

Appendix B

Pavement Needs Calculation Procedures

Appendix B

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This appendix contains an example of the pavement needs calculation. The calculation assumptions are based on 2008 statewide study. County X was selected, as it was a large county with both rural and urban elements. The following information was provided in the survey.

- 24 million (major) & 13.4 million (local) Pavement Area (sq. yd.):
- **Unpaved Roads:** 100 centerline miles
- Average PCI:
- Scenario:

- 78 (major), 73 (local)
- Reach Best Management Practice (BMP) condition in 20 years

The following steps describe the systematic process used to estimate the pavement needs for this scenario.

Step 1: Determine the distribution of pavement area percentages in each of the four condition categories using Table B.1

Again, recall that the survey questionnaire only asked agencies to provide their average PCI; however, they did not include the distribution of pavements in different conditions. As was explained in the report, this did not offer any information on the distribution of PCIs within that particular network or database. For example, if City X reported an average PCI of 75, there was no corresponding information on what percentage of streets were actually 90, or 55 or 32. An infinite number of combinations were possible to arrive at an average of 75. This distribution was required to perform the needs analysis.

Therefore, we examined the distribution of PCIs for 128 agencies and arrived at Table B.1. Most of the 128 agencies came from agencies came from the San Francisco Bay area, since MTC was able to provide

this detailed breakdown readily. However, we also included data from rural agencies to ensure that we had a representative sample.

The condition categories are defined as:

- Category I (PCI from 70 to 100)
- Category II (PCI from 50 to 69)
- Category III (PCI from 25 to 49)
- Category IV (PCI from 0 to 24)

These categories were based on widely accepted industry standards as well as from the survey responses (see Figure B.1).

For each condition category, a best-fit curve was developed to calculate the pavement area percentages. Figures B.2 to B.5 present the graphs showing the best-fit curves and the actual data points from the 128 agencies. These curves were used to develop the pavement percentages in Table B.1 (PCI Distribution Table).







Since the average PCIs for most of the jurisdictions in California fall between 50 to 85, this portion of the table was used most frequently. Figure B.6 shows that the middle two quartiles of the PCIs from the surveys falls between 60 and 75.

In this step, we used the PCI distribution table (Table B.1) to look up the distribution of pavement areas in the four condition categories.

The average PCI for County X's <u>major roads</u> is 78. From Table B.1, for a PCI of 78, the pavement areas in Condition Category I, II, III and IV are 79.0%, 15.10%, 4.9% and 1.0% of the total area of the major roads, respectively. This row is highlighted in yellow.

The average PCI of County X's <u>local roads</u> is 73. From Table B.1, for a PCI of 73, the pavement areas in Condition Category I, II, III and IV are 69.2%, 18.6%, 9.7% and 2.5%, respectively. This row is highlighted in yellow.

	Pavement Area (%)									
PCI	Condition Category I (PCI: 70 to 100)	Condition Category II (PCI: 50 to 69)	Condition Category III (PCI: 25 to 49)	Condition Category IV (PCI: 0 to 24)	Total					
0	0.0	0.0	0.0	100.0	100.0					
1	0.4	0.0	1.1	98.5	100.0					
2	0.7	0.0	2.3	97.0	100.0					
3	1.1	0.0	3.4	95.5	100.0					
4	1.5	0.0	4.5	94.0	100.0					
5	1.9	0.0	5.6	92.5	100.0					
6	2.2	0.0	6.8	91.0	100.0					
7	2.6	0.0	7.9	89.5	100.0					
8	3.0	0.0	9.0	88.0	100.0					
9	3.4	0.0	10.1	86.5	100.0					
10	3.7	0.0	11.3	85.0	100.0					
11	4.1	0.0	12.4	83.5	100.0					
12	4.5	0.0	13.5	82.0	100.0					
13	4.9	0.0	14.6	80.5	100.0					
14	5.3	0.0	15.8	78.9	100.0					
15	5.7	0.0	16.9	77.4	100.0					
16	6.1	0.0	18.0	75.9	100.0					
17	6.4	0.1	19.1	74.4	100.0					
18	6.7	0.1	20.3	72.9	100.0					
19	7.0	0.2	21.4	71.4	100.0					
20	7.4	0.2	22.5	69.9	100.0					
21	7.7	0.3	23.6	68.4	100.0					
22	8.0	0.3	24.8	66.9	100.0					

