

# **2020 State of the Pavement Report**

**California Department of Transportation  
Division of Maintenance  
Pavement Program  
April 2022**



This report is prepared by the California Department of Transportation, Division of Maintenance, Office of Pavement Management and the Office of Pavement Programming.

This report can be downloaded from the Division of Maintenance internet page, located at:

<<https://dot.ca.gov/programs/maintenance/pavement/pavement-management>>

TABLE OF CONTENTS

---

**TABLE OF CONTENTS** ..... I

**LIST OF TABLES** ..... III

**LIST OF FIGURES** ..... V

**EXECUTIVE SUMMARY** ..... VI

**STATE HIGHWAY SYSTEM** ..... 1

**PAVEMENT CONDITION MONITORING AND MANAGEMENT** ..... 4

    Pavement Condition Monitoring ..... 4

    Pavement Management System ..... 4

**FEDERAL PAVEMENT PERFORMANCE MEASURES** ..... 6

    Pavement Condition Statewide ..... 7

        Overall Pavement Condition ..... 7

        Condition by Pavement Type ..... 7

        Condition by Roadway Class ..... 8

        Condition by Highway Type ..... 9

    Pavement Condition by District ..... 9

**CALTRANS PAVEMENT RATING SYSTEM** ..... 11

    Pavement Condition Statewide ..... 15

        Overall Pavement Condition ..... 15

        Condition by Pavement Type ..... 16

        Pavement Condition by Roadway Class ..... 16

        Pavement Condition by Highway Type ..... 17

    Pavement Condition by District ..... 18

**PAVEMENT ROUGHNESS** ..... 20

    Pavement Roughness Statewide ..... 20

    Pavement Roughness by District ..... 22

**PAVEMENT TREATMENT STRATEGIES** ..... 23

**PAVEMENT EXPENDITURES AND FINANCIAL PLAN** ..... 25

**APPENDIX A – CALTRANS DISTRICT BOUNDARY MAP** ..... 32

**APPENDIX B – 2020 PAVEMENT CONDITION BY DISTRICT AND ROADWAY CLASSIFICATION, BASED ON FEDERAL PAVEMENT PERFORMANCE MEASURES** . 33

**APPENDIX C – 2019 PAVEMENT CONDITION BY DISTRICT AND ROADWAY CLASSIFICATION, BASED ON FEDERAL PAVEMENT PERFORMANCE MEASURES** . 34

**APPENDIX D – 2020 PAVEMENT CONDITION BY DISTRICT AND ROADWAY CLASSIFICATION, BASED ON CALTRANS PAVEMENT RATING SYSTEM** ..... 35

**APPENDIX E – 2019 PAVEMENT CONDITION BY DISTRICT AND ROADWAY  
CLASSIFICATION, BASED ON CALTRANS PAVEMENT RATING SYSTEM..... 36**

**APPENDIX F – 2020 I.R.I. DISTRIBUTION BY DISTRICT AND HIGHWAY TYPE ..... 37**

**APPENDIX G – 2019 I.R.I. DISTRIBUTION BY DISTRICT AND HIGHWAY TYPE..... 39**

**APPENDIX H – H.M.1 MAINTENANCE STRATEGY COST PER LANE-MILE AND LANE-  
MILES TREATED FOR F.Y. 2019/20 THROUGH F.Y. 2020/21..... 41**

**APPENDIX I – S.H.O.P.P. - C.A.P.M. STRATEGY COST PER LANE-MILE AND LANE-  
MILES TREATED FOR F.Y. 2019/20 THROUGH F.Y. 2020/21..... 42**

**APPENDIX J – S.H.O.P.P. - REHABILITATION STRATEGY COST PER LANE-MILE AND  
LANE-MILES TREATED FOR F.Y. 2019/20 THROUGH F.Y. 2020/21 ..... 43**

## LIST OF TABLES

---

TABLE 1. STATEWIDE PAVEMENT CONDITION SUMMARY BY ROADWAY CLASSIFICATION, BASED ON FEDERAL PERFORMANCE MEASURES .....	VII
TABLE 2. STATEWIDE PAVEMENT CONDITION SUMMARY BY ROADWAY CLASSIFICATION, BASED ON CALTRANS RATING SYSTEM.....	VII
TABLE 3. AWARDED PAVEMENT IMPROVEMENTS CAPITAL COSTS AND LANE-MILES FROM F.Y. 2018/19 TO F.Y. 2019/20.....	VIII
TABLE 4. STATEWIDE LANE-MILES OF A.P.C.S. DATA COLLECTED BY PAVEMENT TYPE.....	1
TABLE 5. STATEWIDE LANE-MILES OF A.P.C.S. DATA COLLECTED BY ROADWAY CLASSIFICATION.....	2
TABLE 6. STATEWIDE LANE-MILES OF A.P.C.S. DATA COLLECTED BY HIGHWAY TYPE .....	2
TABLE 7. STATEWIDE LANE-MILES OF A.P.C.S. DATA COLLECTED BY DISTRICT.....	3
TABLE 8. FEDERAL PAVEMENT PERFORMANCE METRICS AND MEASURES CRITERIA	6
TABLE 9. STATEWIDE PAVEMENT PERFORMANCE TARGETS FOR EACH ROADWAY CLASSIFICATION AND FEDERAL PERFORMANCE MEASURE .....	7
TABLE 10. STATEWIDE PAVEMENT CONDITION SUMMARY BASED ON FEDERAL PERFORMANCE MEASURES .....	7
TABLE 11. STATEWIDE PAVEMENT CONDITION SUMMARY BY PAVEMENT TYPE, BASED ON FEDERAL PERFORMANCE MEASURES.....	8
TABLE 12. STATEWIDE PAVEMENT CONDITION SUMMARY BY ROADWAY CLASSIFICATION, BASED ON FEDERAL PERFORMANCE MEASURES.....	8
TABLE 13. STATEWIDE PAVEMENT CONDITION SUMMARY BY HIGHWAY TYPE, BASED ON FEDERAL PERFORMANCE MEASURES.....	9
TABLE 14. STATEWIDE PAVEMENT CONDITION SUMMARY BY DISTRICT, BASED ON FEDERAL PERFORMANCE MEASURES .....	10
TABLE 15. CALTRANS CONDITION RATING PRIORITY MATRIX FOR ASPHALT PAVEMENT.....	13
TABLE 16. CALTRANS CONDITION RATING PRIORITY MATRIX FOR JOINTED PLAIN CONCRETE PAVEMENT.....	14
TABLE 17. STATEWIDE PAVEMENT CONDITION SUMMARY BASED ON CALTRANS RATING SYSTEM .....	15
TABLE 18. STATEWIDE PAVEMENT CONDITION SUMMARY BY PAVEMENT TYPE, BASED ON CALTRANS RATING SYSTEM .....	16
TABLE 19. STATEWIDE PAVEMENT CONDITION SUMMARY BY ROADWAY CLASSIFICATION, BASED ON CALTRANS RATING SYSTEM.....	17
TABLE 20. STATEWIDE PAVEMENT CONDITION SUMMARY BY HIGHWAY TYPE, BASED ON CALTRANS RATING SYSTEM .....	18
TABLE 21. STATEWIDE PAVEMENT CONDITION SUMMARY BY DISTRICT, BASED ON CALTRANS RATING SYSTEM .....	19
TABLE 22. AVERAGE COST PER LANE-MILE FOR DIFFERENT FUNDING PROGRAMS FROM F.Y. 2018/19 THROUGH F.Y. 2019/20.....	24

TABLE 23. AWARDED PAVEMENT IMPROVEMENTS CAPITAL COSTS AND LANE-MILES FROM F.Y. 2018/19 TO F.Y. 2019/20.....	25
TABLE 24. 2019 PAVEMENT CONDITION BY DISTRICT AND ROADWAY CLASSIFICATION, BASED ON FEDERAL PAVEMENT PERFORMANCE MEASURES.....	33
TABLE 25. 2018 PAVEMENT CONDITION BY DISTRICT AND ROADWAY CLASSIFICATION, BASED ON FEDERAL PAVEMENT PERFORMANCE MEASURES.....	34
TABLE 26. 2019 PAVEMENT CONDITION BY DISTRICT AND ROADWAY CLASSIFICATION, BASED ON CALTRANS PAVEMENT RATING SYSTEM .....	35
TABLE 27. 2018 PAVEMENT CONDITION BY DISTRICT AND ROADWAY CLASSIFICATION, BASED ON CALTRANS PAVEMENT RATING SYSTEM .....	36
TABLE 28. 2019 N.H.S. INTERSTATE I.R.I.....	37
TABLE 29. 2019 N.H.S. NON-INTERSTATE I.R.I.....	37
TABLE 30. 2019 NON-N.H.S. I.R.I. ....	38
TABLE 31. 2018 N.H.S. INTERSTATE I.R.I.....	39
TABLE 32. 2018 N.H.S. NON-INTERSTATE I.R.I.....	39
TABLE 33. 2018 NON-N.H.S. I.R.I. ....	40
TABLE 34. H.M.1 MAINTENANCE STRATEGY COST PER LANE-MILE .....	41
TABLE 35. H.M.1 MAINTENANCE STRATEGY LANE-MILES TREATED.....	41
TABLE 36. C.A.P.M. STRATEGY COST PER LANE-MILE.....	42
TABLE 37. C.A.P.M. STRATEGY LANE-MILES TREATED .....	42
TABLE 38. REHABILITATION STRATEGY COST PER LANE-MILE.....	43
TABLE 39. REHABILITATION STRATEGY LANE-MILES TREATED .....	43

## LIST OF FIGURES

---

FIGURE 1. A.P.C.S. VEHICLE ON THE ROAD AND MANUAL PAVEMENT INSPECTION .....	4
FIGURE 2. EXAMPLES OF PAVEMENT CONDITION BASED ON CALTRANS RATING SYSTEM .....	12
FIGURE 3. EXAMPLES OF DISTRESS FOR ASPHALT PAVEMENT .....	13
FIGURE 4. EXAMPLES OF DISTRESS FOR CONCRETE PAVEMENT .....	15
FIGURE 5. STATEWIDE I.R.I. DISTRIBUTION PERCENTAGE .....	20
FIGURE 6. STATEWIDE I.R.I. DISTRIBUTION PERCENTAGE BY HIGHWAY TYPE .....	21
FIGURE 7. 2019 STATEWIDE I.R.I. DISTRIBUTION PERCENTAGE BY DISTRICT .....	22
FIGURE 8. ILLUSTRATION OF COST EFFECTIVENESS OF PAVEMENT STRATEGIES.....	23
FIGURE 9. AWARDED PAVEMENT IMPROVEMENTS CAPITAL COSTS AND LANE-MILES FROM F.Y. 2018/19 TO F.Y. 2019/20.....	26
FIGURE 10. F.Y. 2018/19 H.M.1 PREVENTIVE AND CORRECTIVE MAINTENANCE STRATEGIES .....	27
FIGURE 11. F.Y. 2018/19 C.A.P.M. STRATEGIES .....	27
FIGURE 12. F.Y. 2018/19 MAJOR REHABILITATION STRATEGIES .....	28
FIGURE 13. F.Y. 2019/20 H.M.1 PREVENTIVE AND CORRECTIVE MAINTENANCE STRATEGIES .....	29
FIGURE 14. F.Y. 2019/20 C.A.P.M. STRATEGIES .....	29
FIGURE 15. F.Y. 2019/20 MAJOR REHABILITATION STRATEGIES .....	30
FIGURE 16. FINANCIAL PLAN FOR PAVEMENT IMPROVEMENTS .....	31

## EXECUTIVE SUMMARY

---

As the steward of the State Highway System (S.H.S.), the California Department of Transportation (Caltrans) is responsible for maintaining over 50,000 lane-miles of pavement along more than 255 state and interstate highways. The State of the Pavement Report presents the latest pavement condition of the S.H.S., recent pavement project expenditures, and financial plan for future pavement improvements.

Caltrans conducts an automated pavement condition survey (A.P.C.S.) to collect pavement data at highway speeds for all lanes along the S.H.S. A.P.C.S. vehicles are equipped with various on-board equipment, high-definition cameras, and laser sensors to collect pavement images and pavement surface profiles. Pavement condition is reported for every 0.1-mile.

The 2020 State of the Pavement Report is based on the A.P.C.S. data collected in the 2020 calendar year. The difference in the total lane-miles collected between 2020 compared to 2019 may be attributed to right-of-way relinquishments, new roadway pavement segments, new roadway re-alignments, or pavement locations where conditions could not be collected such as roadway closures for construction activities. The report presents pavement condition in accordance with two analysis methodologies:

- 1) The National Highway Performance Program's (N.H.P.P.) pavement performance measures codified under Title 23, Code of Federal Regulations, Part 490, Subpart C (23 C.F.R. 490, Subpart C);
- 2) The Caltrans pavement rating system.

The N.H.P.P. measures pavement performance as *Good*, *Fair*, and *Poor* based on an assessment of several distress metrics combined together. Table 1 presents the 2018 and 2019 statewide pavement condition by roadway classification, based on federal performance measures. The percentage of *Good* pavement decreased for Class 1 and Class 3, while it remained relatively the same for Class 2 in 2020 compared to 2019. The percentage of *Fair* pavement increased for Class 1 and Class 3, while it remained relatively the same for Class 2. The percentage of *Poor* pavement increased slightly for all three roadway classes.

The Caltrans pavement rating system uses a different methodology than the federal measures. Caltrans designates the color *Green* for pavement with no distress or very low distress, the color *Yellow* for pavement with minor surface distress, and the color *Red* for pavement with structural distress or poor ride quality. Through this monitoring and assessment effort, Caltrans can proactively apply the most cost-effective treatments to minimize pavement deterioration and bring it to a state of good repair. Table 2 presents the 2019 and 2020 statewide pavement condition by roadway classification, based on the Caltrans



rating system. The percentage of Green pavement decreased for all three roadway classes in 2019 compared to 2018. The percentage of Yellow and Red pavement increased for all three roadway classes.

**TABLE 1. STATEWIDE PAVEMENT CONDITION SUMMARY BY ROADWAY CLASSIFICATION, BASED ON FEDERAL PERFORMANCE MEASURES**

<u>Roadway Class</u>	<u>2019 Good Lane-Miles</u>	<u>2019 Fair Lane-Miles</u>	<u>2019 Poor Lane-Miles</u>	<u>2019 Sub-Total</u>	<u>2020 Good Lane-Miles</u>	<u>2020 Fair Lane-Miles</u>	<u>2020 Poor Lane-Miles</u>	<u>2020 Sub-Total</u>
<b>Class 1</b>	17,801 (66.2%)	8,781 (32.6%)	314 (1.2%)	26,895 (100%)	16,732 (61.6%)	10,062 (37.1%)	349 (1.3%)	27,142 (100%)
<b>Class 2</b>	7,509 (46.8%)	8,409 (52.4%)	138 (0.9%)	16,056 (100%)	7,486 (46.3%)	8,512 (52.6%)	185 (1.1%)	16,183 (100%)
<b>Class 3</b>	3,002 (44.7%)	3,654 (54.4%)	64 (1.0%)	6,720 (100%)	2,823 (42.8%)	3,664 (55.5%)	112 (1.7%)	6,599 (100%)
<b>Statewide Total</b>	28,312 (57.0%)	20,844 (42.0%)	516 (1.0%)	49,672 (100%)	27,041 (54.2%)	22,237 (44.5%)	646 (1.3%)	49,924 (100%)

**TABLE 2. STATEWIDE PAVEMENT CONDITION SUMMARY BY ROADWAY CLASSIFICATION, BASED ON CALTRANS RATING SYSTEM**

<u>Roadway Class</u>	<u>2019 Green Lane-Miles</u>	<u>2019 Yellow Lane-Miles</u>	<u>2019 Red Lane-Miles</u>	<u>2019 Sub-Total</u>	<u>2020 Green Lane-Miles</u>	<u>2020 Yellow Lane-Miles</u>	<u>2020 Red Lane-Miles</u>	<u>2020 Sub-Total</u>
<b>Class 1</b>	22,204 (82.6%)	2,861 (10.6%)	1,831 (6.8%)	26,895 (100%)	21,195 (78.1%)	3,481 (12.8%)	2,466 (9.1%)	27,142 (100%)
<b>Class 2</b>	9,302 (57.9%)	4,053 (25.2%)	2,701 (16.8%)	16,056 (100%)	8,863 (54.8%)	4,439 (27.4%)	2,882 (17.8%)	16,183 (100%)
<b>Class 3</b>	3,634 (54.1%)	1,729 (25.7%)	1,358 (20.2%)	6,720 (100%)	3,319 (50.3%)	1,755 (26.6%)	1,525 (23.1%)	6,599 (100%)
<b>Statewide Total</b>	35,139 (70.7%)	8,643 (17.4%)	5,890 (11.9%)	49,672 (100%)	33,376 (66.9%)	9,676 (19.4%)	6,872 (13.8%)	49,924 (100%)

In 2020, approximately 59 percent of total lane-miles collected were measured with an International Roughness Index (I.R.I.) of less than 95 inches per mile, 33 percent with an I.R.I. between 95 to 170 inches per mile, and 8 percent with an I.R.I. greater than 170 inches per mile.

