1986 PAVEMENT EVALUATION SYSTEM

ANNUAL REPORT

Texas State Department of Highways

and Public Transportation

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OBJECTIVES

This report summarizes the results of the 1986 Pavement Evaluation System (PES) survey of Texas highways. PES is a combination of field evaluations and computer programs which describes statewide pavement condition and determines statewide rehabilitation needs.

The objectives of this annual report are to:

1. Describe the current condition of the Texas highway system and identify significant trends in condition over the last four years.

2. Estimate total funding needed for pavement rehabilitation in 1986, as well as the total lane mileage in need of rehabilitation. Identify significant trends in rehab needs over the last four years.

This report also contains the results of the 1986 PES Audit, which will provide insight into the reliability of the PES condition estimates.

CHAPTER 1 -- Introduction

PES uses two types of data to define pavement condition: visual surface distress data and ride quality data. Surface distress and ride data are obtained by District personnel who are specially trained in pavement evaluation once each year.

Each year PES identifies a list of pavement sections to be rated, based on a statistical sample of all state-maintained roadway mileage. Pavement condition cannot be determined until both the visual and the ride data have been collected, entered, and stored into the system. Pavement sections are usually about two miles long and are defined by mileposts at both the beginning and the end of the section.

The cycle of visual and ride quality evaluations occurs once each year, usually beginning in September and lasting until mid December.

Surface distress data consists of a series of categorical values recorded by the raters for each distress type observed on a pavement section. Ride quality is measured mechanically and is reported on a scale of 0 (very rough) to 5 (very smooth). The surface distress and ride quality values are then combined into a condition rating value which describes the current condition of the pavement surface on a scale of 0 (very bad) to 100 (excellent).

PES provides a consistent method of describing the condition of various pavement sections across the state. The condition ratings also enable an estimate of statewide pavement rehabilitation needs by incorporating traffic, environmental, and functional class factors into a priority index. This index measures a section's relative priority for rehabilitation on a scale of 0 (most urgent) to 100 (least urgent) with 34 or below generally being considered to be the threshhold value for PES rehabilitation estimates.

Additional improvements remain to be made before PES can be reliably used to make District-level pavement management decisions. However, the consistency of the PES condition and rehabilitation calculations enables its use at the Administrative level in guiding statewide policy decisions.

CHAPTER 2 -- 1986 PES Survey

Each year a certain percentage of total roadway mileage on each highway system is selected for evaluation. The PES program selects 100 percent of the Interstate mileage, 50 percent of the State and US highway mileage, and 20 percent of the Farm-to-Market road mileage. This results in a yearly sample size of approximately 30,000 lane miles.

Table 1 lists the total length of pavement, in lane miles, evaluated over the past four years (1983-1986). Table 1 consists of four sections, representing sample distributions for 1983, 1984, 1985, and 1986, respectively. Lane mileage totals are provided for the following pavement types:

1. ACP -- Asphalt Concrete Pavement
2. CRC -- Continuously-Reinforced Concrete
3. JCP -- Jointed Concrete Pavement

Lane mileage totals are also provided for the following major highway systems:

1. IH -- Interstate Highway system
2. US/SH -- U.S. and State Highway systems
3. FM -- Farm-to-Market system

The inclusion of concrete (CRC and JCP) sections into the PES sample in 1984 has caused significant variations in the amount of mileage to be rated. PES contains an overlap function which attempts to provide continuity from year to year by adding sections rated in a previous year to the current year's sample.

In 1984, concrete had never been rated, therefore PES selected all concrete sections for evaluation. In 1985, the overlap function selected all concrete not rated in 1984 (i.e. zero) and added a small percentage of the concrete which had been rated in 1984. This process reversed in 1986 -- a small percentage of the 1985 concrete was added to a large number of concrete sections not rated in 1985. The oscillation in the number of concrete sections to be rated must be considered when analyzing the results of the condition and rehabilitation studies.

