MAINTENANCE DIVISION

State of the Pavement

2022

Comments should be directed to

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EXECUTIVE SUMMARY

The Virginia Department of Transportation (VDOT) is responsible for more than 129,000 lane miles of roadway. Virginia's current highway network is the result of more than 100 years of investment in infrastructure that provides safe, easy movement of people and goods and enhances the economy of the Commonwealth. Preserving this investment is a core function of VDOT.

This report describes the pavement condition on Virginia's pavements based on data collected, processed and analyzed during the early months of 2022. It also provides trend analysis over the last five years of pavement condition ratings. The information in this report is used to understand variations in pavement condition by pavement type, highway system, and maintenance district.

This report provides background information on the methodology of data collection, quality assurance of data, derivation of condition measures, and the use of pavement condition data to assess pavement sufficiency statewide.

The report is organized into two major areas: (i) pavement condition data collection, data processing and quality assurance, and (ii) statewide pavement condition summary. Appendices provide pavement condition maps by system and district.

The data presented in this report comprise a "snapshot" of pavement conditions during the early months of 2022. The data displayed highlights the pavement condition summary. These results are broken down into further detail in the main body of this report. Throughout this report the abbreviations in Table I are used to denote the construction districts. Table II below shows the mileage by system maintained by each district based on the last published mileage tables.

Table I: Abbreviations for VDOT Districts

District Number	District Name	Abbreviation
1	Bristol	1/BR
2	Salem	2/SA
3	Lynchburg	3/LY
4	Richmond	4/RI
5	Hampton Roads	5/HR
6	Fredericksburg	6/FR
7	Culpeper	7/CU
8	Staunton	8/ST
9	Northern Virginia	9/NO

Table II: Lane Mileage by District and System

District	Interstate	Primary	Secondary	Frontage	Total
Bristol	536	2,973	12,343	106	15,958
Salem	502	2,674	14,745	106	18,027
Lynchburg	0	2,825	12,385	41	15,251
Richmond	1,327	3,423	14,445	71	19,266
Hampton Roads	906	1,796	7,191	81	9,974
Fredericksburg	299	2,195	9,555	22	12,071
Culpeper	279	1,829	8,472	56	10,636
Staunton	942	2,482	10,623	72	14,119
Nova	802	1,687	11,633	76	14,198
Statewide	**5,593**	**21,884**	**101,392**	**631**	**129,500**

PAVEMENT DATA COLLECTION, DATA PROCESSING & QUALITY CONTROL/QUALITY ASSURANCE

The pavement condition data presented in this report were collected and processed by VDOT's contractor, Fugro Inc., using continuous digital imaging and automated crack detection technology. For data collection purposes, Fugro uses vehicles equipped with special cameras to capture downward pavement images for crack detection as well as forward images for the collection of right of way images for assets and shoulder condition data. Roughness and rutting data are simultaneously captured with sensors mounted on the van. Downward images collected during the survey are processed with specialized automated crack detection software for the identification of cracks. Further analysis of the digital images is necessary for the identification of other distresses, such as patching, bleeding or delamination.

This year data was collected by the above-mentioned method on the entire Interstate, Primary, and secondary system with an Annual Average Daily Traffic (AADT) of least 3500. The data was also collected on approximately 20% of Secondary system with AADT less than 3500. The distresses are interpreted according to the methodology detailed in the VDOT Distress Identification Manual[(1)], processed, and summarized in a pre-defined format. Quality Control (QC) is conducted by the data collection contractor, and Quality Assurance (QA)/Independent Validation and Verification (IV&V) is performed by a third party consultant - Quality Engineering Solutions (QES). This consultant independently rates and verifies approximately 5% of all the data collected by the data collection contractor. The ratings on pavement sections are also compared with the previous year's ratings on the same sections and any major differences in ratings are further investigated. The data are processed, verified and delivered in batches. VDOT then accepts the data based on predefined acceptance criteria mentioned in the quality review document.

Individual distress data are aggregated into two Pavement Condition Indices, the Load-related Distress Rating (LDR) and Non-load-related Distress Rating (NDR). The LDR incorporates

pavement distresses that are related to vehicle load related damages (e.g. fatigue cracking, patching, rutting, etc.) to pavement. The NDR is comprised of distresses (e.g. transverse and longitudinal cracking, longitudinal joint separation, bleeding, etc.) considered to be primarily non-load related, i.e., caused by weathering of pavement surface or material and/or construction deficiency. Both indices are on a scale of 0 to 100 with 100 representing a pavement with no visible distresses while 0 represents a pavement with significant distresses. The details of the index calculation methodology for asphalt surfaced pavements are provided in a VDOT report[(2)] published in 2002.

A third index – the Critical Condition Index (CCI) is calculated as the lower of the LDR and NDR. These indices were first derived in 1998 based on the PAVER methodology developed by the US Army Corps of Engineers, and have undergone extensive validation process using the Long Term Pavement Performance (LTPP) data collected through the Strategic Highway Research Program (SHRP) of FHWA and through a process of consensus building using numerous VDOT pavement experts. It should be noted that LDR and NDR are used only for asphalt-surfaced pavements. For jointed concrete pavements the Slab Distress Rating (SDR) is used while Concrete Punchout Rating (CPR) and Concrete Distress Rating (CDR) are used for continuously reinforced concrete pavements. However, the same concept of CCI applies to the latter two pavement types. More details about concrete pavement condition indices are documented in another published VDOT report[(3)].

As shown below in Table III, CCI values are grouped into five ranges corresponding to condition categories: excellent, good, fair, poor and very poor. In general, pavement sections with a CCI value below 60 (poor and very poor) are considered 'deficient' and should be further evaluated for maintenance and rehabilitation actions. Pavement sections with a CCI value of at least 60 (fair or better) are considered 'sufficient'.

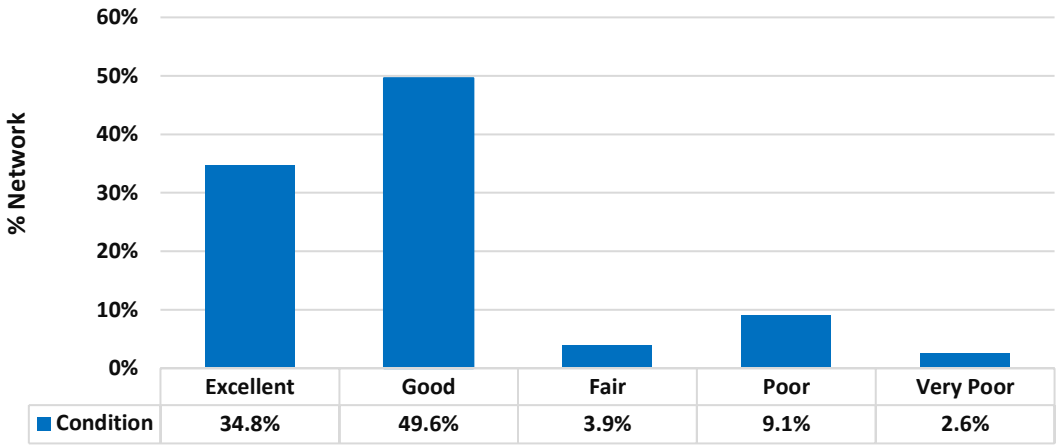
Table III: Pavement Condition Category Based on CCI

Pavement Condition	Index Scale (CCI)
Excellent	90 and above
Good	70-89
Fair	60-69
Poor	50-59
Very Poor	49 and below

STATEWIDE PAVEMENT CONDITION SUMMARY

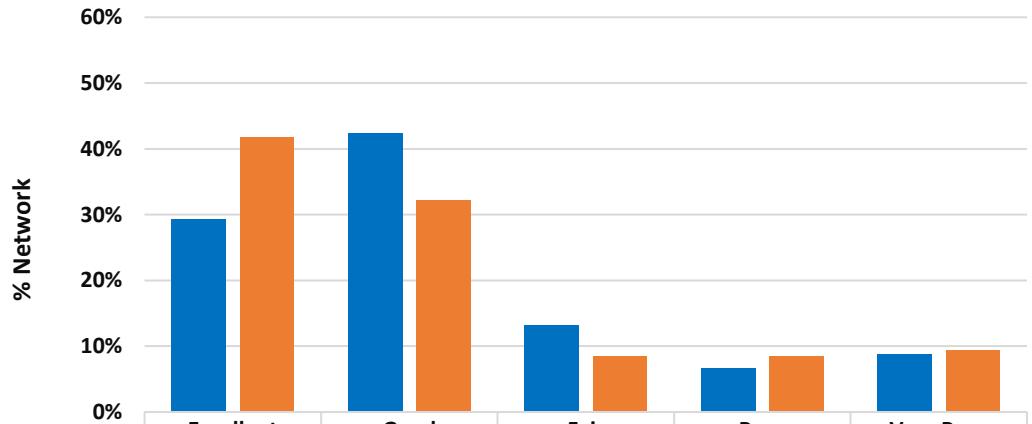
For the Interstate, Primary, and Secondary systems, the statewide pavement condition summary is presented in the Figures I, II and III. Table III above provided definitions of the pavement condition categories shown in the figures. High AADT pavement sections are those with AADT of at least 3500 while low AADT sections have less than 3500 AADT.

Figure I: Pavement Condition - Interstate



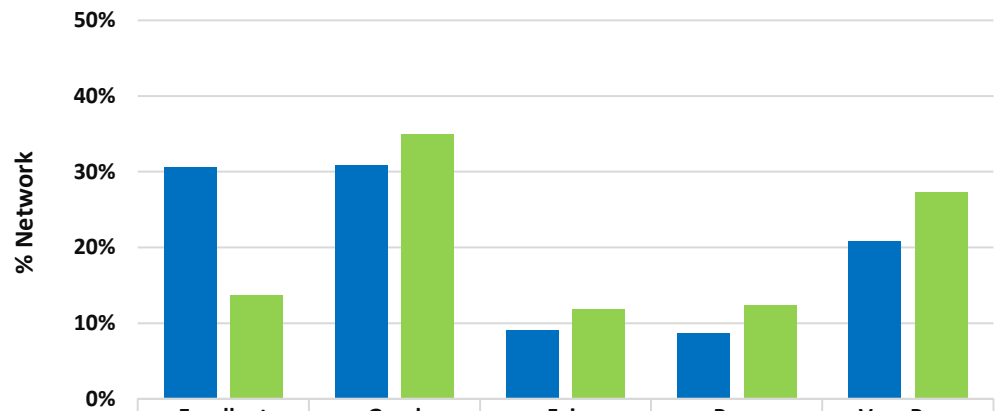
	Excellent	Good	Fair	Poor	Very Poor
Condition	34.8%	49.6%	3.9%	9.1%	2.6%

Figure II: Pavement Condition - Primary



	Excellent	Good	Fair	Poor	Very Poor
high AADT	29.3%	42.3%	13.1%	6.6%	8.7%
low AADT	41.7%	32.1%	8.4%	8.5%	9.3%

Figure III: Pavement Condition - Secondary



	Excellent	Good	Fair	Poor	Very Poor
high AADT	30.6%	30.9%	9.0%	8.7%	20.8%
low AADT	13.7%	34.9%	11.8%	12.3%	27.3%

Interstate Pavement Condition by District

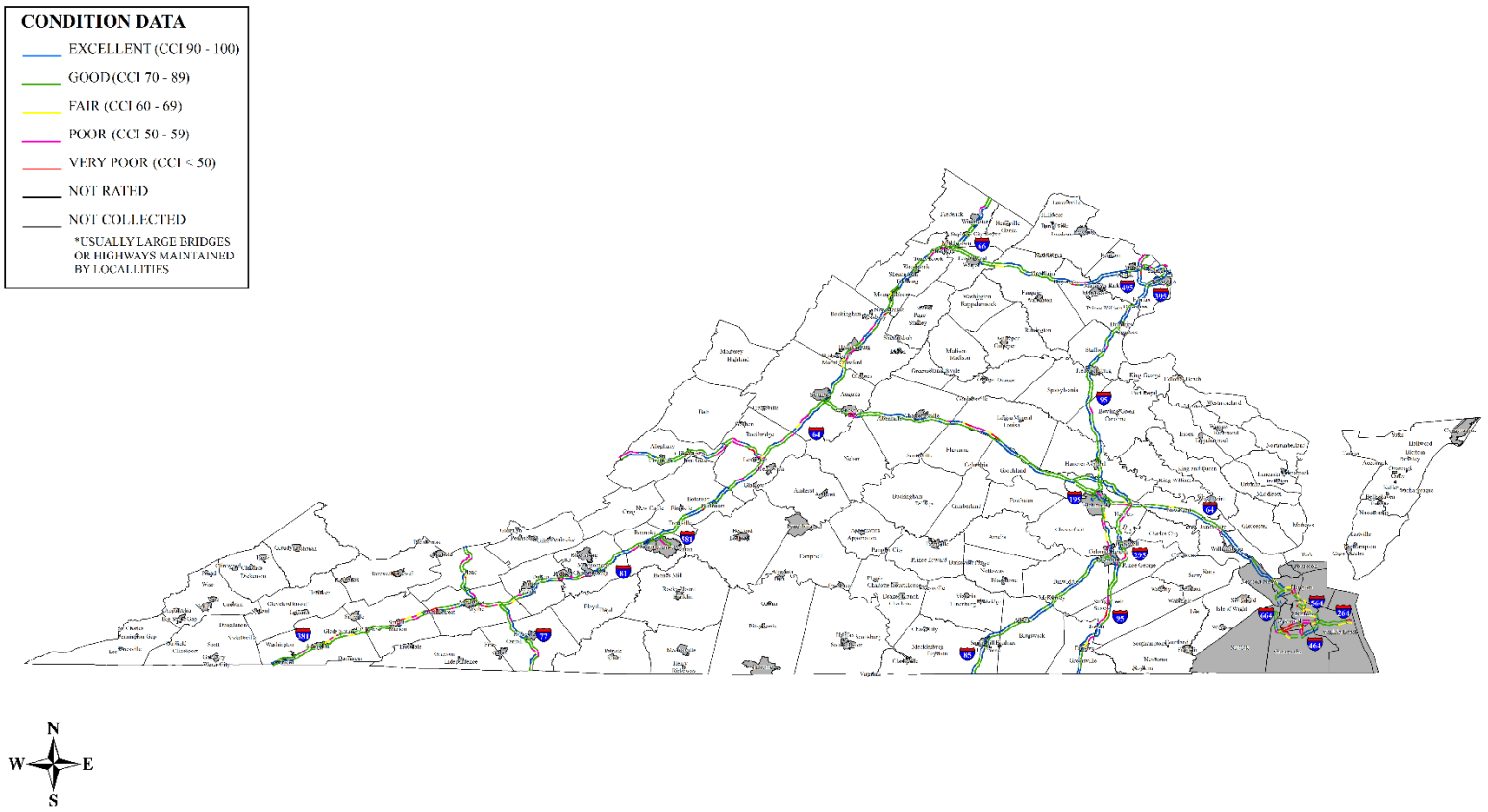
The following graphic shows the pavement ratings for the Interstate pavement system on a map. Following this graphic, the detailed ratings for the system are reported.

The statewide performance target for percentage of Interstate pavements rated sufficient, i.e., in fair condition or better, is 82% or more. Figure IV shows the percent sufficient on the Interstate system by district based on pavement condition. More than 88% of the Interstate network has been rated to be in 'sufficient' condition. These are illustrated in Figure IV with each district's pavement condition along with statewide statistics. Figure V presents the total number of sufficient lane miles in each district on the Interstate system.

The number of lane miles maintained by each district varies considerably, therefore, one district may have a larger percentage of lane miles in sufficient condition but fewer lane miles sufficient than another. The percent of lane miles rated sufficient varies from as high as 96% in Fredericksburg District to as low as 82% in Bristol District. Richmond District maintains the largest number of Interstate lane miles while Lynchburg District does not maintain any Interstate pavements.