Caltrans is committed to using maintenance resources effectively to prolong the service life of the pavement and maintain the S.H.S. at the lowest possible long-term cost. The A.P.C.S. data also serves as a crucial component of Caltrans' Pavement Management System (PaveM). PaveM uses pavement condition data along with other information such as traffic census, climate region, and construction history to predict future pavement condition and recommend project locations viable for cost-effective treatments.

From Fiscal Year (F.Y.) 2019/20 through F.Y. 2020/21, Caltrans delivered approximately \$2.9 billion in pavement projects on nearly 5,245 lane-miles of roadway. Table 3 summarizes the total capital costs and lane-miles for Highway Maintenance (H.M.1) and State Highway Operations and Protection Program (S.H.O.P.P.) pavement projects within the last two fiscal years.

**TABLE 3. AWARDED PAVEMENT IMPROVEMENTS CAPITAL COSTS AND LANE-MILES FROM F.Y. 2019/20 TO F.Y. 2020/21**

<b><u>Funding Program</u></b>	<b><u>F.Y. 2019/20 Million Dollar<sup>1</sup></u></b>	<b><u>F.Y. 2019/20 Lane- Miles</u></b>	<b><u>F.Y. 2020/21 Million Dollar<sup>1</sup></u></b>	<b><u>F.Y. 2020/21 Lane- Miles</u></b>	<b><u>Total Million Dollar<sup>1</sup></u></b>	<b><u>Total Lane- Miles</u></b>
<b>H.M.1</b>	\$204	1,200	\$291	1,689	\$495	2,889
<b>S.H.O.P.P. – C.A.P.M.</b>	\$383	1,043	\$211	468	\$594	1,511
<b>S.H.O.P.P. – Rehabilitation</b>	\$1,038	453	\$759	374	\$1,797	827
<b>S.H.O.P.P. – Minor A</b>	\$5	7	\$6	11	\$11	18
<b>S.H.O.P.P. – Sub-Total</b>	\$1,426	1,503	\$976	853	\$2,402	2,356
<b>Total H.M.1 &amp; S.H.O.P.P.</b>	\$1,630	2,703	\$1,267	2,542	\$2,897	5,245

<sup>1</sup> Costs associated to pavement-related contract bid items only and exclude project support costs. It also does not include on-call maintenance contracts or Director's Order contracts.

## STATE HIGHWAY SYSTEM

---

The S.H.S. primarily consists of two types of pavement: asphalt and concrete. Asphalt pavements include pavement surfaced with conventional hot mix asphalt (either open-graded or dense-graded), rubberized hot mix asphalt (either open-graded or gap-graded), chip seal, slurry seal, bonded wearing course, or other asphaltic materials. Asphalt pavement surfaces also include composite pavements with underlying concrete pavement. Concrete pavements include pavement surfaced with concrete materials such as jointed plain concrete pavement (J.P.C.P.), continuously reinforced concrete pavement (C.R.C.P.), and precast concrete pavement.

Table 4 presents the statewide lane-miles of pavement, by type and excluding bridges and other structures, that were collected in the 2019 and 2020 A.P.C.S. cycles.

**TABLE 4. STATEWIDE LANE-MILES OF A.P.C.S. DATA COLLECTED BY PAVEMENT TYPE**

<b>Pavement Type</b>	<b>2019 Lane-Miles Collected</b>	<b>2020 Lane-Miles Collected</b>
<b>Asphalt</b>	36,663 (73.8%)	36,859 (73.8%)
<b>Concrete</b>	13,009 (26.2%)	13,065 (26.2%)
<b>Statewide Total</b>	49,672 (100%)	49,924 (100%)

The difference in the total lane-miles collected between 2019 and 2020 may be attributed to right-of-way relinquishments, new roadway pavement segments, new roadway re-alignments, or pavement locations where conditions could not be collected such as roadway closures for highway construction activities.

Table 5 presents the statewide lane-miles of pavement, by roadway classification, that were collected in the 2019 and 2020 A.P.C.S. cycles. For planning purposes, the S.H.S. has been classified into three roadway classifications:

- Roadway Class 1 contains route segments classified as Interstate and other principal arterials. It includes Freight Network Tier I and II, and the Strategic Highway Network (S.T.R.A.H.N.E.T.) routes. Examples of Class 1 routes are Sacramento-80, Alameda-580, Ventura-101, Los Angeles-210, and San Diego-8.
- Roadway Class 2 contains route segments classified as non-Interstate National Highway System and Interregional Road System (I.R.R.S.). It

includes Freight Network Tier 3. Examples of Class 2 routes are Mendocino-20, Napa-29, Monterey-1, Riverside-74, and Orange-73.

- Roadway Class 3 contains all other routes not included in Classes 1 and 2. Examples of Class 3 routes are Trinity-3, Humbolt-36, San Luis Obispo-58, and Mono-167.

**TABLE 5. STATEWIDE LANE-MILES OF A.P.C.S. DATA COLLECTED BY ROADWAY CLASSIFICATION**

<b><u>Roadway Class</u></b>	<b><u>2019 Lane-Miles Collected</u></b>	<b><u>2020 Lane-Miles Collected</u></b>
<b>Class 1</b>	26,895 (54.1%)	27,142 (54.4%)
<b>Class 2</b>	16,056 (32.3%)	16,183 (32.4%)
<b>Class 3</b>	6,720 (13.5%)	6,599 (13.2%)
<b>Statewide Total</b>	49,672 (100%)	49,924 (100%)

The S.H.S. includes the Interstate System, other roadways along the National Highway System (N.H.S.), and Non-N.H.S. roadways. Table 6 presents the statewide lane-miles of pavement, by highway type, that were collected in the 2019 and 2020 A.P.C.S. cycles.

**TABLE 6. STATEWIDE LANE-MILES OF A.P.C.S. DATA COLLECTED BY HIGHWAY TYPE**

<b><u>Highway Type</u></b>	<b><u>2019 Lane-Miles Collected</u></b>	<b><u>2020 Lane-Miles Collected</u></b>
<b>N.H.S. – Interstate</b>	14,283 (28.8%)	14,339 (28.7%)
<b>N.H.S. – Non-Interstate</b>	22,417 (45.1%)	22,716 (45.5%)
<b>N.H.S. Sub-Total</b>	36,700 (73.9%)	36,055 (74.2%)
<b>Non-N.H.S.</b>	12,972 (26.1%)	12,868 (25.8%)
<b>Statewide Total</b>	49,672 (100%)	49,924 (100%)

There are 12 Caltrans regional districts across California. Each district is responsible for managing and maintaining their respective portions of the S.H.S. network. Table 7 presents the statewide lane-miles of pavement, by district, that were collected in the 2019 and 2020 A.P.C.S. cycles.

**TABLE 7. STATEWIDE LANE-MILES OF A.P.C.S. DATA COLLECTED BY DISTRICT**

<b>District</b>	<b>2019 Lane-Miles Collected</b>	<b>2020 Lane-Miles Collected</b>
<b>District 1</b>	2,323 (4.7%)	2,285 (4.6%)
<b>District 2</b>	3,953 (8.0%)	3,900 (7.8%)
<b>District 3</b>	4,403 (8.9%)	4,416 (8.8%)
<b>District 4</b>	6,051 (12.2%)	6,090 (12.2%)
<b>District 5</b>	3,150 (6.3%)	3,149 (6.3%)
<b>District 6</b>	4,995 (10.1%)	5,038 (10.1%)
<b>District 7</b>	6,029 (12.1%)	6,002 (12.0%)
<b>District 8</b>	6,600 (13.3%)	6,766 (13.6%)
<b>District 9</b>	2,548 (5.1%)	2,563 (5.1%)
<b>District 10</b>	3,498 (7.0%)	3,516 (7.0%)
<b>District 11</b>	4,162 (8.4%)	4,168 (8.3%)
<b>District 12</b>	1,960 (3.9%)	2,031 (4.1%)
<b>Statewide Total</b>	49,672 (100%)	49,924 (100%)

A map of each Caltrans district's boundary is available in Appendix A.

## PAVEMENT CONDITION MONITORING AND MANAGEMENT

---

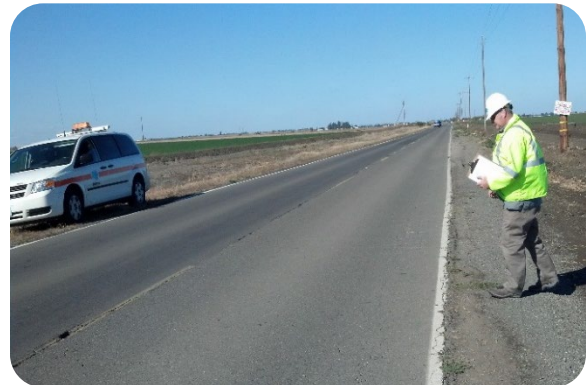
### Pavement Condition Monitoring

Historically, a team of pavement raters would conduct a manual pavement condition survey at various locations along the S.H.S. once a year. The pavement raters visually inspected the outside highway lanes for both directions of travel using systematic sampling techniques. Pavement condition assessments would be extrapolated for the entire S.H.S. based on those sample locations.

Between 2011 and 2012, Caltrans began testing and transitioning to A.P.C.S. to efficiently collect, evaluate, and analyze pavement condition for all lanes on the S.H.S. It utilizes vehicles equipped with an array of on-board high-definition cameras, laser sensors, Global Positioning System tracker, and other measurement devices that quickly collect pavement data at highway speeds. The data collected includes geographical locations of the highways, downward-looking pavement surface images, forward right-of-way images, and pavement surface profiles. For asphalt pavement and C.R.C.P., one data element is reported for every 26.4-foot section. For J.P.C.P., one data element is reported for each concrete slab. The data elements would be aggregated to calculate a weighted average of the pavement condition for each 0.1-mile segment.

Figure 1 presents the data collection methods for A.P.C.S. and manual inspection. The manual pavement inspection is now a component of the A.P.C.S. data validation process in compliance with 23 C.F.R. 490.319(c).

**FIGURE 1. A.P.C.S. VEHICLE ON THE ROAD AND MANUAL PAVEMENT INSPECTION**



### Pavement Management System

The Pavement Management System (PaveM) is a versatile tool that assists Caltrans with analyzing existing pavement condition, predicting future pavement condition, and recommending pavement projects to achieve

targeted performance goals by data driven strategies. PaveM uses many data inputs such as pavement condition, traffic census, climate region, pavement treatments, and construction history to predict future pavement condition and recommend projects. The tool maximizes funding resources by assisting with analysis of network-wide investment alternatives.

## FEDERAL PAVEMENT PERFORMANCE MEASURES

The Moving Ahead for Progress in the 21<sup>st</sup> Century Act (M.A.P.-21) established a performance-based objective that directs States to make smart transportation investment decisions and work toward achieving seven national performance goals. One of the national goals is pavement performance. The National Highway Performance Program (N.H.P.P.) was enacted under M.A.P.-21 and continued under the Fixing America's Surface Transportation Act (F.A.S.T. Act) to provide guidance for States to meet the national goals. In accordance with the N.H.P.P., the federal pavement performance measures are codified under 23 C.F.R. 490, Subpart C.

The N.H.P.P. determines pavement performance measures based on a combination of different pavement distress metrics. Asphalt pavement metrics are surface roughness according to I.R.I., cracking, and rutting. J.P.C.P. pavement metrics are I.R.I., cracking, and faulting. C.R.C.P. pavement metrics are I.R.I. and cracking. The metrics are rated as *Good*, *Fair*, and *Poor* based on a set of criteria for each pavement type. Table 8 presents the performance metrics and measures criteria for each pavement type. *Good* pavement measure is represented as green, *Fair* pavement measure is represented as light purple, and *Poor* pavement measure is represented as purple.

**TABLE 8. FEDERAL PAVEMENT PERFORMANCE METRICS AND MEASURES CRITERIA**

<b><u>Performance Metrics</u></b>	<b><u>Good</u></b>	<b><u>Fair</u></b>	<b><u>Poor</u></b>
<b>I.R.I. (inches per mile)</b>	Less than 95	Between 95 to 170	Greater than 170
<b>Cracking (percentage) for Asphalt Pavement</b>	Less than 5	Between 5 to 20	Greater than 20
<b>Cracking (percentage) for J.P.C.P.</b>	Less than 5	Between 5 to 15	Greater than 15
<b>Cracking (percentage) for C.R.C.P.</b>	Less than 5	Between 5 to 10	Greater than 10
<b>Rutting (inch) for Asphalt Pavement</b>	Less than 0.2	Between 0.2 to 0.4	Greater than 0.4
<b>Faulting (inch) for J.P.C.P.</b>	Less than 0.10	Between 0.10 to 0.15	Greater than 0.15

The overall condition of a pavement section will be considered *Good* if all the performance metrics for each pavement type are rated as *Good*. If two or more performance metrics are rated as *Poor*, then the pavement section is considered *Poor*. All other condition combinations are considered as *Fair*.



Table 9 presents the statewide pavement performance targets established by Caltrans for each roadway classification and performance measure.

**TABLE 9. STATEWIDE PAVEMENT PERFORMANCE TARGETS FOR EACH ROADWAY CLASSIFICATION AND FEDERAL PERFORMANCE MEASURE**

<u>Roadway Class</u>	<u>Good</u>	<u>Fair</u>	<u>Poor</u>
<b>Class 1</b>	60%	39%	1%
<b>Class 2</b>	55%	43%	2%
<b>Class 3</b>	45%	53%	2%

### Pavement Condition Statewide

#### *Overall Pavement Condition*

Table 10 presents the 2019 and 2020 statewide pavement condition based on the federal performance measures. The percentage of *Good* pavement decreased, and the percentage of *Fair* and *Poor* pavement increased in 2020 compared to 2019.

**TABLE 10. STATEWIDE PAVEMENT CONDITION SUMMARY BASED ON FEDERAL PERFORMANCE MEASURES**

<u>Federal Measure</u>	<u>2019 Lane-Miles</u>	<u>2020 Lane-Miles</u>
<b>Good</b>	28,312 (57.0%)	27,041 (54.2%)
<b>Fair</b>	20,844 (42.0%)	22,237 (44.5%)
<b>Poor</b>	516 (1.0%)	646 (1.3%)
<b>Statewide Total</b>	49,672 (100%)	49,924 (100%)

#### *Condition by Pavement Type*

Table 11 presents the 2019 and 2020 statewide pavement condition by pavement type, based on the federal performance measures. For asphalt pavement, the percentage of *Good* and *Fair* pavement remained relatively the same, and the percentage of *Poor* pavement increased in 2020 compared to 2019. For concrete pavement, the percentage of *Good* pavement decreased, and the percentage of *Fair* and *Poor* pavement increased in 2020 compared to 2019.

**TABLE 11. STATEWIDE PAVEMENT CONDITION SUMMARY BY PAVEMENT TYPE,  
BASED ON FEDERAL PERFORMANCE MEASURES**

<u>Federal Measure</u>	<u>2019 Asphalt Lane-Miles</u>	<u>2020 Asphalt Lane-Miles</u>	<u>2019 Concrete Lane-Miles</u>	<u>2020 Concrete Lane-Miles</u>
<b>Good</b>	21,367 (58.3%)	21,467 (58.2%)	6,945 (53.4%)	5,574 (42.7%)
<b>Fair</b>	15,093 (41.2%)	15,096 (41.0%)	5,750 (44.2%)	7,140 (54.7%)
<b>Poor</b>	203 (0.6%)	295 (0.8%)	314 (2.4%)	351 (2.7%)
<b>Statewide Total</b>	36,663 (100%)	36,859 (100%)	13,009 (100%)	13,065 (100%)

*Condition by Roadway Class*

Table 12 presents the 2019 and 2020 statewide pavement condition by roadway classification, based on the federal performance measures. The percentage of Good pavement decreased for Class 1 and Class 3, while it remained relatively the same for Class 2 in 2020 compared to 2019. The percentage of Fair pavement increased for Class 1 and Class 3, while it remained relatively the same for Class 2. The percentage of Poor pavement increased slightly for all three roadway classes.

