CEEn-2018CPST-013

Springville Performance Evaluation & Pavement Design for Minor Collectors

MagiCAP

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Introduction

Five streets were chosen based on geographic location, pavement age, and average PASER value to understand why some pavements are performing better than others.

Field and laboratory tests were used to determine potential causes of failure.

Several recommendations along with a new pavement design were determined.

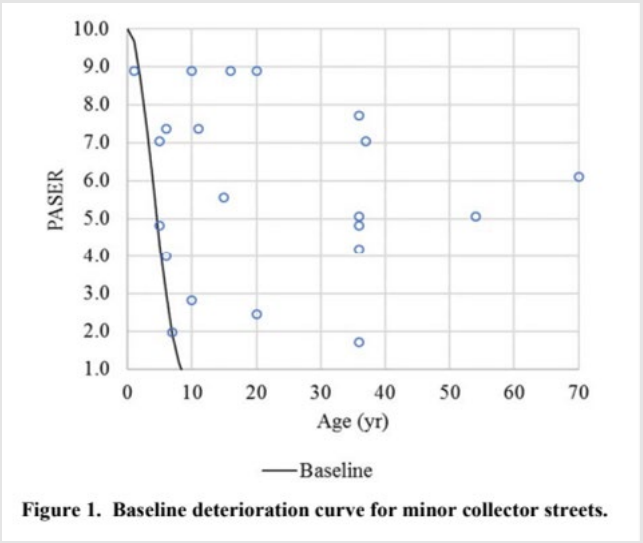


Figure 1. Baseline deterioration curve for minor collector streets.

Table 1. Pavement Segment Information

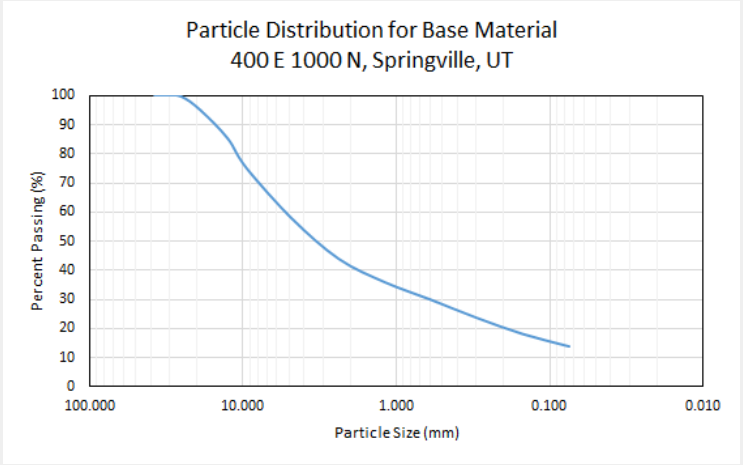
Geographic Region	Segment Number	Location	Pavement Age (yr)	Average PASER Value
West	1438	550 N, 750 to 800 W	11	5.0
	1053	550 W, 300 to 400 S	10	3.3
Southeast	1085	900 S, 1600 to 1650 E	20	10.0
	193	800 E, 800 to 900 S	21	2.5
Northeast	873	400 E, 1000 to 1050 N	5	4.0