VDOT Interstate Road Conditions 2022

VIRGINIA DEPARTMENT OF TRANSPORTATION
PAVEMENT CONDITIONS 2022
INTERSTATE ROUTES



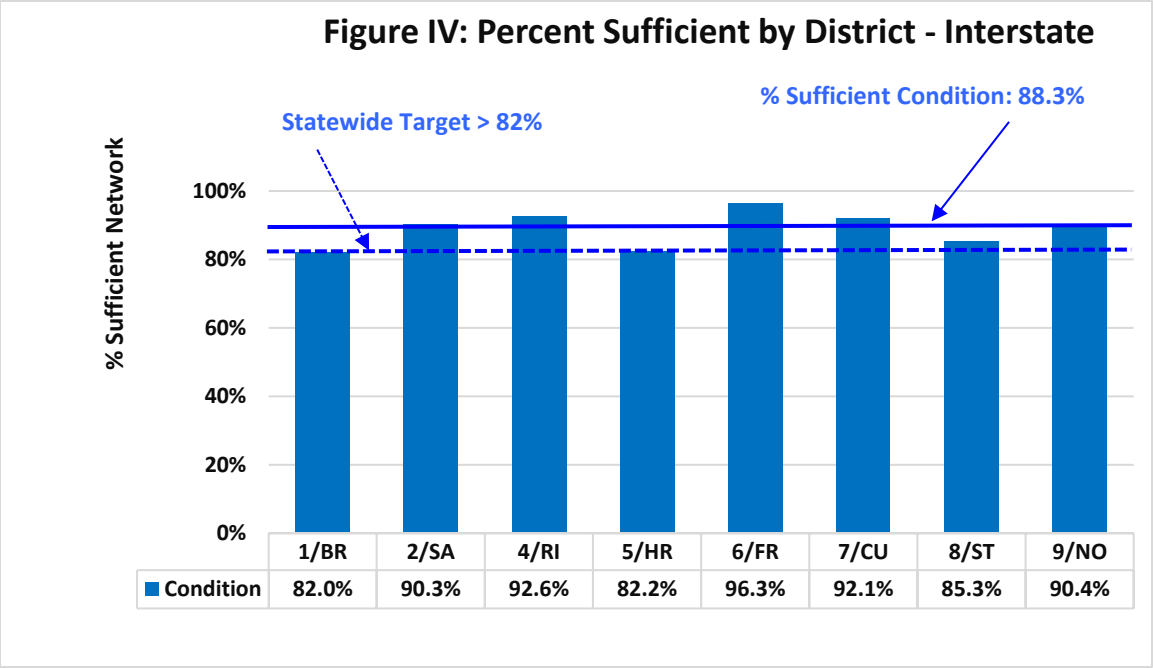


Figure IV: Percent Sufficient by District - Interstate
% Sufficient Condition: 88.3%
Statewide Target > 82%
% Sufficient Network
100%
80%
60%
40%
20%
0%
1/BR 2/SA 4/RI 5/HR 6/FR 7/CU 8/ST 9/NO
Condition 82.0% 90.3% 92.6% 82.2% 96.3% 92.1% 85.3% 90.4%

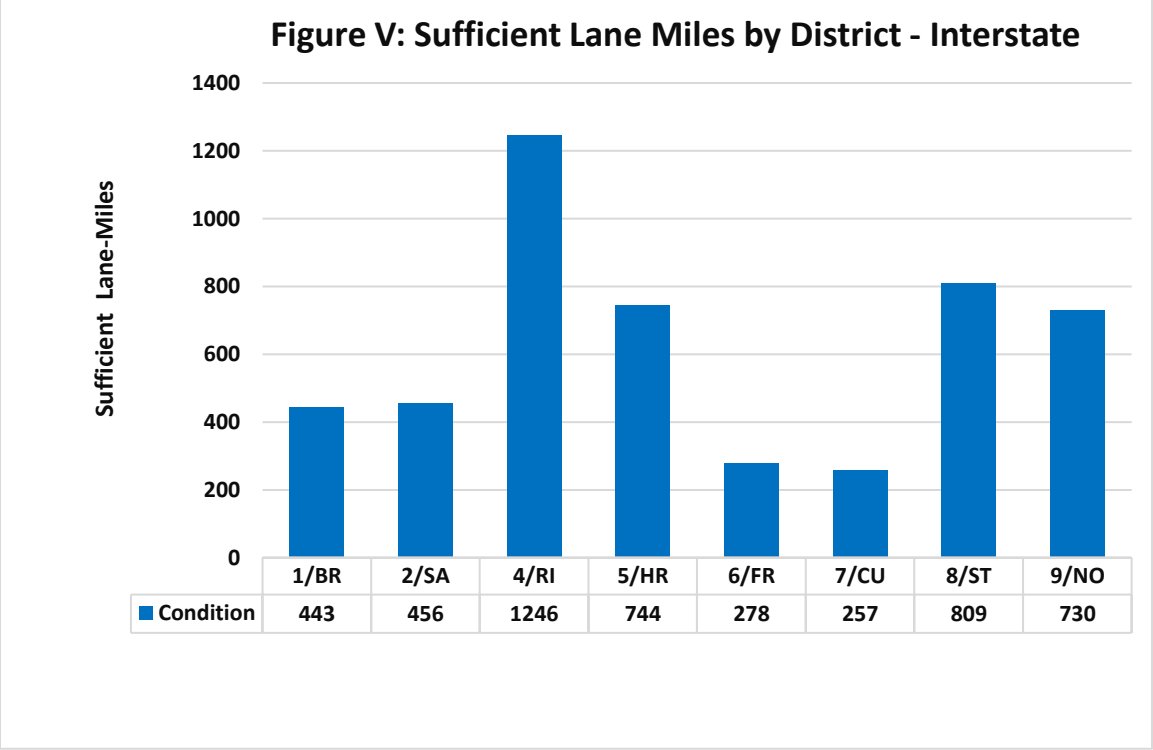


Figure V: Sufficient Lane Miles by District - Interstate
Sufficient Lane-Miles
1400
1200
1000
800
600
400
200
0
1/BR 2/SA 4/RI 5/HR 6/FR 7/CU 8/ST 9/NO
Condition 443 456 1246 744 278 257 809 730

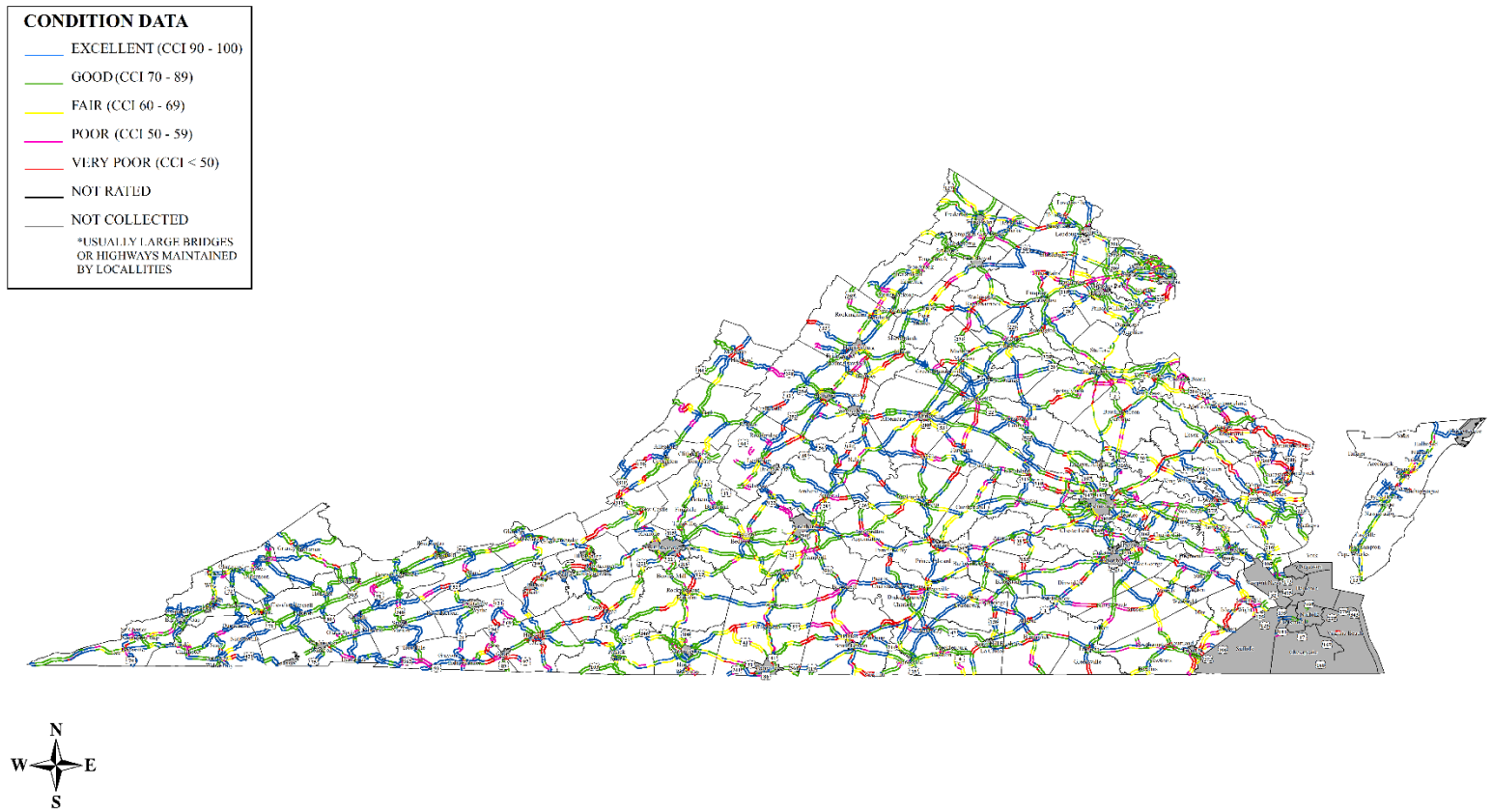
Primary Pavement Condition by District

The graphic on the following page shows the pavement ratings for the Primary pavement system on a map.

Figures VI and VII show pavement condition summaries for the Primary pavement network. Figure VI shows the percent of sufficient network by district based on pavement condition along with statewide figures. Figure VII shows the number of sufficient lane-miles in each district. Current VDOT performance targets for Primary network are for 82 percent or more for pavements with high AADT (at least 3500) to be in sufficient condition, and 75 percent or more with low AADT (less than 3500) to be in sufficient condition.

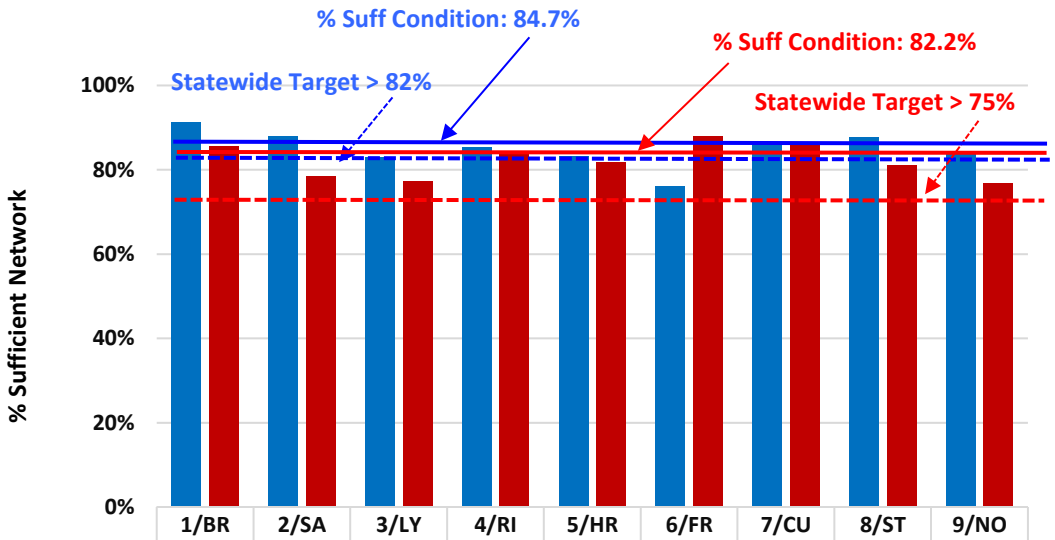
VDOT Primary Road Conditions 2022

VIRGINIA DEPARTMENT OF TRANSPORTATION
PAVEMENT CONDITIONS 2022
PRIMARY ROUTES



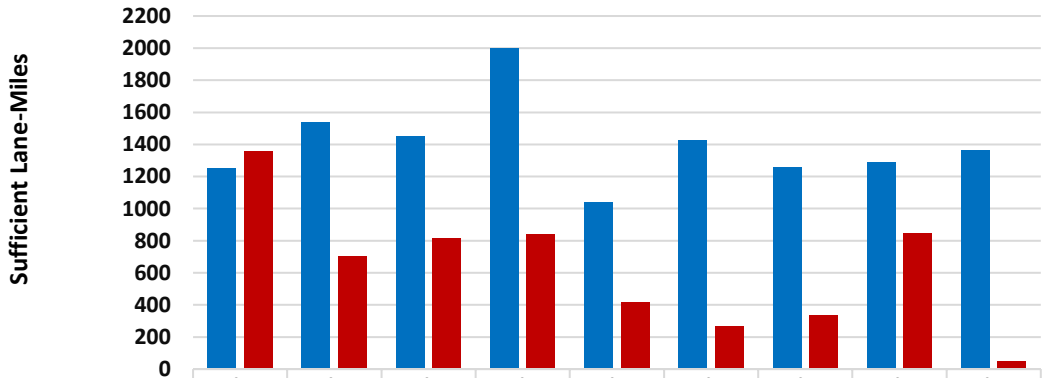
Maintenance

Figure VI: Percent Sufficient by District - Primary



	1/BR	2/SA	3/LY	4/RI	5/HR	6/FR	7/CU	8/ST	9/NO
high AADT	91.3%	87.9%	82.8%	85.2%	83.2%	76.0%	86.4%	87.6%	84.0%
low AADT	85.5%	78.5%	77.2%	84.3%	81.9%	87.8%	85.8%	81.1%	76.7%

Figure VII: Sufficient Lane Miles by District - Primary



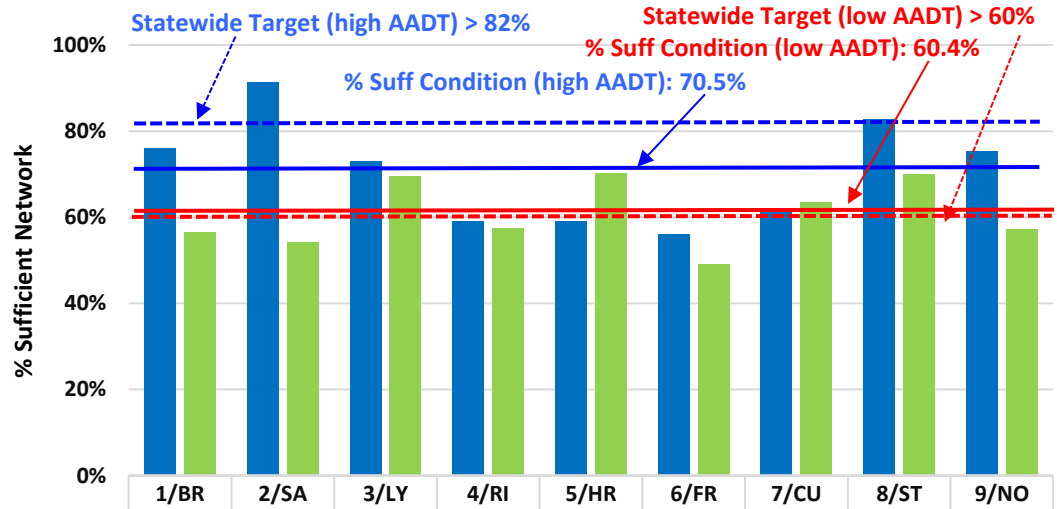
	1/BR	2/SA	3/LY	4/RI	5/HR	6/FR	7/CU	8/ST	9/NO
high AADT	1251	1539	1449	1998	1039	1428	1256	1289	1362
low AADT	1354	704	818	842	412	265	335	844	45

Secondary Pavement Condition by District

For secondary network with at least 3500 AADT, the data was collected on the entire network and the summaries are presented for the network with current year's data. On secondary system with AADT less than 3500, the data was collected on approximately 20% of the network. Therefore, the remaining data from the previous years was selected to extract the latest condition of the entire secondary network with AADT less than 3500, and summaries are provided.

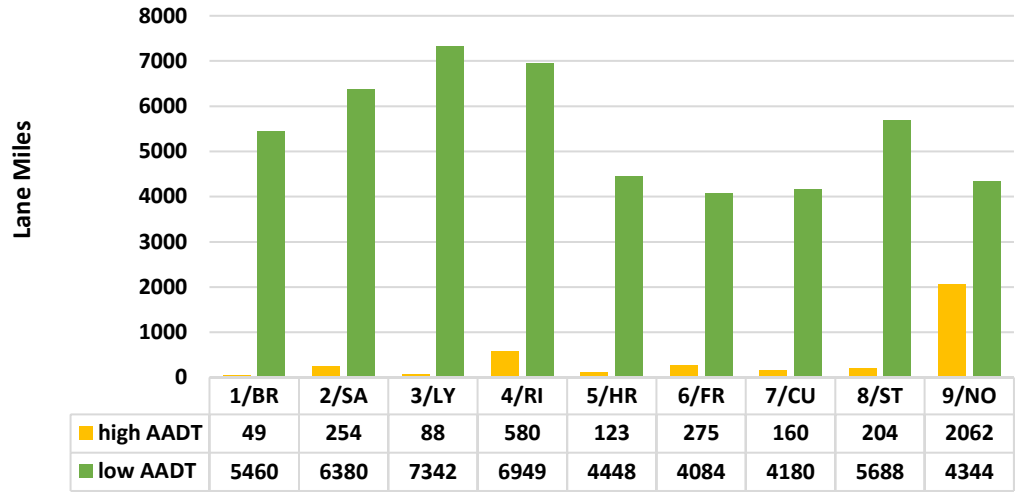
Figure VIII shows the percent sufficient network by district based on pavement condition. Figure IX represents the number of sufficient lane miles in terms of condition. Statewide, 70.5% and 60.4% of the Secondary system with high AADT (at least 3500) and low AADT (less than 3500) respectively were found to have pavement condition rated sufficient.