Table B.1 PCI Distribution Table





		I	Pavement Area (%)	
PCI	Condition Category I (PCI: 70 to 100)	Condition Category II (PCI: 50 to 69)	Condition Category III (PCI: 25 to 49)	Condition Category IV (PCI: 0 to 24)	Total
23	8.3	0.4	25.9	65.4	100.0
24	8.7	0.4	27.0	63.9	100.0
25	9.1	0.4	28.1	62.4	100.0
26	9.3	0.5	29.3	60.9	100.0
27	9.7	0.5	30.4	59.4	100.0
28	10.0	0.6	31.5	57.9	100.0
29	10.4	0.6	32.6	56.4	100.0
30	10.6	0.7	33.8	54.9	100.0
31	11.5	2.1	33.5	52.9	100.0
32	12.4	3.4	33.3	50.9	100.0
33	13.3	4.7	33.0	49.0	100.0
34	14.1	6.0	32.8	47.1	100.0
35	15.1	7.2	32.5	45.2	100.0
36	16.0	8.4	32.2	43.4	100.0
37	17.1	9.5	31.8	41.6	100.0
38	18.1	10.6	31.5	39.8	100.0
39	19.1	11.6	31.2	38.1	100.0
40	20.2	12.6	30.8	36.4	100.0
41	21.2	13.6	30.4	34.8	100.0
42	22.3	14.5	30.0	33.2	100.0
43	23.5	15.3	29.6	31.6	100.0
44	24.6	16.1	29.2	30.1	100.0
45	25.9	16.8	28.7	28.6	100.0
46	27.1	17.5	28.2	27.2	100.0
47	28.2	18.2	27.8	25.8	100.0
48	29.5	18.8	27.3	24.4	100.0
49	30.7	19.4	26.8	23.1	100.0
50	32.1	19.9	26.2	21.8	100.0
51	33.5	20.3	25.7	20.5	100.0
52	34.8	20.8	25.1	19.3	100.0
53	36.3	21.1	24.5	18.1	100.0
54	37.5	21.5	24.0	17.0	100.0
55	39.1	21.7	23.3	15.9	100.0
56	40.5	22.0	22.7	14.8	100.0
57	42.0	22.1	22.1	13.8	100.0
58	43.5	22.3	21.4	12.8	100.0
59	45.0	22.4	20.8	11.8	100.0
60	46.6	22.4	20.1	10.9	100.0
61	48.1	22.4	19.4	10.1	100.0

Table B.1 PCI Distribution Table (cont'd)





		F	Pavement Area (%)	
PCI	Condition Category I (PCI: 70 to 100)	Condition Category II (PCI: 50 to 69)	Condition Category III (PCI: 25 to 49)	Condition Category IV (PCI: 0 to 24)	Total
62	49.9	22.3	18.6	9.2	100.0
63	51.5	22.2	17.9	8.4	100.0
64	53.0	22.1	17.2	7.7	100.0
65	54.8	21.9	16.4	6.9	100.0
66	56.5	21.7	15.6	6.2	100.0
67	58.2	21.4	14.8	5.6	100.0
68	60.0	21.0	14.0	5.0	100.0
69	61.8	20.6	13.2	4.4	100.0
70	63.6	20.2	12.3	3.9	100.0
71	65.5	19.7	11.4	3.4	100.0
72	67.3	19.2	10.6	2.9	100.0
73	69.2	18.6	9.7	2.5	100.0
74	71.1	18.0	8.8	2.1	100.0
75	73.1	17.3	7.8	1.8	100.0
76	75.0	16.6	6.9	1.5	100.0
77	77.0	15.9	5.9	1.2	100.0
78	79.0	15.1	4.9	1.0	100.0
79	81.0	14.2	4.0	0.8	100.0
80	83.2	13.3	2.9	0.6	100.0
81	85.3	12.3	1.9	0.5	100.0
82	87.4	11.3	0.9	0.4	100.0
83	89.3	10.3	0.0	0.4	100.0
84	90.4	9.2	0.0	0.4	100.0
85	91.9	8.1	0.0	0.0	100.0
86	92.5	7.5	0.0	0.0	100.0
87	93.0	7.0	0.0	0.0	100.0
88	93.5	6.5	0.0	0.0	100.0
89	94.1	5.9	0.0	0.0	100.0
90	94.6	5.4	0.0	0.0	100.0
91	95.2	4.8	0.0	0.0	100.0
92	95.7	4.3	0.0	0.0	100.0
93	96.2	3.8	0.0	0.0	100.0
94	96.8	3.2	0.0	0.0	100.0
95	97.3	2.7	0.0	0.0	100.0
96	97.8	2.2	0.0	0.0	100.0
97	98.4	1.6	0.0	0.0	100.0
98	98.9	1.1	0.0	0.0	100.0
99	99.5	0.5	0.0	0.0	100.0
100	100.0	0.0	0.0	0.0	100.0

