

March 11, 2008




EARTH ENGINEERING  
COMPANY, INC.

Landmark Construction Solution  
4627 West 20<sup>th</sup> Street Road, Unit A  
Greeley, Colorado 80634

Attn: Mr. Sean Rogers

Re: Pavement Design Report  
Fossil Lake P.D.P. – 4<sup>th</sup> Filing  
Dripping Rock Lane and Fossil Lake Place  
Fort Collins, Colorado  
EEC Project No. 07-01-095

**APPROVED**  
By: [Signature] Date: 3-20-08  
 City of Fort Collins  
Engineering Department

Mr. Rogers:

Our subgrade evaluation report for selected roadway subgrades within the Fossil Lake P.D.P. – 4<sup>th</sup> Filing Condominium Development, in south Fort Collins, Colorado was submitted to your attention on March 7, 2008. Based on that report, the City of Fort Collins Engineering Department has provided estimated traffic loadings for the development streets which have been prepared to date. Pavement section recommendations are provided in this report based on the traffic loadings provided by the City of Fort Collins Engineering Department and the subgrade soil tests previously completed by Earth Engineering Consultants, Inc. (EEC). Those streets included sections for Dripping Rock Lane and Fossil Lake Place.

A Hveem Stabilometer R-value of 5 was used for the rough-graded pavement subgrades. Using the Colorado Department of Transportation (CDOT) and the revised Larimer County Urban Area Street Standards (LCUASS) Pavement Design Criteria as of April 2, 2007, an R-value of 5 corresponds to a resilient modulus value of 3025. The resilient modulus value of 3025 was used in the pavement evaluation for the roadways within Fossil Lake P.D.P. – 4<sup>th</sup> Filing Condominium Development.

The American Association of State Highway and Transportation Officials (AASHTO) design guidelines for pavement design were used to evaluate recommended pavement sections for this project. Recommended pavement sections based on that evaluation are provided on the attached summary.

The subgrade soils are generally low strength lean clays with variable (low to high) swell potential. As presented in our subgrade report dated March 7, 2008: “The average swell-index for the overburden soil samples analyzed was approximately (+) 2.5%, which is greater than the LCUASS 2

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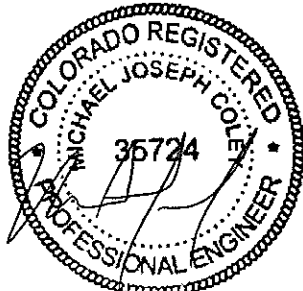
percent criteria established for requiring a swell mitigation plan throughout the development. Therefore, due to the swell potential of the on-site subgrade materials we recommend a subgrade stabilization procedure be implemented to reduce the swell potential.”

Stabilization of the pavement subgrades through the addition of Class C fly ash will be required to develop stable subgrades for construction of the roadways. The stabilized subgrade should enhance the long term performance of the pavements and reduce the potential for adverse weather impacting the pavement construction. The addition of 13% Class C fly ash (based on dry weight) to the top 12 inches of the subgrades is recommended to stabilize those subgrades. In accordance with City of Fort Collins Standards, the stabilization should extend from back-of-curb to back-of-curb.

The asphaltic concrete used as the surface course in the pavement area should be consistent with City of Fort Collins classification for Grading S (75) PG 58-28. The aggregate base should be consistent with Colorado Department of Transportation requirements for Class 5 or Class 6 base.

We appreciate the opportunity to be of service to you on this project. If you have any questions concerning this report, or if we can be of further service to you in any other way, please do not hesitate to contact us.

Very truly yours,  
**Earth Engineering Company, Inc.**



Michael J. Cole, P.E.  
Principal Engineer

MJC/dla

cc: Rick Richter – City of Fort Collins (4)

## PAVEMENT SECTION RECOMMENDATIONS

Client:	Landmark Construction Solution	Project:	Fossil Lake P.D.P. -- 4th Filing	Project No.	07-01-095	Date:	Mar-08
<b>Roadways</b>							
Dripping Rock Lane and Fossil Lake Place							
Local Residential Roadways							
Roadway Classification	10						
18-kip Equivalent Daily Load Axles (EDLA)	73,000						
20-Year 18-kip Equivalent Single Axle Loads (ESAL)	75						
Reliability (%)	0.44						
Standard Deviation	3025						
Subgrade Resilient Modulus: Based on Subgrade R-Value of 5	2.5						
PSI Loss	2.79						
AASHTO Design Structural Number - $S_N$	2.79						
<b>Minimum Pavement Thicknesses - Inches</b>							
Composite Pavement Section (Alternative A)	(1) Alternative A - Composite w/o Fly Ash		(2) Alternative B - Composite with Fly Ash				
	Thickness, Inches	Calculated SN	Thickness, Inches	Calculated SN			
Hot Bituminous Pavement (Grade S) - Structural Number $S_N$	4.5	1.98	4.0	1.76			
Aggregate Base Course (CDOT Class 5 or 6) - Structural No. $S_N$	8.0	0.88	6.0	0.66			
Stabilized Subgrade - Fly Ash Treated Subgrade 13% Class C			12.0	0.60			
Calculated Pavement Structural Number - $S_N$	$S_N =$	2.86	$S_N =$	3.02			

- Notes:
- (1) For alternative A, the thicknesses presented herein assumes an approved subgrade section passing a proof-roll is positioned prior to placement of the pavement section.
  - (2) If fly ash is utilized for the on-site pavement areas for stabilization purposes, Alternative B, it is recommended that at least the upper 12-inches of the prepared subgrade be treated with 13% fly ash (by weight) of Class C fly ash.
  - (3) The minimum pavement section in general accordance with LCUASS is 4-inches HMA over 6-Inches ABC