Figure VIII: Percent Sufficient by District - Secondary



	1/BR	2/SA	3/LY	4/RI	5/HR	6/FR	7/CU	8/ST	9/NO
high AADT	76.1%	91.5%	73.1%	59.1%	59.0%	56.0%	61.1%	82.8%	75.5%
low AADT	56.5%	54.4%	69.7%	57.5%	70.2%	49.1%	63.4%	70.1%	57.2%

Figure IX: Sufficient Lane Miles by District - Secondary

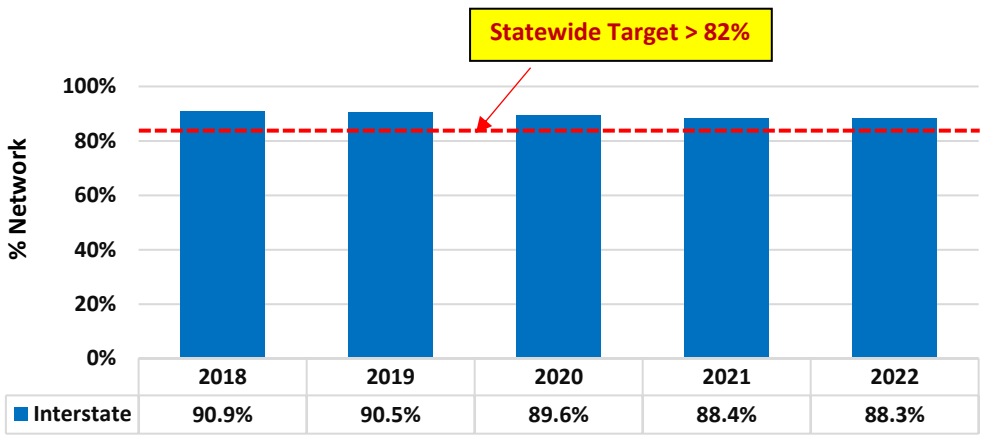


	1/BR	2/SA	3/LY	4/RI	5/HR	6/FR	7/CU	8/ST	9/NO
high AADT	49	254	88	580	123	275	160	204	2062
low AADT	5460	6380	7342	6949	4448	4084	4180	5688	4344

Statewide Pavement Sufficiency Trends

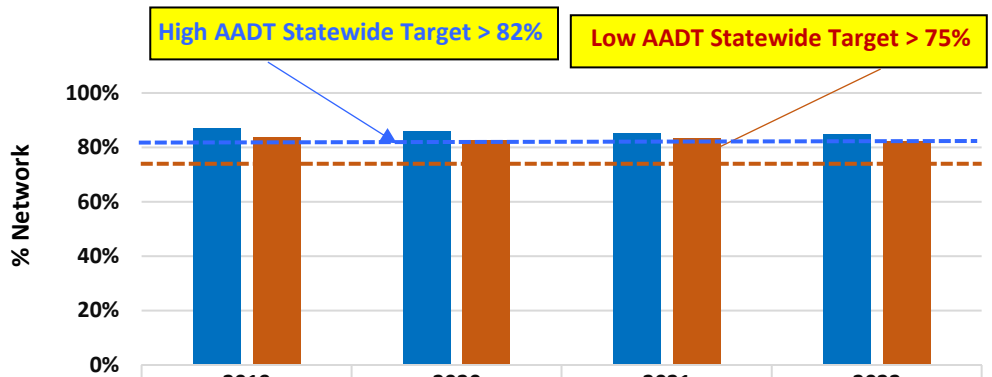
The trends over recent years by system in percent sufficient network is shown in Figures X – XII. The higher the percentage of sufficient pavements, the better is the pavement network condition in general. The upward or downward trends seen over the years are as expected according to the planned management of the pavement network as outlined in the Maintenance and Operations Comprehensive Review report [(4)].

Figure X: Trend in Percent Sufficient - Interstate



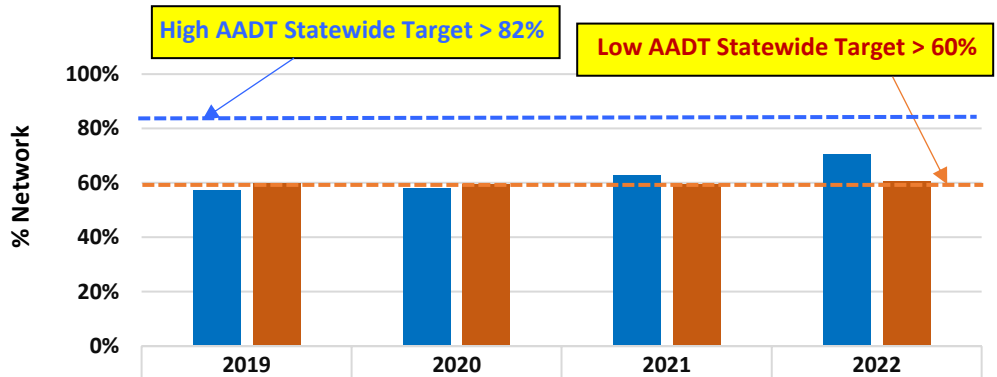
	2018	2019	2020	2021	2022
Interstate	90.9%	90.5%	89.6%	88.4%	88.3%

Figure XI: Trend in Percent Sufficient - Primary



	2019	2020	2021	2022
high AADT	86.8%	85.8%	85.1%	84.7%
low AADT	83.6%	82.7%	83.3%	82.2%

Figure XII: Trend in Percent Sufficient - Secondary



	2019	2020	2021	2022
high AADT	57.1%	58.0%	62.8%	70.5%
low AADT	59.8%	59.4%	59.6%	60.4%

CURRENT AND FUTURE USES OF THE DATA

Pavement condition data presented in this report are used for multiple purposes – both internal and external to VDOT, including:

1. Needs-Based Budgeting. Pavement condition data are used to estimate the cost to achieve and sustain pavement performance targets, and to recommend allocation of available maintenance funds across districts. The pavement condition data are an important input into the Pavement Management System (PMS) to develop estimates of pavement maintenance and

rehabilitation needs based on optimization analysis. These needs are subsequently used for the development of sustainable pavement investment, and the work plan generated by the optimization serves as a guide to district personnel for the selection of pavement maintenance strategy for the yearly pavement maintenance schedules. Once a particular section of pavement is selected for maintenance, a detailed project level analysis is conducted to determine the specific treatment.

The data are also used to feed the maintenance decision trees to determine the unconstrained maintenance needs for the pavement assets. Unconstrained needs analysis establishes the maintenance and rehabilitation needs to appropriately correct the existing pavement conditions where available funding for work would not be considered a constraint. It provides an idea of the amount and type of work needed on the whole network. For this needs determination, each section's distress quantities and severities, and CCI are input from the condition survey data into the unconstrained decision trees. Traffic level, structural condition, and maintenance history are also used as additional inputs to the selection of maintenance treatments wherever the data are available. In many cases the unconstrained needs are used as the first indicator of the scope of necessary maintenance which is further refined by field inspections, detailed project level analysis, and overall needs of the network.

2. Planning for Preventive Maintenance and Resurfacing. The surface distress condition data are used to identify and prioritize recommended candidate pavement sections for preventative maintenance activities. These recommendations are based on decision trees developed for the needs analysis, as described above.

The pavement data are used for selection of pavement sections and maintenance strategies for yearly pavement maintenance schedules. Automated data that provide high consistency and efficiency are used to aid in prioritizing Maintenance Resurfacing by the districts. Typically, the districts have used the data in combination with their local knowledge of pavement conditions to select pavement projects.

Information about specific distresses can be used to determine appropriate maintenance and rehabilitation actions for consideration. For example, a pavement with serious load related distress would typically require a resurface or "mill and fill" treatment, whereas a preventive maintenance treatment would be more appropriate for a pavement with primarily non-load related distresses.

3. Pavement Performance Reporting. The pavement condition data has provided input to the preparation of Maintenance and Operations Comprehensive Review report (4). The Comprehensive Review Report is updated and reported to the Commonwealth Transportation Board on an annual basis, reported in the Commissioner of Highways Biennial Report (Section 33.2-232) and the annual budgeting of VDOT's Maintenance and Operations Program (Section 33.2-352).

The data are also used for tracking performance measures on the dashboard and are reported to the Commonwealth Transportation Board (CTB). Pavements are rated in one of the following categories: Excellent, Good, Fair, Poor, or Very Poor. Segments of pavement classified as Poor and Very Poor are considered deficient, all others are sufficient. VDOT's goal, as established by the Commonwealth Transportation Board's policy, is to have a minimum of 82% of Interstate, high AADT Primary, and high AADT Secondary pavement; as well as 75% of low AADT Primary, and 60% low AADT Secondary pavement in Fair or better condition.

4. Federal HPMS Reporting. Pavement condition data are included in VDOT's Highway Performance Monitoring System (HPMS) data submission to FHWA. This report is the basis for the federal apportionment of Virginia's share of federal funds. HPMS data are also used for assessing and reporting highway system performance under FHWA's strategic planning process and are the source for a substantial portion of the information published in Highways Statistics and in other FHWA publications and media.

Finally, the HPMS data are widely used throughout the transportation community, including other governmental interest, business and industry, institutions of higher learning, the media and general public. More details can be found in the HPMS Field Manual[(5)]. VDOT provides the FHWA with the length, roughness and lane-miles on state maintained roads in various functional systems for assessing and reporting highway performance. HPMS data specifications have expanded to include requirements to report surface distress quantifications as well as additional pavement structural information for a statistical sample of highway sections. The data collected in the annual pavement condition survey will be used to meet many of the new reporting requirements.

5. Research Needs. Pavement data are made available to a variety of customers to meet research, analysis and planning needs. The data are also used for other purposes including determination of performance of various types of paving materials/mix designs as well as in initial screening to identify locations for detailed project level analysis when planning maintenance and rehabilitation activities.

Accumulation of consistent and quality pavement condition data over time will also allow VDOT to predict future pavement performance trends more accurately, enabling VDOT to more efficiently manage the pavement assets. It will also help the agency measure maintenance cost effectiveness, study the influence of new construction materials on pavement performance, and can serve as a basis for future vehicle cost responsibility studies.

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STATE OF THE PAVEMENT – 2022

BACKGROUND

The Virginia Department of Transportation (VDOT) maintains the third largest public road network in this country, covering a total of 129,500 lane miles consisting of 5,593 lane miles of Interstate highways, 22,515 lane miles of Primary highways and 101,392 lane miles of Secondary roads. The pavement management program in Virginia began with the establishment of a pavement inventory. That phase took place in the 1970s with the manual gathering of pavement records including those of construction history and rehabilitation projects. The merging of those early pavement records and the then existing highway inventory eventually evolved into what was known in VDOT as the Highway Traffic Records Information/Inventory System (HTRIS). While, as the name implies, HTRIS was heavily oriented toward traffic engineering needs, it also was the first repository for pavement construction and rehabilitation records or pavement inventory. The Roadway Network System (RNS) created a replacement system for the aging HTRIS mainframe system. The new system now incorporates a relational database that provides universal enterprise data access, links geo-spatial data and business attributes to the roadway centerlines, and provides web accessibility to users to retrieve critical roadway data. From 2016 Roadway Inventory Management System (RIMS) is the new system of record for VDOT's road data inventory. With this initiative, new business processes were established that streamlined data editing and maintenance and allows efficient data sharing across applications.

A second stage of pavement management activity in the state took place in the early 1980s and involved the development of a first generation pavement condition assessment methodology. This methodology, used throughout most of the 1980s and early 1990s, was a windshield survey based index procedure called the distress maintenance rating (DMR) with a rating scale of 0 to 100, with 100 being a pavement with no visual surface distress. The procedure gave consideration only to pavement surface distresses with heavy emphasis on cracking and patching. In the mid-1990s VDOT began to collect pavement distress data through the use of videotaped images. To make use of data collected from those tapes, VDOT also made interim use of the pavement condition index (PCI) defined and used by the U.S. Army Corps of Engineers[(6)]. After several trial years, the PCI was deemed too general for Virginia conditions and a VDOT specific method was developed. Briefly, that system recognizes that pavement distresses fall into two basic categories; they are either load related (caused by the application of vehicular loadings) or they are not load related (caused by the exposure of pavement elements to the environment). This realization gave rise to the development of two separate indices to describe pavement surface distresses. These are the load related distress rating (LDR) and the non-load related distress rating (NDR). These two indices also use 0 to 100 scales and are the basis for asphalt pavement surface condition evaluation in VDOT.

The advent of pavement data collection through contracted, automated means led to a need to standardize the procedures for the purposes of consistency and as a contractual

instrument for bidding purposes. The document providing this standardization, A Guide To Evaluating Pavement Distress Through The Use Of Digital Images [(1)], was developed and made available to vendors bidding on contract data collection.

Pavement distress condition throughout the state is crucially important information and one of the most important products of the Pavement Management Program. Dissemination of that product throughout the agency is a major reason the condition reports were assembled. One of the uses of this information is to aid in the maintenance activities of the agency. Another value of disseminating this information is to receive feedback from users on the pavement management and the asset management systems. This feedback will be used to identify and address changes that may enhance the continued implementation of the Pavement Management System.

PURPOSE AND SCOPE

The present document is more of a "fact sheet" than an in-depth research report; the intention is to provide the reader with an overall assessment of the condition of pavements throughout the Commonwealth on the roads maintained by VDOT. The condition of pavements in terms of condition states, and sufficient pavement network are included in this report.

Only the surface distress, roughness and rutting data are collected which has limitations. Any consideration of the structural integrity of the pavements needs to be deduced from the nature of the distresses (e.g., early alligator or fatigue cracking would suggest a pavement is subject to loadings in excess of its design capacity).

The surface distress data are collected and analyzed on the Interstate, Primary, and the hard-surfaced Secondary pavement network.

PAVEMENT DATA COLLECTION, DATA PROCESSING & QC/QA

The pavement condition data presented in this report were collected and processed by a contractor (Fugro Inc.) using continuous digital imaging and automated crack detection technology. For data collection purposes, Fugro uses vehicles equipped with special cameras to capture downward pavement images for crack detection, and a forward perspective view. Roughness and rutting data are simultaneously captured with the sensors mounted on the van. The data are collected at highway speeds as the vans are driven along the pavement. Downward images collected during the survey are processed with specialized automated crack detection software for the identification of cracks. Further analysis of digital images is necessary for the identification of other distresses; such as patching, bleeding or delamination. The following sections describe the major data items that are collected, and the results of the 2022 surveys.

Distress Data Elements Collected

Distresses were collected for various pavement types following the protocols specified in the distress data collection manual: "A Guide to Evaluating Pavement Distress Through the Use of Digital Images[1]." The data are collected for the following pavement types: continuously reinforced concrete pavement (CRCP), jointed concrete pavement (JCP) and asphalt-surfaced concrete pavement (ACP) that further includes bituminous (BIT), bituminous over jointed concrete (BOJ), and bituminous over continuously reinforced concrete (BOC) pavements. Detailed distress data in terms of extents and severities are collected and summarized for each 0.1 mile as well as for each homogeneous section. For ease of interpretation, the data are also summarized in a format which is used in the decision matrices to determine maintenance and rehabilitation recommendations. This is similar in format to the "windshield" data obtained while data were collected by windshield surveys before automated data collection method was adopted.

Quality Assurance

An independent QA process is an important consideration for quality data. For the 2022 data collection, the QA process began with evaluation of control sections comprised of ACP, CRCP and JCP for Interstate, Primary and Secondary systems. Image evaluations were completed on 15 control sections distributed over the system and pavement types. The control sections were used to calibrate the pavement distress rating process and also to establish the precision and bias values for the roughness and rutting measurements.

For the rutting and roughness comparison, the precision (repeatability), as specified in the terminology of ASTM E177[7] and the bias, based upon the average value or "ground truth", were used for QA checks. A data-collection vehicle is considered to have passed the QA checks if it is capable of collecting rutting and roughness data within the specified repeatability limits.

For the production ratings, batches of data, including Interstate, Primary and Secondary system ACP, JCP and CRCP pavements, were delivered to, and reviewed by the Independent data Verification and Validation (IV&V) contractor. Five percent of the data delivered in each batch were randomly chosen for QA and rated independently by the IV&V contractor. A batch is considered to have passed the QA checks when the CCI index values from the production data fall within 10 points of the CCI values from the IV&V ratings for 90% of the pavement length. In addition to the random 5% QA checks, a "high-level" data review consisted of reasonableness and a completeness check was also conducted for each delivery table. The ratings on pavement sections were also compared with the previous year's ratings on the same sections. Any major differences in ratings were further investigated.

Pavement Inventory Evaluated

The 2022 automated condition surveys began in August, 2021 and were completed, including the QA evaluations, by July of 2022. The following sections summarize the inventory evaluated and the results of those surveys, including the establishment of a scale of relative condition evaluation.

The surveys were conducted in the rightmost traffic lane, usually designated lane 1 in the VDOT pavement inventory, while the tabulations, graphs, and discussions below were extended to a lane mile basis. For example, a one-mile long pavement section with three lanes in the direction of rating would be reported as three lane miles. Using the method described above, about 5,620 lane miles on Interstate and 21,729 lanes miles on Primary (26,985 lanes miles of ACP pavements and 364 lanes miles of JCP and CRCP pavements) are accounted for in 2022 surveys. Approximately 25,291 lane miles of Secondary pavements were surveyed in 2022 (24,899 lane miles of plant mix and 392 lane miles of non-plant mix).

PAVEMENT CONDITION - 2022

The 2022 automated condition surveys began in August, 2021 and were completed, including the QA evaluations, by July of 2022. The following sections summarize the inventory evaluated and the results of those surveys, including the establishment of a scale of relative condition evaluation.

CONDITION EVALUATION CRITERIA

Table 1 provides a scale for evaluation for the 2022 pavement surface distress condition survey results. The index scale provided in that table is the result of experience with previous windshield surveys and reflects earlier action of the VDOT Pavement Management Engineering Team (PMET). The PMET action was a decision that pavements with a condition index of less than 60, referred to as the deficient pavements, would be evaluated further for possible higher types of maintenance and rehabilitation. Images of pavement sections in different conditions are shown in Appendix A.

The condition state of pavement shown in Table 1 is based on CCI values. For asphalt surfaced pavements LDR and NDR are used and CCI is defined as the lower of the two values. The slab distress rating (SDR) is used for JCP pavements and the Concrete Punchout Rating (CPR) and the Concrete Distress Rating (CDR) are collected for CRCP pavements. However, the same concept of CCI and the same scale in Table 1 apply to the latter two pavement types as well: SDR is directly equivalent to CCI for JCP pavements; and the lower of CDR and CPR is equivalent to CCI for CRCP pavements. More details about these concrete pavement condition indices are documented in another VDOT report[3]. In general, pavements rating less than 60 by either index are considered to be deficient, i.e., they need some kind of attention, more specifically, some heavier type of maintenance/rehabilitation actions. Appendix B shows the maps of condition of Interstate and Primary pavements.

