Bridge**

All aesthetic treatments for structural Elements shall be designed and constructed in accordance with this Item 10,000 and coordinated with DB Contractor's structural designer team to facilitate constructability and maintain safety requirements.

Color specifications for the Skillman/Audelia bridge are defined in this Item 10,000.

10000.10.4 **Trees, Shrubs, and Other Plant Materials**

DB Contractor shall adhere to Item 23.

10000.10.5 **Riprap, Paving, and Pavers**

DB Contractor shall design and construct the hardscape for pedestrian and roadway in accordance with the Skillman-Audelia Hardscape and Landscape Aesthetic Concept located in the RIDs and Item 23.

Hardscape installations shall be included at the following locations:

- Intersection at Skillman Street/Whitehurst Drive/Audelia Road
- Intersection at Skillman Street/Eastbound Frontage Road
- Skillman Street Bridge
- Intersection at Skillman Street/Westbound Frontage Road
- Intersection at Skillman Street/Audelia Road/Adleta Court

DB Contractor shall provide concrete paving and paver hardscape elements that meet the intent presented in the Skillman-Audelia Hardscape and Landscape Aesthetic Concepts located in the RIDs and meet the requirements of TxDOT Standard Specification Item 528: Colored Textured Concrete and Landscape Pavers. Color specifications for hardscape elements including pavers and concrete paving are defined in the Skillman-Audelia Hardscape and Landscape Aesthetic Concept located in the RIDs.

10000.10.6 **Color Palette**

DB Contractor shall submit a plan that indicates where color is to be applied based on the I-635 LBJ East Aesthetic Technical Guidelines and the aesthetic requirements listed in this Item 10,000. 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.

10000.10.7 **Illumination Concept**

DB Contractor shall prepare an illumination aesthetic plan that meets the intent of the Skillman-Audelia Lighting Concept and Fixtures located in the RIDs. The illumination aesthetic plan shall identify each light fixture (i.e., roadside lighting, bridge lighting, and under bridge fixture) and type of light fixture (i.e., Light Emitting Diode (LED) lighting, point source lighting, and High Intensity Discharge lamps). DB Contractor shall perform photometric design of all proposed lighting, including high mast lighting, continuous lighting, underpass lighting, pedestrian lighting and aesthetic bridge lighting to meet the requirements in TxDOT's *Highway Illumination Manual*. Highway illumination on I-635 shall not detract from the Skillman/Audelia bridge aesthetic lighting while meeting TxDOT's safety lighting requirements. No lighting fixtures shall intrude on the sidewalk. The illumination design shall meet the requirements of TxDOT Standard Specification Item 610: Roadway Illumination Assemblies.

10000.10.7.1 **Skillman/Audelia Bridge Lighting**

The illumination layout plan shall meet the intent of Lighting Concept 1 for the Skillman/Audelia bridge in the Skillman-Audelia Lighting Concept and Fixtures located in the RIDs. The illumination layout plan shall identify bridge lighting fixtures that can provide the same lighting effect as the bridge lighting fixtures selected in the Skillman-Audelia Lighting Concept and Fixtures, or provide approved equivalent.

The bridge illumination shall be comprised of a color changing DMX aesthetic lighting system that features three main light fixtures to enhance the three main structural features of the arch bridge as the following:

- Outer Arches and Cables
- Cross-ribs
- Center Arch

10000.10.7.2 **Roadway and Pedestrian Lighting**

The illumination layout plan shall include pedestrian lighting along Skillman Street and Audelia Road. City of Dallas Master Spec Dwg. No. 131-19176-003 (Poulson NYPA/59W LED/4000K/120-277V/BLK 734/TRI/TWIN/12'/BLK 734/DIMMING 7 POLE PC-RECP/TAMPER PROOF) shall be used as the pedestrian lighting fixture. Pedestrian lighting fixture shall be installed every 75' along Skillman Street and Audelia Road.

Continuous roadway lighting shall be provided along either side of Audelia Road (within the construction limits).

Continuous roadway lighting shall be provided within the median of Skillman Street. Additionally, pedestrian lighting shall be provided adjacent to the sidewalks on Skillman Street. No lighting fixtures shall intrude into sidewalks.

10000.10.8 **Construction Requirements**

DB Contractor shall follow the construction requirements outlined in Item 23 and as identified this Item 10,000.

10000.11 **Submittals**

All submittals described in this Item 10,000 shall be in accordance with the schedule and for the purpose (approval, review and comment, for information) set forth in Table 10,000-2.

Table 10,000-2: Submittals to TxDOT

Submittals	Submittal Schedule	TxDOT Action	Reference Section
In-Service Design Documentations	Prior to completion of bridge construction	For Information	10,000.4.5
Erection Manual	Prior to bridge construction	For Information	10,000.5.1
Cable Material and Assemblies Testing Results	Prior to bridge construction	For Information	10,000.6.4
Owner's Manual	Prior to completion of bridge construction	Review and Approval	10,000.7
Shop Drawings	Prior to fabrication of the bridge	For Information	10,000.8
Illumination Aesthetic Plan	Prior to lighting installation	Review and Approval	10,000.10.7