Design, Analysis and Results

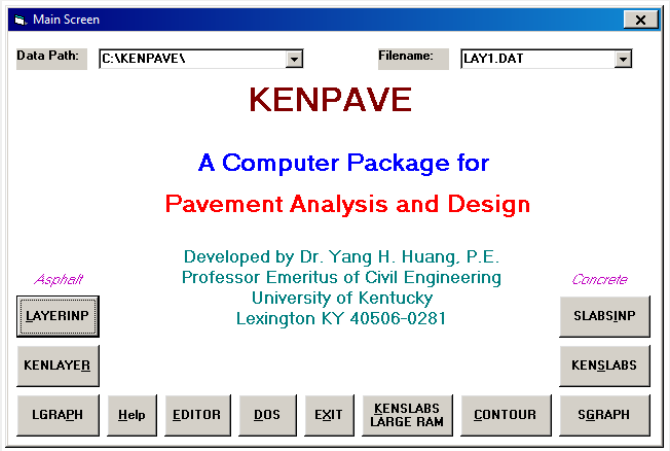
Traffic Studies

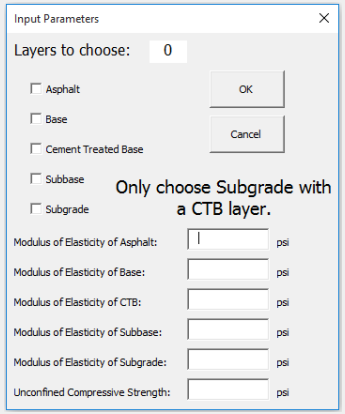
Testing of the current pavement design indicated that the design is insufficient. Base material gradations showed that approximately 14% fines are present in the material. Marshall Flow and Stability testing on asphalt cores revealed that asphalt overlays are not strong enough to prolong pavement life. New design criteria are necessary, and were determined by a mechanistic-empirical analysis.