Table 1: Pavement Condition Definition

Pavement Condition	Index Scale (CCI)
Excellent	90 and above
Good	70-89
Fair	60-69
Poor	50-59
Very Poor	49 and below

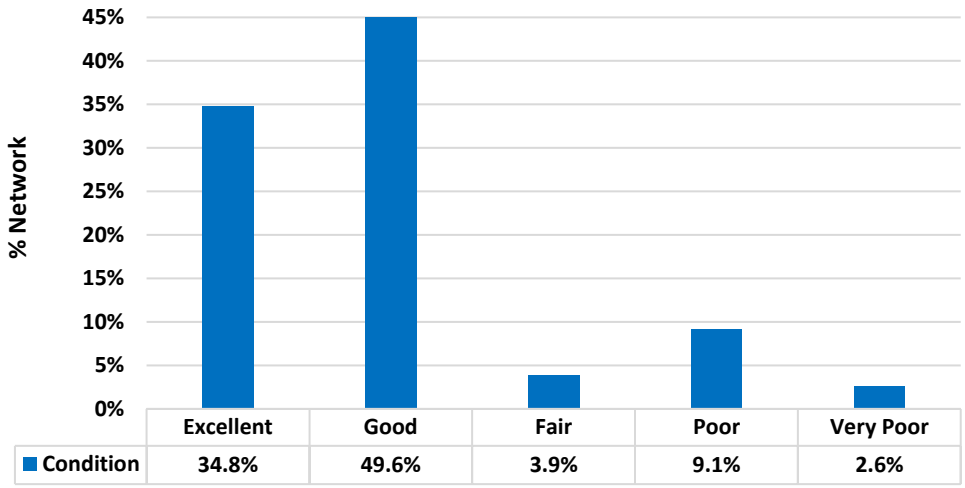
CONDITION OF INTERSTATE PAVEMENT

The percentage of pavements in different condition states is shown in Figure 1 for the Interstate system. It shows that more than 82 percent of the Interstate pavements are in fair or better condition on statewide basis. The distribution of Interstate condition states on a district basis is presented in Figure 2. Here all of the condition states are represented as percentages in the chart along with numerical values.

Figure 3 is a bar chart that presents the Interstate sufficient lane miles in each district. This chart also presents the sufficient lane miles by pavement type: Asphalt Concrete (AC), Continuously Reinforced Concrete (CRC) and Jointed Reinforced Concrete (JRC) in each district. Since the sufficient lane miles presented in Figure 3 are part of different Interstate network sizes in different districts, the percentage of sufficient pavements is presented in Figure 4.

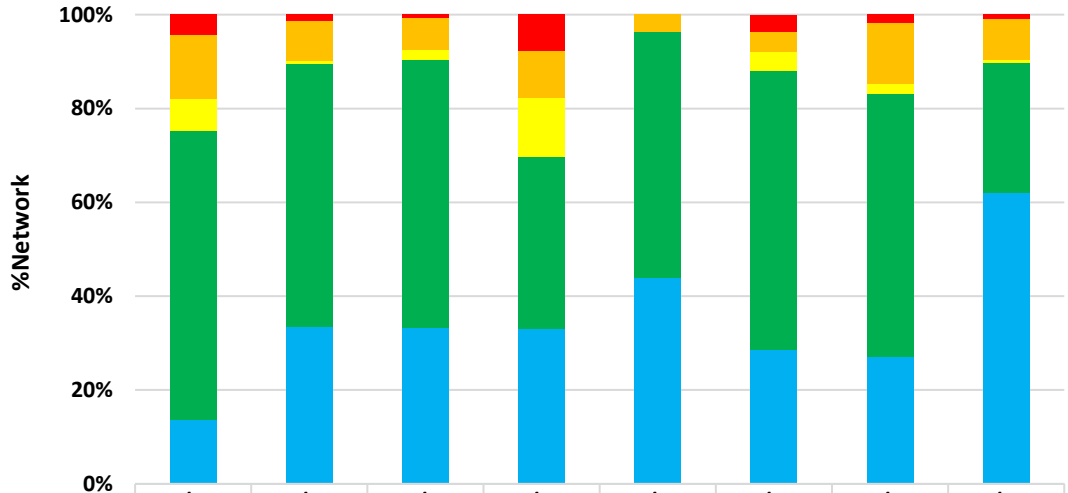
A performance target of a minimum of 82% sufficient pavements is established for Interstate pavements. A higher value of percent sufficient is preferred since it indicates higher percentage of pavements in fair or better condition. In Figure 4 the statewide performance target of 82% sufficient is represented by a line, and the current percent sufficient of 88.3% for Interstate pavements is represented by another line. It can be seen that all the districts are above performance target of minimum 82% sufficiency. District 6 shows the highest percentage sufficient, at 96%, whereas the lowest percentage, 82%, is found in District 1.

Figure 1: Pavement Condition - Interstate



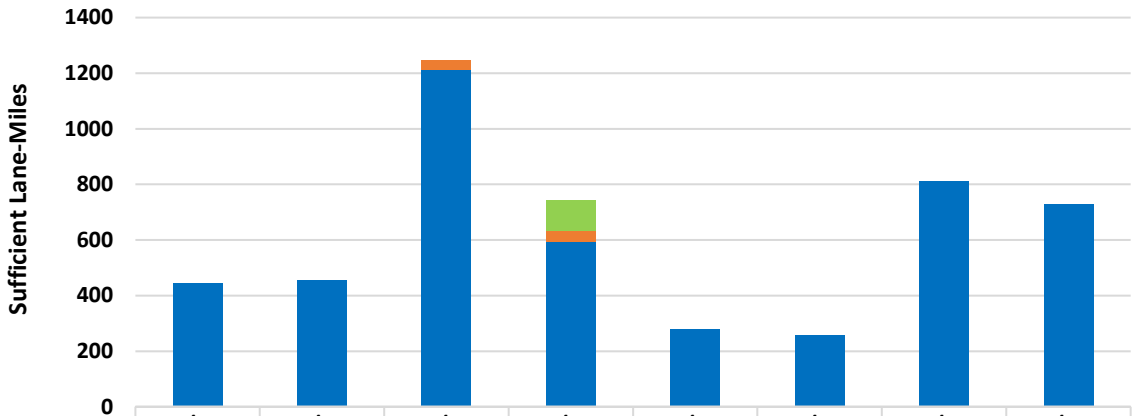
	Excellent	Good	Fair	Poor	Very Poor
Condition	34.8%	49.6%	3.9%	9.1%	2.6%

Figure 2: Pavement Condition by District - Interstate



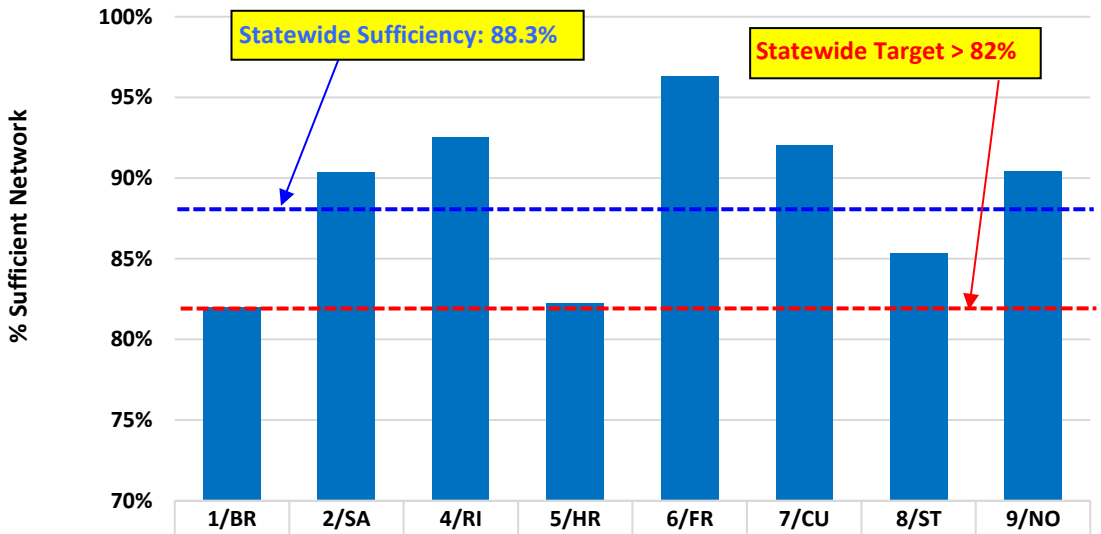
	1/BR	2/SA	4/RI	5/HR	6/FR	7/CU	8/ST	9/NO
Very Poor	4.4%	1.4%	0.7%	7.8%	0.0%	3.6%	1.8%	1.0%
Poor	13.6%	8.3%	6.7%	10.0%	3.7%	4.3%	12.9%	8.6%
Fair	6.8%	0.7%	2.2%	12.4%	0.0%	4.0%	2.2%	0.7%
Good	61.6%	56.1%	57.2%	36.7%	52.3%	59.5%	56.0%	27.5%
Excellent	13.6%	33.5%	33.2%	33.1%	44.0%	28.6%	27.1%	62.2%

Figure 3: Sufficient Lane Miles by District - Interstate



	1/BR	2/SA	4/RI	5/HR	6/FR	7/CU	8/ST	9/NO
JRCP	N/A	N/A	0	110	N/A	N/A	N/A	0
CRCP	N/A	N/A	34	41	N/A	N/A	N/A	N/A
ACP	443	456	1212	593	278	257	809	730
Total	443	456	1246	744	278	257	809	730

Figure 4: Percent Sufficiency by District - Interstate

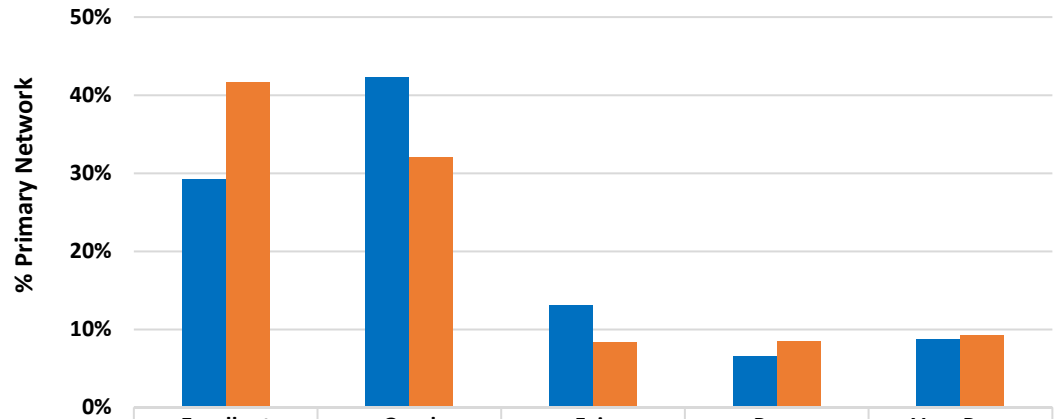


	1/BR	2/SA	4/RI	5/HR	6/FR	7/CU	8/ST	9/NO
% Sufficient	82.0%	90.3%	92.6%	82.2%	96.3%	92.1%	85.3%	90.4%

CONDITION OF PRIMARY PAVEMENT

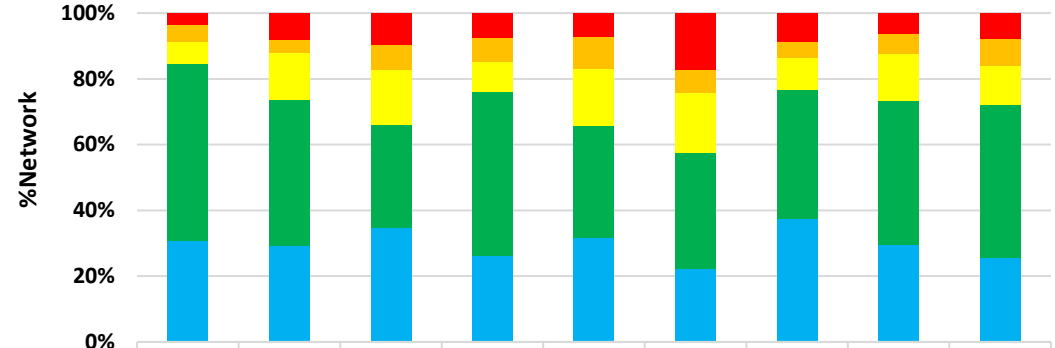
The statewide distribution of pavement condition on the Primary system is presented in Figure 5. It can be seen that the percentage of pavements in fair or better condition for high and low AADT is 84.7% and 82.2% respectively. The distribution of pavement condition states on Primary system by district and AADT is shown in Figures 6 and 7.

Figure 5: Pavement Condition - Primary



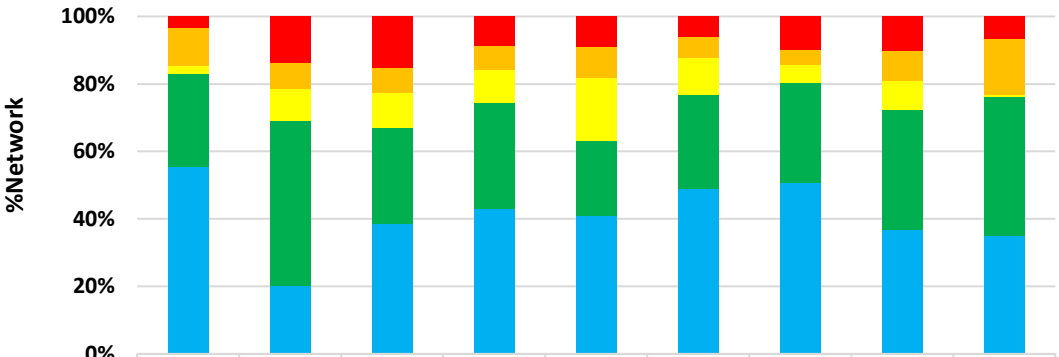
	Excellent	Good	Fair	Poor	Very Poor
high AADT	29.3%	42.3%	13.1%	6.6%	8.7%
low AADT	41.7%	32.1%	8.4%	8.5%	9.3%

Figure 6: Pavement Condition - Primary (high AADT)



	1/BR	2/SA	3/LY	4/RI	5/HR	6/FR	7/CU	8/ST	9/NO
Very Poor	3.5%	8.0%	9.6%	7.5%	7.3%	17.3%	8.7%	6.2%	7.8%
Poor	5.2%	4.1%	7.6%	7.3%	9.5%	6.7%	4.9%	6.2%	8.2%
Fair	6.8%	14.2%	16.7%	9.1%	17.4%	18.3%	9.7%	14.1%	11.8%
Good	53.8%	44.4%	31.5%	49.7%	34.3%	35.4%	39.2%	43.9%	46.6%
Excellent	30.7%	29.3%	34.6%	26.4%	31.5%	22.3%	37.5%	29.6%	25.6%

Figure 7: Pavement Condition - Primary (low AADT)

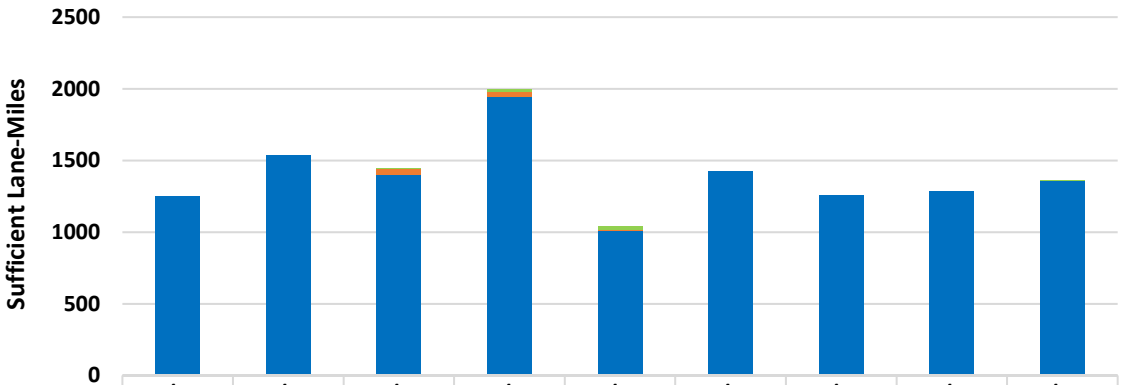


	1/BR	2/SA	3/LY	4/RI	5/HR	6/FR	7/CU	8/ST	9/NO
Very Poor	3.3%	13.7%	15.1%	8.7%	9.0%	6.2%	9.9%	10.3%	6.6%
Poor	11.2%	7.8%	7.7%	7.0%	9.1%	6.0%	4.3%	8.6%	16.7%
Fair	2.6%	9.3%	10.2%	10.0%	18.6%	11.2%	5.4%	8.7%	0.5%
Good	27.3%	49.1%	28.5%	31.2%	22.5%	27.6%	29.7%	35.5%	41.1%
Excellent	55.6%	20.1%	38.5%	43.1%	40.8%	49.0%	50.7%	36.9%	35.1%

Figures 8 and 9 present the sufficient lane miles in each district, with numerical values by pavement type. Again, each district maintains a different size network, so the total sufficient

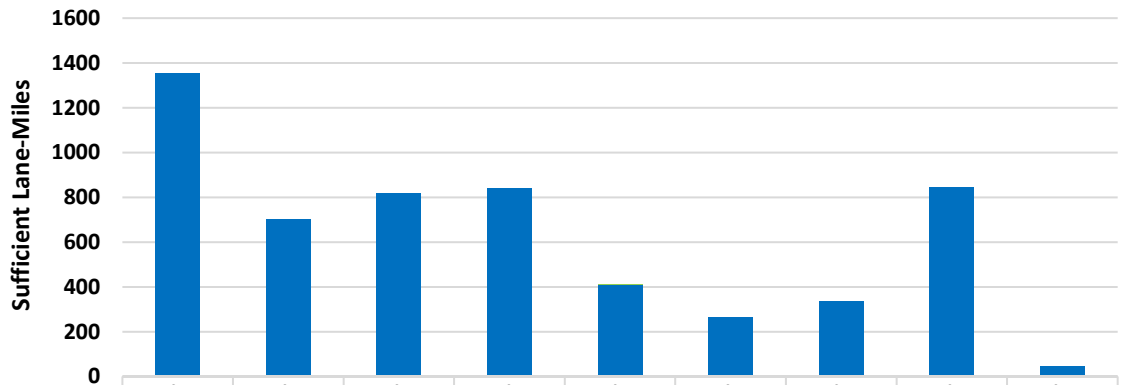
lane miles vary from district to district based on both the relative size and condition of each network.

