# AGENDA
# City of Lucas
# City Council Meeting
# November 5, 2020
# 7:00 PM
# City Hall, Council Chambers and Video Conference
# 665 Country Club Road – Lucas, Texas

*Notice is hereby given that a meeting of the Lucas City Council will be held on Thursday, November 5, 2020 at 7:00 pm at Lucas City Hall, 665 Country Club Road, Lucas, Texas 75002-7651 and by video conference, at which time the following agenda will be discussed. As authorized by Section 551.071 of the Texas Government Code, the City Council may convene into closed Executive Session for the purpose of seeking confidential legal advice from the City Attorney on any item on the agenda at any time during the meeting.*

On March 16, 2020 Governor Abbott suspended some provisions of the Open Meetings Act in response to the COVID-19 emergency. In order to practice safe distancing, Lucas City Council meetings will be open to on-site visitors in a limited capacity of 15 audience members. City Council meetings will also be available through Zoom Webinar from your computer or smartphone. To join the meeting, please click this URL https://zoom.us/s/95534828374?pwd=ZkJ5cTZkVWNEL3o0WFNCQXBjQ0RvZz09 and enter your name and email address. To join by phone: 1-346-248-7799 Webinar ID: 955 3482 8374 Passcode: 712285

If you would like to watch the meeting live, and not participate via Zoom, you may go to the City's live streaming link at https://www.lucastexas.us/live-streaming-videos/.

If the public desires to speak during a specific agenda item, they must email shenderson@lucastexas.us by 4:00 pm on the day of the meeting. The email must contain the person's name, address, phone number, and the agenda item(s) for which comments will be made. You may also communicate and send your comments to the City Councilmembers directly by emailing citycouncil@lucastexas.us.

## Call to Order

- Roll Call
- Determination of Quorum
- Reminder to turn off or silence cell phones
- Pledge of Allegiance

## Citizen Input

1. Citizen Input

## Community Interest

*Pursuant to Section 5510415 of the Texas Government Code, the City Council may report on the following items: 1)expression of thanks, congratulations or condolences; 2) information about holiday schedules; 3) recognition of individuals; 4) reminders about upcoming City Council events; 5) information about community events; and 6) announcements involving imminent threat to public health and safety.*

2. Items of Community Interest

## Consent Agenda

*All items listed under the consent agenda are considered routine and are recommended to the City Council for a single vote approval. If discussion is desired, an item may be removed from the consent agenda for a separate vote.*

3. Consent Agenda:

   A. Approval of the minutes of the October 15, 2020 City Council meeting. **(City Secretary Stacy Henderson)**

   B. Approval of the City of Lucas Investment Report for quarter ending September 30, 2020. **(Finance Director Liz Exum)**

## Regular Agenda

4. Consider adopting Ordinance 2020-11-00923 by the City Council of the City of Lucas, Texas authorizing the issuance of "City of Lucas, Texas general obligation refunding bonds, series 2020", and other matters incident and related thereto. **(Finance Director Liz Exum, Andrew Friedman, SAMCO Financial)**

5. Consider the Lucas Farmers Market Fiscal Year 2019/2020 Annual Report and provide guidance to the Lucas Farmers Market Committee and City Staff regarding recommendations for the 2021 season. **(Lucas Farmers Market Committee Chair Debra Guillemaud, Councilmember Tim Baney, City Manager Joni Clarke)**

6. Consider establishing priorities and goals for the Geographic Information System (GIS) Mapping and data entry along various roadway rights-of-ways and easements and view a presentation and demonstration of the work completed by Lakes Engineering in FY 19/20. **(City Engineer Stanton Foerster)**

7. Consider 1) approving Resolution R-2020-11-00502 authorizing the Mayor to enter into an Interlocal Agreement between City of Lucas and Collin County for the improvements to West Lucas Road from FM 1378/Country Club Road to FM 2551/Angel Parkway in Lucas, Collin County, Texas, for which Collin County shall reimburse the City of Lucas the amount of $8,365,180.00 as Collin County's portion of the improvements; a provide for an effective date.**(City Engineer Stanton Foerster)**

8. Consider the Bridge Alternative Report (BAR) of the Stinson Bridge and Roadway Improvements and provide direction to the City Manager. **(City Engineer Stanton Foerster)**

9. Consider board/commission applications to be interviewed by the City Council to fill board vacancies or prospective board positions. **(City Council, City Secretary Stacy Henderson)**

## Executive Session Agenda

10. Executive Session: An Executive Session is not scheduled for this meeting.

11. Reconvene from Executive Session and take any action necessary as a result of the Executive Session.

12. Adjournment.

## Certification

*I do hereby certify that the above notice was posted in accordance with the Texas Open Meetings Act on the bulletin board at Lucas City Hall, 665 Country Club Road, Lucas, TX 75002 and on the City's website at www.lucastexas.us on or before 5:00 p.m. on October 30, 2020.*

_____

*Stacy Henderson, City Secretary*

*In compliance with the American with Disabilities Act, the City of Lucas will provide for reasonable accommodations for persons attending public meetings at City Hall. Requests for accommodations or interpretive services should be directed to City Secretary Stacy Henderson at 972.912.1211 or by email at shenderson@lucastexas.us at least 48 hours prior to the meeting.*

Item No. 01

# City of Lucas
# City Council Agenda Request
# November 5, 2020

Requester: Mayor Jim Olk

## Agenda Item Request

Citizen Input

## Background Information

NA

## Attachments/Supporting Documentation

NA

## Budget/Financial Impact

NA

## Recommendation

NA

## Motion

NA

Item No. 02

# City of Lucas
# City Council Agenda Request
# November 5, 2020

Requester: Mayor Jim Olk

## Agenda Item Request

2. Items of Community Interest.

## Background Information

NA

## Attachments/Supporting Documentation

NA

## Budget/Financial Impact

NA

## Recommendation

NA

## Motion

NA

# City of Lucas
# City Council Agenda Request
# November 5, 2020

Item No. 03

Requester: City Secretary Stacy Henderson, Finance Director Liz Exum

## Agenda Item Request

3. Consent Agenda:

   A. Approval of the minutes of the October 15, 2020 City Council meeting.

   B. Approval of the City of Lucas Investment Report for quarter ending September 30, 2020.

## Background Information

NA

## Attachments/Supporting Documentation

1. Minutes of the October 15, 2020 City Council meeting.
2. Quarterly Investment Report for September 30, 2020.

## Budget/Financial Impact

NA

## Recommendation

City Staff recommends approval of the Consent Agenda.

## Motion

I make a motion to approve the Consent Agenda as presented.

# City of Lucas
# City Council Meeting
# October 15, 2020
# Video Conference Meeting
# 7:00 P.M.
# City Hall, 665 Country Club Road, Lucas, Texas

# MINUTES

## Call to Order

**City Councilmembers Present:**
Mayor Pro Tem Kathleen Peele
Councilmember Wayne Millsap
Councilmember Tim Baney
Councilmember Steve Duke
Councilmember Philip Lawrence
Councilmember Debbie Fisher

**City Staff Present:**
City Manager Joni Clarke
City Secretary Stacy Henderson
Finance Director Liz Exum

**City Councilmember Absent:**
Mayor Jim Olk

This meeting was conducted by video conference.

Mayor Pro Tem Peele called the meeting to order at 7:00 p.m., determined that a quorum was present, and the Pledge of Allegiance was recited.

## Citizen Input

### 1. Citizen Input

There was no citizen participation during this agenda item.

## Community Interest

### 2. Community Interest

Mayor Pro Tem Peele noted that the following items of Community Interest:

- Early voting was underway through October 30 at the Lucas Community Center. Sample ballots are available on the City's website.
- The City's Country Christmas event will be held on December 4 from 6 – 9 pm, face masks and social distancing will be required.

## Consent Agenda

### 3. Consent Agenda:

A. Approval of the minutes of the October 15, 2020 City Council meeting.

**MOTION**: A motion was made by Councilmember Fisher, seconded by Councilmember Duke to approve the Consent Agenda as presented. The motion passed unanimously by a 6 to 0 vote.

## Regular Agenda

**4. Consider an alternative financing plan for the cash defeasance and bond refunding for the General Obligation Refunding Bonds, Series 2007 and Certificates of Obligation, Series 2011 using sinking fund reserves to buy down outstanding Certificates of Obligation, Series 2011 and refund the remaining principal.**

Andrew Friedman with SAMCO Financial, presented new information to the Council noting that in meeting with the bond holder of the existing 2007 series General Obligation Refunding Bonds, it was discovered that paying off the bonds would result in a penalty of $27,522. Mr. Friedman stated they were proposing an alternate plan using sinking fund reserves to buy down the 2011 Certificates of Obligation and refund the remaining $2,980,000 to generate savings of approximately $531,097.

Councilmember Fisher discussed with Mr. Friedman various options to pay off debt using utility fund reserves.

The Council discussed using utility fund reserves towards the construction of the new water tower.

**MOTION**: A motion was made by Councilmember Millsap, seconded by Councilmember Baney to authorize City staff and SAMCO Consultants to proceed with the alternative plan to use sinking fund reserves totaling $342,600 and refunding the remaining $2,980,000 principal to generate debt service savings of approximately 531,097. The motion passed unanimously by a 6 to 0 vote.

**5. Consider establishing priorities and goals for the Geographic Information System (GIS) Mapping and data entry along various roadway rights-of-ways and easements and view a presentation and demonstration of the work completed by Lakes Engineering in FY 19/20.**

Mayor Pro Tem Peele requested this item be moved to the November 5, 2020 City Council meeting to allow the Mayor to be present and provide feedback regarding this item. The Council was in agreement to move this item to the November 5, 2020 City Council meeting.

**6. Consider opening the City of Lucas City Council and Board and Commission meetings to the public and set guidelines for those who would like to attend official city meetings in person.**

Mayor Pro Tem Peele stated she would like to see the following guidelines available as part of opening meetings to the public:

- Hand sanitation station
- Social distancing inside Council Chambers

- Sign posted on door stating masks were required to enter the building
- Sign that states don't approach dais, City Secretary area, and staff area.
- City staff members to attend remotely from their office and when their item is ready to be discussed, the staff member will come into the Council Chambers
- Wipe down the podium between presenters

**MOTION**: A motion was made by Councilmember Fisher, seconded by Councilmember Duke to approve opening the City of Lucas City Council and Board and Commission meetings to the public effective November 5, 2020 with the guidelines outlined above. The motion passed unanimously by a 6 to 0 vote.

## Executive Session Agenda

**7. Executive Session: An Executive Session is not scheduled for this meeting.**

An Executive Session was not held at this meeting.

**8. Reconvene from Executive Session and take any action necessary as a result of the Executive Session.**

No action was taken from the Executive Session.

## Adjournment

**9. Adjournment.**

**MOTION**: A motion was made by Councilmember Millsap, seconded by Councilmember Baney to adjourn the meeting at 7:20 pm. The motion passed unanimously by a 6 to 0 vote.

APPROVED:

Jim Olk, Mayor

ATTEST:

Stacy Henderson, City Secretary

# CITY OF LUCAS
# QUARTERLY INVESTMENT REPORT

**Quarter Ended**

**Sep, 2020**

| Bank Account Name | Rating | June 30, 2020 | September 30, 2020 | Changes | Total Portfolio |
|---|---|---|---|---|---|
| ANB | AAAm | $4,211,797.51 | $4,671,352.60 | $459,555.09 | 14.38% |
| Pooled Cash | | | | | |
| Interest Rate | | 0.20% | 0.20% | 0% | |
| ANB - Reserve | AAAm | $3,000,000.00 | $3,000,000.00 | 0% | 9.24% |
| General Fund | | | | | |
| ANB - Cares Act | AAAm | $361,429.45 | $89,754.90 | -$271,674.55 | 0.28% |
| Restric Covid-19 | | | | | |
| Interest Rate | | 0.23% | 0.20% | -0.03% | |
| **Total Bank Accounts** | | **$7,573,226.96** | **$7,761,107.50** | **$187,880.54** | **23.89%** |
| Weighted Average Life/Days(Balances assumed to have a one day maturity) | | 1 | 1 | 0 | |
| **Pools** | | | | | |
| Logic - General Fund | AAAm | $5,065,169.57 | $4,665,974.21 | -$399,195.36 | 14.36% |
| Logic - Water Fund | AAAm | $5,252,709.85 | $5,232,104.31 | -$20,605.54 | 16.11% |
| Logic 2017 CO - Water Fund | AAAm | $2,312,315.97 | $2,048,973.61 | -$263,342.36 | 6.31% |
| Logic 2019 CO - General Fund | AAAm | $7,367,185.97 | $7,194,443.18 | -$172,742.79 | 22.15% |
| Logic 2019 CO - Water Fund | AAAm | $1,469,125.04 | $1,470,353.09 | $1,228.05 | 4.53% |
| Interest Rate | | 0.6260% | 0.2565% | -0.3695% | |
| Weighted Average Life/Days(Balances assumed to have a one day maturity) | | 1 | 1 | 0 | |
| Lone Star Invest - General Fund | AAAm | $2,050,996.21 | $2,051,607.54 | $611.33 | 6.32% |
| Lone Star Invest- Water Fund | AAAm | $770,535.76 | $770,765.42 | $229.66 | 2.37% |
| Interest Rate | | 0.1923% | 0.2090% | 0.0167% | |
| Weighted Average Life/Days(Balances assumed to have a one day maturity) | | 1 | 1 | 0 | |
| Tex Pool - Debt Service Fund | AAAm | $1,272,967.92 | $1,288,165.40 | $15,197.48 | 3.97% |
| Interest Rate | | 0.2165% | 0.1474% | -0.0691% | |
| Weighted Average Life/Days(Balances assumed to have a one day maturity) | | 1 | 1 | 0 | |
| **Total Pools** | | **$25,561,006.29** | **$24,722,386.76** | **-$838,619.53** | **76.11%** |
| **Total Bank Acct. and Pools** | | **$33,134,233.25** | **$32,483,494.26** | **-$650,738.99** | **100.00%** |

**The invested portfolio of the City of Lucas is in compliance with the Public Funds Investment Act and the City's Investment Policy and Strategies**

Jon Clarke- City Manager

Liz Exum - Finance Director

Item No. 04

# City of Lucas
# City Council Agenda Request
# November 5, 2020

Requester: Finance Director Liz Exum, Andrew Friedman, SAMCO Financial

## Agenda Item Request

Consider adopting Ordinance 2020-11-00923 by the City Council of the City of Lucas, Texas authorizing the issuance of "City of Lucas, Texas general obligation refunding bonds, series 2020", and other matters incident and related thereto.

## Background Information

During the September 17, 2020 and October 15, 2020 Lucas City Council meetings, a bond refunding opportunity was presented by SAMCO Financial. City Council approved the plan at the October 15, 2020 meeting to buy down $342,600 of outstanding Certificates of Obligation, Series 2011 (using sinking fund reserves) and refund the remaining $2,980,000 principal (par value) to generate approximately $531,097 of debt service savings.

## Attachments/Supporting Documentation

1. Ordinance 2020-11-00923 Refunding Bonds

## Budget/Financial Impact

The plan to use $342,600 in sinking fund reserves to buy down outstanding Certificates of Obligation, Series 2011 and refund the remaining $2,980,000 principal (par value) will generate debt service savings of approximately $531,097.

## Recommendation

Staff recommends the approval of Ordinance 2020-11-00923 Refunding Bonds to refund $2,980,000 principal (par value) of Certificates of Obligation, Series 2011.

## Motion

I make a motion to adopt Ordinance 2020-11-00923 Refunding Bonds, authorizing the issuance of "City of Lucas, Texas general obligation refunding bonds, series 2020", and other matters incident and related thereto.

**DRAFT 10/28/2020**

**ORDINANCE NO. 2020-11-00923**

**AN ORDINANCE BY THE CITY COUNCIL OF THE CITY OF LUCAS, TEXAS AUTHORIZING THE ISSUANCE OF "CITY OF LUCAS, TEXAS GENERAL OBLIGATION REFUNDING BONDS, SERIES 2020"; LEVYING AN ANNUAL AD VALOREM TAX, WITHIN THE LIMITATIONS PRESCRIBED BY LAW, FOR THE PAYMENT OF THE BONDS; PRESCRIBING THE FORM, TERMS, CONDITIONS, AND RESOLVING OTHER MATTERS INCIDENT AND RELATED TO THE ISSUANCE, SALE, AND DELIVERY OF THE BONDS, INCLUDING THE APPROVAL AND DISTRIBUTION OF AN OFFICIAL STATEMENT PERTAINING THERETO; AUTHORIZING THE EXECUTION OF A PAYING AGENT/REGISTRAR AGREEMENT, AN OFFICIAL BID FORM, AND AN ESCROW DEPOSIT LETTER; COMPLYING WITH THE LETTER OF REPRESENTATIONS ON FILE WITH THE DEPOSITORY TRUST COMPANY; AUTHORIZING THE EXECUTION OF ANY NECESSARY ENGAGEMENT AGREEMENT WITH THE CITY'S FINANCIAL ADVISORS; AND PROVIDING AN EFFECTIVE DATE**

WHEREAS, the City Council (the *City Council*) of the City of Lucas, Texas (the *City*) has heretofore issued, sold, and delivered, and there are currently outstanding obligations in the aggregate original principal amount of $3,490,000, being the obligations set forth on Schedule I hereto which is incorporated by reference for all purposes to this ordinance (the *Refunded Obligations*); and

WHEREAS, the City Council intends to issue an aggregate principal amount of $_____ in general obligation refunding bonds the proceeds of which will be utilized to provide for the (i) discharge and final payment of the Refunded Obligations and (ii) payment of the costs of issuance of the general obligation refunding bonds; and

WHEREAS, pursuant to the provisions of Chapter 1207, as amended, Texas Government Code (the *Act*), the City Council is authorized to issue refunding bonds and deposit the proceeds of sale under an escrow agreement to provide for the payment of the Refunded Obligations, and such deposit, when made in accordance with the Act, shall constitute the making of firm banking and financial arrangements for the discharge and final payment of the Refunded Obligations; and

WHEREAS, the Act permits that the deposit of the proceeds from the sale of the refunding bonds be deposited directly with any designated escrow agent which is not the depository bank of the City; and

WHEREAS, when firm banking arrangements have been made for the payment of principal of and interest to the stated maturity or redemption dates of the Refunded Obligations, then the Refunded Obligations shall no longer be regarded as outstanding except for the purpose of receiving payment from the funds provided for such purpose and may not be included in or

considered to be an indebtedness of the City for the purpose of a limitation on outstanding indebtedness or taxation or for any other purpose; and

WHEREAS, BOKF, NA, Dallas, Texas, currently serves as the paying agent for the Refunded Obligations; and

WHEREAS, BOKF, NA, Dallas, Texas, which is not a depository bank of the City, is hereby appointed as the Escrow Agent (hereinafter defined) and Paying Agent/Registrar (hereinafter defined) for the general obligation refunding bonds; and

WHEREAS, the City Council also hereby finds and determines that the Refunded Obligations are scheduled to mature or are subject to being redeemed, not more than twenty (20) years from the date of the general obligation refunding bonds herein authorized and being issued to realize debt service savings, and such refunding will result in a net present value savings of $_____ and a gross savings of $_____, including the City's cash contribution of $_____; and

WHEREAS, the City Council hereby finds and determines that the issuance of the general obligation refunding bonds for the purpose of refunding the Refunded Obligations is in the best interests of the residents of the City, now, therefore,

BE IT ORDAINED BY THE CITY COUNCIL OF THE CITY OF LUCAS, TEXAS THAT:

SECTION 1. Authorization - Designation - Principal Amount - Purpose. General obligation refunding bonds of the City shall be and are hereby authorized to be issued in the aggregate principal amount _____ THOUSAND AND NO/100 DOLLARS ($_____), to be designated and bear the title of "CITY OF LUCAS, TEXAS GENERAL OBLIGATION REFUNDING BONDS, SERIES 2020" (the *Bonds*), for the purpose of providing funds for the (i) discharge and final payment of the Refunded Obligations and (ii) payment of the costs of issuance of the Bonds, all in conformity with the laws of the State of Texas, particularly Chapter 1207, as amended, Texas Government Code, this ordinance adopted by the City Council on November 5, 2020, and the City's Home Rule Charter.

SECTION 2. Fully Registered Obligations - Authorized Denominations - Stated Maturities - Interest Rates – Dated Date. The Bonds shall be issued as fully registered obligations, without coupons, shall be dated November 15, 2020 (the *Dated Date*), and shall be in denominations of $5,000 or any integral multiple thereof, and the Bonds shall be lettered "R" and numbered consecutively from One (1) upward, and principal shall become due and payable on February 1 in each of the years and in principal amounts (the *Stated Maturities*) and bear interest on the unpaid principal amounts from the Dated Date (hereinafter defined) or from the most recent Interest Payment Date (hereinafter defined) to which interest has been paid or duly provided for, to Stated Maturity, at the per annum rates, while Outstanding (hereinafter defined), in accordance with the following schedule:

| Years of Stated Maturity | Principal Amounts ($) | Interest Rates (%) |
|---|---|---|
| 2022 | | |
| 2023 | | |
| 2024 | | |
| 2025 | | |
| 2026 | | |
| 2027 | | |
| 2028 | | |
| 2029 | | |
| 2030 | | |
| 2031 | | |

The Bonds shall bear interest on the unpaid principal amounts from the Dated Date, or from the most recent Interest Payment Date (hereinafter defined) to which interest has been paid or duly provided for to Stated Maturity or prior redemption, while Outstanding, at the rates per annum shown in the above schedule (calculated on the basis of a 360-day year of twelve 30-day months). Interest on the Bonds shall be payable on February 1 and August 1 (each, an *Interest Payment Date*) of each year, commencing August 1, 2021, while the Bonds are Outstanding.

SECTION 3. Payment of Bonds - Paying Agent/Registrar.

The principal of, premium, if any, and the interest on the Bonds, due and payable by reason of Stated Maturity, redemption, or otherwise, shall be payable in any coin or currency of the United States of America which at the time of payment is legal tender for the payment of public and private debts, and such payment of principal of, premium, if any, and interest on the Bonds shall be without exchange or collection charges to the Holder (as hereinafter defined) of the Bonds.

The selection and appointment of BOKF, NA, Dallas, Texas (the *Paying Agent/Registrar*), to serve as the initial Paying Agent/Registrar for the Bonds is hereby approved and confirmed, and the City agrees and covenants to cause to be kept and maintained at the corporate trust office of the Paying Agent/Registrar books and records (the *Security Register*) for the registration, payment, and transfer of the Bonds, all as provided herein, in accordance with the terms and provisions of a Paying Agent/Registrar Agreement, attached, in substantially final form, as Exhibit A hereto, and such reasonable rules and regulations as the Paying Agent/Registrar and the City may prescribe. The City covenants to maintain and provide a Paying Agent/Registrar at all times while the Bonds are Outstanding, and any successor Paying Agent/Registrar shall be (i) a national or state banking institution or (ii) an association or a corporation organized and doing business under the laws of the United States of America or of any state, authorized under such laws to exercise trust powers. Such Paying Agent/Registrar shall be subject to supervision or examination by federal or state authority and authorized by law to serve as a Paying Agent/Registrar.

The City reserves the right to appoint a successor Paying Agent/Registrar upon providing the previous Paying Agent/Registrar with a certified copy of a resolution or ordinance terminating such agency. Additionally, the City agrees to promptly cause a written notice of this substitution

to be sent to each Holder of the Bonds by United States mail, first-class postage prepaid, which notice shall also give the address of the corporate office of the successor Paying Agent/Registrar.

Principal of, premium, if any, and interest on the Bonds, due and payable by reason of Stated Maturity, redemption, or otherwise, shall be payable only to the registered owner of the Bonds appearing on the Security Register (the *Holder* or *Holders*) maintained on behalf of the City by the Paying Agent/Registrar as hereinafter provided (i) on the Record Date (hereinafter defined) for purposes of payment of interest on the Bonds, (ii) on the date of surrender of the Bonds for purposes of receiving payment of principal thereof upon redemption of the Bonds or at the Bonds' Stated Maturity, and (iii) on any other date for any other purpose. The City and the Paying Agent/Registrar, and any agent of either, shall treat the Holder as the owner of a Bond for purposes of receiving payment and all other purposes whatsoever, and neither the City nor the Paying Agent/Registrar, or any agent of either, shall be affected by notice to the contrary.

Principal of and premium, if any, on the Bonds shall be payable only upon presentation and surrender of the Bonds to the Paying Agent/Registrar at its corporate trust office. Interest on the Bonds shall be paid to the Holder whose name appears in the Security Register at the close of business on the fifteenth day of the month next preceding an Interest Payment Date for the Bonds (the *Record Date*) and shall be paid (i) by check sent on or prior to the appropriate date of payment by United States mail, first-class postage prepaid, by the Paying Agent/Registrar, to the address of the Holder appearing in the Security Register or (ii) by such other method, acceptable to the Paying Agent/Registrar, requested in writing by the Holder at the Holder's risk and expense.

If the date for the payment of the principal of, premium, if any, or interest on the Bonds shall be a Saturday, a Sunday, a legal holiday, or a day on which banking institutions in the city where the corporate trust office of the Paying Agent/Registrar is located are authorized by law or executive order to close, then the date for such payment shall be the next succeeding day which is not such a day. The payment on such date shall have the same force and effect as if made on the original date any such payment on the Bonds was due.

In the event of a non-payment of interest on a scheduled payment date, and for thirty (30) days thereafter, a new record date for such interest payment (a *Special Record Date*) will be established by the Paying Agent/Registrar, if and when funds for the payment of such interest have been received from the City. Notice of the Special Record Date and of the scheduled payment date of the past due interest (the *Special Payment Date* - which shall be fifteen (15) days after the Special Record Date) shall be sent at least five (5) business days prior to the Special Record Date by United States mail, first-class postage prepaid, to the address of each Holder of a Bond appearing on the Security Register at the close of business on the last business day next preceding the date of mailing of such notice.

SECTION 4. Redemption.

A. Mandatory Redemption of Bonds. The Bonds stated to mature on February 1, 20__, February 1, 20__ and February 1, 20__ are referred to herein as the "Term Bonds". The Term Bonds are subject to mandatory sinking fund redemption prior to their Stated Maturities from money required to be deposited in the Bond Fund for such purpose and shall be redeemed in part, by lot or other customary method, at the principal amount thereof plus accrued interest to the date

of redemption in the following principal amounts on February 1 in each of the years as set forth below:

| Term Bonds Stated to Mature on February 1, 20__ | | Term Bonds Stated to Mature on February 1, 20__ | |
|---|---|---|---|
| Year | Principal Amount ($) | Year | Principal Amount ($) |
| * | | * | |

| Term Bonds Stated to Mature on February 1, 20_ | |
|---|---|
| Year | Principal Amount ($) |
| * | |

*Payable at Stated Maturity.

The principal amount of a Term Bond required to be redeemed pursuant to the operation of such mandatory redemption provisions shall be reduced, at the option of the Issuer, by the principal amount of any Term Bonds of such Stated Maturity which, at least fifty (50) days prior to the mandatory redemption date (1) shall have been defeased or acquired by the Issuer and delivered to the Paying Agent/Registrar for cancellation, (2) shall have been purchased and canceled by the Paying Agent/Registrar at the request of the Issuer with money in the Bond Fund, or (3) shall have been redeemed pursuant to the optional redemption provisions set forth below and not theretofore credited against a mandatory redemption requirement.

B. Optional Redemption of Bonds. The Bonds having Stated Maturities on and after February 1, 2030 shall be subject to redemption prior to Stated Maturity, at the option of the Issuer, on February 1, 2029, or on any date thereafter, in whole or in part, in principal amounts of $5,000 or any integral multiple thereof (and if within a Stated Maturity selected at random and by lot by the Paying Agent/Registrar) at the redemption price of par plus accrued interest to the date of redemption.

C. Exercise of Redemption Option. At least forty-five (45) days prior to a date set for the redemption of the Bonds (unless a shorter notification period shall be satisfactory to the Paying Agent/Registrar), the Issuer shall notify the Paying Agent/Registrar of its decision to exercise the right to redeem the Bonds, the principal amount of each Stated Maturity to be redeemed, and the date set for the redemption thereof. The decision of the Issuer to exercise the right to redeem the Bonds shall be entered in the minutes of the governing body of the Issuer.

D. Selection of Bonds for Redemption. If less than all Outstanding Bonds of the same Stated Maturity are to be redeemed on a redemption date, the Paying Agent/Registrar shall select at random and by lot the Bonds to be redeemed, provided that if less than the entire principal amount of a Bond is to be redeemed, the Paying Agent/Registrar shall treat such Bond then subject to redemption as representing the number of Bonds Outstanding which is obtained by dividing the principal amount of such Bond by $5,000.

E. Notice of Redemption. Not less than thirty (30) days prior to a redemption date for the Bonds, the Paying Agent/Registrar shall cause a notice of redemption to be sent by United States mail, first-class postage prepaid, in the name of the Issuer and at the Issuer's expense, by the Paying Agent/Registrar to each Holder of a Bond to be redeemed in whole or in part at the address of the Holder appearing on the Security Register at the close of business on the business day next preceding the date of mailing such notice, and any notice of redemption so mailed shall be conclusively presumed to have been duly given irrespective of whether received by the Holder. This notice may also be published once in a financial publication, journal, or reporter of general circulation among securities dealers in the City of New York, New York (including, but not limited to, *The Bond Buyer* and *The Wall Street Journal*), or in the State of Texas (including, but not limited to, *The Texas Bond Reporter*).

All notices of redemption shall (i) specify the date of redemption for the Bonds, (ii) identify the Bonds to be redeemed and, in the case of a portion of the principal amount to be redeemed, the principal amount thereof to be redeemed, (iii) state the redemption price, (iv) state that the Bonds, or the portion of the principal amount thereof to be redeemed, shall become due and payable on the redemption date specified, and the interest thereon, or on the portion of the principal amount thereof to be redeemed, shall cease to accrue from and after the redemption date, and (v) specify that payment of the redemption price for the Bonds, or the principal amount thereof to be redeemed, shall be made at the corporate trust office of the Paying Agent/Registrar only upon presentation and surrender thereof by the Holder.

If a Bond is subject by its terms to redemption and has been called for redemption and notice of redemption thereof has been duly given or waived as herein provided, such Bond (or the principal amount thereof to be redeemed) so called for redemption shall become due and payable, and if money sufficient for the payment of such Bonds (or of the principal amount thereof to be redeemed) at the then applicable redemption price is held for the purpose of such payment by the Paying Agent/Registrar, then on the redemption date designated in such notice, interest on the Bonds (or the principal amount thereof to be redeemed) called for redemption shall cease to accrue, and such Bonds shall not be deemed to be Outstanding in accordance with the provisions of this Ordinance.

F. Transfer/Exchange of Bonds. Neither the Issuer nor the Paying Agent/Registrar shall be required (1) to transfer or exchange any Bond during a period beginning forty-five (45) days prior to the date fixed for redemption of the Bonds or (2) to transfer or exchange any Bond selected for redemption, provided, however, such limitation of transfer shall not be applicable to an exchange by the Holder of the unredeemed balance of a Bond which is subject to redemption in part.

SECTION 5. Execution - Registration. The Bonds shall be executed on behalf of the City by its Mayor or Mayor Pro Tem under the seal of the City reproduced or impressed thereon and attested by its City Secretary. The signature of any of said officers on the Bonds may be manual or facsimile. Bonds bearing the manual or facsimile signatures of individuals who were, at the time of the Dated Date, the proper officers of the City shall bind the City, notwithstanding that such individuals or either of them shall cease to hold such offices prior to the delivery of the Bonds to the Purchasers (hereinafter defined), all as authorized and provided in Chapter 1201, as amended, Texas Government Code.

No Bond shall be entitled to any right or benefit under this Ordinance, or be valid or obligatory for any purpose, unless there appears on such Bond either a certificate of registration substantially in the form provided in Section 8C, executed by the Comptroller of Public Accounts of the State of Texas or his duly authorized agent by manual signature, or a certificate of registration substantially in the form provided in Section 8D, executed by the Paying Agent/Registrar by manual signature, and either such certificate upon any Bond shall be conclusive evidence, and the only evidence, that such Bond has been duly certified or registered and delivered.

SECTION 6. Registration - Transfer - Exchange of Bonds - Predecessor Bonds. A Security Register relating to the registration, payment, transfer, or exchange of the Bonds shall at all times be kept and maintained by the City at the corporate trust office of the Paying Agent/Registrar, and the Paying Agent/Registrar shall obtain, record, and maintain in the Security Register the name and address of every owner of the Bonds, or, if appropriate, the nominee thereof. Any Bond may, in accordance with its terms and the terms hereof, be transferred or exchanged for Bonds of other authorized denominations upon the Security Register by the Holder, in person or by his duly authorized agent, upon surrender of such Bond to the Paying Agent/Registrar for cancellation, accompanied by a written instrument of transfer or request for exchange duly executed by the Holder or by his duly authorized agent, in form satisfactory to the Paying Agent/Registrar.

Upon surrender for transfer of any Bond at the corporate trust office of the Paying Agent/Registrar, the City shall execute and the Paying Agent/Registrar shall register and deliver, in the name of the designated transferee or transferees, one or more new Bonds of authorized denomination and having the same Stated Maturity and of a like interest rate and aggregate principal amount as the Bond or Bonds surrendered for transfer.

At the option of the Holder, Bonds may be exchanged for other Bonds of authorized denominations and having the same Stated Maturity, bearing the same rate of interest and of like aggregate principal amount as the Bonds surrendered for exchange upon surrender of the Bonds to be exchanged at the corporate trust office of the Paying Agent/Registrar. Whenever any Bonds are so surrendered for exchange, the City shall execute, and the Paying Agent/Registrar shall register and deliver, the Bonds to the Holder requesting the exchange.

All Bonds issued upon any transfer or exchange of Bonds shall be delivered at the corporate trust office of the Paying Agent/Registrar, or be sent by United States registered mail to the Holder at his request, risk, and expense, and upon the delivery thereof, the same shall be the valid and binding obligations of the City, evidencing the same obligation to pay, and entitled to the same benefits under this Ordinance, as the Bonds surrendered upon such transfer or exchange.

All transfers or exchanges of Bonds pursuant to this Section shall be made without expense or service charge to the Holder, except as otherwise herein provided, and except that the Paying Agent/Registrar shall require payment by the Holder requesting such transfer or exchange of any fee, tax or other governmental charges required to be paid with respect to such transfer or exchange.

Bonds canceled by reason of an exchange or transfer pursuant to the provisions hereof are hereby defined to be Predecessor Bonds, evidencing all or a portion, as the case may be, of the same debt evidenced by the new Bond or Bonds registered and delivered in the exchange or transfer therefor. Additionally, the term Predecessor Bonds shall include any Bond registered and delivered pursuant to Section 17 in lieu of a mutilated, lost, destroyed, or stolen Bond which shall be deemed to evidence the same obligation as the mutilated, lost, destroyed, or stolen Bond.

SECTION 7. Initial Bond. The Bonds herein authorized shall be initially issued as either (i) a single fully registered Bond in the aggregate principal amount of $_____ with principal installments to become due and payable as provided in Section 2 hereof and numbered T-1, or (ii) as one (1) fully registered Bond for each year of Stated Maturity in the applicable principal amount and denomination and to be numbered consecutively from T-1 and upward (the *Initial Bond*), and the Initial Bond shall be registered in the name of the Purchasers or the designee thereof. The Initial Bond shall be the Bonds submitted to the Office of the Attorney General of the State of Texas for approval, certified and registered by the Office of the Comptroller of Public Accounts of the State of Texas and delivered to the Purchasers. Any time after the delivery of the Initial Bond, the Paying Agent/Registrar, pursuant to written instructions from the Purchasers, or the designee thereof, shall cancel the Initial Bond delivered hereunder and exchange therefor definitive Bonds of like kind and of authorized denominations, Stated Maturities, principal amounts bearing applicable interest rates, and shall be lettered "R" and numbered consecutively from one (1) upward for transfer and delivery to the Holders named at the addresses identified therefor; all pursuant to and in accordance with such written instructions from the Purchasers, or the designee thereof, and such other information and documentation as the Paying Agent/Registrar may reasonably require.

SECTION 8. Forms.

A. Forms Generally. The Bonds, the Registration Certificate of the Comptroller of Public Accounts of the State of Texas, the Registration Certificate of Paying Agent/Registrar, and the form of Assignment to be printed on each of the Bonds shall be substantially in the forms set forth in this Section with such appropriate insertions, omissions, substitutions, and other variations as are permitted or required by this Ordinance and may have such letters, numbers, or other marks of identification (including identifying numbers and letters of the Committee on Uniform Securities Identification Procedures of the American Bankers Association) and such legends and endorsements (including insurance legends in the event the Bonds, or any Stated Maturities thereof, are insured, and any reproduction of an opinion of Bond Counsel (hereinafter referenced)) thereon as may, consistent herewith, be established by the City or determined by the officers executing the Bonds as evidenced by their execution thereof. Any portion of the text of any Bond may be set forth on the reverse thereof, with an appropriate reference thereto on the face of the Bond.

The definitive Bonds shall be printed, lithographed, or engraved, produced by any combination of these methods, or produced in any other similar manner, all as determined by the officers executing the Bonds as evidenced by their execution thereof, but the Initial Bond submitted to the Attorney General of the State of Texas may be typewritten or photocopied or otherwise reproduced.

*[The remainder of this page intentionally left blank.]*

B. Form of Definitive Bond.

REGISTERED
NO. _____

REGISTERED
PRINCIPAL AMOUNT
$_____

United States of America
State of Texas
County of Collin
CITY OF LUCAS, TEXAS
GENERAL OBLIGATION REFUNDING BONDS,
SERIES 2020

| Dated Date: | Interest Rate: | Stated Maturity: | CUSIP NO: |
|---|---|---|---|
| November 15, 2020 | | | |

REGISTERED OWNER: _____

PRINCIPAL AMOUNT: _____ AND NO/100 DOLLARS

The City of Lucas, Texas (the *City*), a body corporate and a municipal corporation in the County of Collin, State of Texas, for value received, acknowledges itself indebted to and hereby promises to pay to the order of the Registered Owner specified above, or the registered assigns thereof, on the Stated Maturity date specified above, the Principal Amount specified above (or so much thereof as shall not have been paid upon prior redemption) and to pay interest on the unpaid Principal Amount hereof from the Dated Date or from the most recent Interest Payment Date (hereinafter defined) to which interest has been paid or duly provided for, until such Principal Amount has become due and payment thereof has been made or duly provided for, to the earlier of redemption or Stated Maturity, while Outstanding, at the per annum rate of interest specified above computed on the basis of a 360-day year of twelve 30-day months; such interest being payable on February 1 and August 1 (each, an *Interest Payment Date*) of each year, commencing August 1, 2021.

Principal of and premium, if any, on this Bond shall be payable to the Registered Owner hereof (the *Holder*), upon presentation and surrender at the corporate trust office of the Paying Agent/Registrar executing the registration certificate appearing hereon or a successor thereof. Interest shall be payable to the Holder of this Bond (or one or more Predecessor Bonds, as defined in the Ordinance hereinafter referenced) whose name appears on the Security Register maintained by the Paying Agent/Registrar at the close of business on the Record Date, which is the fifteenth day of the month next preceding each Interest Payment Date. All payments of principal of, premium, if any, and interest on this Bond shall be in any coin or currency of the United States of America which at the time of payment is legal tender for the payment of public and private debts. Interest shall be paid by the Paying Agent/Registrar by check sent on or prior to the appropriate date of payment by United States mail, first-class postage prepaid, to the Holder hereof at the address appearing in the Security Register or by such other method, acceptable to the Paying Agent/Registrar, requested by the Holder hereof at the Holder's risk and expense.

This Bond is one of the series specified in its title issued in the aggregate principal amount of $_____ (the *Bonds*) pursuant to an ordinance adopted by the governing body of the City (the *Ordinance*), for the purpose of providing funds for the (i) discharge and final payment of the Refunded Obligations and (ii) payment of the costs of issuance of the Bonds, under and in strict conformity with the laws of the State of Texas, including Chapter 1207, as amended, Texas Government Code, and the City's Home Rule Charter.

The Bonds stated to mature on February 1, 20__, February 1, 20__ and February 1, 20_ are referred to herein as the "Term Bonds". The Term Bonds are subject to mandatory sinking fund redemption prior to their Stated Maturities from money required to be deposited in the Bond Fund for such purpose and shall be redeemed in part, by lot or other customary method, at the principal amount thereof plus accrued interest to the date of redemption in the following principal amounts on February 1 in each of the years as set forth below:

Term Bonds
Stated to Mature
on February 1, 20__

| Year | Principal Amount ($) |
|---|---|
| * | |

Term Bonds
Stated to Mature
on February 1, 20__

| Year | Principal Amount ($) |
|---|---|
| * | |

Term Bonds
Stated to Mature
on February 1, 20_

| Year | Principal Amount ($) |
|---|---|
| * | |

*Payable at Stated Maturity.

The principal amount of a Term Bond required to be redeemed pursuant to the operation of such mandatory redemption provisions shall be reduced, at the option of the City, by the principal amount of any Term Bonds of such Stated Maturity which, at least fifty (50) days prior to the mandatory redemption date (1) shall have been defeased or acquired by the City and delivered to the Paying Agent/Registrar for cancellation, (2) shall have been purchased and canceled by the Paying Agent/Registrar at the request of the City with money in the Bond Fund, or (3) shall have been redeemed pursuant to the optional redemption provisions set forth below and not theretofore credited against a mandatory redemption requirement.

As specified in the Ordinance, the Bonds having Stated Maturities on and after February 1, 2030 shall be subject to redemption prior to Stated Maturity, at the option of the City, on February 1, 2029, or on any date thereafter, in whole or in part in principal amounts of $5,000 or

any integral multiple thereof (and if within a Stated Maturity selected at random and by lot by the Paying Agent/Registrar) at the redemption price of par plus accrued interest to the date of redemption, and upon thirty (30) days prior written notice being given by United States mail, first-class postage prepaid, to Holders of the Bonds to be redeemed, and subject to the terms and provisions relating thereto contained in the Ordinance. If this Bond is subject to redemption prior to Stated Maturity and is in a denomination in excess of $5,000, portions of the principal sum hereof in installments of $5,000 or any integral multiple thereof may be redeemed, and, if less than all of the principal sum hereof is to be redeemed, there shall be issued, without charge therefor, to the Holder hereof, upon the surrender of this Bond to the Paying Agent/Registrar at its corporate trust office, a new Bond or Bonds of like Stated Maturity and interest rate in any authorized denominations provided in the Ordinance for the then unredeemed balance of the principal sum hereof.

If this Bond (or any portion of the principal sum hereof) shall have been duly called for redemption and notice of such redemption has been duly given, then upon such redemption date this Bond (or the portion of the principal sum hereof to be redeemed) shall become due and payable, and, if money for the payment of the redemption price and the interest accrued on the principal amount to be redeemed to the date of redemption is held for the purpose of such payment by the Paying Agent/Registrar, interest shall cease to accrue and be payable hereon from and after the redemption date on the principal amount hereof to be redeemed. If this Bond is called for redemption, in whole or in part, the Issuer or the Paying Agent/Registrar shall not be required to issue, transfer, or exchange this Bond within forty-five (45) days of the date fixed for redemption; provided, however, such limitation of transfer shall not be applicable to an exchange by the Holder of the unredeemed balance hereof in the event of its redemption in part.

The Bonds of this series are payable from the proceeds of an annual ad valorem tax levied upon all taxable property within the City within the limitations prescribed by law.

Reference is hereby made to the Ordinance, a copy of which is on file in the corporate trust office of the Paying Agent/Registrar, and to all of the provisions of which the Holder by his acceptance hereof hereby assents, for definitions of terms; the description of and the nature and extent of the tax levied for the payment of the Bonds; the terms and conditions relating to the transfer or exchange of the Bonds; the conditions upon which the Ordinance may be amended or supplemented with or without the consent of the Holders; the rights, duties, and obligations of the City and the Paying Agent/Registrar; the terms and provisions upon which this Bond may be redeemed or discharged at or prior to the Stated Maturity thereof, and deemed to be no longer Outstanding thereunder; and for the other terms and provisions specified in the Ordinance. Capitalized terms used herein have the same meanings assigned in the Ordinance.

This Bond, subject to certain limitations contained in the Ordinance, may be transferred on the Security Register upon presentation and surrender at the corporate trust office of the Paying Agent/Registrar, duly endorsed by, or accompanied by a written instrument of transfer in form satisfactory to the Paying Agent/Registrar duly executed by the Holder hereof, or his duly authorized agent, and thereupon one or more new fully registered Bonds of the same Stated Maturity, of authorized denominations, bearing the same rate of interest, and of the same aggregate principal amount will be issued to the designated transferee or transferees.

The City and the Paying Agent/Registrar, and any agent of either, shall treat the Holder hereof whose name appears on the Security Register (i) on the Record Date as the owner hereof for purposes of receiving payment of interest hereon, (ii) on the date of surrender of this Bond as the owner hereof for purposes of receiving payment of principal hereof at its Stated Maturity or its redemption, in whole or in part, and (iii) on any other date as the owner hereof for all other purposes, and neither the City nor the Paying Agent/Registrar, or any such agent of either, shall be affected by notice to the contrary. In the event of a non-payment of interest on a scheduled payment date, and for thirty (30) days thereafter, a new record date for such interest payment (a *Special Record Date*) will be established by the Paying Agent/Registrar, if and when funds for the payment of such interest have been received from the City. Notice of the Special Record Date and of the scheduled payment date of the past due interest (the *Special Payment Date* - which shall be fifteen (15) days after the Special Record Date) shall be sent at least five (5) business days prior to the Special Record Date by United States mail, first-class postage prepaid, to the address of each Holder appearing on the Security Register at the close of business on the last business day next preceding the date of mailing of such notice.

It is hereby certified, covenanted, and represented that all acts, conditions, and things required to be performed, exist, and be done precedent to or in the issuance of this Bond in order to render the same a legal, valid, and binding obligation of the City have been performed, exist, and have been done, in regular and due time, form, and manner, as required by the laws of the State of Texas and the Ordinance, and that the issuance of the Bonds does not exceed any constitutional or statutory limitation; and that due provision has been made for the payment of the principal of, premium if any, and interest on the Bonds by the levy of a tax as aforestated. In case any provision in this Bond or any application thereof shall be deemed invalid, illegal, or unenforceable, the validity, legality, and enforceability of the remaining provisions and applications shall not in any way be affected or impaired thereby. The terms and provisions of this Bond and the Ordinance shall be construed in accordance with and shall be governed by the laws of the State of Texas.

*[The remainder of this page intentionally left blank.]*

IN WITNESS WHEREOF, the City has caused this Bond to be duly executed under its official seal.

CITY OF LUCAS, TEXAS

_____
Mayor

ATTEST:

_____
City Secretary

(CITY SEAL)

*[The remainder of this page intentionally left blank.]*

C. *Form of Registration Certificate of Comptroller of Public Accounts to Appear on Initial Bond Only.

REGISTRATION CERTIFICATE OF
COMPTROLLER OF PUBLIC ACCOUNTS

| | | |
|---|---|---|
| OFFICE OF THE COMPTROLLER OF PUBLIC ACCOUNTS | § | |
| | § | |
| | § | REGISTER NO. _____ |
| THE STATE OF TEXAS | § | |

I HEREBY CERTIFY that this Bond has been examined, certified as to validity and approved by the Attorney General of the State of Texas, and duly registered by the Comptroller of Public Accounts of the State of Texas.

WITNESS my signature and seal of office this _____.

_____
Comptroller of Public Accounts
of the State of Texas

(SEAL)

* Note to Printer: Do Not Print on Definitive Bonds

D. *Form of Certificate of Paying Agent/Registrar to Appear on Definitive Bonds Only.

REGISTRATION CERTIFICATE OF PAYING AGENT/REGISTRAR

This Bond has been duly issued under the provisions of the within-mentioned Ordinance; the Bond or Bonds of the above-entitled and designated series originally delivered having been approved by the Attorney General of the State of Texas and registered by the Comptroller of Public Accounts, as shown by the records of the Paying Agent/Registrar.

Registered this date:

_____

BOKF, NA, Dallas, Texas, as Paying Agent/Registrar

By: _____
Authorized Signature

* Note to Printer: Print on Definitive Bonds

E. Form of Assignment.

ASSIGNMENT

FOR VALUE RECEIVED the undersigned hereby sells, assigns, and transfers unto (Print or typewrite name, address, and zip code of transferee): _____

_____

(Social Security or other identifying number): _____

the within Bond and all rights thereunder, and hereby irrevocably constitutes and appoints _____ attorney to transfer the within Bond on the books kept for registration thereof, with full power of substitution in the premises.

DATED: _____

_____

NOTICE: The signature on this assignment must correspond with the name of the registered owner as it appears on the face of the within Bond in every particular.

Signature guaranteed:

_____

F. Form of Initial Bond. The Initial Bond shall be in the form set forth in paragraph B of this Section, except that the form of a single fully registered Initial Bond shall be modified as follows:

(i) immediately under the name of the Bond the headings "Interest Rate" and "Stated Maturity" shall both be completed "as shown below";

(ii) the first two paragraphs shall read as follows:

REGISTERED OWNER: _____

PRINCIPAL AMOUNT: _____ AND NO/100 DOLLARS

The City of Lucas, Texas (the *City*), a body corporate and municipal corporation in the County of Collin, State of Texas, for value received, acknowledges itself indebted to and hereby promises to pay to the order of the Registered Owner named above, or the registered assigns thereof, the Principal Amount specified above stated to mature on the first day of February in each of the years and in principal amounts and bearing interest at per annum rates in accordance with the following schedule:

| Years of Stated Maturity | Principal Amounts ($) | Interest Rates (%) |
|---|---|---|

(Information to be inserted from schedule in Section 2 hereof).

and to pay interest on the unpaid Principal Amount hereof from the Dated Date or from the most recent Interest Payment Date (hereinafter defined) to which interest has been paid or duly provided for until the Principal Amount has become due and payment thereof has been made or duly provided for, to Stated Maturity, while Outstanding, at the per annum rates of interest specified above computed on the basis of a 360-day year of twelve 30-day months; such interest being payable on February 1 and August 1 (each, an *Interest Payment Date*) of each year, commencing August 1, 2021.

Principal of this Bond shall be payable to the Registered Owner hereof (the *Holder*), upon its presentation and surrender to Stated Maturity, while Outstanding, at the corporate trust office of BOKF, NA, Dallas, Texas (the *Paying Agent/Registrar*). Interest shall be payable to the Holder of this Bond whose name appears on the Security Register maintained by the Paying Agent/Registrar at the close of business on the Record Date, which is the last business day of the month next preceding each Interest Payment Date. All payments of principal of, premium, if any, and interest on this Bond shall be in any coin or currency of the United States of America which at the time of payment is legal tender for the payment of public and private debts. Interest shall be paid by the Paying Agent/Registrar by check sent on or prior to the appropriate date of payment by United States mail, first-class postage prepaid, to the Holder hereof at the address appearing in the Security Register or by such other method, acceptable to the Paying Agent/Registrar, requested by, and at the risk and expense of, the Holder hereof.

[END OF FORMS]

G. Insurance Legend. If bond insurance is obtained by the City or the Purchasers for the Bonds, the Definitive Bonds and the Initial Bond shall bear an appropriate legend as provided by the bond insurer to appear under the following header:

[BOND INSURANCE] or [STATEMENT OF INSURANCE]

SECTION 9. Definitions. For all purposes of this Ordinance (as defined below), except as otherwise expressly provided or unless the context otherwise requires: (i) the terms defined in this Section have the meanings assigned to them in this Section, and certain terms used in Sections 21 and 38 of this Ordinance have the meanings assigned to them in such Sections, and all such terms include the plural as well as the singular; (ii) all references in this Ordinance to designated "Sections" and other subdivisions are to the designated Sections and other subdivisions of this Ordinance as originally adopted; and (iii) the words "herein", "hereof", and "hereunder" and other words of similar import refer to this Ordinance as a whole and not to any particular Section or other subdivision.

A. The term *Authorized Officials* shall mean the Mayor, Mayor Pro Tem, City Manager, Director of Finance, and/or City Secretary.

B. The term *Bond Fund* shall mean the special fund created and established by the provisions of Section 10 of this Ordinance.

C. The term *Bonds* shall mean the $_____ "CITY OF LUCAS, TEXAS GENERAL OBLIGATION REFUNDING BONDS, SERIES 2020" authorized by this Ordinance.

D. The term *City* or the *Issuer* shall mean City of Lucas, located in the County of Collin, Texas and, where appropriate, the City Council of the City.

E. The term *Closing Date* shall mean the date of physical delivery of the Initial Bonds in exchange for the payment in full by the Purchasers.

F. The term *Debt Service Requirements* shall mean, as of any particular date of computation, with respect to any obligations and with respect to any period, the aggregate of the amounts to be paid or set aside by the City as of such date or in such period for the payment of the principal of, premium, if any, and interest (to the extent not capitalized) on such obligations; assuming, in the case of obligations without a fixed numerical rate, that such obligations bear interest at the maximum rate permitted by the terms thereof and further assuming in the case of obligations required to be redeemed or prepaid as to principal prior to Stated Maturity, the principal amounts thereof will be redeemed prior to Stated Maturity in accordance with the mandatory redemption provisions applicable thereto.

G. The term *Depository* shall mean an official depository bank of the City.

H. The term *Government Securities*, as used herein, shall mean (i) direct noncallable obligations of the United States, including obligations that are unconditionally guaranteed by, the United States of America; (ii) noncallable obligations of an agency or instrumentality of the United States, including obligations that are unconditionally guaranteed or insured by the agency or instrumentality and that, on the date the governing body of the issuer adopts or approves the proceedings authorizing the issuance of refunding bonds, are rated as to investment quality by a nationally recognized investment rating firm not less than AAA or its equivalent; (iii) noncallable obligations of a state or an agency or a county, municipality, or other political subdivision of a state that have been refunded and that, on the date the governing body of the issuer adopts or approves the proceedings authorizing the issuance of refunding bonds, are rated as to investment quality by a nationally recognized investment rating firm not less than AAA or its equivalent, or (iv) any additional securities and obligations hereafter authorized by the laws of the State of Texas as eligible for use to accomplish the discharge of obligations such as the Bonds.

I. The term *Holder* or *Holders* shall mean the registered owner, whose name appears in the Security Register, for any Bond.

J. The term *Interest Payment Date* shall mean the date interest is payable on the Bonds, being February 1 and August 1 of each year, commencing August 1, 2021, while any of the Bonds remain Outstanding.

K. The term *Ordinance* shall mean this ordinance adopted by the City Council of the City on November 5, 2020.

L. The term *Outstanding* when used in this Ordinance with respect to Bonds shall mean, as of the date of determination, all Bonds issued and delivered under this Ordinance, except:

(1) those Bonds canceled by the Paying Agent/Registrar or delivered to the Paying Agent/Registrar for cancellation;

(2) those Bonds for which payment has been duly provided by the City in accordance with the provisions of Section 23 of this Ordinance; and

(3) those Bonds that have been mutilated, destroyed, lost, or stolen and replacement Bonds have been registered and delivered in lieu thereof as provided in Section 17 of this Ordinance.

M. The term *Purchasers* shall mean the initial purchasers of the Bonds named in Section 18 of this Ordinance.

N. The term *Stated Maturity* shall mean the annual principal payments of the Bonds payable on February 1 of each year the Bonds are Outstanding, as set forth in Section 2 of this Ordinance.

SECTION 10. Bond Fund; Investments. For the purpose of paying the interest on and to provide a sinking fund for the payment, redemption and retirement of the Bonds, there shall be and is hereby created a special fund to be designated "CITY OF LUCAS, TEXAS GENERAL OBLIGATION REFUNDING BONDS, SERIES 2020 INTEREST AND SINKING FUND" (the *Bond Fund*), which fund shall be kept and maintained at the Depository, and money deposited in such fund shall be used for no other purpose and shall be maintained as provided in Section 21. Authorized Officials of the City are hereby authorized and directed to make withdrawals from the Bond Fund sufficient to pay the purchase price or amount of principal of, premium, if any, and interest on the Bonds as the same become due and payable and shall cause to be transferred to the Paying Agent/Registrar from money on deposit in the Bond Fund an amount sufficient to pay the amount of principal and/or interest stated to mature on the Bonds, such transfer of funds to the Paying Agent/Registrar to be made in such manner as will cause immediately available funds to be deposited with the Paying Agent/Registrar on or before the business day next preceding each interest and principal payment date for the Bonds.

Pending the transfer of funds to the Paying Agent/Registrar, money deposited in any fund created and established pursuant to the provisions of this Ordinance, at the option of the City, may be placed in time deposits, certificates of deposit, guaranteed investment contracts, or similar contractual agreements as permitted by the provisions of the Public Funds Investment Act, as amended, Chapter 2256, Texas Government Code, secured (to the extent not insured by the Federal Deposit Insurance Corporation) by obligations of the type hereinafter described, or be invested, as authorized by any law, including investments held in book-entry form, in securities including, but not limited to, direct obligations of the United States of America, obligations guaranteed or insured by the United States of America, which, in the opinion of the Attorney General of the United States, are backed by its full faith and credit or represent its general obligations, or invested in indirect obligations of the United States of America, including, but not limited to, evidences of indebtedness issued, insured or guaranteed by such governmental agencies as the Federal Land

Banks, Federal Intermediate Credit Banks, Banks for Cooperatives, Federal Home Loan Banks, Government National Mortgage Association, Farmers Home Administration, Federal Home Loan Mortgage Association, Small Business Administration, or Federal Housing Association; provided that all such deposits and investments shall be made in such a manner that the money required to be expended from such fund will be available at the proper time or times. All interest and income derived from deposits and investments in such fund shall be credited to, and any losses debited to, such fund. All such investments shall be sold promptly when necessary to prevent any default in connection with the Bonds.

SECTION 11. Tax Levy. To provide for the payment of the Debt Service Requirements on the Bonds being (i) the interest on the Bonds and (ii) a sinking fund for their redemption at Stated Maturity or a sinking fund of 2% (whichever amount shall be the greater), there shall be and there is hereby levied for the current year and each succeeding year thereafter while the Bonds or any interest thereon shall remain Outstanding, a sufficient tax, within the limitations prescribed by law, on each one hundred dollars' valuation of taxable property in the City, adequate to pay such Debt Service Requirements, full allowance being made for delinquencies and costs of collection; said tax shall be assessed and collected each year and applied to the payment of the Debt Service Requirements, and the same shall not be diverted to any other purpose. The taxes so levied and collected shall be paid into the Bond Fund and are thereafter pledged to the payment of the Bonds. The City Council hereby declares its purpose and intent to provide and levy a tax legally and fully sufficient to pay such Debt Service Requirements, it having been determined that the existing and available taxing authority of the City for such purpose is adequate to permit a legally sufficient tax in consideration of all other outstanding indebtedness and other obligations of the City.

SECTION 12. Deposits to Bond Fund; Surplus Bond Proceeds. The City hereby covenants and agrees to cause to be deposited in the Bond Fund prior to a principal and interest payment date for the Bonds, from the annual levy of an ad valorem tax or from other lawfully available funds, amounts sufficient to fully pay and discharge promptly each installment of interest and principal of the Bonds as the same accrues or matures or comes due by reason of Stated Maturity.

Accrued interest received from the Purchasers of the Bonds, along with any taxes collected pertaining to the Refunded Obligations, after the Closing Date, shall be deposited to the Bond Fund. In addition, any surplus proceeds from the sale of the Bonds, including investment income thereon, not expended for authorized purposes shall be deposited in the Bond Fund, and such amounts so deposited shall reduce the sums otherwise required to be deposited in said fund from ad valorem taxes.

SECTION 13. Security of Funds. All money on deposit in the funds for which this Ordinance makes provision (except any portion thereof as may be at any time properly invested as provided herein) shall be secured in the manner and to the fullest extent required by the laws of the State of Texas for the security of public funds, and money on deposit in such funds shall be used only for the purposes permitted by this Ordinance.

SECTION 14. Remedies in Event of Default. In addition to all the rights and remedies provided by the laws of the State of Texas, the City covenants and agrees particularly that in the event the City (a) defaults in the payments to be made to the Bond Fund or (b) defaults in the

observance or performance of any other of the covenants, conditions, or obligations set forth in this Ordinance, the Holders of any of the Bonds shall be entitled to seek a writ of mandamus issued by a court of proper jurisdiction compelling and requiring the governing body of the City and other officers of the City to observe and perform any covenant, condition, or obligation prescribed in this Ordinance.

No delay or omission to exercise any right or power accruing upon any default shall impair any such right or power or shall be construed to be a waiver of any such default or acquiescence therein, and every such right and power may be exercised from time to time and as often as may be deemed expedient. The specific remedies herein provided shall be cumulative of all other existing remedies and the specification of such remedies shall not be deemed to be exclusive.

SECTION 15. Notices to Holders; Waiver. Wherever this Ordinance provides for notice to Holders of any event, such notice shall be sufficiently given (unless otherwise herein expressly provided) if in writing and sent by United States mail, first-class postage prepaid, to the address of each Holder appearing in the Security Register at the close of business on the business day next preceding the mailing of such notice.

In any case where notice to Holders is given by mail, neither the failure to mail such notice to any particular Holders, nor any defect in any notice so mailed, shall affect the sufficiency of such notice with respect to all other Holders. Where this Ordinance provides for notice in any manner, such notice may be waived in writing by the Holder entitled to receive such notice, either before or after the event with respect to which such notice is given, and such waiver shall be the equivalent of such notice. Waivers of notice by Holders shall be filed with the Paying Agent/Registrar, but such filing shall not be a condition precedent to the validity of any action taken in reliance upon such waiver.

SECTION 16. Cancellation. All Bonds surrendered for payment, redemption, transfer, exchange, or replacement, if surrendered to the Paying Agent/Registrar, shall be promptly canceled by it and, if surrendered to the City, shall be delivered to the Paying Agent/Registrar and, if not already canceled, shall be promptly canceled by the Paying Agent/Registrar. The City may at any time deliver to the Paying Agent/Registrar for cancellation any Bonds previously certified or registered and delivered which the City may have acquired in any manner whatsoever, and all Bonds so delivered shall be promptly canceled by the Paying Agent/Registrar. All canceled Bonds held by the Paying Agent/Registrar shall be destroyed as directed by the City.

SECTION 17. Mutilated, Destroyed, Lost, and Stolen Bonds. If (1) any mutilated Bond is surrendered to the Paying Agent/Registrar, or the City and the Paying Agent/Registrar receive evidence to their satisfaction of the destruction, loss, or theft of any Bond, and (2) there is delivered to the City and the Paying Agent/Registrar such security or indemnity as may be required to save each of them harmless, then, in the absence of notice to the City or the Paying Agent/Registrar that such Bond has been acquired by a bona fide purchaser, the City shall execute and, upon the City's request, the Paying Agent/Registrar shall register and deliver, in exchange for or in lieu of any such mutilated, destroyed, lost, or stolen Bond, a new Bond of the same Stated Maturity and interest rate and of like tenor and principal amount, bearing a number not contemporaneously Outstanding.

In case any such mutilated, destroyed, lost, or stolen Bond has become or is about to become due and payable, the City in its discretion may, instead of issuing a new Bond, pay such Bond.

Upon the issuance of any new Bond or payment in lieu thereof, under this Section, the City may require payment by the Holder of a sum sufficient to cover any tax or other governmental charge imposed in relation thereto and any other expenses and charges (including attorney's fees and the fees and expenses of the Paying Agent/Registrar) connected therewith.

Every new Bond issued pursuant to this Section in lieu of any mutilated, destroyed, lost, or stolen Bond shall constitute a replacement of the prior obligation of the City, whether or not the mutilated, destroyed, lost, or stolen Bond shall be at any time enforceable by anyone, and shall be entitled to all the benefits of this Ordinance equally and ratably with all other Outstanding Bonds.

The provisions of this Section are exclusive and shall preclude (to the extent lawful) all other rights and remedies with respect to the replacement and payment of mutilated, destroyed, lost, or stolen Bonds.

SECTION 18. Sale of Bonds – Authorization of Official Bid Form – Approval of the Official Statement – Use of Bond Proceeds. The Bonds authorized by this Ordinance are hereby sold by the City to _____, _____, _____, as the authorized representative of a group of purchasers at a competitive sale (the *Purchasers,* having all the rights, benefits, and obligations of a Holder), in accordance with the provisions of an Official Bid Form (the *Official Bid Form*), dated November 5, 2020, attached hereto as Exhibit B and incorporated herein by reference as a part of this Ordinance for all purposes, at the price of par, plus a reoffering premium of $_____ (including the Purchasers' compensation), and accrued interest of $_____ and is hereby approved and confirmed. The Initial Bond shall be registered in the name of _____. It is hereby officially found, determined, and declared that the Purchasers are the highest bidder for the Bonds whose bid, received as a result of invitations for competitive bids in compliance with applicable law, produced the lowest true interest cost to the City. The pricing and terms of the sale of the Bonds are hereby found and determined to be the most advantageous reasonably obtainable by the City. Any Authorized Official is hereby authorized and directed to execute the Official Bid Form for and on behalf of the City and as the act and deed of this City Council, and in regard to the approval and execution of the Official Bid Form, the City Council hereby finds, determines and declares that the representations, warranties, and agreements of the City contained in the Official Bid Form are true and correct in all material respects and shall be honored and performed by the City. Delivery of the Bonds to the Purchasers shall occur as soon as practicable after the adoption of this Ordinance, upon payment therefor in accordance with the terms of the Official Bid Form.

Furthermore, the City hereby ratifies, confirms, and approves in all respects (i) the City's prior determination that the Preliminary Official Statement was, as of its date, "deemed final" in accordance with the Rule (hereinafter defined) and (ii) the use and distribution of the Official Notice of Sale, Official Bid Form, and Preliminary Official Statement by the Purchasers in connection with the public offering and sale of the Bonds. The final Official Statement, being a modification and amendment of the Preliminary Official Statement to reflect the terms of sale referenced in the Official Bid Form (together with such changes approved by any Authorized

Official, any one or more of said officials), shall be and is hereby in all respects approved and the Purchasers are hereby authorized to use and distribute the final Official Statement, dated November 5, 2020 in the reoffering, sale and delivery of the Bonds to the public. The Mayor, Mayor Pro Tem, and/or City Secretary are further authorized and directed to manually execute and deliver for and on behalf of the City copies of the Official Statement in final form as may be required by the Purchasers, and such final Official Statement in the form and content manually executed by said officials shall be deemed to be approved by the City Council and constitute the Official Statement authorized for distribution and use by the Purchasers. The proper officials of the City are hereby authorized to execute and deliver a certificate pertaining to such Official Statement as prescribed therein, dated as of the date of payment for and delivery of the Bonds.

SECTION 19. Escrow Agreement Approval and Execution; Proceeds of Sale; Contribution by City. The Escrow Deposit Letter dated as of November 5, 2020 to be effective upon the initial delivery of the Bonds to the Purchasers (the *Agreement*) between the City and BOKF, NA, Dallas, Texas (the *Escrow Agent*), attached hereto as Exhibit C and incorporated herein by reference as a part of this Ordinance for all purposes, is hereby approved as to form and content, and such Agreement in substantially the form and substance attached hereto, together with such changes or revisions as may be necessary to accomplish the refunding or benefit the City, is hereby authorized to be executed by any Authorized Official on behalf of the City and as the act and deed of this City Council; and such Agreement as executed by said officials shall be deemed approved by the City Council and constitute the Agreement herein approved.

