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**GEOTECHNICAL  
ENGINEERING STUDY**

**CLEARWATER CREEK SUBDIVISION  
MARION, TEXAS  
COLLECTOR  
PAVEMENT DESIGN**

**FROST GEOSCIENCES, INC. PROJECT NO.: FGS-G 20020-S1**

**REVISED**

**MAY 12, 2021**

**Prepared Exclusively for:**

**Mr. Allen Hoover  
Mosaic Land Development  
6812 West Avenue, Suite 100  
San Antonio, Texas 78213**

The logo for Frost GeoSciences features a large, dark blue, stylized 'F' that curves around the company name. The name 'Frost GeoSciences' is written in a bold, italicized, sans-serif font. 'Frost' is in a dark grey color, while 'GeoSciences' is in a lighter, metallic-looking grey with a slight gradient.

***Frost GeoSciences***

***Construction Materials ▪ Forensics  
Environmental ▪ Geotechnical***



**Frost GeoSciences**

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TBPE Firm Registration # F-9227  
TBPG Firm Registration # 50040

May 12, 2021

Mr. Allen Hoover  
Mosaic Land Development  
6812 West Avenue, Suite # 100  
San Antonio, Texas 78213

**SUBJECT:**

Clearwater Creek Subdivision  
San Antonio, Texas  
FGS Project No: FGS-G20020-S1

Dear Mr. Hoover;

Attached is the flexible pavement design for the collector type street having a CBR value of 2.0 for the Clearwater Creek Subdivision. The collector street is very similar to the Local "B" with the exception of the terminal serviceability requirements.

We appreciate the opportunity to be of service to you in this phase of your project and future projects. If you have any questions pertaining to this report, or if we may be of further service, please contact our office.

Respectfully submitted,  
**Frost GeoSciences, Inc.**



F. J. Caballero, P.E.  
Project Engineer

JOT – FGS-G20020-S1

Copies Submitted:

- i. ☐ One (1) Electronic: Mr. Allen Hoover, Mosaic Land Development, San Antonio, Texas
- ii. ☐ One (1) Electronic: Mr. Michael Richards, P. E., KFW Engineers

**FGS Project No.: FGS-G20020-S1**

In accordance with Bexar County design parameters we have developed the following flexible pavement recommendations for **Collector Streets** on a Clay subgrade with a CBR value of 2.0.

COMPONENT	FLEXIBLE DESIGN SECTION (inches)			
	Local "B" Streets			
	Option # 1	Option # 2	Option # 3	Option # 4
Type D HMAC Surface	3.0 inches	3.0 inches		
Type B HMAC Base	4.0 inches	4.0 inches		
Flexible Base, (Type B, Grade 2), Pit Run	11.00 inches	6.0 inches		
Lime Treated Subgrade (6 inch Min.)	YES	YES		
3 X 5 Rock				
Wrapped in Mirafi 180N Filter Fabric	NO	NO		
TENSAR GEOGRID (TX-5)	NO	YES		
Design ESAL Value	2,000,000	2,000,000		
Actual ESAL Value	2,000,000	2,147,000		



# SpectraPave™ Pavement Optimization Design Analysis



## Design Parameters for AASHTO (1993) Equation

Reliability (%)	= 90	Initial Serviceability	= 4.2
Standard Normal Deviate	= -1.282	Terminal Serviceability	= 2.5
Standard Deviation	= 0.45	Change in Serviceability	= 1.7

Aggregate fill shall conform to following requirement:

D50 ≤ 27mm (Base course)

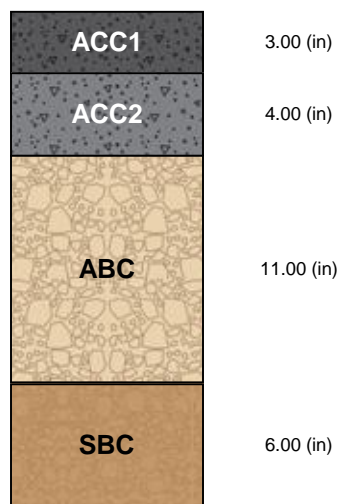
## Unstabilized Section Material Properties

Layer	Description	Cost (\$/ton)	Layer coefficient	Drainage factor
ACC1	Asphalt Wearing Course	70.00	0.440	N/A
ACC2	Dense-graded Asphalt Course	70.00	0.380	N/A
ABC	Aggregate Base Course	20.00	0.140	1.0
SBC	Subbase Course	16.00	0.080	1.0

## Stabilized Section Material Properties

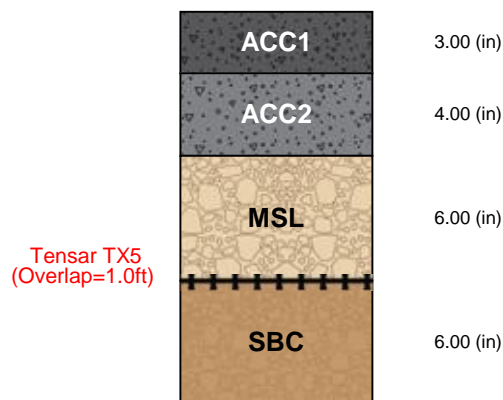
Layer	Description	Cost (\$/ton)	Layer coefficient	Drainage factor
ACC1	Asphalt Wearing Course	70.00	0.440	N/A
ACC2	Dense-graded Asphalt Course	70.00	0.380	N/A
MSL	Mechanically Stabilized Base Course	20.00	0.265	1.0
SBC	Subbase Course	16.00	0.080	1.0

## Unstabilized Pavement



Subgrade Modulus = 3,980 (psi)  
Structural Number = 4.860  
Calculated Traffic (ESALs) = 2,000,000

## Stabilized Pavement



Subgrade Modulus = 3,980 (psi)  
Structural Number = 4.910  
Calculated Traffic (ESALs) = 2,147,000

## LIMITATIONS OF THE REPORT

The designs, illustrations, information and other content included in this report are necessarily general and conceptual in nature, and do not constitute engineering advice or any design intended for actual construction. Specific design recommendations can be provided as the project develops.

Project Name	CLEARWATER CREEK, (COLLECTOR) Opt. 1 & 2 Lime		
Company Name	FROST GEOSCIENCES		
Designer	F. J. CABALLERO, P. E.	Date	October 29, 2020