Figure 8: Sufficient Lane Miles - Primary (high AADT)



	1/BR	2/SA	3/LY	4/RI	5/HR	6/FR	7/CU	8/ST	9/NO
JRCP	N/A	0	6	17	24	N/A	N/A	N/A	1
CRCP	N/A	N/A	42	34	5	N/A	N/A	N/A	N/A
ACP	1251	1539	1401	1947	1010	1428	1256	1289	1361
Total	1251	1539	1449	1998	1039	1428	1256	1289	1362

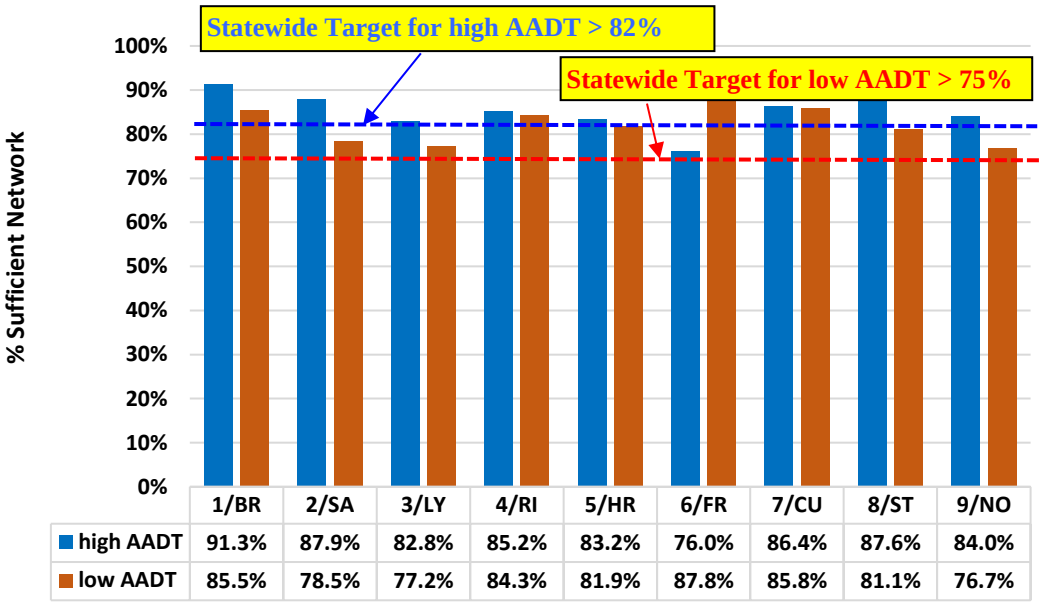
Figure 9: Sufficient Lane Miles - Primary (low AADT)



	1/BR	2/SA	3/LY	4/RI	5/HR	6/FR	7/CU	8/ST	9/NO
JRCP	N/A	N/A	N/A	N/A	4	N/A	N/A	N/A	0
CRCP	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
ACP	1354	704	818	842	408	265	335	844	45
Total	1354	704	818	842	412	265	335	844	45

The percent sufficient lane miles in each district is presented in Figure 10. The performance target is a minimum of 82% pavement rated as sufficient for high AADT and 75% for low AADT.

Figure 10: Percent Sufficiency by District - Primary

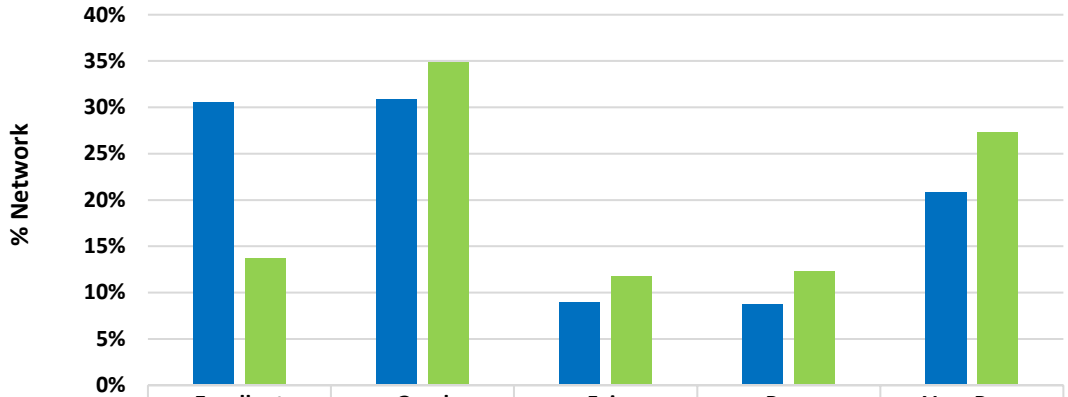


	1/BR	2/SA	3/LY	4/RI	5/HR	6/FR	7/CU	8/ST	9/NO
high AADT	91.3%	87.9%	82.8%	85.2%	83.2%	76.0%	86.4%	87.6%	84.0%
low AADT	85.5%	78.5%	77.2%	84.3%	81.9%	87.8%	85.8%	81.1%	76.7%

CONDITION OF SECONDARY PAVEMENT

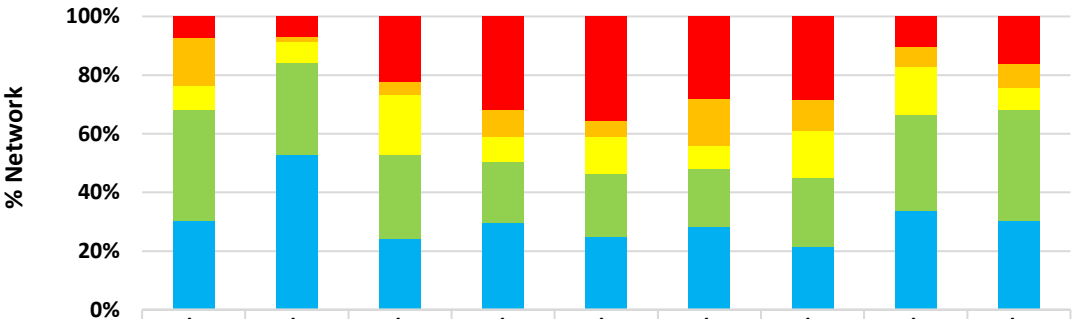
Figure 11 shows the statewide condition distribution of the Secondary network while Figures 12 and 13 presents the distribution on district basis.

Figure 11: Pavement Condition - Secondary



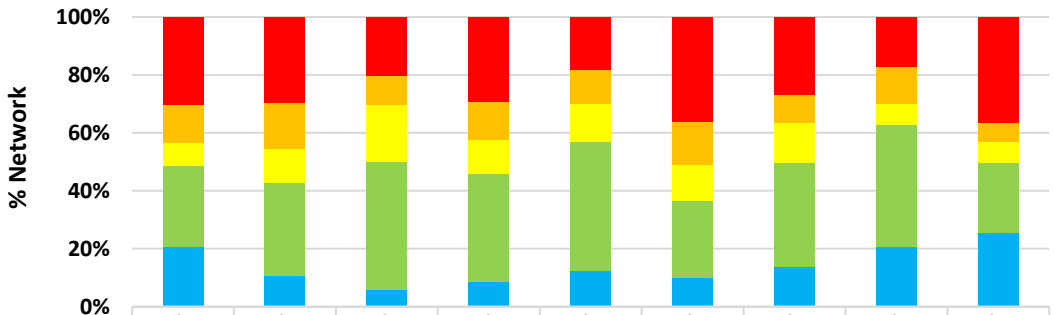
	Excellent	Good	Fair	Poor	Very Poor
high AADT	30.6%	30.9%	9.0%	8.7%	20.8%
low AADT	13.7%	34.9%	11.8%	12.3%	27.3%

Figure 12: Pavement Condition - Secondary (high AADT)



	1/BR	2/SA	3/LY	4/RI	5/HR	6/FR	7/CU	8/ST	9/NO
Very Poor	7.2%	7.0%	22.2%	31.9%	35.5%	28.0%	28.5%	10.6%	16.3%
Poor	16.7%	1.5%	4.7%	9.0%	5.5%	16.0%	10.4%	6.6%	8.2%
Fair	8.0%	7.2%	20.2%	8.8%	12.7%	8.0%	16.3%	16.3%	7.3%
Good	37.6%	31.5%	28.7%	20.5%	21.4%	19.5%	23.4%	32.9%	37.8%
Excellent	30.5%	52.8%	24.2%	29.8%	24.9%	28.5%	21.4%	33.6%	30.4%

Figure 13: Pavement Condition - Secondary (low AADT)



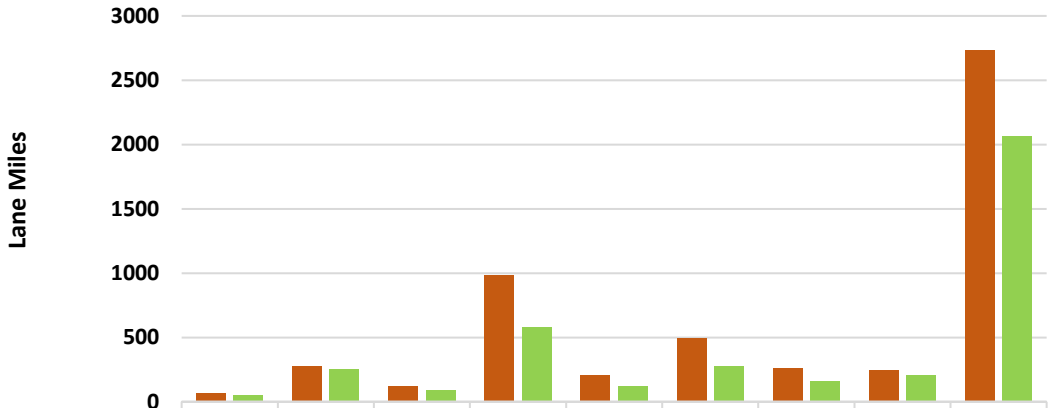
	1/BR	2/SA	3/LY	4/RI	5/HR	6/FR	7/CU	8/ST	9/NO
Very Poor	30.3%	29.5%	20.2%	29.2%	18.2%	36.0%	26.8%	17.0%	36.5%
Poor	13.2%	16.1%	10.1%	13.3%	11.6%	14.9%	9.8%	12.9%	6.3%
Fair	7.7%	11.7%	19.8%	11.7%	13.2%	12.5%	13.6%	7.3%	7.5%
Good	28.2%	31.8%	44.0%	37.2%	44.6%	26.5%	36.0%	42.2%	24.1%
Excellent	20.6%	10.9%	5.9%	8.6%	12.4%	10.1%	13.8%	20.6%	25.6%

Figures 14 and 15 show the number of lane-miles surveyed in each district as well as the number of lane-miles rated as 'sufficient'. Figure 16 represents the percent sufficient.

Within the Secondary network, the rated lane miles of plant mix surfaces and non-plant mix surfaces are shown in Figures 17 and 18. Some districts have more plant mix lanes miles while non-plant mix lane miles are more in other districts.

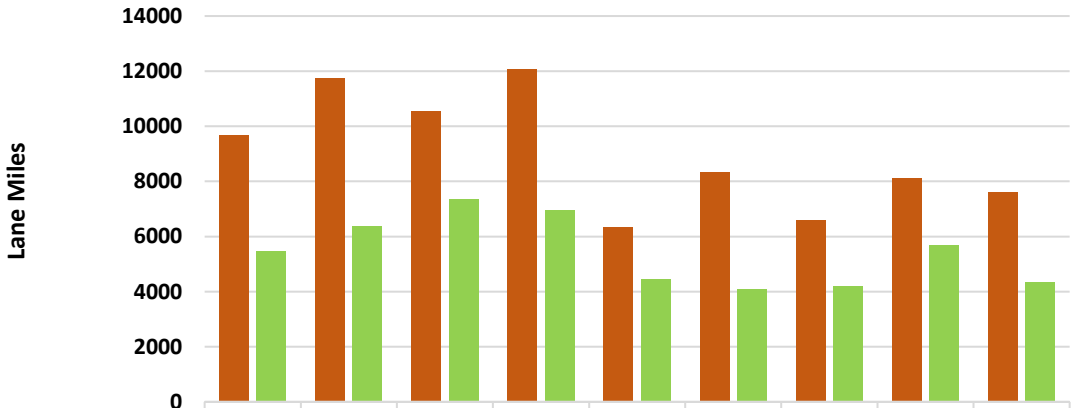
The percentage of sufficient Secondary plant mix and non-plant mix lane miles are presented in Figures 19 and 20.

Figure 14: Surveyed and Sufficient Lane Miles by District - Secondary (high AADT)



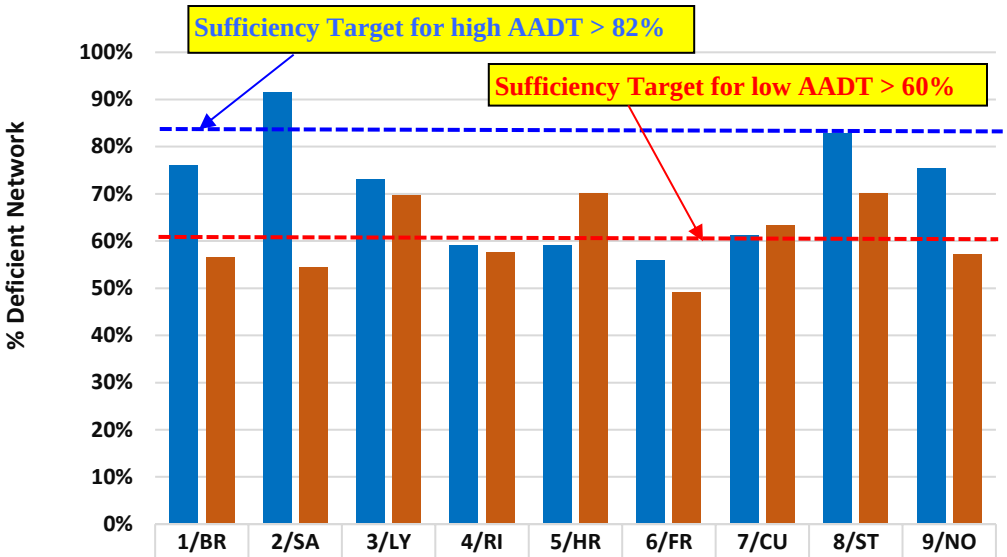
	1/BR	2/SA	3/LY	4/RI	5/HR	6/FR	7/CU	8/ST	9/NO
Surveyed	65	277	121	982	208	491	261	246	2732
Sufficient	49	254	88	580	123	275	160	204	2062

Figure 15: Surveyed and Sufficient Lane Miles by District - Secondary (low AADT)



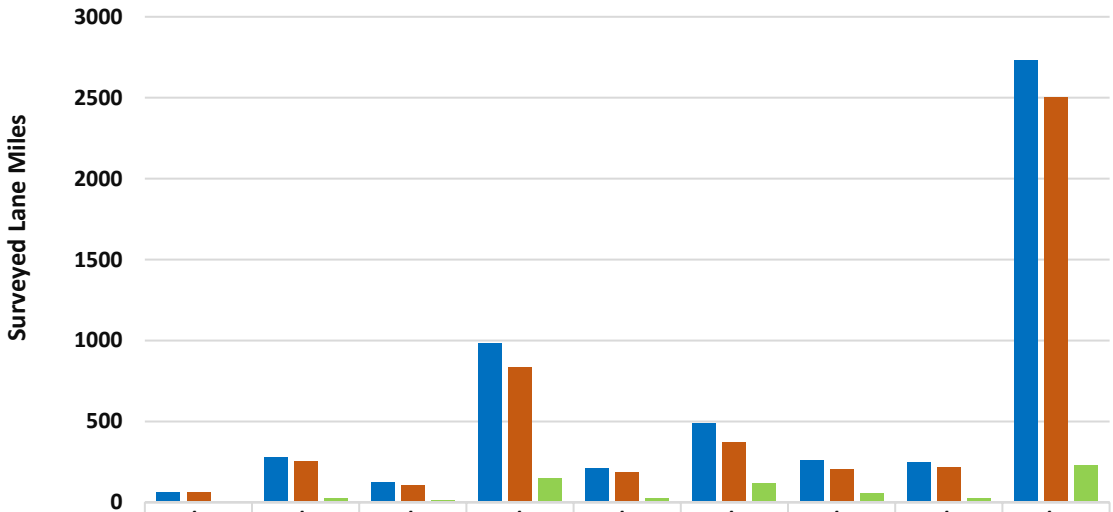
	1/BR	2/SA	3/LY	4/RI	5/HR	6/FR	7/CU	8/ST	9/NO
Surveyed	9660	11735	10537	12080	6339	8313	6597	8120	7600
Sufficient	5460	6380	7342	6949	4448	4084	4180	5688	4344

Figure 16: Percent Sufficiency by District - Secondary



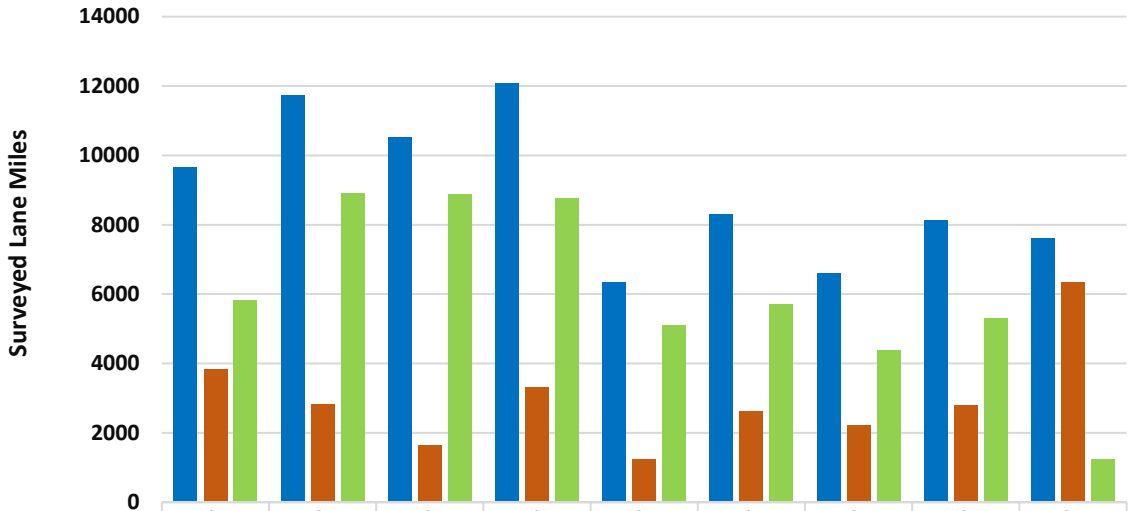
	1/BR	2/SA	3/LY	4/RI	5/HR	6/FR	7/CU	8/ST	9/NO
high AADT	76.1%	91.5%	73.1%	59.1%	59.0%	56.0%	61.1%	82.8%	75.5%
low AADT	56.5%	54.4%	69.7%	57.5%	70.2%	49.1%	63.4%	70.1%	57.2%