Furthermore, any Authorized Official, or any one or more of said officials, and Bond Counsel in cooperation with the Escrow Agent are hereby authorized and directed to make the necessary arrangements for the purchase of the Escrowed Securities, if any, referenced in the Agreement and the initial delivery thereof to the Escrow Agent on the day of delivery of the Bonds to the Purchasers for deposit to the credit of the "CITY OF LUCAS, TEXAS GENERAL OBLIGATION REFUNDING BONDS, SERIES 2020 ESCROW FUND" (the *Escrow Fund*), including the execution of the subscription forms for the purchase and issuance of the "United States Treasury Securities - State and Local Government Series", if any, for deposit to the Escrow Fund; all as contemplated and provided by the provisions of the Act, this Ordinance, and the Agreement.

Immediately following the delivery of the Bonds, the proceeds of sale along with a cash contribution, if any, from the City (less certain costs of issuance, and accrued interest, if any, received from the Purchasers of the Bonds) shall be deposited with the Escrow Agent for application and disbursement in accordance with the provisions of the Agreement. The proceeds of sale of the Bonds not so deposited with the Escrow Agent for the refunding of the Refunded Obligations shall be disbursed for payment of costs of issuance and deposited with the place of payment (of the Refunded Obligations) in an account in the name of the City and applied for the purposes of providing for the payment of the costs and expenses incurred in connection therewith or deposited in the Bond Fund for the Bonds, all in accordance with written instructions from the Authorized Officials.

SECTION 20. Redemption of Refunded Obligations. The Refunded Obligations referenced in the preamble hereof become subject to redemption prior to their stated maturities at the price of par, premium, if any, and accrued interest to the date of redemption. The Mayor or

the City Secretary shall give written notice to the paying agent/registrar for the Refunded Obligations and the Escrow Agent that the Refunded Obligations have been called for redemption, and the City Council orders that such obligations are called for redemption on the date set forth on Schedule I attached to this Ordinance, and such order to redeem the Refunded Obligations on such date shall be irrevocable upon the delivery of the Bonds. A copy of the notice of redemption pertaining to the Refunded Obligations is attached to this Ordinance as Exhibit D and are incorporated herein by reference for all purposes. The paying agent for the Refunded Obligations is authorized and instructed to provide notice of this redemption to the holders of the Refunded Obligations in the form and manner described in the ordinance authorizing the issuance of the Refunded Obligations.

SECTION 21. Covenants to Maintain Tax-Exempt Status.

A. Definitions. When used in this Section, the following terms have the following meanings:

*Closing Date* means the date of physical delivery of the Initial Bonds in exchange for the payment in full by the Purchasers.

*Code* means the Internal Revenue Code of 1986, as amended by all legislation, if any, effective on or before the Closing Date.

*Computation Date* has the meaning set forth in Section 1.148-1(b) of the Regulations.

*Gross Proceeds* means any proceeds as defined in Section 1.148-1(b) of the Regulations, and any replacement proceeds as defined in Section 1.148-1(c) of the Regulations, of the Bonds.

*Investment* has the meaning set forth in Section 1.148-1(b) of the Regulations.

*Nonpurpose Investment* means any investment property, as defined in section 148(b) of the Code, in which Gross Proceeds of the Bonds are invested and which is not acquired to carry out the governmental purposes of the Bonds.

*Rebate Amount* has the meaning set forth in Section 1.148-1(b) of the Regulations.

*Regulations* means any proposed, temporary, or final Income Tax Regulations issued pursuant to sections 103 and 141 through 150 of the Code, and 103 of the Internal Revenue Code of 1954, which are applicable to the Bonds. Any reference to any specific Regulation shall also mean, as appropriate, any proposed, temporary or final Income Tax Regulation designed to supplement, amend or replace the specific Regulation referenced.

*Yield* of

(1) any Investment has the meaning set forth in Section 1.148-5 of the Regulations; and

(2) the Bonds has the meaning set forth in Section 1.148-4 of the Regulations.

B. Not to Cause Interest to Become Taxable. The City shall not use, permit the use of, or omit to use Gross Proceeds or any other amounts (or any property the acquisition, construction or improvement of which is to be financed or refinanced directly or indirectly with Gross Proceeds) in a manner which if made or omitted, respectively, would cause the interest on any Bond to become includable in the gross income, as defined in section 61 of the Code, of the owner thereof for federal income tax purposes. Without limiting the generality of the foregoing, unless and until the City receives a written opinion of counsel nationally recognized in the field of municipal bond law to the effect that failure to comply with such covenant will not adversely affect the exemption from federal income tax of the interest on any Bond, the City shall comply with each of the specific covenants in this Section.

C. No Private Use or Private Payments. Except to the extent it will not cause the Bonds to become "private activity bonds" within the meaning of section 141 of the Code and the Regulations and rulings thereunder, the City shall at all times prior to the last Stated Maturity of Bonds:

(1) exclusively own, operate and possess all property the acquisition, construction or improvement of which is to be financed or refinanced directly or indirectly with Gross Proceeds of the Bonds (including property financed with Gross Proceeds of the Refunded Obligations), and not use or permit the use of such Gross Proceeds (including all contractual arrangements with terms different than those applicable to the general public) or any property acquired, constructed or improved with such Gross Proceeds in any activity carried on by any person or entity (including the United States or any agency, department and instrumentality thereof) other than a state or local government, unless such use is solely as a member of the general public; and

(2) not directly or indirectly impose or accept any charge or other payment by any person or entity who is treated as using Gross Proceeds of the Bonds (including property financed with Gross Proceeds of the Refunded Obligations) or any property the acquisition, construction or improvement of which is to be financed or refinanced directly or indirectly with such Gross Proceeds (including property financed with Gross Proceeds of the Refunded Obligations), other than taxes of general application within the City or interest earned on investments acquired with such Gross Proceeds pending application for their intended purposes.

D. No Private Loan. Except to the extent it will not cause the Bonds to become "private activity bonds" within the meaning of section 141 of the Code and the Regulations and rulings thereunder, the City shall not use Gross Proceeds of the Bonds to make or finance loans to any person or entity other than a state or local government. For purposes of the foregoing covenant, such Gross Proceeds are considered to be "loaned" to a person or entity if: (1) property acquired, constructed or improved with such Gross Proceeds is sold or leased to such person or entity in a transaction which creates a debt for federal income tax purposes; (2) capacity in or service from such property is committed to such person or entity under a take-or-pay, output or similar contract or arrangement; or (3) indirect benefits, or burdens and benefits of ownership, of

such Gross Proceeds or any property acquired, constructed or improved with such Gross Proceeds are otherwise transferred in a transaction which is the economic equivalent of a loan.

E. Not to Invest at Higher Yield. Except to the extent it will not cause the Bonds to become "arbitrage bonds" within the meaning of section 148 of the Code and the Regulations and rulings thereunder, the City shall not at any time prior to the final Stated Maturity of the Bonds directly or indirectly invest Gross Proceeds in any Investment, if as a result of such investment the Yield of any Investment acquired with Gross Proceeds (or with money replaced thereby), whether then held or previously disposed of, materially exceeds the Yield of the Bonds.

F. Not Federally Guaranteed. Except to the extent permitted by section 149(b) of the Code and the Regulations and rulings thereunder, the City shall not take or omit to take any action which would cause the Bonds to be federally guaranteed within the meaning of section 149(b) of the Code and the Regulations and rulings thereunder.

G. Information Report. The City shall timely file the information required by section 149(e) of the Code with the Secretary of the Treasury on Form 8038-G or such other form and in such place as the Secretary may prescribe.

H. Rebate of Arbitrage Profits. Except to the extent otherwise provided in section 148(f) of the Code and the Regulations and rulings thereunder:

(1) The City shall account for all Gross Proceeds (including all receipts, expenditures and investments thereof) on its books of account separately and apart from all other funds (and receipts, expenditures and investments thereof) and shall retain all records of accounting for at least six years after the day on which the last Outstanding Bond is discharged. However, to the extent permitted by law, the City may commingle Gross Proceeds of the Bonds with other money of the City, provided that the City separately accounts for each receipt and expenditure of Gross Proceeds and the obligations acquired therewith.

(2) Not less frequently than each Computation Date, the City shall calculate the Rebate Amount in accordance with rules set forth in section 148(f) of the Code and the Regulations and rulings thereunder. The City shall maintain such calculations with its official transcript of proceedings relating to the issuance of the Bonds until six years after the final Computation Date.

(3) As additional consideration for the purchase of the Bonds by the Purchasers and the loan of the money represented thereby and in order to induce such purchase by measures designed to insure the excludability of the interest thereon from the gross income of the owners thereof for federal income tax purposes, the City shall pay to the United States out of the Bond Fund or its general fund, as permitted by applicable Texas statute, regulation or opinion of the Attorney General of the State of Texas, the amount that when added to the future value of previous rebate payments made for the Bonds equals (i) in the case of a Final Computation Date as defined in Section 1.148-3(e)(2) of the Regulations, one hundred percent (100%) of the Rebate Amount on such date; and (ii) in the case of any other Computation Date, ninety percent (90%) of the Rebate Amount on such date. In all

cases, the rebate payments shall be made at the times, in the installments, to the place and in the manner as is or may be required by section 148(f) of the Code and the Regulations and rulings thereunder, and shall be accompanied by Form 8038-T or such other forms and information as is or may be required by section 148(f) of the Code and the Regulations and rulings thereunder.

(4) The City shall exercise reasonable diligence to assure that no errors are made in the calculations and payments required by paragraphs (2) and (3), and if an error is made, to discover and promptly correct such error within a reasonable amount of time thereafter (and in all events within one hundred eighty (180) days after discovery of the error), including payment to the United States of any additional Rebate Amount owed to it, interest thereon, and any penalty imposed under Section 1.148-3(h) of the Regulations.

I. Not to Divert Arbitrage Profits. Except to the extent permitted by section 148 of the Code and the Regulations and rulings thereunder, the City shall not, at any time prior to the earlier of the Stated Maturity or final payment of the Bonds, enter into any transaction that reduces the amount required to be paid to the United States pursuant to Subsection H of this Section because such transaction results in a smaller profit or a larger loss than would have resulted if the transaction had been at arm's length and had the Yield of the Bonds not been relevant to either party.

J. Bonds Not Hedge Bonds.

(1) At the time the original bonds refunded by the Bonds were issued, the City reasonably expected to spend at least 85% of the spendable proceeds of such bonds within three years after such bonds were issued.

(2) Not more than 50% of the proceeds of the original bonds refunded by the Bonds were invested in Nonpurpose Investments having a substantially guaranteed Yield for a period of 4 years or more.

K. Qualified Current Refunding. The Bonds are issued, in part, to refund the Refunded Obligations, and the Bonds will be issued, and certain proceeds thereof used, within 90 days after the Closing Date for the redemption of the Refunded Obligations. In the issuance of the Bonds, the City has employed no "device" to obtain a material financial advantage (based on arbitrage), within the meaning of section 149(d)(4) of the Code, apart from savings attributable to lower interest rates. The City has complied with the covenants, representations, and warranties contained in the documents executed in connection with the issuance of the Refunded Obligations. Accordingly, the City expects to invest the Bond proceeds to be used to refund the Refunded Obligations without regard to Yield restrictions.

L. Elections. The City hereby directs and authorizes any Authorized Official, either or any combination of the foregoing, to make such elections in the Certificate as to Tax Exemption or similar or other appropriate certificate, form, or document permitted or required pursuant to the provisions of the Code or the Regulations, as they deem necessary or appropriate in connection with the Bonds. Such elections shall be deemed to be made on the Closing Date.

M. Qualified Tax-Exempt Obligations. The City hereby designates the Bonds as *qualified tax-exempt obligations* for purposes of section 265(b) of the Code. In furtherance of such designation, the City represents, covenants and warrants the following: (a) during the calendar year in which the Bonds are issued, the City (including any subordinate entities) has not designated nor will designate obligations, which when aggregated with the Bonds, will result in more than $10,000,000 of "qualified tax-exempt obligations" being issued; (b) the City reasonably anticipates that the amount of tax-exempt obligations issued during the calendar year 2020 by the City (including any subordinate entities) will not exceed $10,000,000; and (c) the City will take such action or refrain from such action as is necessary in order that the Bonds will not be considered "private activity bonds" within the meaning of section 141 of the Code.

SECTION 22. Control and Custody of Bonds. The Mayor shall be and is hereby authorized to take and have charge of all necessary orders and records pending investigation by the Attorney General of the State of Texas and shall take and have charge and control of the Bonds pending their approval by the Attorney General, the registration thereof by the Comptroller of Public Accounts and the delivery of the Bonds to the Purchasers.

Furthermore, any Authorized Official, either or all, are hereby authorized and directed to furnish and execute such documents relating to the City and its financial affairs as may be necessary for the issuance of the Bonds, the approval of the Attorney General and their registration by the Comptroller of Public Accounts and, together with the City's financial advisors, Bond Counsel, and the Paying Agent/Registrar, make the necessary arrangements for the delivery of the Initial Bonds to the Purchasers and the initial exchange thereof for definitive Bonds.

SECTION 23. Satisfaction of Obligation of City. If the City shall pay or cause to be paid, or there shall otherwise be paid to the Holders, the principal of, premium, if any, and interest on the Bonds, at the times and in the manner stipulated in this Ordinance, then the pledge of taxes levied under this Ordinance and all covenants, agreements, and other obligations of the City to the Holders shall thereupon cease, terminate, and be discharged and satisfied.

Bonds, or any principal amount(s) thereof, shall be deemed to have been paid within the meaning and with the effect expressed above in this Section when (i) money sufficient to pay in full such Bonds or the principal amount(s) thereof at Stated Maturity or to the redemption date therefor, together with all interest due thereon, shall have been irrevocably deposited with and held in trust by the Paying Agent/Registrar, or an authorized escrow agent, and/or (ii) Government Securities shall have been irrevocably deposited in trust with the Paying Agent/Registrar, or an authorized escrow agent, which Government Securities will mature as to principal and interest in such amounts and at such times as will insure the availability, without reinvestment, of sufficient money, together with any money deposited therewith, if any, to pay when due the principal of and interest on such Bonds, or the principal amount(s) thereof, on and prior to the Stated Maturity thereof or (if notice of redemption has been duly given or waived or if irrevocable arrangements therefor acceptable to the Paying Agent/Registrar have been made) the redemption date thereof for the Bonds. In the event of a defeasance of the Bonds, the City shall deliver a certificate from its financial advisor, the Paying Agent/Registrar, an independent accounting firm, or another qualified third party concerning the deposit of cash and/or Government Securities to pay, when due, the principal of, redemption premium (if any), and interest due on any defeased Bonds. To the extent applicable, if at all, the City covenants that no deposit of money or Government

Securities will be made under this Section and no use made of any such deposit which would cause the Bonds to be treated as arbitrage bonds within the meaning of section 148 of the Code (as defined in Section 21 hereof).

Any money so deposited with the Paying Agent/Registrar, and all income from Government Securities held in trust by the Paying Agent/Registrar, or an authorized escrow agent, pursuant to this Section which is not required for the payment of the Bonds, or any principal amount(s) thereof, or interest thereon with respect to which such money has been so deposited shall be remitted to the City or deposited as directed by the City. Furthermore, any money held by the Paying Agent/Registrar for the payment of the principal of and interest on the Bonds and remaining unclaimed for a period of three (3) years after the Stated Maturity of the Bonds or applicable redemption date, such money was deposited and is held in trust to pay shall upon the request of the City be remitted to the City against a written receipt therefor, subject to the unclaimed property laws of the State of Texas.

Notwithstanding any other provision of this Ordinance to the contrary, it is hereby provided that any determination not to redeem defeased Bonds that is made in conjunction with the payment arrangements specified in subsection (i) or (ii) above shall not be irrevocable, provided that: (1) in the proceedings providing for such defeasance, the Issuer expressly reserves the right to call the defeased Bonds for redemption; (2) gives notice of the reservation of that right to the owners of the defeased Bonds immediately following the defeasance; (3) directs that notice of the reservation be included in any redemption notices that it authorizes; and (4) at the time of the redemption, satisfies the conditions of (i) or (ii) above with respect to such defeased debt as though it was being defeased at the time of the exercise of the option to redeem the defeased Bonds, after taking the redemption into account in determining the sufficiency of the provisions made for the payment of the defeased Bonds.

SECTION 24. Printed Opinion. The Purchasers' obligation to accept delivery of the Bonds is subject to its being furnished a final opinion of Norton Rose Fulbright US LLP, San Antonio, Texas, as Bond Counsel, approving certain legal matters as to the Bonds, said opinion to be dated and delivered as of the date of initial delivery and payment for such Bonds. Printing of a true and correct copy of said opinion on the reverse side of each of the Bonds, with appropriate certificate pertaining thereto executed by facsimile signature of the City Secretary of the City is hereby approved and authorized.

SECTION 25. CUSIP Numbers. CUSIP numbers may be printed or typed on the definitive Bonds. It is expressly provided, however, that the presence or absence of CUSIP numbers on the definitive Bonds shall be of no significance or effect as regards the legality thereof, and neither the City nor attorneys approving said Bonds as to legality are to be held responsible for CUSIP numbers incorrectly printed or typed on the definitive Bonds.

SECTION 26. Effect of Headings. The Section headings herein are for convenience only and shall not affect the construction hereof.

SECTION 27. Ordinance a Contract; Amendments - Outstanding Bonds. The City acknowledges that the covenants and obligations of the City herein contained are a material inducement to the purchase of the Bonds. This Ordinance shall constitute a contract with the

Holders from time to time, shall be binding on the City and its successors and assigns, and shall not be amended or repealed by the City so long as any Bond remains Outstanding except as permitted in this Section. The City may, without the consent of or notice to any Holders, from time to time and at any time, amend this Ordinance in any manner not detrimental to the interests of the Holders, including the curing of any ambiguity, inconsistency, or formal defect or omission herein. In addition, the City may, with the written consent of Holders holding a majority in aggregate principal amount of the Bonds then Outstanding affected thereby, amend, add to, or rescind any of the provisions of this Ordinance; provided; however, that, without the consent of all Holders of Outstanding Bonds, no such amendment, addition, or rescission shall (1) extend the time or times of payment of the principal of, premium, if any, and interest on the Bonds, reduce the principal amount thereof, the redemption price thereof, or the rate of interest thereon, or in any other way modify the terms of payment of the principal of, premium, if any, or interest on the Bonds, (2) give any preference to any Bond over any other Bond, or (3) reduce the aggregate principal amount of Bonds required for consent to any such amendment, addition, or rescission.

SECTION 28. Benefits of Ordinance. Nothing in this Ordinance, expressed or implied, is intended or shall be construed to confer upon any person other than the City, Bond Counsel, Paying Agent/Registrar, and the Holders, any right, remedy, or claim, legal or equitable, under or by reason of this Ordinance or any provision hereof, this Ordinance and all its provisions being intended to be and being for the sole and exclusive benefit of the City, Bond Counsel, the Paying Agent/Registrar, and the Holders.

SECTION 29. Inconsistent Provisions. All ordinances and resolutions, or parts thereof, which are in conflict or inconsistent with any provision of this Ordinance are hereby repealed to the extent of such conflict, and the provisions of this Ordinance shall be and remain controlling as to the matters ordained herein.

SECTION 30. Construction of Terms. If appropriate in the context of this Ordinance, words of the singular number shall be considered to include the plural, words of the plural number shall be considered to include the singular, and words of the masculine, feminine or neuter gender shall be considered to include the other genders.

SECTION 31. Governing Law. This Ordinance shall be construed and enforced in accordance with the laws of the State of Texas and the United States of America.

SECTION 32. Severability. If any provision of this Ordinance or the application thereof to any person or circumstance shall be held to be invalid, the remainder of this Ordinance and the application of such provision to other persons and circumstances shall nevertheless be valid, and the City Council hereby declares that this Ordinance would have been enacted without such invalid provision.

SECTION 33. Incorporation of Preamble Recitals. The recitals contained in the preamble hereof are hereby found to be true, and such recitals are hereby made a part of this Ordinance for all purposes and are adopted as a part of the judgment and findings of the City Council.

SECTION 34. Authorization of Paying Agent/Registrar Agreement. The City Council of the City hereby finds and determines that it is in the best interest of the City to authorize the

execution of a Paying Agent/Registrar Agreement concerning the payment, exchange, registration, and transferability of the Bonds. A copy of the Paying Agent/Registrar Agreement is attached hereto, in substantially final form, as Exhibit A and is incorporated by reference to the provisions of this Ordinance.

SECTION 35. Public Meeting. It is officially found, determined, and declared that the meeting at which this Ordinance is adopted was open to the public and public notice of the time, place, and subject matter of the public business to be considered at such meeting, including this Ordinance, was given, all as required by Chapter 551, as amended, Texas Government Code.

SECTION 36. Unavailability of Authorized Publication. If, because of the temporary or permanent suspension of any newspaper, journal, or other publication, or, for any reason, publication of notice cannot be made meeting any requirements herein established, any notice required to be published by the provisions of this Ordinance shall be given in such other manner and at such time or times as in the judgment of the City or of the Paying Agent/Registrar shall most effectively approximate such required publication and the giving of such notice in such manner shall for all purposes of this Ordinance be deemed to be in compliance with the requirements for publication thereof.

SECTION 37. No Recourse Against City Officials. No recourse shall be had for the payment of principal of, premium, if any, or interest on any Bond or for any claim based thereon or on this Ordinance against any official of the City or any person executing any Bond.

SECTION 38. Continuing Disclosure Undertaking.

A. Definitions.

As used in this Section, the following terms have the meanings ascribed to such terms below:

*EMMA* means the MSRB's Electronic Municipal Market Access system, accessible by the general public, without charge, on the internet through the uniform resource locator (URL) http://www.emma.msrb.org.

*Financial Obligation* means a (a) debt obligation; (b) derivative instrument entered into in connection with, or pledged as security or a source of payment for, an existing or planned debt obligation; or (c) guarantee of a debt obligation or any such derivative instrument; provided that "financial obligation" shall not include municipal securities (as defined in the Securities Exchange Act of 1934, as amended) as to which a final official statement (as defined in the Rule) has been provided to the MSRB consistent with the Rule.

*MSRB* means the Municipal Securities Rulemaking Board.

*Rule* means SEC Rule 15c2-12, as amended from time to time.

*SEC* means the United States Securities and Exchange Commission.

*Undertaking* means the City's continuing disclosure undertaking, described in Subsections B through F below, hereunder accepted and entered into by the City for the purpose of compliance with the Rule.

B. Annual Reports.

The City shall file annually with the MSRB, (1) within six months after the end of each fiscal year of the City ending in or after 2020, financial information and operating data with respect to the City of the general type included in the final Official Statement authorized by Section 18 of this Ordinance, being the information described in Exhibit E hereto, and (2) if not provided as part of such financial information and operating data, audited financial statements of the City, when and if available. Any financial statements so to be provided shall be (i) prepared in accordance with the accounting principles described in Exhibit E hereto, or such other accounting principles as the City may be required to employ from time to time pursuant to state law or regulation, and (ii) audited, if the City commissions an audit of such financial statements and the audit is completed within the period during which they must be provided. If the audit of such financial statements is not complete within such period, then the City shall file unaudited financial statements within such period and audited financial statements for the applicable fiscal year to the MSRB, when and if the audit report on such financial statements becomes available. Under current Texas law, including, but not limited to, Chapter 103, as amended, Texas Local Government Code, the City must have its records and accounts audited annually and shall have an annual financial statement prepared based on the audit. The annual financial statement, including the auditor's opinion on the statement, shall be filed in the office of the City Secretary within 180 days after the last day of the City's fiscal year. Additionally, upon the filing of this financial statement and the annual audit, these documents are subject to the Texas Open Records Act, as amended, Texas Government Code, Chapter 552.

If the City changes its fiscal year, it will file notice of such change (and of the date of the new fiscal year end) with the MSRB prior to the next date by which the City otherwise would be required to provide financial information and operating data pursuant to this Section.

C. Notice of Certain Events.

The City shall file notice of any of the following events with respect to the Bonds to the MSRB in a timely manner and not more than 10 business days after occurrence of the event:

(1) Principal and interest payment delinquencies;

(2) Non-payment related defaults, if material;

(3) Unscheduled draws on debt service reserves reflecting financial difficulties;

(4) Unscheduled draws on credit enhancements reflecting financial difficulties;

(5) Substitution of credit or liquidity providers, or their failure to perform;

(6) Adverse tax opinions, the issuance by the Internal Revenue Service of proposed or final determinations of taxability, Notices of Proposed Issue (IRS Form 5701-

TEB), or other material notices or determinations with respect to the tax status of the Bonds, or other material events affecting the tax status of the Bonds;

(7) Modifications to rights of Holders of the Bonds, if material;

(8) Bond calls, if material, and tender offers;

(9) Defeasances;

(10) Release, substitution, or sale of property securing repayment of the Bonds, if material;

(11) Rating changes;

(12) Bankruptcy, insolvency, receivership, or similar event of the City, which shall occur as described below;

(13) The consummation of a merger, consolidation, or acquisition involving the City or the sale of all or substantially all of its assets, other than in the ordinary course of business, the entry into of a definitive agreement to undertake such an action or the termination of a definitive agreement relating to any such actions, other than pursuant to its terms, if material;

(14) Appointment of a successor or additional paying agent/registrar or the change of name of a paying agent/registrar, if material;

(15) Incurrence of a Financial Obligation of the City, if material, or agreement to covenants, events of default, remedies, priority rights, or other similar terms of a Financial Obligation of the City, any of which affect security holders, if material; and

(16) Default, event of acceleration, termination event, modification of terms, or other similar events under the terms of a Financial Obligation of the City, any of which reflect financial difficulties.

For these purposes, (a) any event described in the immediately preceding paragraph (12) is considered to occur when any of the following occur: the appointment of a receiver, fiscal agent, or similar officer for the City in a proceeding under the United States Bankruptcy Code or in any other proceeding under state or federal law in which a court or governmental authority has assumed jurisdiction over substantially all of the assets or business of the City, or if such jurisdiction has been assumed by leaving the existing governing body and officials or officers in possession but subject to the supervision and orders of a court or governmental authority, or the entry of an order confirming a plan of reorganization, arrangement, or liquidation by a court or governmental authority having supervision or jurisdiction over substantially all of the assets or business of the City, and (b) the City intends the words used in the immediately preceding paragraphs (15) and (16) and the definition of Financial Obligation in this Section to have the same meanings as when they are used in the Rule, as evidenced by SEC Release No. 34-83885, dated August 20, 2018.

The City shall file notice with the MSRB, in a timely manner, of any failure by the City to provide financial information or operating data in accordance with this Section by the time required by this Section.

D. Limitations, Disclaimers, and Amendments.

The City shall be obligated to observe and perform the covenants specified in this Section for so long as, but only for so long as, the City remains an "obligated person" with respect to the Bonds within the meaning of the Rule, except that the City in any event will give notice of any deposit that causes the Bonds to be no longer Outstanding.

The provisions of this Section are for the sole benefit of the Holders and beneficial owners of the Bonds, and nothing in this Section, express or implied, shall give any benefit or any legal or equitable right, remedy, or claim hereunder to any other person. The City undertakes to provide only the financial information, operating data, financial statements, and notices which it has expressly agreed to provide pursuant to this Section and does not hereby undertake to provide any other information that may be relevant or material to a complete presentation of the City's financial results, condition, or prospects or hereby undertake to update any information provided in accordance with this Section or otherwise, except as expressly provided herein. The City does not make any representation or warranty concerning such information or its usefulness to a decision to invest in or sell Bonds at any future date.

UNDER NO CIRCUMSTANCES SHALL THE CITY BE LIABLE TO THE HOLDER OR BENEFICIAL OWNER OF ANY BOND OR ANY OTHER PERSON, IN CONTRACT OR TORT, FOR DAMAGES RESULTING IN WHOLE OR IN PART FROM ANY BREACH BY THE CITY, WHETHER NEGLIGENT OR WITH OR WITHOUT FAULT ON ITS PART, OF ANY COVENANT SPECIFIED IN THIS SECTION, BUT EVERY RIGHT AND REMEDY OF ANY SUCH PERSON, IN CONTRACT OR TORT, FOR OR ON ACCOUNT OF ANY SUCH BREACH SHALL BE LIMITED TO AN ACTION FOR *MANDAMUS* OR SPECIFIC PERFORMANCE.

No default by the City in observing or performing its obligations under this Section shall constitute a breach of or default under this Ordinance for purposes of any other provision of this Ordinance.

Nothing in this Section is intended or shall act to disclaim, waive, or otherwise limit the duties of the City under federal and state securities laws.

The provisions of this Section may be amended by the City from time to time to adapt to changed circumstances that arise from a change in legal requirements, a change in law, or a change in the identity, nature, status, or type of operations of the City, but only if (1) the provisions of this Section, as so amended, would have permitted an underwriter to purchase or sell Bonds in the primary offering of the Bonds in compliance with the Rule, taking into account any amendments or interpretations of the Rule to the date of such amendment, as well as such changed circumstances, and (2) either (a) the Holders of a majority in aggregate principal amount (or any greater amount required by any other provision of this Ordinance that authorizes such an amendment) of the Outstanding Bonds consent to such amendment or (b) a person that is

unaffiliated with the City (such as nationally recognized bond counsel) determines that such amendment will not materially impair the interests of the Holders and beneficial owners of the Bonds. The City may also repeal or amend the provisions of this Section if the SEC amends or repeals the applicable provisions of the Rule or any court of final jurisdiction enters judgment that such provisions of the Rule are invalid, and the City also may amend the provisions of this Section in its discretion in any other manner or circumstance, but in either case only if and to the extent that the provisions of this sentence would not have prevented an underwriter from lawfully purchasing or selling Bonds in the primary offering of the Bonds, giving effect to (a) such provisions as so amended and (b) any amendments or interpretations of the Rule. If the City so amends the provisions of this Section, the City shall include with any amended financial information or operating data next provided in accordance with this Section an explanation, in narrative form, of the reasons for the amendment and of the impact of any change in the type of financial information or operating data so provided.

E. Information Format – Incorporation by Reference.

The City information required under this Section shall be filed with the MSRB through EMMA in such format and accompanied by such identifying information as may be specified from time to time thereby. Under the current rules of the MSRB, continuing disclosure documents submitted to EMMA must be in word-searchable portable document format (PDF) files that permit the document to be saved, viewed, printed, and retransmitted by electronic means and the series of obligations to which such continuing disclosure documents relate must be identified by CUSIP number or numbers.

Financial information and operating data to be provided pursuant to this Section may be set forth in full in one or more documents or may be included by specific reference to any document (including an official statement or other offering document) available to the public through EMMA or filed with the SEC.

F. General Policies and Procedures Concerning Compliance with the Rule.

Because the issuance of the Bonds is subject to the provisions of the Rule and because the potential "underwriters" in a negotiated sale of the Bonds or the initial purchasers in a competitive sale of the Bonds may be subject to MSRB rules and regulations with respect to such sale (including certain due diligence and suitability requirements, among others), the City hereby adopts the General Policies and Procedures Concerning Compliance with the Rule (the "Policies and Procedures"), attached hereto as Exhibit G, with which the City shall follow to assure compliance with the Undertaking. The City has developed these Policies and Procedures for the purpose of meeting its requirements of the Undertaking and, in connection therewith, has sought the guidance from its internal staff charged with administering the City's financial affairs, its municipal or financial advisors, its legal counsel (including its Bond Counsel), and its independent accountants (to the extent determined to be necessary or advisable). The Policies and Procedures can be amended at the sole discretion of the City and any such amendment will not be deemed to be an amendment to the Undertaking. Each Authorized Official is hereby authorized to amend the Policies and Procedures as a result of a change in law, a future issuance of indebtedness subject to the Rule, or another purpose determined by the Authorized Official to be necessary or desirable for or with respect to future compliance with the Undertaking.

SECTION 39. Book-Entry Only System.

The Bonds initially shall be registered so as to participate in a securities depository system (the *DTC System*) with the Depository Trust Company, New York, New York, or any successor entity thereto (*DTC*), as set forth herein. Each Stated Maturity of the Bonds shall be issued (following cancellation of the Initial Bonds described in Section 7) in the form of a separate single definitive Bond. Upon issuance, the ownership of each such Bond shall be registered in the name of Cede & Co., as the nominee of DTC, and all of the Outstanding Bonds shall be registered in the name of Cede & Co., as the nominee of DTC. The City and the Paying Agent/Registrar are authorized to execute, deliver, and take the actions set forth in such letters to or agreements with DTC as shall be necessary to effectuate the DTC System, including the Letter of Representations attached hereto as Exhibit F (the *Representation Letter*).

With respect to the Bonds registered in the name of Cede & Co., as nominee of DTC, the City and the Paying Agent/Registrar shall have no responsibility or obligation to any broker-dealer, bank, or other financial institution for which DTC holds the Bonds from time to time as securities depository (a *Depository Participant*) or to any person on behalf of whom such a Depository Participant holds an interest in the Bonds (an *Indirect Participant*). Without limiting the immediately preceding sentence, the City and the Paying Agent/Registrar shall have no responsibility or obligation with respect to (i) the accuracy of the records of DTC, Cede & Co., or any Depository Participant with respect to any ownership interest in the Bonds, (ii) the delivery to any Depository Participant or any other person, other than a registered owner of the Bonds, as shown on the Security Register, of any notice with respect to the Bonds, including any notice of redemption, or (iii) the delivery to any Depository Participant or any Indirect Participant or any other Person, other than a Holder of a Bond, of any amount with respect to principal of, premium, if any, or interest on the Bonds. While in the DTC System, no person other than Cede & Co., or any successor thereto, as nominee for DTC, shall receive a bond certificate evidencing the obligation of the City to make payments of principal, premium, if any, and interest pursuant to this Ordinance. Upon delivery by DTC to the Paying Agent/Registrar of written notice to the effect that DTC has determined to substitute a new nominee in place of Cede & Co., and subject to the provisions in this Ordinance with respect to interest checks or drafts being mailed to the Holder, the word "Cede & Co." in this Ordinance shall refer to such new nominee of DTC.

In the event that (a) the City determines that DTC is incapable of discharging its responsibilities described herein and in the Representation Letter, (b) the Representation Letter shall be terminated for any reason, or (c) DTC or the City determines that it is in the best interest of the beneficial owners of the Bonds that they be able to obtain certificated Bonds, the City shall notify the Paying Agent/Registrar, DTC, and the Depository Participants of the availability within a reasonable period of time through DTC of bond certificates, and the Bonds shall no longer be restricted to being registered in the name of Cede & Co., as nominee of DTC. At that time, the City may determine that the Bonds shall be registered in the name of and deposited with a successor depository operating a securities depository system, as may be acceptable to the City, or such depository's agent or designee, and if the City and the Paying Agent/Registrar do not select such alternate securities depository system then the Bonds may be registered in whatever name or names the Holders of Bonds transferring or exchanging the Bonds shall designate, in accordance with the provisions hereof.

Notwithstanding any other provision of this Ordinance to the contrary, so long as any Bond is registered in the name of Cede & Co., as nominee of DTC, all payments with respect to principal of, premium, if any, and interest on such Bond and all notices with respect to such Bond shall be made and given, respectively, in the manner provided in the Representation Letter.

SECTION 40. Further Procedures. The officers and employees of the City are hereby authorized, empowered and directed from time to time and at any time to do and perform all such acts and things and to execute, acknowledge and deliver in the name and under the corporate seal and on behalf of the City all such instruments, whether or not herein mentioned, as may be necessary or desirable in order to carry out the terms and provisions of this Ordinance, the initial sale and delivery of the Bonds, the Paying Agent/Registrar Agreement, the Official Bid Form, the Agreement, and the Official Statement. In addition, prior to the initial delivery of the Bonds, any Authorized Official and Bond Counsel are hereby authorized and directed to approve any technical changes or corrections to this Ordinance or to any of the instruments authorized and approved by this Ordinance necessary in order to (i) correct any ambiguity or mistake or properly or more completely document the transactions contemplated and approved by this Ordinance and as described in the Official Statement, (ii) obtain a rating from any of the national bond rating agencies, or (iii) obtain the approval of the Bonds by the Texas Attorney General's office. In case any officer of the City whose signature shall appear on any certificate shall cease to be such officer before the delivery of such certificate, such signature shall nevertheless be valid and sufficient for all purposes the same as if such officer had remained in office until such delivery.

SECTION 41. City's Consent to Provide Information and Documentation to the Texas MAC. The Municipal Advisory Council of Texas (the *Texas MAC*), a non-profit membership corporation organized exclusively for non-profit purposes described in section 501(c)(6) of the Internal Revenue Code and which serves as a comprehensive financial information repository regarding municipal debt issuers in Texas, requires provision of written documentation regarding the issuance of municipal debt by the issuers thereof. In support of the purpose of the Texas MAC and in compliance with applicable law, the City hereby consents to and authorizes any Authorized Official, Bond Counsel to the City, and/or Financial Advisor to the City to provide to the Texas MAC information and documentation requested by the Texas MAC relating to the Bonds; provided, however, that no such information and documentation shall be provided prior to the Closing Date. This consent and authorization relates only to information and documentation that is a part of the public record concerning the issuance of the Bonds.

SECTION 42. Contract with Financial Advisor. The City Council authorized any Authorized Official, or their designee thereof, to take all actions necessary to execute any necessary financial advisory contract with SAMCO Capital Markets, Inc., as the financial advisor to the City (the *Financial Advisor*). The City understands that under applicable federal securities laws and regulations that the City must have a contractual arrangement with its Financial Advisor relating to the sale, issuance, and delivery of the Bonds.

SECTION 43. Effective Date. Pursuant to the provisions of Section 1201.028, as amended, Texas Government Code, this Ordinance shall be effective immediately upon adoption, notwithstanding any provision in the City's Home Rule Charter to the contrary concerning a multiple reading requirement for the adoption of ordinances.

PASSED, APPROVED AND ADOPTED on the 5th day of November, 2020.

CITY OF LUCAS, TEXAS

_____

Mayor

ATTEST:

_____

City Secretary

(CITY SEAL)

I, the undersigned, City Attorney of the City of Lucas, Texas, hereby certify that I read, passed upon, and approved as to form and legality the foregoing Ordinance prior to its adoption and passage as aforesaid.

_____

City Attorney, City of Lucas, Texas

## INDEX TO SCHEDULE AND EXHIBITS

## SCHEDULE I

### Refunded Obligations

City of Lucas, Texas Combination Tax and Limited Pledge Revenue Certificates of Obligation, Series 2011, dated June 1, 2011, in the original principal amount of $5,750,000 stated to mature on February 1 in each of the years 2022 through 2024 and in the years 2026, 2028, and 2031, in the aggregate principal amount of $3,490,000, to be redeemed on February 1, 2021 (*Refunded Obligations*).

**EXHIBIT A**

**Paying Agent/Registrar Agreement**

See Tab No. __

**EXHIBIT B**

**Official Bid Form**

See Tab No. __

**EXHIBIT C**

**Escrow Deposit Letter**

See Tab No. __

**EXHIBIT D**

**Notice of Redemption**

See Tab No. __

## EXHIBIT E

### Description of Annual Financial Information

The following information is referred to in Section 38 of this Ordinance.

**Annual Financial Statements and Operating Data**

The financial information and operating data with respect to the City to be provided annually in accordance with such Section are as specified (and included in the Appendix or under the headings of the Official Statement referred to) below:

(1) The City's audited financial statements for the most recently concluded fiscal year or to the extent these audited financial statements are not available, the portions of the unaudited financial statements of the City attached to the Official Statement as Appendix D, but for the most recently concluded fiscal year.

(2) The information of the type included in Table 1 of the Official Statement and Tables 1 through 13 of Appendix A to the Official Statement.

**Accounting Principles**

The accounting principles referred to in such Section are generally accepted accounting principles for governmental units as prescribed by the Government Accounting Standards Board from time to time.

**EXHIBIT F**

**DTC Letter of Representations**

See Tab No. __

## EXHIBIT G

### General Policies and Procedures Concerning Compliance with the Rule

I. Capitalized terms used in this Exhibit have the meanings ascribed thereto in Section 38 of the Ordinance. "Bonds" refer to the Bonds that are the subject of the Ordinance to which this Exhibit is attached.

II. As a capital markets participant, the City is aware of its continuing disclosure requirements and obligations existing under the Rule prior to February 27, 2019, the effective date of the most recent amendment to the Rule (the "Effective Date"), and has implemented and maintained internal policies, processes, and procedures to ensure compliance therewith. Adherence to these internal policies, processes, and procedures has enabled underwriters in non-exempt negotiated sales and initial purchasers in non-exempt competitive sales to comply with their obligations arising under various MSRB rules and regulations concerning due diligence and findings of suitability, among other matters, regarding the City's compliance with the Rule.

III. The City is aware that the Rule was amended as of the Effective Date (the "Rule Amendment") and has accommodated this amendment by adding paragraphs (15) and (16) to Section 38C of the Ordinance, which provisions are a part of the Undertaking.

IV. The City is aware that "participating underwriters" (as such term is defined in the Rule) of the Bonds must make inquiry and reasonably believe that the City is likely to comply with the Undertaking and that the standards for determining compliance have increased over time as a result of, among others, the United States Securities and Exchange Commission's Municipalities Continuing Disclosure Cooperation Initiative and regulatory commentary relating to the effectiveness of the Rule Amendment.

V. The City now establishes the following general policies and procedures (the "Policies and Procedures") for satisfying its obligations pursuant to the Undertaking, which policies and procedures have been developed based on the City's informal policies, procedures, and processes utilized prior to the Effective Date for compliance with the City's obligations under the Rule, the advice from and discussions with the City's internal senior staff (including staff charged with administering the City's financial affairs), its municipal or financial advisors, its legal counsel (including Bond Counsel), and its independent accountants, to the extent determined to be necessary or advisable (collectively, the "Compliance Team"):

1. the City Manager and the Director of Finance of the City (each, a "Compliance Officer") shall be responsible for satisfying the City's obligations pursuant to the Undertaking through adherence to these Policies and Procedures;

2. the Compliance Officer shall establish reminder or "tickler" systems to identify and timely report to the MSRB, in the format thereby prescribed from time to time, the City's information of the type described in Section 38B of the Ordinance;

3. the Compliance Officer shall promptly determine the occurrence of any of the events described in Section 38C of the Ordinance;

4. the Compliance Officer shall work with external consultants of the City, as and to the extent necessary, to timely prepare and file with the MSRB the annual information of the City and notice of the occurrence of any of the events referenced in Clauses 2 and 3 above, respectively, the foregoing being required to satisfy the terms of the Undertaking;

5. the Compliance Officer shall establish a system for identifying and monitoring any Financial Obligations, whether now existing or hereafter entered into by the City, and (upon identification) determining if such Financial Obligation has the potential to materially impact the security or source of repayment of the Bonds;

6. upon identification of any Financial Obligation meeting the materiality standard identified in Clause 5 above, the Compliance Officer shall establish a process for identifying and monitoring any City agreement to covenants, events of default, remedies, priority rights, or other similar terms under such Financial Obligation;

7. the Compliance Officer shall establish a process for identifying the occurrence of any default, event of acceleration, termination event, modification of terms, or other similar events under the terms of any Financial Obligation, the occurrence of any of which reflect financial difficulties of the City; and

8. the Compliance Officer shall annually review these Policies and Procedures with the remainder of the Compliance Team, make any modifications on an internal document retained by the Compliance Officer and available to any "participating underwriter" (as defined in the Rule), if requested, and on the basis of this annual review (to the extent determined to be necessary or desirable), seek additional training for herself or himself, as well as other members of the City's internal staff identified by the Compliance Officer to assist with the City's satisfaction of the terms and provisions of the Undertaking.

Item No. 05

# City of Lucas
# Council Agenda Request
# November 5, 2020

Requester: Lucas Farmers Market Committee Chair Debra Guillemaud
Councilmember Tim Baney
City Manager Joni Clarke

## Agenda Item Request

Consider the Lucas Farmers Market Fiscal Year 2019/2020 Annual Report and provide guidance to the Lucas Farmers Market Committee and City Staff regarding recommendations for the 2021 season.

## Background Information

At the May 21, 2019 Parks and Open Space Board meeting, the members began exploring a variety of projects in preparation for the annual budget process including the creation of a farmer's market. In the July 2019 Lucas Leader, an article seeking volunteers to provide their expertise in determining the feasibility of a farmer's market was published. At the July 23, 2019 Parks and Open Space Board meeting, the Board took action to create a Farmers Market Subcommittee to explore the possibility of creating the Lucas Farmers Market with the first meeting of the Lucas Farmers Market Committee (LFMC) being held on July 30, 2019 at 5:30 pm.

Test markets were held on October 2 and November 12, 2019 and were very well received by the Lucas Community. Planning efforts by the LFMC for the 2020 season for a series of 11 stand-alone markets and an additional 2 markets associated with existing City events (Founders Day and Country Christmas). However, many challenges associated with the pandemic occurred leading to the cancellation of five markets).

The City's Parks and Open Space Board is discussing how best to support this event for the upcoming season and we are thankful that many of our dedicated volunteers are willing to continue to work hard to provide a wonderful event for the benefit of our citizens and visitors and continue their support of local farmers and producers.

## Attachments/Supporting Documentation

1. Lucas Farmers Market Fiscal Year 19/20 Annual Report

## Budget/Financial Impact

Projected cost for the 2021 season is $5,000 in budgeted operating costs and $7,560 for labor for a total projected cost of $12,560.

## Recommendation

The City's Parks and Open Space Board, the Lucas Farmers Market Committee and City staff recommend moving forward with the 2021 season.

Item No. 05

# City of Lucas
# Council Agenda Request
# November 5, 2020

**Motion**

I make a motion to approve/deny authorizing the Lucas Farmers Market Committee to proceed with the 2021 season.

# LUCAS FARMERS MARKET
## Fiscal Year 19/20 Annual Report

**Background:**
At the May 21, 2019 Parks and Open Space Board meeting, the members began exploring a variety of projects in preparation for the annual budget process including the creation of a farmer's market. In the July 2019 Lucas Leader, an article seeking volunteers to provide their expertise in determining the feasibility of a farmer's market was published. At the July 23, 2019 Parks and Open Space Board meeting, the Board took action to create a Farmers Market Subcommittee to explore the possibility of creating the Lucas Farmers Market with the first meeting of the Lucas Farmers Market Committee (LFMC) being held on July 30, 2019 at 5:30 pm.

**Lucas Farmers Market Trial Markets 2019:**
The LFMC worked to plan for two trial markets on October 12 and November 2, 2019. (Please see Attachment A for a detailed report on these trial markets.) The LFMC created a mission statement and guidelines for the operation of the market. The LFMC agreed to maintain a vendor mix that includes 50% agricultural producers, 30% value added/cottage food vendors, and 20% artisan vendors. Debra Guillemaud was selected as the LFMC Interim Chair and there were 32 vendors at the October 12 market and 47 vendors at the November 2 market. Together we learned a lot and the trial markets made necessary adjustments to ensure the success of future markets.

**Lucas Farmers Market First Season in 2020:**
The Farmers Market schedule that was approved by the City Council included the following dates in 2020:

- First Market of the 2020 Season on April 25 (Fourth Saturday in April)
- May 9 (Second Saturday in conjunction with Founders Day) and May 23 (Fourth Saturday)
- June 13 (Second Saturday) and June 27 (Fourth Saturday)
- July 11 (Second Saturday) and July 25 (Fourth Saturday)
- August 8 (Second Saturday) and August 22 (Fourth Saturday)
- September 12 (Second Saturday and September 26 (Fourth Saturday)
- October 10 (Second Saturday)
- November (no market scheduled)
- December 4 (First Friday indoor Holiday Farmers Market at Country Christmas)

However, the most difficult of times occurred when the pandemic began to impact our way of life. In light of public health concerns associated with COVID-19, the City of Lucas cancelled the Farmers Market scheduled for the months of April and May. With a revised 2020 schedule, the LFMC once again began its quest to create a community event by planning to hold the Lucas Farmers Market.

**Revised 2020 Schedule**:

- June 13 (Second Saturday) and June 27 (Fourth Saturday)
- July 11 (Second Saturday) and July 25 (Fourth Saturday)
- August 8 (Second Saturday) and August 22 (Fourth Saturday)
- September 12 (Second Saturday) and September 26 (Fourth Saturday)
- October 10 (Second Saturday)
- November (no market scheduled)
- December 4 (First Friday Holiday Farmers Market at Country Christmas)

Unfortunately, after holding a wildly successful market on June 13, the public health concern continued leading Governor Abbott to impose additional restrictions due to COVID-19. The City subsequently cancelled the June 27 and July 11 markets.

# LUCAS FARMERS MARKET
**Fiscal Year 19/20 Annual Report**

In response to the ongoing challenge of COVID-19, the LFMC created strategies to address public health concerns by creating multiple market scenarios to meet changing safety requirements during these uncertain COVID-19 times. The scenarios are described in phases and the described details will be adjusted as needed to stay in line with evolving state and local requirements. Below is a summary of the stages:

- Stage I - normal operations
- Stage II - minor adjustments needed for public safety – masks required, wash stations provided, logistic modifications to ensure safe distancing.
- Stage III - significant adjustments needed - drive through market. Customers browse and purchase as they drive by the vendor booths. Vendors wear masks and sampling will not be available. The number of booth locations will be limited along the perimeter of the gravel parking lot with vendor preference to food suppliers.
- Stage IV - significant concern for public safety - a drive through pre-order pre-paid pick-up market only. During this stage, vendor participation will be limited to agricultural producers and value-added vendors that provide primarily food items.
- Stage V - extreme concern for public safety - market operations closed

For the July 25 market, the City Council implemented Stage III restrictions and the LFMC held a drive through market (See Appendix B for details). Following this event, Mayor Olk implemented Stage II restrictions for future markets with continued evaluation based on observations and data received regarding COVID-19 cases.

**2020 Season Snapshot**:

| Date | Status | Vehicles | Vendors | # Staff | Labor Cost |
|---|---|---|---|---|---|
| April 25 | Cancelled | N/A | N/A | 0 | N/A |
| May 9 | Cancelled | N/A | N/A | 0 | N/A |
| May 23 | Cancelled | N/A | N/A | 0 | N/A |
| June 13 | No restrictions | ? | 44 | 3 | 636.24 |
| June 27 | Cancelled | N/A | N/A | 0 | N/A |
| July 11 | Cancelled | N/A | N/A | 0 | N/A |
| July 25 | Stage III | 160 | 17 | 1 | 144.88 |
| August 8 | Stage II | 264 | 42 | 5 | 1,318.78 |
| August 22 | Stage II | 306 | 39 | 5 | 1,151.33 |
| September 12 | Stage II | 473 | 38 | 2 | 625.63 |
| September 26 | Stage II | 444 | 42 | 4 | 854.92 |
| October 10 | Stage 2 | 430 | 38 | 3 | 657.23 |

Total nonexempt labor costs (including wages, Medicare, and TMRS) for the 2020 season was $5,389.01 with an average nonexempt labor cost of $769.86 per market. Exempt staff (Joe Hilbourn and Joni Clarke) were not included in the labor cost.

**LFMC Recommendations and Goals for the 2021 Season:**

The following schedule is a proposed calendar for the 2021 season continuing with the second and fourth Saturday date selection with one more date being added (October 23). This schedule provides 12 standard markets plus a Founders Day and Country Christmas Holiday Market:

- April 24
- May 8 (Founders Day)
- May 22
- June 12
- June 26
- July 10
- July 24
- August 14
- August 28
- September 11
- September 25
- October 9
- October 23
- December 3 (Holiday Market in conjunction with Country Christmas)

Consistency in the schedule is important for vendors and customers. The LFMC realizes that if we have this many markets, we need a plan to ease the burden on City staff and the LFMC volunteers. The LFMC and the City are evaluating if any of the set-up tasks can be simplified, transferred to the vendors, or perhaps even stopped with a goal of having a successful market using less staff.

The following volunteers served as members of the LFMC and have expressed an interest in continuing to serve:

| First Name | Last Name | Area of Interest |
|---|---|---|
| | | |
| Tim | Baney | City Council |
| Joni | Clarke | City Staff |
| Lynne | Dodson | Marketing/Website |
| Bill | Esposito | Parks Board |
| Mark | Gerber | Volunteer/Vendor |
| Jennifer | Gerber | Volunteer/Vendor |
| Laura | Giles | Social Media |
| Joe | Hilbourn | City Staff |
| Kenneth | Patterson | Parks Board |
| David | Rhoads | Parks Board |
| Joan | Stanton | Volunteer |
| Sean | Watts | Volunteer |

The LFMC is discussing 2021 membership/volunteer recruitment and possibly requiring committee members fulfill roles previously held by City staff but under the guidance of a leader from City staff at each market. The LFMC would like to streamline efforts were possible such as removing certain tasks and use committed, dependable volunteers to help one or two city employees with the market in 2021.

An important goal of the LFMC is to publicize and recruit vendors in order to provide market customers with the best selection possible. The LFMC recommends 35 to 40 vendors at each market. The LFMC will also be evaluating web-based software to help manage market vendors.

The LFMC will review and update Market Rules and Regulations, as necessary. Vendor applications will need to be updated and posted on the City's website no later than early December 2020. Social media will continue to be used to publicize vendors participating in the Lucas Farmers Market.

The LFMC proposes to continue to spread vendors throughout the park. This is a safety enhancement, but it also provides for a pleasant experience. The pavilion will continue to be a place where attendees can rest or enjoy a tasty treat purchased at the market. Vendors and attendees alike have been typically been great and respectful of the park disposing of trash appropriately.

City staff anticipates that each market will require two staff members from Public Works or Development Services to assist with logistics and parking from 6:30 am until 12:30 pm (6 hours) with an approximate cost of $630 per market. Two of the markets will be in conjunction with another City-sponsored event (Founders Day and Country Christmas) so no additional cost will be incurred. The projected cost necessary for staffing the markets would be $630 per market * 12 markets = $7,560.

The LFMC does not support assessing a vendor fee as it adds to the complexity of managing the market and creates additional work for City staff. Once the market was re-established after COVID-19 restrictions, the event was drawing an estimated 900-1,000 customers/event. We hope to maintain this level in 2021 bringing over 10,000 people into the park for the 12 regular markets. This provides the City of Lucas with 12 popular community events for $7,560. The vendors are essentially the entertainment and are paid whatever they bring in.

The planning for the Holiday Market is underway. There will be up to 30 vendors in the park with festive booths and we believe at this point, all vendor slots have been filled.

The LFMC is proud to support local, small businesses and especially at a time where their economic future is uncertain. The City graciously budgeted $5,000 for operational expenses associated with the market in the Parks budget. This budget is for improved signage, t-shirts for volunteers, and miscellaneous supplies.

The City's Parks and Open Space Board is discussing becoming more active and volunteering in support of the Lucas Farmers Market. David Rhoads, Bill Esposito, and Ken Patterson attended the 2020 season wrap-up meeting held on October 13, 2020.

**Vendor Feedback**:

Debra,

I wanted to let you know we had our best 4 hour market in company history! Thanks for everything you and the committee have done in this tough time.

Best regards,
Marcus

Marcus Wentrcek
The Amazing Dip Company

**Customer Comments and Social Media**:

Throughout the season, members of the LFMC received customer comments. Although we did not capture names and dates, some of the comments shared with the LFMC members include:

- How much they are enjoying coming to the park for the Farmers Market. Most mentioned they either didn't realize the park was there or knew it was there but hadn't used the park before.
- Even in COVID-19 times, many mentioned how much they enjoyed coming to a community event even if they couldn't really socialize as much as they would without social distancing.
- The Lucas Farmers Market is a "legitimate" market
- WOW! The Lucas Farmers Market has more produce than McKinney.

Lucas Farmers Market
@lucasfarmersmarket

Build Your Business

Post Photo Promote View As

Farmers Market in Lucas, TX

## Audience

1,794
Total Page Likes
▲ 76 last 28 days

Phil Galofaro, Tedra Johnson and 1.8K other people like your Page

37 Posts | 246 Followers | 366 Following

**Lucas Farmers Market**
The Lucas Farmers Market was established in 2018, by the Lucas Farmers Market Committee, with backing by the City of Lucas, Texas.
#lucasfarmersmarket
lucasfarmersmarket.com/
665 Country Club Road, Lucas, Texas 75002

## Events

SEE MORE

Your events reached 7,458 people in the last 28 days.

469
Event Responses
▼ 560 last 28 days

UPCOMING EVENTS

Lucas Holiday Farmers Market...
Fri Dec 4, 6:00pm
Reach 10.6K
Responses 741

## Page Activity

Your Page was visited 478 times in the past 28 days.

| | |
|---|---|
| New Page Likes | 76 |
| New Followers | 80 |
| Clicks to your Website | 10 |
| Phone Number Clicks | 0 |
| Get Directions Clicks | 0 |
| Page Button Clicks | 4 |

## Discovery

8,311
Page Reach
▼ 4.1K last 28 days

478
Page Views
▼ 570 last 28 days

WHERE YOUR CONTENT IS REACHING PEOPLE

| | |
|---|---|
| Posts | 8,248 |
| Stories | 172 |

Sep 28 - Oct 25 Last 28 days

| Post Reach | Post Engagements | New Page Likes |
|---|---|---|
| 8,248 ▼ 4k | 1,448 ▼ 1.1k | 76 ▼ 161 |

The mission of the Lucas Farmers Market is to create a safe and pleasant social experience for our community and visitors by providing access to local farmers, food producers and artists.


Top Fan
Abena Foli
Wohooo! Can't wait.
4w Care Reply 1
Lucas Farmers Market Abena Foli us t...
Tim Taylor
We went for the first time this past weekend and enjoyed it very much! I hope the vendors are doing well. We bought from several of the booths.
4w Care Reply 1
Lucas Farmers Market Tim Taylor so g...
Hayden Thompson
Is this the last one of the year?
4w Like Reply
Lucas Farmers Market Hayden last o...
Top Fan
Abena Foli
First time vendor this year. Really enjoyed the market especially the sampling part.
2w Care Reply 1
Susan Batiz Jackson
I really liked having the vendors spread out around the entire park.
1w Care Reply 1
Jennie Senn
Loved the market. But for a farmers market there really weren't enough produce vendors, only one poultry and eggs vendor, and NO meat vendors! I would choose to do most of my food shopping there, if the vendors with food basics came. (Most of the market was specialty foods and craft items, and while those are nice they shouldn't be the main focus unless it's a craft fair/ market.) But yours' is a new market and hopefully you will try to recruit

**Jennie Senn**
Loved the market. But for a farmers market there really weren't enough produce vendors, only one poultry and eggs vendor, and NO meat vendors! I would choose to do most of my food shopping there, if the vendors with food basics came. (Most of the market was specialty foods and craft items, and while those are nice they shouldn't be the main focus unless it's a craft fair/ market.) But yours' is... See More

1w Care Reply 1

Author
**Lucas Farmers Market**
Jennie Senn we had chicken, pork and beef vendors. Processing plants were closed/ backlogged during early covid so it made it hard for farmers all over the country to continue to bring proteins to market. (Quite a few processors around here are already booked out past next May.) Thank you for your

**Karen Erz**
I really liked how you made changes to make the market work during this pandemic. My only suggestion would be to keep the vendors in the same spots each time if possible.

2w Care Reply 5

**Andi Tyler Kingsbury**
Karen Erz Yes! I had the same thought. If I need to pop by quickly for a specific item, it would be awesome to know exactly where the vendor is located.

1w Like Reply 1

Top Fan
**Abena Foli**
Thank you Lucas Farmers Market for all you do vendors!
4w Care Reply 1

**Karen Erz**
Great job by all involved in finding a safe way to make this event go on!
4w Care Reply 1

**Rhonda Twitty Joynt**
We visited for the first time last month. We loved it!!
1w Care Reply 1

**Tex Phillip David Weber**
Don't turn into McKinney Farmer's Market foremost! Ughh. Keep Vendor pricing for spots low. Don't deny anyone. At least if like 4 groups sell honey, maybe just spread out. Or Crafts one one end, Food on other, etc. Demonstration? Those old Hit & Miss gas engines are always really cool to watch work. Maybe incorporate a few old tools and tractors that actually work? Cordone off an area for them? Anyone have a Llama that likes attention? Or a miniature donkey? Something that city people don't see too often. Show and Tell? Or an informative display? I have some old Bit & Brace tools and some timber that kids like to drill holes in. It's safe.
1w Care Reply 1


Tina Fast
Half the fruit I bought didn't even make it home... my kids devoured it. So good.
4w Care Reply 1
Tammy Douglas Graves
How do you become a vendor? I sell homemade Salsa. My current market is ending at the end of October
1w Care Reply 1
View 2 previous replies...
Lucas Farmers Market Tammy Dougla...
Sheila Newton
Loved the market! Wish it continued through the cool weather!
1w Care Reply 3
Sarah Proctor
I love, love, love the samples. I bought several things specifically because I tasted or tested them and thought they were worth the money.
1w Care Reply 1
Rhonda Twitty Joynt
We visited for the first time last month. We loved it!!

## Appendix A – 2019 Farmers Market Report

**Report Summary**:

The Lucas Farmers Market Committee (LFMC) held two trial markets on October 12 and November 2 at the Community Park in 2019. A special holiday market is currently planned to be held in the Community Center during Country Christmas on December 6. At the October 12 market, there were 32 vendors who participated in the first trial market. At the November 2 market, there were 47 vendors who participated in the second trial market. There are currently 33 vendors scheduled to participate in the special holiday market during Country Christmas. The LFMC estimated over 1,000 visitors attended each trial run of the Farmers Market, and it is anticipated that attendance and vendor participation will increase in 2020.

The direct costs incurred by the City totaled $5,725.49 for the October 2 and November 12 Farmers Markets. The direct costs include overtime for non-exempt staff and supplies for both markets. The indirect costs totaled $3,337.28 which includes time for exempt staff who assisted at both markets. Although the indirect costs do not include additional work hours, planning meetings and City resources used at both markets, these factors should also be considered in contributing to significant staff time. The total event cost for direct and indirect expenses is $9,062.77. The breakdown for the direct and indirect costs can be seen on the tables of the following pages.

The LFMC primarily consisted of 11 active volunteer members, with active being defined as volunteers who participated in more than two LFMC planning meetings. The LFMC held seven meetings starting in July through October and developed the mission statement and guidelines for the Farmers Market. Debra Guillemaud was selected as the LFMC Interim Chair during the initial trial period and worked with City Manager Joni Clarke and Development Services Director Joe Hilbourn regarding logistics for each Farmers Market. Additional duties included preparing meeting agendas and summaries, establishing rules and regulations, communicating information to vendors, determining vendor locations and managing late vendor changes.

The LFMC members attended other regional markets to recruit vendors as well as pursued other communication outreach tactics for additional vendor recruitment. The LFMC members also helped promote the Farmers Market through social media, designed the logo, signage and photo booth, wrote articles, and provided volunteering assistance at both trial markets. City staff was involved throughout the process and was active during market setup and hours of operation. City staff helped create the market rules and regulations, posted information on the City's website, purchased signage, created and updated vendor maps, prepared the Community Park for market days, developed additional parking, created the hospitality booth, and established permits, licenses and certification requirements for vendors.

**Primary Feedback from the Farmers Markets**:

- Continual assistance from City staff to set up the electricity in advance, turn on the lights, help park vendors with food trucks or trailers on the grass, assist with customer traffic flow and put out additional garbage cans.
- Recommend a minimum of one volunteer at vendor setup that can deal with any issues such as vendor locations.
- Develop new market layout for 2020 to show vendor locations and avoid barriers in the park.
- Separate vendor assignment from the layout map so the market manager can update as needed.
- Ensure the vendor map and information on the City's website is updated.
- Establish clear parking guidelines for market vendors prior to the start of the event.
- Improved lighting since it is still dark when vendors arrive at 6:30 am.

- Consider weather impact strategy in the event of inclement weather and moving food trucks to the concrete area.
- Improve congestion along walking areas and limiting vendors to one side to allow more available walking space.
- Accessibility concerns of electric for vendors who need it for set up and operations.
- Consider additional parking needs as attendance is anticipated to increase.
- Consider three additional staff members to direct traffic.
- Safety concerns with pedestrians crossing Country Club Road.
- Improve lighting at the pavilion.
- Consider how to manage vendors that do not show up to participate at the market.
- Post only the market map on the City's website and do not include a separate vendor list.
- Determine if the hospitality table is needed due to increasing costs of coffee, donuts, candy and additional expenses.
- Consider plastic bags with logo for consumers at the market and supplying water for the event.
- Establish review process of the permits, licenses and training needs by vendor type.
- Recommend the City to stop filing permits and certifications that vendors send in and instead, inform the vendors to have their documents on hand at the marker should they be requested.
- Set a deadline for vendor applications and making selections after the deadline to allow the LFMC to review all applicants together.
- Local artisan vendors were denied because the percentage of artisan vendors were maxed out early. Explore how to manage this in 2020 and determine if preference should be given to vendors located in Lucas.