Table B.1 PCI Distribution Table (cont'd)





Figure B.2 Pavement Area Distribution in Condition Category I



Figure B.3 Pavement Area Distribution in Condition Category II





Figure B.4 Pavement Area Distribution in Condition Category III











Figure B.6 PCI Distribution for California Cities & Counties

Step 2: Calculate pavement areas and pavement area factors in each of the four condition categories for majors and locals.

Using the pavement area percentages determined in Step 1, Tables B.2 (major roads) and B.3 (local roads) illustrate the pavement area factor calculations used in this example.

(1)	(2)	(3)	(4)
Condition Category	Pavement Area %	Pavement Area (sq. yd.) [<u>24,000,000</u> x Column (2)/100]	Pavement Area Factor [Column (3)/10,000]
I	79.0	18,960,000	1896.00
II	15.1	3,624,000	362.40
	4.9	1,176,000	117.60
IV	1.0	240,000	24.00
Total	100	24,000,000	2,400.00

Table B.2 Pavement Area Factors(Major Roads)





(1)	(2)	(3)	(4)
Condition Category	Pavement Area %	Pavement Area (sq. yd.) [13 <u>,400,000</u> x Column (2)/100]	Pavement Area Factor [Column (3)/10,000]
I	69.2	9,272,800	927.28
II	18.6	2,492,400	249.24
	9.7	1,299,800	129.98
IV	2.5	335,000	33.50
Total	100	13,400,000	1,340.00

Table B.3 Pavement Area Factors (Local Roads)

Step 3: Look up benchmark results to determine pavement needs

In order to determine the pavement needs for all the scenarios, benchmark databases were created to determine the needs for a standard 10,000 sq. yds. of pavements. Table B.4 summarizes the eight (8) benchmark databases that were created.

Table B.4 Benchmark Databases

Database No.	Functional Class	Condition Category	PCI Range
1	Major	I	70 – 100
2	Major	II	50 – 69
3	Major	111	25 – 49
4	Major	IV	0-24
5	Local	I	70 - 100
6	Local	II	50 – 69
7	Local	111	25 – 49
8	Local	IV	0-24





MTC's StreetSaver[®] program was used to determine the cost to reach the (BMP) goal in 20 years.

Each benchmark databases included the maintenance and rehabilitation (M&R) decision tree and costs discussed in Chapter 3. Assigning the appropriate maintenance and rehabilitation (M&R) treatment is a critical component of the needs assessment. It is important to know both the <u>type</u> of treatment as well as <u>when</u> to apply that treatment. This is typically described as a decision tree.

Figure B.7 summarizes the types of treatments and their costs in this study. Briefly, good to excellent pavements (PCI >70) are best suited for pavement preservation techniques i.e. preventive maintenance treatments such as chip seals or slurry seals. These are usually applied at intervals of five to seven years depending on the traffic volumes.

As pavements deteriorate, treatments that address structural adequacy are required. Between a PCI of 25 to 69, asphalt concrete (AC) overlays are usually applied at varying thicknesses. Finally, when the pavement has failed (PCI<25), reconstruction is typically required. Note that if a pavement section has a PCI between 90 and 100, no treatment is applied.

The PCI thresholds shown in Figure B.7 are generally accepted industry standards.



Figure B.7 Final M&R Tree and Unit Costs

Multiple treatments may occur within the analysis period. For example, if Main Street were reconstructed in 2012, typical treatments over the 25-year analysis period may include a slurry seal every 7 years in order to preserve the pavement. Therefore, an accurate needs assessment must also include the cost of these seals in addition to the cost of reconstruction.