Figure 17: Surveyed Lane Miles - Secondary with Plant Mix (PM) & Non-Plant Mix (NPM) Surface (high AADT)



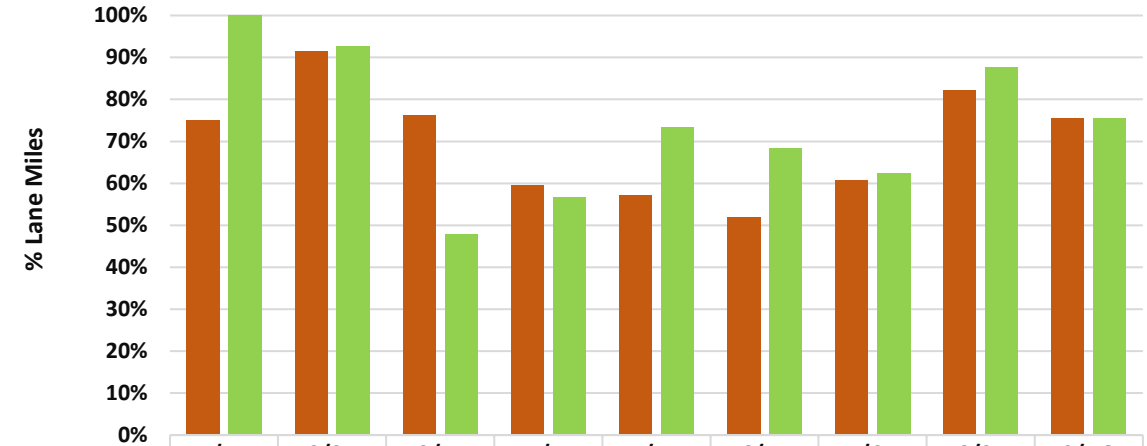
	1/BR	2/SA	3/LY	4/RI	5/HR	6/FR	7/CU	8/ST	9/NO
Surveyed	65	277	121	982	208	491	261	246	2732
PM	62	252	108	833	185	372	204	219	2504
NPM	3	25	13	149	23	119	57	27	228

Figure 18: Surveyed Lane Miles - Secondary with Plant Mix (PM) & Non-Plant Mix (NPM) Surface (low AADT)



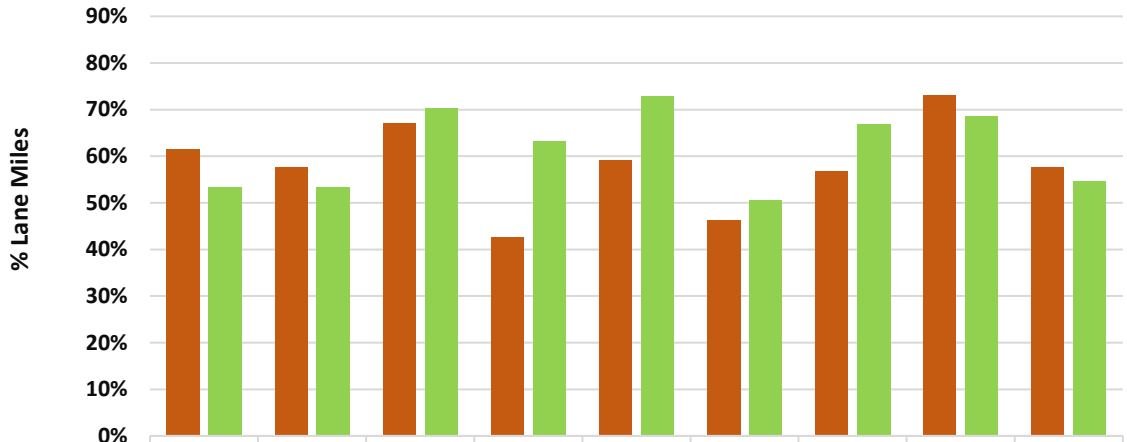
	1/BR	2/SA	3/LY	4/RI	5/HR	6/FR	7/CU	8/ST	9/NO
Surveyed	9660	11735	10537	12080	6339	8313	6597	8120	7600
PM	3830	2830	1642	3317	1248	2618	2226	2806	6356
NPM	5830	8905	8895	8763	5091	5695	4371	5314	1244

Figure 19: Percent Sufficiency by District and Pavement Type - Secondary (high AADT)



	1/BR	2/SA	3/LY	4/RI	5/HR	6/FR	7/CU	8/ST	9/NO
PM	75.1%	91.4%	76.2%	59.5%	57.3%	52.0%	60.8%	82.2%	75.5%
NPM	100.0%	92.6%	47.9%	56.7%	73.4%	68.4%	62.3%	87.7%	75.4%

Figure 20: Percent Sufficiency by District and Pavement Type - Secondary (low AADT)



	1/BR	2/SA	3/LY	4/RI	5/HR	6/FR	7/CU	8/ST	9/NO
PM	61.5%	57.5%	67.1%	42.6%	59.0%	46.2%	56.7%	73.0%	57.7%
NPM	53.3%	53.4%	70.2%	63.2%	72.9%	50.5%	66.8%	68.5%	54.7%

USES & LIMITATIONS OF 2022 PAVEMENT CONDITION DATA

This section describes a few of the uses of this data as well as some of the data limitations. In addition, future uses of this data are described here.

Current Use of the Data

Pavement condition data presented in this report are used by VDOT Central Office and District staff to plan, budget, prioritize, and schedule pavement maintenance and rehabilitation work. Data are also used for internal and external performance reporting; and are made available to pavement researchers, safety planners and others. Major uses of this information are described below.

Pavement Needs Analysis

The pavement condition data are an important input into the Pavement Management System (PMS) to develop estimates of pavement maintenance and rehabilitation needs based on an optimization analysis. These needs are subsequently used for the development of the biennial maintenance budget and the work plan generated by the optimization serves as a guide to district personnel for the selection of pavement maintenance strategy for the yearly pavement maintenance schedules. Once a particular section of pavement is selected for maintenance, a detailed project level analysis is conducted to determine the specific treatment.

To develop the Interstate and Primary pavement needs, the pavement condition data are loaded into the Pavement Management System (PMS) which then optimizes the selection of pavement maintenance activities on the Interstate and Primary network. These needs

estimates are provided through a process called multi-constraint optimization analysis, which develops an optimal work plan (a series of pavement maintenance activities applied to specific sections on the total network) to achieve a single objective (minimizing cost) against multiple condition-based constraints (performance targets) in a given year of the total six year analysis.

The data are also used to feed the maintenance decision trees to determine the unconstrained maintenance needs for the pavement assets. Unconstrained needs analysis establishes the maintenance and rehabilitation needs to appropriately correct the existing pavement conditions where funding would not be considered a constraint. It provides an idea of the amount and type of work needed on the whole network. For the determination of the needed treatment for a particular section, decision trees are used with distress quantities and severities, and condition index as input from the condition survey data. Also, traffic level, structural condition, and maintenance history are provided as additional inputs wherever these are available for the selection of treatment. Unconstrained needs are also used in many cases as the first indicator of the needed treatment which is further refined by field inspections, detailed project level analysis, overall needs of the network and available budget.

Planning for Preventive Maintenance and Resurfacing

The surface distress condition data have been used to identify recommended candidate pavement sections for preventive maintenance activities. These recommendations are based on decision trees developed for the needs analysis, as described above.

The pavement data are used for the selection of pavement sections and maintenance strategies for the yearly pavement maintenance schedule. Automated data that provide high consistency and efficiency have been used to aid in prioritizing Maintenance Resurfacing by the districts. Typically, the districts have used the data in combination with their local knowledge of pavement conditions to select pavement projects.

Information about specific distresses can be used to determine appropriate maintenance and rehabilitation actions for consideration. For example, a pavement with serious load related distress would typically require a resurface or “mill and fill” treatment, whereas a preventive maintenance treatment would be more appropriate for a pavement with primarily non-load related distresses.

Pavement Performance Reporting

The pavement condition data provides input to the preparation of Maintenance and Operations Comprehensive Review report (4). The Comprehensive Review Report is updated and reported to the Commonwealth Transportation Board on an annual basis, reported in the Commissioner of Highways Biennial Report (Section 33.2-232) and the annual budgeting of VDOT’s Maintenance and Operations Program (Section 33.2-352).

The data are also used for tracking performance measures on the dashboard and are reported to the Commonwealth Transportation Board (CTB) yearly. Pavements are rated in one of the following categories: Excellent, Good, Fair, Poor, or Very Poor. Segments of pavement classified as Poor and Very Poor are considered deficient, all others are sufficient. VDOT’s goal,

as established by the Commonwealth Transportation Board's policy, is to have a minimum of 82% of Interstate, high AADT Primary, and high AADT Secondary pavement; as well as 75% of low AADT Primary, and 60% low AADT Secondary pavement in Fair or better condition.

Federal HPMS Reporting

Pavement condition data are included in VDOT's Highway Performance Monitoring System (HPMS) data submission to FHWA. This report is the basis for the federal apportionment of Virginia's share of federal funds. VDOT provides the FHWA with the length, roughness, certain surface distresses, and lane-miles on state maintained roads in various functional systems for assessing and reporting highway performance. Pavement structural information is also provided for a statistical sample of highway sections. HPMS data are also used for assessing and reporting highway system performance under FHWA's strategic planning process and are the source for a substantial portion of the information published in Highways Statistics and in other FHWA publications and media. Finally, the HPMS data are widely used throughout the transportation community, including other governmental interest, business and industry, institutions of higher learning, the media and general public. More details can be found in the HPMS Field Manual[(5)].

Research Needs

The pavement condition data are used to satisfy various internal and external research needs. Frequently, there are requests for pavement condition data from various divisions within VDOT, and also research units associated with VDOT.

Future Use of the Data

Accumulation of consistent, quality condition data over time allows VDOT to better understand the cost-effectiveness of different pavement treatment strategies. This information enables VDOT to make investment decisions that maximize pavement life and optimize the use of scarce resources. Pavement performance models are a key element of VDOT's pavement management system – they are used to predict future pavement conditions and calculate the benefits of alternative treatment strategies. Historical condition data provide the basis for improvements to these performance models which in turn enhance the accuracy, reliability, and usefulness of the system's recommendations. Historical data also provide a rich base of information for research into maintenance cost effectiveness, the influence of new construction materials and techniques on pavement performance, and the performance of pavements under different traffic loading and environmental conditions. Pavement performance research results may also be used for vehicle cost responsibility studies and the establishment of licensing fees related to pavement damage.

Limitations of the Data

While surface condition data are very helpful in project selection they cannot be the only source of information used to determine what actually should be done to a pavement. Determining the appropriate action for a pavement that is not performing as well as desired may require projected traffic loads, maintenance history of the pavement, analysis of cores, trenching, and use of non-destructive testing procedures. In other words, surface distress

(especially premature) might indicate the need for a more detailed investigation or testing. For example, excessive early fatigue cracking suggests structural inadequacy, but does not indicate where the inadequacy lies (foundation, base, surface, etc.) warranting the need for detailed investigation.

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1. *A Guide to Evaluating Pavement Distress Through the Use of Digital Images*, Virginia Department of Transportation, Maintenance Division, December, 2022.

2. McGhee, K H. *Development and Implementation of Pavement Condition Indices for the Virginia Department of Transportation, Phase I: Flexible Pavement. Virginia Department of Transportation, Maintenance Division,* Sept. 2002.

3. McGhee, K H., Habib, Affan and Tanveer Chowdhury. 2002. *Development of Pavement Condition Indices for the Virginia Department of Transportation: Phase II – Rigid Pavements.* Virginia Department of Transportation, Maintenance Division.

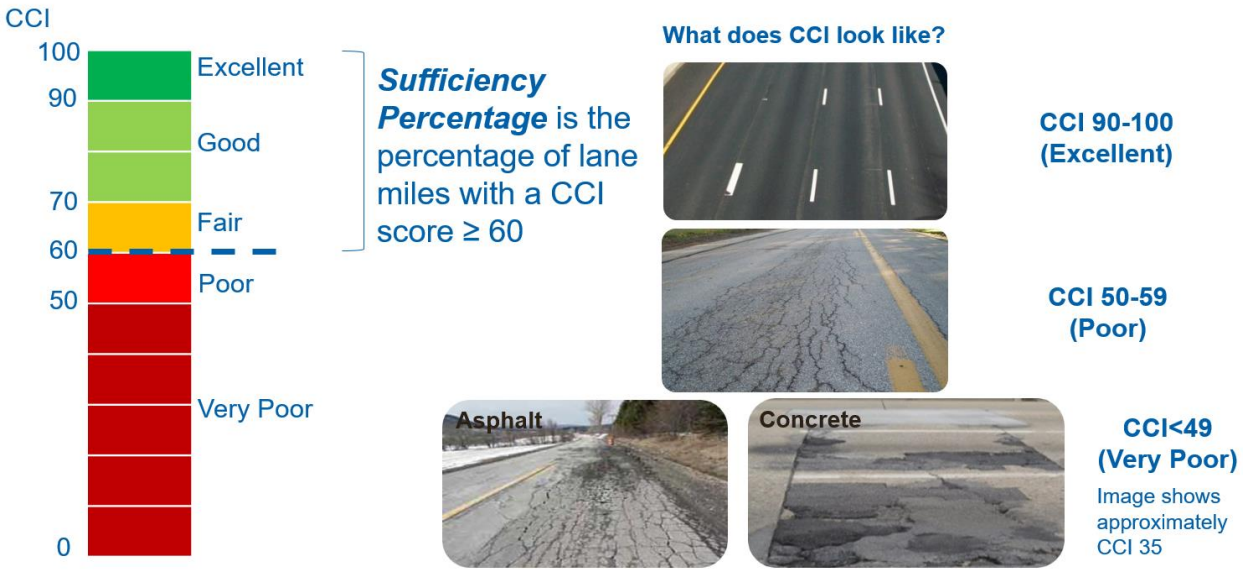
4. Maintenance and Operations Comprehensive Review, https://www.virginiadot.org/projects/resources/legstudies/Maintenance_and_Operations_Comprehensive_Review_%E2%80%93_2019.pdf, VDOT, 2019.

5. *HPMS Field Manual*, U.S. Department of Transportation, Federal Highway Administration Office of Highway Policy Information, December, 2016.

6. *Pavement Maintenance Management for Roads and Streets Using the PAVER S*ystem, U.S. Army Corps of Engineers, Washington, D. C., 1990.