Table 1. Total Length of Pavement Evaluated Each Year From 1983 to 1986 (Lane Miles).

1983				
SURFACE	IH	US/SH	FM	TOTAL
ACP	3317	14606	13464	31387
CRCP	0	0	0	0
JCP	0	0	0	0
TOTAL	3317	14606	13464	31387

1984				
SURFACE	IH	US/SH	FM	TOTAL
ACP	4054	16756	8497	29307
CRCP	1287	739	0	2026
JCP	273	623	21	917
TOTAL	5614	18118	8518	32350

1985				
SURFACE	IH	US/SH	FM	TOTAL
ACP	4196	14594	8942	27732
CRCP	1270	74	2	1346
JCP	199	134	25	358
TOTAL	5665	14802	8969	29436

1986				
SURFACE	IH	US/SH	FM	TOTAL
ACP	4383	17519	9148	31050
CRCP	1298	639	4	1941
JCP	130	578	34	742
TOTAL	5811	18736	9186	33733

Note: Frontage roads are not included in this table.

CHAPTER 3 -- Audit of 1986 Data

District personnel rated roads in their own District during the 1986 survey. However, raters from an adjoining District were instructed to check the work being done over a five day period. This audit provided insight into the variability of ratings which can be expected when different people rate the same highway section.

Audit sections were selected at random from the list of mandatory sections. The sample size was kept down to about 5 percent, so that the audit could be completed within one week. However, each of the three surface types (ACP, CRC, and JCP) was sampled separately so that a representative number of each would be obtained.

Ideally, condition values computed for any single section from the audit and the District data would be identical, since the same road was being rated. In reality, the current rating procedure is somewhat subjective and different condition values may be obtained by different rating teams on the same section of road. The precision (or "repeatability") of these values is a major influence on the reliability of the PES condition descriptions.

Reliability of Statewide Condition Ratings

Comparison of the condition values returned from the District and audit teams indicates a 77.5 percent probability that condition values from two teams rating the same section will be within 15 points of each other. Identical values were returned for 232 (36.7 percent) of the 632 audit sections. This finding is a slight improvement over last year, when approximately 75 percent of the rated sections had condition values within 15 points of each other.

Condition values for asphalt (ACP) pavements showed a 77.2 percent probability of being within 15 points of each other. As a comparison, the probabilities obtained for continuously reinforced concrete (CRC) and jointed concrete (JCP) were 87.2 and 60.0 percent, respectively.

Reliability of Pavement Distress Ratings

The 1986 PES audit also enabled an analysis of the reliability of the individual pavement distress ratings which make up the final condition rating. Although several distress types are considered in the computation of a condition rating, they are not considered to have equal weight -- some distress types are more detrimental to a pavement's condition than others.

Therefore, the reliability of PES condition ratings depends on the magnitude of error in a distress rating as well as the distress type which is being reported erroneously.

For example, on asphalt pavements, 9.2 percent of the sections showed an error in the distress ratings for rutting which would have been large enough to cause a condition value error of more than 10 points. In other words, the two rating teams did not agree on the amount of rutting observed and the different rutting observations would have resulted in two condition values which differed by more than 10 points for the same pavement section.

Each distress was analyzed in the same manner, with the intent of identifying distresses most likely to cause condition values to differ by more than 10 points. Table 2 lists the results of this distress type analysis.

Table 2. Probability of Different Distress Ratings Causing More Than 10 Point Error in Pavement Condition Rating Value.

Pavement Type	Distress	Probability
ACP	Rutting	9.2%
	Patching	11.0%
	Failures	6.3%
	Block Cracking	3.8%
	Alligator Cracking	16.9%
	Longitudinal Cracking	7.2%
	Transverse Cracking	8.1%
CRC	Spalled Cracks	6.4%
	Punchouts	12.8%
	Asphalt Patches	8.5%
	Concrete Patches	4.2%
JCP	Failed Joints/Cracks	33.3%
	Failures	33.3%
	Shattered Slabs	6.7%
	Longitudinal Cracks	6.7%
	Concrete Patches	6.7%

Table 2 suggests that raters need more thorough training on rating patching, alligator cracking, punchouts, failed joints and cracks, and JCP failures.

