APPENDIX Z
SUGGESTED PRIORITY INDEX

The TxDOT project agreement for this project requires the team to provide a "priority index that can be used for programming projects for preservation, rehabilitation, and reconstruction." The team did learn about prioritization procedures that various districts did use to program projects for their rehabilitation and rehabilitation programs. Based a discussion with the TxDOT Project Director, and based on the district interviews and results of the analysis of project data, the following index equation is suggested:

> [(Project length, miles)*(total number of travel lanes)/(Project cost, $)]*(Percent of roadway needing treatment according to PMIS)]*(Age of last surface, years)*1,000,000

This index was successfully used by the Fort Worth District for prioritizing such projects for at least 10 years. Higher index values indicate higher priority. District personnel realized that relying on PMIS data alone was not sufficient for prioritization. The research team agrees with this viewpoint.

The reasoning behind this equation is as follows:

1. The equation is relatively simple and easy to understand. District personnel could understand what variables affected the index and determine why some projects were selected and others were not selected.

2. The first part of the equation generates a lane mile per project dollar value. As a result, more miles per dollar would increase the index value. By using project cost as the denominator in the equation, the best pavement treatment as determined by the project designer is incorporated into the prioritization process.

3. For determining the percent of roadway requiring treatment, the equation uses the PMIS needs estimate results. In the Fort Worth District, the number of lane miles on the project recommended by PMIS for preventive maintenance, light rehabilitation, medium rehabilitation, and heavy rehabilitation was determined using the PMIS needs estimate. The percent was then determined by dividing the above value by the total number of lane miles for the candidate project.

   The Fort Worth District decided to use all of the treatment recommendations from PMIS in determining this value for four main reasons. First, for preventive maintenance and light rehabilitation projects, TxDOT maintenance personnel would generally fix those areas with maintenance funds where PMIS indicated that medium or heavy rehabilitation was needed. Second, project designers may determine that major rehabilitation for a candidate section was necessary, but the PMIS needs estimate would indicate that preventive maintenance or light rehabilitation was only needed. This was generally the case when TxDOT personnel conducted maintenance work to keep candidate sections in serviceable condition until the district lets a rehabilitation project for that roadway. Third, the PMIS needs estimate report usually did not give a uniform needs estimate recommendation for candidate projects. Finally, district personnel believed that the PMIS needs estimate recommendations were useful in determining how much of a

roadway needed work, even though the recommendation did not reflect the actual treatment applied.

An alternative to this approach is to use the number of lane miles with a condition score below 70 in order to reflect the current commission goal of having 90 percent of the network to be good or better. However, it appears that this goal may expire in FY 2013.

4. The age of last surface is generated from the date of the last TxDOT contracted project on the roadway section. Obviously, the older the surface, the higher the index value. This value can be stored in the PMIS database, although currently is optional. The Fort Worth District also added a requirement that any projects submitted by the area offices for PM or rehabilitation must have a surface age of five years or greater. If a project had surfaces that were placed at different times, the age used in the equation equaled to the age of the surface with the longest length on the project.

5. All three values are weighted equally in the index. The results of the calculation appeared to be reasonable to Fort Worth District personnel without using weighting factors.

The following is an example for calculating this index: A 4 mile long project on a specific roadway segment costs $1,000,000. That roadway has two lanes and a surface placed 7 years ago. According to PMIS, 1 mile needs PM, 1 mile needs MR, and 1 mile needs HR, so 75% of the roadway needs treatment. Thus, the index for that project will be:

$$[(4)*(2)/($1,000,000)]*([1+1+1]/4)]*(7)*1,000,000 = 42$$

An illustrative example of how this equation prioritizes projects is as follows. Table Z1 was generated using the following values:

1. Project Lane Miles – 2, 3, 4, 5, and 6.

2. Project Cost – $1,000,000 (this is kept constant since the miles per dollar value is used in the equation).

3. Percent of Project needing work – 25, 50, 75, and 100.

4. Age of Surface in years – 7, 11, and 15.

As can be seen in Table Z1, and as expected, the longer projects with higher needs and surface ages are more highly ranked. However, the table shows that roadway sections with lower percent needs may rank higher than those with higher percent needs, obviously depending on surface age and the project length. In other words, the sections with the most needs from the PMIS needs estimate do not necessarily rank the highest. In general, the index gives preference to preventive maintenance and light rehabilitation projects.

Table Z1. Example of Equation in Use.

Project Cost, $	Project Lane Miles	Percent Need	Surface Age, Years	Priority Index
1,000,000	6	100	15	90.0
1,000,000	5	100	15	75.0
1,000,000	6	75	15	67.5
1,000,000	6	100	11	66.0
1,000,000	4	100	15	60.0
1,000,000	5	75	15	56.3
1,000,000	5	100	11	55.0
1,000,000	6	75	11	49.5
1,000,000	6	50	15	45.0
1,000,000	3	100	15	45.0
1,000,000	4	75	15	45.0
1,000,000	4	100	11	44.0
1,000,000	6	100	7	42.0
1,000,000	5	75	11	41.3
1,000,000	5	50	15	37.5
1,000,000	5	100	7	35.0
1,000,000	3	75	15	33.8
1,000,000	6	50	11	33.0
1,000,000	3	100	11	33.0
1,000,000	4	75	11	33.0
1,000,000	6	75	7	31.5
1,000,000	4	50	15	30.0
1,000,000	2	100	15	30.0
1,000,000	4	100	7	28.0
1,000,000	5	50	11	27.5
1,000,000	5	75	7	26.3
1,000,000	3	75	11	24.8
1,000,000	6	25	15	22.5
1,000,000	3	50	15	22.5
1,000,000	2	75	15	22.5

Table Z1. Example of Equation in Use.

Project Cost, $	Project Lane Miles	Percent Need	Surface Age, Years	Priority Index
1,000,000	4	50	11	22.0
1,000,000	2	100	11	22.0
1,000,000	6	50	7	21.0
1,000,000	3	100	7	21.0
1,000,000	4	75	7	21.0
1,000,000	5	25	15	18.8
1,000,000	5	50	7	17.5
1,000,000	6	25	11	16.5
1,000,000	3	50	11	16.5
1,000,000	2	75	11	16.5
1,000,000	3	75	7	15.8
1,000,000	4	25	15	15.0
1,000,000	2	50	15	15.0
1,000,000	4	50	7	14.0
1,000,000	2	100	7	14.0
1,000,000	5	25	11	13.8
1,000,000	3	25	15	11.3
1,000,000	4	25	11	11.0
1,000,000	2	50	11	11.0
1,000,000	6	25	7	10.5
1,000,000	3	50	7	10.5
1,000,000	2	75	7	10.5
1,000,000	5	25	7	8.8
1,000,000	3	25	11	8.3
1,000,000	2	25	15	7.5
1,000,000	4	25	7	7.0
1,000,000	2	50	7	7.0
1,000,000	2	25	11	5.5
1,000,000	3	25	7	5.3
1,000,000	2	25	7	3.5