**TABLE 12. STATEWIDE PAVEMENT CONDITION SUMMARY BY ROADWAY  
CLASSIFICATION, BASED ON FEDERAL PERFORMANCE MEASURES**

<u>Roadway Class</u>	<u>2019 Good Lane- Miles</u>	<u>2019 Fair Lane- Miles</u>	<u>2019 Poor Lane- Miles</u>	<u>2019 Sub- Total</u>	<u>2020 Good Lane- Miles</u>	<u>2020 Fair Lane- Miles</u>	<u>2020 Poor Lane- Miles</u>	<u>2020 Sub- Total</u>
<b>Class 1</b>	17,801 (66.2%)	8,781 (32.6%)	314 (1.2%)	26,895 (100%)	16,732 (61.6%)	10,062 (37.1%)	349 (1.3%)	27,142 (100%)
<b>Class 2</b>	7,509 (46.8%)	8,409 (52.4%)	138 (0.9%)	16,056 (100%)	7,486 (46.3%)	8,512 (52.6%)	185 (1.1%)	16,183 (100%)
<b>Class 3</b>	3,002 (44.7%)	3,654 (54.4%)	64 (1.0%)	6,720 (100%)	2,823 (42.8%)	3,664 (55.5%)	112 (1.7%)	6,599 (100%)
<b>Statewide Total</b>	28,312 (57.0%)	20,844 (42.0%)	516 (1.0%)	49,672 (100%)	27,041 (54.2%)	22,237 (44.5%)	646 (1.3%)	49,924 (100%)

Pavement condition for each district by roadway classification, based on the federal performance measures is available in Appendix B and Appendix C.

### Condition by Highway Type

Table 13 presents the 2019 and 2020 statewide pavement condition by highway type, based on the federal performance measures. The percentage of *Good* pavement decreased, and the percentage of *Fair* pavement increased for all highway types in 2020 compared to 2019. The percentage of *Poor* pavement remained relatively the same for the N.H.S. – Interstate, while it increased slightly for the other highway types in 2019.

**TABLE 13. STATEWIDE PAVEMENT CONDITION SUMMARY BY HIGHWAY TYPE, BASED ON FEDERAL PERFORMANCE MEASURES**

<b>Highway Type</b>	<b>2019 Good Lane- Miles</b>	<b>2019 Fair Lane- Miles</b>	<b>2019 Poor Lane- Miles</b>	<b>2019 Sub- Total</b>	<b>2020 Good Lane- Miles</b>	<b>2020 Fair Lane- Miles</b>	<b>2020 Poor Lane- Miles</b>	<b>2020 Sub- Total</b>
<b>N.H.S. – Interstate</b>	9,428 (66.0%)	4,676 (32.7%)	179 (1.3%)	14,283 (100%)	8,933 (62.3%)	5,221 (36.4%)	185 (1.3%)	14,339 (100%)
<b>N.H.S. – Non-Interstate</b>	13,041 (58.2%)	9,158 (40.9%)	217 (1.0%)	22,417 (100%)	12,516 (55.1%)	9,907 (43.6%)	293 (1.3%)	22,716 (100%)
<b>N.H.S. – Sub-Total</b>	22,470 (61.2%)	13,834 (37.7%)	397 (1.1%)	36,700 (100%)	21,449 (57.9%)	15,128 (40.8%)	478 (1.3%)	37,055 (100%)
<b>Non-N.H.S.</b>	5,843 (45.0%)	7,010 (54.0%)	120 (0.9%)	12,972 (100%)	5,592 (43.5%)	7,108 (55.2%)	168 (1.3%)	12,868 (100%)
<b>Statewide Total</b>	28,312 (57.0%)	20,844 (42.0%)	516 (1.0%)	49,672 (100%)	27,041 (54.2%)	22,237 (44.5%)	646 (1.3%)	49,924 (100%)

### Pavement Condition by District

Table 14 presents the 2019 and 2020 statewide pavement condition by district, based on the federal performance measures. The percentage of *Good* pavement increased for District 2, District 5, and District 10, and it decreased the other districts in 2020 compared to 2019. The percentage of *Fair* pavement decreased for District 2, District 3, District 5, and District 10, and it increased for the other districts in 2020. The percentage of *Poor* pavement decreased or remained relatively the same for District 3 and District 4, while it increased slightly for the other districts.

**TABLE 14. STATEWIDE PAVEMENT CONDITION SUMMARY BY DISTRICT, BASED ON  
FEDERAL PERFORMANCE MEASURES**

<b>District</b>	<b>2019 Good Lane- Miles</b>	<b>2019 Fair Lane- Miles</b>	<b>2019 Poor Lane- Miles</b>	<b>2019 Sub- Total</b>	<b>2020 Good Lane- Miles</b>	<b>2020 Fair Lane- Miles</b>	<b>2020 Poor Lane- Miles</b>	<b>2020 Sub- Total</b>
District 1	1,129 (48.6%)	1,185 (51.0%)	9 (0.4%)	2,323 (100%)	1,068 (46.7%)	1,191 (52.1%)	26 (1.1%)	2,285 (100%)
District 2	2,274 (57.5%)	1,656 (41.9%)	23 (0.6%)	3,953 (100%)	2,392 (61.3%)	1,479 (37.9%)	29 (0.7%)	3,900 (100%)
District 3	2,418 (54.9%)	1,940 (44.1%)	45 (1.0%)	4,403 (100%)	2,610 (59.1%)	1,761 (39.9%)	46 (1.0%)	4,416 (100%)
District 4	2,871 (47.4%)	3,069 (50.7%)	111 (1.8%)	6,051 (100%)	2,799 (46.0%)	3,189 (52.4%)	103 (1.7%)	6,090 (100%)
District 5	1,746 (55.4%)	1,381 (43.8%)	24 (0.7%)	3,150 (100%)	1,854 (58.9%)	1,257 (39.9%)	38 (1.2%)	3,149 (100%)
District 6	3,332 (66.7%)	1,617 (32.4%)	45 (0.9%)	4,995 (100%)	3,065 (60.8%)	1,901 (37.7%)	73 (1.4%)	5,038 (100%)
District 7	2,879 (47.7%)	3,048 (50.6%)	102 (1.7%)	6,029 (100%)	2,259 (37.6%)	3,606 (60.1%)	136 (2.3%)	6,002 (100%)
District 8	3,875 (58.7%)	2,615 (39.6%)	110 (1.7%)	6,600 (100%)	3,622 (53.5%)	3,023 (44.7%)	120 (1.8%)	6,766 (100%)
District 9	1,939 (76.1%)	605 (23.7%)	4 (0.1%)	2,548 (100%)	1,906 (74.4%)	650 (25.4%)	6 (0.2%)	2,563 (100%)
District 10	2,268 (64.8%)	1,205 (34.5%)	25 (0.7%)	3,498 (100%)	2,290 (65.1%)	1,193 (33.9%)	33 (0.9%)	3,516 (100%)
District 11	2,564 (61.6%)	1,588 (38.1%)	10 (0.2%)	4,162 (100%)	2,243 (53.8%)	1,901 (45.6%)	23 (0.6%)	4,168 (100%)
District 12	1,017 (51.9%)	935 (47.7%)	8 (0.4%)	1,960 (100%)	932 (45.9%)	1,085 (53.4%)	13 (0.6%)	2,031 (100%)
<b>Statewide Total</b>	<b>28,312 (57.0%)</b>	<b>20,844 (42.0%)</b>	<b>516 (1.0%)</b>	<b>49,672 (100%)</b>	<b>27,041 (54.2%)</b>	<b>22,237 (44.5%)</b>	<b>646 (1.3%)</b>	<b>49,924 (100%)</b>

## CALTRANS PAVEMENT RATING SYSTEM

---

The Caltrans pavement rating system utilizes a different methodology than the federal measures to integrate conditions with engineering solutions. The Caltrans pavement rating system designates the color *Green* for pavement with no distress or very low distress, the color *Yellow* for pavement with minor cracking or surface distress, and the color *Red* for distressed pavement that has structural distress or poor ride quality. This is referred to as the R.Y.G. (Red, Yellow, and Green) designation.

Preventive treatments would typically be applied to the *Green* pavement to maintain and prolong its good condition. *Yellow* pavement would receive corrective treatments to slow pavement deterioration. *Red* distressed pavement would need more substantial rehabilitation treatments to bring it to a state of good repair or complete reconstruction and replacement.

To determine the appropriate treatments for the distressed pavement, the *Red* pavement is further subdivided into the color *Blue* for pavement with poor ride quality, the color *Orange* for pavement with minor structural distress, and the color *Red* for pavement with major structural distress. Along with the prior *Green* and *Yellow* pavements, this is referred to as the R.O.B.Y.G. (Red, Orange, Blue, Yellow, and Green) designation. Figure 2 presents examples of the pavement condition for each category of the R.O.B.Y.G. designation.

**FIGURE 2. EXAMPLES OF PAVEMENT CONDITION BASED ON CALTRANS RATING SYSTEM**

**Green**

**Yellow**



**No Distress**

**Minor Surface Distress**

**Blue**

**Orange**

**Red**



**Poor Ride Only**

**Minor Structural Distress**

**Major Structural Distress**

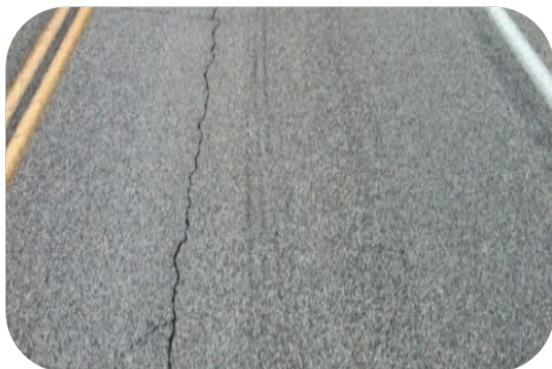
Table 15 presents the Caltrans pavement condition rating priority matrix for asphalt pavement. Figure 3 presents examples of distress for asphalt pavement.

**TABLE 15. CALTRANS CONDITION RATING PRIORITY MATRIX FOR ASPHALT PAVEMENT**

<u>Alligator B Cracking (percentage) Rating Criteria</u>	<u>Alligator A Plus Alligator B Cracking (percentage) Rating Criteria</u>	<u>I.R.I. (inches per mile) Rating Criteria</u>	<u>R.Y.G. Rating</u>	<u>R.O.B.Y.G. Rating</u>	<u>Condition Rating</u>
Less than 5%	Less than 5%	Less than or equal to 170	Green	Green	Low I.R.I., Very Low B Cracking, Very Low A Cracking
Less than 5%	Greater than or equal to 5%	Less than or equal to 170	Yellow	Yellow	A Plus B Cracking
Greater than or equal to 5%, and less than 10%	Any value	Less than or equal to 170	Yellow	Yellow	Low B Cracking
Less than 5%	Any value	Greater than 170	Red	Blue	High I.R.I. Only
Greater than or equal to 5%, and less than 10%	Any value	Greater than 170	Red	Blue	High I.R.I., Low B Cracking
Between 10% and 30%	Any value	Any value	Red	Orange	Medium B Cracking
Greater than 30%	Any value	Any value	Red	Red	High B Cracking

**FIGURE 3. EXAMPLES OF DISTRESS FOR ASPHALT PAVEMENT**

Alligator A Cracking



Alligator B Cracking



Table 16 presents the Caltrans pavement condition rating priority matrix for jointed plain concrete pavement. Figure 4 presents examples of distress for concrete pavement.

**TABLE 16. CALTRANS CONDITION RATING PRIORITY MATRIX FOR JOINTED PLAIN CONCRETE PAVEMENT**

<b><u>3<sup>rd</sup> Stage Cracking (Percentage) Rating Criteria</u></b>	<b><u>Faulting<sup>2</sup> (Percentage) Rating Criteria</u></b>	<b><u>I.R.I. (inches per mile) Rating Criteria</u></b>	<b><u>R.Y.G. Rating</u></b>	<b><u>R.O.B.Y.G. Rating</u></b>	<b><u>Condition Rating</u></b>
Less than 3%	Less than or equal to 25%	Less than or equal to 170	Green	Green	Low I.R.I., Low Cracking, Low Faulting
Between 3% and 10%	Less than or equal to 25%	Less than or equal to 170	Yellow	Yellow	Medium Cracking Only
Less than 3%	Less than or equal to 25%	Greater than 170	Red	Blue	High I.R.I. Only
Between 3% and 10%	Less than or equal to 25%	Greater than 170	Red	Blue	High I.R.I., Medium Cracking, Low Faulting
Less than 3%	Greater than 25%	Any value	Red	Orange	High Faulting, Low Cracking
Between 3% and 10%	Greater than 25%	Any value	Red	Orange	High Faulting, Medium Cracking
Greater than 10%	Any value	Any value	Red	Red	High Cracking

<sup>2</sup> Faulting percentage is the percentage of data elements in a segment with fault height greater than 0.15 inch.



**FIGURE 4. EXAMPLES OF DISTRESS FOR CONCRETE PAVEMENT**



Pavement Condition Statewide

*Overall Pavement Condition*

Table 17 presents the 2019 and 2020 statewide pavement condition based on the Caltrans rating system. The percentage of *Green* pavement decreased, the percentage of *Yellow* pavement increased, and the percentage *Red* pavement increased in 2020 compared to 2019.

**TABLE 17. STATEWIDE PAVEMENT CONDITION SUMMARY BASED ON CALTRANS RATING SYSTEM**

<b>Caltrans Rating System</b>	<b>2019 Lane-miles</b>	<b>2020 Lane-miles</b>
<b>Green</b>	35,139 (70.7%)	33,376 (66.9%)
<b>Yellow</b>	8,643 (17.4%)	9,676 (19.4%)
<b>Red</b>	5,890 (11.9%)	6,872 (13.8%)
<b>Statewide Total</b>	49,672 (100%)	49,924 (100%)

### Condition by Pavement Type

Table 18 presents the 2019 and 2020 statewide pavement condition by pavement type, based on the Caltrans rating system. For asphalt pavement, the percentage of *Green* pavement decreased, the percentage of *Yellow* pavement increased, and the percentage of *Red* pavement increased in 2020 compared to 2019. For concrete pavement, the percentage of *Green* pavement decreased, the percentage of *Yellow* pavement decreased, and the percentage of *Red* pavement increased in 2020 compared to 2019.

**TABLE 18. STATEWIDE PAVEMENT CONDITION SUMMARY BY PAVEMENT TYPE, BASED ON CALTRANS RATING SYSTEM**

<u>Caltrans Rating System</u>	<u>2019 Asphalt Lane-Miles</u>	<u>2020 Asphalt Lane-Miles</u>	<u>2019 Concrete Lane-Miles</u>	<u>2020 Concrete Lane-Miles</u>
<b>Green</b>	24,036 (65.6%)	22,829 (61.9%)	11,103 (85.3%)	10,547 (80.7%)
<b>Yellow</b>	8,082 (22.0%)	9,173 (24.9%)	561 (4.3%)	502 (3.8%)
<b>Red</b>	4,545 (12.4%)	4,856 (13.2%)	1,345 (10.3%)	2,016 (15.4%)
<b>Statewide Total</b>	36,663 (100%)	36,859 (100%)	13,009 (100%)	13,065 (100%)

### Pavement Condition by Roadway Class

Table 19 presents the 2019 and 2020 statewide pavement condition by roadway classification, based on the Caltrans rating system. The percentage of *Green* pavement decreased for all three roadway classes in 2020 compared to 2019. The percentage of *Yellow* and *Red* pavement increased for all three roadway classes.