**Lucas Farmers Market Schedule**:

| | |
|---|---|
| 6:00 am | On-Site Volunteers begin setup |
| 6:30 am – 7:50 am | Vendor setup |
| 7:55 am | All vendors vehicles must be relocated to the vendor parking area |
| 8:00 am | Market is open |
| 12:00 pm – 1:00 pm | Breakdown |
| 1:00 pm | Vendors must be out |

| **Lucas Farmers Market Committee (LFMC)** | **Number** |
|---|---|
| Active Volunteers | 11 |
| City Staff Liaison | 2 |
| City Council Liaison | 1 |
| **TOTAL** | **14** |

**Farmers Market Cost Breakdown**:

| Direct Costs | Amount |
|---|---|
| Supplies | |
| Apple Cider for October 12 Farmers Market | $24.95 |
| Apple Cider for November 2 Farmers Market | $29.28 |
| Business Cards | $72.86 |
| Candy for Hospitality Table | $117.24 |
| Coffee for October 12 Farmers Market | $153.36 |
| Coffee for November 2 Farmers Market | $230.00 |
| Decorations for Hospitality Booth | $121.69 |
| Donuts for October 12 Farmers Market | $46.51 |
| Donuts for November 2 Farmers Market | $45.91 |
| Logo | $167.84 |
| Shirts for LFMC members | $959.50 |
| Signage | $870.00 |
| Total Cost | $2,839.14 |
| Non-exempt City Staff Overtime (includes compensation and benefits) | |
| October 12 Farmers Market | |
| Anthony Aguinaga (8.5 hours) | $339.85 |
| Scott Dejong (8.5 hours) | $455.08 |
| Jose Quiles (8.5 hours) | $260.41 |
| Jacob Tassan (8.5 hours) | $281.22 |
| November 2 Farmers Market | |
| Anthony Aguinaga (8.5 hours) | $339.85 |
| Marcus Chaney (8 hours) | $264.68 |
| Scott Dejong (8.5 hours) | $455.08 |
| Cesar Guevara (8 hours) | $245.09 |
| Jose Quiles (8 hours) | $245.09 |
| Total Cost | $2,886.35 |
| **TOTAL DIRECT COSTS** | **$5,725.49** |

| Indirect Costs | Amount |
|---|---|
| Exempt City Staff Time (includes compensation and benefits) | |
| October 12 Farmers Market | |
| Joni Clarke (6 hours) | $732.59 |
| Joe Hilbourn (8.5 hours) | $689.53 |
| November 2 Farmers Market | |
| Joni Clarke (6 hours) | $732.59 |
| Stanton Foerster (5.5 hours) | $493.04 |
| Joe Hilbourn (8.5 hours) | $689.53 |
| **TOTAL INDIRECT COSTS** | **$3,337.28** |

**October 12 Farmers Market Breakdown**:

| Market Vendors | Confirmed Participants |
|---|---|
| Agricultural Producers (Farmers, Ranchers, Other)<br>Bare Naked Bee Company<br>Berkshire Farms<br>Fairview Farms<br>Fieldsong Farm<br>Gentlesoll Farm<br>Kelly Family Farms<br>Lovejoy High School Organic Permaculture Club<br>Mill Creek Honey Bee Farm<br>Nisan Farm Honey<br>Printz Farms<br>Royal Roost Farm<br>Sunken Boot Honey<br>Two Rivers Family Farm | 13 |
| Value Added Producers (Prepared Food Vendors, Cottage Food Vendors)<br>Always Cookin' for 10<br>Buttermilk Sky Pie<br>Cita's Salsa<br>Cupid's Candies<br>Julie's Sweet Ideas<br>Love That! Gluten Free<br>Lucas Cookie Company<br>Oven Love Baked Goods<br>Quaattro Grain<br>R'Achelle's Rockin Juice<br>Something from the Oven<br>Spice and Tea Merchants<br>Wisdom Health | 13 |
| Artisans (Artist, Craftsperson)<br>Ah-Mazing Doors<br>Body Artisan<br>Cande Wrapperz<br>MCLWood<br>Rocky Creek Candy Company<br>Woodshop Stop | 6 |
| **TOTAL PARTICIPANTS** | **32** |

**November 2 Farmers Market Breakdown**:

| Market Vendors | Confirmed Participants |
|---|---|
| Agricultural Producers (Farmers, Ranchers, Other)<br>Bare Naked Bee Company<br>Berkshire Farms<br>Buck Creek Meats<br>Fairview Farms<br>Fieldsong Farm<br>Gentlesoll Farm<br>Kelly Family Farms<br>Lime Ridge Farm<br>Lovejoy High School Organic Permaculture Club<br>Mill Creek Honey Bee Farm<br>Nisan Farm Honey<br>On the Grow<br>Rockin' SJS Farm/Raintree Ranch<br>Royal Roost Farm<br>Sunken Boot Honey<br>Two Rivers Family Farm | 16 |
| Value Added Producers (Prepared Food Vendors, Cottage Food Vendors)<br>Always Cookin' for 10<br>Amazing Dip Company<br>Buttermilk Sky Pie<br>Chimmy Tea<br>Cita's Salsa<br>Cross My Heart and Hope for Pie<br>Cupid's Candies<br>Dippin' Darlin's<br>Igknighted Kitchen<br>Julie's Sweet Ideas<br>Lettuce Indulge<br>Line Drinks<br>Love That! Gluten Free<br>Lucas Cookie Company<br>Mix It Up<br>Oven Love Baked Goods<br>Quaattro Grain<br>Something from the Oven<br>Spice and Tea Merchants<br>Spicemart Grocers and Caterers<br>Susie's Snack Shop<br>Sweet Life Baking and Canning<br>Twisted Cake Balls<br>Wisdom Health | 24 |
| Artisans (Artist, Craftsperson) | 7 |

| | |
|---|---|
| Bees and Blossoms Soaps<br>Body Artisan<br>Cande Wrapperz<br>MCLWood<br>Ranch Hand Originals<br>Rocky Creek Candle Company<br>Woodshop Stop | |
| **TOTAL PARTICIPANTS** | **47** |

**December 6 Holiday Farmers Market Breakdown**:

| Market Vendors | Scheduled Participants |
|---|---|
| Agricultural Producers (Farmers, Ranchers, Other)<br>Bare Naked Bee Company<br>Buck Creek Meets<br>Fieldsong Farm<br>Gentlesoll Farm<br>Kelly Family Farms<br>Mill Creek Honey Bee Farm<br>Nisan Farm Honey<br>Royal Roost Farm<br>Sunken Boot Honey | 9 |
| Value Added Producers (Prepared Food Vendors, Cottage Food Vendors)<br>Always Cookin' for 10<br>Amazing Dip Company<br>Chimmy Tea<br>Igknighted Kitchen<br>Julie's Sweet Ideas<br>Love That! Gluten Free<br>Lucas Cookie Company<br>Mix It Up<br>Oven Love Baked Goods<br>Quaattro Grain<br>Something from the Oven<br>Spice and Tea Merchants<br>Susie's Snack Shop<br>Sweet Life Baking and Canning<br>Twisted Cake Balls<br>Wisdom Health | 16 |
| Artisans (Artist, Craftsperson)<br>Ah-Mazing Doors<br>Bees and Blossoms Soap<br>Body Artisan<br>Cande Wrapperz<br>Canticle Farms<br>MCLWood<br>Ranch Hand Originals<br>Woodshop Stop | 8 |
| **TOTAL PARTICIPANTS** | **33** |

## Appendix B -- Drive Through Farmers Market on July 25, 2020

The Lucas Farmers Market Committee held its first drive through market (Stage III) on July 25, 2020. Market personnel that assisted with the management of the market included:

- Joan Stanton (LFMC)
- Ron Lacock (LFMC)
- Jennifer Gerber (LFMC)
- Joe Hilbourn (Development Services)
- Eduardo Gaudron (Public Works)
- Kent Souriyasak (Administration)
- Joni Clarke (Administration)
- Deputy Noel (Collin County Sheriff's Office)

When the Lucas Farmers Market is operating at Stage III, significant adjustments are needed and a drive through market option is implemented. Customers browse and purchase as they drive by the vendor booths. Vendors wear masks and sampling will not be available. A pre-order pre-paid pick-up station will be available for vendors wanting to use this service. The number of booth locations will be limited along the perimeter of the gravel parking lot and food suppliers will be prioritized if demand exceeds availability.

The following vendors participated in the event:

1. Along Came Tamale
2. Bare Naked Bee Co
3. Bomb Ass Beef Jerky
4. Bustos Creations
5. Fieldsong Farms
6. Julie's Sweet Ideas
7. Kona Ice
8. MCL Wood
9. Nana's Home Baked Goods
10. North Texas Pecans
11. Oven Love Bake Shop
12. POKs Spices
13. Rocky Creek Candle Company
14. S & J Canning
15. Smokin' Hot Chix
16. Sunken Boot Honey
17. Susie's Snack Shop


The majority of the vendors that members of the LFMC talked to were very happy with how the day went. A couple of them said they sold more than they usually would have. It seems that participating vendor enthusiasm is high.

It was interesting to see how interested people were to try out the drive through market. Customers comments were very positive and several stated that due to their age or physical condition they could not have attended a normal market. We told people they were welcome to pull out of the line and pass cars if they wanted to but most of them said they just wanted to follow the line and enjoy the experience. And they did.

Out of the 160 cars that came through only 3 or 4 turned around after entering the market because they did not have the time to participate in the drive through market.

We only had two customers get out of their cars all day. The vendors all faithfully wore their masks.

Also, the reaction via social media has been very positive, and we had several vendors interested in watching to see how it works so we may see more join for August.

The drive through Lucas Farmers Market is giving people the ability to attend a market and get fresh items when other markets are still too crowded. It could be a very niche spot for us especially since some markets are not enforcing people to wear masks.

<u>Challenges with Drive Through Market</u>:

1. Vendor recruitment has been negatively impacted by previous market closures. In particular, produce vendors had to find other avenues in which to sell their products due to limited shelf life. They need notification to harvest and to arrange for staffing of markets.
2. Stage III market will need to be limited to approximately 20 vendors to avoid congestion and to be able to effectively manage traffic flow.

3. While this drive through concept was very functional, it did not provide for the social aspect reflected in the mission statement adopted by LFMC "To create a safe and pleasant social experience for our community and visitors by providing access to local farmers, food producers and artists."
4. Not visible from Country Club Road.
5. We need to round the corners so cars can more easily pull up beside the corner booths.
6. We need to ensure that we rotate the vendors each Farmers Market. There is an advantage in being the first vendor with a particular product.
7. Encourage more vendor preorders. The vendors who had preorders did especially well.
8. We cannot fit more than a few more vendors in the loop in the back lot, especially if we round the corners. More space is good with that many cars involved.
9. We had a few customers comment that it would have been a lot easier for them if the vendors were on the driver's side of the car. Interestingly enough they were usually alone in the car. Those with passengers did not mention that.
10. We need more produce.
11. People love local honey. Maybe Councilmember Baney can help us learn how to really know if honey is 100% local, or mixed, etc.
12. We feel the need to keep with only local produce, at least as much as possible. And at least always give local producers first priority. However, a large number of customers wanted to know where to buy peaches, watermelons, avocados, etc.

Opportunities with Drive Through Markets:

1. Some individuals who had physical limitations that would not allow them to participate in a market that requires walking were able to enjoy the drive through market. Also, some enjoyed shopping from their air conditioned vehicles.
2. Logistical layout worked well with plenty of area for stacking of cars.
3. Easier set up and break down with not as many personnel required.
4. Safe alternative to regular market. Majority of customers chose to wear masks or put them on as they drove into the City Hall parking lot.

Vendor Feedback:

- Along Came Tamale – Sales amazing, sold out. Very pleased with turnout and overall market.
- Bare Naked Bee Co – Pleasantly surprised. Much preferred this approach than to shutting down completely. One con was the flow with bottleneck areas.
- Bomb Ass Beef Jerky – Had repeat customers and compared to open-aired market where 80 bags were sold; they sold 35 at this market and very pleased.
- Bustos Creations – Fantastic market, sold 85+% of what was brought. They actually love the drive through format better than an open market.
- Julie's Sweet Ideas, LLC – Better than expected – not as busy as our open market. Suggest spacing out more due to the bottleneck areas. She mentioned mixed reviews from customers.
- MCL Wood – MCL Wood called me back regarding feedback requested. He stated that they did not do well and his product may not be for drive-thru. He thought everything went smoothly, with no issues.
- North Texas Pecans – Vendor is interested in adding additional products from other farmers. Sales were not as good, and he did not like the traffic bottleneck – thought sales may have been lost due to cars in line and moving too slow.

- Oven Love Bake Shop – Things went smoothly for this vendor. She did not think we had a huge turnout but overall good.
- POKs Spices – Stated some customers did not know it was a drive through market. Concerns with traffic flow and bottlenecks. Happy to have the market even as a drive through.
- Rocky Creek Candle Company – Loved the market over $700 in sales. She enjoyed seeing elderly people being able as passengers to get the opportunity to shop. She is thrilled to be a part of the market. She actually sold out and had to get replacements brought in. She was concerned with the last booth which was the lady selling honey. She loved her spot – it helped that she was next to the tamale stand.
- S & J Canning – He suggested that we have a handout of vendors and their offerings at the entrance to City Hall. Had good sales. He thought that the first 4 vendors in line were getting all of the majority of the looks/business and felt shoppers were leaving the market because of the bottlenecks. He also mentioned that the last booth (lady with honey) was not getting anyone to stop because of the other vendors with honey.
- Susie's Snack Shop – Thought we had a good idea and did a fantastic job!!! She also thought a Vendor Offering List should be handed out. She was skeptical but put a $ threshold on what she should sell to participate. She succeeded.

The schedule for the remaining 2020 season includes:

- August 8 (Second Saturday)
- August 22 (Fourth Saturday)
- September 12 (Second Saturday)
- September 26 (Fourth Saturday)
- October 10 (Second Saturday)

(Note: On December 4 there will be an indoor Holiday Farmers Market at Country Christmas.)

**In evaluating vendor applications, requests to participate in the August 8 market include 18 agricultural producers, 25 value-added vendors and 11 artisans. Because customers at the July 25 market demonstrated a willingness to wear masks, the LFMC is requesting the City Council consider Stage II for the remainder of the season and allow operational adjustments to be provided by Mayor Olk. Stage II includes the following safety procedures:**

Minor adjustments needed for public safety - vendors required to wear masks, max of 2 people running each vendor booth, no samples, increased space between booths, wash stations provided, pedestrian flow in one direction, a pre-order pre-paid pick-up station will be available for vendors wanting to use this service. Control access to the park to 2 families per vendor booth. Estimate the max would be 120 families in the park at a time.

In addition to the above-referenced protocols, LFMC is willing to implement any additional recommendations the City Council recommends. City staff will incorporate a layout that would enhance distancing between vendors.

Item No. 06

# City of Lucas
# City Council Agenda Request
# November 5, 2020

Requester: City Engineer Stanton Foerster

## Agenda Item Request

Consider establishing priorities and goals for the Geographic Information System (GIS) Mapping and data entry along various roadway rights-of-ways and easements and view a presentation and demonstration of the work completed by Lakes Engineering in FY 19/20.

## Background Information

During late FY 19/20, Lakes Engineering was engaged to assess the current state of the City's GIS system and to begin creation of a citywide database. This work included the capturing and entering a significant portion of data focused along Blondy Jhune Road, Winningkoff Road, Snider Lane, and Stinson Road. There initial work was completed in September.

The next step in electronically documenting the various rights-of-ways and easements (trail, utility, drainage, access, etc.) is ready to begin. Lakes Engineering, if engaged, will continue their work along these and other roadways:

First Priority

1. Blondy Jhune Road
2. Winningkoff Road
3. Snider Lane
4. Stinson Road
5. Shady Lane
6. Forest Grove Road

Second Priority

7. E. Winningkoff Road
8. Orr Road
9. Rock Ridge Road
10. Ingram Lane
11. Estelle Lane

Cost of the next step will be determined by the City Council establishing priorities and goals for the GIS Mapping project.

## Attachments/Supporting Documentation

NA

Item No. 06

# City of Lucas
# City Council Agenda Request
# November 5, 2020

## Budget/Financial Impact

The funding for this work was not included in the FY 20/21 budget.

## Recommendation

City staff recommends the continuation of the GIS Mapping and data entry by Lakes Engineering with the following priorities and goals:

1. Development of a Prescriptive Right-Of-Way Policy;
2. Establishment of prescriptive rights-of-way along Neighborhood Connectors;
3. Input easements by separate interment data (trail, utility, drainage, access, etc.);
4. Input city infrastructure data (water, sewer, culverts, etc.); and
5. Collection of data from other agencies.

## Motion

No motion is required. Staff is seeking guidance to determine if the City should request a project proposal from Lakes Engineering for City Council consideration and funding.

Item No. 07

# City of Lucas
# City Council Agenda Request
# November 5, 2020

Requester: City Engineer Stanton Foerster

## Agenda Item Request

Consider 1) approving Resolution R-2020-11-00502 authorizing the Mayor to enter into an Interlocal Agreement between City of Lucas and Collin County for the improvements to West Lucas Road from FM 1378/Country Club Road to FM 2551/Angel Parkway in Lucas, Collin County, Texas, for which Collin County shall reimburse the City of Lucas the amount of $8,365,180.00 as Collin County's portion of the improvements; a provide for an effective date.

## Background Information

The Collin County Commissioners Court voted on March 16, 2020, to award funding to projects submitted by Collin County cities. The City is to receive $8,365,180 of the $10,040,000 requested. The County has followed up with discussions with the City to determine the deal points of an Interlocal Agreement (ILA). As the County stated in the Call for Projects, Collin County anticipates the City moving out immediately on the City project. The County followed their previous practice of transferring funds to the City at specific milestones identified in the ILA. The total project cost is $12,550,000.

Since the award was less than the City's request, the County requested the City Manager to certify to the County that the City has the funding available to add to the County's award to make up the total required for the project. This additional funding commitment from the City was not part of the City's request or intent.

## Attachments/Supporting Documentation

1. Resolution R-2020-11-00502
2. Interlocal Agreement

## Budget/Financial Impact

The City Manager has certified the $4,184,820 in funding is available for this project from the 2019 Certificate of Obligation funds, and the City Council budgeted said amount in FY 20/21 Capital Improvements Account 21-8210-491-136.

## Recommendation

Staff recommends approval of Resolution 2020-11-00502.

Item No. 07

# City of Lucas
# City Council Agenda Request
# November 5, 2020

## Motion

I make a motion to approve/not approve 1) Resolution R-2020-11-00502 authorizing the Mayor to enter into an Interlocal Agreement between City of Lucas and Collin County for the improvements to West Lucas Road from FM 1378/Country Club Road to FM 2551/Angel Parkway in Lucas, Collin County, Texas, for which Collin County shall reimburse the City of Lucas the amount $8,365,180.00 as Collin County's portion of the improvements; a provide for an effective date.

# RESOLUTION R-2020-11-00502
**[Approving Interlocal Agreement with Collin County]**

**A RESOLUTION OF THE CITY COUNCIL OF THE CITY OF LUCAS, TEXAS, APPROVING THE INTERLOCAL AGREEMENT BY AND BETWEEN THE CITY OF LUCAS AND COLLIN COUNTY FOR THE IMPROVEMENTS TO WEST LUCAS ROAD FROM FM 1378/COUNTRY CLUB ROAD TO FM 2551/ANGEL PARKWAY IN LUCAS, COLLIN COUNTY, TEXAS, FOR WHICH COLLIN COUNTY SHALL REIMBURSE CITY OF LUCAS THE AMOUNT OF EIGHT MILLION THREE HUNDRED SIXTY-FIVE THOUSAND ONE HUNDRED EIGHTY DOLLARS ($8,365,180.00) AS ITS PORTION OF THE IMPROVEMENTS; A PROVIDING FOR AN EFFECTIVE DATE.**

**WHEREAS,** the County of Collin, Texas ("County") and the City of Lucas, Texas ("City") desire to enter into this agreement ("Agreement") concerning the improvements to West Lucas Road from FM 1378/Country Club Road to FM 2551/Angel Parkway ("Project") in Lucas, Collin County, Texas; and

**WHEREAS,** the Interlocal Cooperation Act (Texas Government Code Chapter 791) authorizes any local government to contract with one or more local governments to perform governmental functions and services under the terms of the Act; and

**WHEREAS,** the City and County have determined that the improvements may be constructed most economically by implementing this Agreement; and

**WHEREAS,** the Lucas City Council has requested that Collin County acquire the required additional right-of-way for the project using funds provided by the City of Lucas; and

**WHEREAS,** the Commissioners Court allocated Eight Million Three Hundred Sixty-Five Thousand One Hundred Eighty Dollars ($8,365,180.00) from the 2018 Bond Program to the City of Lucas for Project, Collin County Bond Project #RI18007;

**NOW, THEREFORE, BE IT RESOLVED BY THE CITY COUNCIL OF THE CITY OF LUCAS, TEXAS, THAT:**

**SECTION 1.** The Interlocal Agreement by and between the City of Lucas and Collin County attached hereto as Exhibit "A" is hereby approved, and Collin County is hereby authorized to prepare and execute all documents necessary for this acquisition on behalf of the City.

**SECTION 2.** This Resolution shall take effect immediately upon its passage.

**DULY PASSED AND APPROVED** by the City Council of the City of Lucas, Texas, on this the 5th day of November, 2020.

**ATTEST:**

_____
Stacy Henderson, City Secretary
(03-30-2017/84926)

**APPROVED:**

_____
Jim Olk, Mayor

**EXHIBIT "A"**
**Interlocal Agreement**

**INTERLOCAL AGREEMENT**
**BETWEEN COLLIN COUNTY AND THE CITY OF LUCAS**
**CONCERNING THE CONSTRUCTION OF**
**WEST LUCAS ROAD**
**2018 BOND PROJECT # RI18007**

**WHEREAS,** the County of Collin, Texas ("County") and the City of Lucas, Texas ("City") desire to enter into this agreement ("Agreement") concerning the improvements to West Lucas Road from FM 1378/Country Club Road to FM 2551/Angel Parkway ("Project") in Lucas, Collin County, Texas; and

**WHEREAS,** the Interlocal Cooperation Act (Texas Government Code Chapter 791) authorizes any local government to contract with one or more local governments to perform governmental functions and services under the terms of the Act; and

**WHEREAS,** the City and County have determined that the improvements may be constructed most economically by implementing this Agreement; and

**WHEREAS,** the Lucas City Council has requested that Collin County acquire the required additional right-of-way for the project using funds provided by the City of Lucas; and

**WHEREAS,** the Commissioners Court allocated Eight Million Three Hundred Sixty-Five Thousand One Hundred Eighty Dollars ($8,365,180.00) from the 2018 Bond Program to the City of Lucas for Project, Collin County Bond Project #RI18007;

**NOW, THEREFORE,** this Agreement is made and entered into by the County and the City upon and for the mutual consideration stated herein.

**WITNESSETH:**

**ARTICLE I.**

The City shall arrange to design and construct the Project. The Project shall consist of constructing West Lucas Road as a four-lane divided arterial from FM 1378/Country Club Road to FM 2551/Angel Parkway. All improvements shall be designed to meet or exceed the City's roadway design standards and criteria as well as the County's design standards and shall be constructed in accordance with the plans and specifications approved by the City.

**ARTICLE II.**

The City shall prepare plans and specifications for the improvements, accept bids and award a contract to construct the improvements and administer the construction contract. In all such activities, the City shall comply with all statutory requirements applicable to a municipal public work project. The City shall provide the County with a copy of the executed design and construction contract(s) for the Project. Changes to the Project, other than what was submitted for the initial project ranking or which alter the initial funding set forth in Article IV, must be reviewed and approved by Collin County.

**ARTICLE III.**

Real property or easements shall be acquired to protect the width of one hundred twenty feet (120') in connection with the full length of the Project. The City requests and authorizes Collin County to acquire this land by all means necessary at the discretion of Collin County, including the use of eminent domain. The City will provide all survey parcel documents and any drainage or slope easements required and set monuments on all corners and points of intersection. The County recognizes that the City prefers the acquisition of easements rather than fee simple title. The City will provide to the County $826,000 for right-of-way acquisition and any other costs necessary for the acquisition, such as appraisals, legal expenses, title, etc. If it is determined that more than that

amount is required to acquire land that is necessary for the project, the additional funds required will be deducted from the County participation amount. If it is determined that less than that amount is required to acquire land that is necessary for the project, the additional funds required will be added to the award that the County has made to the City.

**ARTICLE IV.**

The County agrees to participate in the Project by providing Eight Million Three Hundred Sixty-Five Thousand One Hundred Eighty Dollars ($8,365,180.00) (the "County Participation Amount") to the performance of the Project. Eight Hundred Twenty-Six Thousand Dollars ($826,000) of the County Participation Amount will be used by the County to fund the acquisition of right-of-way. The County shall remit fifty percent (50%) of the County Participation Amount to the City within thirty (30) days after the City issues a Notice to Proceed to the design engineer and the City submits a written request for payment to the County. The County shall remit the remaining fifty percent (50%) less $826,000, or any portion thereof, that was used by the County to acquire right-of-way of the County Participation Amount to the City within thirty (30) days after the City receives bids for the construction of the Project and the City submits a written request for payment to the County. The County Commissioners Court may revise this payment schedule based on the progress of the Project. If the payment schedule is revised and that revision results in the City facing the potential of incurring an unfunded debt in violation of the Texas Constitution the City, in its sole discretion, shall be free from any obligation or commitment to continue working on or complete the Project until the next installment of the County Participation Amount is paid to City.

If the actual cost to design and construct the Project is less than the County Participation Amount, then the City shall reimburse to the County an amount equal to the difference between the County Participation Amount and the actual project cost. The City shall remit any such reimbursement to the County following City's final acceptance of the Project and along with an itemized final accounting of expenditures for the Project.

**ARTICLE V.**

The County's participation in the Project shall not exceed Eight Million Three Hundred Sixty-Five Thousand One Hundred Eighty Dollars ($8,365,180.00).

**ARTICLE VI.**

The City shall install a **project sign** identifying the Project as being partially funded by the Collin County 2018 Bond Programs. The City shall also provide **quarterly progress reports throughout the Project as well as before, during and after photos** during the construction process, in electronic format or via US mail to the Collin County Engineering Department. Following completion of the Project, the City shall provide an **itemized final accounting of expenditures** for the Project.

**ARTICLE VII.**

The City and County agree that the party paying for the performance of governmental functions or services shall make those payments only from current revenues legally available to the paying party.

**ARTICLE VIII.**

**INDEMNIFICATION. TO THE EXTENT ALLOWED BY LAW, EACH PARTY AGREES TO RELEASE, DEFEND, INDEMNIFY, AND HOLD HARMLESS THE OTHER (AND ITS OFFICERS, AGENTS, AND EMPLOYEES) FROM AND AGAINST ALL CLAIMS OR CAUSES OF ACTION FOR INJURIES (INCLUDING DEATH), PROPERTY DAMAGES (INCLUDING LOSS OF USE), AND ANY OTHER LOSSES, DEMANDS, SUITS, JUDGMENTS AND COSTS, INCLUDING REASONABLE ATTORNEYS' FEES AND EXPENSES, IN ANY WAY ARISING OUT OF, RELATED TO, OR RESULTING FROM ITS PERFORMANCE UNDER THIS AGREEMENT, OR CAUSED BY ITS NEGLIGENT ACTS OR OMISSIONS (OR THOSE OF ITS RESPECTIVE OFFICERS, AGENTS, EMPLOYEES, OR ANY OTHER THIRD PARTIES FOR WHOM IT IS LEGALLY RESPONSIBLE) IN CONNECTION WITH PERFORMING THIS AGREEMENT.**

NO WAIVER OF IMMUNITY OR DEFENSE. No party, by execution of this Agreement, waives nor shall be deemed to have waived, any immunity or defense that would otherwise be available to it.

**ARTICLE IX.**

VENUE. The laws of the State of Texas shall govern the interpretation, validity, performance and enforcement of this Agreement. The parties agree that this Agreement is performable in Collin County, Texas and that exclusive venue shall lie in Collin County, Texas.

**ARTICLE X.**

SEVERABILITY. The provisions of this Agreement are severable. If any paragraph, section, subdivision, sentence, clause, or phrase of this Agreement is for any reason held by a court of competent jurisdiction to be contrary to law or contrary to any rule or regulation having the force and effect of the law, the remaining portions of the Agreement shall be enforced as if the invalid provision had never been included.

**ARTICLE XI.**

ENTIRE AGREEMENT. This Agreement embodies the entire agreement between the parties and may only be modified in a writing executed by both parties.

**ARTICLE XII.**

SUCCESSORS AND ASSIGNS. This Agreement shall be binding upon the parties hereto, their successors, heirs, personal representatives and assigns. Neither party will assign or transfer an interest in this Agreement without the written consent of the other party.

**ARTICLE XIII.**

IMMUNITY. It is expressly understood and agreed that, in the execution of this Agreement, neither party waives, nor shall be deemed hereby to have waived any immunity or defense that would otherwise be available to it against claims arising in the exercise of governmental powers and functions. By entering into this Agreement, the parties do not create any obligations, express or implied, other that those set forth herein, and this Agreement shall not create any rights in parties not signatories hereto.

**ARTICLE XIV.**

EXPENSES FOR ENFORCEMENT. In the event either Party hereto is required to employ an attorney to enforce the provisions of this Agreement or is required to commence legal proceedings to enforce the provisions hereof, the prevailing Party shall be entitled to recover from the other, reasonable attorney's fees and court costs incurred in connection with such enforcement, including collection.

**ARTICLE XV.**

**FORCE MAJEURE.** No party shall be liable or responsible to the other party, nor be deemed to have defaulted under or breached this Agreement, for any failure or delay in fulfilling or performing any term of this Agreement, when and to the extent such failure or delay is caused by or results from acts beyond the affected party's reasonable control, including, without limitation: acts of God; flood, fire or explosion; war, invasion, riot or other civil unrest; actions, embargoes or blockades in effect on or after the date of this Agreement; or national or regional emergency (each of the foregoing, a "Force Majeure Event"). A party whose performance is affected by a Force Majeure Event shall give notice to the other party, stating the period of time the occurrence is expected to continue and shall use diligent efforts to end the failure or delay and minimize the effects of such Force Majeure Event.

**ARTICLE XVI.**

TERM. This Agreement shall be effective upon execution by both parties and shall continue in effect annually until final acceptance of the Project. This Agreement shall automatically renew annually during this period.

[*Signature page follows*.]

**COUNTY OF COLLIN, TEXAS**

By: _____
Name: Chris Hill
Title: County Judge
Date: _____

Executed on this _____ day of _____, 20__, by the County of Collin, pursuant to Commissioners' Court Order No._____.

**ATTEST:**

By: _____
Name: Stacy Henderson
Title: City Secretary
Date: _____

**CITY OF LUCAS, TEXAS**

By: _____
Name: Jim Olk
Title: Mayor
Date: _____

Executed on behalf of the City of Lucas pursuant to City Council Resolution No. 2020-11-00502

**APPROVED AS TO FORM:**

By: _____
Name: Joseph J. Gorfida, Jr.
Title: City Attorney
Date: _____

Item No. 08

# City of Lucas
# City Council Agenda Request
# November 5, 2020

Requester: City Engineer Stanton Foerster

## Agenda Item Request

Consider the Bridge Alternative Report (BAR) of the Stinson Bridge and Roadway Improvements and provide direction to the City Manager.

## Background Information

In December 2019, the City engaged the professional services of Lakes Engineering, Inc. to start design of the Stinson Road bridge crossing at Muddy Creek and the associated roadway from Bristol Park to Bentwater Drive. Lakes has completed about 10% of the design, but Lakes is requesting direction from the City regarding bridge materials and location relative to the existing bridge before proceeding any further with the design.

At the August 20, 2020 City Council Meeting, the City Council decided to hold a neighborhood meeting to discuss the design alternative with those citizens that would be impacted.

Approximately 18 citizens attended the meeting on Tuesday, October 13 to discuss the two proposed alignments for the bridge under design by Lakes Engineering. All were thankful there was an in-person meeting in lieu of Zoom. The general consensus from those citizens in attendance was to keep the bridge and roadway in its existing location.

## Attachments/Supporting Documentation

1. Pro and Con Analysis from October 13, 2020 Neighborhood Meeting.
2. Coversheet and Bridge Alternative Report for Stinson Bridge and Roadway Improvements from Bristol Park to Bentwater Drive prepared by Lakes Engineering, Inc. for the City of Lucas and dated July 2020 and presented to City Council at the August 20, 2020 meeting.

## Budget/Financial Impact

The BAR provides several various cost alternatives. The impacts of the budget cannot be determined without direction from the City Council. This construction project is not funded.

## Recommendation

The City Engineer recommends proceeding with Horizontal Alignment No. 1 (keeping the bridge and roadway in its exiting location), acquiring the necessary access easements where

# City of Lucas
# City Council Agenda Request
# November 5, 2020

rights-of-way are needed and incorporate a single-span bridge design with four-7DS23 Beams, which will raise the existing roadway 3.64 feet at the bridge.

Staff anticipates the closure of the roadway and bridge to all through traffic during construction. Staff will work with property owners regarding maintenance of access for the two driveways closest to the bridge.

## Motion

I make a motion to (approve/deny) proceeding with the design of the Stinson Bridge and Roadway Improvements project by incorporating the Horizontal Alignment No. 1 (keeping the bridge and roadway in its exiting location), acquiring the necessary access easements where rights-of-way are needed and incorporate a single-span bridge design with four-7DS23 Beams, which will raise the existing roadway 3.64 feet at the bridge.

Neighborhood Meeting - October 13, 2020

**Subject: Stinson Bridge and Roadway Improvements Project**

This meeting is to discuss the two alternatives of horizontal alignment for the Stinson Bridge and Roadway Improvements from Bristol Park to Bentwater Drive. The Horizontal Alignment #1 will keep the roadway and bridge in the current location, and Horizontal Alignment #2 will shift the bridge to the east of the existing culvert crossing, introducing curves before and after the bridge.

Below is a non-exhaustive list of Pros and Cons for the alignment alternatives:

**Horizontal Alignment #1 (Maintain roadway and creek crossing location)**

| *Pros* | *Cons* |
|---|---|
| 1. Bridge is 60 feet in length (shorter bridge). Reduce cost by 15%.<br>2. Driving surface elevation is only raised 4 feet from existing.<br>3. Minor impact to trees and utilities.<br>4. Preserve the feel and look of existing roadway and driveways. | 1. Driveways west side of roadway will require more reconstruction inside private property with moderate grades and retaining walls.<br>2. Complete closure of Stinson Road during bridge construction.<br>3. Speeding concerns will not be addressed.<br>4. Requires retaining wall on both sides of the roadway.<br>5. Requires drainage easement acquisition from property west side of the roadway.<br>6. Bridge is closer to a large 42-inch water line pipe. |

**Horizontal Alignment #2 (Shift bridge to the east)**

| *Pros* | *Cons* |
|---|---|
| 1. Provides more space to reconstruct driveways and drainage along west side of the roadway.<br>2. Shifting the bridge to the east will add curves before and after the bridge that may help to reduce speeding.<br>3. Possibility to keep one lane open for most of the project duration.<br>4. Construction and excavation of bridge foundation will be away from 42-inch water line.<br>5. Retaining wall only along west side of the roadway.<br>6. Overhead electric lines will be clear from trees. | 1. Bridge is 80 feet in length (longer).<br>2. Driving surface elevation is raised 5 feet from existing.<br>3. Most of the trees along the east side of the roadway will be removed.<br>4. Driveways east side of the roadway will be slightly shortened.<br>5. Requires utility relocations.<br>6. Requires right of way and/or easement acquisition. |

Item No. 08

# City of Lucas
# City Council Agenda Request
# August 20, 2020

Requester: City Engineer Stanton Foerster

## Agenda Item Request

Consider the Bridge Alternative Report (BAR) of the Stinson Bridge and Roadway Improvements and provide direction to the City Manager.

## Background Information

In December 2019, the City engaged the professional services of Lakes Engineering, Inc. to start designs of the Stinson Road bridge crossing at Muddy Creek and the associated roadway from Bristol Park to Bentwater Drive. Lakes has completed about 10% of the design, but Lakes is requesting direction from the City regarding bridge materials and location relative to the existing bridge before proceeding any further with the design. The major elements discussed in the BAR as follows:

A. Which alignment is best: maintain the same horizontal location or shift it to the east?

B. What are the impacts to the rights-of-way based on the two alignments?

C. What are the impacts to the easements based on the two alignments?

D. How are the nine driveways within the project impacted? What special consideration is needed for the two driveways closest to the bridge?

E. What materials should be used for the bridge structure and how do the materials impact the height of the bridge above Muddy Creek?

F. How do the two alignments impact bridge constructability and impede traffic flow during construction?

G. How do the two alignments impact the cost of the bridge construction?

## Attachments/Supporting Documentation

Bridge Alternative Report for Stinson Bridge and Roadway Improvements from Bristol Park to Bentwater Drive prepared by Lakes Engineering, Inc. for the City of Lucas and dated July 2020.

# City of Lucas
# City Council Agenda Request
# August 20, 2020

## Budget/Financial Impact

The BAR provides several various cost alternatives. The impacts of the budget cannot be determined without direction from the City Council. This construction project is not funded.

## Recommendation

The City Engineer does not concur with the Lakes recommendations and adds the following clarifications to the major elements:

A. Proceed with Horizontal Alignment 1. Keep the bridge and roadway in its exiting location.
B. Avoid right-of-way acquisition.
C. Proceed with access easements where rights-of-way are needed.
D. Develop consensus with the property owner regarding maintenance of access for the two driveways closest to the bridge.
E. Proceed with a single-span bridge design with four-7DS23 Beams, which will raise the existing roadway 3.64 feet at the bridge.
F. Close the project to all through traffic during the construction of the bridge and roadway.
G. Proceed with Horizontal Alignment 1. Keep the bridge and roadway in its exiting location despite the cost being 15% higher than Horizontal Alignment 2.

Lakes Engineering's recommendations are as follows:

The **proposed bridge** typical section provides one (1) 12'-0" traveling lanes in each direction and a 2'-0" wide shoulder on each side with a 0.02 ft/ft crown, and a bridge railing type T411. The **proposed roadway** typical section provides one concrete paved (1) 12'-0" traveling lanes in each direction and an unpaved 2'- 0" wide shoulder on each side with a cross-slope of 0.02 ft/ft and 0.06 ft/ft, respectively.

Given the information here in presented, it is recommended that Stinson Road Culvert be replace with an 80'-0" single-span bridge on Horizontal Alignment 2 with a 4.31 ft vertical profile raise, utilizing Option 2: six (6) TxDOT Prestressed Concrete Box Beams (5B28) with a minimum 5" thick cast-in-place reinforced concrete deck, supported on twelve (12) 18"x18" driven concrete piles foundation or six (6) 30" diameter drilled shafts with a cast-in-place reinforced concrete abutment foundation. Retaining walls are recommended on the northeast and southeast of the bridge. It is also recommended that construction be completed by implementing a Complete Closure and Detour with southbound remaining open to local traffic only.

Horizontal Alignment 2 has a higher estimated cost by only 15%, see Appendix A for the Alternatives Cost Comparison. The increase is due to right-of-way acquisition and increased span length. A significant key advantage of the Horizontal Alignment 2 is that it offers added safety to the traveling to the public and residents along Stinson Road by encouraging reduced

# City of Lucas
# City Council Agenda Request
# August 20, 2020

speed. It also makes phased construction feasible if the City should desire. Many advantages are realized by Horizontal Alignment 2 for a fractional increase in cost. Therefore, the recommended proposed alignment is Horizontal Alignment 2.

If Horizontal Alignment 2 is not feasible due to right-of-way acquisitions, then it is recommended that Stinson Road Culvert be replaced with a 60'-0" single-span bridge on Horizontal Alignment 1 with a 3.64 ft vertical profile raise, utilizing Option 1: four (4) TxDOT Prestressed Concrete Decked Slab Beams (7DS23) with a minimum 2" thick concrete or asphalt overlay, which supports on ten (10) 18"x18" driven concrete piles foundation or six (6) 30" diameter drilled shafts with a cast-in-place reinforced concrete abutment foundation. Retaining walls are recommended on all four corners of the bridge.

The Complete Closure with Detour Option is recommended as this would allow for a shorter construction duration, resulting in overall construction savings.

## Motion

I make a motion to (direct/not direct) the City Manager to proceed with design of the Stinson Road bridge and roadway in accordance with the following:

I. Option 1 - Keep the bridge and roadway in its current location
OR
Option 2 – Shift the roadway and bridge to the east.

II. Proceed with fee simple right-of-way acquisition
OR
proceed with obtaining easements in-leu-of fee simple right-of-way.

III. Proceed with a single span bridge using the following typical section:

Option 1/Option 2
Figure 10/NA – TxDOT Prestressed Concrete Decked Slab Beams (7SB23)
OR
Figure 11/15 – TxDOT Prestressed Concrete Box Beams
OR
Figure 12/16 – TxDOT Prestressed Concrete XBeams
OR
Figure 13/17 – TxDOT Prestressed Concrete I-Girders
OR
Figure 14/18 – Steel Rolled Beams

IV. Close the project to all through traffic during the construction of the bridge and roadway.

# BRIDGE ALTERNATIVE REPORT

## Stinson Bridge and Roadway Improvements from Bristol Park to Bentwater Drive

**City of Lucas**

**Prepared for:**
**City of Lucas**

Prepared by:

**Lakes Engineering, Inc.**

LAKES ENGINEERING bcc
A BCC Engineering Company

July 2020

# TABLE OF CONTENTS

## 1. EXECUTIVE SUMMARY

Lakes Engineering, Inc. has prepared this Bridge Alternative Report (BAR) for the proposed Stinson Bridge and Roadway Improvements from Bristol Park to Bentwater Drive The intent of this report is to give the City of Lucas a comprehensive analysis of the different options and costs to replace Stinson Road crossing over Muddy Creek. It provides our recommendations of the best alternative that will deliver, to the City of Lucas residents, the most value, best economy, and least impact to the public for these improvements.

Stinson Road Culvert over Muddy Creek is located approximately 1 mile north of Parker Rd. This crossing is currently in a floodplain and below the flood elevation. Muddy Creek has historically frequently overtopped Stinson Road Culvert, which is comprised of a double-barrel steel pipe each with a 78-inch diameter opening. The aging culvert opening is not adequate for larger storm events, gets clogged with debris easily, and has caused closure of the road many times. This is a problem that the City must monitor after heavy rains and causes recurring maintenance. Flooding and overtopping of Stinson Road is a safety hazard for the residents and road users of the vicinity area. Replacing the culvert with a bridge that is above the flood elevation will provide adequate opening, which will resolve the clogging and overtopping issues and may lower the water surface elevations locally. Replacing the existing crossing with a new culvert and roadway above the flood elevation does not solve the clogging issue and could potentially raise the water surface elevations upstream if clogging occurred. For these reasons, a culvert replacement option was not evaluated. We have evaluated many bridge constructions types and materials in the development of this report, provide a comparison and recommend solutions.

This report identifies the project in terms of needs, purpose, and recommended solution. It also provides design criteria and parameters, description of bridge superstructure options, and evaluates the alternatives according to the following:

A. Horizontal/Vertical Alignments
B. Right-of-Way/Easement
C. Access Impact
D. Bridge Superstructure Options
E. Method of Construction
F. Cost

The major elements discussed above are summarized below:

A. Two (2) Horizontal Alignments are presented.
   - ***Horizontal Alignment 1***, Stinson Road Bridge over Muddy Creek will match existing horizontal alignment.
   - ***Horizontal Alignment 2***, Stinson Road Bridge over Muddy Creek will be shifted to the east of the existing Stinson Road alignment introducing curves before and after the bridge.

   Horizontal Alignment 2 is recommended due to benefits in method of construction, it may reduce speeding, and less impact to driveways.
B. Both Horizontal Alignments require right-of-way acquisition as most of the road is on prescriptive right-of-way.
   - Horizontal Alignment 1 will require a total of 47,518 square feet right-of-way acquisition from 8 parcels along Stinson Road.

- Horizontal Alignment 2 will require total of 55,240 square feet right-of-way acquisition from 7 parcels along Stinson Road.

C. Both Horizontal Alignments will need easement acquisition along the east side for future utilities or any relocation needed.
   - Horizontal Alignment 1 will require total of 25,645 square feet easement acquisition from 9 parcels along Stinson Road.
   - Horizontal Alignment 2 will require total of 28,440 square feet easement acquisition from 9 parcels along Stinson Road.

D. There is a total of nine (9) driveways within the project limits on Stinson Road that may be impacted. Two driveways nearest the crossing will be significantly impacted due to the necessary raise of existing elevation should Horizontal Alignment 1 be employed, and work on private property would be required. Horizontal Alignment 2 will have less impact to driveways.

E. Seven (7) bridge superstructure alternatives are presented for each alignment. We have found option 2 to be the most cost-effective superstructure option considered for the most beneficial alignment, Horizontal Alignment 2. Option 2 offers an overall cost-savings, construction schedule advantages, and the lowest vertical profile raise compared to the other options. Therefore, option 2 with Horizontal Alignment 2 is the most feasible and is the recommended bridge superstructure alternative. This recommended bridge has the following characteristics:
   - 80ft single-span bridge with 0-degree skew,
   - Six (6) TxDOT Prestressed Concrete Box Beams (5B28)
   - 5in thick cast-in-place reinforced concrete deck.
   - Aesthetics similar to the Blondy Jhune bridges.
   - Vertical alignment associated with option 2/alignment 2 will raise the bridge 5 feet from the existing top of pavement and will have retaining walls northeast and southeast of the bridge.

F. The construction for Horizontal Alignment 1, which matches the existing alignment, would require complete road closure. For Horizontal Alignment 2, due to the offset to the east from the existing road, provides an opportunity for traffic access with at least one lane open for a majority of the project duration. Both alignments will provide a detour option for drivers to use Lewis Lane as an alternate route.

G. The recommended bridge superstructure alternative, option 2, is the most economical option for Horizontal Alignment 2.

# 2. INTRODUCTION

This Bridge Alternatives Report (BAR) is developed to define the parameters which affect the selection of the superstructure and substructure for the proposed bridge and provide alternatives. Issues addressed herein include geometric constraints, horizontal and vertical clearance requirements, utility conflicts, drainage issues, evaluation of span arrangements, evaluation of different superstructure and substructure alternatives, aesthetics, traffic control and construction sequencing and construction cost.

It is not the intent for this BAR to define the precise geometry of all structural elements, but rather to provide information in sufficient detail to fairly assess the relative impacts of the various alternatives and establish basic parameters needed to proceed to the final design phase.

## 2.1. Project Background

Stinson Road crosses Muddy Creek approximately 1 mile north of Parker Road and approximately 3 miles west of Lavon Lake within the City of Lucas located in Collin County, Texas. The existing culvert is comprised of a double-barrel steel pipe each with a 78-inch diameter opening and approximately 29.6 feet long with 3 feet of fill and an asphalt roadway on top. It is estimated that the culvert was constructed around 1980 with a timber headwall and was later reconstructed to a concrete headwall with the two-barrel steel pipe remaining in place. The culvert does not appear to have ever been rehabilitated since the reconstruction. The culvert has a roadway width of approximately 21 feet and carries two lanes of traffic with no shoulder width on either side.

Based on an inspection report performed by Lakes Engineering on June 26, 2019 (refer to Appendix B), the current condition of the culvert is structurally deficient and functionally obsolete with a sufficiency rating of 63 (rated by NBIS procedure). It is important to note that structurally deficient does not carry the meaning of structurally unsafe, at the time of this report. The field inspection found the following deficiencies:

- Marginal and substantial longitudinal cracking on the top of the asphalt roadway
- Asphalt pavement edge failure in all four corners
- Spalls and cracks on various locations on the headwalls and wingwalls
- Evidence of flooding
- Headwall 2 (downstream) is out of plumb
- 1-foot scour at outfall and exposed encased utility at headwall 2 (downstream) under culvert 2
- Scour/erosion at outlet of headwall 2 (downstream) above culvert 2 and loss of backfill
- Undermining of headwall 1 (upstream)
- Substandard railing type, height, openings and crashworthiness

The waterway opening appears to be inadequate. It is reported that Muddy Creek overtops Stinson Road multiple times a year, causing traffic delays and disruptions. A gate with a “ROAD FLOODED” sign is posted on each approach of the culvert that is closed by the City of Lucas when overtopping occurs.

Existing condition photos are shown below.

Approach- Looking North

Approach - Looking South

Downstream Headwall

Upstream Headwall

Downstream – During A Storm Event

Upstream – During A Storm Event

## 2.2. Project Objective

The intent of this project is to address the existing and future operational and safety conditions of Stinson Road culvert over Muddy Creek. Because the age and current condition, the project proposes to replace the culvert with a new structure that is sufficiently durable and resilient to environmental effects and flooding. The structure must be sustainable, minimize maintenance requirements and provide a safe and rideable corridor for the traveling public.

The project will involve the construction of a new bridge to carry Stinson Road over Muddy Creek located in the City of Lucas, Collin County, Texas. See **Figure 1 – Project Location Map.**

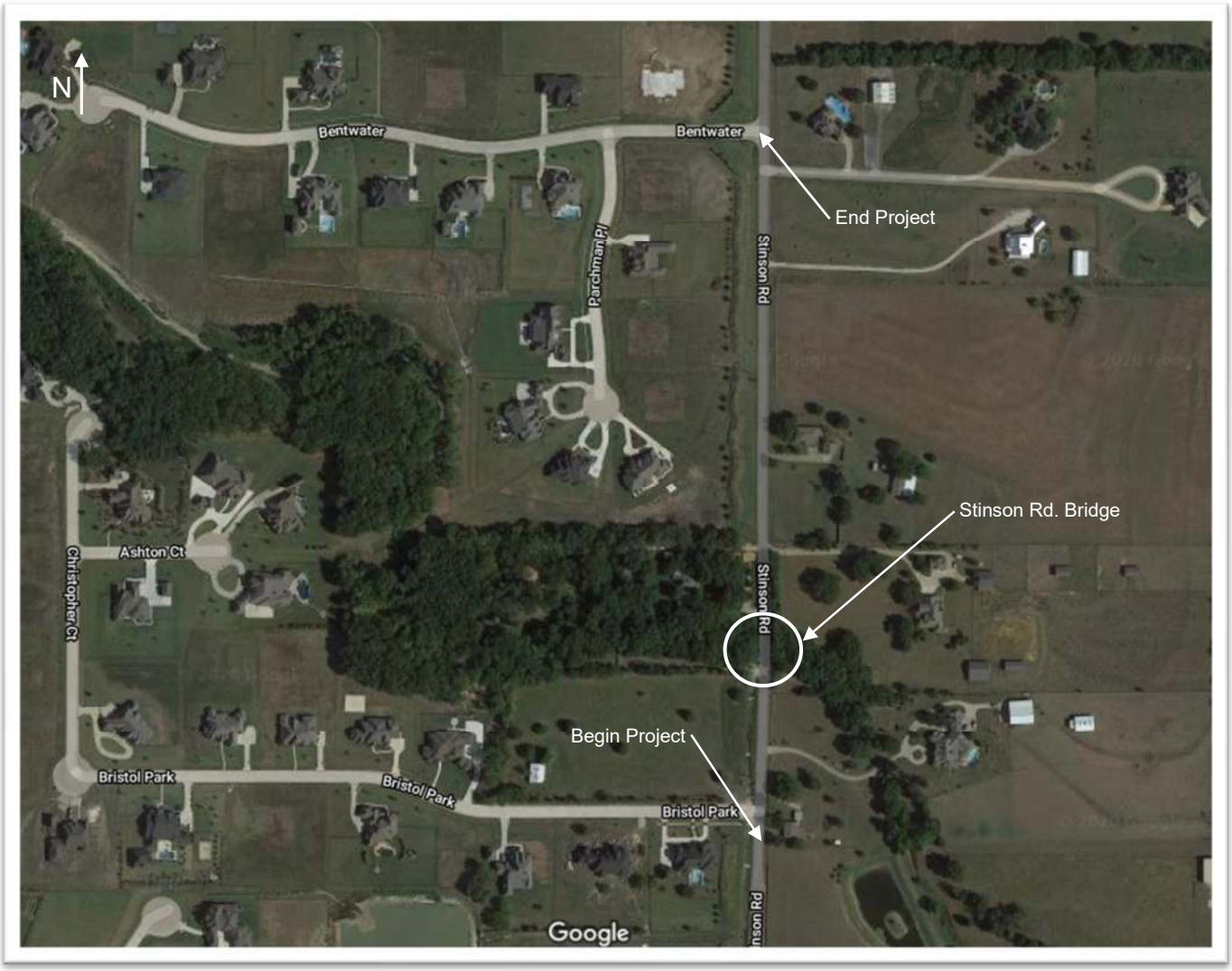


**Figure 1 – Project Location Map**

# 3. GEOMETRIC DESIGN

## 3.1. Geometric Criteria

Stinson Road is a low-speed, local road. It is classified as a low-speed, major collector and is under the jurisdiction of the City of Lucas. Stinson Road has a posted speed limit of 40 mph. Stinson road narrows at the culvert over Muddy Creek and has an advisory speed of 15 mph.

### *Roadway Design Parameters*

- Functional Classification: Rural/Major Collector
- Design Speed: 45 mph
- Minimum Travel Lane Width: 11 ft

### *Design Specifications*

- American Association of State Highway and Transportation Officials (AASHTO) A Policy on Geometric Design of Highways and Streets "The Green Book" (2018), 7th Edition with latest Interim Revisions
- Texas Manual on Uniform Traffic Control Devices (October 2014)
- TxDOT Roadway Design Manual (April 2018)
- TxDOT Hydraulic Design Manual (September 2019)
- TxDOT Environmental Handbook (November 2019)
- TxDOT Bridge Project Development Manual (March 2018)

### *Horizontal Clearance (waterway)*

In accordance with the TxDOT Bridge Project Development Manual, Chapter 3, Section 1, bridges over water shall have substructure supports located within the horizontal clearance requirements as follows:

- A maximum of 2:1 embankment slope in a direction normal to the abutment cap.
- Side slopes should be normal to the roadway and no steeper than 3:1.
- Use stone riprap (preferred) or concrete riprap under the bridge and wrap around the abutment.

Embankment slope and stone riprap will be considered for the proposed bridge evaluation.

### *Vertical Clearance*

According to Federal Emergency Management Agency (FEMA), the Base Flood Elevation (BFE), which is the current flood elevation, is at EL. 568.73. Based on TxDOT Hydraulic Design Manual a minimum 2'-0" freeboard, additional clearance above the flood elevation, is required. In order to prevent Stinson Road from future flooding, providing a minimum 2'-0" above the BFE should be provided. The minimum Low Member Elevation (bottom of the bearing pad) shall equal or exceed the BFE EL. 570.73. However, by replacing the culvert with a bridge, the current flood elevation is expected to be lower. An in-depth Hydrology and Hydraulic study shall be performed in the design process.

The intent of the design is to provide the minimum vertical clearance. This is proposed to be achieved by a combination of minimization of the proposed structure depth and raising the vertical profile.

## 3.2. Horizontal and Vertical Alignment

### *Horizontal Alignment*

The existing horizontal alignment of Stinson Road, within the limits of the culvert over the Muddy Creek is on a tangent segment. Two alternatives are presented for the proposed alignment.

#### Horizontal Alignment 1:

Proposed alternative horizontal alignment 1, Stinson Road Bridge over Muddy Creek will match existing horizontal alignment.

Horizontal Alignment 1 is shown in **Figure 2 – Horizontal Alignment 1** below.

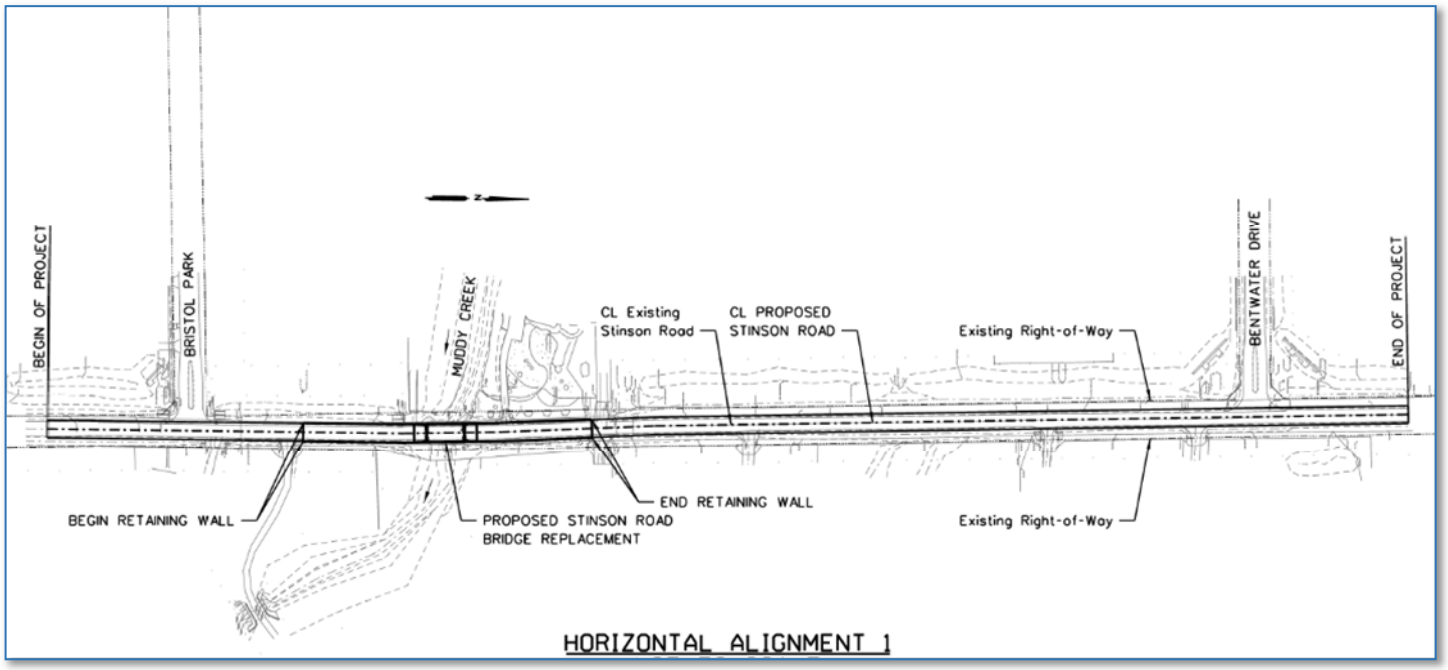


**Figure 2 - Horizontal Alignment 1**

### Horizontal Alignment 2:

Proposed horizontal alignment 2, Stinson Road bridge over Muddy Creek will be shifted to the east of the existing Stinson Road alignment introducing curves before and after the bridge.

Horizontal Alignment 2 is shown in **Figure 3 – Horizontal Alignment 2** below.

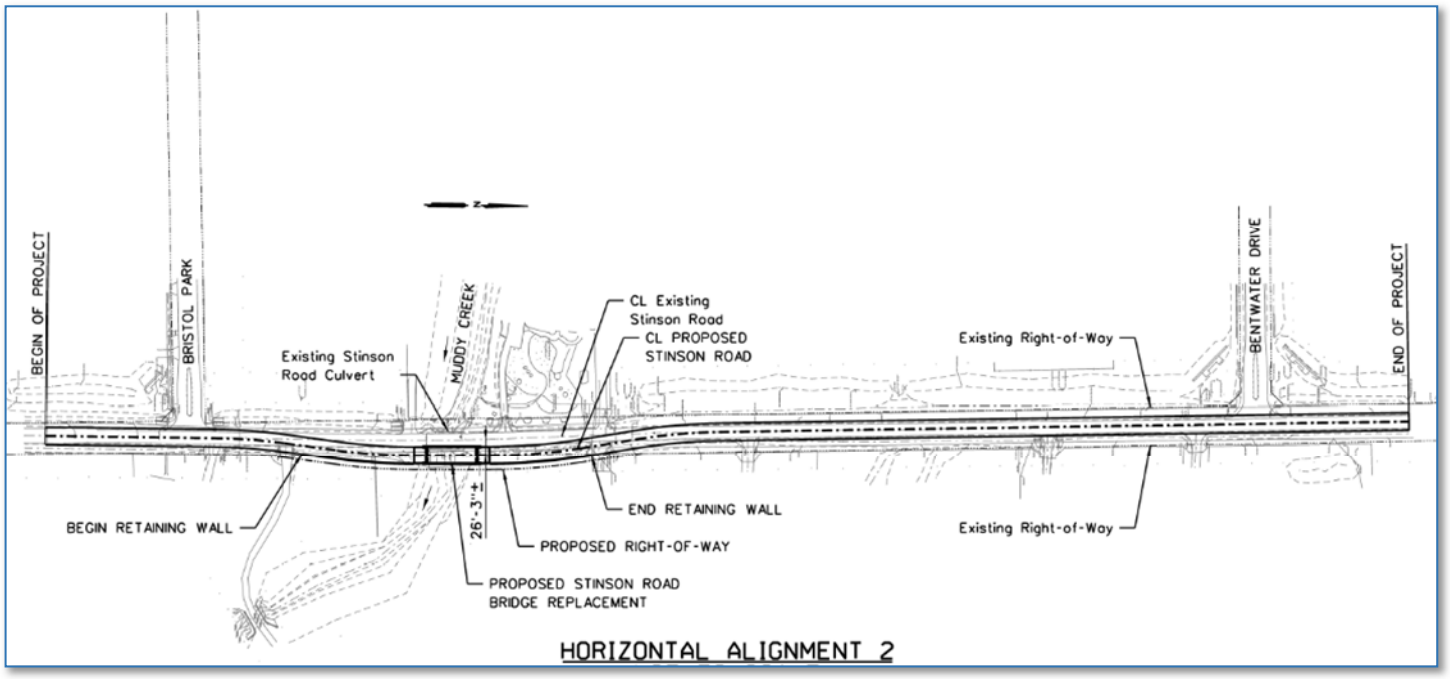


**Figure 3 - Horizontal Alignment 2**

### *Recommendation*

The advantages of Horizontal Alignment 2 over Horizontal Alignment 1 are listed below.

- Allows construction in phases and at least one lane open to traffic
- Curvature may help reduce speeding along Stinson Road
- Less impact to driveways
- Minimize costs by reducing the length of retaining walls

The disadvantages of Horizontal Alignment 2 over Horizontal Alignment 1 are listed below.

- Requires Right-of-Way acquisition from 3 parcels on the east side of Stinson Road
- Longer bridge span
- Limited shallow superstructure types
- 11.5" higher profile due to deeper superstructure section
- Higher cost compared to Decked Slab Beams recommended for Horizontal Alignment 1

Horizontal Alignment 2 requires right-of-way acquisition and increased span length. A significant key advantage of the Horizontal Alignment 2 is that it offers added safety to the traveling to the public and

residents along Stinson Road by encouraging reduced speed. Many advantages are realized by Horizontal Alignment 2 as presented above. The recommended proposed alignment is Horizontal Alignment 2.

*Vertical Alignment/Profile*

Muddy Creek has historically frequently overtopped Stinson Road. Raising the top of the road to be above the designated flood elevation is recommended. It is also recommended that the low member elevation should be a minimum of 2'-0" above the current flood elevations. Several bridge superstructure alternatives (see section 5.4) were evaluated with the intent to minimize raising the vertical profile, which reduce the limits of the project, impact to property driveway access, and additional roadway embankment.

## 3.3. Right-of-Way

The City of Lucas has established a 50 feet prescriptive right-of-way being 25 feet offset each side of the existing centerline of the road. There are one (1) parcel on the west and five (5) parcels on the east of Stinson Road that have a 25 feet prescriptive right-of-way from the centerline of Stinson Road within the project limits. There are six (6) parcels that have a 30 feet permanent right-of-way and one (1) parcel that have a 20 feet permanent right-of-way on the west of Stinson Road from the centerline of Stinson Road within the project limits. Also, there are three (3) parcels that have a 30 feet permanent right-of-way on the east of Stinson Road from the centerline of Stinson Road within the project limits. Both Horizontal Alignment 1 and 2 will require right-of-way acquisition from a total of eight (8) and nine (9) parcels, respectively, see Appendix A for reference. Therefore, the proposed right-of-way acquisition will be a 25 feet offset from the centerline of Stinson Road each side. The proposed improvements will be within the acquired right-of-way.

## 3.4. Easement

The City of Lucas has established a 20 feet water/utility easement offset from the existing right-of-way on both sides of Stinson Road. There are eight (8) parcels on the west and two (2) parcels on the east of Stinson Road that have a 20 feet water/utility easement from the right-of-way of Stinson Road within the project limits. There are two (2) parcels on the east of Stinson Road that have a 10 feet water/utility easement from the right-of-way of Stinson Road within the project limits. Also, there is one (1) parcel on the west of Stinson Road that does not have a water/utility easement. Both Horizontal Alignment 1 and 2 will require easement acquisition from a total of nine (9) parcels, see Appendix A for reference. Therefore, the proposed easement acquisition matches the typical 20 feet offset.

## 3.5. Access Impact

There is a total of nine (9) driveways within the project limits on Stinson Road that may be impacted. For Horizontal Alignment 1, two driveways will be significantly impacted due to the proposed profile raise. The driveway just south of the proposed bridge and west of Stinson Road where there is an existing concrete culvert that was recently constructed will need approximately 50 feet in length from the edge of the pavement to tie into the existing ground. And the driveway just north of the bridge and west of Stinson Road will need approximately 40 feet in length from the edge of the pavement to tie into the existing ground. Both driveways will require work to be perform on the owners' properties. However, Horizontal Alignment 2 will be less of an impact to the driveways compared with Horizontal Alignment 1. Access must be provided for all property owners during the duration of construction. Temporary driveways may be required.

# 4. STRUCTURAL DESIGN CRITERIA

## 4.1. Specifications

The design of the structural elements of this project shall be in full compliance with AASHTO and TxDOT Bridge Design Manual - LRFD. The structure shall be designed in accordance with the TxDOT standard practices and procedures. The design shall comply with the latest edition of the following design specifications:

*General Specifications:*

- Texas Department of Transportation (TxDOT) Standard Specifications for Construction and Maintenance of Highways, Streets and Bridge, 2014

*Design Standards and Specifications:*

- American Association of State Highway and Transportation Officials (AASHTO) LRFD Bridge Design Specifications (2017), 8th Edition with latest Interim Revisions
- TxDOT Bridge Project Development Manual (March 2018)
- TxDOT Bridge Design Manual - LRFD (July 2018)
- TxDOT Bridge Railing Manual (September 2019)
- TxDOT Bridge Standard Drawings

*Design Methodology*

All structural components shall be designed in accordance with Load and Resistance Factor (LRFD) design methodology. The design life for bridge structures is 75 years per AASHTO LRFD and TxDOT design criteria.

## 4.2. Bridge Loading

The following design loads were utilized in the evaluation of the superstructure and substructure alternatives:

*Dead Loads:*

Unit weights in accordance with the TxDOT Standards and the AASHTO LRFD Bridge Design Specifications were utilized.

Concrete, Structural ..... 150 pcf
Asphalt Concrete Pavement Overlay ..... 150 pcf (Applicable to prestressed slab unit alternative)
Future Wearing Surface ..... 25 psf

Soil, Compacted ..... 120 pcf

Vertical-Faced Concrete Parapet ..... 270 plf (TxDOT Traffic Railing Type T411)

Bridge Deck Sacrificial Thickness ..... ½ in. (½" sacrificial deck thickness for grinding and grooving was accounted for as dead load but was not utilized for bridge deck section properties).

*Live Loads*
Vehicular Loading: HL-93

*Wind Loads*
Wind loads will be calculated in accordance with AASHTO LRFD Bridge Design Specifications.

*Vessel Collision*
Not applicable.

*Seismic Criteria*
According to TxDOT Bridge Design Manual, bridges and structure in Texas do not require analysis for seismic loading due to the low seismic hazard as shown in AASHTO Article 3.10.2. TxDOT Bridge Standards and conventional bridge configurations have been evaluated for seismic effects and do not require further analysis.

### 4.3. Environmental Classification

Non-Severe: De-icing agents are not frequently used and contact with salt-water spray is not possible.

### 4.4. Materials

The following material properties shall be utilized in the design of the structures:

*Concrete*
Concrete shall be specified in accordance with TxDOT Standard Specifications.

| Class | Minimum 28-day Compressive Strength (psi) | Location |
|---|---|---|
| **Superstructure** | | |
| C (HPC if needed) | 3,600 | Traffic Railings |
| S (HPC if needed) | 4,000 | Decks and Approach Slabs, |
| H (HPC if needed) | 5,500 | Prestressed Deck Slab Units |
| **Substructure** | | |
| C | 3,600 | Abutments, Bent and Wingwalls |
| C (Drilled Shaft) | 3,600 | Drilled Shafts |
| C (Driven Pile) | 3,600 | Driven Piles |

*Reinforcing Steel*
Reinforcement shall be ASTM A615, Grade 60 deformed carbon-steel bar. All superstructure reinforcement shall be epoxy coated or galvanized.

*Prestressing Steel*

Prestressing strands shall conform to ASTM A416, Grade 270, low-relaxation strands. Stress-relieved strands will not be used.

### 4.5. Permit

The following regulatory and permitting agencies may have interest and/or jurisdiction requiring permits to perform the proposed bridge replacement:

- City of Lucas
- Texas Commission on Environmental Quality (TCEQ)
- United States Environmental Protection Agency (EPA)
- Federal Emergency Management Agency (FEMA)

### 4.6. Aesthetics

The proposed bridge will not have any non-standard aesthetic requirements. As reference, the bridge aesthetics will be similar to the Blondy Jhune bridges.