The unit costs shown in Figure B.7 are rural counties averages. The range in costs for each treatment is for the different functional classes of pavements i.e. majors have a higher cost than locals.

Table B.5 contains the pavement needs and backlog results. Each column is further described below:

- Year: 1 to 20. The analysis period is 20 years.
- <u>Major Roads/Local Roads</u>: The analysis was separate for major roads and local roads and so are the results;
- <u>Condition Category I/II/III/IV</u>: The results are further presented under each of the four Condition Categories.
- <u>Needs</u>: Each year's pavement needs or required budget to meet the goal.
- <u>Backlog</u>: Each year's unmet pavement maintenance and rehabilitation.
- <u>Total</u>: The needs are summed for the 20 years.

The calculations are detailed in Tables B.6 (major roads) and B.7 (local roads). For each condition category:

From Table B.6, the total pavement needs of County X's major roads are:

368,089,440 + 165,500,832 + 65,289,168 + 14,812,800 = 613,692,240

From Table B.7, the total pavement needs of County X's local roads are:

\$121,418,043 + \$87,468,586 + \$61,472,741 + \$17,870,240 = \$288,229,310

Step 4: Calculate needs for unpaved roads

It is estimated that unpaved road needs is \$9,800 per centerline mile per year. This is the average unpaved road needs from the statewide online survey. Since there are 100 centerline miles of unpaved roads in County X:

Unpaved road needs = \$9,800/yr/mile x 20 years x 100 miles = \$19,600,000

Step 5: Sum up paved and unpaved roads

TOTAL	\$921,521,550
Unpaved road needs:	\$ 19,600,000
Paved needs for local roads:	\$288,229,310
Paved needs for major roads:	\$613,692,240

From above calculations, in order to reach the BMP goal in twenty years, approximately \$46 million is needed per year for the next twenty years.





				M	ajor Roads				Local Roads							
Year	Condi Categ	tion ory l	Cond Categ	lition Jory II	Cor Cate	ndition egory III	Con Cate	dition gory IV	Cond Categ	lition Jory I	Condition	Category II	Cor Cate	ndition egory III	Cor Cate	ndition gory IV
	Needs	Backlog	Needs	Backlog	Needs	Backlog	Needs	Backlog	Needs	Backlog	Needs	Backlog	Needs	Backlog	Needs	Backlog
1	9,707	0	22,834	152,166	27,759	247,241	30,860	528,300	6,547	0	17,547	139,953	23,647	224,853	26,672	472,388
2	9,707	0	22,834	139,332	27,759	255,002	30,860	509,280	6,547	0	17,547	131,507	23,647	232,526	26,672	456,156
3	9,707	0	22,834	131,498	27,759	274,603	30,860	478,420	6,547	0	17,547	123,060	23,647	229,759	26,672	429,484
4	9,707	0	22,834	123,664	27,759	294,204	30,860	447,560	6,547	0	17,547	114,614	23,647	237,432	26,672	402,812
5	9,707	0	22,834	115,831	27,759	301,965	30,860	416,699	6,547	0	17,547	106,167	23,647	245,105	26,672	376,140
6	9,707	0	22,834	97,997	27,759	301,766	30,860	387,379	6,547	0	17,547	97,721	23,647	252,778	26,672	349,468
7	9,707	0	22,834	87,588	27,759	279,827	30,860	358,059	6,547	0	17,547	84,725	23,647	239,571	26,672	322,796
8	9,707	0	22,834	72,180	27,759	267,788	30,860	328,739	6,547	0	17,547	74,028	23,647	238,644	26,672	297,384
9	9,707	0	22,834	91,371	27,759	243,509	30,860	299,419	6,547	0	17,547	58,782	23,647	227,277	26,672	271,972
10	9,707	0	22,834	100,563	27,759	217,290	30,860	270,099	6,547	0	17,547	48,086	23,647	207,310	26,672	246,560
11	9,707	0	22,834	97,379	27,759	191,071	30,860	242,319	6,547	0	17,547	50,440	23,647	187,343	26,672	221,148
12	9,707	0	22,834	94,195	27,759	174,552	30,860	214,539	6,547	0	17,547	61,294	23,647	166,796	26,672	195,736
13	9,707	0	22,834	91,011	27,759	152,213	30,860	186,759	6,547	0	17,547	59,097	23,647	144,409	26,672	170,324
14	9,707	0	22,834	87,827	27,759	129,474	30,860	158,979	6,547	0	17,547	56,901	23,647	122,021	26,672	144,912
15	9,707	0	22,834	72,269	27,759	104,795	30,860	131,199	6,547	0	17,547	54,705	23,647	101,475	26,672	120,759
16	9,707	0	22,834	64,235	27,759	78,576	30,860	104,959	6,547	0	17,547	52,508	23,647	80,927	26,672	96,608
17	9,707	0	22,834	48,176	27,759	63,597	30,860	78,720	6,547	0	17,547	39,563	23,647	62,221	26,672	72,456
18	9,707	0	22,834	29,692	27,759	40,858	30,860	52,480	6,547	0	17,547	26,617	23,647	41,674	26,672	48,304
19	9,707	0	22,834	13,633	27,759	21,599	30,860	26,240	6,547	0	17,547	15,971	23,647	22,387	26,672	24,152
20	9,707	0	22,834	0	27,759	0	30,860	0	6,547	0	17,547	0	23,647	0	26,672	0
Total	\$194,140		\$456,680		\$555,180		\$617,200		\$130,940		\$350,940		\$472,940		\$533.440	

