IOWA INFRASTRUCTURE CONDITION EVALUATION ICE

2015-2016 HIGHWAY PLANNING REPORT

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Iowa Infrastructure Condition Evaluation

Highway Planning Report

2015-2016

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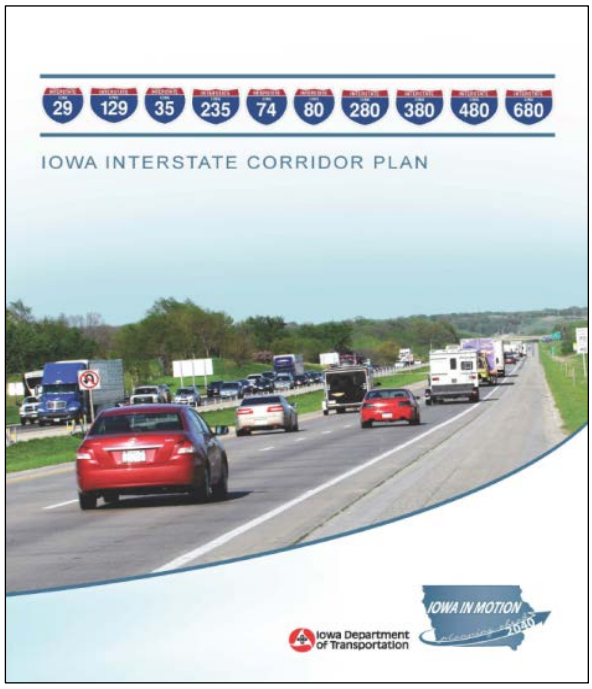
1. Introduction



2013 Interstate Corridor Plan

To aid in the evaluation of the Primary Highway System, the Iowa DOT has developed a tool that measures the current condition of roadway segments using a single composite rating calculated from seven different criteria. The Infrastructure Condition Evaluation (ICE) tool is based on the result of merging seven individual criteria using a linear overlay process that includes Iowa DOT's in-house Geographic Information Management System (GIMS) and Pavement Management Information Systems (PMIS). This evaluation was initially the basis for development of the Interstate Corridor Plan and now has been expanded to cover Iowa's entire Primary Highway System. Development of the ICE tool relied heavily on the use of a Linear Referencing System (LRS), which is a spatial referencing component that utilizes reference posts to calculate the segmentation found in ICE.

Through the linear overlay process, a single table is created and stored in Oracle Spatial, the Iowa DOT's data warehouse, which allows for easy querying and use of LRS for visualization in Geographic Information Systems (GIS). This table is then further analyzed and processed using Structured Query Language (SQL) to achieve data normalization, weighting, and composite rating as determined by input from internal stakeholders. The results from the ICE tool are presented in this planning report and through ArcGIS Online.

1.1 Purpose and need for an annual report

Beginning with the first discussions related to the development of the ICE tool, there was a dominant theme present in conversations with key department stakeholders. A statement often heard was that staff needed more information to help answer the question, "Where do we need to be looking to next, and when?" There was a strong desire to be able to use this tool to help populate that initial pool of candidate segments that would progress toward further study, as discussed later in this chapter. It was this theme that framed the need for the original interstate analysis and ultimately guided its development.

The purpose of the initial Interstate Corridor Evaluation was to provide the Iowa DOT with an initial screening and prioritization of interstate corridors/segments. This process evaluated the interstate system, independent of current financial constraints, using a select group of criteria weighted in terms of their relative significance. The resulting segments would then represent those areas that should be considered for further study (e.g., environmental, design, engineering), with the possibility of being considered for programming by the Iowa Transportation Commission.

The expansion of the ICE tool now includes the entire primary system while addressing an identical set of goals and objectives, with the core goal being to serve as an initial screening and prioritization tool. The newly named Infrastructure Condition Evaluation reflects the change from interstate-only segmentation to the entire Primary Highway System, and analyzes corridors defined by natural road breaks allowing for a more comprehensive look at the criteria that comprise the final ICE rating. While this initial screening will assist the Iowa DOT in identifying those areas that should be considered for further study, the report will not identify specific projects or alternatives that could be *directly* considered as part of the programming process.