### 4.7. Utilities

Based on field surveying performed by Surveying and Mapping, LLC (SAM) in March 2020, existing overhead and underground utilities were noted at various locations. Further investigation will need to be conducted as the project progresses to identify the exact facility locations. The following companies operate within the project limits:

- City of Lucas Public Utilities – 12” water line located along the west side of Stinson Road and 8" sanitary sewer force main located along the east side of Stinson Road.
- North Texas Municipal Water District (NTMWD) Water – 42” water line located along the west side of Stinson Road.
- Oncor Electric – Aerial facilities on the west and east side of Stinson Road.
- CoServ Gas – 8” gas main near the beginning of project limit at Bristol Park.
- Frontier Fiber – Underground facilities located along the west and east side of Stinson Road.

There are five (5) Utility Agency Owners (UAO) with facilities within the project limits and additional utility coordination will be performed in preliminary and final design phases. The table below lists utility agency owners, utility contact data, and potential for required relocations.

| Existing Utilities | | | | | |
|---|---|---|---|---|---|
| | **Utility Agency Owner** | **Facilities** | **Contact Person** | **Phone** | **Relocation Potential** |
| 1 | City of Lucas | Water | Jeremy Bogle | 469-628-8586 | Y |
| 2 | North Texas Municipal Water District (NTMWD) | Water | Ray Sikes | 469-626-4569 | N |
| 3 | Oncor | Electric | Chris Dulaney | 972-569-1294 | Y |
| 4 | CoServ | Gas | Shawn Mead | 214-458-7851 | N |
| 5 | Frontier | Fiber | David Lemons | 972-578-3212 | Y |

*Bridge Mounted Utilities*

The existing culvert structure does not carry any utilities. No utilities are proposed for attachment to the bridge. It is recommended that conduit be placed in each bridge railing for future use of utility passthrough.

*Overhead Utilities*

Shared-use utility poles run longitudinally near the west and east fascia of the bridge, carrying likely electrical, and telephone/cable.

Construction activities will need to address temporary support or relocation of these utilities.

## 5. BRIDGE ALTERNATIVES

### 5.1. Span Arrangement Alternatives

An approximate minimum overall bridge length of 60'-0" for Horizontal Alignment 1 and 80'-0" for Horizontal Alignment 2 are required to span over Muddy Creek. This would locate the begin and end bridge outside of the Muddy Creek limits and would provide a 2H:1V slope embankment at each abutment. The proposed abutments would be placed approximately at the edge of Muddy Creek top embankment to minimize future scour potential. The proposed bridge replacement structure must comply with the vertical clearance requirement discussed in Section 3 above.

*Single-Span Bridge Option*

A single-span bridge option is considered for the culvert structure replacement to maximize the bridge opening for optimum hydraulics. This option is less likely to minimize vertical profile raise; however, it offers the most cost-effective option by minimizing substructure costs. As such, this option appears to be the most feasible.

The proposed Plan for Horizontal Alignment 1 is shown in **Figure 4 – Plan View** below.

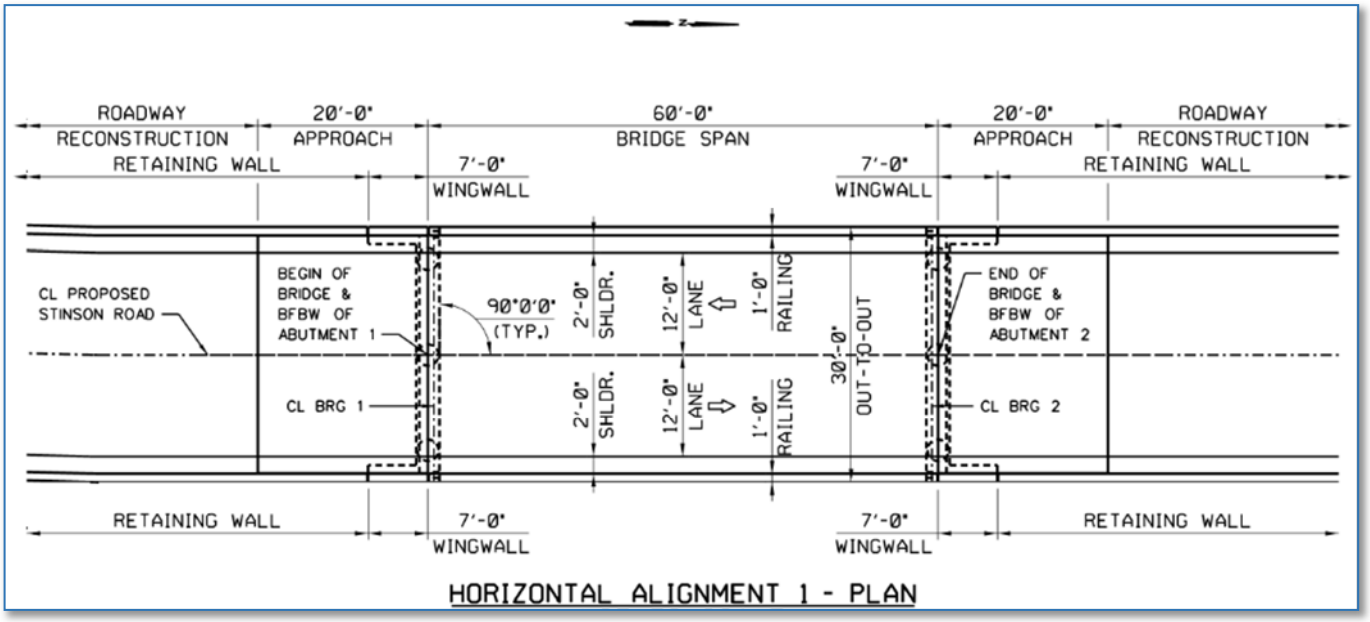


**Figure 4 - Bridge Plan (Alignment 1)**

The proposed Elevation for Horizontal Alignment 1 is shown in **Figure 5 – Elevation View** below.

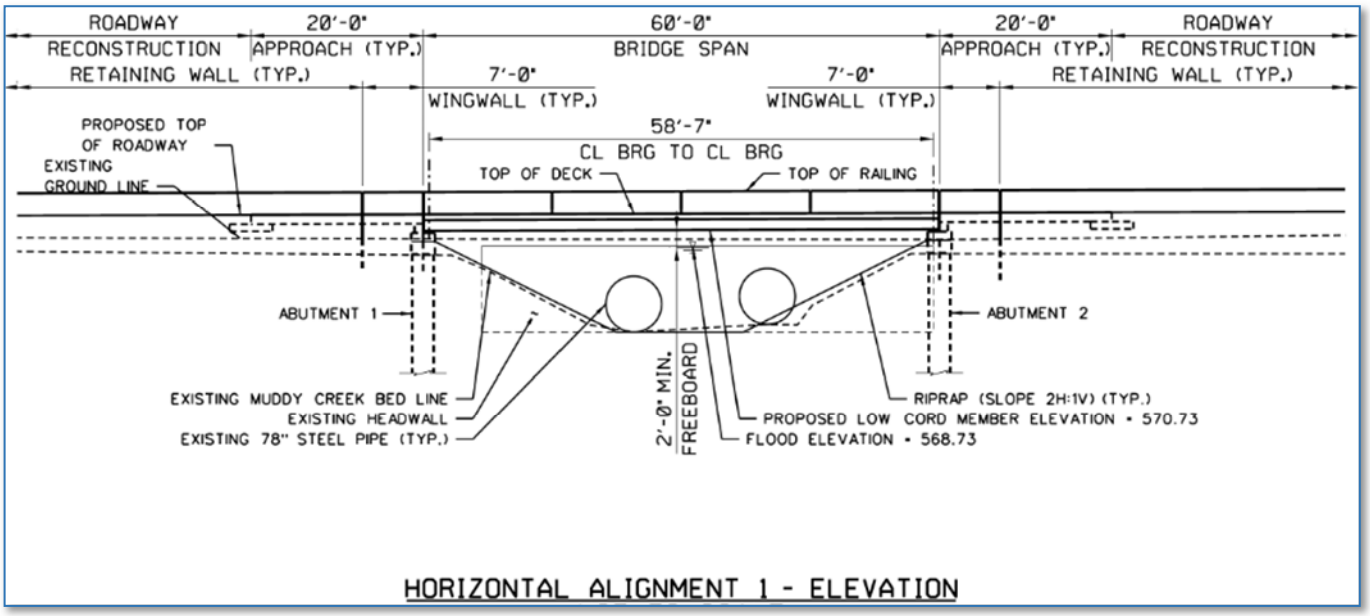


**Figure 5 - Bridge Elevation (Alignment 1)**

The proposed Plan for Horizontal Alignment 2 is shown in **Figure 6 – Plan View** below.

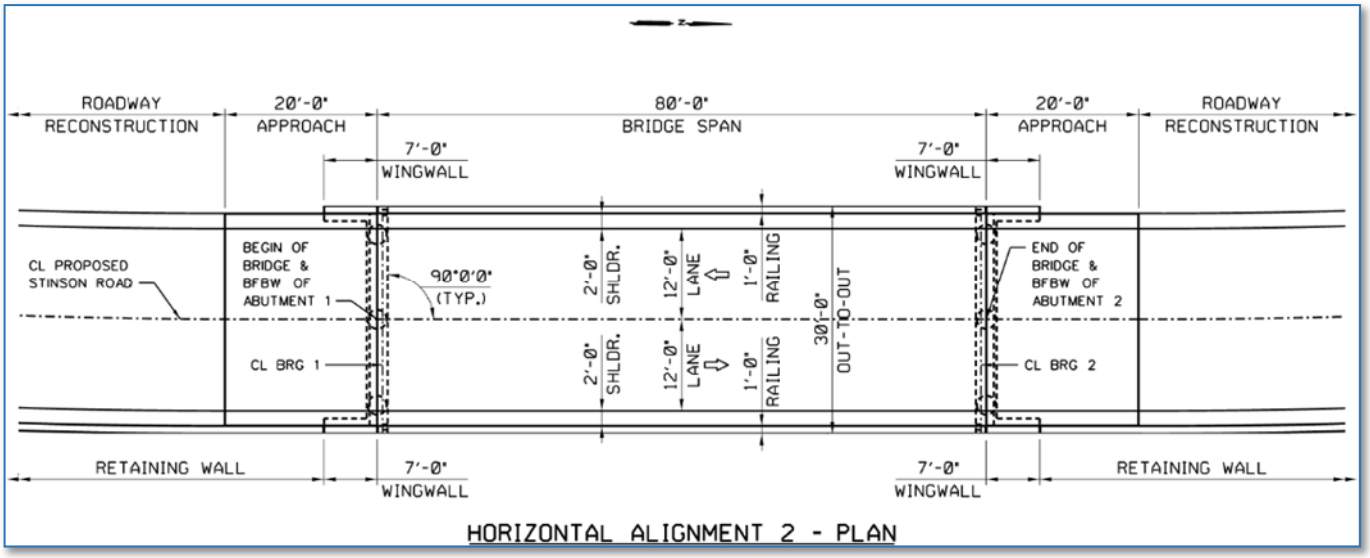


**Figure 6 - Bridge Plan (Alignment 2)**

The proposed Elevation for Horizontal Alignment 2 is shown in **Figure 7 – Elevation View** below.

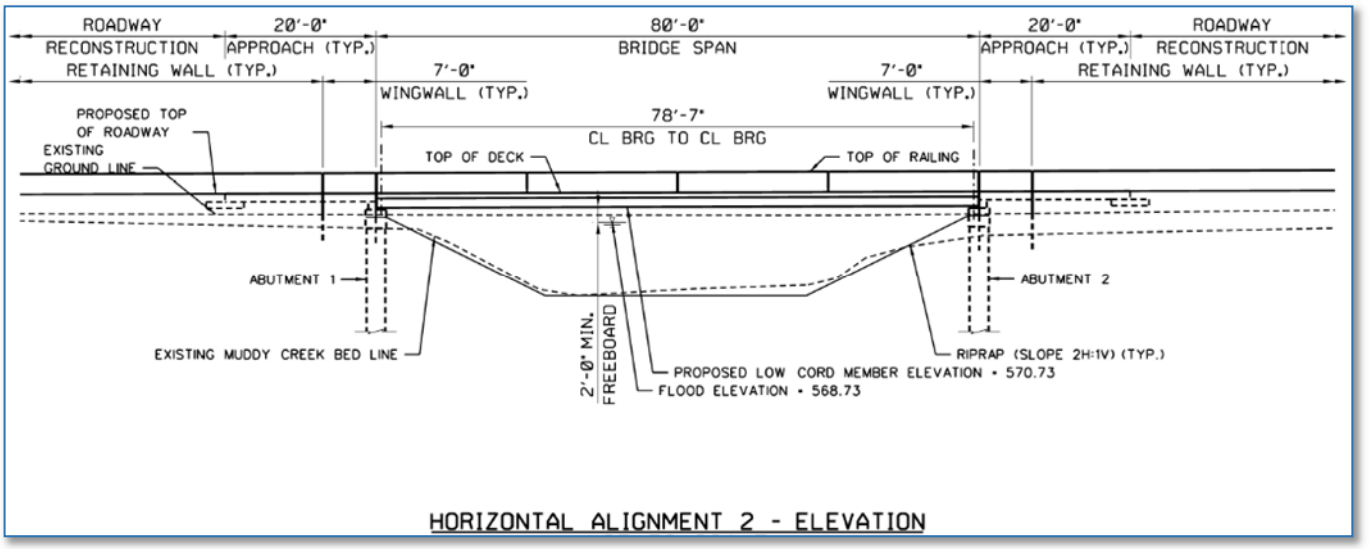


**Figure 7 - Bridge Elevation (Alignment 2)**

### *Two-Span Bridge Option*

A two-span bridge is another option to minimize vertical profile raise; however, this option is less feasible as it would locate an intermediate bent in the middle of the Muddy Creek's, which would require additional

future maintenance, introduces high scour potential, and impedes the hydraulic opening. Having an intermediate bent increases the overall construction cost above a similar length single-span bridge in this particular situation and is not considered economical. As such, a two-span bridge was not further evaluated.

*Three-Span Bridge Option*

A three-span bridge is another option to minimize vertical profile raise; however, this option is not feasible as it would locate two intermediate bents near the edge of the Muddy Creek's embankments, which increase the negative impacts mentioned above in the two-span option. As such, a three-span bridge was not further evaluated.

***Recommendation***

A single-span bridge configuration is recommended for the replacement structure.

### 5.2. Bridge Skew

Muddy Creek is perpendicular to Stinson Road; therefore, the bridge will have a 0-degree skew.

### 5.3. Typical Section

The existing roadway approach typical sections have two (2) approximately 11 ft paved asphalt travel lanes and no shoulders on either side. The roadway narrows over the Muddy Creek culvert crossing. The existing typical section of Stinson Road at the Muddy Creek culvert has two (2) approximately 10'-6" asphalt paved travel lanes, various unpaved shoulders on either side and a substandard black iron fence railing with a flood gate attached.

The existing typical section of Stinson Road at Muddy Creek is shown in **Figure 8 – Existing Typical Section** below.

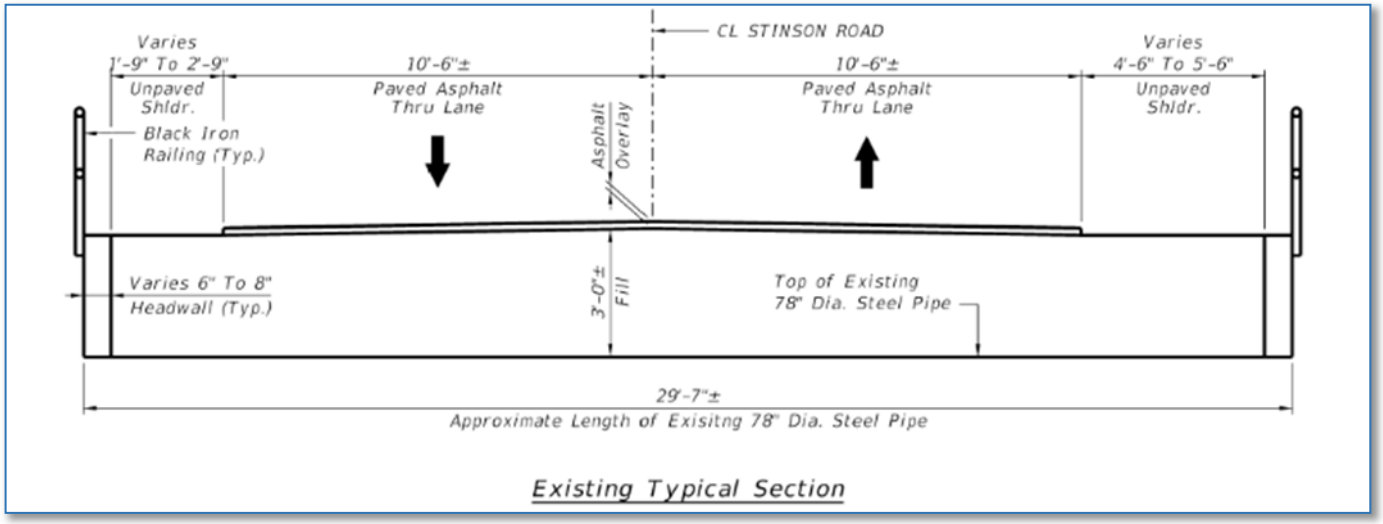


**Figure 8 - Stinson Rd Typical Section at Muddy Creek**

Stinson Road was recently reconstructed south of this project's limits. To provide a consistent corridor, it is recommended to match the roadway typical section for Stinson Road Bridge over Muddy Creek. The proposed roadway typical section provides two (2) 12'-0" travel lanes and a 2'-0" unpaved shoulder in each direction. Travel lanes and shoulders provide a cross-slope of 0.02 ft/ft and 0.06 ft/ft, respectively. The proposed bridge typical section provides two (2) 12'-0" travel lanes and a 2'-0" shoulder in each direction. Travel lanes and shoulders provide a constant cross-slope of 0.02 ft/ft. Based on TxDOT Bridge Railing Manual (September 2019), 45 mph or less is considered as low speed and a bridge railing that is a minimum Test Level 2 (TL-2) is required. There are three (3) types of bridge railings that have a minimum TL-2 rating, such as T631LS, T411, and C411. There are no sidewalks present on Stinson Road, therefore, type C411 is not suitable. Type T631LS is a w-beam supported on steel posts and needs to be replaced after an impact. Type T411 is a continuous concrete railing that has 6" wide windows spaced every 18", center to center, with a nominal 2'-8" height and 1'-0' width. The recommended bridge railing is type T411. Type T411 is less likely to require replacement after impact and offers better aesthetics, Texas Classic, over type T631LS. The proposed bridge typical section will have an out-to-out bridge width of 30'-0".

The proposed bridge typical section is shown in **Figure 9 – Proposed Bridge Typical Section** below.

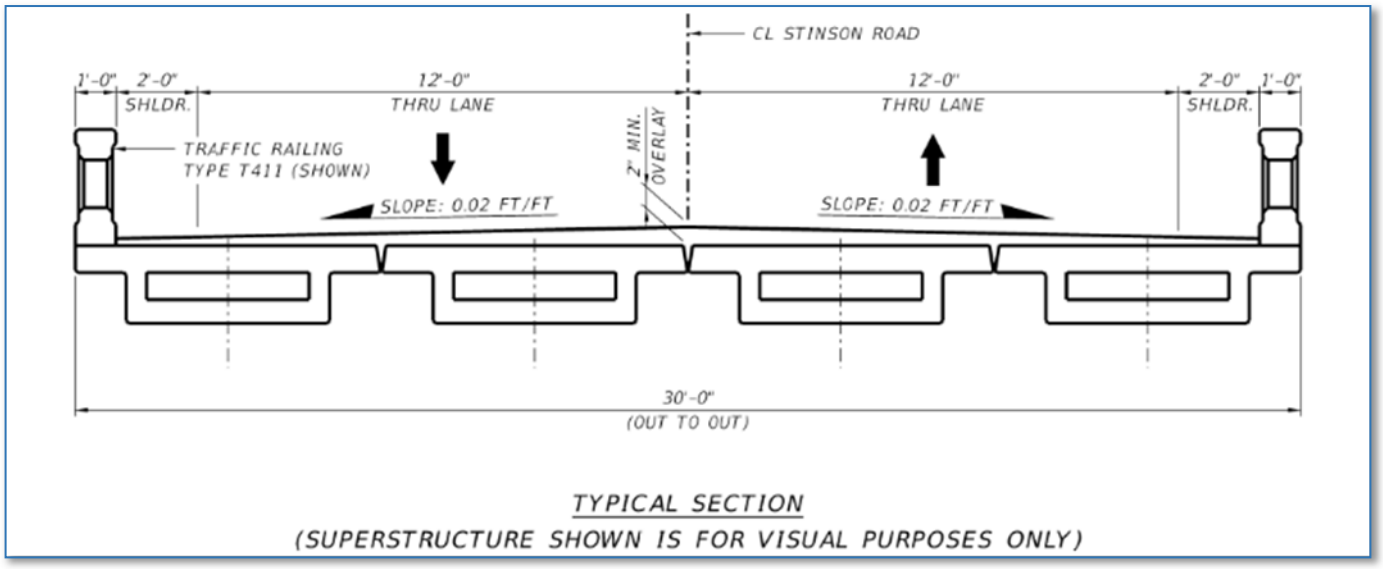


**Figure 9 - Proposed Bridge Typical Section**

## 5.4. Superstructure Alternatives

The superstructure alternatives have been selected to satisfy the minimum horizontal and vertical clearance, hydraulic requirements, and constructability. Different superstructure alternatives were considered and elevated based on two Horizontal Alignments as discussed in section 3.2 above

**Horizontal Alignment 1:**
Seven superstructure alternatives were considered and evaluated for Stinson Road Bridge over Muddy Creek. The overall bridge length is 60'-0" for Horizontal Alignment 1. TxDOT Prestressed Concrete Slab Beam was evaluated and eliminated due to capacity limitations for Horizontal Alignment 1. A steel through-

truss superstructure was considered to minimize superstructure depth. The advantages to a through-truss superstructure are generally realized in long spans where prestressed concrete does not perform well or the members become very large. Since the span is relatively short, the structure depth for a through-truss is not less than other alternatives considered. Therefore, the steel through-truss was eliminated. The remaining five superstructure alternatives are described below, options 1 through 5.

Each superstructure alternative presented below for Horizontal Alignment 1 is presented with the recommended typical section as discussed in Section 4.1 above.

### *Option 1: TxDOT Prestressed Concrete Decked Slab Beams (7DS23)*

This superstructure alternative consists of replacing the existing culvert structure with a single-span bridge utilizing four (4) TxDOT Prestressed Concrete Decked Slab Beams (7DS23) with a minimum of 2" thick concrete or asphalt overlay. The proposed superstructure depth is 25 inches. This shallow superstructure depth in conjunction with a modified vertical profile results in the lowest vertical profile raise over Muddy Creek and places the bottom of the bridge bearings elevation to be above the 100-year flood storm. Option 1 proposes a 3.64' vertical profile raise and is the most cost-effective superstructure alternative.

Option 1 is considered the most economical and offers the lowest vertical profile raise compared to the other options. Therefore, this option appears the most feasible.

The proposed TxDOT Prestressed Concrete Decked Slab Beams (7DS23) typical section is shown in **Figure 10 – TxDOT Prestressed Concrete Decked Slab Beams (7SB23) Typical Section** below.

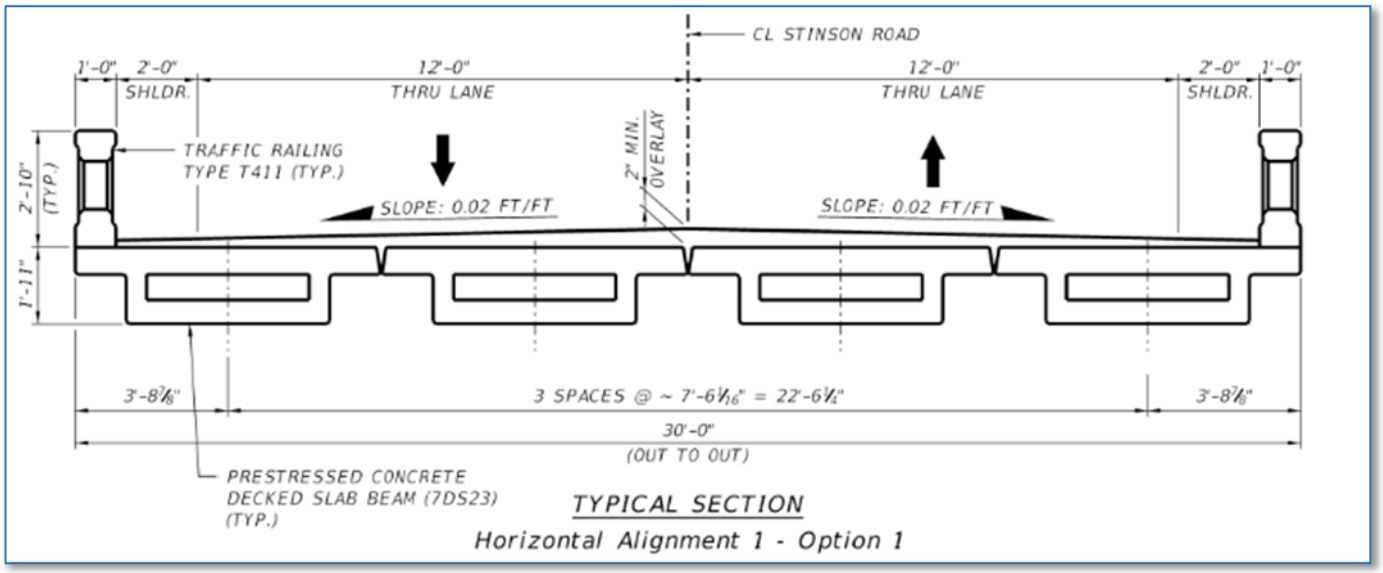


**Figure 10 - TxDOT Prestressed Concrete Decked Slab Beams (7SB23) Typical Section**

### *Option 2: TxDOT Prestressed Concrete Box Beams (5B20)*

This superstructure alternative consists of replacing the existing culvert structure with a single-span bridge utilizing six (6) TxDOT Prestressed Concrete Box Beams (5B20) with a minimum of 5" thick Cast-in-Place (CIP) reinforced concrete deck. The proposed superstructure depth is 25". This shallow superstructure depth in conjunction with a modified vertical profile results in matching option 1 with the lowest vertical profile raise over Muddy Creek and places the bottom of the bridge bearing elevation to be above the 100-year flood storm. Option 2 proposes a 3.64' vertical profile raise and is the second most cost-effective superstructure alternative.

Although there is no reduction in the vertical profile raise compared to Option 1, utilizing six (6) TxDOT Prestressed Concrete Box Beams (5B20) with a 5" thick reinforced concrete deck increases the construction cost by 12%, see Appendix A for reference, compared to Option 1. Option 2 is not considered the most economical and does not offer any cost-saving or a lower vertical profile raise compared to Option 1. Therefore, this option was not further evaluated.

The proposed TxDOT Prestressed Concrete Box Beams (5B20) typical section is shown in **Figure 11 – TxDOT Prestressed Concrete Box Beams (5B20) Typical Section** below.

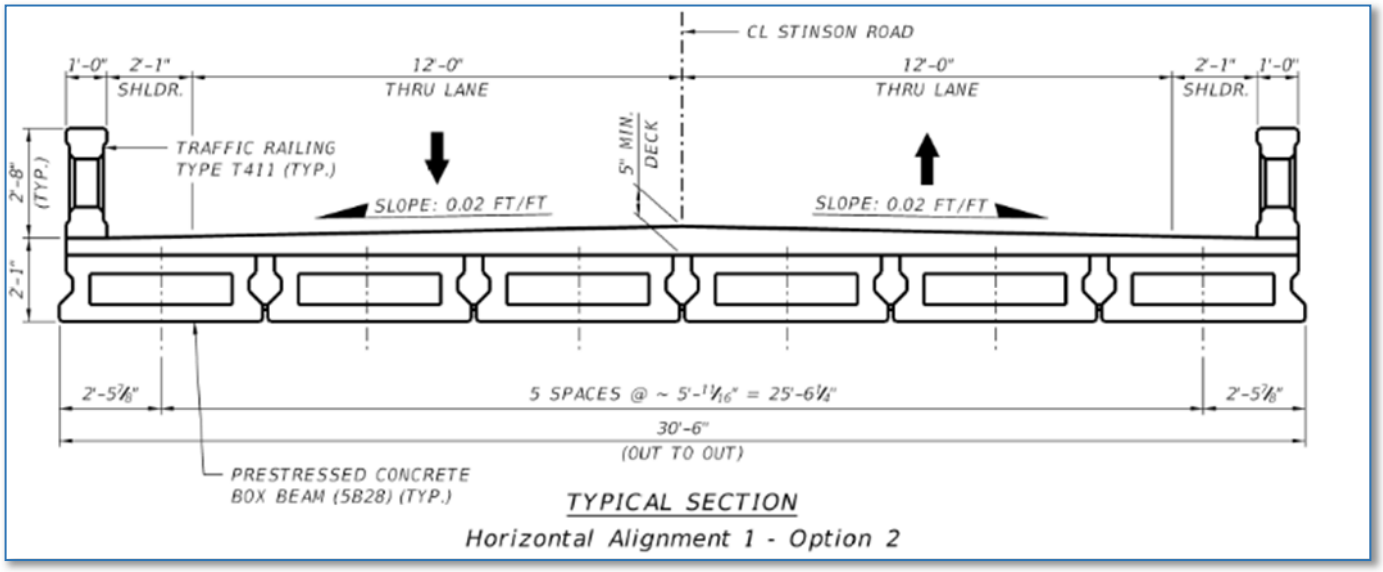


**Figure 11 - TxDOT Prestressed Concrete Box Beams (5B20) Typical Section**

### *Option 3: TxDOT Prestressed Concrete XBeams (5XB20)*

This superstructure alternative consists of replacing the existing culvert structure with a single-span bridge utilizing four (4) TxDOT Prestressed Concrete XBeams (5XB20) with an 8" thick Cast-in-Place (CIP) reinforced concrete deck. The proposed superstructure depth is 30". This shallow superstructure depth in conjunction with a modified vertical profile results in the second lowest vertical profile raise over Muddy Creek and places the bottom of the bridge bearing elevation to be above the 100-year flood storm. Option 3 proposes a 4.06' vertical profile raise and is the fourth most cost-effective superstructure alternative.

There is a 5" increase in the vertical profile raise compared to Option 1. Also, utilizing four (4) TxDOT Prestressed Concrete XBeams (5XB20) with an 8" thick reinforced concrete deck increases the construction cost by 25%, see Appendix A for reference, compared to Option 1. Option 3 is not considered the most economical and does not offer any cost-saving or a lower vertical profile raise compared to Option 1. Therefore, this option was not further evaluated.

The proposed TxDOT Prestressed Concrete XBeams (5XB20) typical section is shown in **Figure 12 – TxDOT Prestressed Concrete XBeams (5XB20) Typical Section** below.

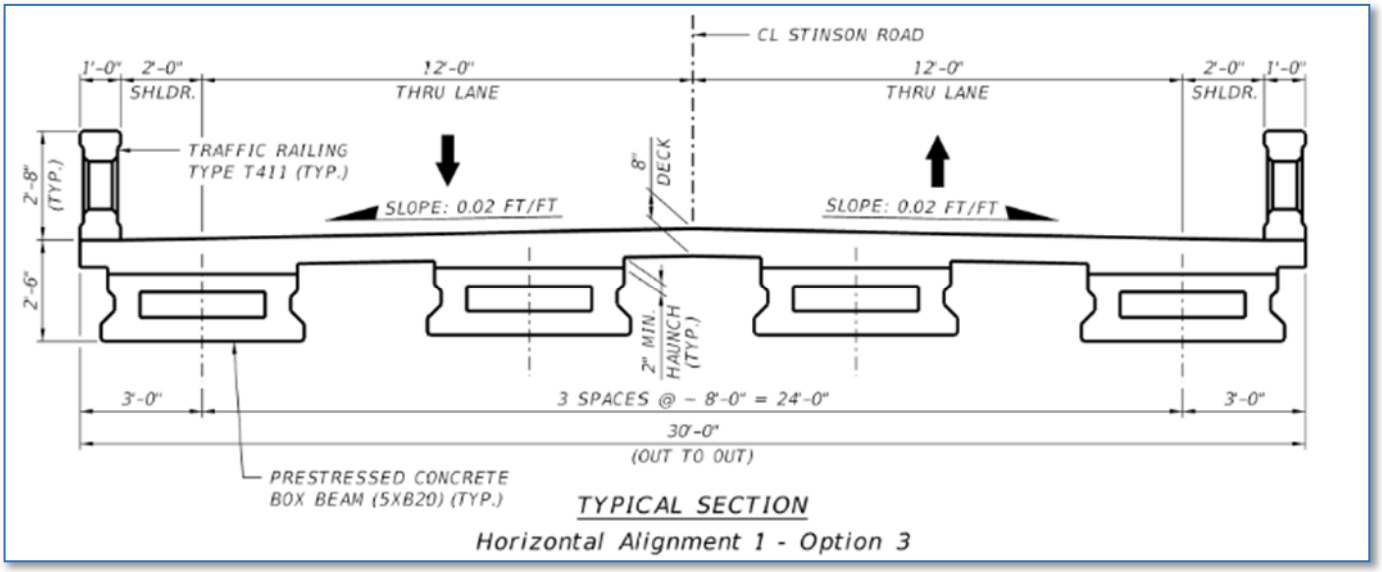


**Figure 12 - TxDOT Prestressed Concrete XBeams (5XB20) Typical Section**

### *Option 4: TxDOT Prestressed Concrete I-Girders (TX28)*

This superstructure alternative consists of replacing the existing culvert structure with a single-span bridge utilizing four (4) TxDOT Prestressed Concrete I-Girders (TX28) with an 8.5” thick Cast-in-Place (CIP) reinforced concrete deck. The proposed superstructure depth is 38.5”. This superstructure depth in conjunction with a modified vertical profile results in the highest vertical profile raise over Muddy Creek and places the bottom of the bridge bearing elevation to be above the 100-year flood storm. Option 4 proposes a 4.77’ vertical profile raise and is the third most cost-effective superstructure alternative.

There is a 13.5" increase in the vertical profile raise compared to Option 1. Also, utilizing four (4) TxDOT Prestressed Concrete I-Girders (TX28) with an 8.5” thick reinforced concrete deck increases the construction cost by 15%, see Appendix A for reference, compared to Option 1. Option 4 is not considered the most economical and does not offer any cost-saving or a lower vertical profile raise compared to Option 1. Therefore, this option was not further evaluated.

The proposed TxDOT Prestressed Concrete I-Girders (TX28) typical shown in **Figure 13 – TxDOT Prestressed Concrete I-Girders (TX28) Typical Section** below.

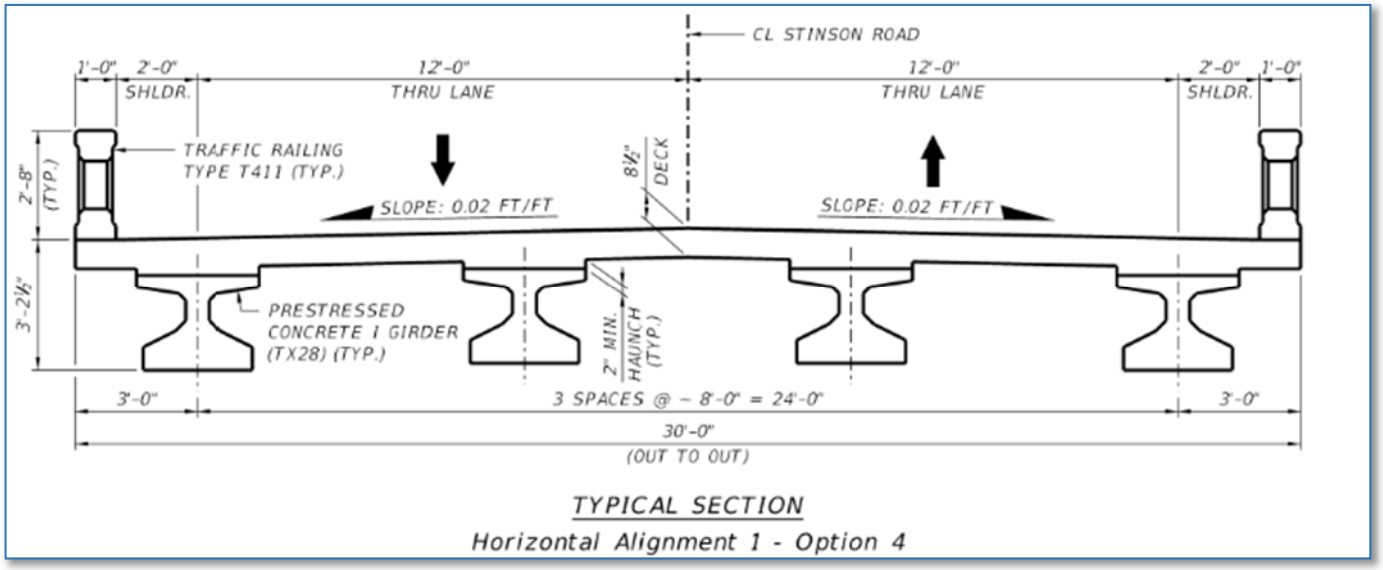


**Figure 13 - TxDOT Prestressed Concrete I-Girders (TX28) Typical Section**

### *Option 5: Steel Rolled Beams (W21X166)*

This superstructure alternative consists of replacing the existing culvert structure with a single-span bridge utilizing four (4) Steel Rolled Beams (W21X166) with an 8.5” thick Cast-in-Place (CIP) reinforced concrete deck. The proposed superstructure depth is 33”. This superstructure depth in conjunction with a modified vertical profile results in the third lowest vertical profile raise over Muddy Creek and places the bottom of the bridge bearing elevation to be above the 100-year flood storm. Option 5 proposes a 4.31’ vertical profile raise and is the least cost-effective superstructure alternative.

There is an 8" increase in the vertical profile raise compared to Option 1. Also, utilizing four (4) Steel Rolled Beams (W21X166) with an 8.5” thick reinforced concrete deck increases the construction cost by 145%, see Appendix A for reference, compared to Option 1. The steel beams increase maintenance requirements as well. Option 5 is not considered the most economical and does not offer any cost-saving or a lower vertical profile raise compared to Option 1. Therefore, this option was not further evaluated.

The proposed Steel Rolled Beams (W21X166) typical section is shown in **Figure 14 – Steel Rolled Beams (W21X166) Typical Section** below.

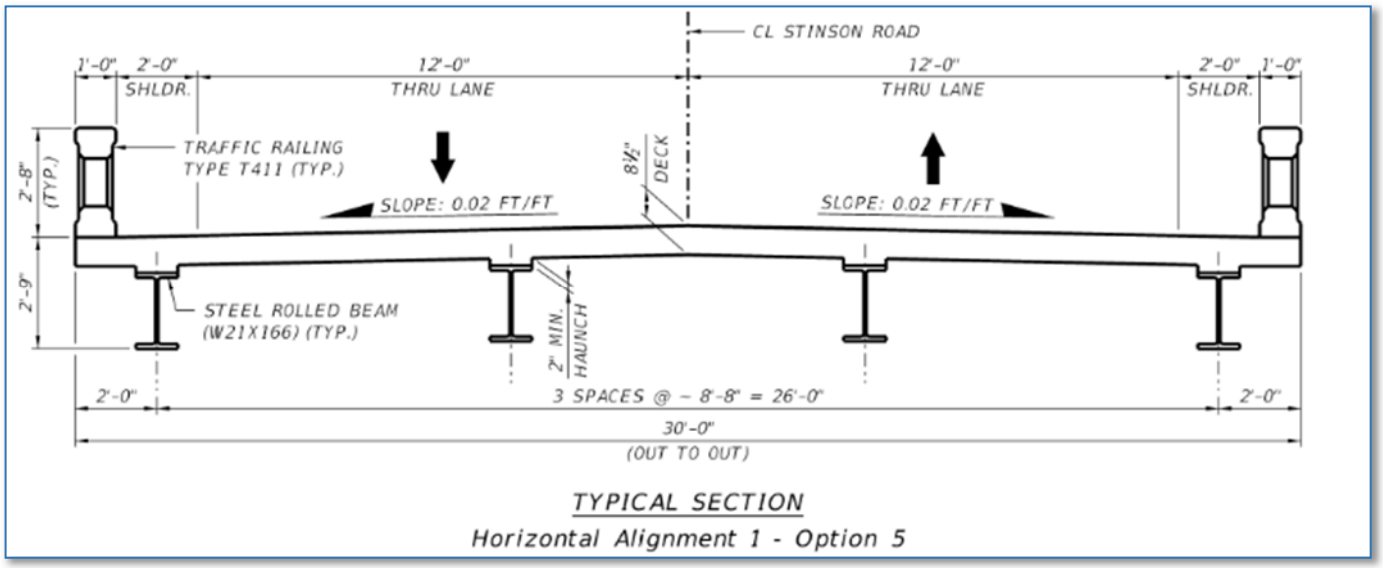


**Figure 14 - Steel Rolled Beams (W21X166) Typical Section**

### *Recommendation for Horizontal Alignment 1*

Of the five options discussed above for Horizontal Alignment 1, Option 1 is recommended: a single-span bridge utilizing four (4) TxDOT Prestressed Concrete Decked Slab Beams (7DS23) with a 2” thick concrete or asphalt overlay. Option 1 is the most cost-effective superstructure alternative. This option provides the shallowest superstructure depth, minimizing the vertical profile raise, and provides the most overall cost savings.

**Horizontal Alignment 2:**

Four of the five superstructure alternatives considered for Horizontal Alignment 1 were considered and evaluated for Horizontal Alignment 2 of Stinson Road Bridge over Muddy Creek. The overall bridge length is 80'-0" for Horizontal Alignment 2. Option 1 considered the TxDOT Prestressed Concrete Decked Slab beam was evaluated and eliminated due to capacity limitations for Horizontal Alignment 2.

Each superstructure alternative for Horizontal Alignment 2 presented below is presented with the recommended typical section as discussed in Section 5.1 above.

#### *Option 1: TxDOT Prestressed Concrete Decked Slab Beams (7DS23)*

This superstructure alternative consists of replacing the existing culvert structure with a single-span bridge utilizing four (4) TxDOT Prestressed Concrete Decked Slab Beams (7DS23) with a minimum of 2” thick concrete or asphalt overlay. However, TxDOT Prestressed Concrete Decked Slab Beams (7DS23) can only span up to 60’-0”, Option 1 was not further evaluated.

### *Option 2: TxDOT Prestressed Concrete Box Beams (5B28)*

This superstructure alternative consists of replacing the existing culvert structure with a single-span bridge utilizing six (6) TxDOT Prestressed Concrete Box Beams (5B28) with a minimum of 5" thick Cast-in-Place (CIP) reinforced concrete deck. The proposed superstructure depth is 25". This shallow superstructure depth in conjunction with a modified vertical profile results in the lowest vertical profile raise over Muddy Creek and places the bottom of the bridge bearing elevation to be above the 100-year flood storm. Option 2 proposes a 4.31' vertical profile raise and is the second most cost-effective superstructure alternative.

Option 2 is the most cost-effective superstructure option considered for Alignment 2. This option offers overall cost-saving and the lowest vertical profile raise compared to the other options. Therefore, this option is the most feasible.

The proposed TxDOT Prestressed Concrete Box Beams (5B28) typical section is shown in **Figure 15 – TxDOT Prestressed Concrete Box Beams (5B28) Typical Section** below.

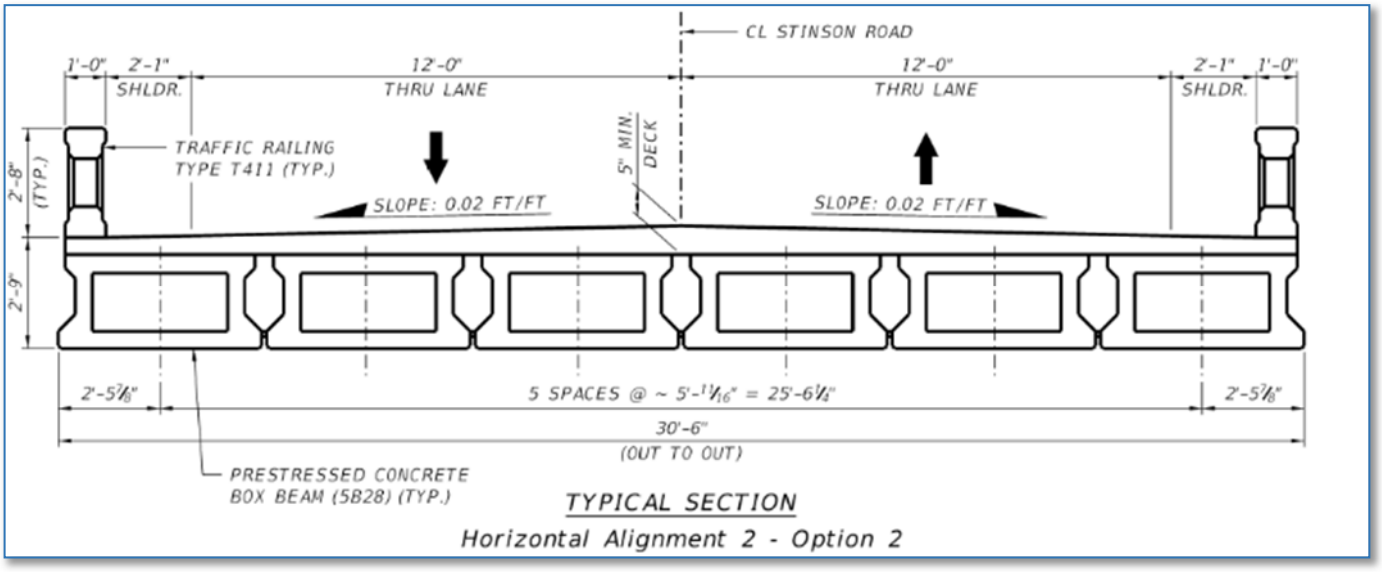


**Figure 15 - TxDOT Prestressed Concrete Box Beams (5B28) Typical Section**

*Option 3: TxDOT Prestressed Concrete XBeams (5XB28)*

This superstructure alternative consists of replacing the existing culvert structure with a single-span bridge utilizing four (4) TxDOT Prestressed Concrete XBeams (5XB28) with an 8" thick Cast-in-Place (CIP) reinforced concrete deck. The proposed superstructure depth is 30". This shallow superstructure depth in conjunction with a modified vertical profile results in the second lowest vertical profile raise over Muddy Creek and places the bottom of the bridge bearing elevation to be above the 100-year flood storm. Option 3 proposes a 4.73' vertical profile raise and is the third most cost-effective superstructure alternative.

There is a 5" increase in the vertical profile raise compared to Option 2. Also, utilizing four (4) TxDOT Prestressed Concrete XBeams (5XB28) with an 8" thick reinforced concrete deck increases the construction cost by 10%, see Appendix A for reference, compared to Option 2. Option 3 is not considered the most economical and does not offer any cost-saving or a lower vertical profile raise compared to Option 2. Therefore, this option was not further evaluated.

The proposed TxDOT Prestressed Concrete XBeams (5XB28) typical section is shown in **Figure 16 – TxDOT Prestressed Concrete XBeams (5XB28) Typical Section** below.

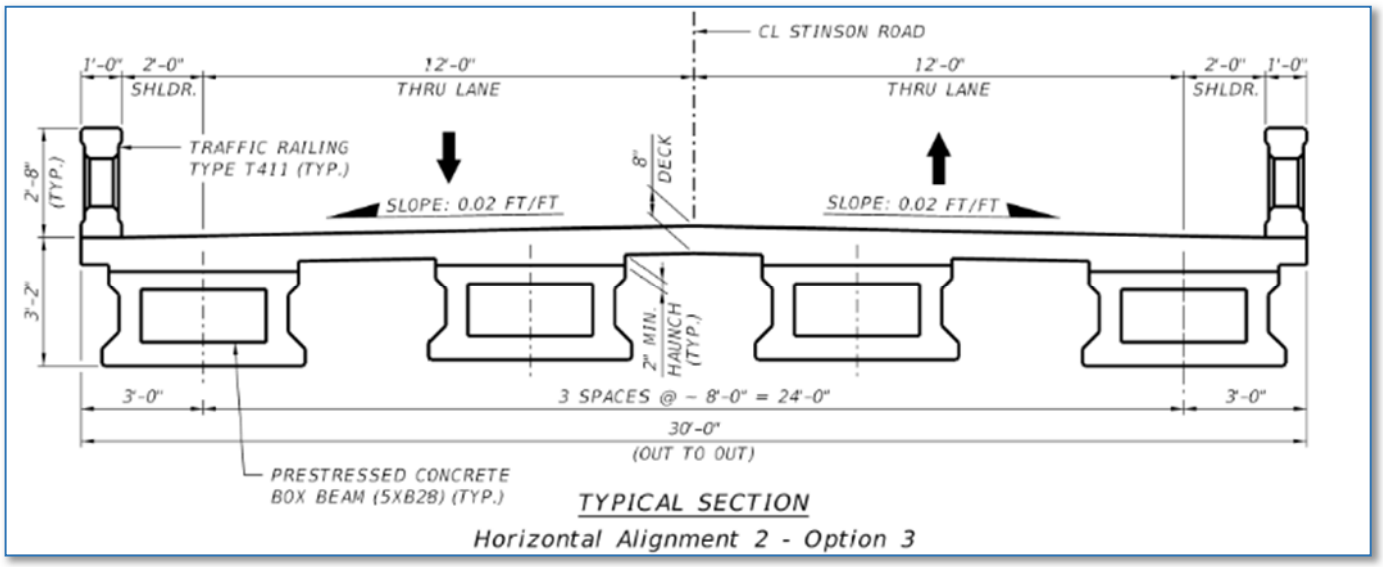


**Figure 16 - TxDOT Prestressed Concrete XBeams (5XB28) Typical Section**

### *Option 4: TxDOT Prestressed Concrete I-Girders (TX34)*

This superstructure alternative consists of replacing the existing culvert structure with a single-span bridge utilizing four (4) TxDOT Prestressed Concrete I-Girders (TX34) with an 8.5” thick Cast-in-Place (CIP) reinforced concrete deck. The proposed superstructure depth is 38.5”. This superstructure depth in conjunction with a modified vertical profile results in the highest vertical profile raise over Muddy Creek and places the bottom of the bridge bearing elevation to be above the 100-year flood storm. Option 4 proposes a 5.27’ vertical profile raise and is the most cost-effective superstructure alternative.

There is a 13.5" increase in the vertical profile raise compared to Option 2. Utilizing four (4) TxDOT Prestressed Concrete I-Girders (TX34) with an 8.5” thick reinforced concrete deck decreases the construction cost by -12%, see Appendix A for reference, compared to Option 2. Option 4 is the most cost-effective superstructure alternative, but this option does not offer any overall cost-saving from the higher vertical profile raise compared to Option 2. Therefore, this option was not further evaluated.

The proposed TxDOT Prestressed Concrete I-Girders (TX34) typical shown in **Figure 17 – TxDOT Prestressed Concrete I-Girders (TX34) Typical Section** below.

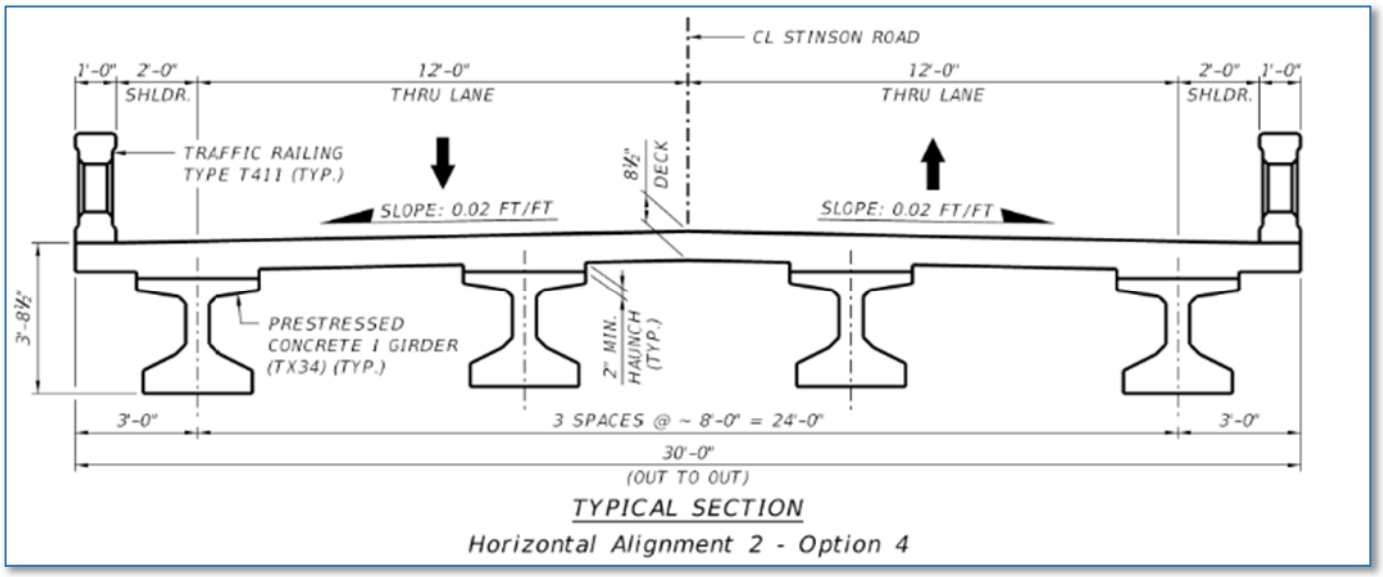


**Figure 17 - TxDOT Prestressed Concrete I-Girders (TX34) Typical Section**

### *Option 5: Steel Rolled Beams (W27X235)*

This superstructure alternative consists of replacing the existing culvert structure with a single-span bridge utilizing four (4) Steel Rolled Beams (W27X235) with an 8.5” thick Cast-in-Place (CIP) reinforced concrete deck. The proposed superstructure depth is 33”. This superstructure depth in conjunction with a modified vertical profile results in the third lowest vertical profile raise over Muddy Creek and places the bottom of the bridge bearing elevation to be above the 100-year flood storm. Option 5 proposes a 4.82’ vertical profile raise and is the least cost-effective superstructure alternative.

There is an 8" increase in the vertical profile raise compared to Option 2. Also, utilizing four (4) Steel Rolled Beams (W27X235) with an 8.5” thick reinforced concrete deck increases the construction cost by 172%, see Appendix A for reference, compared to Option 2. Option 5 is not considered the most economical and does not offer any cost-saving or a lower vertical profile raise compared to Option 2. Therefore, this option was not further evaluated.

The proposed Steel Rolled Beams (W27X235) typical section is shown in **Figure 18 – Steel Rolled Beams (W27X235) Typical Section** below.

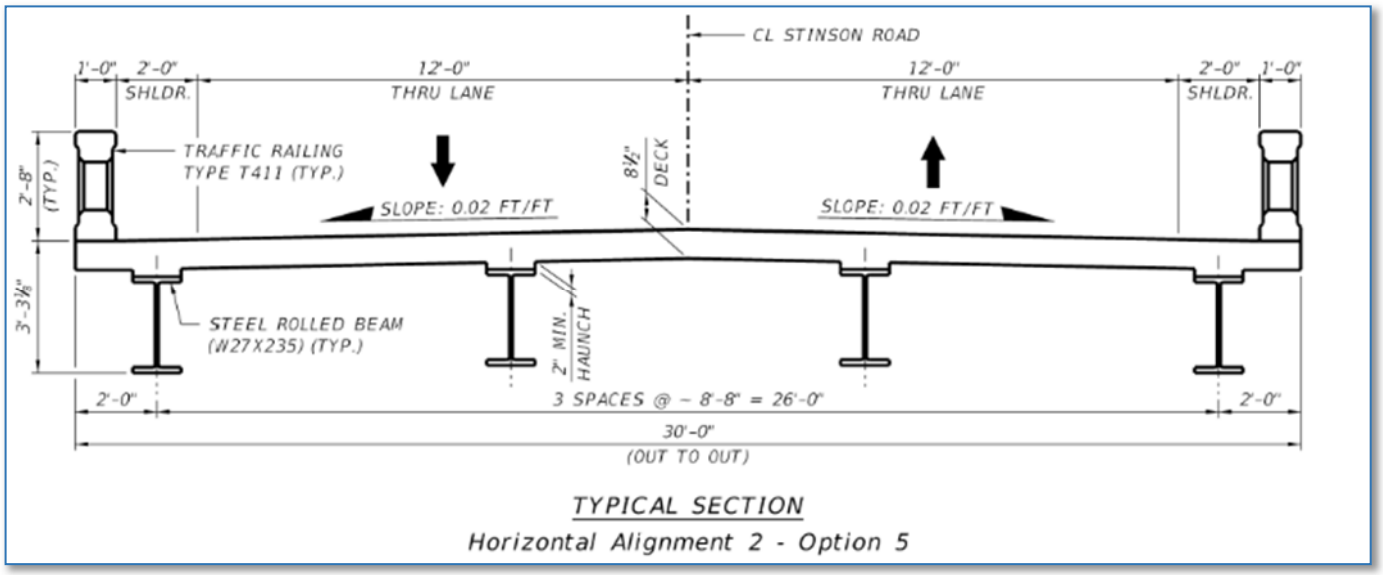


**Figure 18 - Steel Rolled Beams (W27X235) Typical Section**

### *Recommendation for Horizontal Alignment 2*

Of the five options discussed above for Horizontal Alignment 2, Option 2 is recommended: a single-span bridge utilizing six (6) TxDOT Prestressed Concrete Box Beams (5B28) with 5” thick reinforced concrete deck. Option 2 is the most feasible superstructure alternative. This option provides the shallowest superstructure depth, minimizing the vertical profile raise, and provides the most overall cost savings.

## 5.5. Substructure / Foundation Alternatives

A full geotechnical evaluation of the bridge site will be investigated during the final design phase to determine the suitability and capacity needed for the proposed bridge replacement. TxDOT standards for prestressed concrete decked slab beams and box beams allow two foundation alternatives with a cast-in-place concrete abutment cap. A specialty design may also be considered should the geotechnical evaluation recommend a non-standard substructure.

### *Driven Concrete Piles*

TxDOT Standard allows for five (5) 18”x18” driven concrete piles per an abutment for prestressed concrete decked slab beams and six (6) 18”x18” driven concrete piles per an abutment for prestressed concrete box beams. An in-depth foundation design will be performed to verify the capacity in the final design phase.

### *Drilled Shafts*

TxDOT Standard allows for three (3) 30” diameter drilled shafts per an abutment for prestressed concrete decked slab beams and box beams. An in-depth foundation design will be performed to verify the capacity in the final design phase.

### ***Recommendation***

No recommendation is provided at this time for the substructure foundation alternatives.

## 5.6. Retaining Walls

Retaining walls will be used on this project to minimize the encroachment of the roadway embankment and to contain the typical section footprint within the limits of the existing right-of-way. Two types of walls are considered feasible, conventional Cast-In-Place (CIP) walls and proprietary walls. The required wall area is determined by superstructure type as well as the foundation soil conditions to determine what type of wall will be best suited for this application. An in-depth retaining wall evaluation will be performed in the final design phase.

## 5.7. Bridge Drainage

Bridge drainage will be evaluated in preliminary and final design phases.

## 5.8. Bridge Lighting

There is no street light system existing along Stinson Road, and there are no light poles on the existing culvert. Therefore, no lighting will be proposed for the bridge.

## 5.9. Construction Sequencing

Safety to motorists and pedestrians is the highest priority for the Traffic Control Plan and the plan must minimize disruption to traffic flow during the construction of these improvements. To achieve these goals several keys issues will be addressed in the development of the selected alternative:

- Maintain access to the residential community during all phases of construction.
- Communicate with all project stakeholders, including local HOAs.
- Avoid or minimize utility facility relocations.
- Minimize impacts to traffic during the construction phase.

The following two construction options have been evaluated:

### *Phased Construction Option*

To maintain traffic along Stinson Road, phased construction was considered and evaluated. At the culvert, Stinson Road has a paved roadway width of approximately 21'. There are unpaved shoulder widths of approximately 1'-9" on the southbound and 4'-6" on the northbound. Also, the existing railing is substandard and should not be used as a safe bridge railing during construction. Therefore, a pre-stage to pave the shoulder and to install an appropriate traffic railing will be needed. TxDOT requires a 1'-0" offset from the barriers and a minimum 10'-0" lane. Given the required widths and width of temporary barriers, providing two lanes of traffic will be impossible, however leaving only one southbound lane open was considered. This option was utilized for the Stinson Road reconstruction immediately south of this project. Initial investigations find staged construction will require either widening the bridge significantly or shifting the horizontal alignment. Widening the bridge to accommodate a phased construction would significantly increase the cost without realizing the added benefit of shifting the alignment as discussed in section 2.2. If Horizontal Alignment 2 is ultimately chosen, then the additional cost of phased construction will be much smaller since the bridge will be offset from the existing roadway. The additional costs would be noticed in traffic control items and schedule.

### *Complete Closure with Detour Option*

Replacement of the Stinson Road Culvert of Muddy Creek can be completed in a shorter duration and with a reduced construction cost (when compared to the phased option) by implementing complete closure from Bristol Park to Bentwater Drive during construction and implementing a Detour. An initial detour plan will utilize East Parker Road or West Lucas Road for west to east detours and Lewis Lane or Southview Drive for south to north detours. A minimum of one (1) driveway access would be required for each property within the closure, which may require temporary driveways and temporary construction easements through adjacent properties. An in-depth detour route and access plan will be evaluated in preliminary design.

### ***Recommendation***

The Complete Closure with Detour Option is recommended as this would allow for a shorter construction duration, resulting in overall construction savings.

## 6. ALTERNATIVE COST COMPARISON

*Horizontal Alignment 1*

A comparison of the estimated % difference in cost based on selective variable components of each alternatives to Option 1 of Horizontal Alignment 1 has been prepared for the bridge, roadway options, and retaining wall evaluated (refer to Appendix A - Alternatives Cost Comparison for more details).

The table below summarizes the bridge alternatives by percentage differences of cost for each alternative compared with Option 1 based only on superstructure types.

| Bridge Alternatives | % Difference Compared to Option 1 |
|---|---|
| **Option 1: Single-Span with four-7DS23 Beams** | |
| **Option 2: Single-Span with six-5B20 Beams** | 5% increase |
| **Option 3: Single-Span with four-5XB20 Beams** | 4% increase |
| **Option 4: Single-Span with four-TX28 Beams** | 29% increase |
| **Option 5: Single-Span with four-W21x166 Beams** | 102% increase |

Based on a bridge superstructure cost estimated comparison, Option 1 is the most economical.

The table below summarizes the associated roadway profile raise of each bridge alternatives by percentage differences of cost compared with Option 1 based only on roadway fill. Profile raise is measured from the top of the existing pavement at the culvert to the top of the proposed concrete bridge deck at the center of the proposed bridge span. The top of the existing pavement at the culvert and at the center of the proposed bridge span is estimated to be at EL. 569.70.

| Roadway Profile Raise | % Difference Compared to Option 1 |
|---|---|
| **Option 1: 3.64 feet Profile Raise** | |
| **Option 2: 3.64 feet Profile Raise** | 0% increase |
| **Option 3: 4.06 feet Profile Raise** | 14% increase |
| **Option 4: 4.77 feet Profile Raise** | 45% increase |
| **Option 5: 4.31 feet Profile Raise** | 24% increase |

Based on the roadway profile raise cost estimated comparison, Option 1 and Option 2 are the most economical.

The table below summarizes the associated retaining wall area of each bridge alternatives and roadway profile raise by percentage differences of cost compared with Option 1 based only on estimated exposed retaining wall area.

| Retaining Wall Area | % Difference Compared to Option 1 |
|---|---|
| **Option 1: 1336 SF** | |
| **Option 2: 1336 SF** | 0% increase |
| **Option 3: 1576 SF** | 18% increase |
| **Option 4: 2118 SF** | 59% increase |
| **Option 5: 1754 SF** | 31% increase |

Based on retaining wall cost estimated comparison, Option 1 and Option 2 are the most economical. The table below summarizes the overall alternatives by percentage differences of cost for each alternative compared with Option 1.

| Overall Alternatives | % Difference Compared to Option 1 |
|---|---|
| **Option 1: Single-Span with four-7DS23 Beams** | |
| **Option 2: Single-Span with six-5B20 Beams** | 2% increase |
| **Option 3: Single-Span with four-5XB20 Beams** | 8% increase |
| **Option 4: Single-Span with four-TX28 Beams** | 31% increase |
| **Option 5: Single-Span with four-W21x166 Beams** | 46% increase |

This comparison provides a summary of the overall cost for each option. Based on the above overall alternative cost estimated comparison, Option 1 is the most economical and provides an overall cost-saving.

*Horizontal Alignment 2*

A comparison of the estimated % difference in cost based on selective variable components of each alternatives to Option 2 of Horizontal Alignment 2 has been prepared for the bridge, roadway options, and retaining wall evaluated (refer to Appendix A for more details).

The table below summarizes the bridge alternatives by percentage differences of cost for each alternative compared with Option 2 based only on superstructure types.

| Bridge Alternatives | % Difference Compared to Option 2 |
|---|---|
| **Option 2: Single-Span with six-5B28 Beams** | |
| **Option 3: Single-Span with four-5XB28 Beams** | 14% increase |
| **Option 4: Single-Span with four-TX34 Beams** | 7% decrease |
| **Option 5: Single-Span with four-W27x235 Beams** | 176% increase |

Based on a bridge superstructure cost estimated comparison, Option 4 is the most economical. However, Option 4 roadway profile raise and retaining wall costs do not offset the cost enough from Option 2 roadway profile and retaining wall cost. Option 2 would be a more suitable alternative in this case.

The table below summarizes the associated roadway profile raise of each bridge alternatives by percentage differences of cost compared with Option 1 based only on roadway fill. Profile raise is measured from the top of the existing pavement at the culvert to the top of the proposed concrete bridge deck at the center of the proposed bridge span. The top of the existing pavement at the culvert and at the center of the proposed bridge span is estimated to be at EL. 569.70.

| Roadway Profile Raise | % Difference Compared to Option 2 |
|---|---|
| **Option 2: 4.31 feet Profile Raise** | |
| **Option 3: 4.75 feet Profile Raise** | 8% increase |
| **Option 4: 5.27 feet Profile Raise** | 21% increase |
| **Option 5: 4.82 feet Profile Raise** | 10% increase |

Based on the roadway profile raise cost estimated comparison, Option 2 is the most economical.
The table below summarizes the associated retaining wall area of each bridge alternatives and roadway profile raise by percentage differences of cost compared with Option 2, based only on estimated exposed retaining wall area.

| Retaining Wall Area | % Difference Compared to Option 2 |
|---|---|
| **Option 2: 1345 SF** | |
| **Option 3: 1469 SF** | 9% increase |
| **Option 4: 1684 SF** | 25% increase |
| **Option 5: 1500 SF** | 12% increase |

Based on retaining wall cost estimated comparison, Option 2 is the most economical.