Table B.5 Benchmark Analysis Results: Reach the Best Management Practice (BMP) goal in 20 years





			Condition	Category I		Condition Category II					
	from Be	enchmark		Actual (benchmark	results x	from Be	enchmark		Actual (benchm	ark results x	
Year	Results		Area	area factor)		Results		Area	area factor)		
	Needs	Backlog	Factor	Needs	Backlog	Needs	Backlog	Factor	Needs	Backlog	
1	9,707	0	1896.00	18,404,472	0	22,834	152,166	362.40	8,275,042	55,144,958	
2	9,707	0	1896.00	18,404,472	0	22,834	139,332	362.40	8,275,042	50,493,917	
3	9,707	0	1896.00	18,404,472	0	22,834	131,498	362.40	8,275,042	47,654,875	
4	9,707	0	1896.00	18,404,472	0	22,834	123,664	362.40	8,275,042	44,815,834	
5	9,707	0	1896.00	18,404,472	0	22,834	115,831	362.40	8,275,042	41,977,154	
6	9,707	0	1896.00	18,404,472	0	22,834	97,997	362.40	8,275,042	35,514,113	
7	9,707	0	1896.00	18,404,472	0	22,834	87,588	362.40	8,275,042	31,741,891	
8	9,707	0	1896.00	18,404,472	0	22,834	72,180	362.40	8,275,042	26,158,032	
9	9,707	0	1896.00	18,404,472	0	22,834	91,371	362.40	8,275,042	33,112,850	
10	9,707	0	1896.00	18,404,472	0	22,834	100,563	362.40	8,275,042	36,444,031	
11	9,707	0	1896.00	18,404,472	0	22,834	97,379	362.40	8,275,042	35,290,150	
12	9,707	0	1896.00	18,404,472	0	22,834	94,195	362.40	8,275,042	34,136,268	
13	9,707	0	1896.00	18,404,472	0	22,834	91,011	362.40	8,275,042	32,982,386	
14	9,707	0	1896.00	18,404,472	0	22,834	87,827	362.40	8,275,042	31,828,505	
15	9,707	0	1896.00	18,404,472	0	22,834	72,269	362.40	8,275,042	26,190,286	
16	9,707	0	1896.00	18,404,472	0	22,834	64,235	362.40	8,275,042	23,278,764	
17	9,707	0	1896.00	18,404,472	0	22,834	48,176	362.40	8,275,042	17,458,982	
18	9,707	0	1896.00	18,404,472	0	22,834	29,692	362.40	8,275,042	10,760,381	
19	9,707	0	1896.00	18,404,472	0	22,834	13,633	362.40	8,275,042	4,940,599	
20	9,707	0	1896.00	18,404,472	0	22,834	0	362.40	8,275,042	0	
Total				\$368.089.440					\$165.500.832		

Table B.6 Needs Calculation for County X (Major Roads)