**TABLE 19. STATEWIDE PAVEMENT CONDITION SUMMARY BY ROADWAY CLASSIFICATION, BASED ON CALTRANS RATING SYSTEM**

<b><u>Roadway Class</u></b>	<b><u>2019 Green Lane-Miles</u></b>	<b><u>2019 Yellow Lane-Miles</u></b>	<b><u>2019 Red Lane-Miles</u></b>	<b><u>2019 Sub-Total</u></b>	<b><u>2020 Green Lane-Miles</u></b>	<b><u>2020 Yellow Lane-Miles</u></b>	<b><u>2020 Red Lane-Miles</u></b>	<b><u>2020 Sub-Total</u></b>
<b>Class 1</b>	22,204 (82.6%)	2,861 (10.6%)	1,831 (6.8%)	26,895 (100%)	21,195 (78.1%)	3,481 (12.8%)	2,466 (9.1%)	27,142 (100%)
<b>Class 2</b>	9,302 (57.9%)	4,053 (25.2%)	2,701 (16.8%)	16,056 (100%)	8,863 (54.8%)	4,439 (27.4%)	2,882 (17.8%)	16,183 (100%)
<b>Class 3</b>	3,634 (54.1%)	1,729 (25.7%)	1,358 (20.2%)	6,720 (100%)	3,319 (50.3%)	1,755 (26.6%)	1,525 (23.1%)	6,599 (100%)
<b>Statewide Total</b>	35,139 (70.7%)	8,643 (17.4%)	5,890 (11.9%)	49,672 (100%)	33,376 (66.9%)	9,676 (19.4%)	6,872 (13.8%)	49,924 (100%)

Pavement condition for each district by roadway class, based on the Caltrans rating system is available in Appendix D and Appendix E.

*Pavement Condition by Highway Type*

Table 20 presents the 2019 and 2020 statewide pavement by highway type, based on the Caltrans rating system. The percentage of Green pavement decreased, while the percentages of Yellow and Red pavement increased for all highway types in 2020 compared to 2019.

**TABLE 20. STATEWIDE PAVEMENT CONDITION SUMMARY BY HIGHWAY TYPE, BASED ON CALTRANS RATING SYSTEM**

<u>Highway Type</u>	<u>2019 Green Lane-Miles</u>	<u>2019 Yellow Lane-Miles</u>	<u>2019 Red Lane-Miles</u>	<u>2019 Sub-Total</u>	<u>2020 Green Lane-Miles</u>	<u>2020 Yellow Lane-Miles</u>	<u>2020 Red Lane-Miles</u>	<u>2020 Sub-Total</u>
<b>N.H.S – Interstate</b>	11,979 (83.9%)	1,356 (9.5%)	948 (6.6%)	14,283 (100%)	11,392 (79.4%)	1,666 (11.6%)	1,281 (8.9%)	14,339 (100%)
<b>N.H.S. – Non-Interstate</b>	15,998 (71.4%)	3,893 (17.4%)	2,526 (11.3%)	22,417 (100%)	15,401 (67.8%)	4,332 (19.1%)	2,983 (13.1%)	22,716 (100%)
<b>N.H.S. Sub-Total</b>	27,977 (76.2%)	5,249 (14.3%)	3,474 (9.5%)	36,700 (100%)	26,793 (72.3%)	5,998 (16.2%)	4,264 (11.5%)	37,055 (100%)
<b>Non-N.H.S.</b>	7,162 (55.2%)	3,394 (26.2%)	2,417 (18.6%)	12,972 (100%)	6,583 (51.2%)	3,678 (28.6%)	2,607 (20.3%)	12,868 (100%)
<b>Statewide Total</b>	35,139 (70.7%)	8,643 (17.4%)	5,890 (11.9%)	49,672 (100%)	33,376 (66.9%)	9,676 (19.4%)	6,872 (13.8%)	49,924 (100%)

#### Pavement Condition by District

Table 21 presents the 2019 and 2020 statewide pavement condition by district, based on the Caltrans rating system. The percentage of *Green* pavement decreased for most districts except for District 5, District 8, and District 12 in 2020 compared to 2019. The percentage of *Yellow* pavement increased for most districts except for District 5 where it decreased, and District 1 where it remained relatively the same. The percentage of *Red* pavement increased for most districts except for District 2 and District 5 where it decreased in 2020.

**TABLE 21. STATEWIDE PAVEMENT CONDITION SUMMARY BY DISTRICT, BASED ON CALTRANS RATING SYSTEM**

<u>District</u>	<u>2019 Green Lane- Miles</u>	<u>2019 Yellow Lane- Miles</u>	<u>2019 Red Lane- Miles</u>	<u>2019 Sub- Total</u>	<u>2020 Green Lane- Miles</u>	<u>2020 Yellow Lane- Miles</u>	<u>2020 Red Lane- Miles</u>	<u>2020 Sub- Total</u>
District 1	1,546 (66.5%)	412 (17.7%)	366 (15.8%)	2,323 (100%)	1,509 (66.0%)	404 (17.7%)	372 (16.3%)	2,285 (100%)
District 2	2,383 (60.3%)	1,207 (30.5%)	363 (9.2%)	3,953 (100%)	2,188 (56.1%)	1,379 (35.4%)	333 (8.5%)	3,900 (100%)
District 3	3,064 (69.6%)	751 (17.1%)	588 (13.4%)	4,403 (100%)	3,018 (68.3%)	912 (20.7%)	486 (11.0%)	4,416 (100%)
District 4	4,260 (70.4%)	630 (10.4%)	1,161 (19.2%)	6,051 (100%)	4,158 (68.3%)	742 (12.2%)	1,190 (19.5%)	6,090 (100%)
District 5	1,904 (60.4%)	724 (23.0%)	522 (16.6%)	3,150 (100%)	1,917 (60.9%)	713 (22.6%)	519 (16.5%)	3,149 (100%)
District 6	3,543 (70.9%)	976 (19.5%)	476 (9.5%)	4,995 (100%)	3,418 (67.8%)	991 (19.7%)	629 (12.5%)	5,038 (100%)
District 7	4,669 (77.5%)	525 (8.7%)	834 (13.8%)	6,029 (100%)	4,234 (70.5%)	578 (9.6%)	1,190 (19.8%)	6,002 (100%)
District 8	4,397 (66.6%)	1,423 (21.6%)	780 (11.8%)	6,600 (100%)	4,095 (60.5%)	1,635 (24.2%)	1,036 (15.3%)	6,766 (100%)
District 9	1,935 (75.9%)	522 (20.5%)	91 (3.6%)	2,548 (100%)	1,778 (69.4%)	657 (25.6%)	128 (5.0%)	2,563 (100%)
District 10	2,432 (69.5%)	734 (21.0%)	332 (9.5%)	3,498 (100%)	2,361 (67.2%)	816 (23.2%)	339 (9.6%)	3,516 (100%)
District 11	3,381 (81.2%)	563 (13.5%)	218 (5.2%)	4,162 (100%)	3,092 (74.2%)	639 (15.3%)	437 (10.5%)	4,168 (100%)
District 12	1,626 (83.0%)	175 (8.9%)	159 (8.1%)	1,960 (100%)	1,608 (79.2%)	209 (10.3%)	213 (10.5%)	2,031 (100%)
<b>Statewide Total</b>	<b>35,139 (70.7%)</b>	<b>8,643 (17.4%)</b>	<b>5,890 (11.9%)</b>	<b>49,672 (100%)</b>	<b>33,376 (66.9%)</b>	<b>9,676 (19.4%)</b>	<b>6,872 (13.8%)</b>	<b>49,924 (100%)</b>

## PAVEMENT ROUGHNESS

### Pavement Roughness Statewide

Pavement roughness correlates surface ride quality to the level of comfort that people experience while traveling along the roadway. Both the Federal Highway Administration (F.H.W.A.) and Caltrans included I.R.I. as a pavement performance criterion. It is undesirable for I.R.I. to exceed 170 inches per mile.

Figure 5 presents the 2019 and 2020 statewide I.R.I. distribution percentage. Green represents pavement with I.R.I. less than 95 inches per mile, yellow represents pavement with I.R.I. between 95 to 170 inches per mile, and blue represents pavement with I.R.I. greater than 170 inches per mile. Overall, there was a slightly 0.5% increased of pavement with I.R.I. greater than 170 inches per mile in 2020 compared to 2019.

**FIGURE 5. STATEWIDE I.R.I. DISTRIBUTION PERCENTAGE**

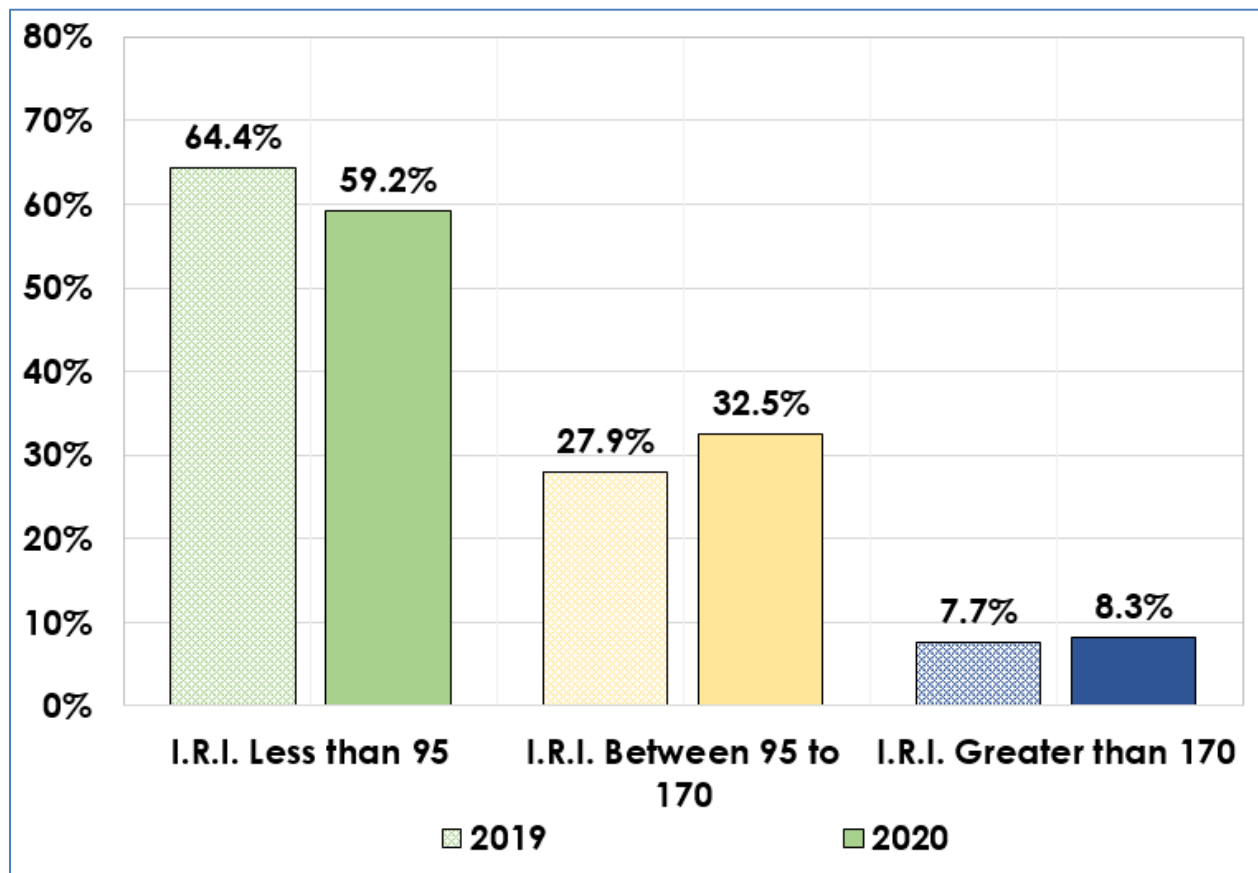
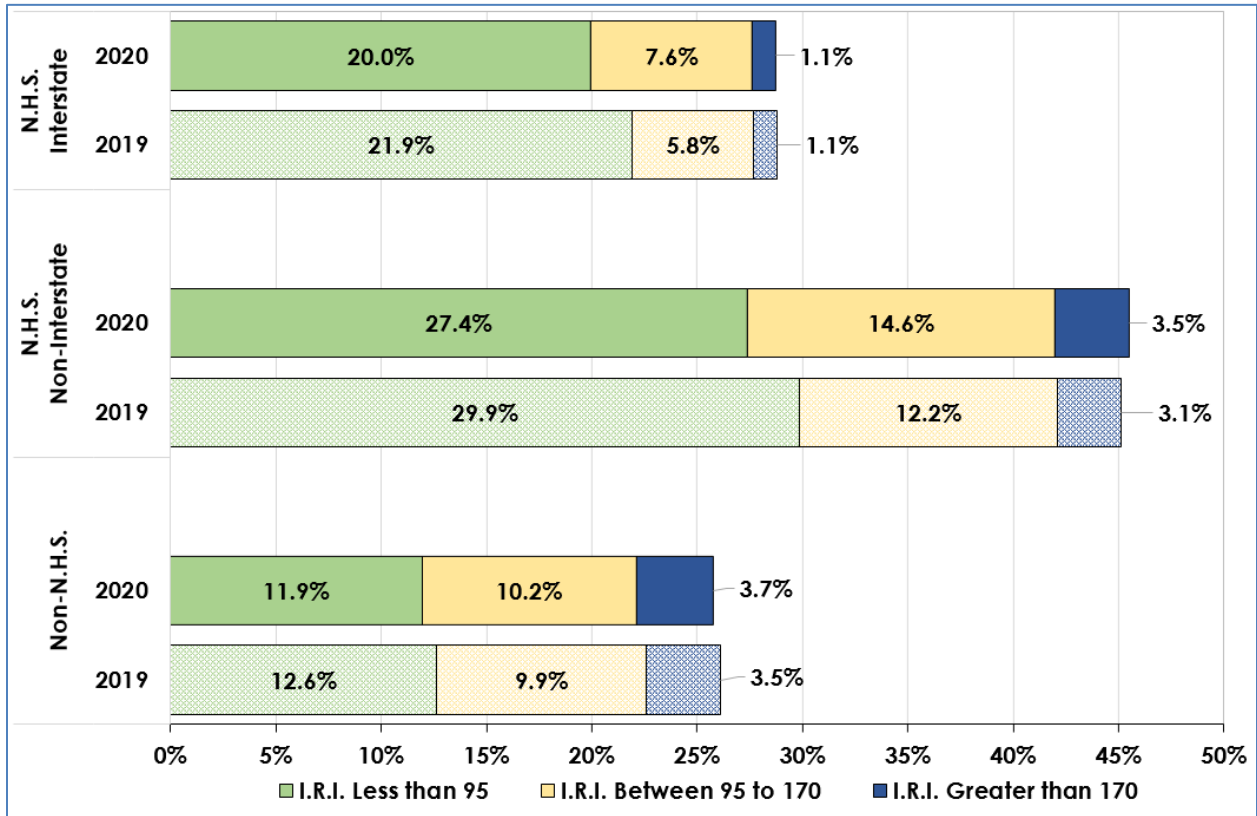


Figure 6 presents the 2019 and 2020 statewide I.R.I. distribution percentage by highway type. The percentage of pavement lane-miles with I.R.I. less than 95 inches per mile decreased for all highway types in 2020 compared to 2019. The

percentage of I.R.I. between 95 to 170 inches per mile increased for all highway types. The percentage of I.R.I. greater than 170 inches per mile remained relatively the same for N.H.S Interstate, while it increased for the other highway types.