With the production of this annual report, Office of Systems Planning attempted to objectively apply data analysis using the Iowa DOT's internal data sources to identify corridors that are well suited for continuous evaluation on an annual basis. Studying and reporting our results annually allows for timely analysis and the ability to provide yearly trend data within the document. As stakeholders' needs continue to evolve, the ICE analysis provides the appropriate means for studying the changes on Iowa's primary road network.

1.2 Current and future uses

The ICE data included in this report provides analysis on corridors throughout Iowa and can also serve as a valuable input to a number of different processes within the Iowa DOT. The report provides a simple breakdown of data to confirm and enhance some of the programming analysis that has already been conducted. Some of the other current uses of the ICE tool include the following.

VCAP

The Value, Condition, and Performance (VCAP) matrix is a highway analysis tool developed to leverage the multiple tools available at Iowa DOT to help identify and prioritize candidates for highway freight improvements on the Primary Highway System. The analysis uses INRIX-identified bottlenecks and results of the freight mobility issue survey performed by the Iowa DOT to populate a list of candidate locations. These projects are ranked based on the bottleneck occurrences and/or

prioritization and represent the performance portion of the VCAP tool. Then, projects are evaluated using the Iowa Travel Analysis Model (iTRAM) to measure the vehicle miles traveled (VMT)/ vehicle hours traveled (VHT) cost-reduction benefit. This component serves as the value portion of the VCAP analysis. Lastly, ICE was used to evaluate the current conditions at each candidate location by selecting and analyzing the segmentation from the initial list of INRIX bottleneck locations.

After each candidate location was assigned a Value, Condition, and Performance rating, each was ranked using those values for each of the three categories. The average of these three rankings was calculated and the candidate locations were assigned an overall priority rank. If two locations had the same average ranking, total truck traffic at the location was used as a tiebreak.

Transportation Systems Management and Operations

The Office of Traffic Operations has developed a Transportation Systems Management and Operations (TSMO) plan which utilizes and expands upon the ICE methodology for data analysis. Originating from the ICE tool structure, the ICE-Ops concept utilizes a similar normalization and weighting structure and composite scoring approach to compare 21 Interstate corridors as initially defined by the Interstate Corridor Plan. The tool is meant to provide a detailed analysis for each interstate corridor using nine different criteria, which include:

- All bottleneck occurrences per mile
- Freight bottleneck occurrences per mile
- Incident frequency per mile
- Crash rate
- Planning Time Index (PTI)
- Weather sensitive corridor mileage
- Event center buffer mileage
- Average Annual Daily Traffic (AADT)
- ICE rating

A final composite score is then used to provide a relative ranking for each corridor. Similar to the ICE tool, raw data from each criterion is maintained in an Excel table and summarized in a final output table through the use of SQL.

Corridor studies

While the corridors in this document were defined by natural breaks in the primary highway network, they can be adjusted to meet specific needs. Shortening or lengthening the corridors is a simple

process that can be conducted in Geomedia, the Iowa DOT's GIS mapping software. The segments would be shown spatially and data attributed to the individual segments would be reflected in an Excel spreadsheet. As a result, the ICE tool can provide tremendous benefit to any sort of corridor study effort.

1.3 Data access

The primary location of the ICE data outside of this document can be found on the Iowa DOT Web map powered by ArcGIS online (ICE Web map link). Within this Web map, users can explore the ICE data across the entire system and display those results visually. By clicking on the line features within the Web map, the GIS platform displays a popup box that contains the route, county, length, and the normalization values of each of the seven criteria. Each of the data layers contains a description of the data and can be toggled on and off to display the ICE ratings by individual criteria.

ICE Web map portal

The Web map is intended to serve as a quick, visual reference for the public and internal users. For those seeking a simple answer to their condition questions across the state, the Web map would be the recommended medium.

Data availability

Through the use of SQL and Geomedia, the data was grouped and organized in a series of Excel spreadsheets. These spreadsheets contain all of the roughly 28,000 ICE segments across the state and make up the 283 corridors defined later in the report. Other raw data available for each record can be found in Table 1.1.