			Condition (Category III			Condition Category IV					
Voor	from Be	from Benchmark		Actual (benchr	nark results x	from Be	enchmark	Aree	Actual (benchr	nark results x		
i cai	Results		Factor	area fa	actor)	Re	Results		area factor)			
	Needs	Backlog	Facior	Needs	Backlog	Needs	Backlog	Facior	Needs	Backlog		
1	27,759	247,241	117.60	3,264,458	29,075,542	30,860	528,300	24.00	740,640	12,679,200		
2	27,759	255,002	117.60	3,264,458	29,988,235	30,860	509,280	24.00	740,640	12,222,720		
3	27,759	274,603	117.60	3,264,458	32,293,313	30,860	478,420	24.00	740,640	11,482,080		
4	27,759	294,204	117.60	3,264,458	34,598,390	30,860	447,560	24.00	740,640	10,741,440		
5	27,759	301,965	117.60	3,264,458	35,511,084	30,860	416,699	24.00	740,640	10,000,776		
6	27,759	301,766	117.60	3,264,458	35,487,682	30,860	387,379	24.00	740,640	9,297,096		
7	27,759	279,827	117.60	3,264,458	32,907,655	30,860	358,059	24.00	740,640	8,593,416		
8	27,759	267,788	117.60	3,264,458	31,491,869	30,860	328,739	24.00	740,640	7,889,736		
9	27,759	243,509	117.60	3,264,458	28,636,658	30,860	299,419	24.00	740,640	7,186,056		
10	27,759	217,290	117.60	3,264,458	25,553,304	30,860	270,099	24.00	740,640	6,482,376		
11	27,759	191,071	117.60	3,264,458	22,469,950	30,860	242,319	24.00	740,640	5,815,656		
12	27,759	174,552	117.60	3,264,458	20,527,315	30,860	214,539	24.00	740,640	5,148,936		
13	27,759	152,213	117.60	3,264,458	17,900,249	30,860	186,759	24.00	740,640	4,482,216		
14	27,759	129,474	117.60	3,264,458	15,226,142	30,860	158,979	24.00	740,640	3,815,496		
15	27,759	104,795	117.60	3,264,458	12,323,892	30,860	131,199	24.00	740,640	3,148,776		
16	27,759	78,576	117.60	3,264,458	9,240,538	30,860	104,959	24.00	740,640	2,519,016		
17	27,759	63,597	117.60	3,264,458	7,479,007	30,860	78,720	24.00	740,640	1,889,280		
18	27,759	40,858	117.60	3,264,458	4,804,901	30,860	52,480	24.00	740,640	1,259,520		
19	27,759	21,599	117.60	3,264,458	2,540,042	30,860	26,240	24.00	740,640	629,760		
20	27,759	0	117.60	3,264,458	0	30,860	0	24.00	740,640	0		
Total		•		\$65,289,168	·	•	·	•	\$14,812,800			

Table B.6 Needs Calculation for County X (Major Roads) (Continued)





			Condition	Category I		Condition Category II					
Year	from Benchmark Results		Area	Actual (benchman area facto	rk results x or)	from Be Re	enchmark sults	Area	Actual (benchr area fa	nark results x actor)	
	Needs	Backlog	Factor	Needs	Backlog	Needs	Backlog	Factor	Needs	Backlog	
1	6,547	0	927.28	6,070,902	0	17,547	139,953	249.24	4,373,414	34,881,886	
2	6,547	0	927.28	6,070,902	0	17,547	131,507	249.24	4,373,414	32,776,805	
3	6,547	0	927.28	6,070,902	0	17,547	123,060	249.24	4,373,414	30,671,474	
4	6,547	0	927.28	6,070,902	0	17,547	114,614	249.24	4,373,414	28,566,393	
5	6,547	0	927.28	6,070,902	0	17,547	106,167	249.24	4,373,414	26,461,063	
6	6,547	0	927.28	6,070,902	0	17,547	97,721	249.24	4,373,414	24,355,982	
7	6,547	0	927.28	6,070,902	0	17,547	84,725	249.24	4,373,414	21,116,859	
8	6,547	0	927.28	6,070,902	0	17,547	74,028	249.24	4,373,414	18,450,739	
9	6,547	0	927.28	6,070,902	0	17,547	58,782	249.24	4,373,414	14,650,826	
10	6,547	0	927.28	6,070,902	0	17,547	48,086	249.24	4,373,414	11,984,955	
11	6,547	0	927.28	6,070,902	0	17,547	50,440	249.24	4,373,414	12,571,666	
12	6,547	0	927.28	6,070,902	0	17,547	61,294	249.24	4,373,414	15,276,917	
13	6,547	0	927.28	6,070,902	0	17,547	59,097	249.24	4,373,414	14,729,336	
14	6,547	0	927.28	6,070,902	0	17,547	56,901	249.24	4,373,414	14,182,005	
15	6,547	0	927.28	6,070,902	0	17,547	54,705	249.24	4,373,414	13,634,674	
16	6,547	0	927.28	6,070,902	0	17,547	52,508	249.24	4,373,414	13,087,094	
17	6,547	0	927.28	6,070,902	0	17,547	39,563	249.24	4,373,414	9,860,682	
18	6,547	0	927.28	6,070,902	0	17,547	26,617	249.24	4,373,414	6,634,021	
19	6,547	0	927.28	6,070,902	0	17,547	15,971	249.24	4,373,414	3,980,612	
20	6,547	0	927.28	6,070,902	0	17,547	0	249.24	4,373,414	0	
Total	•		·	\$121,418,043	·	·		•	\$87,468,286		