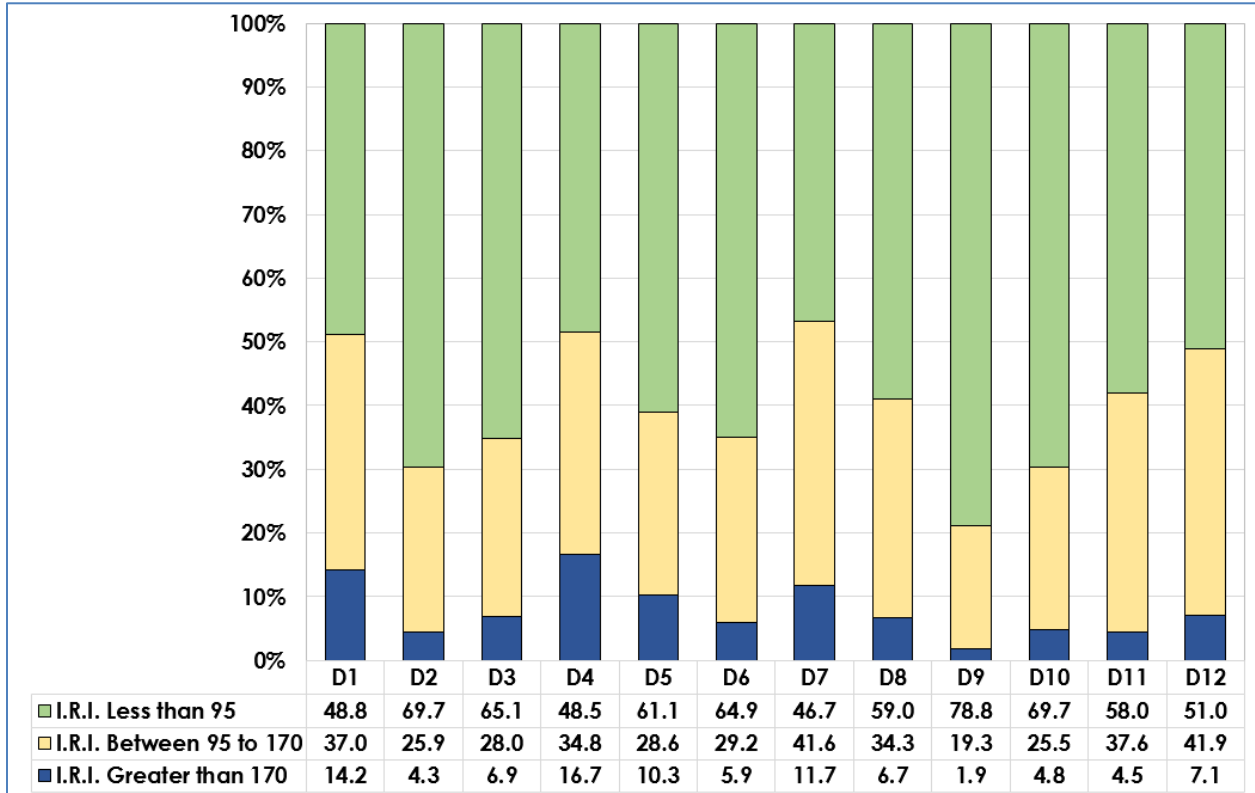
**FIGURE 6. STATEWIDE I.R.I. DISTRIBUTION PERCENTAGE BY HIGHWAY TYPE**



## Pavement Roughness by District

Figure 7 presents the 2020 statewide I.R.I. distribution percentage by district.

**FIGURE 7. 2020 STATEWIDE I.R.I. DISTRIBUTION PERCENTAGE BY DISTRICT**



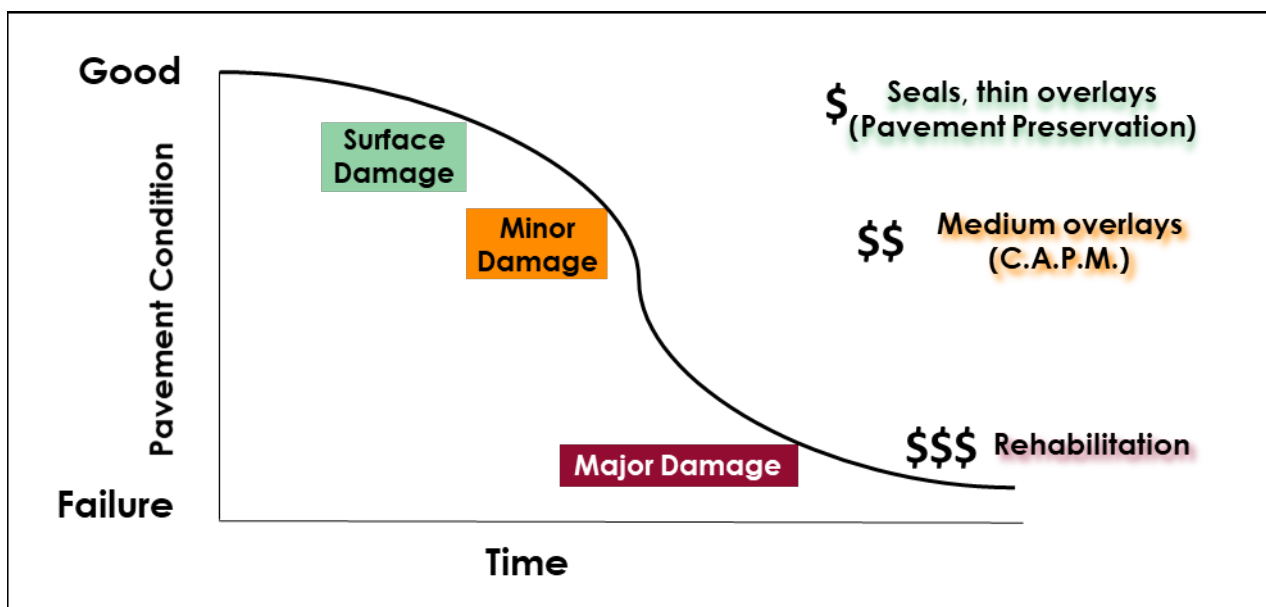
I.R.I. distribution for each district by highway type is available in Appendix F and Appendix G.



## PAVEMENT TREATMENT STRATEGIES

Pavement deterioration can be represented graphically by a sigmoid curve where the rate will be slow initially before exponentially accelerating until the pavement reaches failure. By applying timely preventive treatments, Caltrans can extend the service life of the pavement and delay the need to apply more costly treatments in the future. For example, pavement preventive maintenance costs an average of \$171,000 per lane-mile, while major pavement rehabilitation could cost more than ten times higher. Figure 8 presents a typical pavement deterioration curve and the potential management strategies for each phase of the pavement's service life.

**FIGURE 8. ILLUSTRATION OF COST EFFECTIVENESS OF PAVEMENT STRATEGIES**



Pavement naturally deteriorates over time. Locations in relatively good condition may still be candidates for preventive and corrective treatments to maintain the pavement at a state of good repair. Studies have shown that preventive and corrective maintenance treatments can extend pavement service life by four to seven years depending on traffic volumes and environmental conditions. Preventive and corrective treatments include Hot Mix Asphalt (H.M.A.) thin overlay, chip seal, slurry seal, dig-out, concrete grinding, and concrete slab replacement. These treatments would typically be completed as a part of H.M.1 projects.

Capital Preventive Maintenance (C.A.P.M.) projects are typically applied to pavement with minor structural and poor I.R.I. pavement distresses. C.A.P.M. treatments can extend the service life by approximately five to ten years.

Treatment strategies include concrete grinding, concrete slab replacement, and H.M.A. medium overlay.

Major pavement rehabilitation is a more expensive type of treatment because it typically applies to locations with extensive existing structural distress. Rather than just surface repairs, major pavement rehabilitation requires a comprehensive pavement structure design engineered for future traffic loads over a 20-year or 40-year service life. Major rehabilitation strategies include J.P.C.P. or C.R.C.P. lane replacement, full-depth reclamation, and H.M.A. thick overlays with a thickness greater than 0.25-foot.

Table 22 provides the average costs for the three primary funding programs for pavement treatment from F.Y. 2019/20 through F.Y. 2020/21. Additional details for various treatments within each program are available in Appendix H to Appendix J.

**TABLE 22. AVERAGE COST PER LANE-MILE FOR DIFFERENT FUNDING PROGRAMS FROM F.Y. 2019/20 THROUGH F.Y. 2020/21**

<b><u>Funding Program</u></b>	<b><u>Cost per Lane-Mile</u></b>	<b><u>Expected Service Life</u></b>
H.M.1 (Preventive and Corrective Maintenance)	\$171,000	Four to seven years
C.A.P.M.	\$393,000	Five to 10 years
Major Rehabilitation	\$2,172,000	20 years or more

## PAVEMENT EXPENDITURES AND FINANCIAL PLAN

Caltrans keeps track of awarded pavement projects as a part of its fiduciary responsibility. The information also allows Caltrans to extrapolate and plan for future pavement distresses based on the expected service life of the applied treatments. Table 23 summarizes the total capital costs and lane-miles for H.M.1 and S.H.O.P.P. pavement improvements from F.Y. 2019/20 through F.Y. 2020/21. As Caltrans applies asset management principles into its project planning, programming, and delivery, pavement treatments may be incorporated into projects that include work for other roadway features as well. As a result, the costs presented in Table 23 have been filtered for pavement-related contract bid items only. Project support costs were also excluded from the analysis.

**TABLE 23. AWARDED PAVEMENT IMPROVEMENTS CAPITAL COSTS AND LANE-MILES FROM F.Y. 2019/20 TO F.Y. 2020/21**

<b><u>Funding Program</u></b>	<b><u>F.Y. 2019/20 Million Dollar<sup>3</sup></u></b>	<b><u>F.Y. 2019/20 Lane- Miles</u></b>	<b><u>F.Y. 2020/21 Million Dollar<sup>3</sup></u></b>	<b><u>F.Y. 2020/21 Lane- Miles</u></b>	<b><u>Total Million Dollar<sup>3</sup></u></b>	<b><u>Total Lane- Miles</u></b>
<b>H.M.1</b>	\$204	1,200	\$291	1,689	\$495	2,889
<b>S.H.O.P.P. – C.A.P.M.</b>	\$383	1,043	\$211	468	\$594	1,511
<b>S.H.O.P.P. – Rehabilitation</b>	\$1,038	453	\$759	374	\$1,797	827
<b>S.H.O.P.P. – Minor A</b>	\$5	7	\$6	11	\$11	18
<b>S.H.O.P.P. – Sub-Total</b>	\$1,426	1,503	\$976	853	\$2,402	2,356
<b>Total H.M.1 &amp; S.H.O.P.P.</b>	\$1,630	2,703	\$1,267	2,542	\$2,897	5,245

From F.Y. 2018/19 through F.Y. 2019/20, Caltrans delivered approximately \$2.9 billion in pavement projects on nearly 5,245 lane-miles of roadway. Figure 9 presents a graph of the awarded pavement improvements capital costs and number of lane-miles for the four project types from F.Y. 2019/20 through F.Y. 2020/21.

<sup>3</sup> Costs associated to pavement-related contract bid items only and exclude project support costs. It also does not include on-call maintenance contracts or Director's Order contracts.

**FIGURE 9. AWARDED PAVEMENT IMPROVEMENTS CAPITAL COSTS AND LANE-MILES FROM F.Y. 2019/20 TO F.Y. 2020/21**

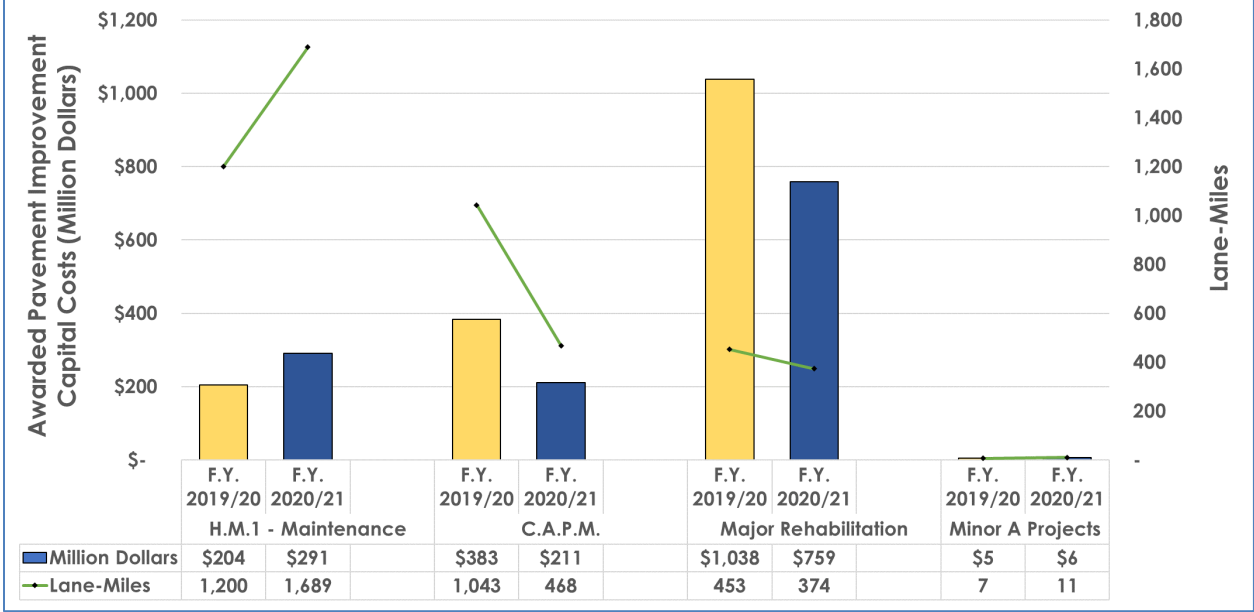
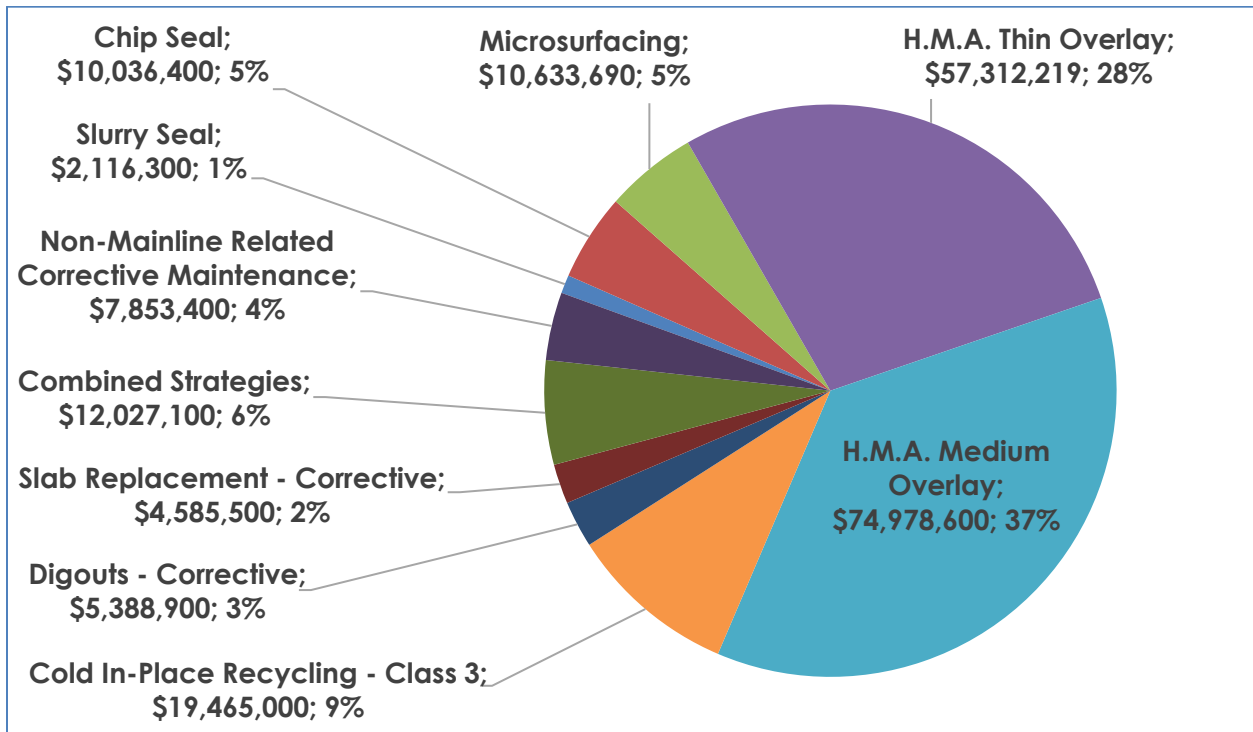


Figure 10 presents a detailed distribution of the pavement treatment strategies utilized in F.Y. 2019/20 for H.M.1 projects based on the awarded amount. H.M.A. medium overlay accounted for 37 percent of the total awarded amounts. At 28 percent, H.M.A. thin overlay was the second most awarded amount. At nine percent, cold in-place recycling – Class 3 was the third most awarded amount.

