



Earthtec Testing & Engineering, P.C.

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September 14, 2005

Mr. Ron Chandler
McKell Excavating
PO Box 312
Orem, UT 84057

Re: **Pavement Section Design**
12340 South 2700 West
Riverton, Utah
Job No. 052311

Dear Mr. Chandler:

As you requested and authorized, this letter presents an asphalt pavement section design for 12340 South street and the adjacent portion of 2700 West street located in Riverton, Utah. We understand that 12340 South street will be a residential street and that 2700 West street is a collector.

Observations

The undersigned engineer visited the site on September 12, 2005 to observe existing conditions. Grading had been performed for the mentioned streets and curb/gutter had been placed. The edge of the gutter was within 2 to 3 feet of the existing pavement section along 2700 West street. The soils exposed at the site visually consisted of SILT with sand (ML) and a trace of gravel.

Traffic Assumptions

For the residential street, we have assumed traffic volumes will comprise approximately 100 cars and pickup trucks per day, with one daily delivery truck and school bus, and a weekly garbage truck. For 2700 West street, we have assumed traffic volumes will comprise approximately 1000 cars and pickup trucks per day, with 20 daily school busses, 10 daily single-unit (delivery/garbage) trucks and 10 daily single-trailer semi trucks.

Pavement Section Design

For design, we used the equations for flexible pavement design from the 1998 UDOT *Pavement Management and Pavement Design Manual*. We have provided two pavement sections for the two types of streets. Based on our observations and experience with similar soils, we estimate that a design CBR value of 3 for the silt subgrade soils is conservative. Given this design CBR, the traffic discussed above and the typical parameters used in the UDOT design manual, we recommend the following minimum pavement sections:

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Table 1: Pavement Section Design

Street Type	Asphalt Thickness (in)	Compacted Road base Thickness (in)	Compacted Subbase Thickness (in)
Residential	3	8	12
2700 West	4	8	12

We also recognize that soft subgrade in the area has been observed and thereby recommend that a separation fabric, such as Mirafi 140 N or equivalent, be placed on top of the subgrade prior to placing pavement materials. Subbase should be dumped and spread on the fabric using track equipment. All subbase, base material, and asphalt should conform to UDOT and/or local requirements regarding gradation, oil content, and any other requirements pertaining to the project. Subbase, if used, should have a minimum CBR of 20 and the base course a minimum CBR of 70. We recommend that all road base and subbase be properly processed, moisture conditioned, and compacted to a minimum of 95% of the maximum dry density as determined by ASTM D1557. All asphalt should be compacted to local requirements or a minimum of 95% of the laboratory Marshal mix design density.

GENERAL CONDITIONS

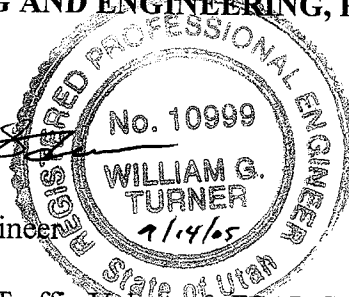
The pavement section design as presented in this report was conducted within the limits prescribed by our client, with the usual thoroughness and competence of the engineering profession in the area. The recommendations given in this letter apply only to the proposed parking areas and bus lane and not to the road leading up to the school. No other warranty or representation, either expressed or implied, is intended in our proposals, contracts or reports. An experienced geotechnical engineer or technician should observe fill placement and conduct testing as required to confirm the use of proper fill materials and placement procedures.

We appreciate the opportunity of providing our services on this project. If we can answer questions or be of further service, please contact us at (801) 225-5711.

Respectfully;

EARTHTEC TESTING AND ENGINEERING, P.C.

William G. Turner, P.E.
 Senior Geotechnical Engineer



Attachments: Figure 1, Traffic Volume & ESAL Calculations
 Figure 2, Flexible Pavement Design

TRAFFIC VOLUME & ESAL CALCULATIONS

PROJECT DESCRIPTION: 2700 WEST STREET
AT APPROXIMATELY 12340 SOUTH
RIVERTON, UTAH

UDOT PROJECT NO.: N/A

EARTHTEC PROJECT NO.:

DATE: September 14, 2005

Traffic Data Provided for Beginning Year:

2005

2005 Average Daily Traffic Volume:

1,000

Estimated Annual Traffic Growth Rate:

1.00%

Construction Year:

2005

Final Design Year:

2025

2005 Estimated Traffic Volume:

1,000

2025 Estimated Traffic Volume:

1,221

LENGTH:

FUNCTIONAL CLASS:

17

PROJECT SCOPE:

CONSTRUCTION

SN USED:

3.0

PAVEMENT TYPE:

FLEXIBLE

NUMBER OF LANES:

2

CONSTRUCTION YEAR:

2005

NUMBER OF DIRECTIONS:

2

DESIGN PERIOD:

20 YEARS

LANE FACTOR, F =

0.83

VEHICLE TYPES CATEGORY I AXLE CLASSES 1 to 3 (Motorcycles & Cars)	PERCENT OF ADT	CNST.YEAR TRAFFIC (A)	GROWTH FACTOR (B)	DESIGN TRAFFIC (C)	ESAL FACTOR (D)	DESIGN ESAL (E)
	96	960	22.02	3,201,915	0.0002	640
	2	20	22.02	66,707	0.8800	58,702
	1	10	22.02	33,353	0.4529	15,106
	1	10	22.02	33,353	2.9028	96,818
		0	22.02	0	3.6584	0
TOTALS =	100	1,000		TOTAL DESIGN ESALS =		171,266
DESIGN LANE ESAL/DAY =						23.5