7. ASTM E 177 – 13, *Standard Practice for Use of the Terms Precision and Bias in ASTM Test Methods*.

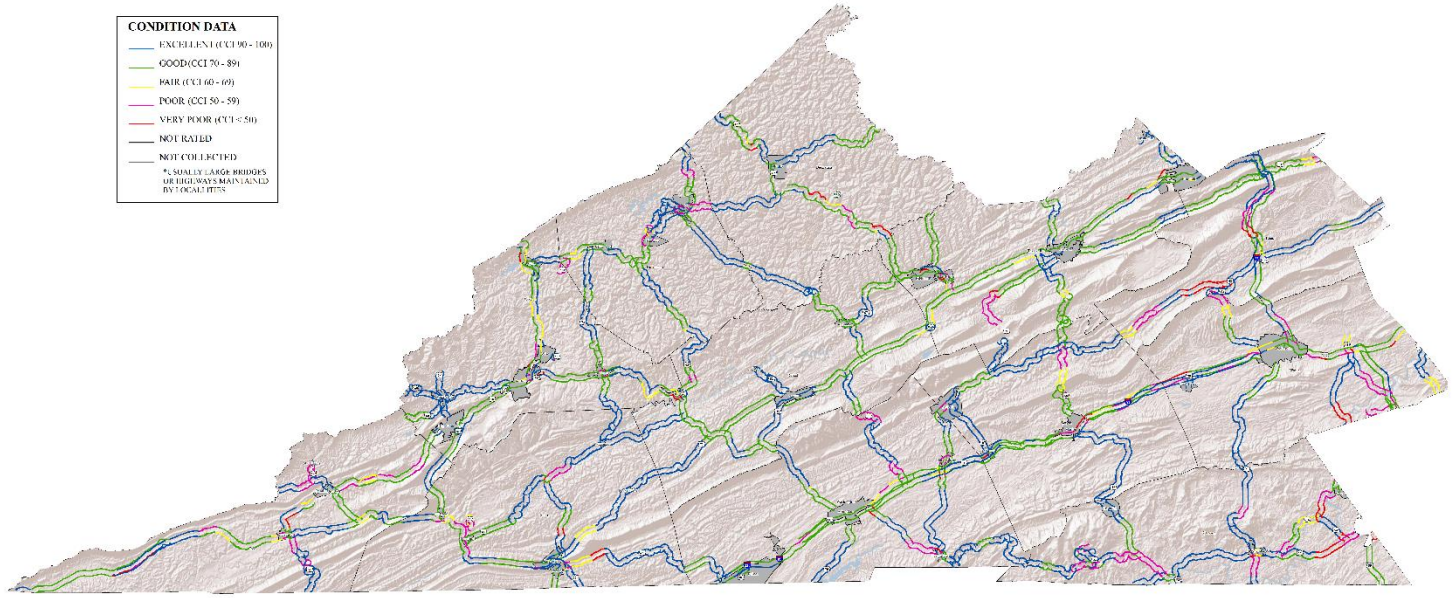
APPENDIX A: PAVEMENT RATING – CRITICAL CONDITION INDEX

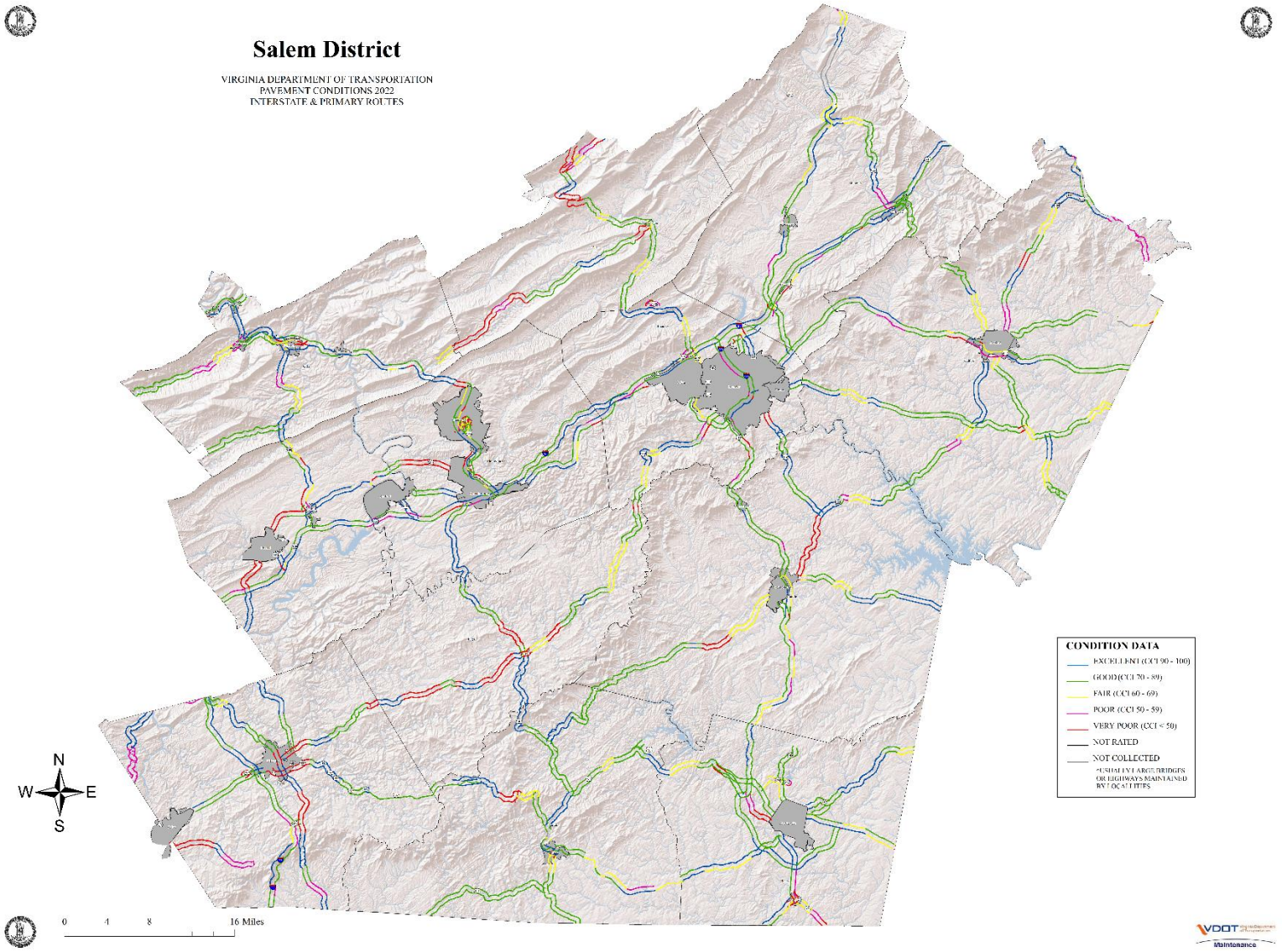

CCI
100
90
70
60
50
0
Excellent
Good
Fair
Poor
Very Poor
Sufficiency Percentage is the percentage of lane miles with a CCI score ≥ 60
What does CCI look like?
CCI 90-100 (Excellent)
CCI 50-59 (Poor)
Asphalt
Concrete
CCI<49 (Very Poor)
Image shows approximately CCI 35

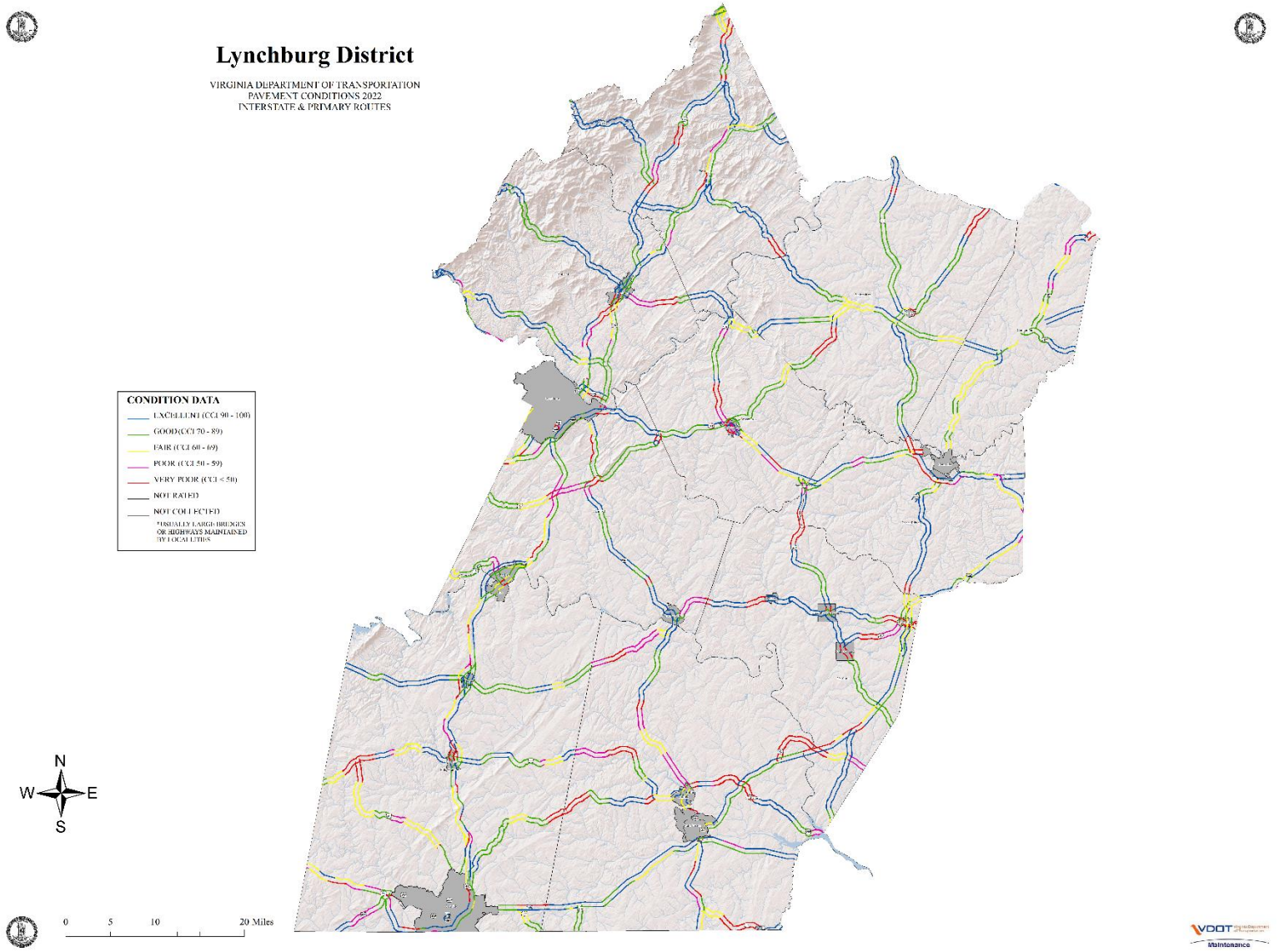
APPENDIX B: PAVEMENT CONDITION MAPS FOR INTERSTATE AND PRIMARY SYSTEMS – 2022

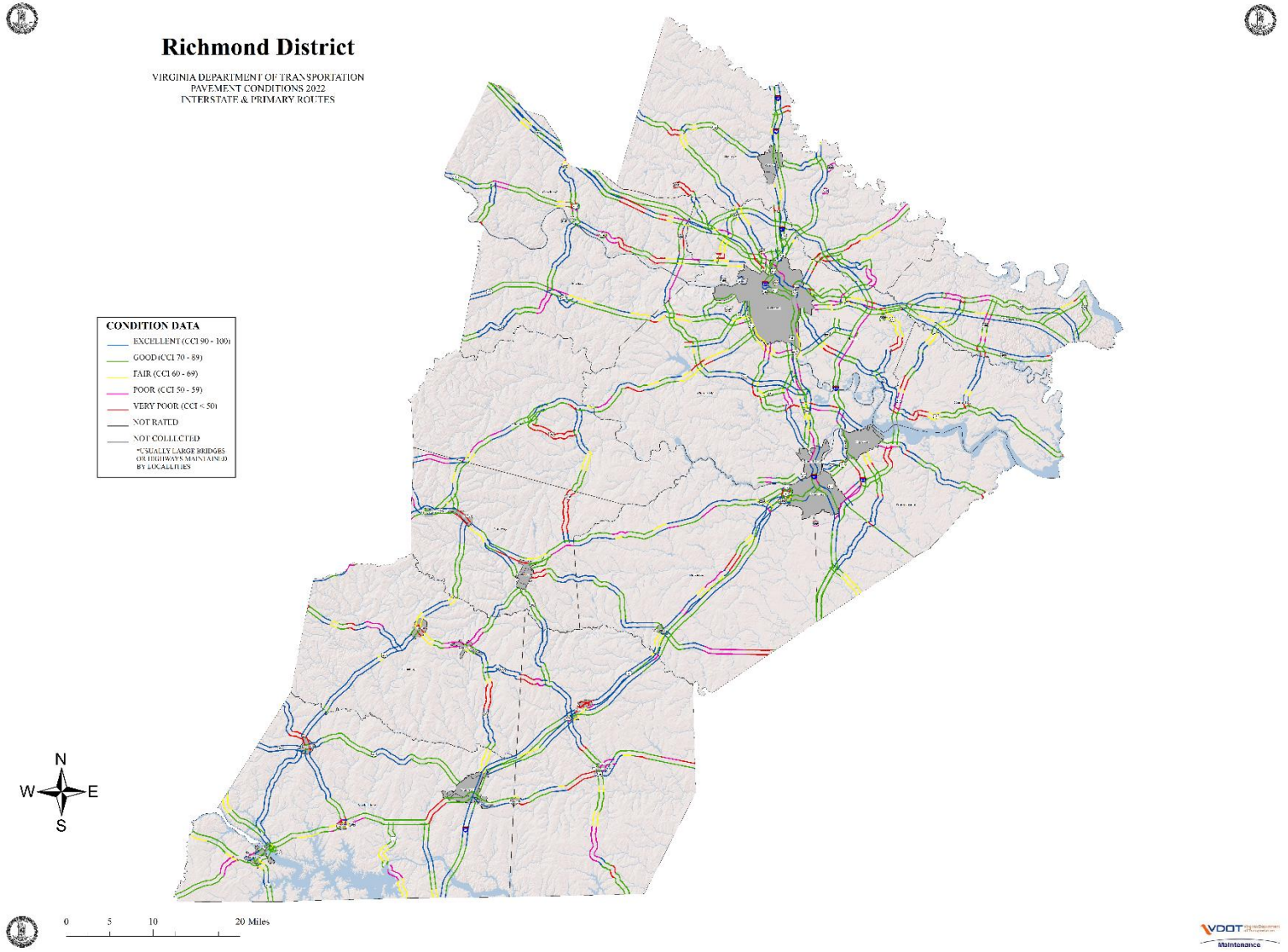
Bristol District

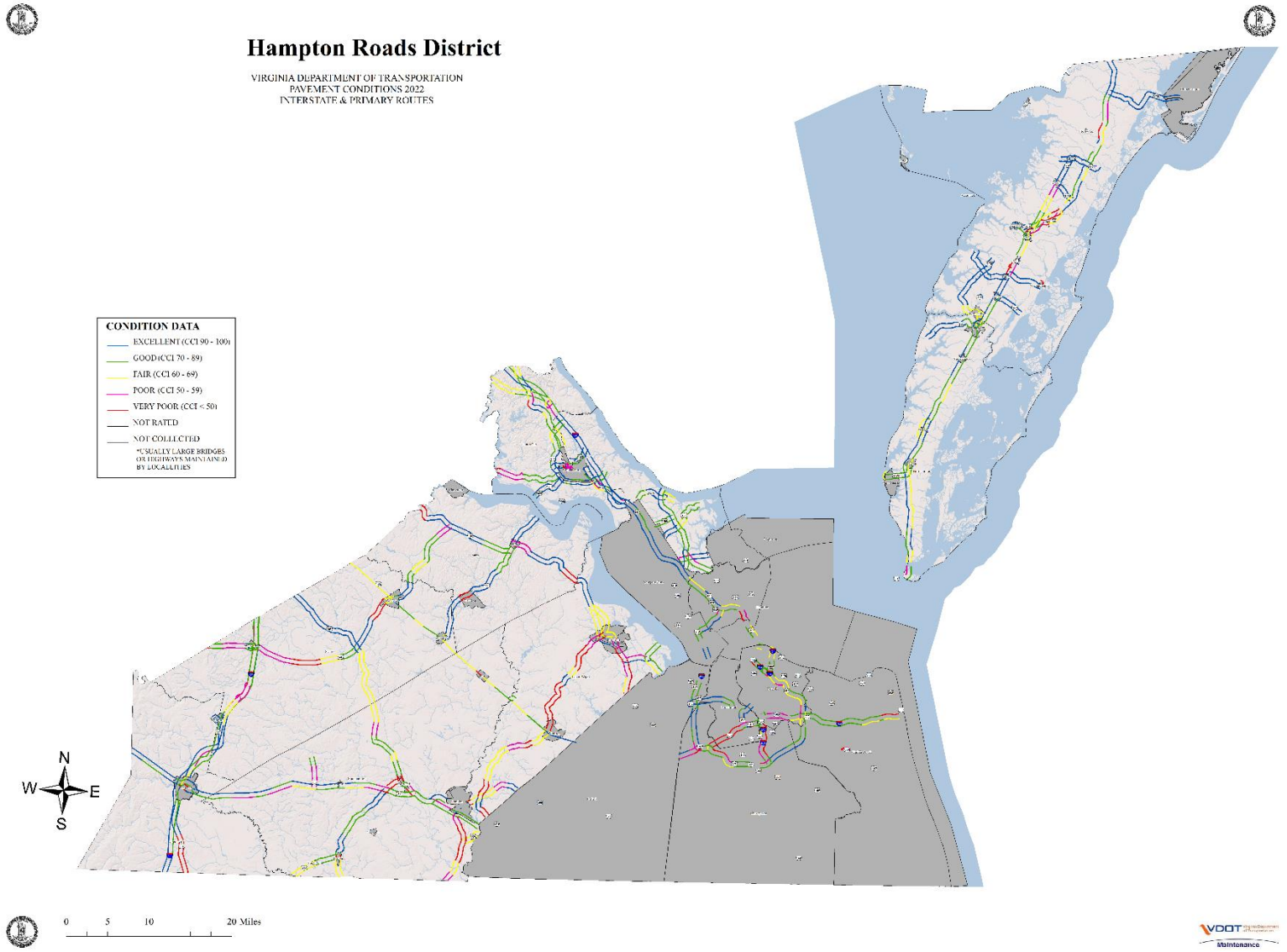
VIRGINIA DEPARTMENT OF TRANSPORTATION
PAVEMENT CONDITIONS 2022
INTERSTATE & PRIMARY ROUTES