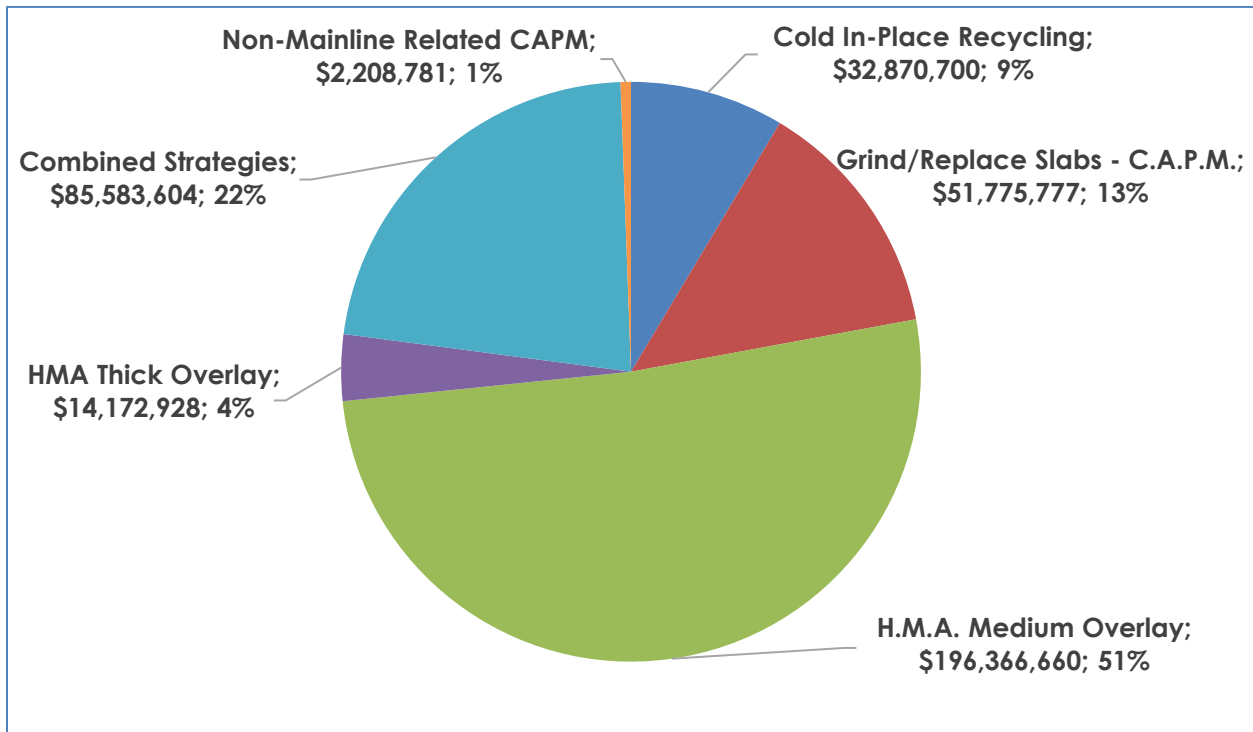
Figure 11 presents a detailed distribution of the pavement treatment strategies utilized in F.Y. 2019/20 for C.A.P.M. projects based on the awarded amount. H.M.A. medium overlay accounted for 51 percent of the total awarded amount. At 22 percent, combined strategies of multiple pavement treatments in one project was the second most awarded amount. Grind/replace slabs for concrete pavement was the third most awarded amount, accounting for 13 percent of the total amount.

Figure 12 presents a detailed distribution of the pavement treatment strategies utilized in F.Y. 2019/20 for major rehabilitation projects based on the awarded amount. At 90 percent, combined strategies of multiple pavement treatments in one project was the most awarded amount. The second most awarded amount was for C.R.C.P. lane replacement with 5 percent of the total amount. With a slightly less total amount than C.R.C.P. lane replacement, the third most award amount was for crack and seat overlay at also 5 percent of the total amount.

**FIGURE 10. F.Y. 2019/20 H.M.1 PREVENTIVE AND CORRECTIVE MAINTENANCE STRATEGIES**



**FIGURE 11. F.Y. 2019/20 C.A.P.M. STRATEGIES**



**FIGURE 12. F.Y. 2019/20 MAJOR REHABILITATION STRATEGIES**

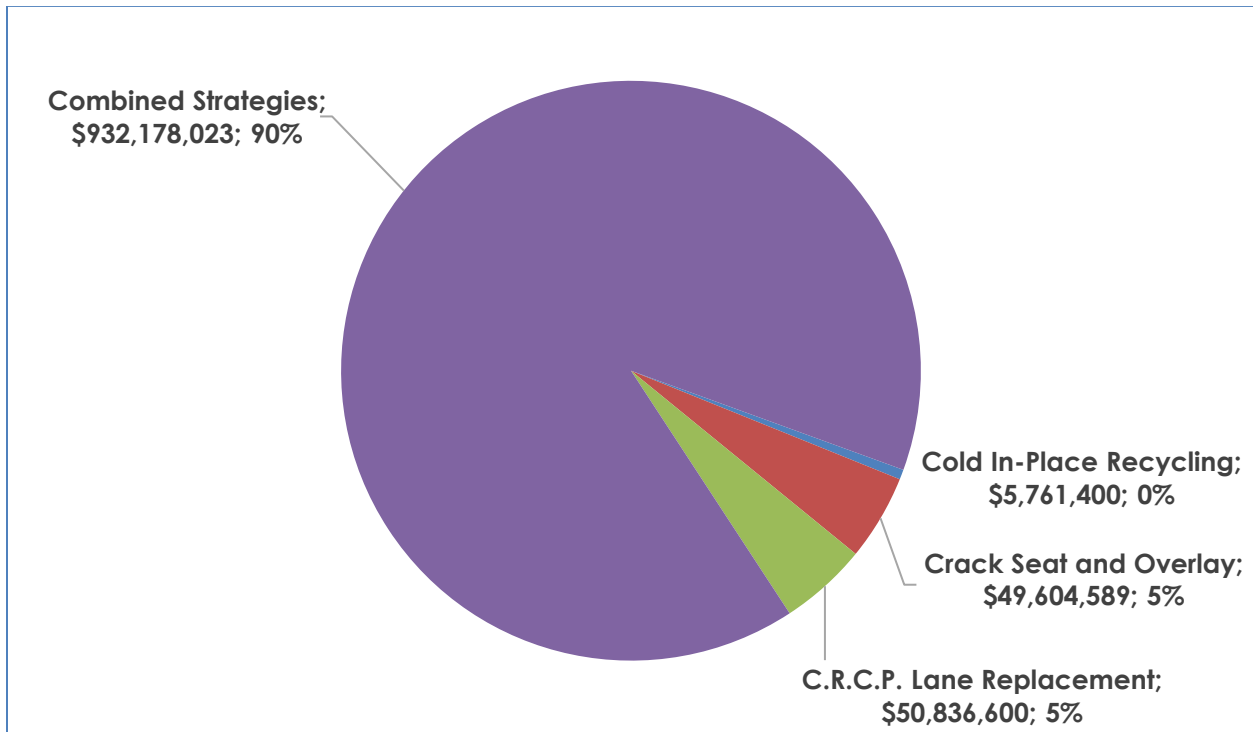
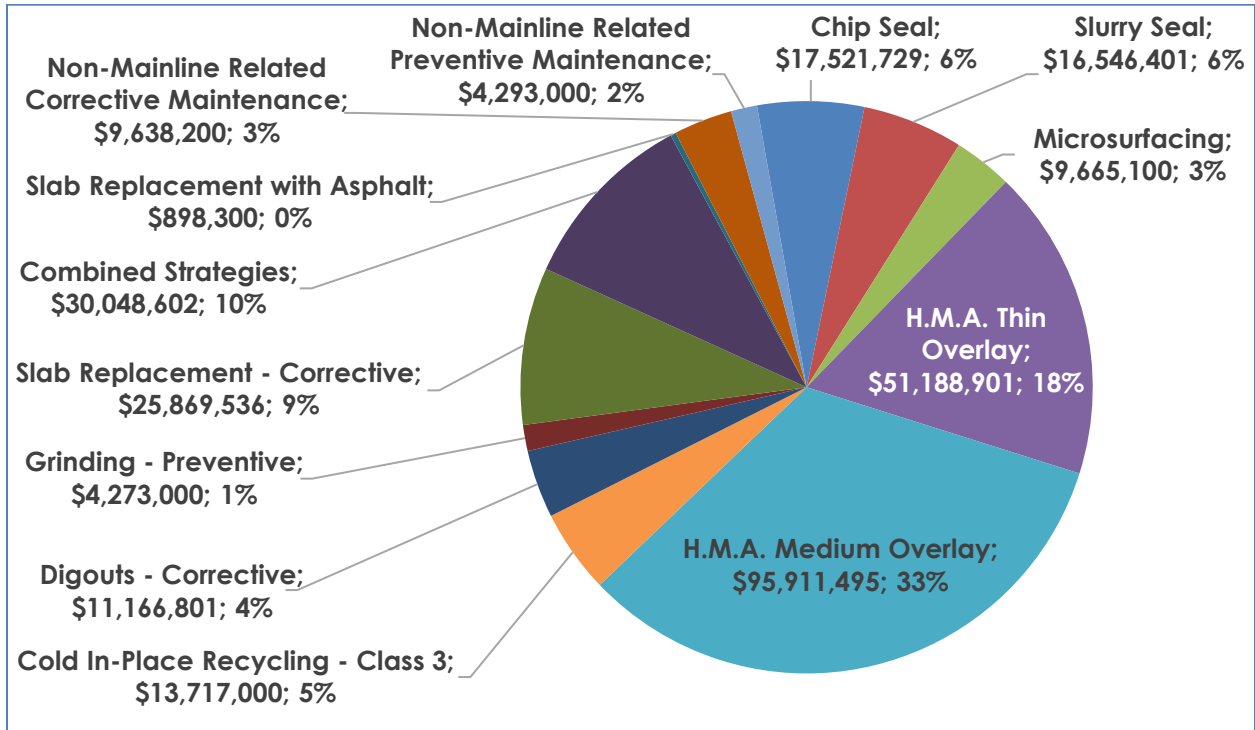


Figure 13 presents a detailed distribution of the pavement treatment strategies utilized in F.Y. 2020/21 for H.M.1 projects based on the awarded amount. H.M.A. medium overlay accounted for 33 percent of the total awarded amount. At 18 percent, H.M.A. thin overlay was the second most awarded amount. At nine percent, corrective slab replacement was the third most awarded amount.

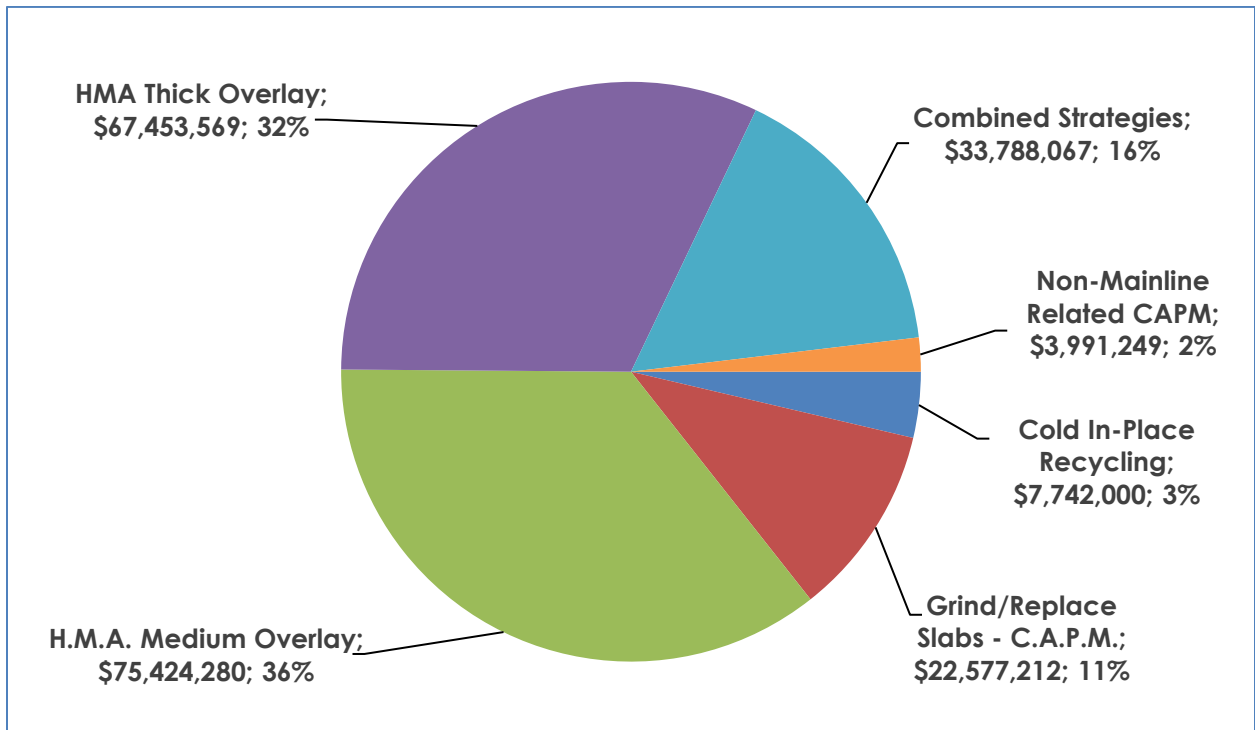
Figure 14 presents a detailed distribution of the pavement treatment strategies utilized in F.Y. 2020/21 for C.A.P.M. projects based on the awarded amount. H.M.A. medium overlay accounted for 36 percent of the total awarded amount. At 32 percent, H.M.A. thick overlay was the second most awarded amount. At 16 percent, combined strategies of multiple pavement treatments in one project were the third most awarded amount.

Figure 15 presents a detailed distribution of the pavement treatment strategies utilized in F.Y. 2020/21 for major rehabilitation projects based on the awarded amount. At 84 percent, combined strategies of multiple pavement treatments in one project was the most awarded amount. C.R.C.P. lane replacement was the second most awarded with 12 percent of the total amount. H.M.A. thick overlay was the third most awarded with two percent of the total amount.