PROJECT NO.: 52311



FIGURE NO.:

1

FLEXIBLE PAVEMENT DESIGN

Evaluation of Structural Requirements

Project Name: 2700 WEST STREET
 AT APPROXIMATELY 12340 SOUTH
 RIVERTON, UTAH

Project No.: 52311
 Date: 9/14/05

Feature: FLEXIBLE PAVEMENT

Phase: CONSTRUCTION

DESIGN PARAMETERS:

Flexible Pavement Proposed Paving Year	2005
Flexible Pavment Initial Serviceability Index	4.2
Flexible Pavement Terminal Serviceability Index	2.5
Flexible Pavement Traffic Analysis Period, years	20
Reliability Factor, Percent	90
Overall Deviation	0.45
Dynamic C.B.R. of Subgrade Soils, Percent	3
Resilient Modulus of Predominant Subgrade Soil, psi	4,500
Resilient Modulus of Granular Borrow, psi	15,000
Resilient Modulus of Untreated Base Course, psi	27,000

DESIGN TRAFFIC:

Average 2005 AADT:	=	1,000 *
Number of Traffic Lanes	=	2 *
Design Lane ESAL/Day	=	23 *
Total Design Lane ESAL	=	171,266 *

*See ESAL CALCULATIONS Sheet

PAVEMENT DESIGN:

Required Structural Number (SN) Determined by AASHTO 1993 Design Procedure:

Above Untreated Base Course	=	1.55
Above Granular Borrow	=	1.96
Above Subgrade Soil	=	3.05

PAVEMENT COMPONENT THICKNESSES TO PROVIDE REQUIRED STRUCTURAL NUMBER

	Thickness, inches		Structural Coeff.		Drainage Coeff.		Structural Number
Asphalt Concrete Pavement	3.88	x	0.40			=	1.55
Untreated Base Course	4.10	x	0.10	x	1.00	=	0.41
Granular Borrow	13.63	x	0.08	x	1.00	=	1.09
Total Thickness	21.60						3.05

***** RECOMMENDED PAVEMENT SECTION *****

	Thickness, Inches		Structural Coeff.		Drainage Coeff.		Structural Number			
							Provided	Cumulative	Required	
Asphalt Concrete Pavement	4	x	0.40			=	1.6	1.60	> 1.55	OK
Untreated Base Course	8	x	0.10	x	1.00	=	0.8	2.40	> 1.96	OK
Granular Borrow	12	x	0.08	x	1.00	=	0.96	3.36	> 3.05	OK
TOTAL	24		Inches							

PROJECT NO.: 52311



FIGURE NO.: 2

R. A. McKell Constructors
 P.O. Box 1935
 Orem, Utah 84059
 (801) 225-7662
 Fax # (801) 225-8015

Fax Transmittal Sheet

Date: 8, 31, 05

From: R.A. McKell Constructors - Ron Chandler

Number of pages (including this sheet) :

2

To: <u>TOM BEESLEY</u>
FAX# <u>801-254-6496</u>
Company: <u>RIVINGTON CITY</u>
Regarding: <u>HERITAGE FARMS</u>

Note: If any of these fax copies are illegible, or you do not receive the same number of pages as stated above, please contact us immediately at: (801) 225 - 7662

**R.A. MCKELL CONSTRUCTORS****R.A. McKell Constructors, Inc.**P.O. Box 1935
Orem, UT 84059

Phone (801) 225-7662

Fax (801) 225-8015

August 31, 2005

Riverton City
Tom Beesley
Re: Hayden Ridge Way Improvements

Dear Tom:

During construction of this roadway R.A. McKell Excavating, Inc. has encountered an unsuitable subsurface layer of clay. This roadway had already shown signs of alligator cracking and movement. The plans called to have the tie-in areas patched and an asphalt overlay of 1" placed over the entire roadway. After a meeting with a Russ (Riverton City inspector), we have been instructed to resolve the problem by excavating 23" of the unsuitable material. Placing a GEO-TEX fabric and using the following roadway section of 12" (4" minus imported sub-base), 8" (Untreated Base Course), and 3" of (Bituminous Surface Course).

We believe this will alleviate the problem and make a durable roadway for Riverton City.

There was no representation from Ron Thome Homes at the meeting. We feel that since the roadway was already failing that some portion of the reconstruction cost be split with Riverton City. R.A. McKell Excavating, Inc. will leave that decision between both of you.

As of now the roadway is completely torn up. We are awaiting your reply so that we can expedite repairs and keep the citizens along this street from undue irritation.

In your telephone conversation with me you also stated that 2700 west was not to be reconstructed until a Geo-tech Engineer looked into the soil samples and gives a recommendation to proceed. As of now we have halted any further disturbance of 2700 west.

Please advise us on what you would like us to do.

Sincerely,

Ron Chandler
Senior Estimator
R.A. McKell Constructors Inc.

cc: Ron Thome Homes