Table 1.1: Data fields included in ICE results

Data fields	
Area type including suburban, incorporated city, and rural	National Highway System (NHS) segments
Area type that classifies urban, suburban, or rural segments	Number of lanes
Corridor length in miles	Number of structures
County name and number	Planning class
Directional ICE ratings	Route name and number
Divided highway classification	Segment capacity bi-directional
Federal functional class	Seven criteria normalizations weighted averages
GIS maps and workspace	Urban area and name
Level of service	V/C ratio
Length in miles	Volume and capacity
Maintenance district, garage, and residency	Weighted averages across the corridor

Data requests

With the expansion of the ICE results, the Iowa DOT's Office of Systems Planning has created a series of Excel spreadsheets to house all of the data used in the analysis. This includes the selection of corridors containing all of the associated data as well as some simple graphs and calculations. Since this data has already been processed, the office has the flexibility to make easy adjustments to the datasheets to fulfill requests in a timely manner.

Another example of how this data can be distributed is through the use of Geomedia. For more advanced analysis, Geomedia allows the user to have access to all fields contained in the ICE results while serving as a visualization tool. A static shapefile can be provided to users who are interested in performing their own analysis. A few examples of how queries can execute the more advanced selection of segmentation are:

- Selecting all segments with ICE ratings less than 60
- Select all segments with ICE ratings less than 60 and located in Story County
- Select all segments on I-80 that have segments with ICE ratings less than 60
- Select all segments with structure sufficiency values less than 5
- Selecting all segments with ICE ratings less than 60 and annual average daily traffic (AADT) normalization values less than 5

These types of requests can be fulfilled by the Office of Systems Planning.

For mapping needs outside the standard production included in this document, the mapping request process is similar. The map templates used for the district and statewide maps can be updated to show a specific area or a specific corridor or segment(s). The standard template is a grey-scale base map that can be changed to something such as an aerial imagery base map to show a part of the state in more detail.

Overall, a variety of different data requests are anticipated as the ICE tool continues to gain exposure and priorities evolve. In most cases, these requests can be performed in a timely manner due to the data processing already completed. However, for more complicated requests, a reasonable time frame will be established for data completion, which will be determined based on the priority of requests submitted to the Office of Systems Planning.

2. Evaluation criteria and process

When evaluating Iowa's entire Primary Highway System, the data pool used in the previous primary highway analysis remained the same. The updated ICE iteration from 2014 saw a slight change in segmentation from roughly 30,000 segments to 28,000. While the update includes ramp geometry on the interstate and primary roads, there is no data associated with these segments. The following sections will summarize the evaluation criteria data that drives the final ICE composite score.

2.1 Data selection and significance

The data available for use in evaluating highway segments includes information contained in hundreds of fields across dozens of tables. The data is also maintained in several different locations in-house through GIMS in Oracle Spatial. Each category of data was considered for its value in the evaluation, but ultimately only seven were selected to serve as the core evaluation criteria and foundation of this analysis. These criteria, which are defined in detail in the ensuing section, include the following.

- Annual average daily traffic (AADT), passenger count
- AADT, single-unit truck count
- AADT, combination truck count
- Congestion Index value
- International Roughness Index (IRI) value
- Pavement Condition Index (PCI) rating
- Structure Inventory and Appraisal (SIA) sufficiency rating

While each of these individual criteria provides a different component, they were chosen due to their collective utility in evaluating the service and structural condition of a roadway segment. As input was gathered during the development of the tool, these criteria very quickly separated themselves from the remaining data. This clear distinction aligned well with one of the initial goals for the evaluation tool, which was to ultimately derive a single composite condition rating for each roadway segment that factored in a selection of the most critical evaluation criteria.