CHAPTER 4 -- Condition of Texas Highway System

The annual PES survey provides information which can be used to describe the condition of Texas highways. PES computes an overall condition rating based on the observed surface distresses and ride quality. The distribution of condition and ride quality ratings provides insight into the overall condition of the Texas highway system.

PES condition ratings may be used to compare pavements from different areas on an absolute basis, without introducing regional factors to bias the results. Traffic, environmental, and functional class factors, which are used to estimate rehabilitation priority, do not enter into the condition ratings. Condition may be used as a rough descriptor of rehab needs (as is done in this chapter), however a condition-based rehab estimate would not include "good-looking" sections with adverse traffic, environmental, or functional class factors. As a result, rehabilitation needs are computed later, although condition ratings are used in this chapter to provide a first-cut view.

Table 3 summarizes the results of the condition analysis by listing the percentage of all rated lane mileage which falls within each of five major condition categories, based on PES ratings from 1983 to 1986. The five condition categories are:

Class "A" -- Condition Rating 90-100
Class "B" -- Condition Rating 70-89
Class "C" -- Condition Rating 50-69
Class "D" -- Condition Rating 35-49
Class "F" -- Condition Rating 0-34

Interstate Highway System

Asphalt Pavements -- 73.2 percent of the lane miles rated in 1986 were in excellent (Class "A") condition. If surface condition (distress and ride quality) were the only measure, only 0.6 percent of the rated lane mileage would be in definite need of rehabilitation (Class "F"). Rutting, patching, longitudinal cracking, and transverse cracking were the most common forms of distress on the Interstate ACP sections.

Asphalt Interstate pavements were in excellent condition in 1986, with good ride quality and little pavement distress. However, 1986 saw a noticeable increase in the amount of intermediate condition mileage having condition values between 50 and 69 (as evidenced by Class "C" in Table 3). Although ride quality has improved since 1985, serious problems could develop if the many miles (699.7 or 16 percent of the rated lane mileage) of intermediate condition highway are not maintained promptly.

Table 3 -- Percentage of Rated Lane Mileage Grouped by Condition Classes.