The table below summarizes the overall alternatives by percentage differences of cost for each alternative compared with Option 2.

| Overall Alternatives | % Difference Compared to Option 2 |
|---|---|
| **Option 2: Single-Span with six-5B28 Beams** | |
| **Option 3: Single-Span with four-5XB28 Beams** | 8% increase |
| **Option 4: Single-Span with four-TX34 Beams** | 6% increase |
| **Option 5: Single-Span with four-W27x235 Beams** | 68% increase |

This comparison provides a summary of the overall cost for each option. Based on the above overall alternative cost estimated comparison, Option 2 is the most economical and provides an overall cost-saving.

*Horizontal Alignment 1 vs Horizontal Alignment 2*

The table below summarizes the overall horizontal alignment alternatives by percentage differences of cost for each alternative compared with Horizontal Alignment 2.

| Overall Horizontal Alignment Alternatives | % Difference Compared to Horizontal Alignment 2 |
|---|---|
| **Horizontal Alignment 1**<br>**Option 1: Single-Span with four-7DS23 Beams** | 15% decrease |
| **Horizontal Alignment 2**<br>**Option 2: Single-Span with six-5B28 Beams** | |

This comparison provides a summary of the overall cost for each horizontal alignment alternative. Based on the above overall horizontal alignment alternative cost estimated comparison, Horizontal Alignment 1 is the most economical. However, the advantages Horizontal Alignment 2 offers are worth the fraction increase.

***Recommendation***

The proposed bridge typical section provides one (1) 12'-0" traveling lanes in each direction and a 2'-0" wide shoulder on each side with a 0.02 ft/ft crown, and a bridge railing type T411. The proposed roadway typical section provides one concrete paved (1) 12'-0" traveling lanes in each direction and an unpaved 2'-0" wide shoulder on each side with a cross-slope of 0.02 ft/ft and 0.06 ft/ft, respectively.

Given the information here in presented, it is recommended that Stinson Road Culvert be replace with an 80'-0" single-span bridge on Horizontal Alignment 2 with a 4.31 ft vertical profile raise, utilizing Option 2: six (6) TxDOT Prestressed Concrete Box Beams (5B28) with a minimum 5" thick cast-in-place reinforced concrete deck, supported on twelve (12) 18”x18” driven concrete piles foundation or six (6) 30” diameter drilled shafts with a cast-in-place reinforced concrete abutment foundation. Retaining walls are recommended on the northeast and southeast of the bridge. It is also recommended that construction be completed by implementing a Complete Closure and Detour with southbound remaining open to local traffic only.

Horizontal Alignment 2 has a higher estimated cost by only 15%, see Appendix A for the Alternatives Cost Comparison. The increase is due to right-of-way acquisition and increased span length. A significant key advantage of the Horizontal Alignment 2 is that it offers added safety to the traveling to the public and residents along Stinson Road by encouraging reduced speed. It also makes phased construction feasible if the City should desire. Many advantages are realized by Horizontal Alignment 2 for a fractional increase in cost. Therefore, the recommended proposed alignment is Horizontal Alignment 2.

If Horizontal Alignment 2 is not feasible due to right-of-way acquisitions, then it is recommended that Stinson Road Culvert be replace with a 60'-0" single-span bridge on Horizontal Alignment 1 with a 3.64 ft vertical profile raise, utilizing Option 1: four (4) TxDOT Prestressed Concrete Decked Slab Beams (7DS23) with a minimum 2” thick concrete or asphalt overlay, which supports on ten (10) 18”x18” driven concrete piles foundation or six (6) 30” diameter drilled shafts with a cast-in-place reinforced concrete abutment foundation. Retaining walls are recommended on all four corners of the bridge.

# APPENDIX A:
# Alternative Cost Comparison Estimate / Calculations

# Horizontal Alignment 1 - Alternative Cost Comparison

**Stinson Bridge Roadway Improvements from Bristol Park to Bentwater Drive**

City of Lucas

| Horizontal Alignment 1 | | | | | |
|---|---|---|---|---|---|
| **Bridge Superstructure** | **Option 1** | **Option 2** | **Option 3** | **Option 4** | **Option 5** |
| **Beam Type** | **7DS23** | **5B20** | **5XB20** | **TX28** | **W21X166** |
| **BEAMS** | | | | | |
| beam length | 59.83 lf | 59.83 lf | 59.83 lf | 59.83 lf | 59.83 lf |
| no. beam | 4 | 6 | 4 | 4 | 4 |
| beam unit weight (steel option only) | | | | | 166 lb/lf |
| total beam length | 239.33 lf | 359.00 lf | 239.33 lf | 239.33 lf | 39729.33 lb |
| *unit cost ($/lf)* | *$430.00* | *$235.00* | *$270.00* | *$400.00* | *$5.00 /lb* |
| total cost | $102,913.33 | $84,365.00 | $64,620.00 | $95,733.33 | $198,646.67 |
| **DECK** | | | | | |
| deck/overlay width | 30.00 lf | 30.17 lf | 30.00 lf | 30.00 lf | 30.00 lf |
| deck/overlay length | 59.83 lf | 59.83 lf | 59.83 lf | 59.83 lf | 59.83 lf |
| deck thickness | | 5.0 in | 8.0 in | 8.5 in | 8.5 in |
| total deck volume | 199.44 sy | 27.85 cy | 44.32 cy | 47.09 cy | 47.09 cy |
| *unit cost ($/cy)* | *$125.00 / sy* | *$1,550.00* | *$1,550.00* | *$1,550.00* | *$1,550.00* |
| total cost | $24,930.56 | $43,174.49 | $68,697.53 | $72,991.13 | $72,991.13 |
| **BEARING PADS** | | | | | |
| total no. bearing pads | 8 ea | 12 ea | 8 ea | 8 ea | 8 ea |
| *unit cost ($/each)* | *$1,700.00* | *$1,700.00* | *$1,700.00* | *$1,700.00* | *$1,700.00* |
| total cost | $13,600.00 | $20,400.00 | $13,600.00 | $13,600.00 | $13,600.00 |
| | | | | | |
| **Overall bridge alternative cost *** | **$141,443.89** | **$147,939.49** | **$146,917.53** | **$182,324.46** | **$285,237.79** |
| **% difference Compared to Option 1** | **0%** | **5%** | **4%** | **29%** | **102%** |
| | | | | | |
| **Roadway Profile Fill** | **Option 1** | **Option 2** | **Option 3** | **Option 4** | **Option 5** |
| | | | | | |
| roadway profile fill area (elevation view) | 925 sf | 925 sf | 1050 sf | 1341 sf | 1145 sf |
| roadway profile fill width | 28 ft | 28 ft | 28 ft | 28 ft | 28 ft |
| roadway profile fill volume | 959.26 cy | 959.26 cy | 1088.89 cy | 1390.67 cy | 1187.41 cy |
| *unit cost ($/cy)* | *$25.00* | *$25.00* | *$25.00* | *$25.00* | *$25.00* |
| total cost | $23,981.48 | $23,981.48 | $27,222.22 | $34,766.67 | $29,685.19 |
| | | | | | |
| **Overall roadway alternative cost *** | **$23,981.48** | **$23,981.48** | **$27,222.22** | **$34,766.67** | **$29,685.19** |
| **% difference Compared to Option 1** | **0%** | **0%** | **14%** | **45%** | **24%** |
| | | | | | |
| **Retaining Wall** | **Option 1** | **Option 2** | **Option 3** | **Option 4** | **Option 5** |
| | | | | | |
| retaining wall area | 668 sf | 668 sf | 788 sf | 1059 sf | 877 sf |
| no. retaining walls | 2 | 2 | 2 | 2 | 2 |
| total retaining wall area | 1336 sf | 1336 sf | 1576 sf | 2118 sf | 1754 sf |
| *unit cost ($/sf)* | *$95.00* | *$95.00* | *$95.00* | *$95.00* | *$95.00* |
| total cost | $126,920.00 | $126,920.00 | $149,720.00 | $201,210.00 | $166,630.00 |
| | | | | | |
| **Overall retaining wall cost *** | **$126,920.00** | **$126,920.00** | **$149,720.00** | **$201,210.00** | **$166,630.00** |
| **% difference Compared to Option 1** | **0%** | **0%** | **18%** | **59%** | **31%** |
| | | | | | |
| **Right-Of-Way Cost** | **Option 1** | **Option 2** | **Option 3** | **Option 4** | **Option 5** |
| | | | | | |
| Total Property Area | 47518 sf | 47518 sf | 47518 sf | 47518 sf | 47518 sf |
| *unit cost ($/sf)* | *$2.30* | *$2.30* | *$2.30* | *$2.30* | *$2.30* |
| total cost | $109,086.32 | $109,086.32 | $109,086.32 | $109,086.32 | $109,086.32 |
| | | | | | |
| **Overall additional right-of-way cost *** | **$109,086.32** | **$109,086.32** | **$109,086.32** | **$109,086.32** | **$109,086.32** |

| **Easement Cost** | **Option 1** | **Option 2** | **Option 3** | **Option 4** | **Option 5** |
|---|---|---|---|---|---|
| | | | | | |
| Total Property Area | 25645 sf | 25645 sf | 25645 sf | 25645 sf | 25645 sf |
| *unit cost ($/sf)* | *$0.23* | *$0.23* | *$0.23* | *$0.23* | *$0.23* |
| total cost | $5,887.28 | $5,887.28 | $5,887.28 | $5,887.28 | $5,887.28 |
| | | | | | |
| **Overall additional easement cost *** | **$5,887.28** | **$5,887.28** | **$5,887.28** | **$5,887.28** | **$5,887.28** |

| | Horizontal Alignment 1 | | | | |
|---|---|---|---|---|---|
| | Option 1 | Option 2 | Option 3 | Option 4 | Option 5 |
| **OVERALL ALTERNATIVE COST **** | **$407,318.97** | **$413,814.57** | **$438,833.35** | **$533,274.73** | **$596,526.58** |
| **% difference Compared to Option 1** | **0%** | **2%** | **8%** | **31%** | **46%** |
| | **Recommendation** | | | | |

* Does not reflect all components, and only selective variable components were used for aiding alternative selection.

** Overall Alternative Cost does not reflect fully estimated construction cost, and is only used for aiding alternative selection.

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Date: June 3, 2020

# Horizontal Alignment 2 - Alternative Cost Comparison

**Stinson Bridge Roadway Improvements from Bristol Park to Bentwater Drive**

City of Lucas

**Horizontal Alignment 2**

| Bridge Superstructure | Option 1 | Option 2 | Option 3 | Option 4 | Option 5 |
|---|---|---|---|---|---|
| Beam Type | 7DS23 | 5B28 | 5XB28 | TX34 | W27X235 |
| **BEAMS** | | | | | |
| beam length | N/A | 79.83 lf | 79.83 lf | 79.83 lf | 79.83 lf |
| no. beam | | 6 | 4 | 4 | 4 |
| beam unit weight (steel option only) | | | | | 235 lb/lf |
| total beam length | | 479.00 lf | 319.33 lf | 319.33 lf | 75043.33 lb |
| *unit cost ($/lf)* | | *$205.00* | *$300.00* | *$165.00* | *$5.00 /lb* |
| total cost | N/A | $98,195.00 | $95,800.00 | $52,690.00 | $375,216.67 |
| **DECK** | | | | | |
| deck/overlay width | N/A | 30.17 lf | 30.00 lf | 30.00 lf | 30.00 lf |
| deck/overlay length | | 79.83 lf | 79.83 lf | 79.83 lf | 79.83 lf |
| deck thickness | | 5.0 in | 8.0 in | 8.5 in | 8.5 in |
| total deck volume | | 37.17 cy | 59.14 cy | 62.83 cy | 62.83 cy |
| *unit cost ($/cy)* | | *$1,550.00* | *$1,550.00* | *$1,550.00* | *$1,550.00* |
| total cost | N/A | $57,606.07 | $91,660.49 | $97,389.27 | $97,389.27 |
| **BEARING PADS** | | | | | |
| total no. bearing pads | N/A | 12 ea | 8 ea | 8 ea | 8 ea |
| *unit cost ($/each)* | | *$1,700.00* | *$1,700.00* | *$1,700.00* | *$1,700.00* |
| total cost | N/A | $20,400.00 | $13,600.00 | $13,600.00 | $13,600.00 |
| | | | | | |
| **Overall bridge alternative cost *** | **N/A** | **$176,201.07** | **$201,060.49** | **$163,679.27** | **$486,205.94** |
| **% difference Compared to Option 4** | | **0%** | **14%** | **-7%** | **176%** |

| Roadway Profile Fill | Option 1 | Option 2 | Option 3 | Option 4 | Option 5 |
|---|---|---|---|---|---|
| | N/A | | | | |
| roadway profile fill area (elevation view) | | 1713 sf | 1844 sf | 2070 sf | 1876 sf |
| roadway profile fill width | | 28 ft | 28 ft | 28 ft | 28 ft |
| roadway profile fill volume | | 1776.44 cy | 1912.30 cy | 2146.67 cy | 1945.48 cy |
| *unit cost ($/cy)* | | *$25.00* | *$25.00* | *$25.00* | *$25.00* |
| total cost | N/A | $44,411.11 | $47,807.41 | $53,666.67 | $48,637.04 |
| | | | | | |
| **Overall roadway alternative cost *** | **N/A** | **$44,411.11** | **$47,807.41** | **$53,666.67** | **$48,637.04** |
| **% difference Compared to Option 4** | | **0%** | **8%** | **21%** | **10%** |

| Retaining Wall | Option 1 | Option 2 | Option 3 | Option 4 | Option 5 |
|---|---|---|---|---|---|
| | N/A | | | | |
| retaining wall area | | 1345 sf | 1469 sf | 1684 sf | 1500 sf |
| no. retaining walls | | 1 | 1 | 1 | 1 |
| total retaining wall area | | 1345 sf | 1469 sf | 1684 sf | 1500 sf |
| *unit cost ($/sf)* | | *$95.00* | *$95.00* | *$95.00* | *$95.00* |
| total cost | N/A | $127,775.00 | $139,555.00 | $159,980.00 | $142,500.00 |
| | | | | | |
| **Overall retaining wall cost *** | **N/A** | **$127,775.00** | **$139,555.00** | **$159,980.00** | **$142,500.00** |
| **% difference Compared to Option 4** | | **0%** | **9%** | **25%** | **12%** |

| Right-Of-Way Cost | Option 1 | Option 2 | Option 3 | Option 4 | Option 5 |
|---|---|---|---|---|---|
| | | 55240 sf | 55240 sf | 55240 sf | 55240 sf |
| Total Property Area | | *$2.30* | *$2.30* | *$2.30* | *$2.30* |
| *unit cost ($/sf)* | | $126,813.59 | $126,813.59 | $126,813.59 | $126,813.59 |
| total cost | N/A | | | | |
| | | | | | |
| **Overall additional right-of-way cost *** | **N/A** | **$126,813.59** | **$126,813.59** | **$126,813.59** | **$126,813.59** |

| Easement Cost | Option 1 | Option 2 | Option 3 | Option 4 | Option 5 |
|---|---|---|---|---|---|
| | | 28440 sf | 28440 sf | 28440 sf | 28440 sf |
| Total Property Area | | *$0.23* | *$0.23* | *$0.23* | *$0.23* |
| *unit cost ($/sf)* | | $6,528.93 | $6,528.93 | $6,528.93 | $6,528.93 |
| total cost | N/A | | | | |
| | | | | | |
| **Overall additional easement cost *** | **N/A** | **$6,528.93** | **$6,528.93** | **$6,528.93** | **$6,528.93** |

| | Horizontal Alignment 2 | | | | |
|---|---|---|---|---|---|
| | Option 1 | Option 2 | Option 3 | Option 4 | Option 5 |
| **OVERALL ALTERNATIVE COST **** | **N/A** | **$481,729.70** | **$521,765.42** | **$510,668.46** | **$810,685.49** |
| **% difference Compared to Option 4** | | **0%** | **8%** | **6%** | **68%** |
| | | **Recommendation** | | | |

* Does not reflect all components, and only selective variable components were used for aiding alternative selection.

** Overall Alternative Cost does not reflect fully estimated construction cost, and is only used for aiding alternative selection.

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Date: June 3, 2020

# Horizontal Alignment 1 VS Horizontal Alignment 2
## Alternative Cost Comparison
### Stinson Bridge Roadway Improvements from Bristol Park to Bentwater Drive
City of Lucas

| | Horizontal Alignment 1 | Horizontal Alignment 2 |
|---|---|---|
| **Bridge Superstructure** | **Option 1** | **Option 2** |
| **Beam Type** | **7DS23** | **5B28** |
| **BEAMS** | | |
| beam length | 59.83 lf | 79.83 lf |
| no. beam | 4 | 6 |
| beam unit weight (steel option only) | | |
| total beam length | 239.33 lf | 479.00 lf |
| *unit cost ($/lf)* | *$430.00* | *$205.00* |
| total cost | $102,913.33 | $98,195.00 |
| **DECK** | | |
| deck/overlay width | 30.00 lf | 30.17 lf |
| deck/overlay length | 59.83 lf | 79.83 lf |
| deck thickness | | 5.0 in |
| total deck volume | 199.44 sy | 37.17 cy |
| *unit cost ($/cy)* | *$125.00 / sy* | *$1,550.00* |
| total cost | $24,930.56 | $57,606.07 |
| **BEARING PADS** | | |
| total no. bearing pads | 8 ea | 12 ea |
| *unit cost ($/each)* | *$1,700.00* | *$1,700.00* |
| total cost | $13,600.00 | $20,400.00 |
| | | |
| **Overall bridge alternative cost *** | **$141,443.89** | **$176,201.07** |
| **% difference Compared to Horizontal Alignment 2 - Option 2** | **-20%** | **0%** |
| | | |
| **Roadway Profile Fill** | **Option 1** | **Option 2** |
| | | |
| roadway profile fill area (elevation view) | 925 sf | 1713 sf |
| roadway profile fill width | 28 ft | 28 ft |
| roadway profile fill volume | 959.26 cy | 1776.44 cy |
| *unit cost ($/cy)* | *$25.00* | *$25.00* |
| total cost | $23,981.48 | $44,411.11 |
| | | |
| **Overall roadway alternative cost *** | **$23,981.48** | **$44,411.11** |
| **% difference Compared to Horizontal Alignment 2 - Option 2** | **-46%** | **0%** |
| | | |
| **Retaining Wall** | **Option 1** | **Option 2** |
| | | |
| retaining wall area | 668 sf | 1345 sf |
| no. retaining walls | 2 sf | 1 sf |
| total retaining wall area | 1336 sf | 1345 sf |
| *unit cost ($/sf)* | *$95.00* | *$95.00* |
| total cost | $126,920.00 | $127,775.00 |
| | | |
| **Overall retaining wall cost *** | **$126,920.00** | **$127,775.00** |
| **% difference Compared to Horizontal Alignment 2 - Option 2** | **-1%** | **0%** |
| | | |
| **Right-Of-Way Cost** | **Option 1** | **Option 2** |
| | | |
| Total Property Area | 47518 sf | 55240 sf |
| *unit cost ($/sf)* | *$2.30* | *$2.30* |
| total cost | $109,086.32 | $126,813.59 |
| | | |
| **Overall additional right-of-way cost *** | **$109,086.32** | **$126,813.59** |
| **% difference Compared to Horizontal Alignment 2 - Option 2** | **-14%** | **0%** |
| | | |
| **Easement Cost** | **Option 1** | **Option 2** |
| | | |
| Total Property Area | 25645 sf | 28440 sf |
| *unit cost ($/sf)* | *$0.23* | *$0.23* |
| total cost | $5,887.28 | $6,528.93 |
| | | |
| **Overall additional easement cost *** | **$5,887.28** | **$6,528.93** |
| **% difference Compared to Horizontal Alignment 2 - Option 2** | **-10%** | **0%** |

| | Horizontal Alignment 1 Option 1 | Horizontal Alignment 2 Option 2 |
|---|---|---|
| **OVERALL ALTERNATIVE COST **** | **$407,318.97** | **$481,729.70** |
| **% difference Compared to Horizontal Alignment 2 - Option 2** | **-15%** | **0%** |
| | | **Recommendation** |

* Does not reflect all components, and only selective variable components were used for aiding alternative selection.
** Overall Alternative Cost does not reflect fully estimated construction cost, and is only used for aiding alternative selection.

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Date: June 3, 2020

**Average Low Bid Unit Prices Based on Apr-2020** Link

| ITEM CODE | ITEM DESCRIPTION | ITEM UNIT | STATEWIDE 3M COUNT | STATEWIDE 3M QUANTITY | STATEWIDE 3M AVG | STATEWIDE 12M COUNT | STATEWIDE 12M QUANTITY | STATEWIDE 12M AVG | USE |
|---|---|---|---|---|---|---|---|---|---|
| 01326001 | EMBANKMENT (FINAL)(ORD COMP)(TY A) | CY | 3 | 984.00 | $21.80 | 24 | 52,683.00 | $16.08 | $25.00 |
| 04206014 | CL C CONC (ABUT)(HPC) | CY | 4 | 489.37 | $1,852.55 | 19 | 2,384.67 | $1,540.16 | $1,550.00 |
| 04236008 | RETAINING WALL (CAST - IN - PLACE) | SF | 2 | 723.00 | $51.67 | 16 | 40,607.00 | $94.99 | $95.00 |
| 04256016 | PRESTR CONC DECK SLAB BEAM (6DS23) | LF | | | | 1 | 220.00 | $330.00 | $430.00 |
| 04256002 | PRESTR CONC BOX BEAM (5B20) | LF | 1 | 69.50 | $233.47 | 14 | 6,872.70 | $187.57 | $235.00 |
| 04256004 | PRESTR CONC BOX BEAM (5B28) | LF | | | | 2 | 2,086.32 | $201.79 | $205.00 |
| 04256020 | PRESTR CONC BOX BEAM (5XB20) | LF | | | | 1 | 387.00 | $265.00 | $270.00 |
| 04256062 | PRESTR CONC BOX BM(5XB28)(MOD1) | LF | | | | 1 | 796.24 | $270.00 | $300.00 |
| 04256024 | PRESTR CONC BOX BEAM (5XB34) | LF | | | | 1 | 1,074.00 | $371.50 | $375.00 |
| 04256035 | PRESTR CONC GIRDER (TX28) | LF | 5 | 12,676.99 | $435.44 | 35 | 69,698.12 | $195.30 | $400.00 |
| 04256036 | PRESTR CONC GIRDER (TX34) | LF | 2 | 793.90 | $162.24 | 19 | 38,538.46 | $139.98 | $165.00 |
| 04346024 | ELASTOMERIC BEARING (E5) | EA | 1 | 8.00 | $1,650.00 | 3 | 15.00 | $1,474.01 | $1,700.00 |
| 04396002 | CONCRETE OVERLAY (2 IN) | SY | 1 | 14,051.00 | $102.00 | 3 | 19,666.50 | $99.18 | $125.00 |
| 04426004 | STR STEEL (ROLLED BEAM) | LB | | | | 1 | 54,042.00 | $10.00 | $5.00 |

Notes:

Item "EMBANKMENT (FINAL)(ORD COMP)(TY A)" was used as "fill" for Roadway profile raise, similar to recently reconstructed project south of project limits.

Item "CL C CONC (ABUT)(HPC)" was used as "deck" - Class S, similar to a nearby project on Blondy Jhune.

Item "PRESTR CONC DECK SLAB BEAM (6DS23)" was from Nov-2019 average low bid unit prices and was used as "7DS23" with a mark up.

Item "PRESTR CONC BOX BEAM (5B20)" average low bid unit prices was from Feb and Mar 2020 with a mark up.

Item "PRESTR CONC BOX BM(5XB28)(MOD1") was used as "5XB28" with a mark up.

Item "ELASTOMERIC BEARING (E5)" was "assumed" use for superstructure types.

Item "CONCRETE OVERLAY (2 IN)" was used as "overlay" for deck slab beams.

## Horizontal Alighment 1 - ROW Take

| Property I.D. | Property Address | Owner(s) | Estimated Land Value /SF | Estimated ROW Take | ROW Take Cost |
|---|---|---|---|---|---|
| 1 | 805 Bristol Pk | Christopher & Heather Blair | $2.30 / SF | 213 SF | $488.98 |
| 2 | Stinson Rd | Lee G. & Betty A. Bauer | $2.30 / SF | 7,635 SF | $17,527.55 |
| 3 | 1190 Stinson Rd | Jennie Ball | $2.30 / SF | 823 SF | $1,889.35 |
| 4 | 1180 Stinson Rd | Francisco & Angel Lopez | $2.30 / SF | 0 SF | $0.00 |
| 5 | 901 Parchman Pl | Manoj & Beena Pappen | $2.30 / SF | 0 SF | $0.00 |
| 6 | 891 Parchman Pl | Laer Trams Co., LLC | $2.30 / SF | 0 SF | $0.00 |
| 7 | 871 Parchman Pl | Laer Trams Co., LLC | $2.30 / SF | 0 SF | $0.00 |
| 8 | 851 Parchman Pl | Brad J. & Marybeth G. Wilkerson | $2.30 / SF | 0 SF | $0.00 |
| 9 | 821 Parchman Pl | Our Country Homes, INC. | $2.30 / SF | 0 SF | $0.00 |
| 10 | 800 Bentwater Dr | Our Country Homes, INC. | $2.30 / SF | 0 SF | $0.00 |
| 11 | 1015 Stinson Rd | HDT Homes, LLC | $2.30 / SF | 0 SF | $0.00 |
| 12 | 1045 Stinson Rd | Shawn N. & Laura K. Warren | $2.30 / SF | 0 SF | $0.00 |
| 13 | 1095 Stinson Rd | Joe S. & Peggy S. Athey | $2.30 / SF | 0 SF | $0.00 |
| 14 | 1111 Stinson Rd | James & Ann Ellis | $2.30 / SF | 7,940 SF | $18,227.73 |
| 15 | 1155 Stinson Rd | Venita Ellis | $2.30 / SF | 8,236 SF | $18,907.25 |
| 16 | 1177 Stinson Rd | Roger A. & Janis H. Steven | $2.30 / SF | 10,187 SF | $23,386.13 |
| 17 | 1325 Stinson Rd | Richard G. & Renee M. Phillips | $2.30 / SF | 9,865 SF | $22,646.92 |
| 18 | 1415 Stinson Rd | Stinson 1415, LLC | $2.30 / SF | 2,619 SF | $6,012.40 |
| | | | | **47,518 SF** | |
| | | | | **Total Cost** | **$109,086.32** |

Note:
Right-of-way acquistion area was estimated based on commonly used prescriptive 25 ft right-of-way offset from the centerline. Cost of land in Lucas was provided by City of Lucas to be $100,000.00 per an acre or $2.30 per a square foot.

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Date: June 3, 2020

## Horizontal Alighment 1 - Easement Take

| Property I.D. | Property Address | Owner(s) | Estimated Land Value /SF | Estimated ESMT Take | ESMT Take Cost |
|---|---|---|---|---|---|
| 1 | 805 Bristol Pk | Christopher & Heather Blair | $0.23 / SF | 304 SF | $69.79 |
| 2 | Stinson Rd | Lee G. & Betty A. Bauer | $0.23 / SF | 0 SF | $0.00 |
| 3 | 1190 Stinson Rd | Jennie Ball | $0.23 / SF | 0 SF | $0.00 |
| 4 | 1180 Stinson Rd | Francisco & Angel Lopez | $0.23 / SF | 0 SF | $0.00 |
| 5 | 901 Parchman Pl | Manoj & Beena Pappen | $0.23 / SF | 0 SF | $0.00 |
| 6 | 891 Parchman Pl | Laer Trams Co., LLC | $0.23 / SF | 0 SF | $0.00 |
| 7 | 871 Parchman Pl | Laer Trams Co., LLC | $0.23 / SF | 0 SF | $0.00 |
| 8 | 851 Parchman Pl | Brad J. & Marybeth G. Wilkerson | $0.23 / SF | 0 SF | $0.00 |
| 9 | 821 Parchman Pl | Our Country Homes, INC. | $0.23 / SF | 0 SF | $0.00 |
| 10 | 800 Bentwater Dr | Our Country Homes, INC. | $0.23 / SF | 0 SF | $0.00 |
| 11 | 1015 Stinson Rd | HDT Homes, LLC | $0.23 / SF | 1,123 SF | $257.81 |
| 12 | 1045 Stinson Rd | Shawn N. & Laura K. Warren | $0.23 / SF | 1,000 SF | $229.57 |
| 13 | 1095 Stinson Rd | Joe S. & Peggy S. Athey | $0.23 / SF | 2,362 SF | $542.24 |
| 14 | 1111 Stinson Rd | James & Ann Ellis | $0.23 / SF | 6,378 SF | $1,464.19 |
| 15 | 1155 Stinson Rd | Venita Ellis | $0.23 / SF | 6,560 SF | $1,505.97 |
| 16 | 1177 Stinson Rd | Roger A. & Janis H. Steven | $0.23 / SF | 7,504 SF | $1,722.68 |
| 17 | 1325 Stinson Rd | Richard G. & Renee M. Phillips | $0.23 / SF | 305 SF | $70.02 |
| 18 | 1415 Stinson Rd | Stinson 1415, LLC | $0.23 / SF | 109 SF | $25.02 |
| | | | | **25,645 SF** | |
| | | | | **Total Cost** | **$5,887.28** |

Note:
Easement acquistion area was estimated based on matching existing 20 ft water/utility easement in vecinity properties.
Cost of Easement in Lucas was provided by City of Lucas to be $10,000.00 per an acre = or $0.23 per a square foot.

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Date: June 3, 2020

## Horizontal Alighment 2 - ROW Take

| Property I.D. | Property Address | Owner(s) | Estimated Land Value /SF | Estimated ROW Take | ROW Take Cost |
|---|---|---|---|---|---|
| 1 | 805 Bristol Pk | Christopher & Heather Blair | $2.30 / SF | 213 SF | $488.98 |
| 2 | Stinson Rd | Lee G. & Betty A. Bauer | $2.30 / SF | 3,631 SF | $8,335.63 |
| 3 | 1190 Stinson Rd | Jennie Ball | $2.30 / SF | 0 SF | $0.00 |
| 4 | 1180 Stinson Rd | Francisco & Angel Lopez | $2.30 / SF | 0 SF | $0.00 |
| 5 | 901 Parchman Pl | Manoj & Beena Pappen | $2.30 / SF | 0 SF | $0.00 |
| 6 | 891 Parchman Pl | Laer Trams Co., LLC | $2.30 / SF | 0 SF | $0.00 |
| 7 | 871 Parchman Pl | Laer Trams Co., LLC | $2.30 / SF | 0 SF | $0.00 |
| 8 | 851 Parchman Pl | Brad J. & Marybeth G. Wilkerson | $2.30 / SF | 0 SF | $0.00 |
| 9 | 821 Parchman Pl | Our Country Homes, INC. | $2.30 / SF | 0 SF | $0.00 |
| 10 | 800 Bentwater Dr | Our Country Homes, INC. | $2.30 / SF | 0 SF | $0.00 |
| 11 | 1015 Stinson Rd | HDT Homes, LLC | $2.30 / SF | 0 SF | $0.00 |
| 12 | 1045 Stinson Rd | Shawn N. & Laura K. Warren | $2.30 / SF | 0 SF | $0.00 |
| 13 | 1095 Stinson Rd | Joe S. & Peggy S. Athey | $2.30 / SF | 0 SF | $0.00 |
| 14 | 1111 Stinson Rd | James & Ann Ellis | $2.30 / SF | 7,940 SF | $18,227.73 |
| 15 | 1155 Stinson Rd | Venita Ellis | $2.30 / SF | 8,739 SF | $20,061.98 |
| 16 | 1177 Stinson Rd | Roger A. & Janis H. Steven | $2.30 / SF | 19,315 SF | $44,341.14 |
| 17 | 1325 Stinson Rd | Richard G. & Renee M. Phillips | $2.30 / SF | 12,783 SF | $29,345.73 |
| 18 | 1415 Stinson Rd | Stinson 1415, LLC | $2.30 / SF | 2,619 SF | $6,012.40 |
| | | | | **55,240 SF** | |
| | | | | **Total Cost** | **$126,813.59** |

Note:
Right-of-way acquistion area was estimated based on commonly used prescriptive 25 ft right-of-way offset from the centerline. Cost of land in Lucas was provided by City of Lucas to be $100,000.00 per an acre or $2.30 per a square foot.

LAKES ENGINEERING bcc
A BCC Engineering Company

Date: June 3, 2020

## Horizontal Alighment 2 - Easement Take

| Property I.D. | Property Address | Owner(s) | Estimated Land Value /SF | Estimated ESMT Take | ESMT Take Cost |
|---|---|---|---|---|---|
| 1 | 805 Bristol Pk | Christopher & Heather Blair | $0.23 / SF | 304 SF | $69.79 |
| 2 | Stinson Rd | Lee G. & Betty A. Bauer | $0.23 / SF | 0 SF | $0.00 |
| 3 | 1190 Stinson Rd | Jennie Ball | $0.23 / SF | 0 SF | $0.00 |
| 4 | 1180 Stinson Rd | Francisco & Angel Lopez | $0.23 / SF | 0 SF | $0.00 |
| 5 | 901 Parchman Pl | Manoj & Beena Pappen | $0.23 / SF | 0 SF | $0.00 |
| 6 | 891 Parchman Pl | Laer Trams Co., LLC | $0.23 / SF | 0 SF | $0.00 |
| 7 | 871 Parchman Pl | Laer Trams Co., LLC | $0.23 / SF | 0 SF | $0.00 |
| 8 | 851 Parchman Pl | Brad J. & Marybeth G. Wilkerson | $0.23 / SF | 0 SF | $0.00 |
| 9 | 821 Parchman Pl | Our Country Homes, INC. | $0.23 / SF | 0 SF | $0.00 |
| 10 | 800 Bentwater Dr | Our Country Homes, INC. | $0.23 / SF | 0 SF | $0.00 |
| 11 | 1015 Stinson Rd | HDT Homes, LLC | $0.23 / SF | 1,123 SF | $257.81 |
| 12 | 1045 Stinson Rd | Shawn N. & Laura K. Warren | $0.23 / SF | 1,000 SF | $229.57 |
| 13 | 1095 Stinson Rd | Joe S. & Peggy S. Athey | $0.23 / SF | 2,362 SF | $542.24 |
| 14 | 1111 Stinson Rd | James & Ann Ellis | $0.23 / SF | 6,378 SF | $1,464.19 |
| 15 | 1155 Stinson Rd | Venita Ellis | $0.23 / SF | 6,581 SF | $1,510.79 |
| 16 | 1177 Stinson Rd | Roger A. & Janis H. Steven | $0.23 / SF | 7,512 SF | $1,724.52 |
| 17 | 1325 Stinson Rd | Richard G. & Renee M. Phillips | $0.23 / SF | 3,071 SF | $705.00 |
| 18 | 1415 Stinson Rd | Stinson 1415, LLC | $0.23 / SF | 109 SF | $25.02 |
| | | | | **28,440 SF** | |
| | | | | **Total Cost** | **$6,528.93** |

Note:
Easement acquistion area was estimated based on matching existing 20 ft water/utility easement in vecinity properties.
Cost of Easement in Lucas was provided by City of Lucas to be $10,000.00 per an acre = or $0.23 per a square foot.

LAKES ENGINEERING bcc
A BCC Engineering Company

Date: June 3, 2020

# APPENDIX B:
# Existing Culvert Inspection Report (Lakes Engineering, Inc. F-15243)

# BRIDGE SUMMARY SHEET

City: Lucas County: Collin Name: Structure #: Route: Stinson Road

Description: Double Barrel Pipe Culvert

Feature Crossed: Muddy Creek Inspector's Signature: Date: 6/26/19

Company Name and Company Number: Lakes Engineering, Inc. F-15243

## Selected Component Description and Rating:

| | Inspection Rating (1085) | Inventory Rating H | Inventory Rating HS | Operating Rating H | Operating Rating HS |
|---|---|---|---|---|---|
| Double Barrel Steel Pipe Culvert | 5 | | | | |
| | | | | | |
| | | | | | |
| | | | | | |

## Comments and/or Upgrade Recommendations (if applicable):

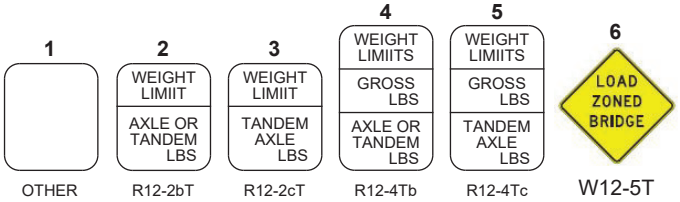
Loss of backfill at culvert pipe 2 should be investigated and repairs scheduled.

Structurally deficient. Functionally obsolete

Sufficiency Rating = 63

## Load Posting Limits for Present Condition (if applicable):

| Inventory | | Operating | |
|---|---|---|---|
| | lbs Gross | | lbs Gross |
| | lbs Tandem Axle | | lbs Tandem Axle |
| | lbs Axle or Tandem | | lbs Axle or Tandem |
| | Sign Code | | Sign Code |




## Posting Recommendation:

## Previous Load Posting Recommendations:

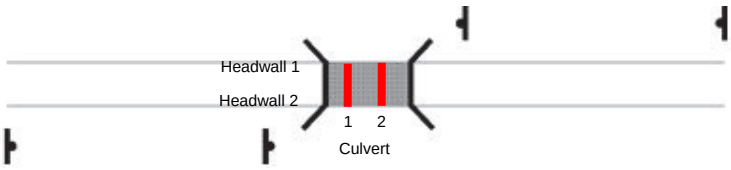
| | | | |
|---|---|---|---|
| | R12-2bT | X | None |
| | R12-2cT | | lbs Gross |
| | R12-4Tb | | lbs Tandem Axle |
| | R12-4Tc | | lbs Axle or Tandem |

## Observed Load Posting at Bridge:

| | | | |
|---|---|---|---|
| | R12-2bT | X | None |
| | R12-2cT | | lbs Gross |
| | R12-4Tb | | lbs Tandem Axle |
| | R12-4Tc | | lbs Axle or Tandem |
| | Other (desc): | | |

## Material Needed

- R12-2bT
- R12-2cT
- R12-4Tb
- R12-4Tc
- W12-5
- Posts
- Hardware Sets
- Decals


| | Advanced Warning (optional) | | Bridge Approach | Bridge Approach | Advanced Warning (optional) | |
|---|---|---|---|---|---|---|
| Sign Code | | | | | | |
| Condition Code | | | | | | |
| Maintenance Need | | | | | | |

A. Visible & Legible
B. Obscured by Vegetation
C. Sign Needs Cleaning
D. Improper Position
E. Damaged Beyond Repair
F. Sign Down
G. Sign Missing
H. Sign & Post Missing
J. Clear Vegetation
K. Clean Sign
L. Reposition Sign
M. Reposition Sign & Post
N. None
P. Replace Sign
S. Replace Sign & Post

# BRIDGE INSPECTION RECORD

City: Lucas County: Collin Name: _____ Structure #: _____ Route: Stinson Road

Description: Double Barrel Steel Pipe Culvert

Feature Crossed: Muddy Creek Inspector's Signature: _____ Date: 6/26/2019

Company Name and Company Number: Lakes Engineering, Inc. F-15243 Inspector: Christopher Meszler, P.E.

**Ratings Defined:**

0 = Failed condition - bridge closed and beyond repair
1 = Failing condition - bridge closed but repairable
2 = Critical condition - bridge should be closed until repaired
3 = Serious condition - deterioration seriously affects structural capacity
4 = Poor condition - deterioration significantly affects structural capacity
5 = Fair condition - minor deterioration of structural elements (extensive)
6 = Satisfactory condition - minor deterioration of structural elements (limited)
7 = Good condition - some minor problems
8 = Very good condition - no problems noted
9 = Excellent condition
- = Not applicable

STATE OF TEXAS
CHRISTOPHER P. MESZLER
112052
LICENSED
PROFESSIONAL ENGINEER
08-01-□01□

Enter a rating for each element of each component. Component ratings should equal the lowest rating of any element of the component, except for Deck. The Deck component is independent of its' associated element ratings. Fully supportive comments are to be made hereon or on attachments for all ratings of 7 or below.

General Comment:

Sufficiency Rating = 63
Structurally deficient: waterway adequacy rating (2). Functionally obsolete: waterway adequacy (2) & deck Geometry (3)

## DECK (Item 58)

| Minimum | Description | Rating | Comments |
|---|---|---|---|
| 1 | Deck - Rating | N | Elements are referred to and numbered: south (begin) to north (end) and west to east. |
| 6 | Wearing Surface | 6 | |
| 6 | Joints, Expansion, Open | - | |
| 6 | Joints, Expansion, Sealed | - | Photo 4: Lt lane, marginal longitudinal cracking (Typ.) |
| 6 | Joints, Other | - | |
| 6 | Drainage System | - | Photo 5: Rt lane, substantial longitudinal cracking (Typ.) |
| 6 | Curbs, Sidewalks & Parapets | - | |
| 6 | Median Barrier | - | Photo 6: Asphalt pavement edge failure all 4 corners (Typ.) |
| 6 | Railings | - | |
| 7 | Railing Protective Coating | - | Photo 7: Substantial failure northwest pavement edge (12") |
| 7 | Delineation (curve Markers) | - | |
| | Other | - | See additional comments. |

## SUPERSTRUCTURE (Item 59)

| Minimum | Description | Rating | Comments |
|---|---|---|---|
| 0 | Main Members - Steel | | |
| 0 | Main Members - Concrete | | |
| 0 | Main Members - Timber | | |
| 0 | Main Members - Connections | | |
| 1 | Floor System Members | | |
| 1 | Floor System Connections | | |
| 5 | Secondary Members | | |
| 5 | Secondary Members Connections | | |
| 6 | Expansion Bearings | | |
| 6 | Fixed Bearings | | |
| 6 | Steel Protective Coating | | |
| | Other | | |
| | Component Rating | N | |

# BRIDGE INSPECTION RECORD

City: Lucas County: Collin Name: _____ Structure #: _____ Route: Stinson Road

## SUBSTRUCTURE (Item 60)

| Minimum | Description | Rating | Comments |
|---|---|---|---|
| 0 | Abutment Caps | | |
| 0 | Above Ground | | |
| 0 | Below Ground or Foundation | | |
| 0 | Backwalls and Wingwalls | | |
| 0 | Intermediate Supports | | |
| | Caps - Concrete | | |
| | Caps - Steel | | |
| | Caps - Timber | | |
| | Above Ground - Concrete | | |
| | Above Ground - Steel | | |
| | Above Ground - Timber | | |
| | Above Ground - Masonry | | |
| | Below Ground or Foundation | | |
| 5 | Collision Protection System | | |
| 6 | Steel Protective Coating | | |
| | Component Rating | N | |

## CHANNEL (Item 61)

| Minimum | Description | Rating | Comments |
|---|---|---|---|
| 0 | Channel Banks | 6 | |
| 0 | Channel Bed | 6 | |
| 5 | Rip Rap, Toe Walls and Aprons | N | |
| 5 | Dikes | N | |
| 5 | Jetties | N | |
| | Other | | |
| | Component Rating | 6 | |
| | | | |
| | | | |
| | | | |

## CULVERTS (Item 62)

| Minimum | Description | Rating | Comments |
|---|---|---|---|
| 0 | Top Slabs | - | Photo 9: Thickness along Headwall 1 Varies (6-8") |
| 0 | Bottom Slab or Footing | 7 | |
| 0 | Abutments & Intermediate Supports | - | Photo 10: 10" x 4" x 1" Spall Midspan Headwall 1 |
| 5 | Headwalls and Wingwalls | 6 | |
| | Other | 5 | Photo 11: 0.025□crack midspan headwall 1, full depth. crack continues approx. 7.5□down headwall |
| | Component Rating | 5 | |
| | | | |
| | | | See additional comments. |
| | | | |

# BRIDGE INSPECTION RECORD

City: Lucas County: Collin Name: _____ Structure #: _____ Route: Stinson Road

## APPROACHES

| Minimum | Description | Rating | Comments |
|---|---|---|---|
| 0 | Embankments | 6 | Photo 29: 6" drop off within 1' of EOP (currently under construction) |
| 4 | Embankment Retaining Walls | N | |
| 5 | Slope Protection | N | |
| 5 | Roadway | 5 | |
| 6 | Relief Joints | N | |
| 6 | Drainage | N | |
| 6 | Guardfence | N | |
| 7 | Delineation | N | |
| 7 | Sight Distance | 8 | |
| | Other | | |
| | Component Rating | 5 | |

## MISCELLANEOUS

| Minimum | Description | Rating | Comments |
|---|---|---|---|
| 7 | Signs | | |
| 7 | Illumination | | |
| 7 | Warning Devices | | |
| 7 | Utility Lines | | |
| | Other - Gates | 8 | |
| | | | |
| | | | |
| | | | |

## TRAFFIC SAFETY (Item 36)

| | Description | Rating | Comments |
|---|---|---|---|
| | Bridge Railing (036.1) | 0 | Guardrail and Bridge railing not present |
| | Transitions (036.2) | 0 | |
| | Approach Guardrail (036.3) | 0 | |
| | Approach Guardrail Ends (036.4) | 0 | |
| | | | |
| | | | |
| | | | |

## APPRAISAL RATINGS

| | Description | Rating | Comments |
|---|---|---|---|
| | Waterway Adequacy (071) | 2 | Frequent overtopping with significant traffic delays (major collector) |
| | Approach Roadway Alignment (072) | 8 | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |

# BRIDGE INSPECTION RECORD
# ADDITIONAL COMMENTS

**DECK (Item 58)**

| [illegible] | [illegible] |
|---|---|
| 1[illegible] | [illegible] |
| [illegible] | 6’ drop off 1’ off the road (currently under construction) |

**CULVERTS (Item 62)**

| [illegible] | [illegible] |
|---|---|
| 1[illegible] | [illegible] |
| 1[illegible] | 16” x 5” x 1.5” spall and 36” x 0.05” crack near culvert 1 [illegible] |
| 1[illegible] | [illegible] |
| 1[illegible] | [illegible] |
| 1[illegible] | Crack and 8” x 5” x 2.5” Spall [illegible] |
| 18[illegible] | [illegible] |
| 1[illegible] | 3” x 0.50” cr[illegible] |
| [illegible]1[illegible] | [illegible] |
| [illegible] | 5’ horizontal crack at headwall 2, culvert 1[illegible] |
| [illegible] | 19” x 1/8”[illegible] |
| [illegible] | [illegible] |
| [illegible] | [illegible] |
| [illegible] | [illegible] |
| [illegible] | [illegible] |
| [illegible] | [illegible] |
| [illegible]8[illegible] | [illegible] |

# BRIDGE INSPECTION RECORD
## Photos

City: Lucas County: Collin Name: Stinson Road Bridge Structure #: 004 Route: Stinson Road

01: Elevation – West View

# BRIDGE INSPECTION RECORD
## Photos

City: Lucas County: Collin Name: Stinson Road Bridge Structure #: 004 Route: Stinson Road

02: Approach – Southbound

# BRIDGE INSPECTION RECORD
## Photos

City: Lucas County: Collin Name: Stinson Road Bridge Structure #: 004 Route: Stinson Road

03: Approach – Northbound

# BRIDGE INSPECTION RECORD
## Photos

City: Lucas County: Collin Name: Stinson Road Bridge Structure #: 004 Route: Stinson Road

04: Top of Deck – North View

Left lane with Marginal longitudinal cracking (Typ.).

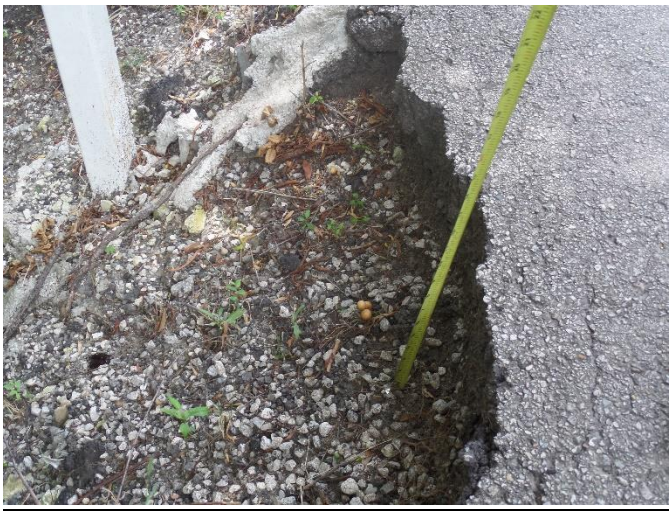
05: Top of Deck – North View

Right Lane substantial longitudinal cracking.

06: Top of Deck – Southwest Corner Pavement failure

Asphalt Pavement edge failure in all four corners (Typ.)

07: Top of Deck – Northwest Corner Pavement failure



Substantial pavement failure (12”)

# BRIDGE INSPECTION RECORD
## Photos

City: Lucas County: Collin Name: Stinson Road Bridge Structure #: 004 Route: Stinson Road

08: Headwall 1 – North View

Typical - no deficiencies noted.

9: Headwall 1 – Top View

Headwall thickness varies from 6” to 8”

10: Headwall 1 – Top View

10” x 4” x 1” Spall midspan

11: Headwall 1

0.025” crack midspan headwall 1, full depth. crack continues approx. 7.5' down headwall

# BRIDGE INSPECTION RECORD
## Photos

City: Lucas County: Collin Name: Stinson Road Bridge Structure #: 004 Route: Stinson Road

12: Headwall 1, Culvert 1

Honeycombing (typ.)

13: Headwall 1, Culvert 1

16” x 5” x 1.5” spall and 36” x 0.05” crack near culvert 1

14: Headwall 1, Culvert 2

Spall and 6’ x .030" crack north of culvert 2, headwall 1

15: Headwall 2 – North View

Headwall 2 out of plumb

# BRIDGE INSPECTION RECORD
## Photos

City: Lucas County: Collin Name: Stinson Road Bridge Structure #: 004 Route: Stinson Road

16: Railing Connection – Headwall 2

Railing/gate connection in good condition

17: Headwall 2 – Midspan

Crack and 8” x 5” x 2.5” spall at headwall 2, top, midspan

18: Headwall 2 – Midspan

Evidence of flooding

19: Headwall 2

3” x .05” crack at first railing support connection to headwall 2

# BRIDGE INSPECTION RECORD
## Photos

City: Lucas County: Collin Name: Stinson Road Bridge Structure #: 004 Route: Stinson Road

20: Headwall 2, Culvert 1

21: Headwall 2, Culvert 1

Spall at headwall 2, culvert 1 (Likely resulting from construction)

22: Headwall 2, Culvert 1

5’ Horizontal crack near culvert 1

23: Wingwall 1 – Southwest Corner

19” x 1/8” crack at wingwall 1

# BRIDGE INSPECTION RECORD
## Photos

City: Lucas County: Collin Name: Stinson Road Bridge Structure #: 004 Route: Stinson Road

24: Headwall 2, Culvert 2 - Encased Utility & Waterway

Approximately 1 ft scour at outfall and exposed encased utility

25: Headwall 2, Culvert 2

Scour/erosion at outlet headwall above pipe. Loss of backfill

26: Inside of Culvert 1, East View

Typical – no deficiencies noted

27: Inside of Culvert 2, East View

Moderate corrosion and sediment build up along bottom

# BRIDGE INSPECTION RECORD
## Photos

City: Lucas County: Collin Name: Stinson Road Bridge Structure #: 004 Route: Stinson Road

28: Channel – West Side

Undermining of headwall 1 at midspan

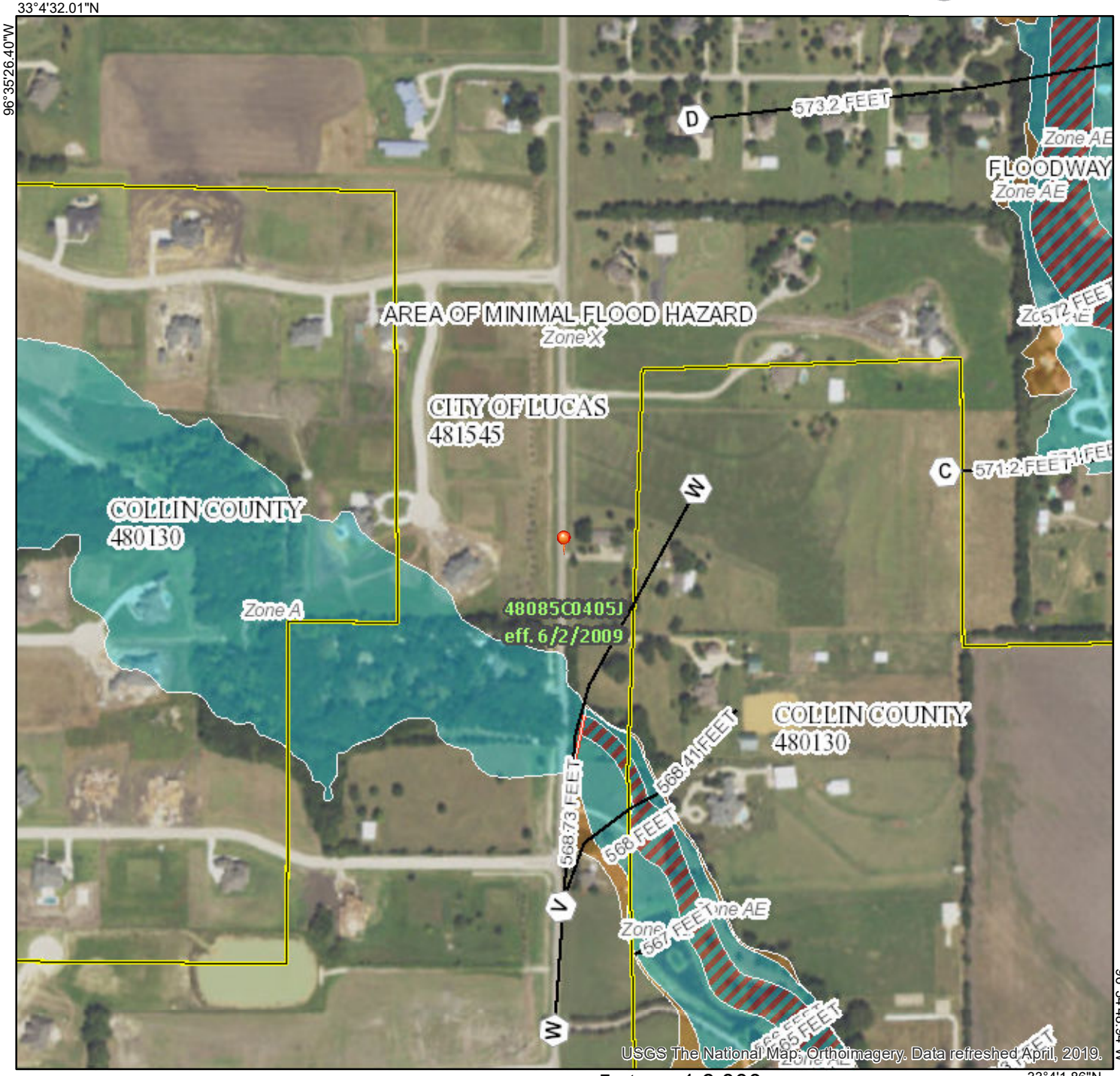
29: Southwest Corner Pavement Dropoff

6’ drop off 1’ off the road (currently under construction)

# APPENDIX C:
# References

# National Flood Hazard Layer FIRMette

FEMA




0 250 500 1,000 1,500 2,000 Feet

1:6,000

## Legend

SEE FIS REPORT FOR DETAILED LEGEND AND INDEX MAP FOR FIRM PANEL LAYOUT

**SPECIAL FLOOD HAZARD AREAS**
- Without Base Flood Elevation (BFE) *Zone A, V, A99*
- With BFE or Depth *Zone AE, AO, AH, VE, AR*
- Regulatory Floodway

**OTHER AREAS OF FLOOD HAZARD**
- 0.2% Annual Chance Flood Hazard, Areas of 1% annual chance flood with average depth less than one foot or with drainage areas of less than one square mile *Zone X*
- Future Conditions 1% Annual Chance Flood Hazard *Zone X*
- Area with Reduced Flood Risk due to Levee. See Notes. *Zone X*
- Area with Flood Risk due to Levee *Zone D*

**OTHER AREAS**
- NO SCREEN Area of Minimal Flood Hazard *Zone X*
- Effective LOMRs
- Area of Undetermined Flood Hazard *Zone D*

**GENERAL STRUCTURES**
- Channel, Culvert, or Storm Sewer
- Levee, Dike, or Floodwall

**OTHER FEATURES**
- 20.2 / 17.5 Cross Sections with 1% Annual Chance / Water Surface Elevation
- Coastal Transect
- 513 Base Flood Elevation Line (BFE)
- Limit of Study
- Jurisdiction Boundary
- Coastal Transect Baseline
- Profile Baseline
- Hydrographic Feature

**MAP PANELS**
- Digital Data Available
- No Digital Data Available
- Unmapped

N

The pin displayed on the map is an approximate point selected by the user and does not represent an authoritative property location.

This map complies with FEMA's standards for the use of digital flood maps if it is not void as described below. The basemap shown complies with FEMA's basemap accuracy standards

The flood hazard information is derived directly from the authoritative NFHL web services provided by FEMA. This map was exported on 12/31/2019 at 10:39:36 AM and does not reflect changes or amendments subsequent to this date and time. The NFHL and effective information may change or become superseded by new data over time.

This map image is void if the one or more of the following map elements do not appear: basemap imagery, flood zone labels, legend, scale bar, map creation date, community identifiers, FIRM panel number, and FIRM effective date. Map images for unmapped and unmodernized areas cannot be used for regulatory purposes.

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DATE:
FILE:

## DESIGNED BEAMS (STRAIGHT STRANDS)

| STRUCTURE | SPAN LENGTH (ft) | BEAM NO. | BEAM TYPE | PRESTRESSING STRANDS: NON-STD STRAND PATTERN | TOTAL NO. | SIZE (in) | STRGTH fpu (ksi) | "e" ℄ (in) | "e" END (in) | TOT NO. DEB | DEBONDED STRANDS PER ROW: DIST FROM BOTTOM (in) | NO. OF STRANDS: TOTAL | NO. OF STRANDS: DE-BONDED | NUMBER OF STRANDS DEBONDED TO (ft from end): 3 | 6 | 9 | 12 | 15 | CONCRETE: RELEASE STRGTH (1) f'ci (ksi) | MINIMUM 28 DAY COMP STRGTH f'c (ksi) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 24' ROADWAY SB12 BEAM | 25 | ALL | 5SB12 | | 8 | 0.6 | 270 | 3.50 | 3.50 | 0 | 2.50 | 8 | 0 | 0 | 0 | 0 | 0 | 0 | 4.000 | 5.000 |
| | 30 | ALL | 5SB12 | | 10 | 0.6 | 270 | 3.50 | 3.50 | 0 | 2.50 | 10 | 0 | 0 | 0 | 0 | 0 | 0 | 4.000 | 5.000 |
| | 35 | ALL | 5SB12 | | 14 | 0.6 | 270 | 3.50 | 3.50 | 0 | 2.50 | 14 | 0 | 0 | 0 | 0 | 0 | 0 | 4.000 | 5.000 |
| | 40 | ALL | 5SB12 | | 18 | 0.6 | 270 | 3.50 | 3.50 | 0 | 2.50 | 18 | 0 | 0 | 0 | 0 | 0 | 0 | 4.000 | 5.000 |
| 24' ROADWAY SB15 BEAM | 25 | ALL | 5SB15 | | 8 | 0.6 | 270 | 5.00 | 5.00 | 0 | 2.50 | 8 | 0 | 0 | 0 | 0 | 0 | 0 | 4.000 | 5.000 |
| | 30 | ALL | 5SB15 | | 8 | 0.6 | 270 | 5.00 | 5.00 | 0 | 2.50 | 8 | 0 | 0 | 0 | 0 | 0 | 0 | 4.000 | 5.000 |
| | 35 | ALL | 5SB15 | | 10 | 0.6 | 270 | 5.00 | 5.00 | 0 | 2.50 | 10 | 0 | 0 | 0 | 0 | 0 | 0 | 4.000 | 5.000 |
| | 40 | ALL | 5SB15 | | 14 | 0.6 | 270 | 5.00 | 5.00 | 0 | 2.50 | 14 | 0 | 0 | 0 | 0 | 0 | 0 | 4.000 | 5.000 |
| | 45 | ALL | 5SB15 | | 18 | 0.6 | 270 | 5.00 | 5.00 | 2 | 2.50 | 18 | 2 | 2 | 0 | 0 | 0 | 0 | 4.000 | 5.000 |
| | 50 | ALL | 5SB15 | | 24 | 0.6 | 270 | 5.00 | 5.00 | 8 | 2.50 | 24 | 8 | 4 | 4 | 0 | 0 | 0 | 4.000 | 5.000 |
| 28' ROADWAY SB12 BEAM | 25 | ALL | 5SB12 | | 8 | 0.6 | 270 | 3.50 | 3.50 | 0 | 2.50 | 8 | 0 | 0 | 0 | 0 | 0 | 0 | 4.000 | 5.000 |
| | 30 | ALL | 5SB12 | | 10 | 0.6 | 270 | 3.50 | 3.50 | 0 | 2.50 | 10 | 0 | 0 | 0 | 0 | 0 | 0 | 4.000 | 5.000 |
| | 35 | ALL | 5SB12 | | 12 | 0.6 | 270 | 3.50 | 3.50 | 0 | 2.50 | 12 | 0 | 0 | 0 | 0 | 0 | 0 | 4.000 | 5.000 |
| | 40 | ALL | 5SB12 | | 18 | 0.6 | 270 | 3.50 | 3.50 | 0 | 2.50 | 18 | 0 | 0 | 0 | 0 | 0 | 0 | 4.000 | 5.000 |
| 28' ROADWAY SB15 BEAM | 25 | ALL | 5SB15 | | 8 | 0.6 | 270 | 5.00 | 5.00 | 0 | 2.50 | 8 | 0 | 0 | 0 | 0 | 0 | 0 | 4.000 | 5.000 |
| | 30 | ALL | 5SB15 | | 8 | 0.6 | 270 | 5.00 | 5.00 | 0 | 2.50 | 8 | 0 | 0 | 0 | 0 | 0 | 0 | 4.000 | 5.000 |
| | 35 | ALL | 5SB15 | | 10 | 0.6 | 270 | 5.00 | 5.00 | 0 | 2.50 | 10 | 0 | 0 | 0 | 0 | 0 | 0 | 4.000 | 5.000 |
| | 40 | ALL | 5SB15 | | 14 | 0.6 | 270 | 5.00 | 5.00 | 0 | 2.50 | 14 | 0 | 0 | 0 | 0 | 0 | 0 | 4.000 | 5.000 |
| | 45 | ALL | 5SB15 | | 18 | 0.6 | 270 | 5.00 | 5.00 | 2 | 2.50 | 18 | 2 | 2 | 0 | 0 | 0 | 0 | 4.000 | 5.000 |
| | 50 | ALL | 5SB15 | | 22 | 0.6 | 270 | 5.00 | 5.00 | 6 | 2.50 | 22 | 6 | 4 | 2 | 0 | 0 | 0 | 4.000 | 5.000 |
| 30' ROADWAY SB12 BEAM | 25 | ALL | 4SB12 | | 6 | 0.6 | 270 | 3.50 | 3.50 | 0 | 2.50 | 6 | 0 | 0 | 0 | 0 | 0 | 0 | 4.000 | 5.000 |
| | 30 | ALL | 4SB12 | | 8 | 0.6 | 270 | 3.50 | 3.50 | 0 | 2.50 | 8 | 0 | 0 | 0 | 0 | 0 | 0 | 4.000 | 5.000 |
| | 35 | ALL | 4SB12 | | 10 | 0.6 | 270 | 3.50 | 3.50 | 0 | 2.50 | 10 | 0 | 0 | 0 | 0 | 0 | 0 | 4.000 | 5.000 |
| | 40 | ALL | 4SB12 | | 14 | 0.6 | 270 | 3.50 | 3.50 | 0 | 2.50 | 14 | 0 | 0 | 0 | 0 | 0 | 0 | 4.000 | 5.000 |
| 30' ROADWAY SB15 BEAM | 25 | ALL | 4SB15 | | 6 | 0.6 | 270 | 5.00 | 5.00 | 0 | 2.50 | 6 | 0 | 0 | 0 | 0 | 0 | 0 | 4.000 | 5.000 |
| | 30 | ALL | 4SB15 | | 6 | 0.6 | 270 | 5.00 | 5.00 | 0 | 2.50 | 6 | 0 | 0 | 0 | 0 | 0 | 0 | 4.000 | 5.000 |
| | 35 | ALL | 4SB15 | | 8 | 0.6 | 270 | 5.00 | 5.00 | 0 | 2.50 | 8 | 0 | 0 | 0 | 0 | 0 | 0 | 4.000 | 5.000 |
| | 40 | ALL | 4SB15 | | 12 | 0.6 | 270 | 5.00 | 5.00 | 0 | 2.50 | 12 | 0 | 0 | 0 | 0 | 0 | 0 | 4.000 | 5.000 |
| | 45 | ALL | 4SB15 | | 14 | 0.6 | 270 | 5.00 | 5.00 | 2 | 2.50 | 14 | 2 | 2 | 0 | 0 | 0 | 0 | 4.000 | 5.000 |
| | 50 | ALL | 4SB15 | | 18 | 0.6 | 270 | 5.00 | 5.00 | 4 | 2.50 | 18 | 4 | 2 | 2 | 0 | 0 | 0 | 4.000 | 5.000 |

## OPTIONAL DESIGN

| STRUCTURE | DESIGN LOAD COMP STRESS (TOP ℄) (SERVICE I) fct (ksi) | DESIGN LOAD TENSILE STRESS (BOTT ℄) (SERVICE III) fcb (ksi) | REQUIRED MINIMUM ULTIMATE MOMENT CAPACITY (STRENGTH I) (kip-ft) | LIVE LOAD DISTRIBUTION FACTOR (2): Moment | Shear |
|---|---|---|---|---|---|
| 24' ROADWAY SB12 BEAM | 0.914 | -1.217 | 448 | 0.450 | 0.450 |
| | 1.292 | -1.685 | 530 | 0.450 | 0.450 |
| | 1.730 | -2.219 | 675 | 0.450 | 0.450 |
| | 2.218 | -2.796 | 820 | 0.440 | 0.440 |
| 24' ROADWAY SB15 BEAM | 0.725 | -0.897 | 551 | 0.450 | 0.450 |
| | 1.020 | -1.244 | 574 | 0.450 | 0.450 |
| | 1.361 | -1.640 | 708 | 0.450 | 0.450 |
| | 1.739 | -2.068 | 864 | 0.440 | 0.440 |
| | 2.179 | -2.574 | 1054 | 0.440 | 0.440 |
| | 2.680 | -3.153 | 1276 | 0.440 | 0.440 |
| 28' ROADWAY SB12 BEAM | 0.903 | -1.184 | 444 | 0.430 | 0.430 |
| | 1.276 | -1.639 | 508 | 0.430 | 0.430 |
| | 1.708 | -2.159 | 647 | 0.430 | 0.430 |
| | 2.200 | -2.744 | 799 | 0.430 | 0.430 |
| 28' ROADWAY SB15 BEAM | 0.716 | -0.874 | 529 | 0.430 | 0.430 |
| | 1.007 | -1.212 | 570 | 0.430 | 0.430 |
| | 1.343 | -1.598 | 680 | 0.430 | 0.430 |
| | 1.725 | -2.032 | 842 | 0.430 | 0.430 |
| | 2.149 | -2.508 | 1013 | 0.420 | 0.420 |
| | 2.643 | -3.073 | 1227 | 0.420 | 0.420 |
| 30' ROADWAY SB12 BEAM | 0.904 | -1.187 | 341 | 0.340 | 0.340 |
| | 1.277 | -1.646 | 407 | 0.340 | 0.340 |
| | 1.711 | -2.169 | 518 | 0.340 | 0.340 |
| | 2.205 | -2.758 | 640 | 0.340 | 0.340 |
| 30' ROADWAY SB15 BEAM | 0.723 | -0.888 | 431 | 0.350 | 0.350 |
| | 1.017 | -1.231 | 438 | 0.350 | 0.350 |
| | 1.346 | -1.605 | 545 | 0.340 | 0.340 |
| | 1.729 | -2.043 | 675 | 0.340 | 0.340 |
| | 2.166 | -2.542 | 823 | 0.340 | 0.340 |
| | 2.665 | -3.115 | 998 | 0.340 | 0.340 |

(1) Based on the following allowable stresses (ksi):

Compression = 0.65 f'ci

Tension = $0.24\sqrt{f'ci}$

Optional designs must likewise conform.