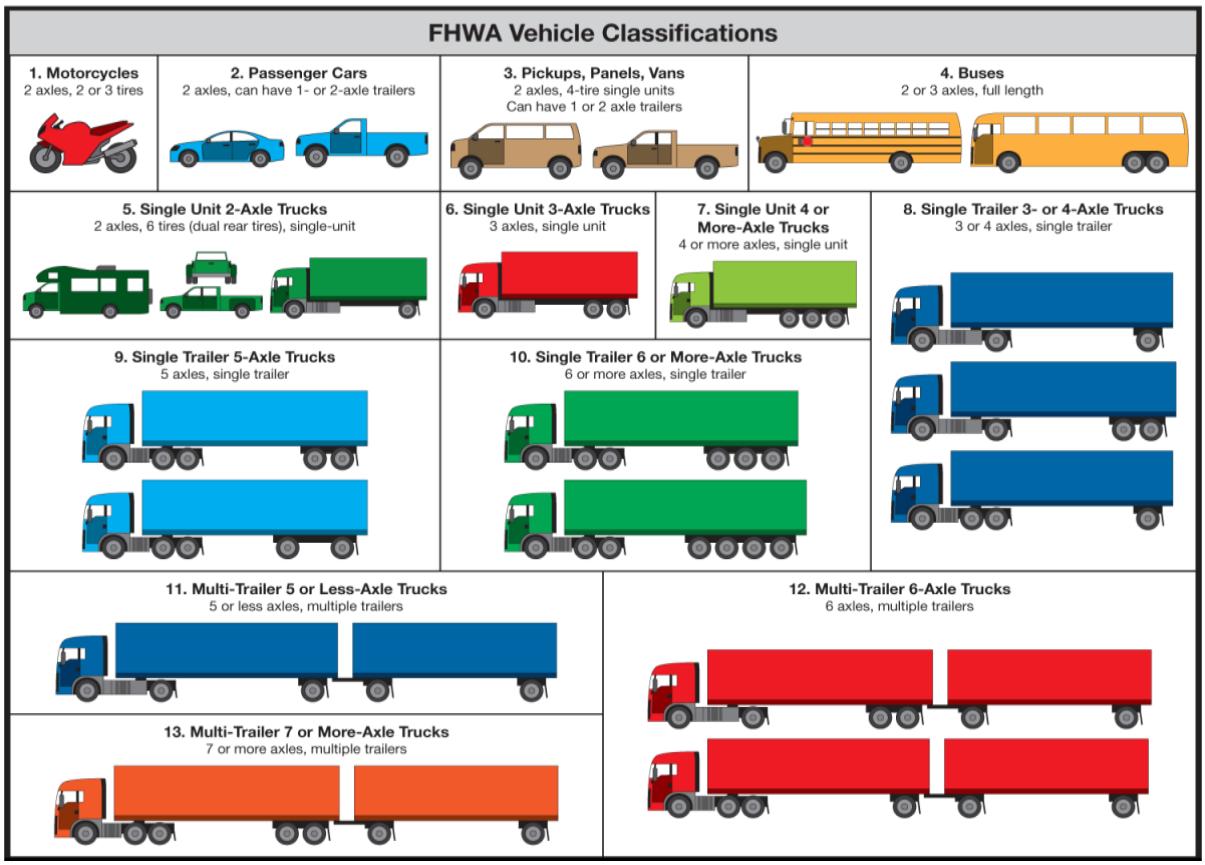
The following information includes a brief definition of the selected data and explains how it is collected and summarized.

AADT

AADT is a general unit of measurement for traffic, which represents the annual average daily traffic that travels a roadway segment. Vehicular traffic counts are collected on a short-term duration using portable counting devices and on a long-term duration using permanent counting devices. Short duration counts ensure geographic diversity and coverage while long-term counts help understand time-of-day, day-of-week, and seasonal patterns. Long-term counts are also used to accurately adjust short duration counts into accurate annual estimates of conditions.

The Federal Highway Administration (FHWA) Traffic Monitoring Guide classifies traffic into 13 categories and can be summarized into fewer categories depending on the desired summary level. The 13 categories are illustrated in Figure 2.1.

Figure 2.1: FHWA 13-Classification



Source: FHWA

In Iowa, the standard traffic count summary categories include passenger car and motorcycles, single-unit trucks, and combination trucks. Generally, and for the purposes of this report, passenger traffic

includes vehicle classifications 1 through 3, single-unit truck traffic includes classifications 4 through 7, and combination truck traffic includes classifications 8 through 13.

Congestion index

The congestion index is a measure that characterizes operational conditions within the flow of traffic. This measure is expressed as a volume-to-capacity (V/C) ratio for a roadway segment. The ratio is an indicator of highway capacity sufficiency, where it is estimated that a facility is congesting as V/C approaches a value of 1. This index emphasizes the relative congestion of primary highway segments to one another.

