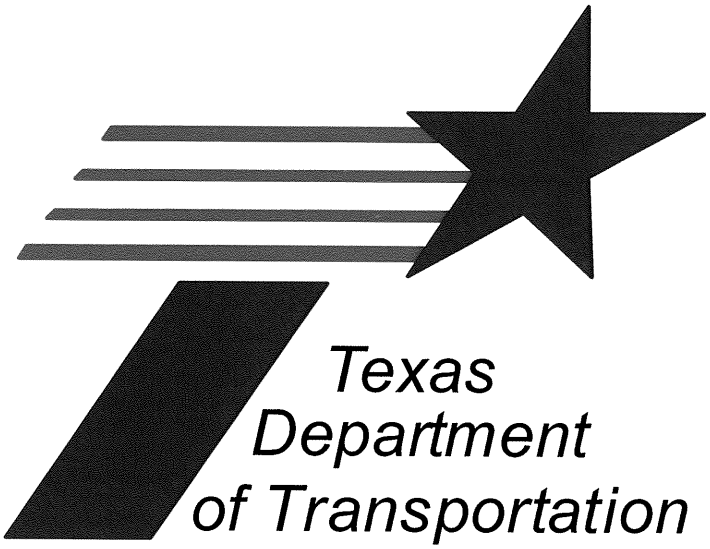
ENERGY SECTOR III

Laredo District
PAVEMENT DESIGN REPORT



HWY: FM 117
CSJ: 0236-03-XXX
County: Zavala
Project Limits:
From US 57 To FM 1866
Project Length: 4.723 Miles

Selected Option: STRATEGY 1-10 YR

Designed by: _____ **Date:** 8/30/13
Robert Moya III, P.E.

Approved By: _____ **Date:** 7/16/13
David Salazar, P.E.
Director of Maintenance

NOTE: This document is released for the purpose of interim review and is not intended for bidding, construction, or permitting purposes.

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GENERAL PROJECT INFORMATION

Location

This pavement design report is for the proposed rehabilitation or overlay of FM 117 in Zavala County for a length of 4.723 miles from US 57 to FM 1866.

The project location map is shown as Exhibit A.

Facility

The section was constructed in 1940. 1.206 miles were reconstructed in 1972 from US 57 south with 12 foot lanes and 8 foot shoulders. It has been sealcoated 5 times since then. The rest of the location was reconstructed in 1979 with 9 inches of flex base and a sealcoat with 12 foot lanes and 6 foot shoulders. It has been sealcoated 4 times since then.

The roadway existing layers in this section consist of approximately 1.25 inches of sealcoat material, and 9 inches of flexible base as per the roadway inventory logs.

The existing typical section of this roadway is 12' lanes and 8' shoulders for the first 1.206 miles, and 12' lanes with 6' shoulders for the rest of the section.

Soil Conditions

The subgrade modulus is assumed to be 8 ksi for the design purposes. The subgrade modulus used for this design was obtained by using the modulus of the adjacent project CSJ: 0236-03-024. The falling Weight data used for the adjacent project can be seen in Exhibit C "Falling Weight Data". The Triaxial classification number used for this location is 5.1. This number was obtained from the FPS 21 software using the predominant soil type. The predominant soil type is silty clay loam. Predominant soil information can be seen in EXHIBIT F "Subgrade Soil Data".

The design was done using an existing base modulus of 30 ksi based on the DCP data.

Traffic Data (Exhibit B)

The Traffic data was obtained from TRM database on February 1, 2013. The 20 year traffic obtained is summarized below:

From: FM 57 To: FM 1866:

2011 ADT: 2200	Percent Trucks in ADT: 21.5
2031 ADT: 3920	ATHWLD: 11,000
Flex 18k ESALs: 2,451,000	Percent Tandem Axles in ATHWLD: 70

Traffic Data

The Traffic data was projected using the Traffic6 software on February 1, 2013. The 20 year traffic obtained is summarized below:

From: FM 57 To: FM 1866:

2014 ADT: 2,458	Percent Trucks in ADT: 21.5
2034 ADT: 4,178	ATHWLD: 11,000

Flex 18k ESALs: 2,657,000 Percent Tandem Axles in ATHWLD: 70

FLEXIBLE PAVEMENT DESIGN

The design was performed with the Flexible Pavement Design System (FPS-21) program and input values were selected using TxDOT guidelines. All design data and parameters are included as Exhibit D, FPS input and output.

The process used for determining the preferred proposed pavement structure included incorporating the most efficient pavement structure for the location that would meet or exceed a design life of 20 years with a minimum overlay timeframe of 8 years. The alternate Strategy is a design life of 10 years with a minimum overlay timeframe of 4 years.
This process resulted in the following pavement design options:

STRATEGY 1 - 10 Year Design

Option 1: Consists of the following:

- Surface: 2" HMA Overlay
- Base 1 - 1" Existing bituminous material to remain
- Base 2 - 9" Existing base material to remain
- T(1) - Time to first overlay = 7 Years
- T(2) - Design Life = 16 Years

This FPS design was checked with Modified Triaxial Design Procedure (Exhibit E) and failed. However, if there is no history of heavy trucks, no severe rutting, and only preventive maintenance has been done on this section since it was last constructed, the Modified Triaxial Test may be waived.

STRATEGY 2 - 20 Year Design

Option 1: Consists of the following:

- Surface: 3" HMA Overlay
- Base 1 - 1" Existing bituminous material to remain
- Base 2 - 9" Existing base material to remain
- T(1) - Time to first overlay = 12 Years
- T(2) - Design Life = 28 Years

This FPS design was checked with Modified Triaxial Design Procedure (Exhibit E) and failed. However, if there is no history of heavy trucks, no severe rutting, and only preventive maintenance has been done on this section since it was last constructed, the Modified Triaxial Test may be waived.

Option 3: Consists of the following:

- Surface: 4" HMA Overlay
- Base 1 - 1" Existing bituminous material to remain
- Base 2 - 9" Existing base material to remain
- T(1) - Time to first overlay = 15 Years

T(2) - Design Life = 33 Years

This FPS design was checked with Modified Triaxial Design Procedure (Exhibit E) and passed with a factor of 1.0, but did not pass with a factor of 1.5.
**(The Pavement Design Task Force (PDTF, 2009) recommends a factor of 1.0 be used for all designs where traffic loading is below 5 M ESALs.

This option would require repairing all the failed locations prior to application.

CONCLUSION

The Director of Maintenance will be review the options noted in the previous section "Flexible Pavement Design" and determine the proposed material and types and determine the most viable and cost effective option.

Surface, base, and subgrade "weak spots" should be addressed prior to, or with the construction project.

In reference of the elements considered for the selection of the roadway surface layer aggregate properties, see the information contained in **Appendix A** – Surface Aggregate Selection Form.