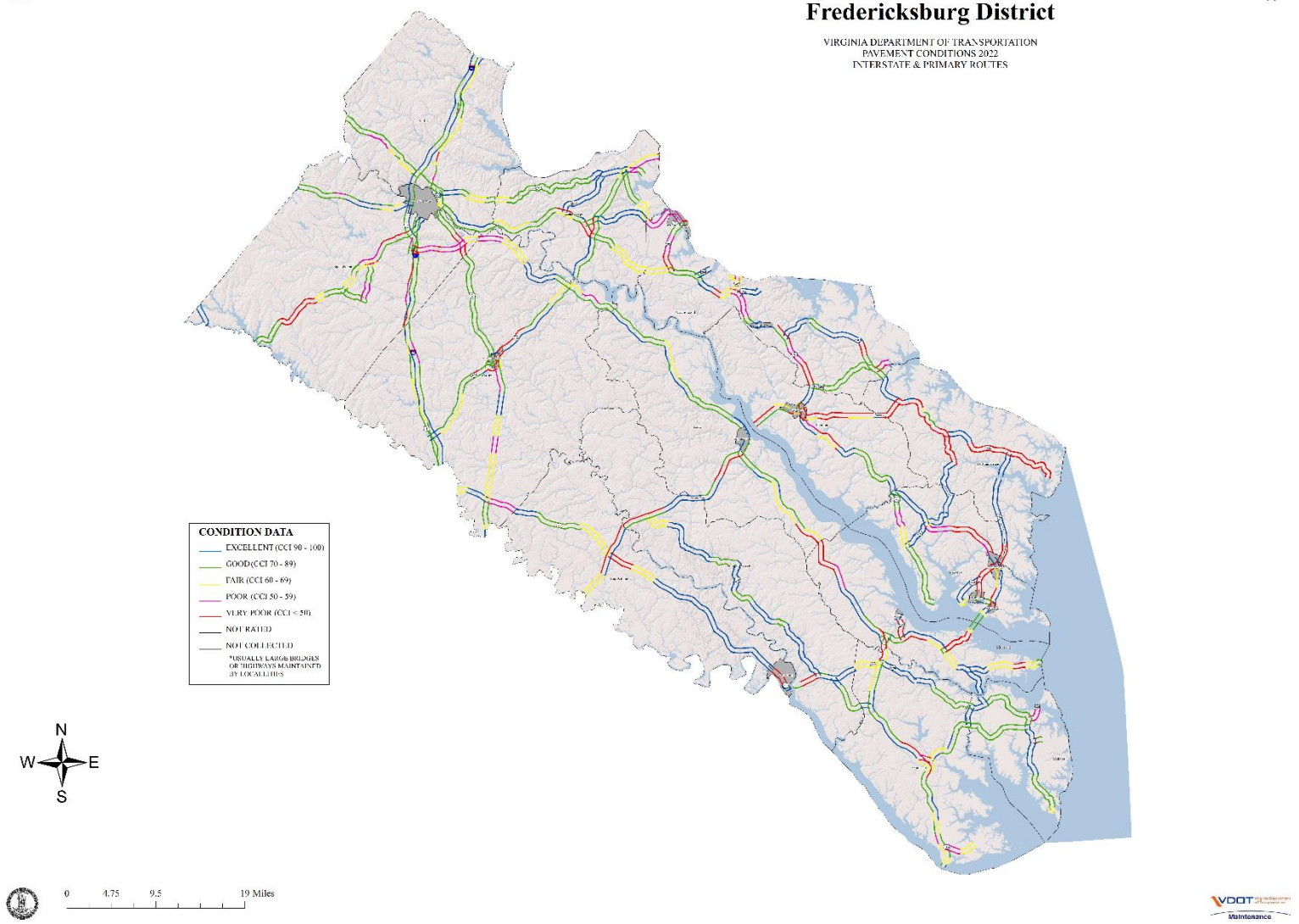



Salem District
VIRGINIA DEPARTMENT OF TRANSPORTATION
PAVEMENT CONDITIONS 2022
INTERSTATE & PRIMARY ROUTES
CONDITION DATA
EXCELLENT (CCI 90 - 100)
GOOD (CCI 70 - 89)
FAIR (CCI 60 - 69)
POOR (CCI 50 - 59)
VERY POOR (CCI < 50)
NOT RATED
NOT COLLECTED
*USUALLY LARGE BRIDGES OR HIGHWAYS MAINTAINED BY LOCALITIES
N
W
E
S
0
4
8
16 Miles
VDOT
Maintenance


Lynchburg District
VIRGINIA DEPARTMENT OF TRANSPORTATION
PAVEMENT CONDITIONS 2022
INTERSTATE & PRIMARY ROUTES
CONDITION DATA
EXCELLENT (CCI 90 - 100)
GOOD (CCI 70 - 89)
FAIR (CCI 60 - 69)
POOR (CCI 50 - 59)
VERY POOR (CCI < 50)
NOT RATED
NOT COLLECTED
USUALLY LARGE BRIDGES OR HIGHWAYS MAINTAINED BY LOCALITIES
N
W
E
S
0
5
10
20 Miles

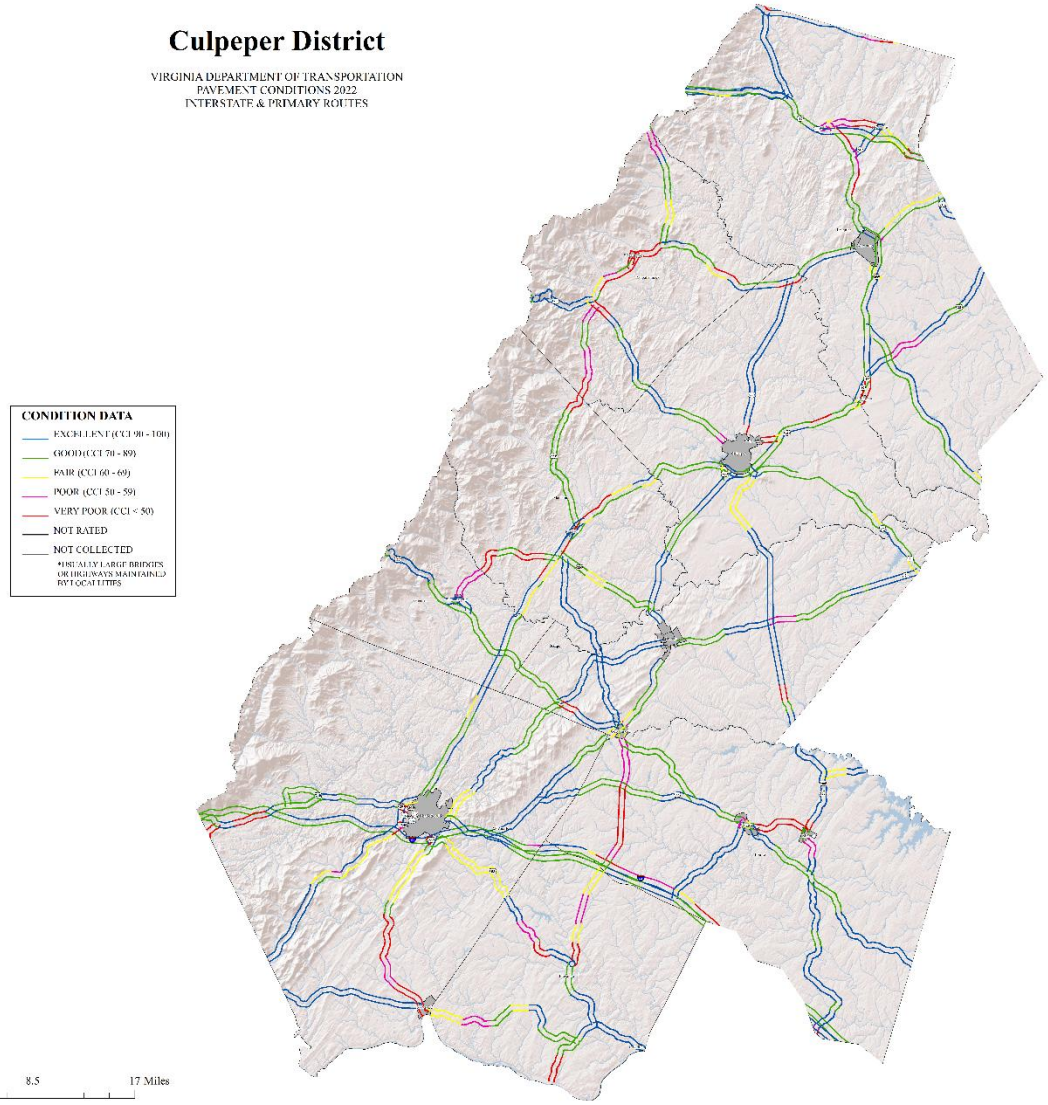

Richmond District
VIRGINIA DEPARTMENT OF TRANSPORTATION
PAVEMENT CONDITIONS 2022
INTERSTATE & PRIMARY ROUTES
CONDITION DATA
EXCELLENT (CCI 90 - 100)
GOOD (CCI 70 - 89)
FAIR (CCI 60 - 69)
POOR (CCI 50 - 59)
VERY POOR (CCI < 50)
NOT RATED
NOT COLLECTED
*USUALLY LARGE BRIDGES OR HIGHWAYS MAINTAINED BY LOCALITIES
N
W
E
S
0
5
10
20 Miles

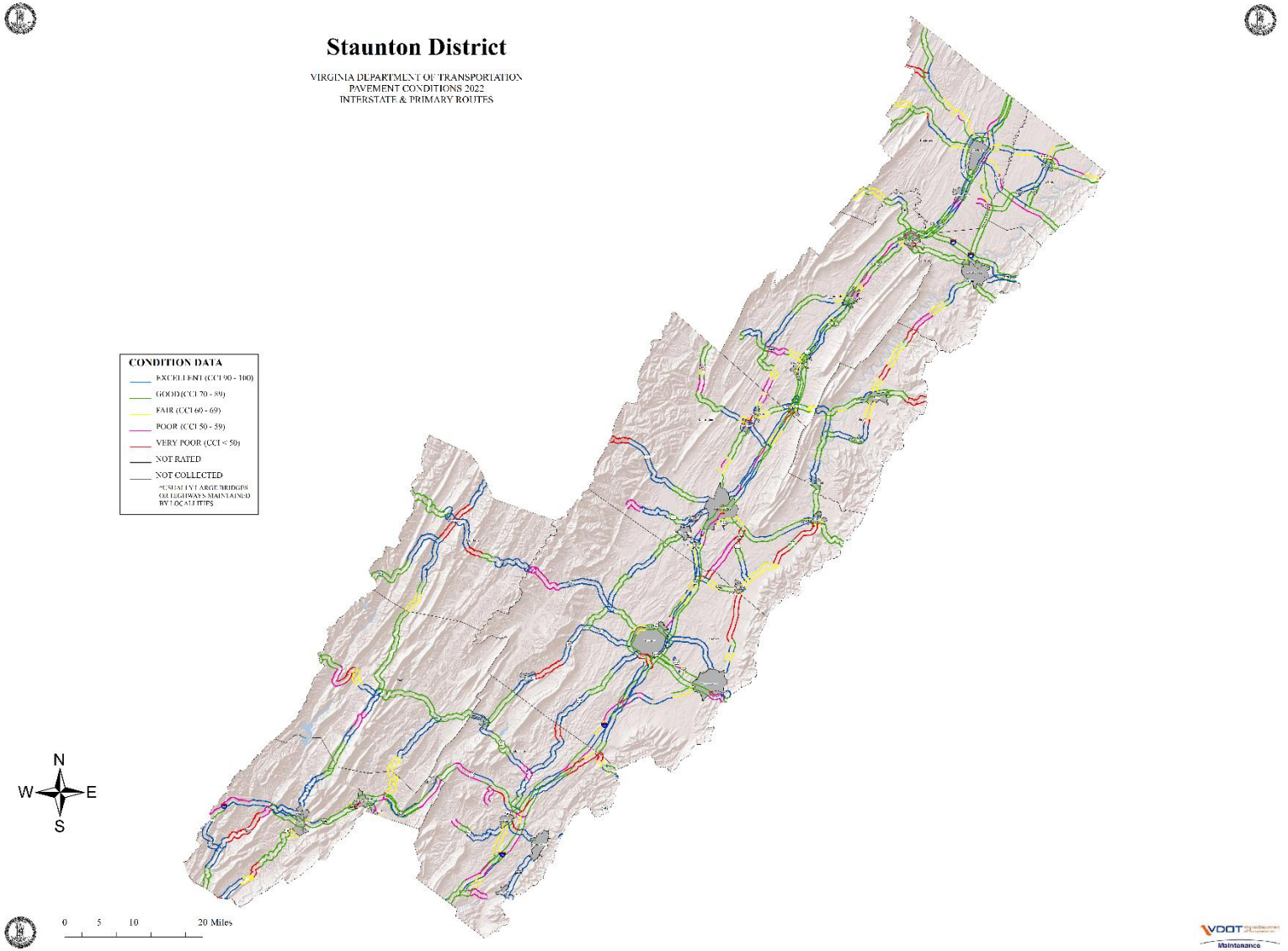

Hampton Roads District
VIRGINIA DEPARTMENT OF TRANSPORTATION
PAVEMENT CONDITIONS 2022
INTERSTATE & PRIMARY ROUTES
CONDITION DATA
EXCELLENT (CCI 90 - 100)
GOOD (CCI 70 - 89)
FAIR (CCI 60 - 69)
POOR (CCI 50 - 59)
VERY POOR (CCI < 50)
NOT RATED
NOT COLLECTED
*USUALLY LARGE BRIDGES OR HIGHWAYS MAINTAINED BY LOCALITIES
N
W
E
S
0
5
10
20 Miles

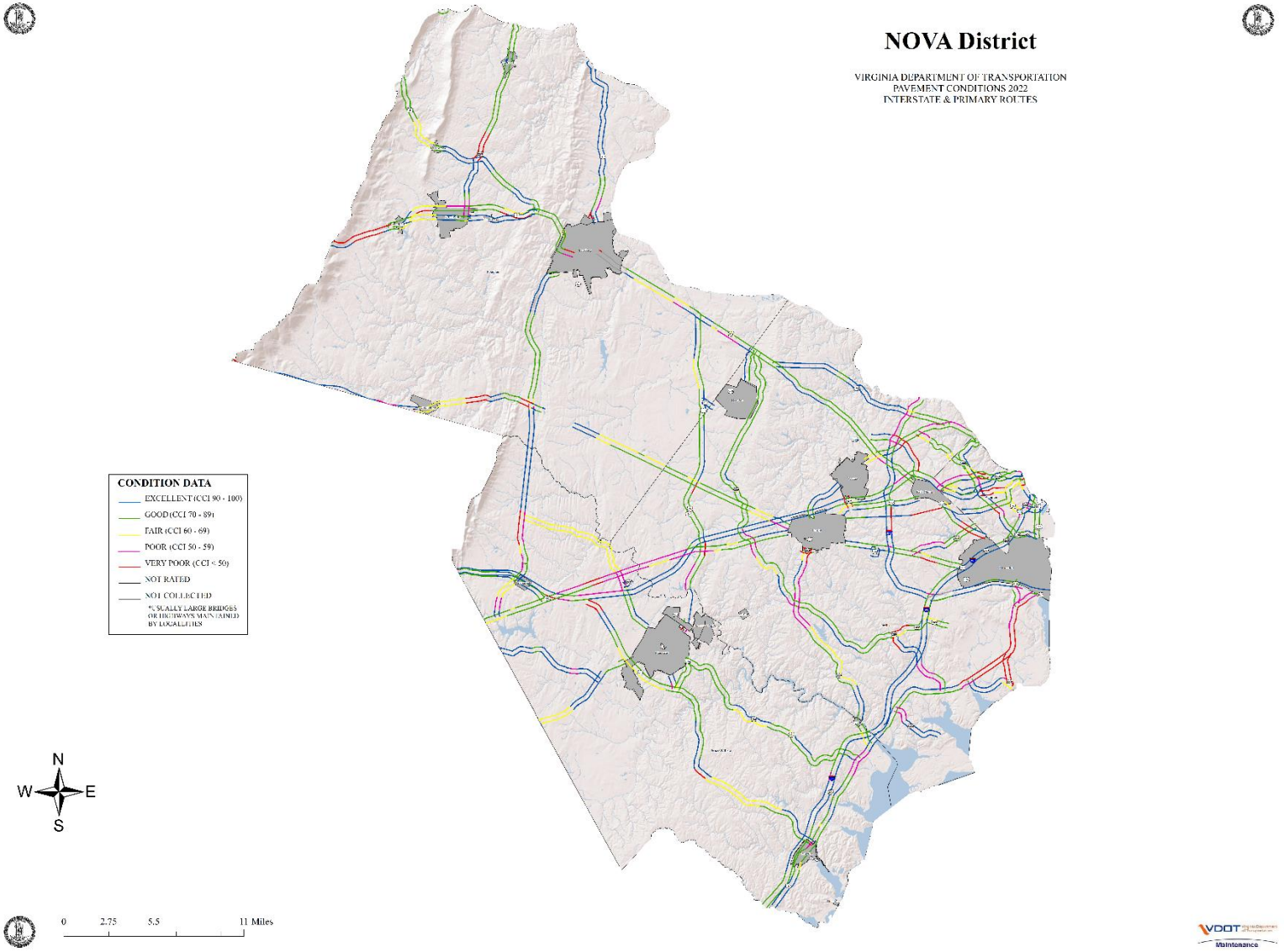

Fredericksburg District
VIRGINIA DEPARTMENT OF TRANSPORTATION
PAVEMENT CONDITIONS 2022
INTERSTATE & PRIMARY ROUTES
CONDITION DATA
EXCELLENT (CCI 90 - 100)
GOOD (CCI 70 - 89)
FAIR (CCI 60 - 69)
POOR (CCI 50 - 59)
VERY POOR (CCI < 50)
NOT RATED
NOT COLLECTED
*USUALLY LARGE BRIDGES OR HIGHWAYS MAINTAINED BY LOCALITIES
N
W
E
S
0
4.75
9.5
19 Miles
VDOT
Maintenance

Culpeper District

VIRGINIA DEPARTMENT OF TRANSPORTATION
PAVEMENT CONDITIONS 2022
INTERSTATE & PRIMARY ROUTES




Staunton District
VIRGINIA DEPARTMENT OF TRANSPORTATION
PAVEMENT CONDITIONS 2022
INTERSTATE & PRIMARY ROUTES
CONDITION DATA
EXCELLENT (CCI 90 - 100)
GOOD (CCI 70 - 89)
FAIR (CCI 60 - 69)
POOR (CCI 50 - 59)
VERY POOR (CCI < 50)
NOT RATED
NOT COLLECTED
*CSUAI LVL ARGE BRIDGES
ON HIGHWAYS MAINTAINED
BY LOCALITIES
N
W
E
S
0 5 10 20 Miles


NOVA District
VIRGINIA DEPARTMENT OF TRANSPORTATION
PAVEMENT CONDITIONS 2022
INTERSTATE & PRIMARY ROUTES
CONDITION DATA
EXCELLENT (CCI 90 - 100)
GOOD (CCI 70 - 89)
FAIR (CCI 60 - 69)
POOR (CCI 50 - 59)
VERY POOR (CCI < 50)
NOT RATED
NOT COLLECTED
*% SCALLY LARGE BRIDGES OR HIGHWAYS MAINTAINED BY LOCALITIES
N
W
E
S
0
2.75
5.5
11 Miles