For the purposes of this report, the numerator or volume portion of the V/C ratio is derived from the most recent observed daily traffic data for segments on the primary highway system. Truck traffic is increased by a factor of 1.5 to account for this vehicle type's more significant impact on congestion. Total traffic is then halved to account for directionality (assumed to be 50 percent in each direction) and then converted to an hourly rate by applying a peak-hour factor that is based on each segment's area type (i.e., rural or urban) and data from the Iowa DOT's automatic traffic recorders.

The denominator or capacity portion of the ratio is calculated in a manner that is consistent with the methodology used for iTRAM, as well as guidelines contained in the Transportation Research Board's *Highway Capacity Manual*. The calculation establishes a capacity by applying a per-lane capacity figure to the number of through lanes on each segment, ultimately providing a reasonable planning estimate of a segment's capacity. The source of the data used for these calculations at the Iowa DOT is GIMS.

IRI value

IRI is a numerical roughness index that is commonly used to evaluate and manage road systems. It is calculated using measured longitudinal road profile data to determine units of slope of a roadway segment. The profile data can be obtained using anything from traditional surveying equipment to more modern inertial profiling systems. There is no defined upper limit to IRI.

In Iowa, IRI is primarily measured on a rotating two year cycle using what is known as a profilometer. This tool utilizes a laser in combination with an odometer and an inertial unit, which establishes a reference plane against which the laser can measure distance. Profilometers are able to collect data at highway speed, typically sampling the surface at intervals of one to six inches. The data collected by the profilometer is used to calculate the IRI, expressed as inches/mile or meters/kilometer.

PCI rating

PCI is a numerical index developed by the United States Army Corps of Engineers and used to indicate the condition of pavement. The index is based on a field survey of the pavement and is expressed as a value between 0 and 100, with 100 representing excellent condition. Generally, the surveying process involves breaking the pavement section into sample units; determining how many units are to be tested; recording the type, extent, and severity of pavement distress; calculating a value for these distresses; and then subtracting that value from a base value to derive the PCI value.

To adapt to the changing conditions of the system, the Iowa DOT periodically evaluates the PCI formula and makes adjustments if needed to better reflect the systemwide roadway conditions. Most recently, Iowa DOT made the switch from PCI version 2 to version 2.1 because some data elements were no longer able to be collected in the same manner and relied on formulas to compensate for missing segment data. **Note: The *2014-2015 Highway Planning Report* contains data using PCI version 2 while the 2015-2016 report contains the updated 2.1 version, which aided in higher average systemwide PCI ratings.**

As Figure 2.2 illustrates, the appearance of a pavement is not always an indicator of its underlying condition, which is also considered in PCI. Many different variables factor into the Iowa DOT's calculation of PCI on roadway segments, including age, percent of life used, high/moderate/low severity longitudinal cracking, IRI, aggregate class durability, pavement thickness, friction value, moderate severity patching, total asphalt depth, relative structural ratio, and base thickness. Ultimately, the condition index is a reasonable indicator of the pavement condition of a network.

Figure 2.2: PCI Roadview photos

SIA sufficiency rating

SIA is a method of evaluating roadway bridge structures by calculating four separate factors to obtain a numeric value that is indicative of a structure's sufficiency to remain in service. These factors include structural adequacy and safety, serviceability and functional obsolescence, and essentiality for public use of the structure. From there, various reductions are then factored into the rating. Table 2.1 highlights the information that factors into the sufficiency rating.

The sufficiency rating is then calculated using the following formula: S1+S2+S3-S4. A value of 100 represents a wholly sufficient structure, while a value of zero represents an insufficiency or deficient structure. The full structure inventory contains dozens of fields of data, which are used to meet several federal reporting requirements that are set forth in the National Bridge Inspection Standards (23 CFR 640.3). The information is collected through on-site inspections, which are conducted at regular intervals not to exceed 24 months. The source of structure sufficiency rating data at the Iowa DOT is GIMS.