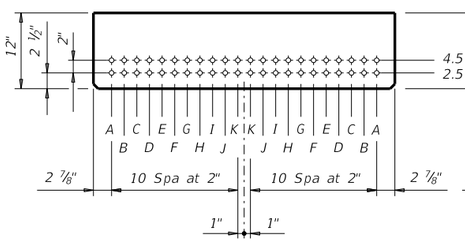
(2) Portion of full HL93.

### DESIGN NOTES:

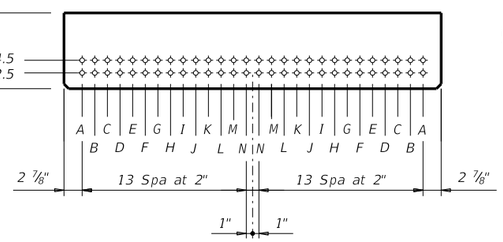
Designed according to AASHTO LRFD Bridge Design Specifications.
Prestress losses for the designed beams have been calculated for a relative humidity of 60 percent. Optional designs must likewise conform.

### FABRICATION NOTES:

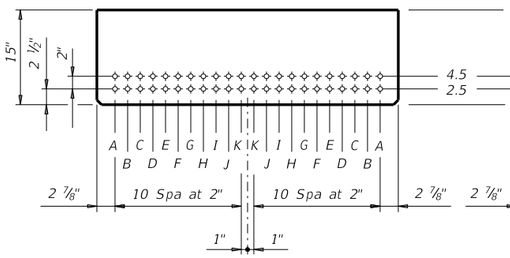
Provide Class H concrete.
Provide Grade 60 reinforcing steel.
Use low relaxation strands, each pretensioned to 75 percent of fpu.
Full-length debonded strands are not permitted in positions "A" and "B".
Strand debonding must comply with Item 424.4.2.2.2.4.
When shown on this sheet, the Fabricator has the option of furnishing either the designed beam or an approved optional beam design. All optional design submittals and shop drawings must be signed, sealed and dated by a Professional Engineer registered in the State of Texas.
Locate strands for the designed beam as low as possible on the 2" grid system unless a non-standard strand pattern is indicated. Fill row "2.5", then row "4.5". Place strands within a row as follows:
1) Locate a strand in each "A" position.
2) Place strand symmetrically about vertical centerline of beam.
3) Space strands as equally as possible across the entire width.
Do not debond strands in position "A". Distribute debonded strands symmetrically about the vertical centerline. Increase debonded lengths working outward, with debonding staggered in each row.



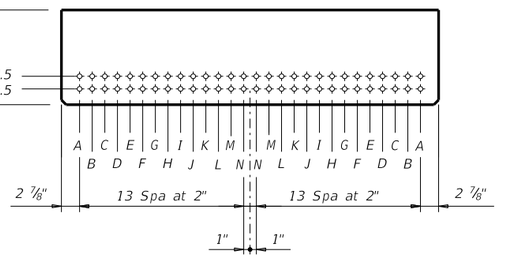

TxDOT 4SB12 SLAB BEAM




TxDOT 5SB12 SLAB BEAM




TxDOT 4SB15 SLAB BEAM




TxDOT 5SB15 SLAB BEAM

HL93 LOADING

Texas Department of Transportation

Bridge Division Standard

# PRESTRESSED CONCRETE SLAB BEAM STD DESIGNS

(TY SB12 OR SB15)

24', 28' & 30' ROADWAY

PSBSD

| FILE: psbsts08-17.dgn | DN: SRW | CK: BMP | DW: SFS | CK: SDB |
|---|---|---|---|---|
| ©TxDOT January 2017 | CONT | SECT | JOB | HIGHWAY |
| REVISIONS | | | | |
| | DIST | COUNTY | | SHEET NO. |

DATE:
FILE:

| STRUCTURE | DESIGNED BEAMS (STRAIGHT STRANDS) | | | | | | | | | | | | | | | | | | OPTIONAL DESIGN | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | SPAN LENGTH (ft) | BEAM NO. | BEAM TYPE | PRESTRESSING STRANDS: NON-STD STRAND PATTERN | TOTAL NO. | SIZE (in) | STRGTH fpu (ksi) | "e" ℄ (in) | "e" END (in) | TOT NO. DEB | DEBONDED STRAND PATTERN PER ROW: DIST FROM BOTTOM (in) | NO.OF STRANDS: TOTAL | DE-BONDED | NUMBER OF STRANDS DEBONDED TO (ft from end): 3 | 6 | 9 | 12 | 15 | CONCRETE: RELEASE STRGTH ① f'ci (ksi) | MINIMUM 28 DAY COMP STRGTH f'c (ksi) | DESIGN LOAD COMP STRESS (TOP ℄) (SERVICE I) fct(ksi) | DESIGN LOAD TENSILE STRESS (BOTT ℄) (SERVICE III) fcb(ksi) | REQUIRED MINIMUM ULTIMATE MOMENT CAPACITY (STRENGTH I) (ft-kips) | LIVE LOAD DISTRIBUTION FACTOR ②: Moment | Shear |
| 28' ROADWAY 7DS20 BEAM | 30 | ALL | 7DS20 | | 10 | 0.6 | 270 | 8.73 | 8.73 | 0 | 2.50 | 10 | 0 | 0 | 0 | 0 | 0 | 0 | 4.000 | 5.000 | 1.128 | -1.251 | 797 | 0.710 | 0.710 |
| | 35 | ALL | 7DS20 | | 14 | 0.6 | 270 | 8.73 | 8.73 | 0 | 2.50 | 14 | 0 | 0 | 0 | 0 | 0 | 0 | 4.000 | 5.000 | 1.429 | -1.594 | 1001 | 0.700 | 0.700 |
| | 40 | ALL | 7DS20 | | 16 | 0.6 | 270 | 8.73 | 8.73 | 0 | 2.50 | 16 | 0 | 0 | 0 | 0 | 0 | 0 | 4.000 | 5.000 | 1.753 | -1.968 | 1218 | 0.690 | 0.690 |
| | 45 | ALL | 7DS20 | | 20 | 0.6 | 270 | 8.73 | 8.73 | 2 | 2.50 | 20 | 2 | 2 | 0 | 0 | 0 | 0 | 4.000 | 5.000 | 2.120 | -2.392 | 1464 | 0.680 | 0.680 |
| | 50 | ALL | 7DS20 | | 26 | 0.6 | 270 | 8.73 | 8.73 | 6 | 2.50 | 26 | 6 | 2 | 4 | 0 | 0 | 0 | 4.000 | 5.000 | 2.568 | -2.905 | 1768 | 0.680 | 0.680 |
| 28' ROADWAY 7DS23 BEAM | 30 | ALL | 7DS23 | | 10 | 0.6 | 270 | 10.53 | 10.53 | 0 | 2.50 | 10 | 0 | 0 | 0 | 0 | 0 | 0 | 4.000 | 5.000 | 0.870 | -0.986 | 900 | 0.710 | 0.710 |
| | 35 | ALL | 7DS23 | | 12 | 0.6 | 270 | 10.53 | 10.53 | 0 | 2.50 | 12 | 0 | 0 | 0 | 0 | 0 | 0 | 4.000 | 5.000 | 1.102 | -1.257 | 1007 | 0.700 | 0.700 |
| | 40 | ALL | 7DS23 | | 14 | 0.6 | 270 | 10.53 | 10.53 | 0 | 2.50 | 14 | 0 | 0 | 0 | 0 | 0 | 0 | 4.000 | 5.000 | 1.353 | -1.553 | 1227 | 0.690 | 0.690 |
| | 45 | ALL | 7DS23 | | 16 | 0.6 | 270 | 10.53 | 10.53 | 0 | 2.50 | 16 | 0 | 0 | 0 | 0 | 0 | 0 | 4.000 | 5.000 | 1.638 | -1.889 | 1475 | 0.680 | 0.680 |
| | 50 | ALL | 7DS23 | | 20 | 0.6 | 270 | 10.53 | 10.53 | 0 | 2.50 | 20 | 0 | 0 | 0 | 0 | 0 | 0 | 4.000 | 5.000 | 1.984 | -2.294 | 1782 | 0.680 | 0.680 |
| | 55 | ALL | 7DS23 | | 24 | 0.6 | 270 | 10.53 | 10.53 | 2 | 2.50 | 24 | 2 | 2 | 0 | 0 | 0 | 0 | 4.000 | 5.000 | 2.334 | -2.706 | 2086 | 0.670 | 0.670 |
| | 60 | ALL | 7DS23 | | 30 | 0.6 | 270 | 10.40 | 10.37 | 6 | 2.50 | 28 | 6 | 2 | 2 | 2 | 0 | 0 | 4.000 | 5.000 | 2.722 | -3.165 | 2425 | 0.670 | 0.670 |

### DESIGN NOTES:

Designed in accordance with AASHTO LRFD Bridge Design Specifications.

Prestress losses for the designed beams have been calculated for a relative humidity of 60 percent. Optional designs must likewise conform.

Beam designs are applicable for 2" ACP overlay and 0 through 30 degree skews.

### FABRICATION NOTES:

Provide Class H concrete.

Provide Grade 60 reinforcing steel bars.

Use low relaxation strands, each pretensioned to 75 percent of fpu.

When shown on this sheet, the Fabricator has the option of furnishing either the designed beam or an approved optional beam design. All optional design submittals and shop drawings must be signed, sealed and dated by a Professional Engineer registered in the State of Texas.

Locate strands for the designed beam as low as possible on the 2" grid system unless a non-standard stand pattern is indicated. Fill row "2.5", then row "4.5". Place strands within a row as follows:

1) Locate a strand in each "1" position.
2) Place strand symmetrically about vertical centerline of box.
3) Space strands as equally as possible across the entire width.

Strand debonding must comply with Item 424.4.2.2.2.4.

Do not debond strands in position "1". Distribute debonded strands equally about the vertical centerline. Decrease debonded lengths working inward, with debonding staggered in each row.

Full-length debonded strands are not permitted in positions "1" through "3".

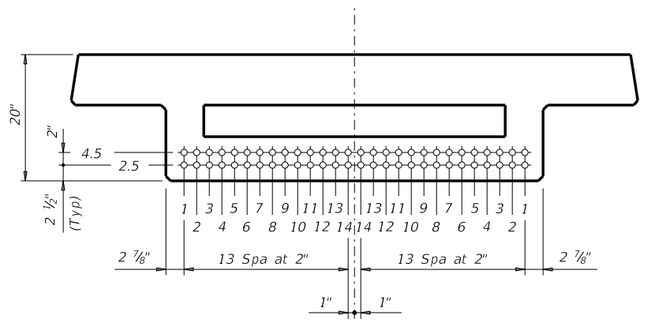
① Based on the following allowable stresses (ksi):

Compression = 0.65 f'ci

Tension = $0.24\sqrt{f'ci}$

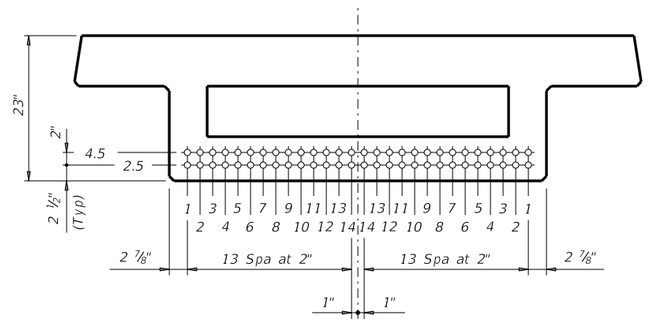
Optional designs must likewise conform.

② Portion of full HL93.




TxDOT 7DS20 DECKED SLAB BEAM

(Showing interior beam, exterior beam similar.)




TxDOT 7DS23 DECKED SLAB BEAM

(Showing interior beam, exterior beam similar.)

HL93 LOADING

Texas Department of Transportation

Bridge Division Standard

# PRESTRESSED CONCRETE DECKED SLAB BEAM STANDARD DESIGNS

## 28' ROADWAY

## DSBSD-28

| FILE: dsbsts15.dgn | DN: GPT | CK: BMP | DW: SFS | CK: SDB |
|---|---|---|---|---|
| ©TxDOT September 2010 | CONT | SECT | JOB | HIGHWAY |
| REVISIONS | | | | |
| 04-11: f'ci and LLDF. 01-16: Notes, 0.6" strand designs. | DIST | COUNTY | | SHEET NO. |

DATE:
FILE:

| STANDARD SBBS-B20-28 | DESIGNED BEAMS (STRAIGHT STRANDS) | | | | | | | | | | | | | | | | | | OPTIONAL DESIGN | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | PRESTRESSING STRANDS | | | | | | | DEBONDED STRAND PATTERN PER ROW | | | | | | | | CONCRETE | | | | |
| | SPAN LENGTH | BEAM NO. | BEAM TYPE | NON-STD STRAND PATTERN | TOTAL NO. | SIZE | STRGTH | "e" ℄ | "e" END | TOT NO. DEB | DIST FROM BOTTOM | NO.OF STRANDS | | NUMBER OF STRANDS DEBONDED TO (ft from end) | | | | | RELEASE STRGTH ① | MINIMUM 28 DAY COMP STRGTH | DESIGN LOAD COMP STRESS (TOP ℄) (SERVICE I) | DESIGN LOAD TENSILE STRESS (BOTT ℄) (SERVICE III) | REQUIRED MINIMUM ULTIMATE MOMENT CAPACITY (STRENGTH I) | LIVE LOAD DISTRIBUTION FACTOR ② | |
| | (ft) | | | | | (in) | fpu (ksi) | (in) | (in) | | (in) | TOTAL | DE-BONDED | 3 | 6 | 9 | 12 | 15 | f'ci (ksi) | f'c (ksi) | fct(ksi) | fcb(ksi) | (ft-kips) | Moment | Shear |
| | 30 | ALL | 5B20 | | 8 | 0.6 | 270 | 7.38 | 7.38 | 0 | 2.50 | 8 | 0 | 0 | 0 | 0 | 0 | 0 | 4.000 | 5.000 | 0.654 | -0.828 | 715 | 0.454 | 0.691 |
| | 35 | ALL | 5B20 | | 8 | 0.6 | 270 | 7.38 | 7.38 | 0 | 2.50 | 8 | 0 | 0 | 0 | 0 | 0 | 0 | 4.000 | 5.000 | 0.861 | -1.069 | 796 | 0.440 | 0.680 |
| 28' Roadway | 40 | ALL | 5B20 | | 10 | 0.6 | 270 | 7.38 | 7.38 | 0 | 2.50 | 10 | 0 | 0 | 0 | 0 | 0 | 0 | 4.000 | 5.000 | 1.092 | -1.335 | 890 | 0.427 | 0.671 |
| 5" Slab | 45 | ALL | 5B20 | | 10 | 0.6 | 270 | 7.38 | 7.38 | 0 | 2.50 | 10 | 0 | 0 | 0 | 0 | 0 | 0 | 4.000 | 5.000 | 1.356 | -1.638 | 980 | 0.417 | 0.663 |
| | 50 | ALL | 5B20 | | 14 | 0.6 | 270 | 7.38 | 7.38 | 0 | 2.50 | 14 | 0 | 0 | 0 | 0 | 0 | 0 | 4.000 | 5.000 | 1.658 | -1.988 | 1172 | 0.408 | 0.655 |
| | 55 | ALL | 5B20 | | 16 | 0.6 | 270 | 7.38 | 7.38 | 0 | 2.50 | 16 | 0 | 0 | 0 | 0 | 0 | 0 | 4.000 | 5.000 | 1.985 | -2.364 | 1374 | 0.400 | 0.649 |
| | 60 | ALL | 5B20 | | 20 | 0.6 | 270 | 7.38 | 7.38 | 2 | 2.50 | 20 | 2 | 2 | 0 | 0 | 0 | 0 | 4.000 | 5.000 | 2.339 | -2.766 | 1587 | 0.393 | 0.643 |
| | 65 | ALL | 5B20 | | 24 | 0.6 | 270 | 7.38 | 7.38 | 6 | 2.50 | 24 | 6 | 2 | 2 | 0 | 2 | 0 | 4.000 | 5.000 | 2.720 | -3.197 | 1811 | 0.387 | 0.638 |

## DESIGN NOTES:

Designed in accordance with AASHTO LRFD Bridge Design Specifications.

Prestress losses for the designed beams have been calculated for a relative humidity of 60 percent. Optional designs must likewise conform.

Beam designs are applicable for 5" concrete slabs without overlay and 0 degree skew.

## FABRICATION NOTES:

Provide Class H concrete.

Provide Grade 60 reinforcing steel bars.

Use low relaxation strands, each pretensioned to 75 percent of fpu.

When shown on this sheet, the Fabricator has the option of furnishing either the designed beam or an approved optional beam design. All optional design submittals and shop drawings must be signed, sealed and dated by a Professional Engineer registered in the State of Texas.

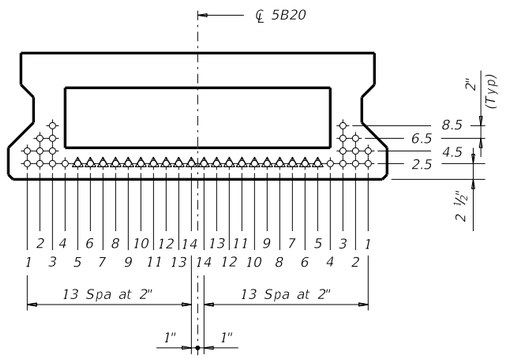
Locate strands for the designed beam as low as possible on the 2" grid system unless a non-standard stand pattern is indicated. Fill row "2.5", then row "4.5", then row "6.5", etc. Place strands within a row as follows:

1) Locate a strand in each "1" position.
2) Place strand symmetrically about vertical centerline of box.
3) Space strands as equally as possible across the entire width.

Strand debonding must comply with Item 424.4.2.2.2.4.

Do not debond strands in position "1". Distribute debonded strands equally about the vertical centerline. Decrease debonded lengths working inward, with debonding staggered in each row.

Full-length debonded strands are only permitted in positions marked △.




TxDOT 5B20 BOX BEAM

① Based on the following allowable stresses (ksi):

Compression = 0.65 f'ci

Tension = $0.24\sqrt{f'ci}$

Optional designs must likewise conform.

② Portion of full HL93.

HL93 LOADING

Texas Department of Transportation

Bridge Division Standard

# PRESTR CONC BOX BEAM STANDARD DESIGNS

TYPE B20 28' RDWY (WITH SLAB)

## BBSDS-B20-28

| FILE: bbstds25.dgn | DN: SRW | CK: BMP | DW: SFS | CK: SDB |
|---|---|---|---|---|
| ©TxDOT December 2006 | CONT | SECT | JOB | HIGHWAY |
| REVISIONS | | | | |
| 04-11: f'ci and LLDF.<br>01-16: Notes, 0.6" strand designs. | DIST | COUNTY | | SHEET NO. |

DISCLAIMER:
The use of this standard is governed by the "Texas Engineering Practice Act". No warranty of any kind is made by TxDOT for any purpose whatsoever. TxDOT assumes no responsibility for the conversion of this standard to other formats or for incorrect results or damages resulting from its use.

DATE:
FILE:

| STANDARD SBBS-B28-28 | DESIGNED BEAMS (STRAIGHT STRANDS) | | | | | | | | | | | | | | | | | | OPTIONAL DESIGN | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | PRESTRESSING STRANDS | | | | | | | | | DEBONDED STRAND PATTERN PER ROW | | | | | | | | CONCRETE | | | | |
| | SPAN LENGTH (ft) | BEAM NO. | BEAM TYPE | NON-STD STRAND PATTERN | TOTAL NO. | SIZE (in) | STRGTH fpu (ksi) | "e" ℄ (in) | "e" END (in) | TOT NO. DEB | DIST FROM BOTTOM (in) | NO.OF STRANDS TOTAL | NO.OF STRANDS DE-BONDED | NUMBER OF STRANDS DEBONDED TO (ft from end) 3 | 6 | 9 | 12 | 15 | RELEASE STRGTH ① f'ci (ksi) | MINIMUM 28 DAY COMP STRGTH f'c (ksi) | DESIGN LOAD COMP STRESS (TOP ℄) (SERVICE I) fct(ksi) | DESIGN LOAD TENSILE STRESS (BOTT ℄) (SERVICE III) fcb(ksi) | REQUIRED MINIMUM ULTIMATE MOMENT CAPACITY (STRENGTH I) (ft-kips) | LIVE LOAD DISTRIBUTION FACTOR ② Moment | LIVE LOAD DISTRIBUTION FACTOR ② Shear |
| | 30 | ALL | 5B28 | | 8 | 0.6 | 270 | 11.24 | 11.24 | 0 | 2.50 | 8 | 0 | 0 | 0 | 0 | 0 | 0 | 4.000 | 5.000 | 0.457 | -0.544 | 757 | 0.461 | 0.700 |
| | 35 | ALL | 5B28 | | 8 | 0.6 | 270 | 11.24 | 11.24 | 0 | 2.50 | 8 | 0 | 0 | 0 | 0 | 0 | 0 | 4.000 | 5.000 | 0.599 | -0.704 | 950 | 0.447 | 0.689 |
| 28' Roadway | 40 | ALL | 5B28 | | 10 | 0.6 | 270 | 11.24 | 11.24 | 0 | 2.50 | 10 | 0 | 0 | 0 | 0 | 0 | 0 | 4.000 | 5.000 | 0.759 | -0.880 | 1157 | 0.434 | 0.679 |
| 5" Slab | 45 | ALL | 5B28 | | 10 | 0.6 | 270 | 11.24 | 11.24 | 0 | 2.50 | 10 | 0 | 0 | 0 | 0 | 0 | 0 | 4.000 | 5.000 | 0.942 | -1.081 | 1342 | 0.424 | 0.671 |
| | 50 | ALL | 5B28 | | 12 | 0.6 | 270 | 11.24 | 11.24 | 0 | 2.50 | 12 | 0 | 0 | 0 | 0 | 0 | 0 | 4.000 | 5.000 | 1.150 | -1.313 | 1477 | 0.415 | 0.664 |
| | 55 | ALL | 5B28 | | 12 | 0.6 | 270 | 11.24 | 11.24 | 0 | 2.50 | 12 | 0 | 0 | 0 | 0 | 0 | 0 | 4.000 | 5.000 | 1.377 | -1.562 | 1477 | 0.407 | 0.657 |
| | 60 | ALL | 5B28 | | 14 | 0.6 | 270 | 11.24 | 11.24 | 0 | 2.50 | 14 | 0 | 0 | 0 | 0 | 0 | 0 | 4.000 | 5.000 | 1.620 | -1.828 | 1707 | 0.399 | 0.651 |
| | 65 | ALL | 5B28 | | 16 | 0.6 | 270 | 11.24 | 11.24 | 0 | 2.50 | 16 | 0 | 0 | 0 | 0 | 0 | 0 | 4.000 | 5.000 | 1.883 | -2.113 | 1952 | 0.393 | 0.646 |
| | 70 | ALL | 5B28 | | 18 | 0.6 | 270 | 11.24 | 11.24 | 0 | 2.50 | 18 | 0 | 0 | 0 | 0 | 0 | 0 | 4.000 | 5.000 | 2.163 | -2.416 | 2208 | 0.387 | 0.641 |
| | 75 | ALL | 5B28 | | 22 | 0.6 | 270 | 11.24 | 11.24 | 2 | 2.50 | 22 | 2 | 2 | 0 | 0 | 0 | 0 | 4.000 | 5.000 | 2.461 | -2.738 | 2477 | 0.382 | 0.636 |
| | 80 | ALL | 5B28 | | 26 | 0.6 | 270 | 11.24 | 11.24 | 4 | 2.50 | 26 | 4 | 0 | 2 | 0 | 2 | 0 | 4.000 | 5.000 | 2.778 | -3.078 | 2758 | 0.377 | 0.632 |

## DESIGN NOTES:

Designed in accordance with AASHTO LRFD Bridge Design Specifications.

Prestress losses for the designed beams have been calculated for a relative humidity of 60 percent. Optional designs must likewise conform.

Beam designs are applicable for 5" concrete slabs without overlay and 0 degree skew.

## FABRICATION NOTES:

Provide Class H concrete.

Provide Grade 60 reinforcing steel bars.

Use low relaxation strands, each pretensioned to 75 percent of fpu.

When shown on this sheet, the Fabricator has the option of furnishing either the designed beam or an approved optional beam design. All optional design submittals and shop drawings must be signed, sealed and dated by a Professional Engineer registered in the State of Texas.

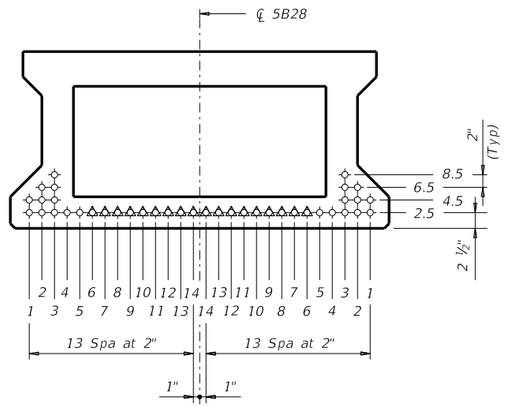
Locate strands for the designed beam as low as possible on the 2" grid system unless a non-standard stand pattern is indicated. Fill row "2.5", then row "4.5", then row "6.5", etc. Place strands within a row as follows:

1) Locate a strand in each "1" position.
2) Place strand symmetrically about vertical centerline of box.
3) Space strands as equally as possible across the entire width.

Strand debonding must comply with Item 424.4.2.2.2.4.

Do not debond strands in position "1". Distribute debonded strands equally about the vertical centerline. Decrease debonded lengths working inward, with debonding staggered in each row.

Full-length debonded strands are only permitted in positions marked △.




TxDOT 5B28 BOX BEAM

① Based on the following allowable stresses (ksi):

Compression = 0.65 f'ci

Tension = $0.24\sqrt{f'ci}$

Optional designs must likewise conform.

② Portion of full HL93.

HL93 LOADING

Texas Department of Transportation — Bridge Division Standard

# PRESTR CONC BOX BEAM STANDARD DESIGNS

TYPE B28 28' RDWY (WITH SLAB)

## BBSDS-B28-28

| FILE: bbstds27.dgn | DN: SRW | CK: BMP | DW: SFS | CK: SDB |
|---|---|---|---|---|
| ©TxDOT December 2006 | CONT | SECT | JOB | HIGHWAY |
| REVISIONS 04-11: f'ci and LLDF. 01-16: Notes, 0.6" stand designs. | DIST | COUNTY | | SHEET NO. |

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DATE:
FILE:

## DESIGNED BEAMS (STRAIGHT STRANDS)

## OPTIONAL DESIGN

| STRUCTURE | SPAN LENGTH (ft) | BEAM NO. | BEAM TYPE | PRESTRESSING STRANDS: NON-STD STRAND PATTERN | TOTAL NO. | SIZE (in) | STRGTH fpu (ksi) | "e" ℄ (in) | "e" END (in) | TOT NO. DEB | DEBONDED STRAND PATTERN PER ROW: DIST FROM BOTTOM (in) | NO.OF STRANDS: TOTAL | DE-BONDED | NUMBER OF STRANDS DEBONDED TO (ft from end): 3 | 6 | 9 | 12 | 15 | CONCRETE: RELEASE STRGTH ① f'ci (ksi) | MINIMUM 28 DAY COMP STRGTH f'c (ksi) | DESIGN LOAD COMP STRESS (TOP ℄) (SERVICE I) fct(ksi) | DESIGN LOAD TENSILE STRESS (BOTT ℄) (SERVICE III) fcb(ksi) | REQUIRED MINIMUM ULTIMATE MOMENT CAPACITY (STRENGTH I) (ft-kips) | LIVE LOAD DISTRIBUTION FACTOR ② Moment | Shear |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| TYPE 5XB20 | 40 | ALL | 5XB20 | | 12 | 0.6 | 270 | 7.03 | 7.03 | 0 | 2.50 | 12 | 0 | 0 | 0 | 0 | 0 | 0 | 4.000 | 5.000 | 1.231 | -1.621 | 1255 | 0.688 | 0.903 |
| X-BEAMS | 45 | ALL | 5XB20 | | 14 | 0.6 | 270 | 7.03 | 7.03 | 0 | 2.50 | 14 | 0 | 0 | 0 | 0 | 0 | 0 | 4.000 | 5.000 | 1.557 | -1.997 | 1498 | 0.667 | 0.897 |
| 32' Roadway | 50 | ALL | 5XB20 | | 20 | 0.6 | 270 | 7.03 | 7.03 | 0 | 2.50 | 20 | 0 | 0 | 0 | 0 | 0 | 0 | 4.000 | 5.000 | 1.926 | -2.432 | 1787 | 0.649 | 0.891 |
| 8" Slab | 55 | ALL | 5XB20 | | 24 | 0.6 | 270 | 7.03 | 7.03 | 4 | 2.50 | 24 | 4 | 2 | 2 | 0 | 0 | 0 | 4.000 | 5.000 | 2.333 | -2.901 | 2090 | 0.633 | 0.887 |
| | 60 | ALL | 5XB20 | | 30 | 0.6 | 270 | 6.90 | 6.87 | 6 | 2.50 | 28 | 6 | 2 | 2 | 2 | 0 | 0 | 4.400 | 5.000 | 2.777 | -3.406 | 2407 | 0.619 | 0.883 |
| | 65 | ALL | 5XB20 | | 36 | 0.6 | 270 | 6.59 | 6.46 | 8 | 2.50 | 28 | 8 | 2 | 2 | 2 | 2 | 0 | 4.900 | 5.200 | 3.259 | -3.946 | 2739 | 0.606 | 0.879 |
| TYPE 5XB28 | 40 | ALL | 5XB28 | | 12 | 0.6 | 270 | 10.63 | 10.63 | 0 | 2.50 | 12 | 0 | 0 | 0 | 0 | 0 | 0 | 4.000 | 5.000 | 0.800 | -1.023 | 1748 | 0.719 | 0.948 |
| X-BEAMS | 45 | ALL | 5XB28 | | 12 | 0.6 | 270 | 10.63 | 10.63 | 0 | 2.50 | 12 | 0 | 0 | 0 | 0 | 0 | 0 | 4.000 | 5.000 | 1.006 | -1.255 | 1793 | 0.697 | 0.942 |
| 32' Roadway | 50 | ALL | 5XB28 | | 12 | 0.6 | 270 | 10.63 | 10.63 | 0 | 2.50 | 12 | 0 | 0 | 0 | 0 | 0 | 0 | 4.000 | 5.000 | 1.240 | -1.523 | 1870 | 0.678 | 0.937 |
| 8" Slab | 55 | ALL | 5XB28 | | 14 | 0.6 | 270 | 10.63 | 10.63 | 0 | 2.50 | 14 | 0 | 0 | 0 | 0 | 0 | 0 | 4.000 | 5.000 | 1.497 | -1.812 | 2187 | 0.661 | 0.933 |
| | 60 | ALL | 5XB28 | | 18 | 0.6 | 270 | 10.63 | 10.63 | 0 | 2.50 | 18 | 0 | 0 | 0 | 0 | 0 | 0 | 4.000 | 5.000 | 1.777 | -2.124 | 2521 | 0.647 | 0.929 |
| | 65 | ALL | 5XB28 | | 22 | 0.6 | 270 | 10.63 | 10.63 | 0 | 2.50 | 22 | 0 | 0 | 0 | 0 | 0 | 0 | 4.000 | 5.000 | 2.079 | -2.454 | 2867 | 0.633 | 0.926 |
| | 70 | ALL | 5XB28 | | 26 | 0.6 | 270 | 10.63 | 10.63 | 2 | 2.50 | 26 | 2 | 2 | 0 | 0 | 0 | 0 | 4.000 | 5.000 | 2.404 | -2.807 | 3231 | 0.621 | 0.923 |
| | 75 | ALL | 5XB28 | | 32 | 0.6 | 270 | 10.38 | 10.32 | 6 | 2.50 | 28 | 6 | 0 | 2 | 2 | 2 | 0 | 4.000 | 5.000 | 2.753 | -3.182 | 3614 | 0.611 | 0.921 |
| | 80 | ALL | 5XB28 | | 36 | 0.6 | 270 | 10.19 | 10.10 | 6 | 2.50 | 28 | 6 | 2 | 2 | 0 | 2 | 0 | 4.600 | 5.000 | 3.124 | -3.578 | 4011 | 0.601 | 0.919 |
| TYPE 5XB34 | 40 | ALL | 5XB34 | | 10 | 0.6 | 270 | 13.11 | 13.11 | 0 | 2.50 | 10 | 0 | 0 | 0 | 0 | 0 | 0 | 4.000 | 5.000 | 0.657 | -0.777 | 1818 | 0.736 | 0.976 |
| X-BEAMS | 45 | ALL | 5XB34 | | 12 | 0.6 | 270 | 13.11 | 13.11 | 0 | 2.50 | 12 | 0 | 0 | 0 | 0 | 0 | 0 | 4.000 | 5.000 | 0.824 | -0.953 | 2172 | 0.714 | 0.971 |
| 32' Roadway | 50 | ALL | 5XB34 | | 14 | 0.6 | 270 | 13.11 | 13.11 | 0 | 2.50 | 14 | 0 | 0 | 0 | 0 | 0 | 0 | 4.000 | 5.000 | 1.014 | -1.158 | 2487 | 0.695 | 0.966 |
| 8" Slab | 55 | ALL | 5XB34 | | 14 | 0.6 | 270 | 13.11 | 13.11 | 0 | 2.50 | 14 | 0 | 0 | 0 | 0 | 0 | 0 | 4.000 | 5.000 | 1.222 | -1.378 | 2432 | 0.678 | 0.962 |
| | 60 | ALL | 5XB34 | | 16 | 0.6 | 270 | 13.11 | 13.11 | 0 | 2.50 | 16 | 0 | 0 | 0 | 0 | 0 | 0 | 4.000 | 5.000 | 1.449 | -1.614 | 2632 | 0.663 | 0.958 |
| | 65 | ALL | 5XB34 | | 18 | 0.6 | 270 | 13.11 | 13.11 | 0 | 2.50 | 18 | 0 | 0 | 0 | 0 | 0 | 0 | 4.000 | 5.000 | 1.693 | -1.866 | 2997 | 0.649 | 0.956 |
| | 70 | ALL | 5XB34 | | 22 | 0.6 | 270 | 13.11 | 13.11 | 0 | 2.50 | 22 | 0 | 0 | 0 | 0 | 0 | 0 | 4.000 | 5.000 | 1.955 | -2.134 | 3381 | 0.637 | 0.953 |
| | 75 | ALL | 5XB34 | | 24 | 0.6 | 270 | 13.11 | 13.11 | 0 | 2.50 | 24 | 0 | 0 | 0 | 0 | 0 | 0 | 4.000 | 5.000 | 2.236 | -2.419 | 3781 | 0.626 | 0.951 |
| | 80 | ALL | 5XB34 | | 28 | 0.6 | 270 | 13.11 | 13.11 | 4 | 2.50 | 28 | 4 | 2 | 2 | 0 | 0 | 0 | 4.000 | 5.000 | 2.535 | -2.718 | 4197 | 0.615 | 0.949 |
| | 85 | ALL | 5XB34 | | 34 | 0.6 | 270 | 12.75 | 12.65 | 8 | 2.50 | 28 | 8 | 4 | 2 | 2 | 0 | 0 | 4.000 | 5.000 | 2.853 | -3.036 | 4634 | 0.606 | 0.947 |
| | 90 | ALL | 5XB34 | | 40 | 0.6 | 270 | 12.51 | 12.31 | 10 | 2.50 | 28 | 10 | 2 | 2 | 2 | 2 | 2 | 4.200 | 5.000 | 3.188 | -3.369 | 5086 | 0.597 | 0.946 |
| | 95 | ALL | 5XB34 | | 44 | 0.6 | 270 | 12.38 | 12.17 | 10 | 2.50 | 28 | 10 | 2 | 2 | 2 | 2 | 2 | 4.600 | 5.200 | 3.542 | -3.719 | 5558 | 0.589 | 0.945 |
| TYPE 5XB40 | 40 | ALL | 5XB40 | | 10 | 0.6 | 270 | 15.70 | 15.70 | 0 | 2.50 | 10 | 0 | 0 | 0 | 0 | 0 | 0 | 4.000 | 5.000 | 0.560 | -0.629 | 1886 | 0.752 | 1.001 |
| X-BEAMS | 45 | ALL | 5XB40 | | 12 | 0.6 | 270 | 15.70 | 15.70 | 0 | 2.50 | 12 | 0 | 0 | 0 | 0 | 0 | 0 | 4.000 | 5.000 | 0.701 | -0.772 | 2255 | 0.729 | 0.996 |
| 32' Roadway | 50 | ALL | 5XB40 | | 14 | 0.6 | 270 | 15.70 | 15.70 | 0 | 2.50 | 14 | 0 | 0 | 0 | 0 | 0 | 0 | 4.000 | 5.000 | 0.861 | -0.938 | 2694 | 0.709 | 0.991 |
| 8" Slab | 55 | ALL | 5XB40 | | 14 | 0.6 | 270 | 15.70 | 15.70 | 0 | 2.50 | 14 | 0 | 0 | 0 | 0 | 0 | 0 | 4.000 | 5.000 | 1.037 | -1.117 | 3007 | 0.692 | 0.988 |
| | 60 | ALL | 5XB40 | | 14 | 0.6 | 270 | 15.70 | 15.70 | 0 | 2.50 | 14 | 0 | 0 | 0 | 0 | 0 | 0 | 4.000 | 5.000 | 1.227 | -1.308 | 2947 | 0.676 | 0.984 |
| | 65 | ALL | 5XB40 | | 16 | 0.6 | 270 | 15.70 | 15.70 | 0 | 2.50 | 16 | 0 | 0 | 0 | 0 | 0 | 0 | 4.000 | 5.000 | 1.433 | -1.513 | 3137 | 0.662 | 0.982 |
| | 70 | ALL | 5XB40 | | 18 | 0.6 | 270 | 15.70 | 15.70 | 0 | 2.50 | 18 | 0 | 0 | 0 | 0 | 0 | 0 | 4.000 | 5.000 | 1.654 | -1.731 | 3521 | 0.650 | 0.980 |
| | 75 | ALL | 5XB40 | | 20 | 0.6 | 270 | 15.70 | 15.70 | 0 | 2.50 | 20 | 0 | 0 | 0 | 0 | 0 | 0 | 4.000 | 5.000 | 1.890 | -1.962 | 3939 | 0.638 | 0.978 |
| | 80 | ALL | 5XB40 | | 24 | 0.6 | 270 | 15.70 | 15.70 | 2 | 2.50 | 24 | 2 | 2 | 0 | 0 | 0 | 0 | 4.000 | 5.000 | 2.142 | -2.207 | 4378 | 0.628 | 0.976 |
| | 85 | ALL | 5XB40 | | 28 | 0.6 | 270 | 15.70 | 15.70 | 4 | 2.50 | 28 | 4 | 2 | 2 | 0 | 0 | 0 | 4.000 | 5.000 | 2.408 | -2.464 | 4834 | 0.618 | 0.975 |
| | 90 | ALL | 5XB40 | | 32 | 0.6 | 270 | 15.45 | 15.40 | 6 | 2.50 | 28 | 6 | 2 | 4 | 0 | 0 | 0 | 4.000 | 5.000 | 2.690 | -2.735 | 5310 | 0.609 | 0.974 |
| | 95 | ALL | 5XB40 | | 36 | 0.6 | 270 | 15.26 | 15.09 | 10 | 2.50 | 28 | 10 | 4 | 6 | 0 | 0 | 0 | 4.000 | 5.000 | 2.988 | -3.020 | 5806 | 0.601 | 0.973 |
| | 100 | ALL | 5XB40 | | 42 | 0.6 | 270 | 15.04 | 14.77 | 12 | 2.50 | 28 | 12 | 2 | 4 | 2 | 2 | 2 | 4.000 | 5.000 | 3.300 | -3.318 | 6319 | 0.593 | 0.972 |
| | 105 | ALL | 5XB40 | | 48 | 0.6 | 270 | 14.87 | 14.58 | 16 | 2.50 | 28 | 14 | 2 | 6 | 2 | 0 | 4 | 4.500 | 5.100 | 3.628 | -3.630 | 6854 | 0.586 | 0.971 |
| | | | | | | | | | | | 4.50 | 20 | 2 | 2 | 0 | 0 | 0 | 0 | | | | | | | |

### DESIGN NOTES:

Designed in accordance with AASHTO LRFD Bridge Design Specifications.

Prestress losses for the designed beams have been calculated for a relative humidity of 60 percent. Optional designs must likewise conform.

Beam designs are applicable for 8" concrete slabs without overlay and 0 through 30 degree skews.

### FABRICATION NOTES:

Provide Class H concrete.

Provide Grade 60 reinforcing steel bars.

Use low relaxation strands, each pretensioned to 75 percent of fpu.

When shown on this sheet, the Fabricator has the option of furnishing either the designed beam or an approved optional beam design. All optional design submittals and shop drawings must be signed, sealed and dated by a Professional Engineer registered in the State of Texas.

Locate strands for the designed beam as low as possible on the 2" grid system unless a non-standard stand pattern is indicated. Fill row "2.5", then row "4.5", then row "6.5", etc. Place strands within a row as follows:

1) Locate a strand in each "1" position.
2) Place strand symmetrically about vertical centerline of box.
3) Space strands as equally as possible across the entire width.

Strand debonding must comply with Item 424.4.2.2.4.

Do not debond strands in position "1". Distribute debonded strands equally about the vertical centerline. Decrease debonded lengths working inward, with debonding staggered in each row.

Full-length debonded strands are only permitted in positions marked △.

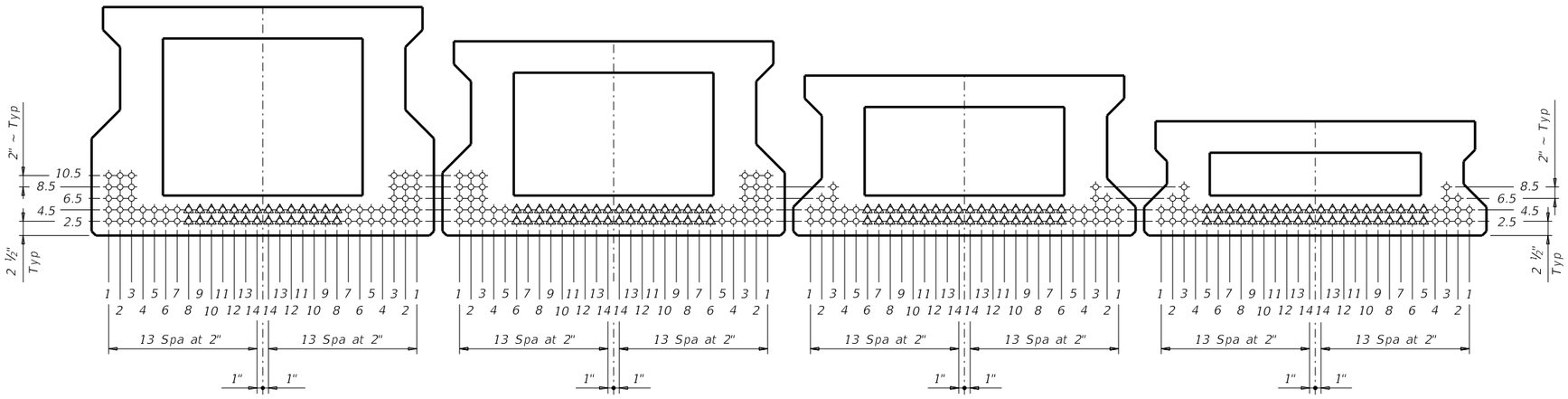
① Based on the following allowable stresses (ksi):

Compression = 0.65 f'ci

Tension = $0.24\sqrt{f'ci}$

Optional designs must likewise conform.

② Portion of full HL93.




TxDOT 5XB40 BEAMS | TxDOT 5XB34 BEAMS | TxDOT 5XB28 BEAMS | TxDOT 5XB20 BEAMS

HL93 LOADING

Texas Department of Transportation

Bridge Division Standard

# PRESTRESSED CONCRETE X-BEAM STANDARD DESIGNS

## 32' ROADWAY

## XBSD-32

| FILE: xbstds40.dgn | DN: SRW | CK: BMP | DW: SFS | CK: SDB |
|---|---|---|---|---|
| ©TxDOT June 2011 | CONT | SECT | JOB | HIGHWAY |
| REVISIONS | DIST | COUNTY | | SHEET NO. |
| 01-16: Notes, 0.6" strand designs. | | | | |

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DATE:
FILE:

| STRUCTURE | DESIGNED GIRDERS | | | | | | | | | DEPRESSED STRAND PATTERN | | CONCRETE | | OPTIONAL DESIGN | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | PRESTRESSING STRANDS | | | | | | | | | | | | | LIVE LOAD DISTRIBUTION FACTOR (2) | |
| | SPAN NO. | GIRDER NO. | GIRDER TYPE | NON-STD STRAND PATTERN | TOTAL NO. | SIZE (in) | STRGTH fpu (ksi) | "e" ℄ (in) | "e" END (in) | NO. | TO END (in) | RELEASE STRGTH (1) f'ci (ksi) | MINIMUM 28 DAY COMP STRGTH f'c (ksi) | DESIGN LOAD COMP STRESS (TOP ℄) (SERVICE I) fct(ksi) | DESIGN LOAD TENSILE STRESS (BOTT ℄) (SERVICE III) fcb(ksi) | REQUIRED MINIMUM ULTIMATE MOMENT CAPACITY (STRENGTH I) (kip-ft) | Moment | Shear |
| Type Tx28 Girders 28' Roadway 8.5" Slab | 40 | ALL | Tx28 | | 12 | 0.6 | 270 | 10.48 | 10.48 | | | 4.700 | 5.000 | 1.152 | -1.588 | 1581 | 0.760 | 0.960 |
| | 45 | ALL | Tx28 | | 12 | 0.6 | 270 | 10.48 | 10.48 | | | 4.800 | 5.800 | 1.458 | -1.949 | 1578 | 0.740 | 0.970 |
| | 50 | ALL | Tx28 | | 14 | 0.6 | 270 | 10.48 | 9.62 | 2 | 8.5 | 4.000 | 5.200 | 1.787 | -2.340 | 1855 | 0.710 | 0.970 |
| | 55 | ALL | Tx28 | | 18 | 0.6 | 270 | 10.04 | 7.81 | 4 | 14.5 | 4.000 | 6.000 | 2.167 | -2.793 | 2180 | 0.700 | 0.980 |
| | 60 | ALL | Tx28 | | 22 | 0.6 | 270 | 9.75 | 6.48 | 4 | 22.5 | 4.400 | 6.500 | 2.557 | -3.243 | 2487 | 0.680 | 0.980 |
| | 65 | ALL | Tx28 | | 24 | 0.6 | 270 | 9.65 | 7.65 | 4 | 16.5 | 5.200 | 6.600 | 2.999 | -3.736 | 2808 | 0.660 | 0.980 |
| | 70 | ALL | Tx28 | | 28 | 0.6 | 270 | 9.48 | 6.91 | 4 | 22.5 | 5.700 | 7.400 | 3.448 | -4.249 | 3154 | 0.650 | 0.990 |
| Type Tx34 Girders 28' Roadway 8.5" Slab | 40 | ALL | Tx34 | | 12 | 0.6 | 270 | 13.01 | 13.01 | | | 4.000 | 5.000 | 0.884 | -1.199 | 1806 | 0.790 | 0.940 |
| | 45 | ALL | Tx34 | | 12 | 0.6 | 270 | 13.01 | 13.01 | | | 4.000 | 5.000 | 1.113 | -1.460 | 1921 | 0.760 | 0.950 |
| | 50 | ALL | Tx34 | | 14 | 0.6 | 270 | 13.01 | 13.01 | | | 5.100 | 6.000 | 1.375 | -1.769 | 2187 | 0.740 | 0.950 |
| | 55 | ALL | Tx34 | | 14 | 0.6 | 270 | 13.01 | 13.01 | | | 5.000 | 6.000 | 1.662 | -2.098 | 2224 | 0.720 | 0.960 |
| | 60 | ALL | Tx34 | | 16 | 0.6 | 270 | 12.76 | 11.76 | 4 | 8.5 | 4.000 | 5.000 | 1.957 | -2.432 | 2537 | 0.700 | 0.960 |
| | 65 | ALL | Tx34 | | 20 | 0.6 | 270 | 12.41 | 9.61 | 4 | 18.5 | 4.000 | 5.500 | 2.285 | -2.804 | 2886 | 0.690 | 0.960 |
| | 70 | ALL | Tx34 | | 22 | 0.6 | 270 | 12.28 | 8.65 | 4 | 24.5 | 4.200 | 5.800 | 2.636 | -3.195 | 3247 | 0.680 | 0.970 |
| | 75 | ALL | Tx34 | | 26 | 0.6 | 270 | 12.09 | 8.40 | 4 | 28.5 | 4.800 | 6.100 | 3.004 | -3.588 | 3587 | 0.660 | 0.970 |
| | 80 | ALL | Tx34 | | 30 | 0.6 | 270 | 11.81 | 7.81 | 6 | 26.5 | 5.300 | 6.500 | 3.398 | -4.016 | 3966 | 0.650 | 0.970 |
| | 85 | ALL | Tx34 | | 34 | 0.6 | 270 | 11.48 | 7.25 | 6 | 30.5 | 5.800 | 7.100 | 3.830 | -4.476 | 4364 | 0.640 | 0.980 |
| Type Tx40 Girders 28' Roadway 8.5" Slab | 40 | ALL | Tx40 | | 10 | 0.6 | 270 | 15.60 | 15.60 | | | 4.000 | 5.000 | 0.735 | -0.976 | 1872 | 0.820 | 0.930 |
| | 45 | ALL | Tx40 | | 12 | 0.6 | 270 | 15.60 | 15.60 | | | 4.000 | 5.000 | 0.917 | -1.181 | 2207 | 0.790 | 0.930 |
| | 50 | ALL | Tx40 | | 14 | 0.6 | 270 | 15.60 | 15.60 | | | 4.500 | 5.500 | 1.130 | -1.430 | 2590 | 0.770 | 0.940 |
| | 55 | ALL | Tx40 | | 14 | 0.6 | 270 | 15.60 | 15.60 | | | 4.300 | 5.300 | 1.364 | -1.695 | 2518 | 0.750 | 0.940 |
| | 60 | ALL | Tx40 | | 16 | 0.6 | 270 | 15.35 | 14.35 | 4 | 8.5 | 4.000 | 5.000 | 1.604 | -1.964 | 2637 | 0.730 | 0.950 |
| | 65 | ALL | Tx40 | | 16 | 0.6 | 270 | 15.35 | 14.35 | 4 | 8.5 | 4.000 | 5.000 | 1.876 | -2.258 | 2970 | 0.710 | 0.950 |
| | 70 | ALL | Tx40 | | 18 | 0.6 | 270 | 15.16 | 14.27 | 4 | 8.5 | 4.000 | 5.000 | 2.170 | -2.579 | 3347 | 0.700 | 0.950 |
| | 75 | ALL | Tx40 | | 22 | 0.6 | 270 | 14.87 | 11.24 | 4 | 24.5 | 4.000 | 5.300 | 2.461 | -2.887 | 3694 | 0.680 | 0.950 |
| | 80 | ALL | Tx40 | | 24 | 0.6 | 270 | 14.77 | 10.77 | 4 | 28.5 | 4.300 | 5.500 | 2.793 | -3.239 | 4093 | 0.670 | 0.960 |
| | 85 | ALL | Tx40 | | 28 | 0.6 | 270 | 14.60 | 10.03 | 4 | 36.5 | 4.800 | 5.700 | 3.120 | -3.588 | 4489 | 0.660 | 0.960 |
| | 90 | ALL | Tx40 | | 32 | 0.6 | 270 | 14.23 | 8.98 | 6 | 34.5 | 5.200 | 5.800 | 3.489 | -3.972 | 4911 | 0.650 | 0.960 |
| | 95 | ALL | Tx40 | | 36 | 0.6 | 270 | 13.93 | 8.93 | 6 | 36.5 | 5.800 | 6.500 | 3.863 | -4.359 | 5336 | 0.640 | 0.970 |
| Type Tx46 Girders 28' Roadway 8.5" Slab | 40 | ALL | Tx46 | | 10 | 0.6 | 270 | 17.60 | 17.60 | | | 4.000 | 5.000 | 0.646 | -0.778 | 1949 | 0.850 | 0.920 |
| | 45 | ALL | Tx46 | | 12 | 0.6 | 270 | 17.60 | 17.60 | | | 4.000 | 5.000 | 0.809 | -0.947 | 2308 | 0.820 | 0.920 |
| | 50 | ALL | Tx46 | | 12 | 0.6 | 270 | 17.60 | 17.60 | | | 4.000 | 5.000 | 0.994 | -1.141 | 2728 | 0.790 | 0.920 |
| | 55 | ALL | Tx46 | | 14 | 0.6 | 270 | 17.60 | 17.60 | | | 4.000 | 5.000 | 1.190 | -1.346 | 3018 | 0.770 | 0.930 |
| | 60 | ALL | Tx46 | | 14 | 0.6 | 270 | 17.60 | 17.60 | | | 4.500 | 5.500 | 1.412 | -1.577 | 3048 | 0.760 | 0.930 |
| | 65 | ALL | Tx46 | | 16 | 0.6 | 270 | 17.35 | 16.35 | 4 | 8.5 | 4.000 | 5.000 | 1.649 | -1.814 | 3161 | 0.740 | 0.930 |
| | 70 | ALL | Tx46 | | 16 | 0.6 | 270 | 17.35 | 16.85 | 4 | 6.5 | 4.000 | 5.000 | 1.903 | -2.063 | 3487 | 0.720 | 0.940 |
| | 75 | ALL | Tx46 | | 18 | 0.6 | 270 | 17.16 | 15.83 | 4 | 10.5 | 4.000 | 5.000 | 2.162 | -2.322 | 3884 | 0.710 | 0.940 |
| | 80 | ALL | Tx46 | | 22 | 0.6 | 270 | 16.88 | 15.06 | 4 | 14.5 | 4.000 | 5.000 | 2.452 | -2.607 | 4306 | 0.700 | 0.940 |
| | 85 | ALL | Tx46 | | 24 | 0.6 | 270 | 16.77 | 14.10 | 4 | 20.5 | 4.000 | 5.000 | 2.738 | -2.889 | 4726 | 0.690 | 0.940 |
| | 90 | ALL | Tx46 | | 28 | 0.6 | 270 | 16.60 | 11.46 | 4 | 40.5 | 4.200 | 5.200 | 3.061 | -3.199 | 5174 | 0.680 | 0.950 |
| | 95 | ALL | Tx46 | | 32 | 0.6 | 270 | 16.23 | 9.85 | 6 | 40.5 | 4.500 | 5.400 | 3.387 | -3.512 | 5624 | 0.670 | 0.950 |
| | 100 | ALL | Tx46 | | 36 | 0.6 | 270 | 15.94 | 10.27 | 6 | 40.5 | 5.100 | 5.800 | 3.728 | -3.837 | 6086 | 0.660 | 0.950 |
| | 105 | ALL | Tx46 | | 40 | 0.6 | 270 | 15.70 | 10.30 | 6 | 42.5 | 5.600 | 6.400 | 4.099 | -4.186 | 6571 | 0.650 | 0.950 |

## NON-STANDARD STRAND PATTERNS

| PATTERN | STRAND ARRANGEMENT AT ℄ OF GIRDER |
|---|---|
| | |
| | |
| | |
| | |
| | |
| | |

(1) Based on the following allowable stresses (ksi):

Compression = 0.65 f'ci

Tension = $0.24\sqrt{f'ci}$

Optional designs must likewise conform.

(2) Portion of full HL93.

### DESIGN NOTES:

Designed according to AASHTO LRFD Bridge Design Specifications.

Optional designs for girders 120 feet or longer must have a calculated residual camber equal to or greater than that of the designed girder.

Prestress losses for the designed girders have been calculated for a relative humidity of 60 percent. Optional designs must likewise conform.

### FABRICATION NOTES:

Provide Class H concrete.

Provide Grade 60 reinforcing steel bars.

Use low relaxation strands, each pretensioned to 75 percent of fpu.

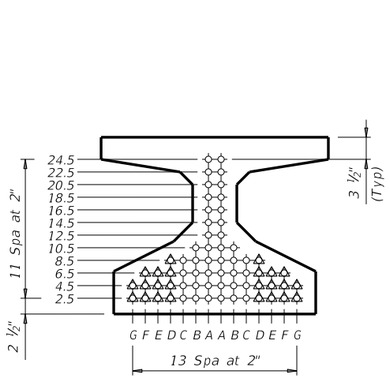
Strand debonding must comply with Item 424.4.2.2.2.4. Full-length debonded strands are only permitted in positions marked △. Double wrap full-length debonded strands in outer most position of each row.

When shown on this sheet, the Fabricator has the option of furnishing either the designed girder or an approved optional design. All optional design submittals must be signed, sealed and dated by a Professional Engineer registered in the State of Texas.

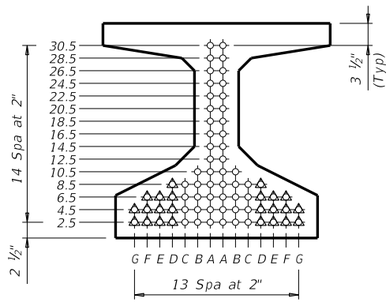
Seal cracks in girder ends exceeding 0.005" in width as directed by the Engineer. The fabricator is permitted to decrease the spacing of Bars R and S by providing additional bars to help limit crack width provided the decreased spacing results in no less than 1" clear between bars. The fabricator must take an approved corrective action if cracks greater than 0.005" form on a repetitive basis.

### DEPRESSED STRAND DESIGNS:

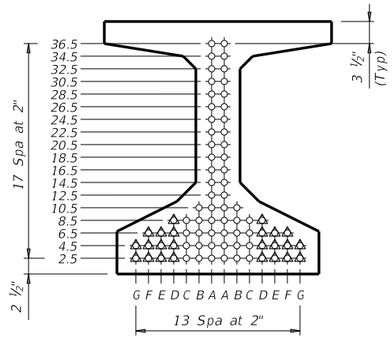
Locate strands for the designed girder as low as possible on the 2" grid system unless a non-standard strand pattern is indicated. Fill row "2.5", then row "4.5", then row "6.5", etc., beginning each row in the "A" position and working outward until the required number of strands is reached. All strands in the "A" position must be depressed, maintaining the 2" spacing so that, at the girder ends, the upper two strands are in the position shown in the table.



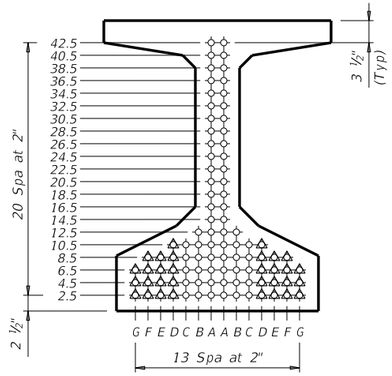

TYPE Tx28




TYPE Tx34




TYPE Tx40




TYPE Tx46

HL93 LOADING

SHEET 1 OF 2

Texas Department of Transportation

Bridge Division Standard

# PRESTRESSED CONCRETE I-GIRDER STANDARD DESIGNS

## 28' ROADWAY

# IGSD-28

| FILE: ig02stds-19.dgn | DN: EFC | CK: AJF | DW: EFC | CK: TAR |
|---|---|---|---|---|
| ©TxDOT August 2017 | CONT | SECT | JOB | HIGHWAY |
| REVISIONS 10-19: Redesigned girders. | DIST | COUNTY | | SHEET NO. |

DATE:
FILE:

| STRUCTURE | DESIGNED GIRDERS | | | | | | | | DEPRESSED STRAND PATTERN | | CONCRETE | | OPTIONAL DESIGN | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | PRESTRESSING STRANDS | | | | | | | | | | | | LIVE LOAD DISTRIBUTION FACTOR (2) | |
| | SPAN NO. | GIRDER NO. | GIRDER TYPE | NON-STD STRAND PATTERN | TOTAL NO. | SIZE (in) | STRGTH fpu (ksi) | "e" ℄ (in) | "e" END (in) | NO. | TO END (in) | RELEASE STRGTH (1) f'ci (ksi) | MINIMUM 28 DAY COMP STRGTH f'c (ksi) | DESIGN LOAD COMP STRESS (TOP ℄) (SERVICE I) fct(ksi) | DESIGN LOAD TENSILE STRESS (BOTT ℄) (SERVICE III) fcb(ksi) | REQUIRED MINIMUM ULTIMATE MOMENT CAPACITY (STRENGTH I) (kip-ft) | Moment | Shear |
| Type Tx54 Girders 28' Roadway 8.5" Slab | 40 | ALL | Tx54 | | 10 | 0.6 | 270 | 21.01 | 21.01 | | | 4.000 | 5.000 | 0.536 | -0.634 | 2015 | 0.880 | 0.910 |
| | 45 | ALL | Tx54 | | 12 | 0.6 | 270 | 21.01 | 21.01 | | | 4.000 | 5.000 | 0.670 | -0.771 | 2387 | 0.850 | 0.910 |
| | 50 | ALL | Tx54 | | 12 | 0.6 | 270 | 21.01 | 21.01 | | | 4.000 | 5.000 | 0.822 | -0.929 | 2824 | 0.820 | 0.910 |
| | 55 | ALL | Tx54 | | 14 | 0.6 | 270 | 21.01 | 21.01 | | | 4.000 | 5.000 | 0.983 | -1.096 | 3285 | 0.800 | 0.920 |
| | 60 | ALL | Tx54 | | 14 | 0.6 | 270 | 21.01 | 21.01 | | | 4.000 | 5.000 | 1.163 | -1.277 | 3619 | 0.780 | 0.920 |
| | 65 | ALL | Tx54 | | 16 | 0.6 | 270 | 20.76 | 20.26 | 4 | 6.5 | 4.000 | 5.000 | 1.356 | -1.468 | 3862 | 0.760 | 0.920 |
| | 70 | ALL | Tx54 | | 16 | 0.6 | 270 | 20.76 | 20.26 | 4 | 6.5 | 4.000 | 5.000 | 1.567 | -1.677 | 3811 | 0.750 | 0.920 |
| | 75 | ALL | Tx54 | | 18 | 0.6 | 270 | 20.56 | 19.67 | 4 | 8.5 | 4.000 | 5.000 | 1.782 | -1.884 | 4043 | 0.730 | 0.930 |
| | 80 | ALL | Tx54 | | 18 | 0.6 | 270 | 20.56 | 19.67 | 4 | 8.5 | 4.000 | 5.000 | 2.026 | -2.119 | 4448 | 0.720 | 0.930 |
| | 85 | ALL | Tx54 | | 20 | 0.6 | 270 | 20.41 | 18.81 | 4 | 12.5 | 4.000 | 5.000 | 2.263 | -2.349 | 4883 | 0.710 | 0.930 |
| | 90 | ALL | Tx54 | | 22 | 0.6 | 270 | 20.28 | 18.46 | 4 | 14.5 | 4.000 | 5.000 | 2.528 | -2.601 | 5348 | 0.700 | 0.930 |
| | 95 | ALL | Tx54 | | 26 | 0.6 | 270 | 20.08 | 16.39 | 4 | 28.5 | 4.000 | 5.000 | 2.786 | -2.848 | 5805 | 0.690 | 0.930 |
| | 100 | ALL | Tx54 | | 30 | 0.6 | 270 | 19.81 | 12.21 | 6 | 44.5 | 4.000 | 5.000 | 3.077 | -3.120 | 6296 | 0.680 | 0.940 |
| | 105 | ALL | Tx54 | | 32 | 0.6 | 270 | 19.63 | 12.51 | 6 | 44.5 | 4.300 | 5.000 | 3.381 | -3.403 | 6800 | 0.670 | 0.940 |
| | 110 | ALL | Tx54 | | 36 | 0.6 | 270 | 19.34 | 12.01 | 6 | 50.5 | 4.700 | 5.400 | 3.686 | -3.686 | 7303 | 0.660 | 0.940 |
| | 115 | ALL | Tx54 | | 40 | 0.6 | 270 | 19.11 | 12.51 | 6 | 50.5 | 5.300 | 6.100 | 4.016 | -3.989 | 7832 | 0.650 | 0.940 |
| | 120 | ALL | Tx54 | | 44 | 0.6 | 270 | 18.83 | 11.55 | 8 | 48.5 | 5.600 | 6.500 | 4.352 | -4.308 | 8420 | 0.650 | 0.940 |
| | 125 | ALL | Tx54 | * | 48 | 0.6 | 270 | 18.42 | 10.09 | 10 | 50.5 | 5.800 | 7.200 | 4.709 | -4.633 | 8977 | 0.640 | 0.940 |
| Type Tx62 Girders 28' Roadway 8.5" Slab | 60 | ALL | Tx62 | | 14 | 0.6 | 270 | 25.78 | 25.78 | | | 4.000 | 5.000 | 0.916 | -1.069 | 3911 | 0.800 | 0.910 |
| | 65 | ALL | Tx62 | | 14 | 0.6 | 270 | 25.78 | 25.78 | | | 4.000 | 5.000 | 1.069 | -1.235 | 4248 | 0.790 | 0.910 |
| | 70 | ALL | Tx62 | | 16 | 0.6 | 270 | 25.53 | 25.53 | | | 4.000 | 5.000 | 1.231 | -1.403 | 4544 | 0.770 | 0.910 |
| | 75 | ALL | Tx62 | | 16 | 0.6 | 270 | 25.53 | 25.53 | | | 4.000 | 5.000 | 1.395 | -1.579 | 4502 | 0.760 | 0.920 |
| | 80 | ALL | Tx62 | | 18 | 0.6 | 270 | 25.33 | 25.33 | | | 4.000 | 5.000 | 1.576 | -1.763 | 4785 | 0.740 | 0.920 |
| | 85 | ALL | Tx62 | | 18 | 0.6 | 270 | 25.33 | 25.33 | | | 4.000 | 5.000 | 1.771 | -1.964 | 5084 | 0.730 | 0.920 |
| | 90 | ALL | Tx62 | | 18 | 0.6 | 270 | 25.33 | 25.33 | | | 4.000 | 5.000 | 1.976 | -2.174 | 5571 | 0.720 | 0.920 |
| | 95 | ALL | Tx62 | | 22 | 0.6 | 270 | 25.05 | 23.96 | 4 | 10.5 | 4.000 | 5.000 | 2.192 | -2.393 | 6073 | 0.710 | 0.920 |
| | 100 | ALL | Tx62 | | 24 | 0.6 | 270 | 24.94 | 23.28 | 4 | 14.5 | 4.000 | 5.000 | 2.400 | -2.605 | 6563 | 0.700 | 0.920 |
| | 105 | ALL | Tx62 | | 28 | 0.6 | 270 | 24.78 | 20.21 | 4 | 36.5 | 4.000 | 5.000 | 2.636 | -2.841 | 7092 | 0.690 | 0.930 |
| | 110 | ALL | Tx62 | | 30 | 0.6 | 270 | 24.58 | 17.78 | 6 | 40.5 | 4.000 | 5.000 | 2.858 | -3.067 | 7602 | 0.680 | 0.930 |
| | 115 | ALL | Tx62 | | 34 | 0.6 | 270 | 24.25 | 15.42 | 6 | 56.5 | 4.200 | 5.000 | 3.113 | -3.319 | 8156 | 0.670 | 0.930 |
| | 120 | ALL | Tx62 | | 36 | 0.6 | 270 | 24.11 | 17.11 | 6 | 48.5 | 4.700 | 5.500 | 3.378 | -3.579 | 8725 | 0.660 | 0.930 |
| | 125 | ALL | Tx62 | | 40 | 0.6 | 270 | 23.88 | 16.68 | 6 | 54.5 | 5.100 | 6.000 | 3.629 | -3.839 | 9330 | 0.660 | 0.930 |
| | 130 | ALL | Tx62 | | 44 | 0.6 | 270 | 23.60 | 14.87 | 8 | 56.5 | 5.300 | 6.200 | 3.913 | -4.116 | 9926 | 0.650 | 0.930 |
| | 135 | ALL | Tx62 | | 48 | 0.6 | 270 | 23.28 | 14.94 | 8 | 58.5 | 5.800 | 6.700 | 4.206 | -4.402 | 10535 | 0.640 | 0.940 |

## NON-STANDARD STRAND PATTERNS

| PATTERN | STRAND ARRANGEMENT AT ℄ OF GIRDER |
|---|---|
| * | 2.5(14),4.5(14),6.5(14),8.5(4),10.5(2) |
| | |
| | |
| | |
| | |
| | |

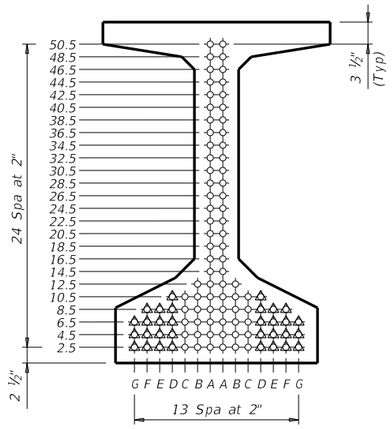
(1) Based on the following allowable stresses (ksi):

Compression = 0.65 f'ci

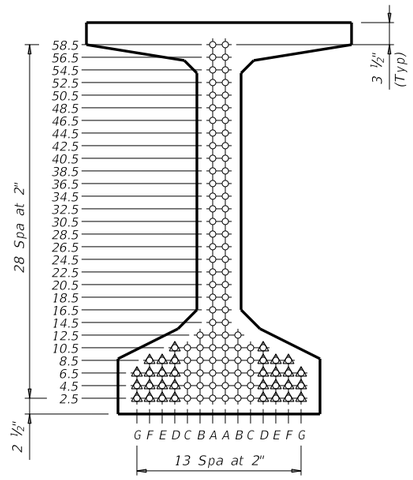
Tension = $0.24\sqrt{f'ci}$

Optional designs must likewise conform.