	Class "F"				Class "D"				Class "C"				Class "B"				Class "A"			
Group	'83	'84	'85	'86	'83	'84	'85	'86	'83	'84	'85	'86	'83	'84	'85	'86	'83	'84	'85	'86
FM	5.2	6.6	5.8	6.2	6.6	10.3	7.2	7.1	15.4	19.8	18.0	18.2	25.9	26.2	25.9	22.5	46.9	37.1	43.0	45.9
IH	0.9	5.5	6.3	4.3	1.7	4.7	3.1	4.0	5.0	9.8	7.8	10.2	18.9	14.4	18.4	16.4	73.5	65.6	64.5	65.1
US/SH	3.1	6.1	4.3	4.7	5.1	7.4	5.1	4.9	14.0	17.1	12.2	11.5	24.9	24.6	22.5	21.7	52.9	44.8	55.9	57.2
ACP	3.7	4.8	4.1	3.6	5.4	7.2	5.2	4.7	13.7	16.4	13.0	12.6	24.7	23.5	22.8	21.5	52.5	48.1	55.0	57.6
CRC	0.0	11.4	14.3	14.1	0.0	11.1	8.3	11.8	0.0	17.8	16.7	18.4	0.0	21.4	24.8	16.2	0.0	38.3	36.0	39.5
JCP	0.0	38.3	56.2	41.0	0.0	14.8	9.9	15.2	0.0	17.7	10.8	20.4	0.0	18.6	11.2	14.9	0.0	10.6	11.9	8.5
FM ACP	5.2	6.5	5.7	6.0	6.6	10.3	7.2	7.1	15.4	19.7	18.0	18.2	25.9	26.2	26.0	22.6	46.9	37.2	43.1	46.0
IH ACP	0.9	2.2	0.8	0.6	1.7	2.3	1.7	2.0	5.0	7.5	5.1	7.8	18.9	12.7	16.7	16.3	73.5	75.2	75.7	73.2
IH CRC	0.0	9.5	14.3	11.4	0.0	9.2	7.5	9.6	0.0	15.0	16.8	18.0	0.0	19.2	25.4	17.7	0.0	47.2	36.0	43.3
IH JCP	0.0	34.3	70.9	55.8	0.0	19.1	3.0	13.6	0.0	19.9	8.3	13.3	0.0	16.4	9.1	7.9	0.0	10.4	8.6	9.4
US/SH ACP	3.1	4.5	4.0	3.1	5.1	6.8	4.9	4.1	14.0	16.9	12.2	10.9	24.9	24.8	22.6	22.1	52.9	47.0	56.3	59.8
US/SH CRC	0.0	14.8	15.3	19.4	0.0	14.4	18.1	16.4	0.0	22.7	16.0	18.7	0.0	25.2	14.5	13.3	0.0	22.9	36.0	32.2
US/SH JCP	0.0	40.1	34.5	36.5	0.0	13.0	18.8	15.8	0.0	15.6	12.9	22.2	0.0	20.2	14.7	17.3	0.0	11.1	19.1	8.3
ALL HWYS.	3.7	6.1	5.2	5.0	5.4	7.7	5.4	5.4	13.7	16.5	13.1	13.1	24.7	23.2	22.7	21.0	52.5	46.4	53.6	55.5

Notes: Class "A" -- UPS=90-100
Class "B" -- UPS=70-89
Class "C" -- UPS=50-69
Class "D" -- UPS=35-49
Class "F" -- UPS=0-34

Continuously-Reinforced Concrete -- 43.3 percent of the rated lane miles were in excellent (Class "A") condition in 1986, while only 11.4 percent were in need of rehabilitation (based on condition alone). Ride quality on CRC was good, although not as good as on ACP: 71.3 percent of rated lane mileage was above 3.0 on CRC, compared to 95.9 percent on ACP. "3.0" was chosen as a threshhold ride quality value since the average motorist would probably identify roads with lower values as being "rough."

CRC Interstate continued to show a broad distribution of condition values, with less bias (compared to ACP) towards the higher values. However, ride quality had improved and CRC did not indicate the large increase in intermediate condition mileage that was shown on ACP.

Jointed Concrete Pavements -- These were typically the worst sections on the Interstate system. Condition values were 30-50 points lower than CRC and over 50 points lower than ACP. Nearly 70 percent of the lane mileage had a condition value below 50. Only 9.4 percent was in Class "A" condition rating, 55.8 percent was in Class "F" (needing rehabilitation). Ride quality was also noticeably lower: about 1.0 points lower than CRC and over 1.5 points lower than ACP. In fact, only 16.9 percent of the rated JCP lane mileage had a ride quality above 3.0. The poor ride quality, combined with the usually high traffic volumes, accounted for much of the lower condition ratings.

U.S. and State Highway Systems

Asphalt Pavements -- 59.8 percent of the rated lane mileage was in Class "A" condition in 1986, with only 3.1 percent of the mileage in Class "F." Overall condition values had improved by about 5 points to the highest level in four years. Ride quality also showed a similar improvement, with 76.8 percent of the rated lane mileage having a ride quality value above 3.0. Rutting, longitudinal cracking, and transverse cracking were the most frequently observed distress types.

Continuously-Reinforced Concrete -- The CRCP sections on the US & SH systems maintained a nearly uniform distribution between zero and 100. Class "A" mileage included 32.2 percent of the rated lane mileage, while Class "F" contained 19.4 percent. Poor ride quality was the primary cause of the low condition scores. Over half of the rated lane mileage had a ride value of 3.0 or less.