**FIGURE 13. F.Y. 2020/21 H.M.1 PREVENTIVE AND CORRECTIVE MAINTENANCE STRATEGIES**



**FIGURE 14. F.Y. 2020/21 C.A.P.M. STRATEGIES**



**FIGURE 15. F.Y. 2020/21 MAJOR REHABILITATION STRATEGIES**

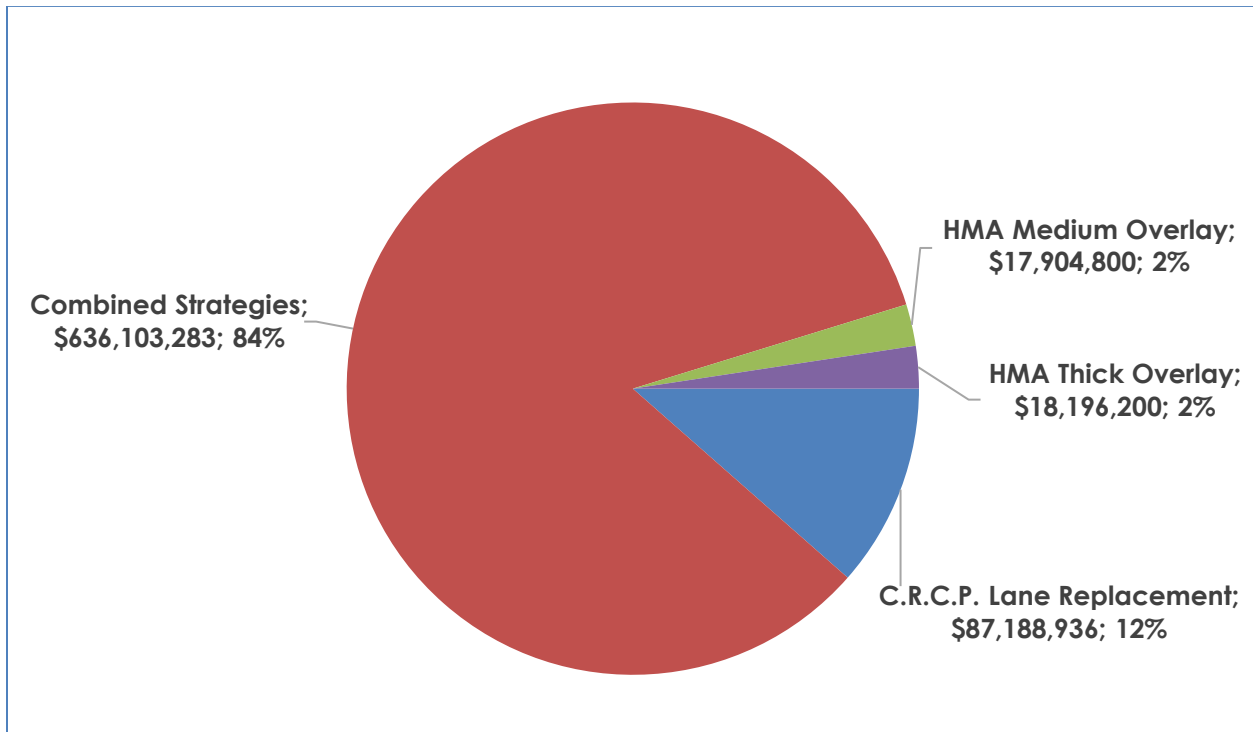
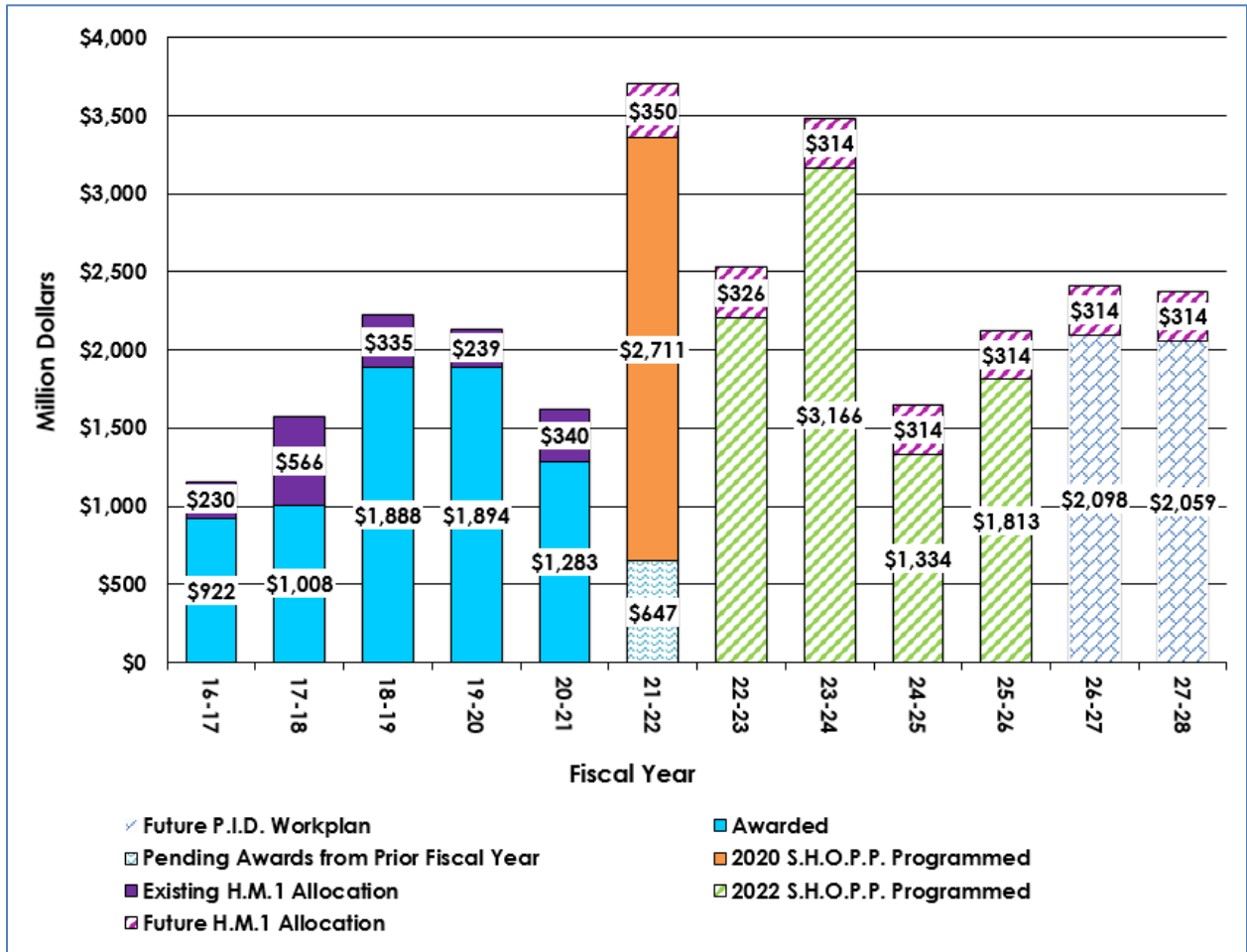


Figure 16 presents the financial plan for pavement improvements. It consists of existing expenditures as of the end of F.Y. 2020/21 and anticipated future expenditures for F.Y. 2021/22 and beyond. While the plan primarily focuses on pavement improvement projects, they may include work for other roadway features as Caltrans is committed to aligning its funding to effectively manage all of its assets. The dollar amounts represent project capital (excluding right-of-way) and support costs that would be accrued as of the Ready-to-List date for construction contract advertisement. Existing expenditures include S.H.O.P.P. projects that have been awarded and annual H.M.1 allocations. Future expenditures include programmed projects from the prior fiscal year that have not been awarded, approved projects from the 2020 S.H.O.P.P. plan to be programmed for F.Y. 2021/22, approved projects from the 2022 S.H.O.P.P. plan to be programmed for F.Y. 2022/23 through F.Y. 2025/26, future H.M.1 allocations, and future projects that have been identified in the S.H.O.P.P. Project Initiation Document (P.I.D.) Workplan for F.Y. 2026/27 through F.Y. 2027/28.



**FIGURE 16. FINANCIAL PLAN FOR PAVEMENT IMPROVEMENTS**



APPENDIX A – CALTRANS DISTRICT BOUNDARY MAP



APPENDIX B – 2020 PAVEMENT CONDITION BY DISTRICT AND ROADWAY CLASSIFICATION, BASED ON FEDERAL PAVEMENT PERFORMANCE MEASURES

**TABLE 24. 2020 PAVEMENT CONDITION BY DISTRICT AND ROADWAY CLASSIFICATION, BASED ON FEDERAL PAVEMENT PERFORMANCE MEASURES**

<b>District</b>	<b>Class 1 Good</b>	<b>Class 2 Good</b>	<b>Class 3 Good</b>	<b>Class 1 Fair</b>	<b>Class 2 Fair</b>	<b>Class 3 Fair</b>	<b>Class 1 Poor</b>	<b>Class 2 Poor</b>	<b>Class 3 Poor</b>	<b>Sub- Total</b>
District 1	680 (29.7%)	313 (13.7%)	76 (3.3%)	342 (15.0%)	410 (17.9%)	439 (19.2%)	15 (0.6%)	1 (0.0%)	10 (0.5%)	2,285 (100%)
District 2	857 (22.0%)	1,025 (26.3%)	510 (13.1%)	152 (3.9%)	760 (19.5%)	567 (14.5%)	1 (0.0%)	4 (0.1%)	24 (0.6%)	3,900 (100%)
District 3	1,228 (27.8%)	1,125 (25.5%)	258 (5.8%)	629 (14.2%)	723 (16.4%)	409 (9.3%)	8 (0.2%)	13 (0.3%)	25 (0.6%)	4,416 (100%)
District 4	2,287 (37.5%)	477 (7.8%)	36 (0.6%)	1,364 (22.4%)	1,506 (24.7%)	319 (5.2%)	50 (0.8%)	44 (0.7%)	9 (0.1%)	6,090 (100%)
District 5	983 (31.2%)	716 (22.7%)	155 (4.9%)	249 (7.9%)	559 (17.8%)	449 (14.3%)	8 (0.3%)	13 (0.4%)	16 (0.5%)	3,149 (100%)
District 6	1,455 (28.9%)	764 (15.2%)	846 (16.8%)	534 (10.6%)	867 (17.2%)	501 (9.9%)	35 (0.7%)	18 (0.4%)	20 (0.4%)	5,038 (100%)
District 7	1,782 (29.7%)	442 (7.4%)	35 (0.6%)	2,559 (42.6%)	854 (14.2%)	194 (3.2%)	113 (1.9%)	23 (0.4%)	0 (0.0%)	6,002 (100%)
District 8	2,774 (41.0%)	702 (10.4%)	147 (2.2%)	1,886 (27.9%)	981 (14.5%)	156 (2.3%)	88 (1.3%)	28 (0.4%)	4 (0.1%)	6,766 (100%)
District 9	1,260 (49.2%)	417 (16.3%)	228 (8.9%)	285 (11.1%)	175 (6.8%)	190 (7.4%)	5 (0.2%)	1 (0.0%)	0 (0.0%)	2,563 (100%)
District 10	943 (26.8%)	974 (27.7%)	372 (10.6%)	331 (9.4%)	650 (18.5%)	212 (6.0%)	12 (0.3%)	21 (0.6%)	0 (0.0%)	3,516 (100%)
District 11	1,736 (41.6%)	347 (8.3%)	161 (3.9%)	995 (23.9%)	679 (16.3%)	227 (5.4%)	8 (0.2%)	13 (0.3%)	3 (0.1%)	4,168 (100%)
District 12	748 (36.8%)	184 (9.1%)	0 (0.0%)	736 (36.2%)	348 (17.1%)	2 (0.1%)	7 (0.4%)	6 (0.3%)	0 (0.0%)	2,031 (100%)
<b>Statewide Total</b>	<b>16,732 (33.5%)</b>	<b>7,486 (15.0%)</b>	<b>2,823 (5.7%)</b>	<b>10,062 (20.2%)</b>	<b>8,512 (17.0%)</b>	<b>3,664 (7.3%)</b>	<b>349 (0.7%)</b>	<b>185 (0.4%)</b>	<b>112 (0.2%)</b>	<b>49,924 (100%)</b>

APPENDIX C – 2019 PAVEMENT CONDITION BY DISTRICT AND ROADWAY CLASSIFICATION, BASED ON FEDERAL PAVEMENT PERFORMANCE MEASURES

**TABLE 25. 2019 PAVEMENT CONDITION BY DISTRICT AND ROADWAY CLASSIFICATION, BASED ON FEDERAL PAVEMENT PERFORMANCE MEASURES**

<b>District</b>	<b>Class 1 Good</b>	<b>Class 2 Good</b>	<b>Class 3 Good</b>	<b>Class 1 Fair</b>	<b>Class 2 Fair</b>	<b>Class 3 Fair</b>	<b>Class 1 Poor</b>	<b>Class 2 Poor</b>	<b>Class 3 Poor</b>	<b>Sub- Total</b>
District 1	705 (30.3%)	316 (13.6%)	108 (4.6%)	337 (14.5%)	415 (17.9%)	434 (18.7%)	4 (0.2%)	1 (0.1%)	4 (0.2%)	2,323 (100%)
District 2	773 (19.5%)	964 (24.4%)	537 (13.6%)	207 (5.2%)	827 (20.9%)	622 (15.7%)	1 (0.0%)	8 (0.2%)	14 (0.4%)	3,953 (100%)
District 3	1,129 (25.6%)	1,054 (23.9%)	235 (5.3%)	705 (16.0%)	791 (18.0%)	444 (10.1%)	16 (0.4%)	11 (0.2%)	18 (0.4%)	4,403 (100%)
District 4	2,300 (38.0%)	531 (8.8%)	40 (0.7%)	1,319 (21.8%)	1,433 (23.7%)	317 (5.2%)	63 (1.0%)	42 (0.7%)	6 (0.1%)	6,051 (100%)
District 5	936 (29.7%)	657 (20.9%)	153 (4.9%)	266 (8.5%)	633 (20.1%)	481 (15.3%)	7 (0.2%)	8 (0.3%)	9 (0.3%)	3,150 (100%)
District 6	1,599 (32.0%)	891 (17.8%)	843 (16.9%)	429 (8.6%)	683 (13.7%)	505 (10.1%)	28 (0.6%)	5 (0.1%)	12 (0.2%)	4,995 (100%)
District 7	2,399 (39.8%)	424 (7.0%)	55 (0.9%)	2,002 (33.2%)	873 (14.5%)	173 (2.9%)	89 (1.5%)	14 (0.2%)	0 (0.0%)	6,029 (100%)
District 8	2,983 (45.2%)	718 (10.9%)	174 (2.6%)	1,549 (23.5%)	921 (14.0%)	145 (2.2%)	82 (1.2%)	27 (0.4%)	1 (0.0%)	6,600 (100%)
District 9	1,259 (49.4%)	431 (16.9%)	249 (9.8%)	288 (11.3%)	147 (5.8%)	169 (6.7%)	4 (0.1%)	0 (0.0%)	0 (0.0%)	2,548 (100%)
District 10	920 (26.3%)	943 (27.0%)	405 (11.6%)	323 (9.2%)	709 (20.3%)	173 (5.0%)	10 (0.3%)	14 (0.4%)	1 (0.0%)	3,498 (100%)
District 11	1,955 (47.0%)	407 (9.8%)	203 (4.9%)	761 (18.3%)	637 (15.3%)	190 (4.6%)	4 (0.1%)	6 (0.1%)	0 (0.0%)	4,162 (100%)
District 12	843 (43.0%)	173 (8.8%)	0 (0.0%)	594 (30.3%)	339 (17.3%)	1 (0.1%)	7 (0.4%)	1 (0.1%)	0 (0.0%)	1,960 (100%)
<b>Statewide Total</b>	<b>17,801 (35.8%)</b>	<b>7,509 (15.1%)</b>	<b>3,002 (6.0%)</b>	<b>8,781 (17.7%)</b>	<b>8,409 (16.9%)</b>	<b>3,654 (7.4%)</b>	<b>314 (0.6%)</b>	<b>138 (0.3%)</b>	<b>64 (0.1%)</b>	<b>49,672 (100%)</b>

APPENDIX D – 2020 PAVEMENT CONDITION BY DISTRICT AND ROADWAY CLASSIFICATION, BASED ON CALTRANS PAVEMENT RATING SYSTEM

**TABLE 26. 2020 PAVEMENT CONDITION BY DISTRICT AND ROADWAY CLASSIFICATION, BASED ON CALTRANS PAVEMENT RATING SYSTEM**

<b>District</b>	<b>Class 1 Green</b>	<b>Class 2 Green</b>	<b>Class 3 Green</b>	<b>Class 1 Yellow</b>	<b>Class 2 Yellow</b>	<b>Class 3 Yellow</b>	<b>Class 1 Red</b>	<b>Class 2 Red</b>	<b>Class 3 Red</b>	<b>Sub-Total</b>
District 1	814 (35.6%)	449 (19.7%)	246 (10.8%)	159 (7.0%)	163 (7.1%)	82 (3.6%)	63 (2.8%)	111 (4.9%)	198 (8.6%)	2,285 (100%)
District 2	771 (19.8%)	905 (23.2%)	513 (13.1%)	218 (5.6%)	765 (19.6%)	396 (10.1%)	21 (0.5%)	119 (3.1%)	194 (5.0%)	3,900 (100%)
District 3	1,425 (32.3%)	1,265 (28.7%)	328 (7.4%)	331 (7.5%)	411 (9.3%)	170 (3.9%)	109 (2.5%)	184 (4.2%)	193 (4.4%)	4,416 (100%)
District 4	3,090 (50.7%)	953 (15.6%)	116 (1.9%)	312 (5.1%)	378 (6.2%)	52 (0.9%)	299 (4.9%)	696 (11.4%)	195 (3.2%)	6,090 (100%)
District 5	943 (29.9%)	764 (24.3%)	210 (6.7%)	241 (7.6%)	313 (10%)	159 (5.1%)	57 (1.8%)	211 (6.7%)	251 (8.0%)	3,149 (100%)
District 6	1,631 (32.4%)	982 (19.5%)	805 (16.0%)	236 (4.7%)	393 (7.8%)	363 (7.2%)	156 (3.1%)	274 (5.4%)	198 (3.9%)	5,038 (100%)
District 7	3,427 (57.1%)	699 (11.6%)	108 (1.8%)	275 (4.6%)	254 (4.2%)	49 (0.8%)	751 (12.5%)	367 (6.1%)	72 (1.2%)	6,002 (100%)
District 8	3,304 (48.8%)	655 (9.7%)	136 (2%)	869 (12.8%)	689 (10.2%)	77 (1.1%)	574 (8.5%)	368 (5.4%)	94 (1.4%)	6,766 (100%)
District 9	1,092 (42.6%)	403 (15.7%)	283 (11.0%)	393 (15.3%)	159 (6.2%)	105 (4.1%)	65 (2.5%)	32 (1.2%)	31 (1.2%)	2,563 (100%)
District 10	1,079 (30.7%)	940 (26.7%)	342 (9.7%)	134 (3.8%)	483 (13.7%)	199 (5.7%)	72 (2.1%)	223 (6.3%)	43 (1.2%)	3,516 (100%)
District 11	2,330 (55.9%)	530 (12.7%)	231 (5.6%)	213 (5.1%)	323 (7.7%)	103 (2.5%)	195 (4.7%)	186 (4.5%)	56 (1.3%)	4,168 (100%)
District 12	1,290 (63.5%)	318 (15.7%)	0 (0.0%)	100 (4.9%)	109 (5.4%)	1 (0.0%)	101 (5.0%)	110 (5.4%)	1 (0.1%)	2,031 (100%)
<b>Statewide Total</b>	<b>21,195 (42.5%)</b>	<b>8,863 (17.8%)</b>	<b>3,319 (6.6%)</b>	<b>3,481 (7.0%)</b>	<b>4,439 (8.9%)</b>	<b>1,755 (3.5%)</b>	<b>2,466 (4.9%)</b>	<b>2,882 (5.8%)</b>	<b>1,525 (3.1%)</b>	<b>49,924 (100%)</b>