Table B.7 Needs Calculation for County X (Local Roads)





			Condition (Category III		Condition Category IV					
Vear	from Be	enchmark	Area	Actual (benchr	nark results x	from Be	enchmark	Area	Actual (benchn	nark results x	
rear	Results		Factor	area fa	area factor)		Results		area factor)		
	Needs	Backlog	Facior	Needs	Backlog	Needs	Backlog	Facior	Needs	Backlog	
1	23,647	224,853	129.98	3,073,637	29,226,393	26,672	472,388	33.50	893,512	15,824,998	
2	23,647	232,526	129.98	3,073,637	30,223,729	26,672	456,156	33.50	893,512	15,281,226	
3	23,647	229,759	129.98	3,073,637	29,864,075	26,672	429,484	33.50	893,512	14,387,714	
4	23,647	237,432	129.98	3,073,637	30,861,411	26,672	402,812	33.50	893,512	13,494,202	
5	23,647	245,105	129.98	3,073,637	31,858,748	26,672	376,140	33.50	893,512	12,600,690	
6	23,647	252,778	129.98	3,073,637	32,856,084	26,672	349,468	33.50	893,512	11,707,178	
7	23,647	239,571	129.98	3,073,637	31,139,439	26,672	322,796	33.50	893,512	10,813,666	
8	23,647	238,644	129.98	3,073,637	31,018,947	26,672	297,384	33.50	893,512	9,962,364	
9	23,647	227,277	129.98	3,073,637	29,541,464	26,672	271,972	33.50	893,512	9,111,062	
10	23,647	207,310	129.98	3,073,637	26,946,154	26,672	246,560	33.50	893,512	8,259,760	
11	23,647	187,343	129.98	3,073,637	24,350,843	26,672	221,148	33.50	893,512	7,408,458	
12	23,647	166,796	129.98	3,073,637	21,680,144	26,672	195,736	33.50	893,512	6,557,156	
13	23,647	144,409	129.98	3,073,637	18,770,282	26,672	170,324	33.50	893,512	5,705,854	
14	23,647	122,021	129.98	3,073,637	15,860,290	26,672	144,912	33.50	893,512	4,854,552	
15	23,647	101,475	129.98	3,073,637	13,189,721	26,672	120,759	33.50	893,512	4,045,427	
16	23,647	80,927	129.98	3,073,637	10,518,891	26,672	96,608	33.50	893,512	3,236,368	
17	23,647	62,221	129.98	3,073,637	8,087,486	26,672	72,456	33.50	893,512	2,427,276	
18	23,647	41,674	129.98	3,073,637	5,416,787	26,672	48,304	33.50	893,512	1,618,184	
19	23,647	22,387	129.98	3,073,637	2,909,862	26,672	24,152	33.50	893,512	809,092	
20	23,647 0 129.98		3,073,637	0	26,672	0	33.50	893,512	0		
Total			•	\$61,472,741		•	•	•	\$17.870.240		

Table B.7 Needs Calculation for County X (Local Roads) (Continued)