Jointed Concrete Pavements -- JCP sections on the US and SH system were in worse condition than the other two pavement types, as suggested by the 8.3 percent of rated mileage in Class "A" and the 36.5 percent in Class "F." Ride quality was also poor -- 81.6 percent of the rated lane mileage had a ride quality value of 3.0 or below. As on the Interstate JCP sections, ride quality was the major cause of low condition scores on jointed U.S. and State highway sections.

Farm to Market System

The Farm-to-Market system is composed primarily of Asphaltic Concrete Pavements (only 38 lane miles of concrete FM roads were rated in 1986) and as a result the CRCP and JCP sample sizes are much too small to be of any value in predicting pavement condition on a network basis. Thus, discussion of pavement condition on the FM system will be limited to asphalt pavements.

Asphalt Pavements -- The Farm-to-Market system ranked lowest of all systems, when considered as a whole, for overall pavement condition. However, only 6.0 percent of the rated lane mileage was in urgent need of major work (Class "F"), while 46.0 percent was in excellent (Class "A") condition. Over 44 percent of the rated lane mileage had a ride quality above 3.0. Rutting and patching were the most prevalent distress types found on asphalt FM pavements.

In general, the overall condition of asphalt FM roads statewide changed very little except in 1984, when a severe winter and reduced maintenance activity caused a noticeable drop in condition. Ride quality showed a definite improvement over 1985 levels, which had been much lower than previous years.

Summarized Condition of Texas Highways

The relative condition of the different highway systems and pavement types throughout the state can be ranked from best to worst, as follows:

1. IH ACP (Best)
2. US ACP
3. FM ACP
4. IH CRCP
5. US CRCP
6. US JCP
7. IH JCP (Worst)

These rankings were the same in 1985, since no significant changes have occured.

Overall condition of the Texas highway system has improved slightly since 1985, returning to near 1983 levels. Although there are more miles in excellent (Class "A") condition now than in 1983, more miles are also in poorer condition (below 70). However, these differences are small. Highway condition has improved significantly since 1984, when major deterioration was observed statewide.

Conditions by system vary widely. While all three systems show a general improvement back to 1983 levels, the Interstate system has been the slowest to respond. In fact, Interstate condition is definitely worse than 1983, having not recovered much

from 1984. The Farm-to-Market system has stabilized between 1983 and 1984 levels, while the US and State systems mirror the overall highway condition trends.

Conditions by pavement type indicate that ACP and JCP sections have improved since 1985, although JCP conditions are still much worse than either CRC or ACP. Pavement condition on CRC has dropped slightly, probably due to the normal aging under traffic of newly built sections. Rutting on ACP continues to be a major problem. In 1986 rutting was observed on nearly one-third (31.23 percent) of the rated sections.

The ride quality distributions for IH, US/SH, FM, ACP, and CRC all show definite improvements from 1985 to 1986. Only the JCP sections display any worsening in ride quality. However, these improvements are suspect, due to ongoing malfunctions (since early 1986) in the Department's profilometer, which is used to calibrate all ride quality measuring devices. The actual impact of these malfunctions will not be known until they have been eliminated and new ride data has been collected. The problems should be corrected in time for the 1987 PES survey.

Improvements in ride quality, due to error or otherwise, could bias the condition distributions, making them seem better than they really are. However recent increases in the number of construction projects let to contract would reduce the amount of "bad" mileage and later, upon completion, would increase the amount of "good" mileage. In view of the increased construction and maintenance activity over the last two years, the improvements observed from PES data reflect a gradual statewide improvement in highway condition.

CHAPTER 5 -- Statewide Pavement Rehabilitation Needs

Statewide pavement rehabilitation needs were estimated by identifying rated lane mileage which was in most urgent need of rehabilitation. PES contains a rating value for rehabilitation priority which ranges from 0 (most urgent) to 100 (least urgent). A pavement section was included in the needs estimate if its rehabilitation priority index was 34 or below.