Soil Gradations and Core Testing



Mechanistic-Empirical Analysis

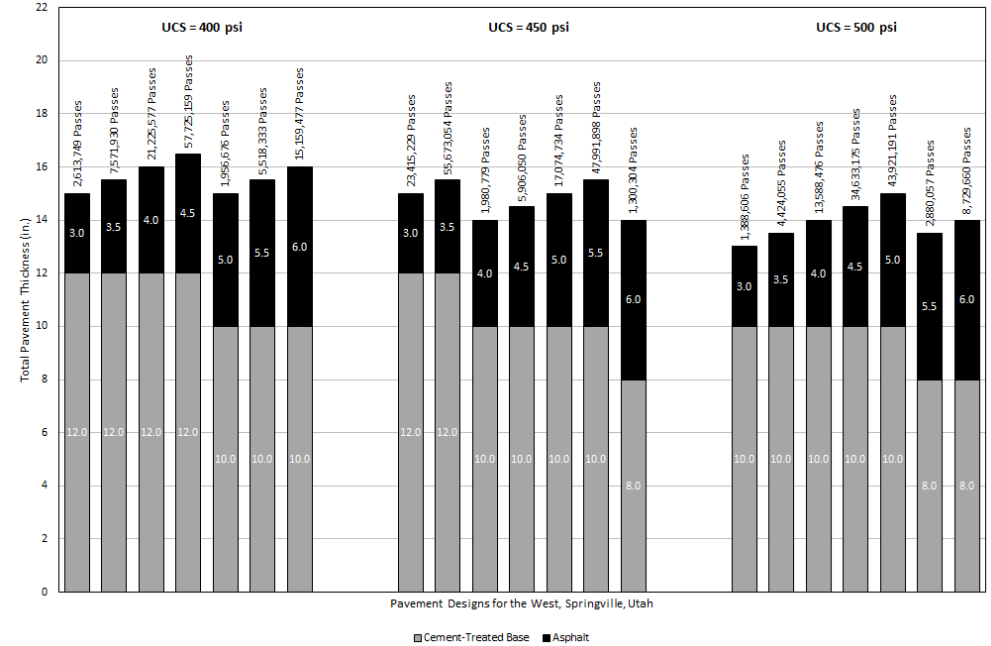




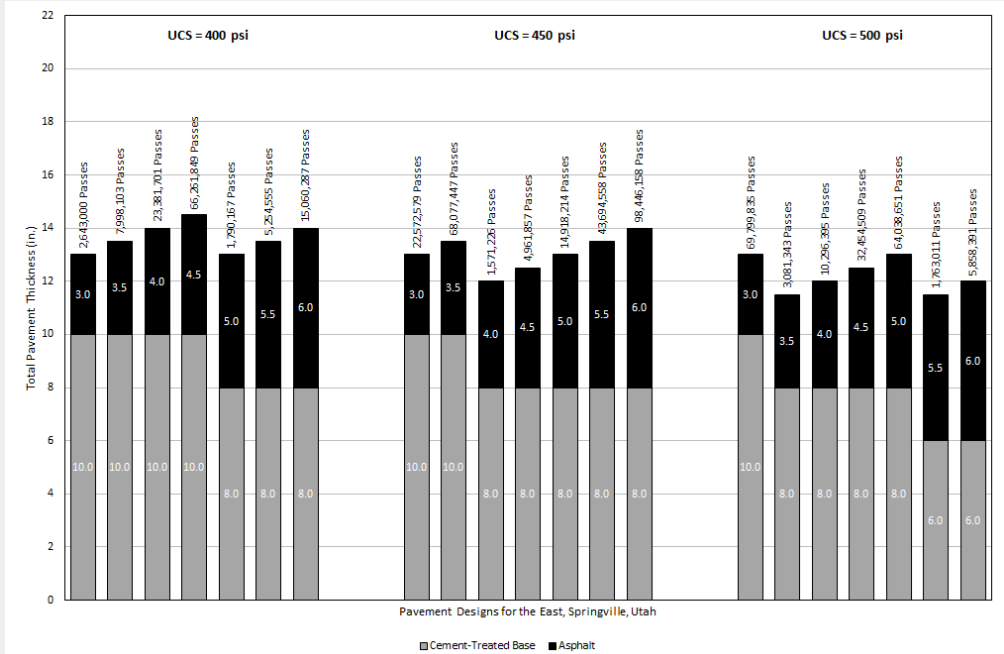
Asphalt Thickness (in)	CTB Thickness (in)	UCS 400 psi West	UCS 400 psi East	UCS 450 psi West	UCS 450 psi East	UCS 500 psi West	UCS 500 psi East
3.0	6.0	0	45	2	374	12	2,424
3.0	8.0	104	15,920	907	134,035	6,180	883,297
3.0	10.0	22,659	2,643,000	200,681	22,572,579	1,388,606	69,799,835
3.0	12.0	2,613,749	167,455,178	23,415,229	179,752,712	47,222,659	192,087,589
3.5	6.0	1	186	8	1,535	55	9,935
3.5	8.0	393	55,882	3,421	469,009	23,240	3,081,343
3.5	10.0	72,837	7,998,103	642,455	68,077,447	4,424,055	89,707,856
3.5	12.0	7,571,930	209,908,241	55,673,054	224,785,760	59,676,864	240,216,243
4.0	6.0	4	725	35	5,983	237	38,658
4.0	8.0	1,419	187,697	12,299	1,571,226	83,300	10,296,395
4.0	10.0	225,498	23,381,701	1,980,779	107,102,381	13,588,476	113,903,693
4.0	12.0	21,225,577	261,152,376	69,968,727	278,791,134	74,723,772	297,909,580
4.5	6.0	17	2,706	145	22,284	970	143,687
4.5	8.0	4,886	593,838	42,292	4,961,857	286,047	32,454,509
4.5	10.0	674,674	66,261,849	5,906,050	135,052,640	34,633,175	143,287,273
4.5	12.0	57,725,159	323,016,000	87,229,031	344,746,907	93,228,536	367,006,050
5.0	6.0	67	9,700	567	79,600	3,776	512,892
5.0	8.0	15,840	1,790,167	136,759	14,918,214	922,196	64,036,651
5.0	10.0	1,956,676	158,423,061	17,074,734	168,446,601	43,921,191	179,257,069
5.0	12.0	101,321,728	396,651,054	108,248,777	423,109,146	115,764,130	450,106,063
5.5	6.0	249	33,501	2,114	274,611	14,047	1,763,011
5.5	8.0	49,698	5,254,555	427,997	43,694,558	2,880,057	81,899,884
5.5	10.0	5,518,333	157,413,147	47,991,898	209,908,241	55,418,001	222,686,152
5.5	12.0	125,298,534	484,618,902	133,924,054	516,530,055	142,477,036	551,050,048
6.0	6.0	893	111,840	7,567	914,627	50,160	5,858,391
6.0	8.0	151,390	15,060,287	1,300,804	98,446,158	8,729,660	104,025,519
6.0	10.0	15,159,477	244,078,272	65,267,055	259,464,618	69,463,546	275,149,492
6.0	12.0	153,906,883	590,729,175	164,539,099	628,970,108	175,041,459	670,283,760

Conclusions and Recommendations

West



East



Designs were limited to an asphalt layer on a CTB layer. Further analysis will be required to determine layer thicknesses for non-CTB designs.

The End