(2) Portion of full HL93.




TYPE Tx54




TYPE Tx62

HL93 LOADING

SHEET 2 OF 2

Texas Department of Transportation

Bridge Division Standard

# PRESTRESSED CONCRETE I-GIRDER STANDARD DESIGNS

## 28' ROADWAY

## IGSD-28

| FILE: ig02stds-19.dgn | DN: EFC | CK: AJF | DW: EFC | CK: TAR |
|---|---|---|---|---|
| ©TxDOT August 2017 | CONT | SECT | JOB | HIGHWAY |
| REVISIONS 10-19: Redesigned girders. | DIST | COUNTY | | SHEET NO. |

# TABLE OF REQUIRED BEAM SIZES, DESIGN DATA AND STEEL QUANTITIES

| SPAN (ft) | ROLLED BEAM | | | | OPTIONAL PLATE GIRDER | | | | | | Diaphragm Spaces | Stud Spacing | Elastomeric Bearing | Estimated Quantities Structural Steel (lbs) | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Beam Member | Dimension "Y" (in) | Deflection "A" (feet) Slab DL | Deflection "A" (feet) Total DL | Plate Sizes (inches) Top Flange | Bott Flange | Web | Dimension "Y" (in) | Deflection "A" (feet) Slab DL | Deflection "A" (feet) Total DL | "N" (ea) | "X" (in) | Type | Rolled Beam | PL Girder (1) |
| 30 | W18 x 130 | 29.25 | 0.017 | 0.021 | 1 x 12 | 1 1/4 x 12 | 1/2 x 17 | 29.25 | 0.018 | 0.022 | 2 | 8 | SB - 1 | 18,200 | 17,200 |
| | W21 x 132 | 31.83 | 0.013 | 0.017 | 7/8 x 12 | 1 1/4 x 12 | 1/2 x 19.5 | 31.62 | 0.014 | 0.017 | 2 | 8 | SB - 1 | 19,440 | 18,110 |
| | W24 x 117 | 34.26 | 0.012 | 0.015 | 3/4 x 12 | 1 x 12 | 1/2 x 22.5 | 34.25 | 0.013 | 0.016 | 2 | 9 | SB - 1 | 17,660 | 16,920 |
| | W27 x 146 | 37.38 | 0.008 | 0.010 | 3/4 x 14 | 1 x 14 | 1/2 x 25.5 | 37.25 | 0.009 | 0.011 | 2 | 9 | SB - 2 | 21,190 | 19,120 |
| | W30 x 173 | 40.44 | 0.005 | 0.007 | 1 x 15 | 1 1/4 x 15 | 1/2 x 28.5 | 40.75 | 0.005 | 0.007 | 2 | 9 | SB - 3 | 24,490 | 23,620 |
| | W33 x 118 | 42.86 | 0.007 | 0.009 | 3/4 x 12 | 3/4 x 12 | 1/2 x 31.5 | 43.00 | 0.007 | 0.009 | 2 | 10.5 | SB - 1 | 18,490 | 18,290 |
| | W36 x 135 | 45.55 | 0.006 | 0.007 | 3/4 x 12 | 7/8 x 12 | 1/2 x 34 | 45.62 | 0.006 | 0.007 | 2 | 10.5 | SB - 1 | 20,530 | 19,450 |
| | W40 x 149 | 48.20 | 0.005 | 0.006 | 3/4 x 12 | 1 x 12 | 1/2 x 36.5 | 48.25 | 0.005 | 0.006 | 2 | 10.5 | SB - 1 | 22,320 | 20,700 |
| 35 | W18 x 130 | 29.25 | 0.032 | 0.039 | 1 x 12 | 1 1/4 x 12 | 1/2 x 17 | 29.25 | 0.033 | 0.040 | 2 | 8 | SB - 1 | 20,850 | 19,670 |
| | W21 x 132 | 31.83 | 0.025 | 0.031 | 7/8 x 12 | 1 1/4 x 12 | 1/2 x 19.5 | 31.62 | 0.026 | 0.032 | 2 | 8 | SB - 1 | 22,140 | 20,560 |
| | W24 x 117 | 34.26 | 0.022 | 0.027 | 3/4 x 12 | 1 x 12 | 1/2 x 22.5 | 34.25 | 0.024 | 0.029 | 2 | 9 | SB - 1 | 20,040 | 19,160 |
| | W27 x 146 | 37.38 | 0.014 | 0.018 | 3/4 x 14 | 1 x 14 | 1/2 x 25.5 | 37.25 | 0.016 | 0.020 | 2 | 9 | SB - 2 | 24,160 | 21,690 |
| | W30 x 173 | 40.44 | 0.010 | 0.013 | 1 x 15 | 1 1/4 x 15 | 1/2 x 28.5 | 40.75 | 0.010 | 0.013 | 2 | 9 | SB - 3 | 28,000 | 26,930 |
| | W33 x 118 | 42.86 | 0.014 | 0.017 | 3/4 x 12 | 3/4 x 12 | 1/2 x 31.5 | 43.00 | 0.013 | 0.016 | 2 | 10.5 | SB - 1 | 20,890 | 20,640 |
| | W36 x 135 | 45.55 | 0.010 | 0.013 | 3/4 x 12 | 7/8 x 12 | 1/2 x 34 | 45.62 | 0.011 | 0.013 | 2 | 10.5 | SB - 1 | 23,280 | 21,980 |
| | W40 x 149 | 48.20 | 0.008 | 0.011 | 3/4 x 12 | 1 x 12 | 1/2 x 36.5 | 48.25 | 0.009 | 0.011 | 2 | 10.5 | SB - 1 | 25,350 | 23,410 |
| 40 | W18 x 130 | 29.25 | 0.054 | 0.067 | 1 x 12 | 1 1/4 x 12 | 1/2 x 17 | 29.25 | 0.055 | 0.068 | 3 | 8 | SB - 1 | 24,080 | 22,720 |
| | W21 x 132 | 31.83 | 0.042 | 0.052 | 7/8 x 12 | 1 1/4 x 12 | 1/2 x 19.5 | 31.62 | 0.044 | 0.054 | 2 | 8 | SB - 1 | 24,840 | 23,020 |
| | W24 x 117 | 34.26 | 0.038 | 0.047 | 3/4 x 12 | 1 x 12 | 1/2 x 22.5 | 34.25 | 0.041 | 0.050 | 2 | 9 | SB - 1 | 22,430 | 21,390 |
| | W27 x 146 | 37.38 | 0.024 | 0.031 | 3/4 x 14 | 1 x 14 | 1/2 x 25.5 | 37.25 | 0.028 | 0.035 | 2 | 9 | SB - 2 | 27,130 | 24,270 |
| | W30 x 173 | 40.44 | 0.017 | 0.022 | 1 x 15 | 1 1/4 x 15 | 1/2 x 28.5 | 40.75 | 0.017 | 0.022 | 2 | 9 | SB - 3 | 31,510 | 30,240 |
| | W33 x 118 | 42.86 | 0.023 | 0.028 | 3/4 x 12 | 3/4 x 12 | 1/2 x 31.5 | 43.00 | 0.023 | 0.028 | 2 | 10.5 | SB - 1 | 23,300 | 22,980 |
| | W36 x 135 | 45.55 | 0.018 | 0.022 | 3/4 x 12 | 7/8 x 12 | 1/2 x 34 | 45.62 | 0.018 | 0.023 | 2 | 10.5 | SB - 1 | 26,030 | 24,510 |
| | W40 x 149 | 48.20 | 0.014 | 0.018 | 3/4 x 12 | 1 x 12 | 1/2 x 36.5 | 48.25 | 0.015 | 0.019 | 2 | 10.5 | SB - 1 | 28,370 | 26,130 |
| 45 | W18 x 130 | 29.25 | 0.087 | 0.108 | 1 x 12 | 1 1/4 x 12 | 1/2 x 17 | 29.25 | 0.089 | 0.109 | 3 | 8 | SB - 1 | 26,740 | 25,190 |
| | W21 x 132 | 31.83 | 0.067 | 0.084 | 7/8 x 12 | 1 1/4 x 12 | 1/2 x 19.5 | 31.62 | 0.070 | 0.086 | 2 | 8 | SB - 1 | 27,540 | 25,470 |
| | W24 x 117 | 34.26 | 0.061 | 0.075 | 3/4 x 12 | 1 x 12 | 1/2 x 22.5 | 34.25 | 0.065 | 0.079 | 2 | 9 | SB - 1 | 24,830 | 23,650 |
| | W27 x 146 | 37.38 | 0.039 | 0.050 | 3/4 x 14 | 1 x 14 | 1/2 x 25.5 | 37.25 | 0.045 | 0.056 | 2 | 9 | SB - 2 | 30,110 | 26,860 |
| | W30 x 173 | 40.44 | 0.027 | 0.035 | 1 x 15 | 1 1/4 x 15 | 1/2 x 28.5 | 40.75 | 0.027 | 0.035 | 2 | 9 | SB - 3 | 35,020 | 33,560 |
| | W33 x 118 | 42.86 | 0.037 | 0.046 | 3/4 x 12 | 3/4 x 12 | 1/2 x 31.5 | 43.00 | 0.036 | 0.045 | 2 | 10.5 | SB - 1 | 25,700 | 25,310 |
| | W36 x 135 | 45.55 | 0.028 | 0.036 | 3/4 x 12 | 7/8 x 12 | 1/2 x 34 | 45.62 | 0.029 | 0.037 | 2 | 10.5 | SB - 1 | 28,760 | 27,030 |
| | W40 x 149 | 48.20 | 0.023 | 0.029 | 3/4 x 12 | 1 x 12 | 1/2 x 36.5 | 48.25 | 0.024 | 0.030 | 2 | 10.5 | SB - 1 | 31,390 | 28,830 |
| 50 | W18 x 130 | 29.25 | 0.132 | 0.164 | 1 x 12 | 1 1/4 x 12 | 1/2 x 17 | 29.25 | 0.135 | 0.166 | 3 | 8 | SB - 1 | 29,400 | 27,660 |
| | W21 x 132 | 31.83 | 0.102 | 0.128 | 7/8 x 12 | 1 1/4 x 12 | 1/2 x 19.5 | 31.62 | 0.107 | 0.131 | 2 | 8 | SB - 1 | 30,230 | 27,930 |
| | W24 x 117 | 34.26 | 0.093 | 0.114 | 3/4 x 12 | 1 x 12 | 1/2 x 22.5 | 34.25 | 0.099 | 0.121 | 2 | 9 | SB - 1 | 27,220 | 25,880 |
| | W27 x 146 | 37.38 | 0.059 | 0.076 | 3/4 x 14 | 1 x 14 | 1/2 x 25.5 | 37.25 | 0.068 | 0.085 | 2 | 9 | SB - 2 | 33,070 | 29,440 |
| | W30 x 173 | 40.44 | 0.041 | 0.054 | 1 x 15 | 1 1/4 x 15 | 1/2 x 28.5 | 40.75 | 0.040 | 0.053 | 2 | 9 | SB - 3 | 38,530 | 36,870 |
| | W33 x 118 | 42.86 | 0.056 | 0.069 | 3/4 x 12 | 3/4 x 12 | 1/2 x 31.5 | 43.00 | 0.055 | 0.068 | 2 | 10.5 | SB - 1 | 28,100 | 27,650 |
| | W36 x 135 | 45.55 | 0.043 | 0.054 | 3/4 x 12 | 7/8 x 12 | 1/2 x 34 | 45.62 | 0.045 | 0.056 | 2 | 10.5 | SB - 1 | 31,510 | 29,560 |
| | W40 x 149 | 48.20 | 0.035 | 0.044 | 3/4 x 12 | 1 x 12 | 1/2 x 36.5 | 48.25 | 0.036 | 0.045 | 2 | 10.5 | SB - 1 | 34,420 | 31,550 |
| 55 | W21 x 132 | 31.83 | 0.149 | 0.187 | 7/8 x 12 | 1 1/4 x 12 | 1/2 x 19.5 | 31.62 | 0.156 | 0.192 | 3 | 8 | SB - 2 | 33,900 | 31,350 |
| | W24 x 117 | 34.26 | 0.136 | 0.167 | 3/4 x 12 | 1 x 12 | 1/2 x 22.5 | 34.25 | 0.146 | 0.177 | 3 | 9 | SB - 2 | 30,580 | 29,100 |
| | W27 x 146 | 37.38 | 0.087 | 0.111 | 3/4 x 14 | 1 x 14 | 1/2 x 25.5 | 37.25 | 0.100 | 0.124 | 3 | 9 | SB - 2 | 36,970 | 32,950 |
| | W30 x 173 | 40.44 | 0.060 | 0.079 | 1 x 15 | 1 1/4 x 15 | 1/2 x 28.5 | 40.75 | 0.059 | 0.077 | 3 | 9 | SB - 3 | 42,980 | 41,120 |
| | W33 x 118 | 42.86 | 0.082 | 0.102 | 3/4 x 12 | 3/4 x 12 | 1/2 x 31.5 | 43.00 | 0.081 | 0.100 | 3 | 10.5 | SB - 2 | 31,740 | 31,210 |
| | W36 x 135 | 45.55 | 0.063 | 0.080 | 3/4 x 12 | 7/8 x 12 | 1/2 x 34 | 45.62 | 0.065 | 0.081 | 3 | 10.5 | SB - 2 | 35,490 | 33,320 |
| | W40 x 149 | 48.20 | 0.051 | 0.065 | 3/4 x 12 | 1 x 12 | 1/2 x 36.5 | 48.25 | 0.053 | 0.066 | 3 | 10.5 | SB - 2 | 38,720 | 35,540 |
| 60 | W21 x 166 | 32.48 | 0.161 | 0.209 | 1 x 12 | 1 5/8 x 12 | 1/2 x 19.75 | 32.38 | 0.187 | 0.235 | 3 | 8 | SB - 2 | 44,710 | 38,800 |
| | W24 x 131 | 34.48 | 0.171 | 0.214 | 7/8 x 12 | 1 1/8 x 12 | 1/2 x 22.5 | 34.50 | 0.183 | 0.225 | 3 | 9 | SB - 2 | 36,310 | 33,750 |
| | W27 x 146 | 37.38 | 0.123 | 0.157 | 3/4 x 14 | 1 x 14 | 1/2 x 25.5 | 37.25 | 0.141 | 0.176 | 3 | 9 | SB - 2 | 39,930 | 35,530 |
| | W30 x 173 | 40.44 | 0.085 | 0.112 | 1 x 15 | 1 1/4 x 15 | 1/2 x 28.5 | 40.75 | 0.084 | 0.109 | 3 | 9 | SB - 3 | 46,480 | 44,430 |
| | W33 x 118 | 42.86 | 0.117 | 0.144 | 3/4 x 12 | 3/4 x 12 | 1/2 x 31.5 | 43.00 | 0.115 | 0.142 | 3 | 10.5 | SB - 2 | 34,140 | 33,560 |
| | W36 x 135 | 45.55 | 0.089 | 0.113 | 3/4 x 12 | 7/8 x 12 | 1/2 x 34 | 45.62 | 0.093 | 0.115 | 3 | 10.5 | SB - 2 | 38,240 | 35,850 |
| | W40 x 149 | 48.20 | 0.072 | 0.092 | 3/4 x 12 | 1 x 12 | 1/2 x 36.5 | 48.25 | 0.076 | 0.093 | 3 | 10.5 | SB - 2 | 41,750 | 38,250 |

(1) For Contractor's information only. Structural Steel pay weight shall be based on Rolled Beams.

**GENERAL NOTES:**

Designed according to AASHTO LRFD Specifications.

See Steel Beam Span sheets for beam spacing, diaphragm locations, fabrication notes and references to values "A", "N", "X" & "Y".

See standard SBEB for bearing details.

Indicated beam/girder designs are applicable for spans with 0, 15 and 30 degree skews.

See Bridge Layout for beam type. Change in beam type within a bridge, for example W18 to W24, is not supported by this standard.

The standard beam designs shown on these sheets are applicable for use only with the Steel Beam Spans shown on Standards SSB-28, SSB-28-15 and SSB-28-30.

HL93 LOADING

SHEET 1 OF 2

Texas Department of Transportation

Bridge Division Standard

# STEEL BEAM STANDARD DESIGNS

## 28' ROADWAY

## SBSD-28

| FILE: sbstde15.dgn | DN: TxDOT | CK: TxDOT | DW: TxDOT | CK: TxDOT |
|---|---|---|---|---|
| ©TxDOT August 2004 | CONT | SECT | JOB | HIGHWAY |
| REVISIONS | | | | |
| Rev. 02-06: W36 sections | DIST | COUNTY | | SHEET NO. |

DISCLAIMER:
The use of this standard is governed by the "Texas Engineering Practice Act". No warranty of any kind is made by TxDOT for any purpose whatsoever. TxDOT assumes no responsibility for the conversion of this standard to other formats or for incorrect results or damages resulting from its use.

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# TABLE OF REQUIRED BEAM SIZES, DESIGN DATA AND STEEL QUANTITIES

| SPAN (ft) | ROLLED BEAM | | | | OPTIONAL PLATE GIRDER | | | | | | Diaphragm Spaces | Stud Spacing | Elastomeric Bearing | Estimated Quantities Structural Steel (lbs) | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Beam Member | Dimension "Y" (in) | Deflection "A" (feet) | | Plate Sizes (inches) | | | Dimension "Y" (in) | Deflection "A" (feet) | | | | | | |
| | | | Slab DL | Total DL | Top Flange | Bott Flange | Web | | Slab DL | Total DL | "N" (ea) | "X" (in) | Type | Rolled Beam | PL Girder (1) |
| 65 | W24 x 162 | 35.00 | 0.185 | 0.239 | 1 1/4 x 12 | 1 1/2 x 12 | 1/2 x 22.5 | 35.25 | 0.196 | 0.248 | 3 | 9 | SB - 2 | 47,010 | 44,160 |
| | W27 x 146 | 37.38 | 0.170 | 0.216 | 3/4 x 14 | 1 x 14 | 1/2 x 25.5 | 37.25 | 0.195 | 0.242 | 3 | 9 | SB - 2 | 42,910 | 38,120 |
| | W30 x 173 | 40.44 | 0.117 | 0.154 | 1 x 15 | 1 1/4 x 15 | 1/2 x 28.5 | 40.75 | 0.116 | 0.150 | 3 | 9 | SB - 3 | 50,000 | 47,760 |
| | W33 x 130 | 43.09 | 0.142 | 0.178 | 3/4 x 12 | 3/4 x 12 | 1/2 x 31.5 | 43.00 | 0.141 | 0.176 | 3 | 10.5 | SB - 2 | 39,640 | 35,960 |
| | W36 x 135 | 45.55 | 0.123 | 0.155 | 3/4 x 12 | 7/8 x 12 | 1/2 x 34 | 45.62 | 0.128 | 0.159 | 3 | 10.5 | SB - 2 | 40,980 | 38,370 |
| | W40 x 149 | 48.20 | 0.099 | 0.127 | 3/4 x 12 | 1 x 12 | 1/2 x 36.5 | 48.25 | 0.104 | 0.129 | 3 | 10.5 | SB - 2 | 44,760 | 40,960 |
| 70 | W24 x 207 | 35.71 | 0.189 | 0.257 | 1 1/2 x 12 | 1 7/8 x 12 | 1/2 x 22.5 | 35.88 | 0.203 | 0.267 | 3 | 9 | SB - 2 | 62,830 | 54,300 |
| | W27 x 178 | 37.81 | 0.185 | 0.244 | 3/4 x 14 | 1 3/8 x 14 | 1/2 x 25.5 | 37.62 | 0.229 | 0.289 | 3 | 9 | SB - 2 | 54,800 | 45,690 |
| | W30 x 173 | 40.44 | 0.158 | 0.207 | 1 x 15 | 1 1/4 x 15 | 1/2 x 28.5 | 40.75 | 0.155 | 0.202 | 3 | 9 | SB - 3 | 53,510 | 51,070 |
| | W33 x 141 | 43.30 | 0.173 | 0.220 | 3/4 x 12 | 1 1/8 x 12 | 1/2 x 31.5 | 43.38 | 0.182 | 0.227 | 3 | 9 | SB - 2 | 45,440 | 42,570 |
| | W36 x 135 | 45.55 | 0.166 | 0.209 | 3/4 x 12 | 7/8 x 12 | 1/2 x 34 | 45.62 | 0.172 | 0.214 | 3 | 10.5 | SB - 2 | 43,720 | 40,900 |
| | W40 x 149 | 48.20 | 0.133 | 0.170 | 3/4 x 12 | 1 x 12 | 1/2 x 36.5 | 48.25 | 0.140 | 0.173 | 3 | 10.5 | SB - 2 | 47,790 | 43,670 |
| 75 | W27 x 217 | 38.43 | 0.193 | 0.265 | 1 1/4 x 14 | 1 3/4 x 14 | 1/2 x 25.5 | 38.50 | 0.209 | 0.277 | 3 | 9 | SB - 2 | 70,050 | 61,050 |
| | W30 x 191 | 40.68 | 0.213 | 0.286 | 1 x 15 | 1 3/8 x 15 | 1/2 x 28.5 | 40.88 | 0.198 | 0.259 | 3 | 9 | SB - 3 | 62,390 | 56,290 |
| | W33 x 169 | 43.82 | 0.184 | 0.241 | 1 x 12 | 1 1/4 x 12 | 1/2 x 31.5 | 43.75 | 0.203 | 0.259 | 3 | 10.5 | SB - 2 | 56,580 | 49,710 |
| | W36 x 160 | 46.01 | 0.176 | 0.228 | 7/8 x 12 | 1 1/4 x 12 | 1/2 x 34 | 46.12 | 0.183 | 0.233 | 3 | 10.5 | SB - 2 | 53,940 | 49,520 |
| | W40 x 149 | 48.20 | 0.175 | 0.224 | 3/4 x 12 | 1 x 12 | 1/2 x 36.5 | 48.25 | 0.184 | 0.228 | 3 | 10.5 | SB - 2 | 50,820 | 46,390 |
| 80 | W27 x 235 | 38.66 | 0.231 | 0.322 | 1 1/4 x 14 | 1 3/4 x 14 | 1/2 x 25.75 | 38.75 | 0.266 | 0.354 | 4 | 9 | SB - 3 | 81,170 | 65,980 |
| | W30 x 191 | 40.68 | 0.243 | 0.326 | 1 x 15 | 1 3/8 x 15 | 1/2 x 28.5 | 40.88 | 0.256 | 0.335 | 4 | 9 | SB - 3 | 67,190 | 60,680 |
| | W33 x 201 | 43.68 | 0.194 | 0.263 | 3/4 x 16 | 1 1/4 x 16 | 1/2 x 31.5 | 43.50 | 0.237 | 0.306 | 4 | 10.5 | SB - 3 | 71,440 | 59,470 |
| | W36 x 170 | 46.17 | 0.212 | 0.278 | 7/8 x 12 | 1 1/4 x 12 | 1/2 x 34 | 46.12 | 0.238 | 0.303 | 4 | 10.5 | SB - 3 | 61,610 | 53,690 |
| | W40 x 167 | 48.59 | 0.192 | 0.251 | 7/8 x 12 | 1 1/4 x 12 | 1/2 x 36.5 | 48.62 | 0.205 | 0.262 | 4 | 12 | SB - 3 | 60,790 | 55,190 |
| 85 | W30 x 235 | 41.30 | 0.244 | 0.341 | 1 x 15 | 1 3/4 x 15 | 1/2 x 28.5 | 41.25 | 0.294 | 0.390 | 4 | 10.5 | SB - 3 | 85,870 | 70,480 |
| | W33 x 221 | 43.93 | 0.223 | 0.308 | 1 1/4 x 16 | 1 3/8 x 16 | 1/2 x 31.5 | 44.12 | 0.226 | 0.306 | 4 | 10.5 | SB - 3 | 82,270 | 74,260 |
| | W36 x 194 | 46.49 | 0.236 | 0.317 | 1 1/8 x 12 | 1 1/2 x 12 | 1/2 x 34 | 46.62 | 0.250 | 0.327 | 4 | 10.5 | SB - 3 | 73,170 | 63,530 |
| | W40 x 183 | 48.98 | 0.214 | 0.285 | 1 x 12 | 1 3/8 x 12 | 1/2 x 36.5 | 48.88 | 0.237 | 0.307 | 4 | 12 | SB - 3 | 69,580 | 61,650 |
| 90 | W30 x 261 | 41.61 | 0.274 | 0.394 | 1 1/4 x 15 | 1 7/8 x 15 | 1/2 x 28.5 | 41.62 | 0.319 | 0.434 | 4 | 10.5 | SB - 3 | 99,940 | 81,150 |
| | W33 x 241 | 44.18 | 0.253 | 0.357 | 1 1/8 x 16 | 1 5/8 x 16 | 1/2 x 31.5 | 44.25 | 0.278 | 0.377 | 4 | 10.5 | SB - 3 | 93,910 | 80,670 |
| | W36 x 231 | 46.49 | 0.268 | 0.374 | 1 1/8 x 16 | 1 1/2 x 16 | 1/2 x 33.5 | 46.12 | 0.256 | 0.346 | 4 | 10.5 | SB - 3 | 90,360 | 79,520 |
| | W40 x 199 | 48.67 | 0.241 | 0.327 | 7/8 x 16 | 1 1/4 x 16 | 1/2 x 36.5 | 48.62 | 0.261 | 0.344 | 4 | 12 | SB - 3 | 79,020 | 71,760 |
| 95 | W33 x 291 | 44.84 | 0.253 | 0.374 | 1 1/2 x 16 | 2 x 16 | 1/2 x 31.5 | 45.00 | 0.270 | 0.382 | 4 | 12 | SB - 3 | 117,630 | 100,150 |
| | W36 x 231 | 46.49 | 0.299 | 0.417 | 1 1/8 x 16 | 1 1/2 x 16 | 1/2 x 33.5 | 46.12 | 0.317 | 0.429 | 4 | 12 | SB - 3 | 94,950 | 83,480 |
| | W40 x 215 | 48.98 | 0.268 | 0.370 | 1 x 16 | 1 3/8 x 16 | 1/2 x 36.5 | 48.88 | 0.292 | 0.392 | 4 | 12 | SB - 3 | 89,110 | 80,510 |
| 100 | W36 x 247 | 46.67 | 0.343 | 0.486 | 1 1/8 x 16 | 1 5/8 x 16 | 1/2 x 33.5 | 46.25 | 0.377 | 0.512 | 4 | 12 | SB - 3 | 105,980 | 90,220 |
| | W40 x 249 | 49.38 | 0.283 | 0.403 | 1 1/8 x 16 | 1 5/8 x 16 | 1/2 x 36.5 | 49.25 | 0.316 | 0.432 | 4 | 12 | SB - 3 | 107,000 | 92,500 |
| 105 | W36 x 282 | 47.11 | 0.356 | 0.521 | 1 3/8 x 16 | 1 7/8 x 16 | 1/2 x 33.5 | 46.75 | 0.388 | 0.542 | 5 | 12 | SB - 4 | 126,780 | 106,940 |
| | W40 x 277 | 49.69 | 0.338 | 0.494 | 1 1/4 x 16 | 1 7/8 x 16 | 1/2 x 36.5 | 49.62 | 0.343 | 0.479 | 5 | 12 | SB - 4 | 124,950 | 106,520 |
| 110 | W40 x 277 | 49.69 | 0.371 | 0.542 | 1 1/4 x 16 | 1 7/8 x 16 | 1/2 x 36.5 | 49.62 | 0.413 | 0.577 | 5 | 12 | SB - 4 | 130,540 | 111,210 |
| 115 | W40 x 297 | 49.84 | 0.419 | 0.624 | 1 3/8 x 16 | 2 x 16 | 1/2 x 36.5 | 49.88 | 0.460 | 0.649 | 5 | 12 | SB - 4 | 145,290 | 122,120 |
| 120 | W40 x 324 | 50.20 | 0.451 | 0.687 | 1 5/8 x 16 | 2 1/8 x 16 | 1/2 x 36.5 | 50.25 | 0.486 | 0.701 | 5 | 12 | SB - 4 | 164,190 | 136,840 |

(1) For Contractor's information only. Structural Steel pay weight shall be based on Rolled Beams.



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HL93 LOADING



Texas Department of Transportation

Bridge Division Standard

STEEL BEAM
STANDARD DESIGNS
28' ROADWAY

SBSD-28

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| Rev. 02-06: W36 sections | DIST | COUNTY | | SHEET NO. |

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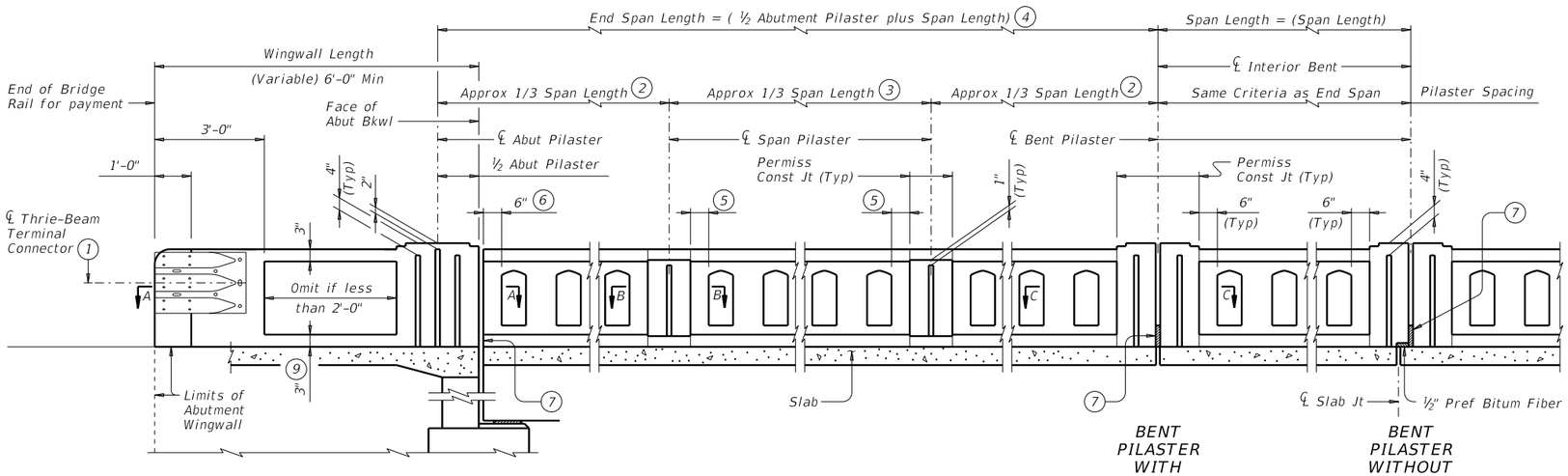
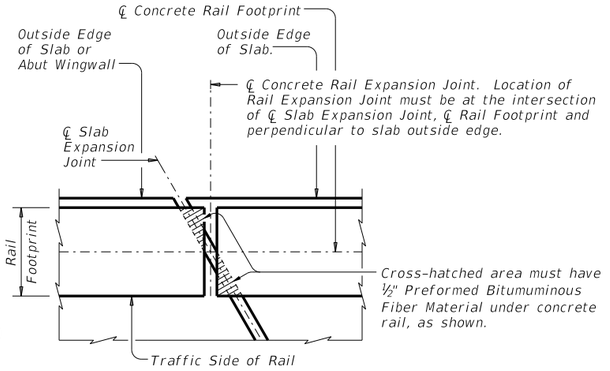


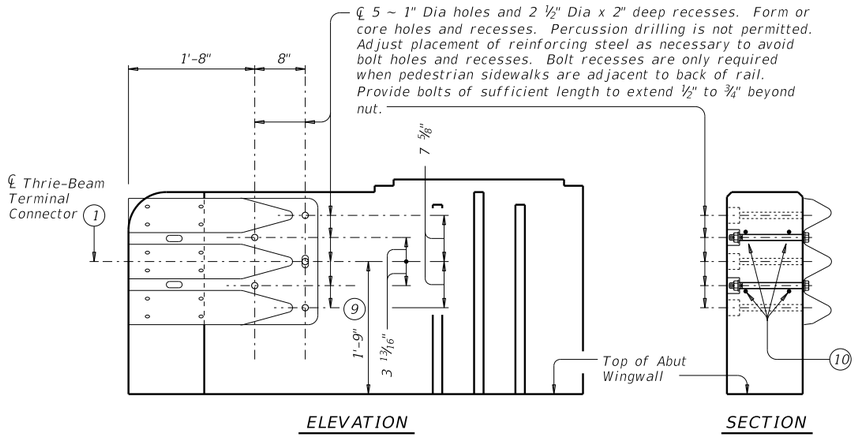

## ROADWAY ELEVATION OF RAIL




## PLAN OF RAIL AT EXPANSION JOINTS

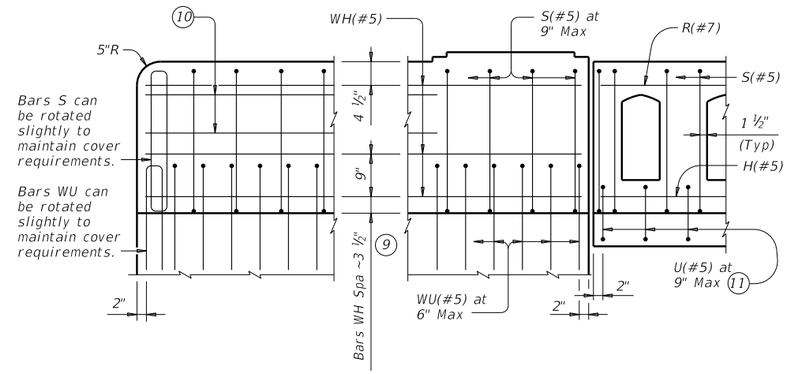
*Example showing Slab Expansion Joints without breakbacks.*

1. Terminal Connectors and associated hardware are to be paid for under the Item "Metal Beam Guard Fence". Attach Metal Beam Guard Fence Transitions to the bridge unless otherwise shown in the plans.
2. Number of windows in exterior bays are equal.
3. Number of windows in interior bay(s) are not less than the amount in exterior bays (Note 2).
4. Space Span Pilasters at 1/3 span length (Approx) when spans are 100 ft and less, as shown. Space Span Pilasters at 1/5 span length (Approx) for spans greater than 100 ft.
5. Dimension is the same for all posts adjacent to Span Pilasters in a span. Dimension may vary from span to span, Min = 3", Max = 7 ½".
6. Min = 6", Max = 1'-3".
7. Provide rail joints at ends of all spans the same width as Slab joint opening, except that Rail Joints over construction joints must be ¼" Min to ¾" Max in width. Joints must be open if slab joint opening is not sealed. Joints over construction joints and over sealed deck joints must be plugged. Forming material used in joints may be left in place if it is light in color and compressible, such as the following materials: polystyrene, molded cork granules, sponge rubber sheet, etc. If forming material is not left in place, plug the bottom 6" with slab joint sealing compound to prevent drainage and staining.
8. Place Preformed Bituminous Fiber Material between slab and rail when rail extends over expansion joint. Shift Bars U as necessary.
9. Increase 2" for structures with overlay.
10. Place 4 additional Bars WH(#5) 3'-8" in length inside Bars S(#5) and centered 2'-0" from end of rail when Terminal Connections are required. Field bend as needed.
11. Shift U Bars from region below ½" Preformed Bituminous Fiber Material at joints.

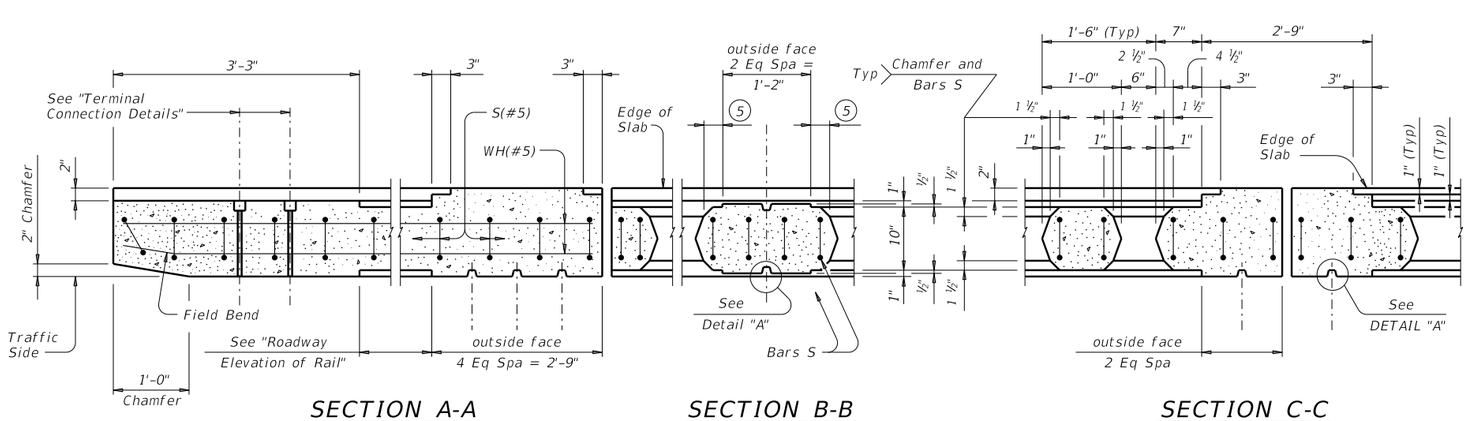


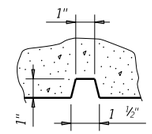

## TERMINAL CONNECTION DETAILS

*(Showing parapet with Pilaster on 6'-0" Wingwall)*




## ELEVATION SHOWING TYPICAL REINFORCING PLACEMENT




DETAIL "A"

The use of this railing is restricted to speeds of 45 mph or less.



Texas Department of Transportation

Bridge Division Standard

# TRAFFIC RAIL TEXAS CLASSIC

# TYPE T411

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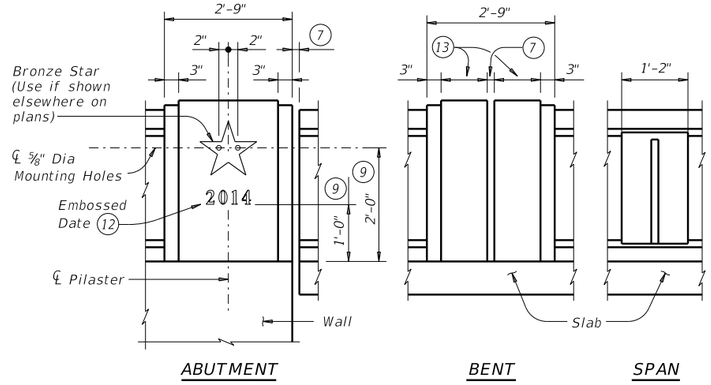



## EXTERIOR PILASTER ELEVATIONS

(7) Provide rail joints at ends of all spans the same width as Slab joint opening, except that Rail Joints over construction joints must be ¼" Min to ¾" Max in width. Joints must be open if slab joint opening is not sealed. Joints over construction joints and over sealed deck joints must be plugged. Forming material used in joints may be left in place if it is light in color and compressible, such as the following materials: polystyrene, molded cork granules, sponge rubber sheet, etc. If forming material is not left in place, plug the bottom 6" with slab joint sealing compound to prevent drainage and staining.

(9) Increase 2" for structures with overlay.

(12) Construction year (use if shown elsewhere on plans) 3" High "Plantin Bold" Typeface with ¼" recess. Placed at one Abutment only or as directed by the Engineer.

(13) Dimensions must be the same on each side of joint.

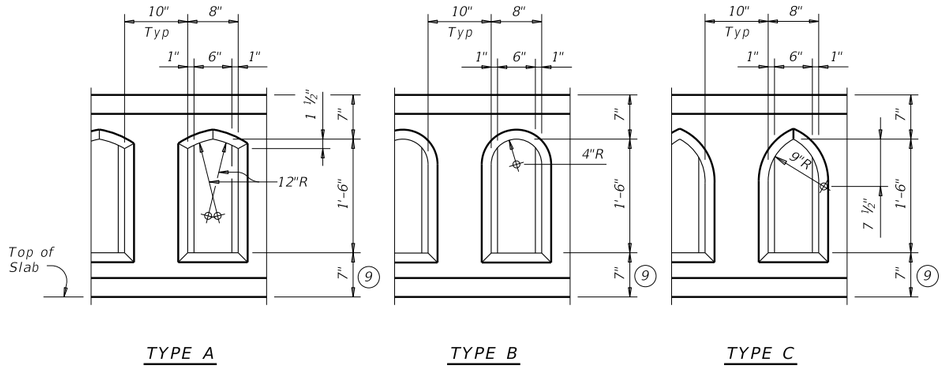
(14) Reduce by 2" or field bend over Preformed Bituminous Fiber Material to gain cover.

(15) 5 ¼" when vertical reinforcing has closer clear cover over horizontal reinforcing in abutment wingwalls or retaining walls on traffic side of wall.

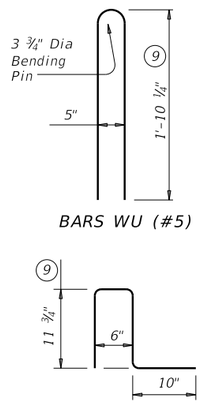
(16) As an aid in supporting reinforcement, additional longitudinal bars may be used in the slab with the approval of the Engineer. Such bars must be furnished at the Contractor's expense.

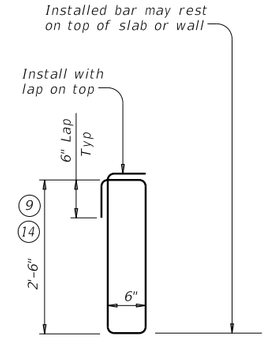
(17) Top longitudinal slab bar may be adjusted laterally 3" plus or minus to tie reinforcing.

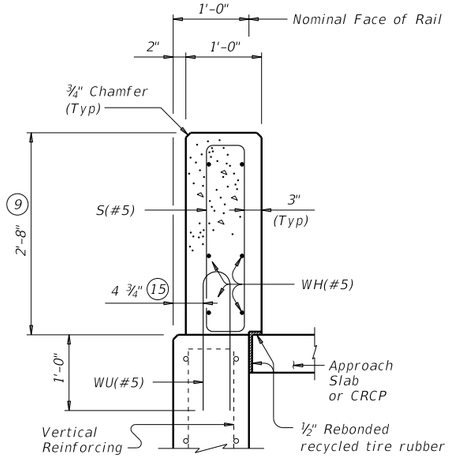
(18) Bronze Star dimensions of the final product can be slightly smaller due to shrinkage after casting.



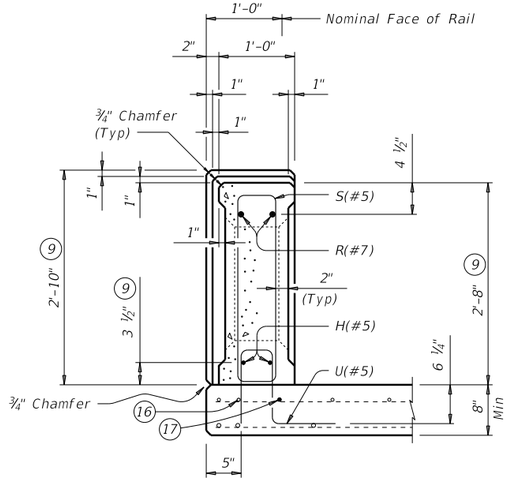

## WINDOW TYPES



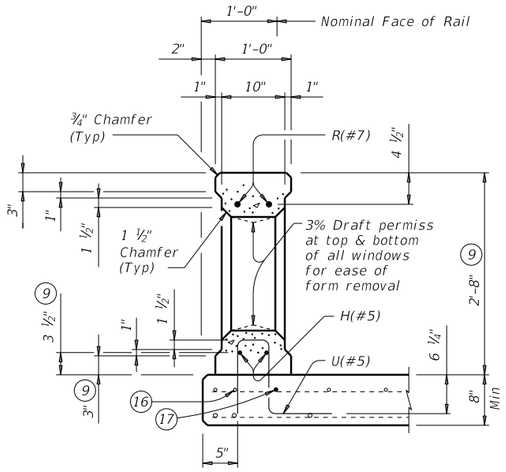




ON ABUTMENT WINGWALLS
OR CIP RETAINING WALLS

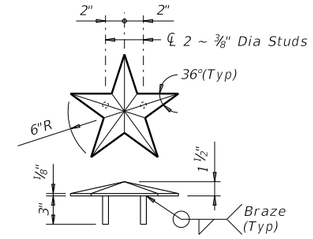



SECTION THRU
POST ON BRIDGE SLAB
(Showing Pilaster)




SECTION THRU
WINDOW ON BRIDGE SLAB

## SECTIONS THRU RAIL




## BRONZE STAR DETAIL (18)

Two known manufacturers are:

1. Kassons Castings
   Austin, Texas

2. Southwell Company
   San Antonio, Texas

### CONSTRUCTION NOTES:

Attach Bronze Star with a Type III Class C, D, E, or F epoxy adhesive. Clamp star until epoxy achieves set. Remove any visible epoxy "squeeze out" from under star.

Face of rail and pilasters, parapet must be plumb unless otherwise approved.

Apply a one rub finish to all railing surfaces unless otherwise shown elsewhere on the plans.

### MATERIAL NOTES:

Provide Class "S" concrete for railing. Provide Class "S" (HPC) concrete if shown elsewhere in the plans.

Provide Grade 60 reinforcing steel.

Epoxy coat or galvanize all reinforcing steel if slab bars are epoxy coated or galvanized.

Bronze Star must be cast of architectural bronze having the following composition: Copper 85 %, Tin 5 %, Lead 5 %, Zinc 5 %.

Provide bar laps, where required, as follows:

Uncoated or galvanized ~ #5 = 2'-0"
Uncoated or galvanized ~ #7 = 2'-11"
Epoxy coated ~ #5 = 3'-0"
Epoxy coated ~ #7 = 4'-4"

### GENERAL NOTES:

This rail has been evaluated and approved to be of equal strength to railing with like geometry, which have been crash tested to meet MASH TL-2 criteria. This rail can be used for speeds of 45 mph and less when a TL-2 or TL-3 rated guard fence transition is used. This rail is only approved for low speed use, speeds of 45 mph and less.

Do not use this railing on bridges with expansion joints providing more than 5" movement.

Rail anchorage details shown on this standard may require modification for select structure types. See appropriate details elsewhere in plans for these modifications.

Shop drawings will not be required for this rail.

See Bridge Layout or other plan sheets for the following: dimensions with the number of span pilasters, dimensions with the number of windows, window type, inclusion of bronze stars, inclusion of construction year with abutment identity.

Submit erection drawings showing span number, span pilaster locations, number of windows between pilasters and spacing to first window (see Note 6) to the Engineer for approval.

Average weight of railing with no overlay increase and no pilasters is 270 plf.

Cover dimensions are clear dimensions, unless noted otherwise. Reinforcing bar dimensions shown are out-to-out of bar.



Texas Department of Transportation

Bridge Division Standard

# TRAFFIC RAIL
# TEXAS CLASSIC

## TYPE T411

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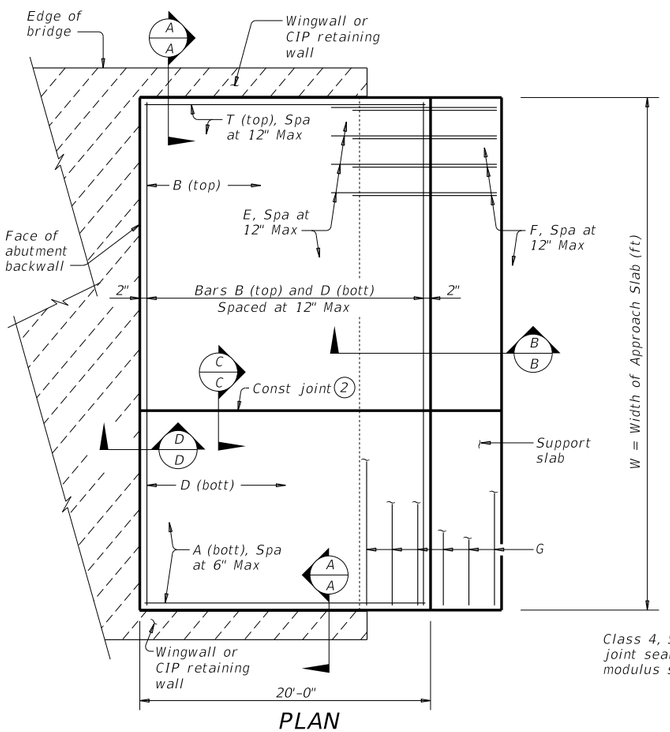
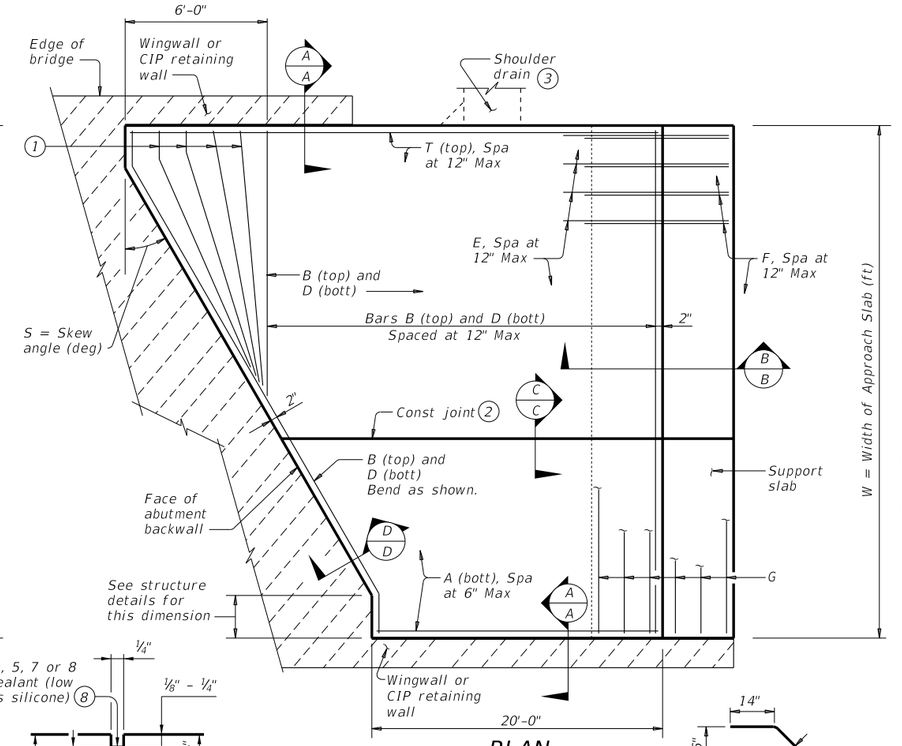


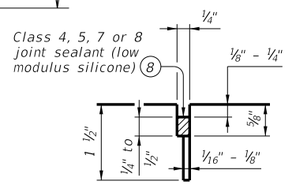

PLAN

(Showing non-skewed approach slab.)

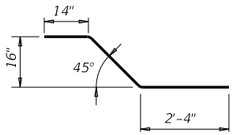



PLAN

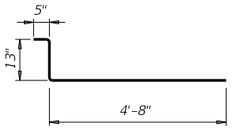
(Showing skewed approach slab.)




LONGITUDINAL SAW CUT JOINT DETAIL




BARS E (#5)




BARS F (#5)

| BAR TABLE | |
|---|---|
| BAR | SIZE |
| A | #8 |
| B | #5 |
| D | #5 |
| E | #5 |
| F | #5 |
| G | #5 |
| T | #5 |

## APPROXIMATE QUANTITIES 4

Reinf steel weight = 8.5 Lbs/SF of Approach Slab
= 18.4 Lbs/LF of Support Slab

Vol of Appr Slab Conc (CY) = 1.057W – 0.008W x T + 0.02W² Tan S
(Includes Support Slab)

W = Width of Approach Slab (ft)

T = Conc Pavement Thickness (in)

S = Skew Angle (deg)

(1) Flare Bars B and D in this region (1'-6" Max Spa, 3" Min Spa). Minimum flared bar length = 2'-6". Bend bars as necessary.

(2) Provide longitudinal construction joints that align with longitudinal construction joints in the bridge slab with bridges built in stages. Other longitudinal construction joints must receive approval of the Engineer.

(3) See details elsewhere in plans for shoulder drain location and details.

(4) For Contractor's information only. Quantities shown are for one approach slab only.

(5) On portion of support slab that supports the concrete pavement, adjust top surface elevation, if required, to accommodate concrete pavement thickness. Smooth trowel finish. Oil top of support slab with 60 grade oil and apply heavy coat of powdered graphite. Press down one layer of 30# roofing felt.

(6) Multiple piece tie bars are acceptable at longitudinal construction joints provided minimum laps shown are achieved.

(7) See details elsewhere in plans for required cross-slope.

(8) Place in accordance with Item 438.

(9) Provide backer rod that is 25% larger than joint opening and compatible with the sealant.

(10) If bridge rail is present at the wingwall or CIP retaining wall, place ½" rebonded recycled tire rubber between concrete railing and top of approach slab as shown when concrete railing projects over the approach slab.

### GENERAL NOTES:

Construct approach slab in accordance with Item 422.

Provide Class "S" concrete with a minimum compressive strength of 4,000 psi.

Provide Grade 60 reinforcing steel.

Provide longitudinal joints as shown on the Longitudinal Saw Cut Joint Detail at lane lines and shoulders when width between longitudinal construction joints or edges of approach slab exceeds 16 feet. Saw cut joints within 24 hours of concrete placement to a depth of 1 ½" and seal in accordance with Item 438. Alternately, provide a controlled joint consisting of 1 ½" vinyl or plastic joint former (Stress Cap, Zip Strip, Stress Lock, or equal as approved by the Engineer.)

Provide rebonded recycled tire rubber joint filler that meets the requirements of DMS-6310. "Joint Sealants and Fillers."

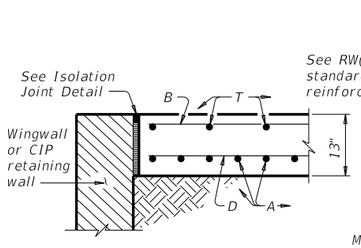
Construct the subgrade or subbase away from the bridge for a minimum distance of 100 feet prior to the approach slab, unless otherwise indicated on the plans.

Compact and finish the subgrade or foundation for the approach slab to the typical cross-section and to the lines and grades shown on the plans.

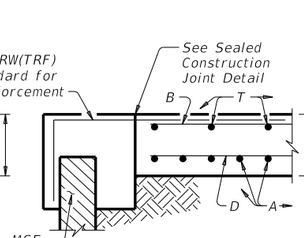
Cure for 4 days using water or membrane curing per Item 422.

All details shown herein are subsidiary to bridge approach slab.

Cover dimensions are clear dimensions, unless noted otherwise. Reinforcing bar dimensions shown are out-to-out of bar.

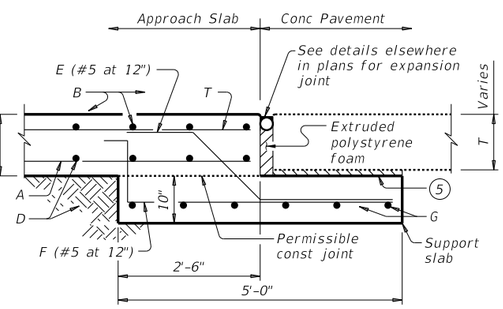



SHOWING WINGWALL OR CIP RETAINING WALL

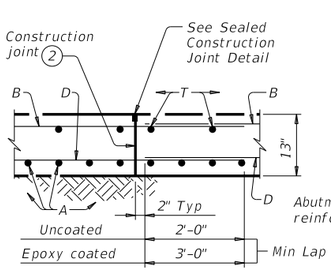



SHOWING MSE WALL

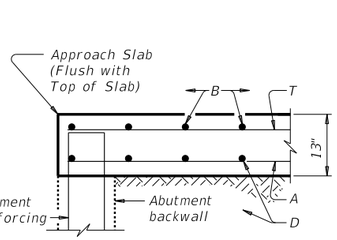
SECTION A-A



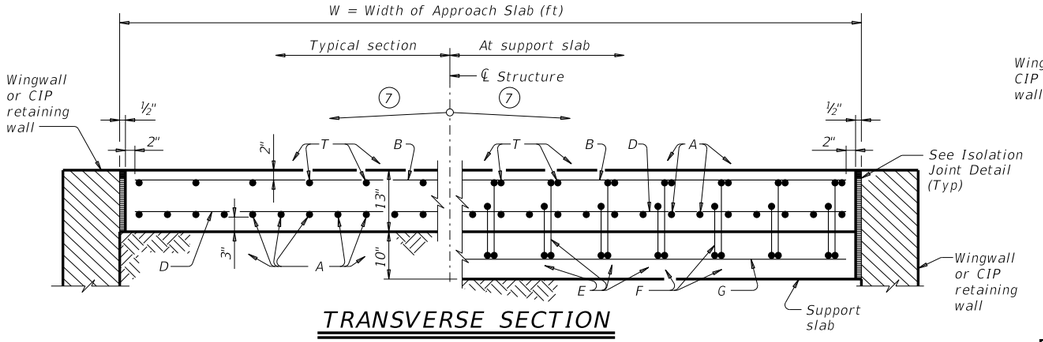

SECTION B-B



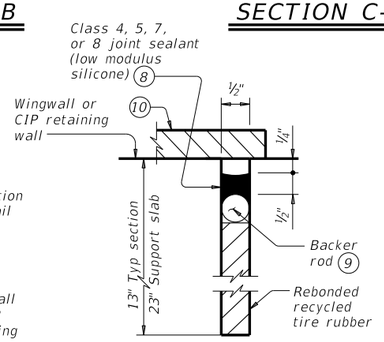

SECTION C-C 6



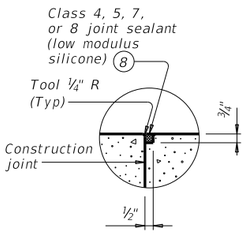

SECTION D-D




TRANSVERSE SECTION




ISOLATION JOINT DETAIL




SEALED CONSTRUCTION JOINT DETAIL

Texas Department of Transportation

Bridge Division Standard

# BRIDGE APPROACH SLAB

## CONCRETE PAVEMENT

## BAS-C

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| 02-20: Removed stress relieving pad. | DIST | COUNTY | | SHEET NO. |

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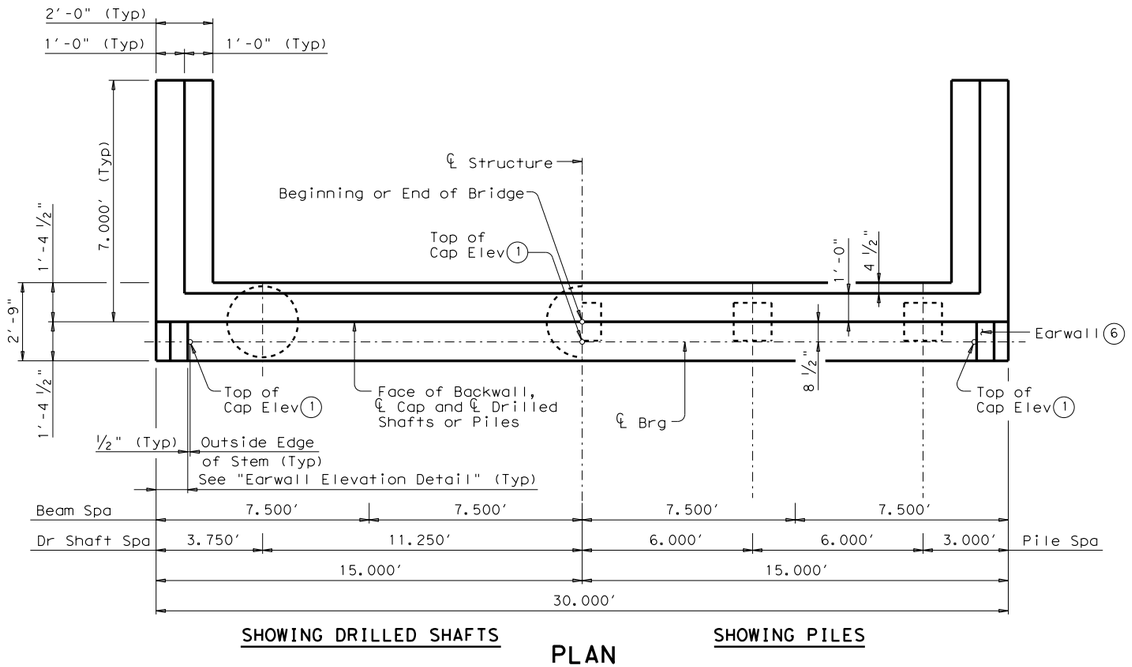
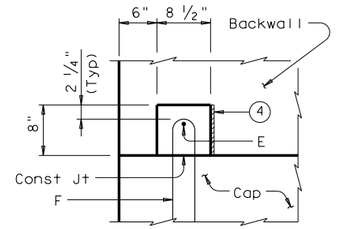



SHOWING DRILLED SHAFTS SHOWING PILES

## PLAN




## EARWALL ELEVATION DETAIL (6)

(Slope top of earwall away from beams)

| TABLE OF FOUNDATION LOADS | | |
|---|---|---|
| Span Length | Drilled Shaft Load | Pile Load |
| Ft | Tons/DS | Tons/Pile |
| 30 | 46 | 27 |
| 35 | 50 | 30 |
| 40 | 54 | 33 |
| 45 | 58 | 35 |
| 50 | 62 | 37 |
| 55 | 65 | 39 |
| 60 | 69 | 41 |

(1) Top of cap elevations are based on section depths shown on span details.

(2) 1'-8" for 7DS20 beams, 1'-11" for 7DS23 beams.

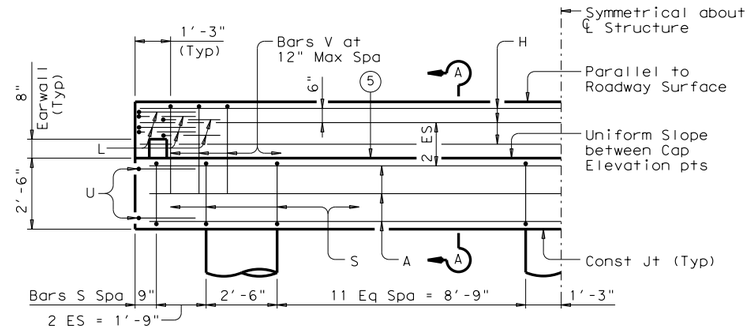
(3) With Pile foundations, replace Bar A, located at bottom centerline of cap with 4 ~ #11 x 4'-8" bars placed between piles. Deduct 55 Lbs from reinforcing steel total.

(4) 1/2" Preformed Bituminous Fiber material between beam stem and earwall. Bond to beam with an approved adhesive. Inside face of earwall to be cast with face of beam stem.

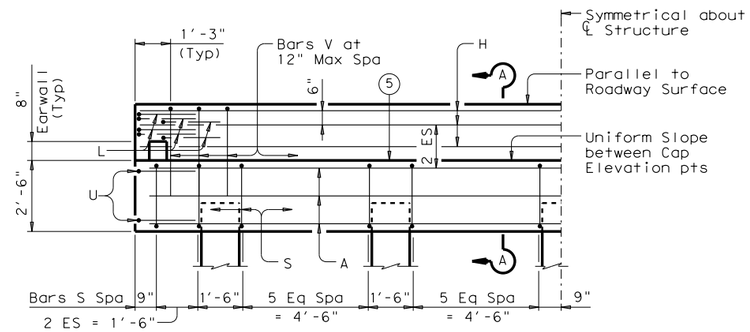
(5) Surface finish for the top of cap must be a wood float finish. The surface must be level in the direction of the centerline of beams. Bearing surface must be clean and free of all loose material before placing bearing pads.