Total statewide needs were extrapolated from PES rated sections, since all state-maintained lane mileage was not rated each year. The needs estimate program distributed all sections into small groups according to the following classes:

1. Year (1983, 1984, 1985, or 1986)
2. District (1-25, except 22)
3. System (IH, US/SH, or FM)
4. Surface Type (ACP, CRC, or JCP)
5. ADT Class (1, 2, or 3)

These five classes partition the Texas highway system into 2592 groups of pavement sections. The extrapolation assumed that the percent of total lane mileage needing rehabilitation in a group would be the same as the percent of rated lane mileage needing rehab. For example, if 10 percent of the rated lane mileage needed rehab, then 10 percent of the total lane mileage would also need rehab. Each group was considered independently, with the results being assembled into larger categories for reporting. Table 4 lists the rated lane mileage found to be in need of rehabilitation.

Construction sections (which could not be rated) and frontage roads were eliminated from the groups by the rehab model. Table 5 depicts the total assumed inventory of mainlane mileage (in lane miles) used in the rehab model, before elimination of the construction sections.

The rehab model estimates lane mileage and funding needs for a one-year statewide pavement rehabilitation program. Unit costs were included, as shown in Table 6, by highway system, surface type, and ADT class. Table 7 contains the estimated statewide rehab lane mileage needs as extrapolated from the rated lane mileage figures (shown in Table 4).

Table 8 contains the total estimated rehabilitation funding needs for the entire Texas highway system for each of the last four years (1983-1986).

Table 4. Total Length of Pavement Rated Each Year Found to be in Need of Rehabilitation (Lane Miles).

1983

SURFACE	IH	US/SH	FM	TOTAL
ACP	81	954	949	1984
CRCP	0	0	0	0
JCP	0	0	0	0
TOTAL	81	954	949	1984

1984

SURFACE	IH	US/SH	FM	TOTAL
ACP	204	1397	748	2349
CRCP	207	179	0	386
JCP	139	304	10	453
TOTAL	550	1880	758	3188

1985

SURFACE	IH	US/SH	FM	TOTAL
ACP	112	997	630	1739
CRCP	261	15	0	276
JCP	147	65	14	226
TOTAL	520	1077	644	2241

1986

SURFACE	IH	US/SH	FM	TOTAL
ACP	131	992	677	1800
CRCP	246	188	1	435
JCP	82	268	22	372
TOTAL	459	1448	700	2607

Note: Frontage roads are not included in this table.

Table 5 - Total Statewide Lane-Mileage Assumed by System and Surface Type for Estimate of Rehabilitation Needs.

SURFACE	IH	US/SH	FM	TOTAL
ACP	9180.2	66172.7	81917.6	157270.5
CRC	3645.3	1982.4	84.4	5712.1
JCP	1445.0	2516.0	357.5	4318.5
TOTAL	14270.5	70671.1	82359.5	167301.1

Table 6 - Rehabilitation Costs per Lane Mile

Pav. Type	IH Cost	IH ADT	US/SH Cost	US/SH ADT	FM Cost	FM ADT
ACP	85,000	23,000	65,000	23,000	25,000	1500
	143,000	100,000	143,000	100,000	50,000	1500+
	400,000	100,000+	400,000	100,000+		
CRC	103,000	25,000	103,000	25,000	25,000	1500
	143,000	100,000	143,000	100,000	50,000	1500+
	400,000	100,000+	400,000	100,000+		
JCP			65,000	25,000	25,000	1500
	165,000	100,000	165,000	100,000	50,000	1500
	500,000	100,000+	500,000	100,000+		

Notes: ADT is Average Daily Traffic, in vehicles/day.
Cost is in dollars/lane mile.

Table 7. Total Projected Mileage in State In Need of Rehabilitation (Lane Miles).