APPENDIX E – 2019 PAVEMENT CONDITION BY DISTRICT AND ROADWAY CLASSIFICATION, BASED ON CALTRANS PAVEMENT RATING SYSTEM

**TABLE 27. 2019 PAVEMENT CONDITION BY DISTRICT AND ROADWAY CLASSIFICATION, BASED ON CALTRANS PAVEMENT RATING SYSTEM**

<b>District</b>	<b>Class 1 Green</b>	<b>Class 2 Green</b>	<b>Class 3 Green</b>	<b>Class 1 Yellow</b>	<b>Class 2 Yellow</b>	<b>Class 3 Yellow</b>	<b>Class 1 Red</b>	<b>Class 2 Red</b>	<b>Class 3 Red</b>	<b>Sub- Total</b>
District 1	804 (34.6%)	448 (19.3%)	294 (12.6%)	182 (7.8%)	160 (6.9%)	70 (3.0%)	60 (2.6%)	124 (5.4%)	182 (7.8%)	2,323 (100%)
District 2	815 (20.6%)	983 (24.9%)	584 (14.8%)	145 (3.7%)	662 (16.7%)	400 (10.1%)	19 (0.5%)	155 (3.9%)	189 (4.8%)	3,953 (100%)
District 3	1,479 (33.6%)	1,261 (28.6%)	325 (7.4%)	232 (5.3%)	354 (8.0%)	165 (3.7%)	139 (3.2%)	241 (5.5%)	208 (4.7%)	4,403 (100%)
District 4	3,119 (51.5%)	999 (16.5%)	142 (2.3%)	254 (4.2%)	329 (5.4%)	47 (0.8%)	309 (5.1%)	678 (11.2%)	174 (2.9%)	6,051 (100%)
District 5	936 (29.7%)	739 (23.5%)	229 (7.3%)	203 (6.5%)	327 (10.4%)	194 (6.2%)	70 (2.2%)	233 (7.4%)	220 (7.0%)	3,150 (100%)
District 6	1,727 (34.6%)	1,028 (20.6%)	788 (15.8%)	218 (4.4%)	373 (7.5%)	385 (7.7%)	110 (2.2%)	179 (3.6%)	186 (3.7%)	4,995 (100%)
District 7	3,805 (63.1%)	726 (12.0%)	139 (2.3%)	233 (3.9%)	257 (4.3%)	35 (0.6%)	452 (7.5%)	328 (5.4%)	54 (0.9%)	6,029 (100%)
District 8	3,478 (52.7%)	748 (11.3%)	172 (2.6%)	745 (11.3%)	602 (9.1%)	77 (1.2%)	392 (5.9%)	317 (4.8%)	71 (1.1%)	6,600 (100%)
District 9	1,206 (47.3%)	417 (16.4%)	311 (12.2%)	300 (11.8%)	136 (5.4%)	85 (3.4%)	44 (1.7%)	25 (1.0%)	22 (0.9%)	2,548 (100%)
District 10	1,060 (30.3%)	977 (27.9%)	394 (11.3%)	126 (3.6%)	452 (12.9%)	156 (4.4%)	67 (1.9%)	237 (6.8%)	29 (0.8%)	3,498 (100%)
District 11	2,493 (59.9%)	633 (15.2%)	255 (6.1%)	140 (3.4%)	310 (7.4%)	114 (2.7%)	87 (2.1%)	108 (2.6%)	24 (0.6%)	4,162 (100%)
District 12	1,282 (65.4%)	344 (17.5%)	0 (0.0%)	82 (4.2%)	93 (4.7%)	1 (0.0%)	81 (4.1%)	78 (4.0%)	1 (0.0%)	1,960 (100%)
<b>Statewide Total</b>	<b>22,204 (44.7%)</b>	<b>9,302 (18.7%)</b>	<b>3,634 (7.3%)</b>	<b>2,861 (5.8%)</b>	<b>4,053 (8.2%)</b>	<b>1,729 (3.5%)</b>	<b>1,831 (3.7%)</b>	<b>2,701 (5.4%)</b>	<b>1,358 (2.7%)</b>	<b>49,672 (100%)</b>

**TABLE 28. 2020 N.H.S. INTERSTATE I.R.I.**

<u>District</u>	<u>Lane-Miles of I.R.I. Less Than 95</u>	<u>Lane-Miles of I.R.I. Between 95 to 170</u>	<u>Lane-Miles of I.R.I. Greater Than 170</u>	<u>Sub-Total</u>
District 1	0	0	0	0
District 2	693	36	1	730
District 3	955	351	33	1,339
District 4	1,605	569	89	2,263
District 5	0	0	0	0
District 6	544	106	36	686
District 7	1,340	940	224	2,504
District 8	2,404	915	104	3,423
District 9	0	0	0	0
District 10	537	89	10	636
District 11	1,518	475	25	2,018
District 12	369	334	37	741
<b>Statewide Total</b>	<b>9,966</b>	<b>3,815</b>	<b>558</b>	<b>14,339</b>

**TABLE 29. 2020 N.H.S. NON-INTERSTATE I.R.I.**

<u>District</u>	<u>Lane-Miles of I.R.I. Less Than 95</u>	<u>Lane-Miles of I.R.I. Between 95 to 170</u>	<u>Lane-Miles of I.R.I. Greater Than 170</u>	<u>Sub-Total</u>
District 1	879	368	50	1,297
District 2	1,128	309	17	1,454
District 3	1,306	342	67	1,714
District 4	1,212	1,177	512	2,901
District 5	1,406	383	70	1,859
District 6	1,686	812	118	2,616
District 7	1,393	1,374	398	3,166
District 8	841	830	225	1,896
District 9	1,397	202	12	1,611
District 10	1,164	466	112	1,742
District 11	580	554	75	1,209
District 12	664	490	97	1,251
<b>Statewide Total</b>	<b>13,657</b>	<b>7,307</b>	<b>1,753</b>	<b>22,716</b>

**TABLE 30. 2020 NON-N.H.S. I.R.I.**

<b>District</b>	<b><u>Lane-Miles of I.R.I. Less Than 95</u></b>	<b><u>Lane-Miles of I.R.I. Between 95 to 170</u></b>	<b><u>Lane-Miles of I.R.I. Greater Than 170</u></b>	<b><u>Sub-Total</u></b>
<b>District 1</b>	236	477	275	988
<b>District 2</b>	898	667	151	1,717
<b>District 3</b>	614	545	204	1,364
<b>District 4</b>	139	372	416	927
<b>District 5</b>	518	517	255	1,290
<b>District 6</b>	1,039	551	145	1,736
<b>District 7</b>	70	181	80	331
<b>District 8</b>	747	579	122	1,447
<b>District 9</b>	622	293	37	951
<b>District 10</b>	750	342	46	1,138
<b>District 11</b>	317	537	86	941
<b>District 12</b>	2	25	11	39
<b>Statewide Total</b>	5,953	5,086	1,829	12,868



APPENDIX G – 2019 I.R.I. DISTRIBUTION BY DISTRICT AND HIGHWAY TYPE

**TABLE 31. 2019 N.H.S. INTERSTATE I.R.I.**

<u>District</u>	<u>Lane-Miles of I.R.I. Less Than 95</u>	<u>Lane-Miles of I.R.I. Between 95 to 170</u>	<u>Lane-Miles of I.R.I. Greater Than 170</u>	<u>Sub-Total</u>
District 1	0	0	0	0
District 2	680	21	1	702
District 3	1,007	285	32	1,324
District 4	1,619	492	131	2,242
District 5	0	0	0	0
District 6	666	80	28	775
District 7	1,579	721	222	2,523
District 8	2,673	634	66	3,373
District 9	0	0	0	0
District 10	524	83	21	628
District 11	1,685	290	15	1,990
District 12	445	265	17	727
<b>Statewide Total</b>	<b>10,879</b>	<b>2,871</b>	<b>533</b>	<b>14,283</b>

**TABLE 32. 2019 N.H.S. NON-INTERSTATE I.R.I.**

<u>District</u>	<u>Lane-Miles of I.R.I. Less Than 95</u>	<u>Lane-Miles of I.R.I. Between 95 to 170</u>	<u>Lane-Miles of I.R.I. Greater Than 170</u>	<u>Sub-Total</u>
District 1	984	298	30	1,312
District 2	1,134	292	24	1,451
District 3	1,325	317	73	1,714
District 4	1,419	992	478	2,888
District 5	1,392	376	74	1,842
District 6	1,819	586	86	2,490
District 7	1,796	1,068	313	3,177
District 8	850	743	200	1,792
District 9	1,482	116	13	1,611
District 10	1,179	447	86	1,712
District 11	694	463	73	1,230
District 12	756	370	71	1,196
<b>Statewide Total</b>	<b>14,830</b>	<b>6,066</b>	<b>1,521</b>	<b>22,417</b>

**TABLE 33. 2019 NON-N.H.S. I.R.I.**

<b>District</b>	<b><u>Lane-Miles of I.R.I. Less Than 95</u></b>	<b><u>Lane-Miles of I.R.I. Between 95 to 170</u></b>	<b><u>Lane-Miles of I.R.I. Greater Than 170</u></b>	<b><u>Sub-Total</u></b>
<b>District 1</b>	236	506	269	1,011
<b>District 2</b>	976	680	145	1,801
<b>District 3</b>	624	506	235	1,365
<b>District 4</b>	167	410	344	920
<b>District 5</b>	486	562	260	1,308
<b>District 6</b>	1,050	525	154	1,729
<b>District 7</b>	92	171	66	329
<b>District 8</b>	758	546	131	1,435
<b>District 9</b>	664	239	34	937
<b>District 10</b>	790	307	61	1,157
<b>District 11</b>	430	462	50	942
<b>District 12</b>	5	26	7	37
<b>Statewide Total</b>	6,277	4,940	1,755	12,972

APPENDIX H – H.M.1 MAINTENANCE STRATEGY COST PER LANE-MILE AND LANE-MILES TREATED FOR F.Y. 2019/20 THROUGH F.Y. 2020/21

**TABLE 34. H.M.1 MAINTENANCE STRATEGY COST PER LANE-MILE**

<u>H.M.1 Treatment Type</u>	<u>F.Y. 2019/20 Cost<sup>4</sup> per Lane-Mile</u>	<u>F.Y. 2020/21 Cost<sup>4</sup> per Lane-Mile</u>	<u>Weighted Average of Cost<sup>4</sup> per Lane-Mile</u>
Chip Seal	\$44,598	\$49,791	\$47,765
Slurry Seal	\$63,427	\$87,037	\$83,512
Micro Surfacing	\$116,985	\$88,745	\$101,592
H.M.A. Thin Overlay	\$157,973	\$144,321	\$151,224
H.M.A. Medium Overlay	\$211,347	\$246,398	\$229,685
Cold In-Place Recycling - Class 3	\$311,320	\$275,386	\$295,387
Dig Outs - Corrective	\$578,829	\$252,643	\$309,395
Grinding - Preventive	Not Used	\$71,217	\$71,217
Slab Replacement with Asphalt	Not Used	\$1,911,277	\$1,911,277
Slab Replacement - Corrective	\$3,057,000	\$3,106,332	\$3,098,803
Combined Strategies	\$201,378	\$228,654	\$220,131

**TABLE 35. H.M.1 MAINTENANCE STRATEGY LANE-MILES TREATED**

<u>H.M.1 Treatment Type</u>	<u>F.Y. 2019/20 Lane-Miles Treated</u>	<u>F.Y. 2020/21 Lane-Miles Treated</u>	<u>Average of Lane-Miles Treated</u>
Chip Seal	225	352	288
Slurry Seal	33	190	112
Micro Surfacing	91	109	100
H.M.A. Thin Overlay	363	355	359
H.M.A. Medium Overlay	355	389	372
Cold In-Place Recycling - Class 3	63	50	56
Dig Outs - Corrective	9	44	27
Grinding - Preventive	Not Used	60	60
Slab Replacement with Asphalt	Not Used	0	0
Slab Replacement - Corrective	2	8	5
Combined Strategies	60	131	96

<sup>4</sup> Costs associated to pavement-related contract bid items only and exclude project support costs. It does not also include on-call maintenance contracts or Director's Order contracts.

APPENDIX I – S.H.O.P.P. - C.A.P.M. STRATEGY COST PER LANE-MILE AND LANE-MILES TREATED FOR F.Y. 2019/20 THROUGH F.Y. 2020/21

**TABLE 36. C.A.P.M. STRATEGY COST PER LANE-MILE**

<b><u>C.A.P.M. Treatment Type</u></b>	<b><u>F.Y. 2019/20 Cost<sup>5</sup> per Lane-Mile</u></b>	<b><u>F.Y. 2020/21 Cost<sup>5</sup> per Lane-Mile</u></b>	<b><u>Weighted Average of Cost<sup>5</sup> per Lane-Mile</u></b>
Cold In-Place Recycling	\$283,963	\$360,294	\$295,914
Grind/Replace Slabs – C.A.P.M.	\$302,38	\$224,016	\$273,346
H.M.A. Medium Overlay	\$344,569	\$391,698	\$356,471
H.M.A. Thick Overlay	\$434,779	\$678,635	\$618,411
Combined Strategies	\$557,980	\$629,037	\$576,410

**TABLE 37. C.A.P.M. STRATEGY LANE-MILES TREATED**

<b><u>C.A.P.M. Treatment Type</u></b>	<b><u>F.Y. 2019/20 Lane-Miles Treated</u></b>	<b><u>F.Y. 2020/21 Lane-Miles Treated</u></b>	<b><u>Average of Lane-Miles Treated</u></b>
Cold In-Place Recycling	116	21	69
Grind/Replace Slabs – C.A.P.M.	171	101	136
H.M.A. Medium Overlay	570	193	381
H.M.A. Thick Overlay	33	99	66
Combined Strategies	153	54	104

<sup>5</sup> Costs associated to pavement-related contract bid items only and exclude project support costs. It does not also include on-call maintenance contracts or Director's Order contracts.

APPENDIX J – S.H.O.P.P. - REHABILITATION STRATEGY COST PER LANE-MILE AND LANE-MILES TREATED FOR F.Y. 2019/20 THROUGH F.Y. 2020/21

**TABLE 38. REHABILITATION STRATEGY COST PER LANE-MILE**

<b><u>Rehabilitation Treatment Type</u></b>	<b><u>F.Y. 2019/20 Cost<sup>6</sup> per Lane-Mile</u></b>	<b><u>F.Y. 2020/21 Cost<sup>6</sup> per Lane-Mile</u></b>	<b><u>Weighted Average of Cost<sup>6</sup> per Lane-Mile</u></b>
Cold In-Place Recycling	\$515,515	Not Used	\$515,515
Crack Seal and Overlay	\$1,148,254	Not Used	\$1,148,254
C.R.C.P. Lane Replacement	\$3,070,770	\$2,462,685	\$2,747,373
H.M.A. Medium Overlay	Not Used	\$870,348	\$870,348
H.M.A. Thick Overlay	Not Used	\$1,094,903	\$1,094,903
Combined Strategies	\$2,434,336	\$2,126,224	\$2,294,456

**TABLE 39. REHABILITATION STRATEGY LANE-MILES TREATED**

<b><u>Rehabilitation Treatment Type</u></b>	<b><u>F.Y. 2019/20 Lane-Miles Treated</u></b>	<b><u>F.Y. 2020/21 Lane-Miles Treated</u></b>	<b><u>Average of Lane-Miles Treated</u></b>
Cold In-Place Recycling	11	Not Used	11
Crack Seal and Overlay	43	Not Used	43
C.R.C.P. Lane Replacement	17	19	18
H.M.A. Medium Overlay	Not Used	21	21
H.M.A. Thick Overlay	Not Used	17	17
Combined Strategies	383	318	351

<sup>6</sup> Costs associated to pavement-related contract bid items only and exclude project support costs. It does not also include on-call maintenance contracts or Director's Order contracts.