(6) Do not cast earwalls until beams are erected in their final position.

(7) Top of backwall elevation is equal to top of beam elevation.

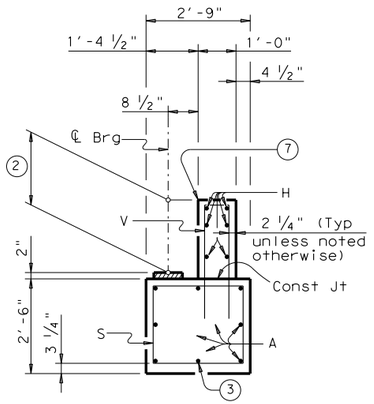



## HALF ELEVATION ~ DRILLED SHAFT ABUTMENT




## HALF ELEVATION ~ PILE ABUTMENT

(Showing 16" Piles ~ for Piles larger than 16", adjust Bars S spacing as required to avoid Piling)




## SECTION A-A

**GENERAL NOTES:**

Designed according to AASHTO LRFD Specifications.
Concrete strength f'c = 3,600 psi.
All reinforcing must be Grade 60.
Designed for normal embankment header slope of 3:1 or 2:1.
See Bridge Layout for beam type and foundation type, size and length.
See standard FD for all foundation details and notes.
See applicable rail details for rail anchorage cast in wingwalls.
See standard CRR for riprap attachment details, if applicable.
These abutment details may only be used with the following standard:
SDSB-28

HL93 LOADING SHEET 1 OF 2

Texas Department of Transportation | Bridge Division Standard

# ABUTMENTS

## PRESTRESSED CONCRETE DECKED SLAB BEAMS 28' ROADWAY

## ADSB-28

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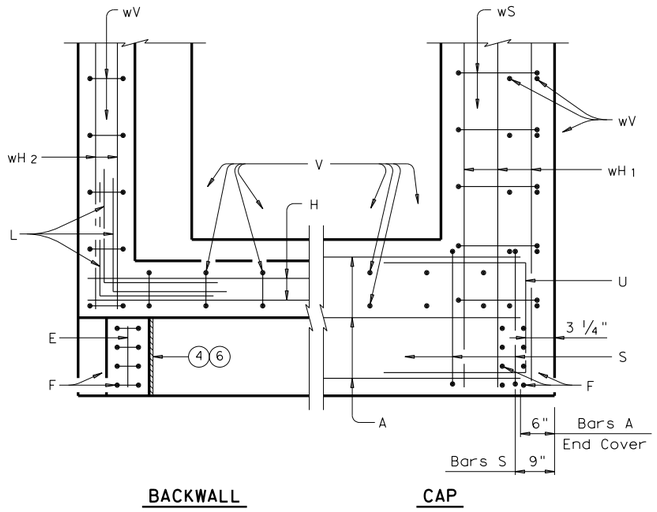
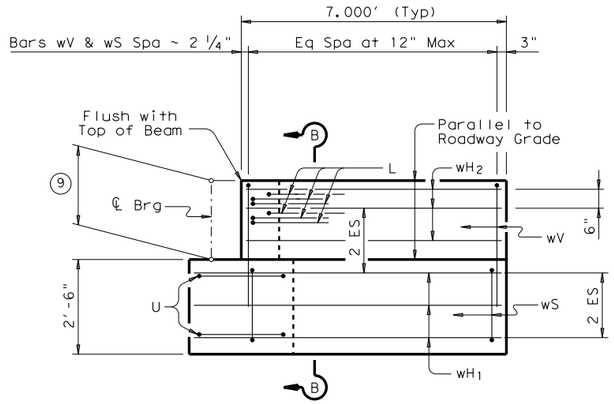


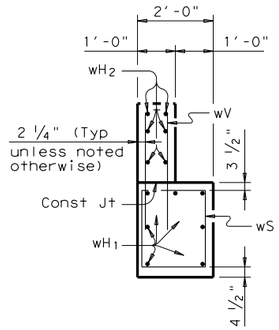

BACKWALL CAP

## CORNER DETAILS

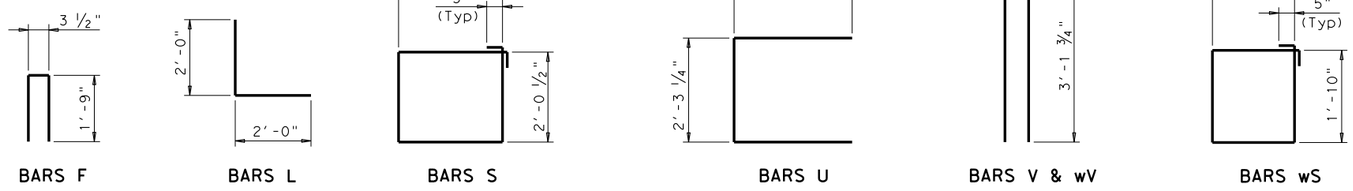



## WINGWALL ELEVATION

(Earwall omitted for clarity)




## SECTION B-B




BARS F BARS L BARS S BARS U BARS V & wV BARS wS

| TABLE OF ESTIMATED QUANTITIES (TYPE 7DS20 BEAMS) (8) | | | | |
|---|---|---|---|---|
| Bar | No. | Size | Length | Weight |
| A (3) | 8 | #11 | 29'- 0" | 1,233 |
| E | 2 | # 5 | 1'- 1" | 2 |
| F | 8 | # 4 | 3'-10" | 20 |
| H | 6 | # 6 | 29'- 8" | 267 |
| L | 12 | # 6 | 4'- 0" | 72 |
| S | 30 | # 4 | 9'- 8" | 194 |
| U | 4 | # 6 | 7'- 3" | 44 |
| V | 29 | # 5 | 6'-11" | 209 |
| wH1 | 14 | # 6 | 8'- 0" | 168 |
| wH2 | 12 | # 6 | 6'- 8" | 120 |
| wS | 16 | # 4 | 7'- 9" | 83 |
| wV | 16 | # 5 | 6'-11" | 115 |
| Reinforcing Steel | | | Lb | 2,527 |
| Class "C" Concrete | | | CY | 12.6 |

| TABLE OF ESTIMATED QUANTITIES (TYPE 7DS23 BEAMS) (8) | | | | |
|---|---|---|---|---|
| Bar | No. | Size | Length | Weight |
| A (3) | 8 | #11 | 29'- 0" | 1,233 |
| E | 2 | # 5 | 1'- 1" | 2 |
| F | 8 | # 4 | 3'-10" | 20 |
| H | 6 | # 6 | 29'- 8" | 267 |
| L | 12 | # 6 | 4'- 0" | 72 |
| S | 30 | # 4 | 9'- 8" | 194 |
| U | 4 | # 6 | 7'- 3" | 44 |
| V | 29 | # 5 | 6'-11" | 209 |
| wH1 | 14 | # 6 | 8'- 0" | 168 |
| wH2 | 12 | # 6 | 6'- 8" | 120 |
| wS | 16 | # 4 | 7'- 9" | 83 |
| wV | 16 | # 5 | 6'-11" | 115 |
| Reinforcing Steel | | | Lb | 2,527 |
| Class "C" Concrete | | | CY | 13.0 |

(3) With Pile foundations, replace Bar A, located at bottom centerline of cap with 4 ~ #11 x 4'-8" bars placed between piles. Deduct 55 Lbs from reinforcing steel total.

(4) 1/2" Preformed Bituminous Fiber material between beam stem and earwall. Bond to beam with an approved adhesive. Inside face of earwall to be cast with face of beam stem.

(6) Do not cast earwalls until beams are erected in their final position.

(8) Quantities shown are for one Abutment only.

(9) 1'-10" for 7DS20 beams, 2'-1" for 7DS23 beams.

HL93 LOADING SHEET 2 OF 2

Texas Department of Transportation | Bridge Division Standard

# ABUTMENTS

## PRESTRESSED CONCRETE DECKED SLAB BEAMS 28' ROADWAY

## ADSB-28

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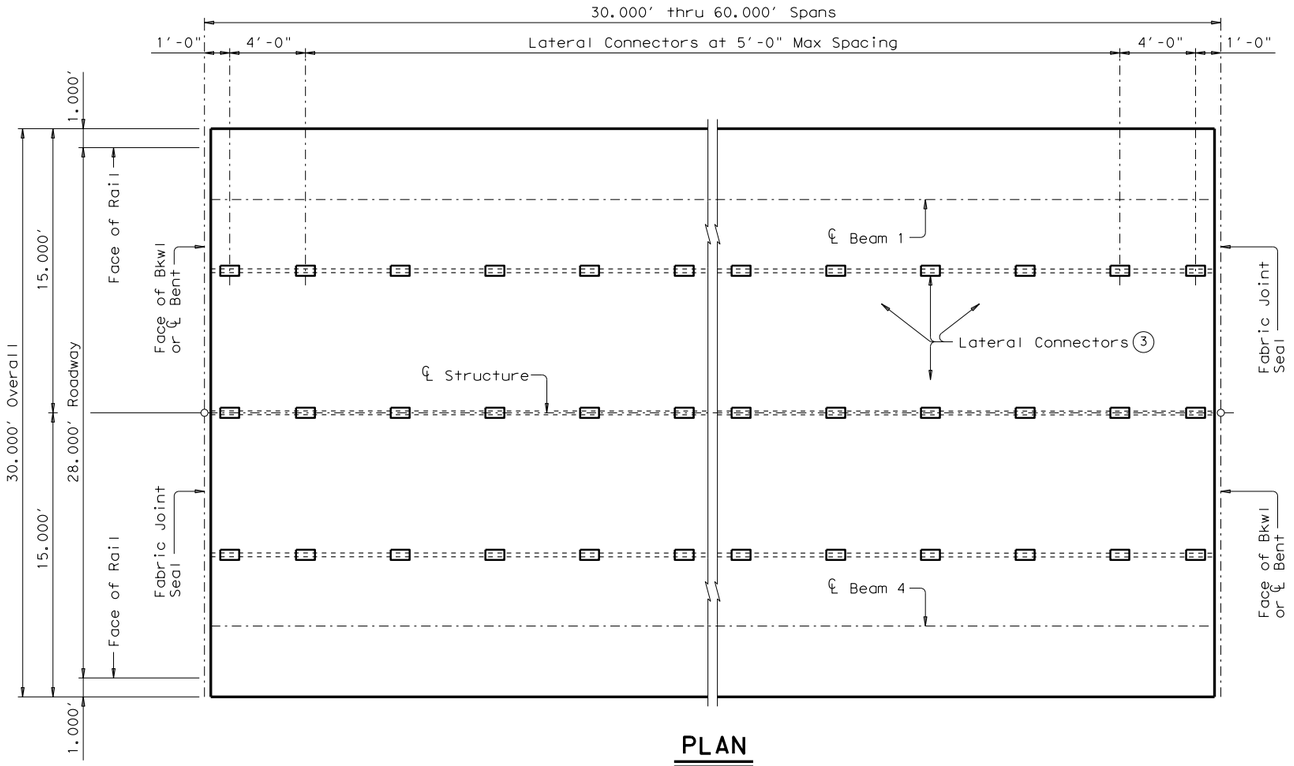
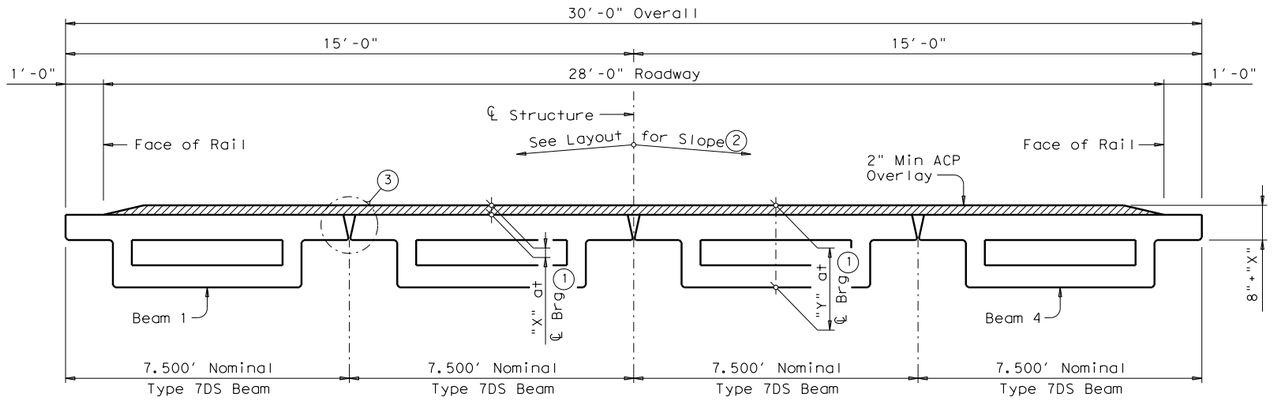



PLAN

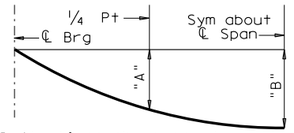



TYPICAL TRANSVERSE SECTION

(1) Based on theoretical beam camber, dead load deflections of two-course surface treatment and 2" ACP Overlay, and a constant grade.

(2) This Standard does not provide for changes in roadway cross-slopes within the structure.

(3) See Lateral Connector Details.




Deflections shown are due to two-course surface treatment and 2" ACP overlay only, ($E_c = 5 \times 10^3$ ksi). Calculated deflections shown are theoretical and actual dimension may be less. Adjust deflections based on field observation.

DEAD LOAD DEFLECTION DIAGRAM

## TABLE OF VARIABLE VALUES

| SPAN LENGTH | BEAM TYPE | DEAD LOAD DEFLECTIONS | | SECTION DEPTHS (1) | |
|---|---|---|---|---|---|
| | | "A" | "B" | "X" AT ℄ BRG | "Y" AT ℄ BRG |
| Ft | | Ft | Ft | In | Ft/In |
| 30 | 7DS20 | 0.001 | 0.001 | 2 ½" | 1'-10 ½" |
| 35 | 7DS20 | 0.001 | 0.002 | 2 ¾" | 1'-10 ¾" |
| 40 | 7DS20 | 0.002 | 0.003 | 3" | 1'-11" |
| 45 | 7DS20 | 0.004 | 0.005 | 3 ½" | 1'-11 ½" |
| 50 | 7DS20 | 0.006 | 0.008 | 4" | 2'-0" |
| 30 | 7DS23 | 0.001 | 0.001 | 2 ½" | 2'-1 ½" |
| 35 | 7DS23 | 0.001 | 0.001 | 2 ½" | 2'-1 ½" |
| 40 | 7DS23 | 0.002 | 0.002 | 2 ¾" | 2'-1 ¾" |
| 45 | 7DS23 | 0.002 | 0.003 | 3" | 2'-2" |
| 50 | 7DS23 | 0.004 | 0.005 | 3 ¼" | 2'-2 ¼" |
| 55 | 7DS23 | 0.006 | 0.008 | 3 ¾" | 2'-2 ¾" |
| 60 | 7DS23 | 0.008 | 0.011 | 4 ½" | 2'-3 ½" |

**GENERAL NOTES:**

Designed according to AASHTO LRFD Specifications.

Lateral Connector Rods (LCR) must be Grade 36 or 50.

See railing details and standard DSBRA for rail anchorage.

This standard does not support the use of transition bents.

It is recommended, with crown cross-slope, to erect beams adjacent to crown point first. For structures without a crown point, it is recommended to erect beams on the high side of cross-slope first and progress to the low side.

Payment for the following is considered subsidiary to the other bid items: packaged non-metallic, non-shrink cementitious grout; corrosion inhibiting bonding agent; fabric underseal; work performed; materials furnished; and curing time.

Payment for Fabric Joint Seal is considered subsidiary to other bid items.

HL93 LOADING



Texas Department of Transportation

Bridge Division Standard

# PRESTRESSED CONCRETE DECKED SLAB BEAM SPANS (TYPE 7DS20 OR 7DS23)

## 28' ROADWAY

## SDSB-28

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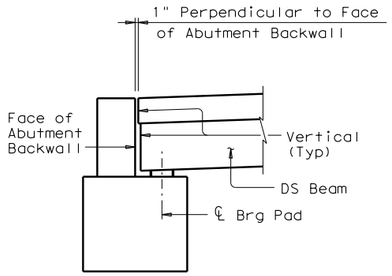
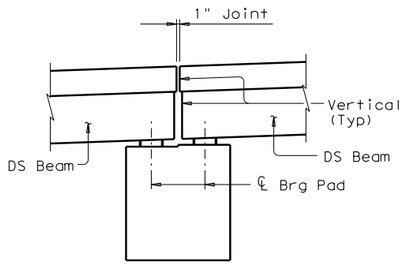


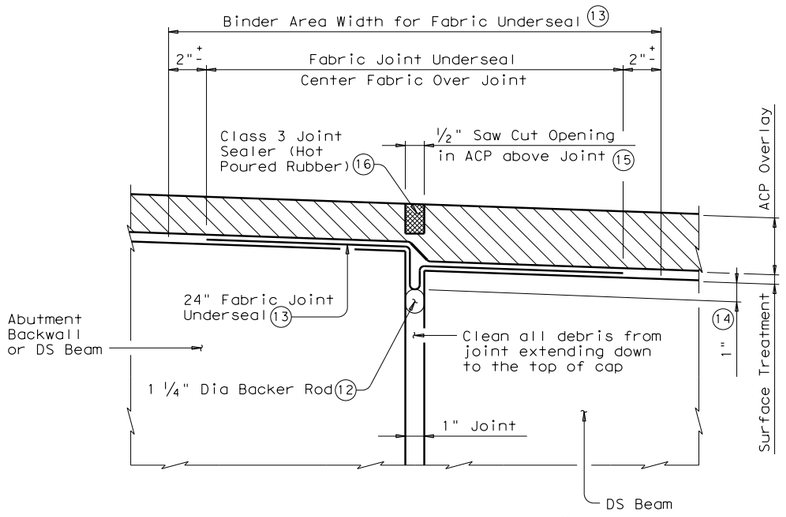

AT ABUTMENT




AT INTERIOR BENT

## STANDARD BEAM END ELEVATIONS

(ACP Overlay not shown for clarity.)




## FABRIC JOINT SEAL (11)

(Showing Expansion Joint with ACP Overlay.)

(4) Fabricator must adjust beam lengths for beam slopes as required.

(5) Seat and center 1" diameter smooth Lateral Connector Rod (LCR) in the bottom of the flange connection "Vee" prior to welding to minimize grout leakage. Caulk where necessary between connectors.

(6) Coat steel surfaces in contact with grout with a 3-component, water-based, epoxy-modified cement bonding agent including a corrosion inhibitor (BASF Emaco P24, Euclid Corr-Bond, Sika Armatec 110 EpoCem or approved equal). Submit material data sheet to Engineer for approval, prior to use. Apply in accordance with manufacturer's specifications and not prior to 12 hours before grout placement.

(7) Fill shear keys with packaged non-metallic, non-shrink cementitious grout that is certified by the manufacturer to meet the requirements of ASTM C 1107, free of chlorides, and capable of a compressive strength of 4,000 psi after 3 days of curing at anticipated temperatures. Surface preparation, mixing and consistency of grout, placing, and curing grout must follow the manufacturer's recommendations. Curing compounds are not allowed. Cure 3 days, minimum, prior to placing surface treatment and overlay. Approximate grout quantity for three beam joints = 0.33 CF of grout per foot of span length.

(8) Use forming material between Lateral Connectors. Maintain a uniform grout depth along length of beams.

(9) Lateral Connector Rods are to be considered subsidiary to other pertinent bid items.

(10) After the specified cure times for the grout is reached, apply fabric underseal to the limits shown. Use fabric underseal meeting the requirements of Item 356, "Fabric Underseal".

(11) Provide joint for roadway width and/or between toe of rails on the superstructure.

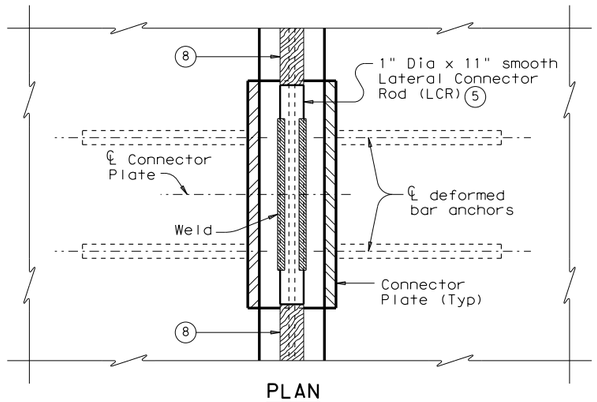
(12) Place backer rod in joint opening prior to placing binder. Backer rods must be suitable for contact with hot asphalt.

(13) Use fabric underseal meeting the requirements of Item 356, "Fabric Underseal." When using the self-adhesive type fabric underseal, pressure roll fabric underseal to improve adhesion. Apply binder to fabric joint underseal as required by the manufacturer's installation instructions.

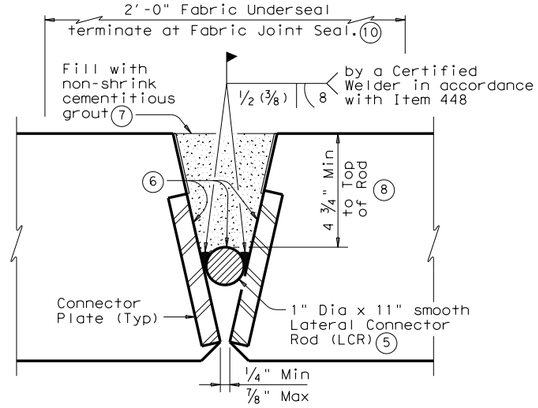
(14) Tuck fabric 1" into joint opening. Mark location of centerline of joint on curb or barrier as approved.

(15) After the asphaltic concrete pavement operations are complete, saw cut through the asphalt at centerline of joint. Make multiple saw cuts to create a 1/2" minimum joint opening. Depth of saw cut will be 1/2" less than total ACP Overlay over joint. Do not damage the underseal.

(16) Seal the joint opening with a Class 3, "Hot Poured Rubber" in accordance with DMS-6310, "Joint Sealants and Fillers." Seal flush with the top of the asphaltic concrete pavement.




PLAN




SECTION

(deformed bar anchors not shown for clarity)

## LATERAL CONNECTOR DETAILS (9)

Do not apply load to beams while welding lateral connector rods.
No vehicles are allowed on the span until shear key grout has cured 72 hours.

## TABLE OF ESTIMATED QUANTITIES

| SPAN LENGTH | BEAM TYPE | PRESTRESSED CONCRETE DECKED SLAB BEAMS (4) | | |
|---|---|---|---|---|
| | | ABUTMENT TO INTERIOR BENT | INT BENT TO INT BENT | ABUTMENT TO ABUTMENT |
| Ft | | LF | LF | LF |
| 30 | 7DS20 | 119.50 | 119.67 | 119.33 |
| 35 | 7DS20 | 139.50 | 139.67 | 139.33 |
| 40 | 7DS20 | 159.50 | 159.67 | 159.33 |
| 45 | 7DS20 | 179.50 | 179.67 | 179.33 |
| 50 | 7DS20 | 199.50 | 199.67 | 199.33 |
| 30 | 7DS23 | 119.50 | 119.67 | 119.33 |
| 35 | 7DS23 | 139.50 | 139.67 | 139.33 |
| 40 | 7DS23 | 159.50 | 159.67 | 159.33 |
| 45 | 7DS23 | 179.50 | 179.67 | 179.33 |
| 50 | 7DS23 | 199.50 | 199.67 | 199.33 |
| 55 | 7DS23 | 219.50 | 219.67 | 219.33 |
| 60 | 7DS23 | 239.50 | 239.67 | 239.33 |

HL93 LOADING SHEET 2 OF 2

Texas Department of Transportation | Bridge Division Standard

# PRESTRESSED CONCRETE DECKED SLAB BEAM SPANS (TYPE 7DS20 OR 7DS23)

## 28' ROADWAY

## SDSB-28

| FILE: dsbste22.dgn | DN: JMH | CK: AM | DW: JTR | CK: JMH |
|---|---|---|---|---|
| ©TxDOT September 2010 | CONT | SECT | JOB | HIGHWAY |
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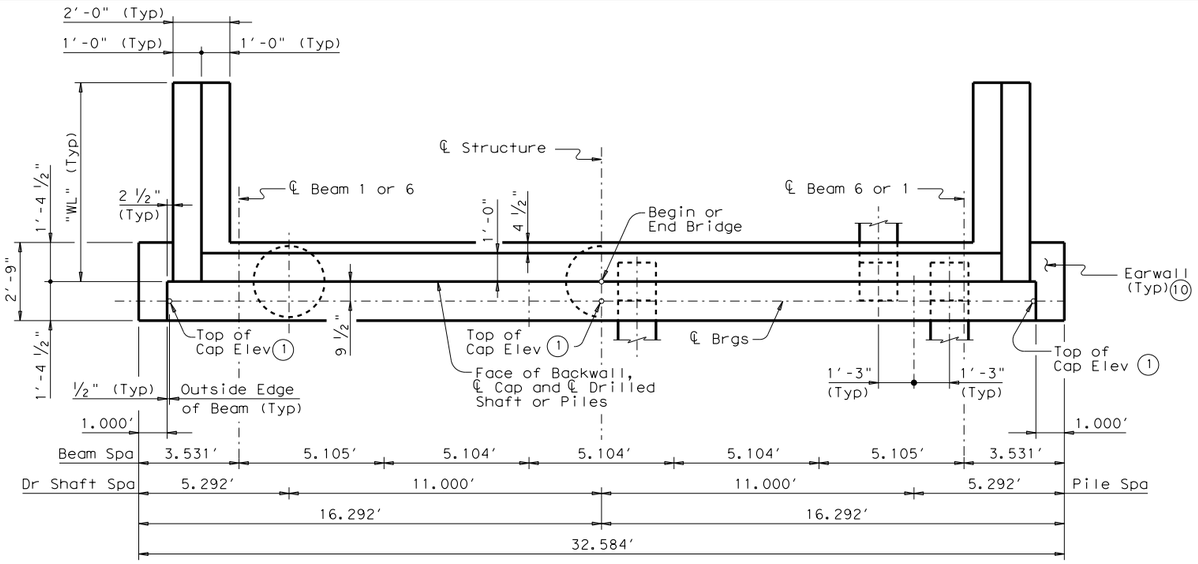
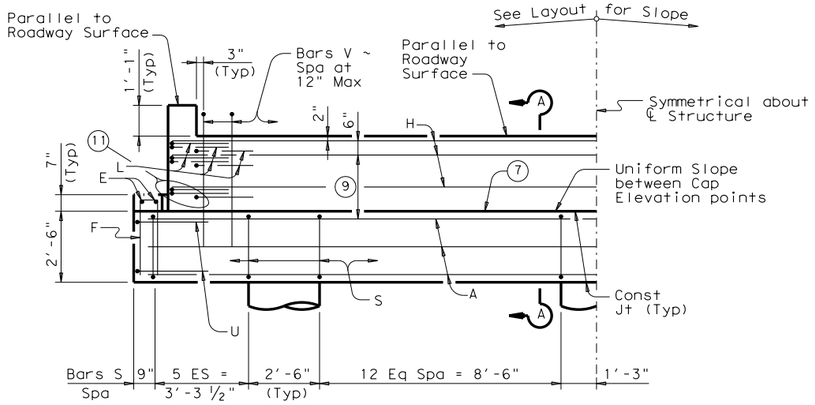
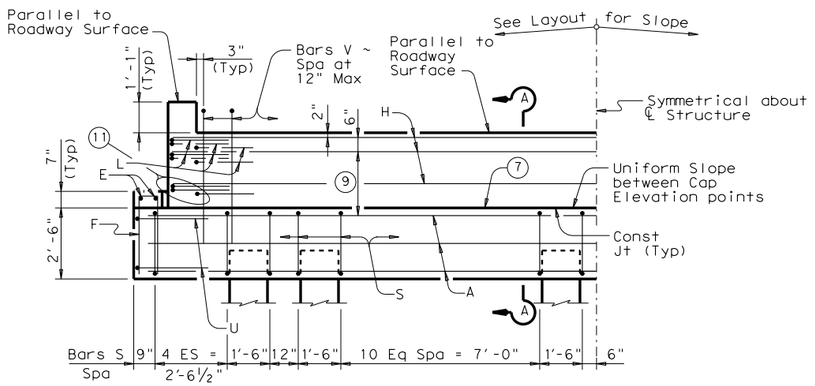



SHOWING DRILLED SHAFTS SHOWING BATTERED PILES

## PLAN

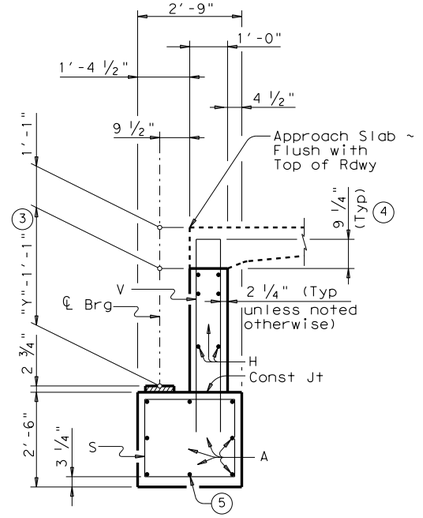



## HALF ELEVATION ~ DRILLED SHAFT ABUTMENT



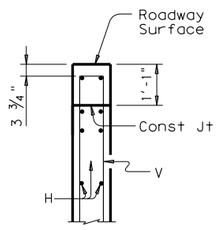

## HALF ELEVATION ~ PILE ABUTMENT

(Showing 16" Piles ~ for Piles larger than 16", adjust Bars S spacing as required to avoid Piling)



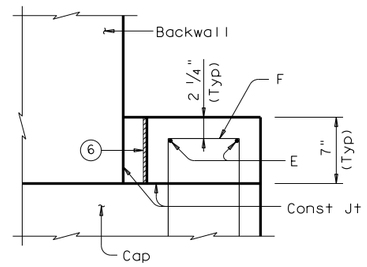

## SECTION A-A

(Showing Approach Slab) (2)




## BACKWALL DETAIL

(Without Approach Slab) (2)




## EARWALL ELEVATION DETAIL (10)

(Slope top of earwall away from beams)

## TABLE OF WINGWALL LENGTHS "WL"

| Beam Type | "WL" |
|---|---|
| B20 | 8.000' |
| B28 | 10.000' |
| B34 | 11.000' |

## TABLE OF FOUNDATION LOADS (8)

| Span Length | Drilled Shaft Load | Battered Pile Load |
|---|---|---|
| Ft | Tons/DS | Tons/Pile |
| 30 | 53 | 41 |
| 35 | 58 | 44 |
| 40 | 63 | 46 |
| 45 | 68 | 49 |
| 50 | 72 | 51 |
| 55 | 77 | 54 |
| 60 | 81 | 56 |
| 65 | 86 | 58 |
| 70 | 90 | 60 |
| 75 | 94 | 63 |
| 80 | 99 | 65 |
| 85 | 103 | 67 |
| 90 | 107 | 69 |
| 95 | 112 | 71 |
| 100 | 116 | 74 |

(1) Top of Cap Elevations are based on section depths shown on Span Details.

(2) See Bridge Layout for Joint type and to determine if Approach Slab is present.

(3) See Span details for "Y" value.

(4) Increase as required to maintain 3 ¾" from Finished Grade.

(5) With pile foundations, replace Bar A, located at bottom centerline of cap with 2 ~ #11 x 7'-0" bars placed between pile groups. Deduct 93 Lbs from reinforcing steel total.

(6) ½" Preformed Bituminous Fiber material between beam and earwall. Bond to beam with an approved adhesive. Inside face of earwall to be cast with vertical side of beam.

(7) Surface finish for the top of Cap will be a textured wood float finish. The surface must be level in the direction of the centerline of Beams.

(8) Foundation loads are based on B34 beams.

(9) Use 2 Eq Spa for B28 and B34 beams. Use 1 space for B20 beams.

(10) Do not cast earwalls until beams are erected in their final position.

(11) This set of Bars L only required for B28 and B34 beams.

**GENERAL NOTES:**

Designed according to AASHTO LRFD Specifications.
Concrete strength f'c = 3,600 psi.
All reinforcing must be Grade 60.
Designed for normal embankment header slope of 3:1 or 2:1.
See Bridge Layout for beam type and foundation type, size and length.
See standard FD for all foundation details and notes.
See applicable rail details for rail anchorage cast in wingwalls.
See standard CRR for riprap attachment details, if applicable.
These abutment details may be used only with the following standards:
SBBS-B20-28 or SBBO-B20-28
SBBS-B28-28 or SBBO-B28-28
SBBS-B34-28 or SBBO-B34-28

HL93 LOADING SHEET 1 OF 2

Texas Department of Transportation — Bridge Division Standard

# ABUTMENTS
## PRESTR CONC BOX BEAMS
## 28' RDWY

# ABB-28

| FILE: bbstde31.dgn | DN: TxDOT | CK: TxDOT | DW: TxDOT | CK: TxDOT |
|---|---|---|---|---|
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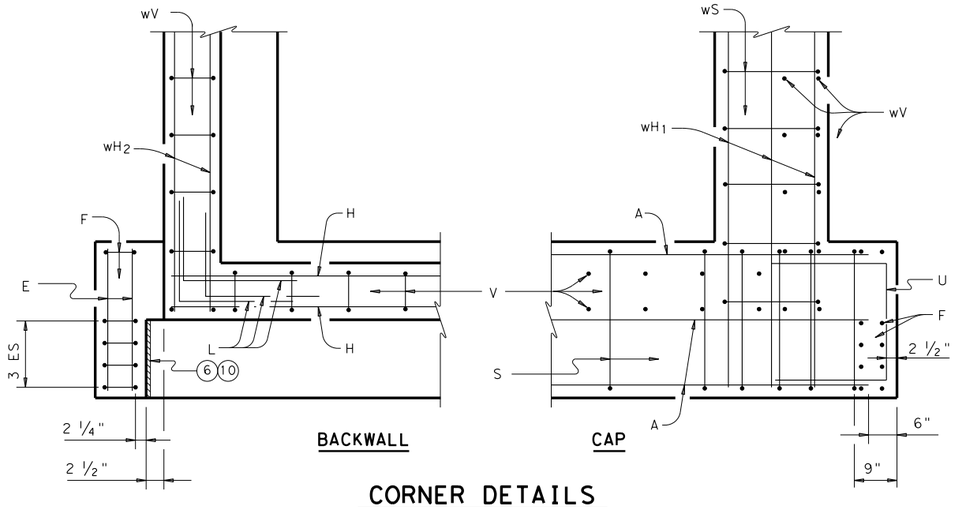
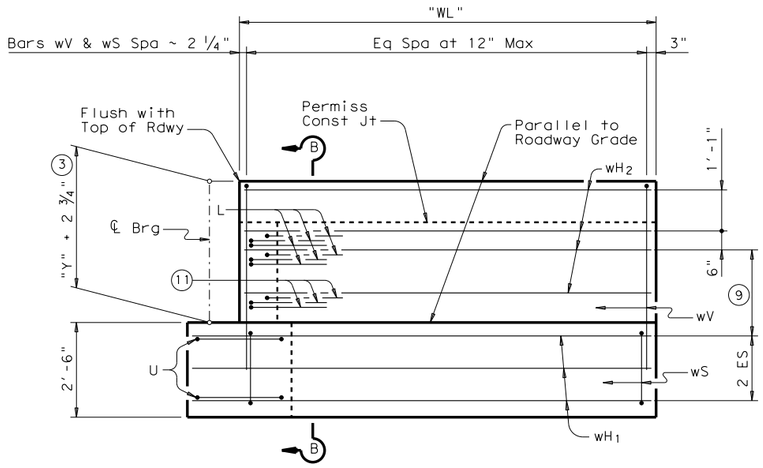



## CORNER DETAILS




## WINGWALL ELEVATION

(Earwall omitted for clarity)




## SECTION B-B

| TABLE OF ESTIMATED QUANTITIES (TYPE B20 BEAMS) (12) | | | | |
|---|---|---|---|---|
| BAR | NO. | SIZE | LENGTH | WEIGHT |
| A (5) | 8 | #11 | 31'- 7" | 1,342 |
| E | 4 | # 5 | 2'- 5" | 10 |
| F | 10 | # 5 | 6'- 1" | 63 |
| H | 4 | # 6 | 29'-10" | 179 |
| L | 12 | # 6 | 4'- 0" | 72 |
| S | 38 | # 4 | 9'- 8" | 245 |
| U | 4 | # 6 | 7'- 6" | 227 |
| V | 29 | # 5 | 7'- 6" | 227 |
| wH1 | 14 | # 6 | 9'- 0" | 189 |
| wH2 | 12 | # 6 | 7'- 8" | 138 |
| wS | 18 | # 4 | 7'- 9" | 93 |
| wV | 18 | # 5 | 7'- 9" | 145 |
| Reinforcing Steel | | | Lb | 2,747 |
| Class "C" Concrete (w/Slab) | | | CY | 13.8 |
| Class "C" Concrete (w/ACP) | | | CY | 13.5 |

| TABLE OF ESTIMATED QUANTITIES (TYPE B28 BEAMS) (12) | | | | |
|---|---|---|---|---|
| BAR | NO. | SIZE | LENGTH | WEIGHT |
| A (5) | 8 | #11 | 31'- 7" | 1,342 |
| E | 4 | # 5 | 2'- 5" | 10 |
| F | 10 | # 5 | 6'- 1" | 63 |
| H | 6 | # 6 | 29'-10" | 269 |
| L | 18 | # 6 | 4'- 0" | 108 |
| S | 38 | # 4 | 9'- 8" | 245 |
| U | 4 | # 6 | 7'- 3" | 44 |
| V | 29 | # 5 | 8'-10" | 267 |
| wH1 | 14 | # 6 | 11'- 0" | 231 |
| wH2 | 16 | # 6 | 9'- 8" | 232 |
| wS | 22 | # 4 | 7'- 9" | 114 |
| wV | 22 | # 5 | 9'- 1" | 208 |
| Reinforcing Steel | | | Lb | 3,133 |
| Class "C" Concrete (w/Slab) | | | CY | 16.1 |
| Class "C" Concrete (w/ACP) | | | CY | 15.7 |

| TABLE OF ESTIMATED QUANTITIES (TYPE B34 BEAMS) (12) | | | | |
|---|---|---|---|---|
| BAR | NO. | SIZE | LENGTH | WEIGHT |
| A (5) | 8 | #11 | 31'- 7" | 1,342 |
| E | 4 | # 5 | 2'- 5" | 10 |
| F | 10 | # 5 | 6'- 1" | 63 |
| H | 6 | # 6 | 29'-10" | 269 |
| L | 18 | # 6 | 4'- 0" | 108 |
| S | 38 | # 4 | 9'- 8" | 245 |
| U | 4 | # 6 | 7'- 3" | 44 |
| V | 29 | # 5 | 9'- 9" | 295 |
| wH1 | 14 | # 6 | 12'- 0" | 252 |
| wH2 | 16 | # 6 | 10'- 8" | 256 |
| wS | 24 | # 4 | 7'- 9" | 124 |
| wV | 24 | # 5 | 10'- 0" | 250 |
| Reinforcing Steel | | | Lb | 3,258 |
| Class "C" Concrete (w/Slab) | | | CY | 17.6 |
| Class "C" Concrete (w/ACP) | | | CY | 17.2 |

(3) See Span details for "Y" value.

(5) With pile foundations, replace Bar A, located at bottom centerline of cap, with 2 ~ #11 x 7'-0" bars placed between pile groups. Deduct 93 Lbs from reinforcing steel total.

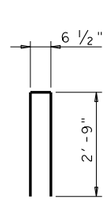
(6) ½" Preformed Bituminous Fiber material between beam and earwall. Bond to beam with an approved adhesive. Inside face of earwall to be cast with vertical side of beam.

(9) Use 2 Eq Spa for B28 and B34 beams and 1 space for B20 beams.

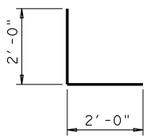
(10) Do not cast earwalls until beams are erected in their final position.

(11) This set of Bars L only required for B28 and B34 beams.

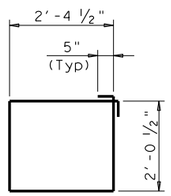
(12) Quantities shown are for one Abutment only (with Approach Slab). With no Approach Slab, add 1.1 CY Class "C" concrete and 90 Lb reinforcing steel for 2 additional Bars H.



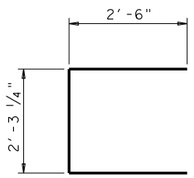

BARS F



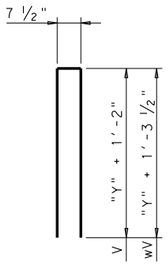

BARS L



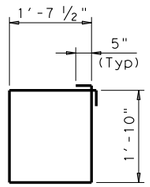

BARS S




BARS U




BARS V & wV (3)




BARS wS

HL93 LOADING

SHEET 2 OF 2

Texas Department of Transportation

Bridge Division Standard

# ABUTMENTS
## PRESTR CONC BOX BEAMS
## 28' RDWY

# ABB-28

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|---|---|---|---|---|
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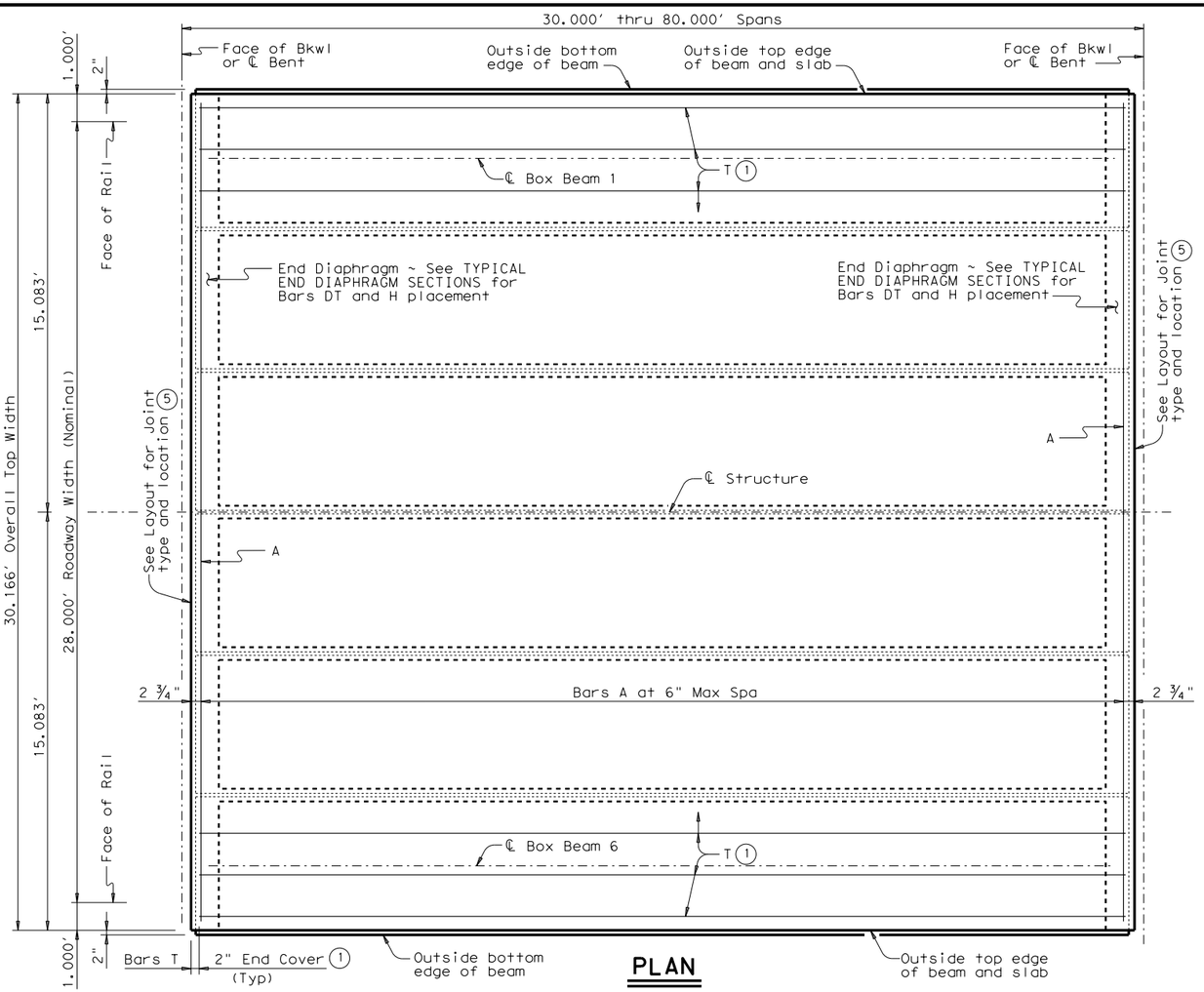
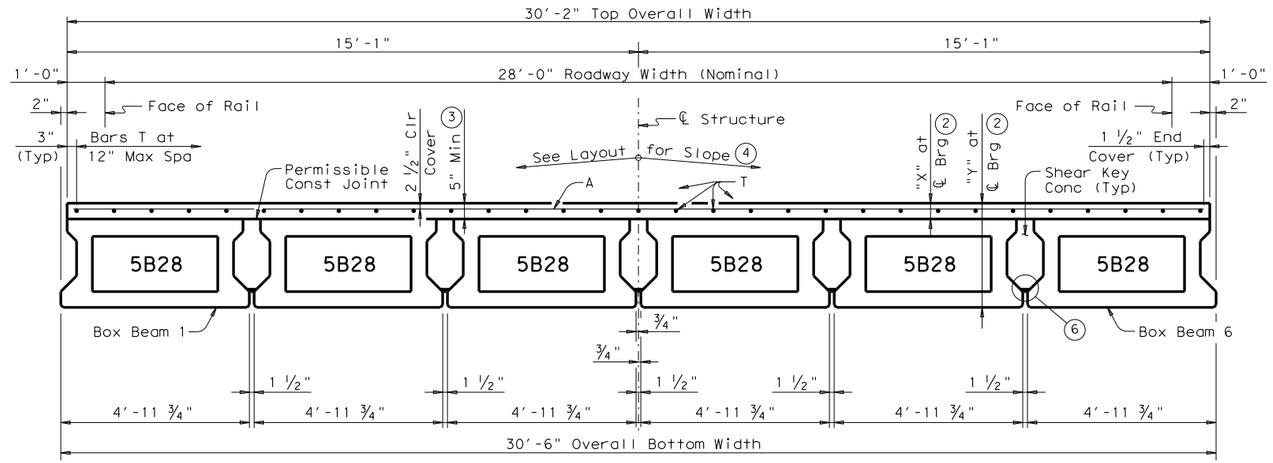
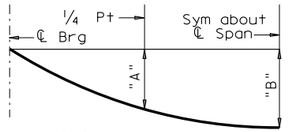



## PLAN




## TYPICAL TRANSVERSE SECTION




Note: Deflections shown are due to shear key and concrete slab only, ($E_c = 5 \times 10^3$ ksi). Calculated deflections shown are theoretical and actual dimension may be less. Deflections may be adjusted based on field observation.

## DEAD LOAD DEFLECTION DIAGRAM

| BAR TABLE | |
|---|---|
| BAR | SIZE |
| A | #4 |
| DT | #4 |
| H | #5 |
| T | #4 |

## TABLE OF DEFLECTIONS AND SECTION DEPTHS

| SPAN LENGTH (FT) | BEAM NO. | POINT | DEAD LOAD DEFLECTIONS (FT) SHEAR KEY | SLAB | TOTAL | SECTION DEPTHS "X" AT ℄ BRG (2) | "Y" AT ℄ BRG (2) |
|---|---|---|---|---|---|---|---|
| 30 | ALL | "A" | 0.000 | 0.001 | 0.001 | 5" | 2'-9" |
| | | "B" | 0.000 | 0.001 | 0.001 | | |
| 35 | ALL | "A" | 0.001 | 0.001 | 0.002 | 5 ¼" | 2'-9 ¼" |
| | | "B" | 0.001 | 0.002 | 0.003 | | |
| 40 | ALL | "A" | 0.001 | 0.003 | 0.004 | 5 ¼" | 2'-9 ¼" |
| | | "B" | 0.002 | 0.003 | 0.005 | | |
| 45 | ALL | "A" | 0.002 | 0.003 | 0.005 | 5 ¼" | 2'-9 ¼" |
| | | "B" | 0.003 | 0.005 | 0.008 | | |
| 50 | ALL | "A" | 0.003 | 0.006 | 0.009 | 5 ¼" | 2'-9 ¼" |
| | | "B" | 0.004 | 0.008 | 0.012 | | |
| 55 | ALL | "A" | 0.004 | 0.008 | 0.012 | 5 ½" | 2'-9 ½" |
| | | "B" | 0.006 | 0.012 | 0.018 | | |
| 60 | ALL | "A" | 0.006 | 0.012 | 0.018 | 5 ½" | 2'-9 ½" |
| | | "B" | 0.010 | 0.016 | 0.026 | | |
| 65 | ALL | "A" | 0.009 | 0.016 | 0.025 | 5 ¾" | 2'-9 ¾" |
| | | "B" | 0.012 | 0.023 | 0.035 | | |
| 70 | ALL | "A" | 0.013 | 0.021 | 0.034 | 6" | 2'-10" |
| | | "B" | 0.018 | 0.030 | 0.048 | | |
| 75 | ALL | "A" | 0.017 | 0.028 | 0.045 | 6 ½" | 2'-10 ½" |
| | | "B" | 0.024 | 0.040 | 0.064 | | |
| 80 | ALL | "A" | 0.022 | 0.037 | 0.059 | 7" | 2'-11" |
| | | "B" | 0.031 | 0.052 | 0.083 | | |

(1) If multi-span units (with slab continuous over Interior Bents) are indicated on the Bridge Layout, Bars T must be continuous through joint. See Continuous Slab Detail.

(2) Based on theoretical beam camber, dead load deflections of 5" Cast-in-place slab, shear key dead load and a constant grade. The contractor must adjust these values for any vertical curve.

(3) Slab thickness at midspan of Beams may not exceed 7 inches.

(4) This standard does not provide for changes in roadway cross slopes within the structure.

(5) If using Type A expansion joints, the maximum distance between joints is 100 feet.

(6) Form bottom of shear keys with foam backer rod or other material acceptable to the Engineer.

### GENERAL NOTES:

Designed according to AASHTO LRFD Specifications.

Provide Class S concrete (f'c = 4,000 psi) for slab and shear key. Provide Class S (HPC) concrete if shown elsewhere in the plans.

All reinforcing must be Grade 60.

Two-span or three-span units, with the slab continuous over Interior Bents, may be formed with the details on this standard. Unit Length cannot exceed 3.5 times length of the shortest end span.

Bar laps, where required, will be as follows:
- Uncoated ~ #4 = 1'-5"
- Epoxy coated ~ #4 = 2'-1"

It is recommended, with crown cross-slope, to erect beams adjacent to crown point first. For structures without a crown point, it is recommended to erect beams on the high side of cross-slope first and progress to the low side.

This sheet does not support the use of Transition Bents.

See railing details and standard BBRAS for rail anchorage.

HL93 LOADING



Texas Department of Transportation

Bridge Division Standard

# PRESTRESSED CONCRETE BOX BEAM SPANS

TYPE B28 28' RDWY (WITH SLAB)

## SBBS-B28-28

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|---|---|---|---|---|
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| REVISIONS 01-12: Cover. 10-15: Table of Est Quantities, Notes. | DIST | COUNTY | | SHEET NO. |

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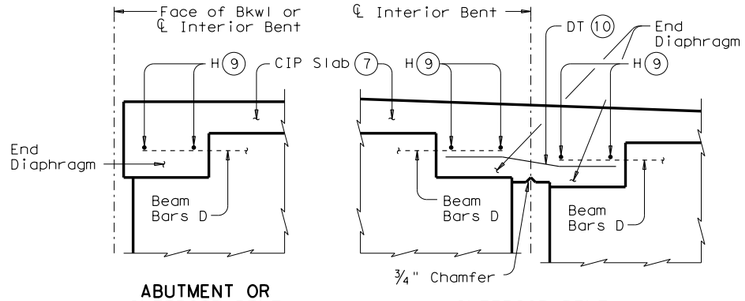
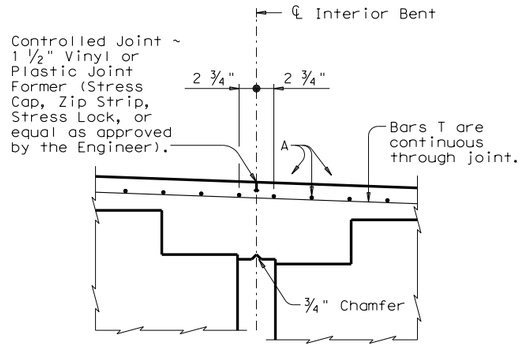



**ABUTMENT OR INTERIOR BENT** (with Expansion Joint) (8)

**INTERIOR BENT** (without Expansion Joint)

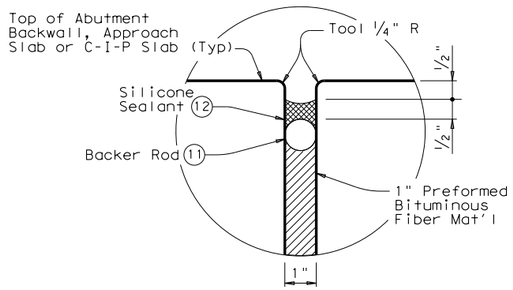
## TYPICAL END DIAPHRAGM SECTIONS

(along centerline of Box Beam)




## CONTINUOUS SLAB DETAIL

(Diaphragm reinforcing not shown for clarity)




## TYPE A JOINT DETAIL (5)

## TABLE OF ESTIMATED QUANTITIES

| SPAN LENGTH | SHEAR KEY | REINF CONC SLAB (BOX BEAM) | PRESTR CONCRETE BOX BEAMS (TY 5B28) (13) | TOTAL REINF STEEL (14) |
|---|---|---|---|---|
| FT | CY | SF | LF | Lb |
| 30 | 7.9 | 905 | 177.00 | 1,810 |
| 35 | 9.3 | 1,056 | 207.00 | 2,112 |
| 40 | 10.6 | 1,207 | 237.00 | 2,414 |
| 45 | 12.0 | 1,357 | 267.00 | 2,714 |
| 50 | 13.3 | 1,508 | 297.00 | 3,016 |
| 55 | 14.7 | 1,659 | 327.00 | 3,318 |
| 60 | 16.0 | 1,810 | 357.00 | 3,620 |
| 65 | 17.4 | 1,961 | 387.00 | 3,922 |
| 70 | 18.7 | 2,112 | 417.00 | 4,224 |
| 75 | 20.0 | 2,262 | 447.00 | 4,524 |
| 80 | 21.4 | 2,413 | 477.00 | 4,826 |

(5) If using Type A expansion joints, the maximum distance between joints is 100 ft.

(7) Slab reinforcing omitted for clarity.

(8) See Bridge Layout for Joint type.

(9) Provide 1 ½" end cover to Bars H. After all beams have been placed, weld one Bar H to two Bars D at each end of all beams.

(10) Lap Bars DT 9" Min with each Beam Bar D at Interior Bents without Expansion Joints. Bars DT shown bent for clarity only.

(11) Backer rod must be 25% larger than joint opening and must be compatible with the sealant.

(12) Use Class 7 silicone sealant. Prepare joint and seal in accordance with Item 438 "Cleaning and Sealing Joints".

(13) Fabricator must adjust beam lengths for beam slopes as required.

(14) Reinforcing steel weight is based on an approximate factor of 2.0 lbs per square foot of slab.

HL93 LOADING



Texas Department of Transportation

Bridge Division Standard

# PRESTRESSED CONCRETE BOX BEAM SPANS

TYPE B28 28' RDWY

(WITH SLAB)

## SBBS-B28-28

| FILE: bbstds35.dgn | DN: TxDOT | CK: TxDOT | DW: TxDOT | CK: TxDOT |
|---|---|---|---|---|
| ©TxDOT December, 2006 | CONT | SECT | JOB | HIGHWAY |
| REVISIONS | | | | |
| 01-12: Cover.<br>10-15: Table of Est Quantities, Notes. | DIST | COUNTY | | SHEET NO. |

Item No. 09

# City of Lucas
# City Council Agenda Request
# November 5, 2020

Requester: City Council
City Secretary Stacy Henderson

## Agenda Item Request

Consider board/commission applications to be interviewed by the City Council to fill board vacancies or prospective board positions.

## Background Information

Per the Board Appointment Policy established in December 2019, new board applications are submitted to the City Council at their first meeting in November to consider prospective applicants to be interviewed for vacant positions or possible appointments. Interviews will be scheduled for the City Council meeting on November 19, 2020. The deadline for applications is November 1, 2020. The City Secretary will send all received applications under separate cover on Monday, November 2, 2020. Currently, there are two vacant alternate positions available on the Parks and Open Space Board, and board/commission members with terms expiring are outlined below noting if they would like to serve another two-year term.

| **Planning and Zoning Commission** | |
|---|---|
| *Board/Commission Member* | *Reappointment Consideration for 2-year term* |
| Tommy Tolson | Yes |
| Joe Williams | Yes |
| Adam Sussman, Alternate 1 | Yes |
| Dusty Kuykendall, Alternate 2 | Yes |
| **Vacancy**: Should the City Council reappoint existing board members, there would be no vacancies. | |
| **Board of Adjustment** | |
| Ron Poteete | Yes |
| ***Brian Blythe*** | ***No*** |
| Brenda Rizos, Alternate 1 | Yes |
| **Vacancy**: One (1) regular member vacancy beginning in January 2021. Should the City Council reappoint all other existing board members, there would be no other vacancies. | |
| **Parks Board** | |
| David Rhoads | Yes |
| Christel Parish | Yes |
| Tommy DeWitt | Yes, but has limited time |
| **Vacancy**: Two (2) alternate member vacancies currently. Should the City Council reappoint existing board members, there would be no additional vacancies. | |

Item No. 09

# City of Lucas
# City Council Agenda Request
# November 5, 2020

## Attachments/Supporting Documentation

1. Board Appointment Policy
2. Board attendance sheets
3. Board applications *(sent under separate attachment)*

## Budget/Financial Impact

NA

## Recommendation

NA

## Motion

I make a motion to interview the following applicants at the November 19, 2020 City Council meeting either during open session or Executive Session:

1.
2.
3.

City of Lucas

# BOARD APPOINTMENT POLICY

## PURPOSE

The purpose of the Board Appointment Policy is to provide procedures and standards for the appointment process by the City Council, and guidelines for citizens being appointed to a City of Lucas board or commission.

## APPLICATION PROCESS

The City of Lucas will advertise in the Lucas Leader and on the City website during the months of September and October each year for the recruitment of new board members.

A Meet and Greet reception will be held on the 4th Thursday in October at 6:30 pm at City Hall for citizens interested in serving on a board as well as existing board members. The reception will provide an opportunity for each City Council liaison to provide information on the board/commission they represent.

Board applications will be accepted through November 1st each year.

New board member applications will be submitted to the City Council for review at the first meeting in November, and the City Council will determine which prospective applicants they would like to interview.

Interviews with the City Council may take place at the second meeting in November.

Prospective applicants of the Board of Adjustment and Planning and Zoning Commission may meet with City Councilmembers during Executive Session. Prospective applicants of the Parks and Open Space Board and Technology Committee may meet with the City Council during the open regular session of the meeting and may be called upon to speak at the podium with the City Council.

During the interview process in Executive Session or during the regular open session meeting, a prospective board member may expect to be asked about the following items:

- Why the applicant would like to serve their community
- What experience the applicant could bring to a board/commission
- What is the applicant's vision for the City
- How the applicant's skillset would benefit the board they are interested in serving
- Any other questions the City Council deems appropriate for that board/commission

## APPOINTMENT PROCESS FOR NEW BOARD MEMBERS

At the first City Council meeting in December, board member appointments will be placed on the City Council agenda.

Following City Council appointment, the City Secretary will notify new board members of their appointment along with procedures for setting up email and appropriate training.

Each new board member will be required to take part in Open Meetings Act training (50-minute video on Attorney General's website), sign a Statement of Officer paperwork and Oath of Office paperwork within 30 days of being appointed. Each new board member will also be required to setup a City of Lucas email account where the City will correspond with the board member for meeting notices, Board packet distribution, and general correspondence.

## REAPPOINTMENT PROCESS FOR EXISTING BOARD MEMBERS

In October each year, the City Secretary shall contact existing board members whose terms are expiring confirming they would like to be considered for reappointments.

At the first City Council meeting in December, reappointment of existing board members whose term are expiring will be considered. Board member attendance may be brought before the City Council as part of reappointment consideration.

The City Council will review each board and vote upon each board member whose term is expiring.

The City Secretary shall contact each board member who was reappointed for another two-year term.

For any existing board members that would like to serve on a different board, a new application shall be completed and submitted for City Council consideration.

Approved by City Council: December 19, 2019

# Board of Adjustment
# Attendance
# 2019-2020

| Meeting Date 2019-2020 | Chris Bierman Chairman | Ron Poteete | James Foster | Tom Redman | Brian Blythe | Brenda Rizos Alternate 1 | Michael Dunn Alternate 2 |
|---|---|---|---|---|---|---|---|
| | *Term Expires: 2021* | *Term Expires: 2020* | *Term Expires: 2021* | *Term Expires: 2021* | *Term Expires: 2020* | *Term Expires: 2020* | *Term Expires: 2021* |
| August 13, 2019 | Present | Present | Present | Present | Present | Present | Present |
| December 18, 2019 | Present | Present | Present | Absent | Present | Present | Present |
| March 9, 2020 | Present | Present | Absent | Present | Absent | Present | Absent |
| July 15, 2020 | Present | Present | Present | Present | Present | Present | Present |
| August 25, 2020 | Present | Present | Absent | Present | Absent | Absent | Present |
| September 21, 2020 | Absent | Absent | Present | Present | Present | Absent | Present |
| **2019-2020 Totals:** | **Present: 5 Absent: 1** | **Present: 5 Absent: 1** | **Present: 4 Absent: 2** | **Present: 5 Absent: 1** | **Present: 4 Absent: 2** | **Present: 4 Absent: 2** | **Present: 5 Absent: 1** |

*Denotes Board members whose terms expire in December 2020

# Planning and Zoning Commission Attendance
# 2019-2020

| Meeting Date 2019-2020 | Peggy Rusterholtz Chairman | David Keer Vice Chairman | Tim Johnson | Joe Williams | Tommy Tolson | Adam Sussman Alternate 1 | Dusty Kuykendall Alternate 2 |
|---|---|---|---|---|---|---|---|
| | *Term Expires: 2021* | *Term Expires: 2021* | *Term Expires: 2021* | *Term Expires: 2020* | *Term Expires: 2020* | *Term Expires: 2020* | *Term Expires: 2020* |
| January 10, 2019 | Present | Present | Present | Present | Present | Appointed 4/18/19 | Appointed 5/21/2020 |
| February 14, 2019 | Absent | Present | Present | Present | Absent | | |
| March 14, 2019 | Present | Present | Present | Absent | Present | | |
| May 9, 2019 | Present | Present | Present | Present | Present | Present | |
| June 13, 2019 | Present | Present | Present | Present | Present | Absent | |
| July 11, 2019 | Present | Absent | Present | Present | Present | Absent | |
| August 8, 2019 | Present | Present | Present | Absent | Present | Present | |
| September 12, 2019 | Present | Present | Present | Present | Absent | Absent | |
| October 10, 2019 | Present | Present | Absent | Absent | Present | Present | |
| November 14, 2019 | Absent | Present | Present | Present | Present | Absent | |
| December 12, 2019 | Absent | Present | Present | Absent | Present | Absent | |
| January 9, 2020 | Resigned Temporarily | Present | Present | Absent | Present | Present | Present |
| March 12, 2020 | Present | Present | Present | Present | Present | Present | Present |
| April 9, 2020 | Present | Present | Present | Present | Present | Absent | Present |
| May 14, 2020 | Present | Present | Present | Present | Present | Present | Present |
| July 28, 2020 | Present | Present | Present | Present | Present | Present | Present |
| August 13, 2020 | Present | Present | Present | Present | Present | Present | Present |
| September 10, 2020 | Present | Present | Present | Absent | Present | Absent | Present |
| October 8, 2020 | Present | Present | Present | Present | Present | Present | Present |
| **2019-2020 Totals:** | **Present: 16 Absent: 3** | **Present: 18 Absent: 1** | **Present: 18 Absent: 1** | **Present: 13 Absent: 6** | **Present: 17 Absent: 2** | **Present: 12 Absent: 7** | **Present: 8 Absent: 0** |

*Denotes Board members whose terms expire in December 2020

# Parks and Open Space Board
# Attendance
# 2019-2020

| Meeting Date 2019-2020 | David Rhoads Chairman | Bill Esposito Vice Chairman | Tommy DeWitt | Ken Patterson | Christel Parish | Vacant Alternate 1 | Vacant Alternate 2 |
|---|---|---|---|---|---|---|---|
| | Term Expires: 2020 | Term Expires: 2021 | Term Expires: 2020 | Term Expires: 2021 | Term Expires: 2020 | Term Expires: 2021 | Term Expires: 2020 |
| January 22, 2019 | Present | Present | Present | Present | Present | | |
| April 23, 2019 | Present | Present | Absent | Present | Absent | | |
| May 21, 2019 | Present | Present | Present | Present | Present | | |
| July 23, 2019 | Present | Present | Absent | Present | Present | | |
| September 24, 2019 | Present | Absent | Absent | Present | Absent | | |
| January 28, 2020 | Present | Present | Absent | Present | Absent | | |
| July 28, 2020 | Present | Present | Present | Present | Absent | | |
| September 22, 2020 | Present | Present | Present | Present | Present | | |
| **2016-2018 Totals:** | **Present: 8 Absent: 0** | **Present: 7 Absent: 1** | **Present: 4 Absent: 4** | **Present: 8 Absent: 0** | **Present: 4 Absent: 4** | | |

*Denotes Board members whose terms expire in December 2020

Item No. 10

# City of Lucas
# City Council Agenda Request
# November 5, 2020

Requestor: Mayor Jim Olk

## Agenda Item Request

**Executive Session.**

An Executive Session is not scheduled for this meeting.

As authorized by Section 551.071 of the Texas Government Code, the City Council may convene into closed Executive Session for the purpose of seeking confidential legal advice from the City Attorney regarding any item on the agenda at any time during the meeting. This meeting is closed to the public as provided in the Texas Government Code.

## Background Information

NA

## Attachments/Supporting Documentation

NA

## Budget/Financial Impact

NA

## Recommendation

NA

## Motion

NA

# City of Lucas
# City Council Agenda Request
# November 5, 2020

Item No. 11

Requester: Mayor Jim Olk

## Agenda Item Request

Reconvene from Executive Session and take any action necessary as a result of the Executive Session.

## Background Information

NA

## Attachments/Supporting Documentation

NA

## Budget/Financial Impact

NA

## Recommendation

NA

## Motion

NA