1983

SURFACE	IH	US/SH	FM	TOTAL
ACP	249	4349	4533	9131
CRCP	0	0	0	0
JCP	0	0	0	0
TOTAL	249	4349	4533	9131

1984

SURFACE	IH	US/SH	FM	TOTAL
ACP	541	5565	7699	13805
CRCP	647	501	0	1148
JCP	426	1049	63	1538
TOTAL	1614	7115	7762	16491

1985

SURFACE	IH	US/SH	FM	TOTAL
ACP	284	4746	5561	10591
CRCP	820	331	0	1151
JCP	561	1165	98	1824
TOTAL	1665	6242	5659	13566

1986

SURFACE	IH	US/SH	FM	TOTAL
ACP	287	3779	4901	8967
CRCP	768	528	2	1298
JCP	422	1100	155	1677
TOTAL	1477	5407	5058	11942

Note: Frontage roads are not included in this table.

Table 8 - Estimated Rehabilitation Needs Estimates for 1983 to 1986 (in thousands of dollars).

1983				
SURFACE	IH	US/SH	FM	TOTAL
ACP	35,496	344,537	144,794	524,827
CRCP	0	0	0	0
JCP	0	0	0	0
TOTAL	35,496	344,537	144,794	524,827

1984				
SURFACE	IH	US/SH	FM	TOTAL
ACP	50,478	395,165	233,594	679,237
CRCP	258,988	90,271	0	349,259
JCP	88,088	106,343	3,135	197,566
TOTAL	397,554	591,779	236,729	1,226,062

1985				
SURFACE	IH	US/SH	FM	TOTAL
ACP	51,695	412,513	179,301	643,509
CRCP	328,090	84,467	0	412,557
JCP	92,550	130,208	4,528	227,286
TOTAL	472,335	627,188	183,829	1,283,352

1986				
SURFACE	IH	US/SH	FM	TOTAL
ACP	33,823	275,570	151,079	460,472
CRCP	307,348	65,718	113	373,179
JCP	69,592	127,871	6,381	203,844
TOTAL	410,763	469,159	157,573	1,037,495

Note: Frontage roads are not included in this table.

1983 -- $0.5 Billion
1984 -- $1.2 Billion
1985 -- $1.3 Billion
1986 -- $1.0 Billion

Addition of concrete pavements into the PES sample is responsible for the increase in estimated need in 1984-1986. Since 1984, estimated rehab funding needs have stablilized, although 1986 does show a definite improvement over 1985 and 1984. This improvement is due primarily to reduced needs on the US system and ACP surface types, although all systems and surface types have improved.

Extrapolated lane mileage and funding estimates in this report cannot be compared to estimates contained in prior PES Annual Reports. Although the rated lane mileage figures are identical, the unit costs used in this report are much lower than those used previously. The total assumed lane mileage values listed in Table 5 are also different, resulting in new extrapolated estimates.

CHAPTER 6 -- Additional Information

The condition and rehabilitation analyses discussed in this report can be generated for any District in the state. Persons interested in obtaining this information for their own District are encouraged to contact Mr. Bryan E. Stampley, D-18P, at TexAn 258-8382.

CHAPTER 7 -- Conclusions

Analysis of pavement evaluation data collected for each of the last four years suggests the following:

1. The condition of the Texas highway system has improved slightly and is now at a level comparable to 1983, after recovering from rapid deterioration experienced in 1984. Over half of the lane mileage is in very good condition (condition rating of 90 or better), with only 5 percent in bad condition (rating of 34 or below).

2. Approximately $1.0 billion is needed for pavement rehabilitation work on 11,942 lane miles. The 1986 figures represent reductions of $200 million and 1624 lane miles from the 1985 rehab needs estimate.

3. The expected variability in PES condition ratings is ±15 points. On 77.5 percent of the 1986 PES audit sections, the audit and District raters returned condition ratings which were within 15 points of each other.