Table 2.1: Structure inventory and appraisal sufficiency rating

Summary	Alias	Weight	Item description
Structural Adequacy & Safety	S1	55%	Superstructure
			Substructure
			Culverts
			Inventory Ranking
Serviceability and Functional Obsolescence	S2	30%	Lanes on Structure
			AADT
			Approach Roadway Width
			Structure Type, Main
			Bridge Roadway Width
			VC over deck
			Deck Condition
			Structural Evaluation
			Deck Geometry
			Under clearances
			Waterway Adequacy
			Approach Roadway Alignment
			STRAHNET Highway Designation
Essentiality for Public Use	S3	15%	Detour Length
			AADT
			STRAHNET Highway Designation
Special Reductions	S4	13%	Detour Length
			Traffic Safety Features
			Structure Type, Main

Source: Iowa DOT

Data sources, GIMS, and limitations

It should be noted that it was decided to initially base the evaluation on current data, meaning forecasted data would not be factored in. The primary reason for this was the current inability to forecast all of the selected criteria. While the option to factor in forecasted data for just some of the criteria was considered, it was decided that an evaluation based purely on current data was more rational and defensible.

In this iteration of ICE, the GIMS snapshot (data cutoff date) was Oct.1, 2015. This means that all of the current data included in the analysis, including AADT, were based on 2014 information. The data snapshot serves as a final cut for this annual analysis and is not updated beyond that point.

Supplementary data and considerations

While only seven criteria were selected for the evaluation of road segments, additional supplementary data has been included in this report and through the Web map. This supplementary data currently includes:

- Corridor level crash rate
- Structurally deficient/functionally obsolete bridges
- Fatal and major injury crashes (last five years)
- Five Year Program projects

Based on stakeholder input, safety is an important factor that aids in a more complete evaluation of a primary roadway. To address the safety component, a segment level crash analysis provided by the Iowa DOT's Office of Traffic and Safety was incorporated into this report. Upon completion of this analysis, future ICE discussions will address how to properly manage the use of the segment level crash data.

2.2 Linear overlay and system segmentation

As previously noted, the core of this report is the evaluation tool itself. This tool uses data from both the Iowa DOT's GIMS and PMIS. This data is then merged through the LRS using linear overlay functions to create a single table of data, which is stored in the Iowa DOT's data warehouse, Oracle spatial.

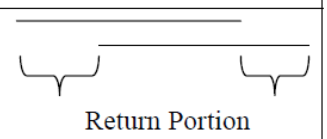
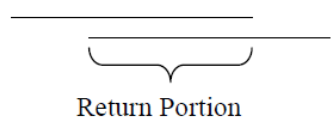
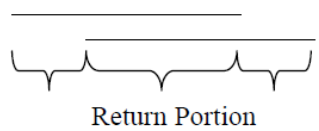
This table is then further analyzed and processed using SQL to achieve the data normalization, weighting, and composite rating outlined in Chapter 3 *Corridor evaluation*. From that point, segment prioritization begins to take shape as the data is prepared for visual representation using GIS as the raw data is processed in Excel.

System segmentation

The linear overlay process returns new segmentation based on specified attributes from the two input spatial data sets. It does this using a datum reference that must be produced for each input spatial data set beforehand. A datum reference can be produced in a few different ways; one example would be using coordinate (i.e., latitude and longitude) and route.

The union operation merges both spatial data sets together and creates segment breaks at every location where the specified attributes break in the previously independent data sets. In applying the analysis used in this report, the primary system was divided into more than 28,000 segments using a combination of the union and intersection operators (see Figure 2.3).

Figure 2.3: Linear overlay functions

Operator	ID	Returns	Visual Definition
Difference	1	Linear portion of an input event and reference event that do not overlay each other.	
Intersection	2	Linear portion of an input event that completely overlays the reference event.	
Union	3	Union of the difference and intersection sets.	

2.3 Normalization and weighting

To ultimately develop a composite rating that could be assigned to roadway segments, a statistical process was used that normalized criteria values to a common scale and then applied an appropriate weighting or multiplier. This process is described below and highlighted in Table 2.2.

Value ranges

The first step in the process was to examine the range of possible values for the seven evaluation criteria identified in Section 2.1. For three of the seven criteria, there was either a logical scale or a rigid scale that could be used. The ranges for these criteria are noted below.

- Congestion index: 0 - 1.00+
- PCI: 0 - 100
- SIA sufficiency rating: 0 - 100

For the remaining four criteria, the range of possible values did not necessarily have a strict upper bound. For these criteria, the upper bound was set at a level where only five percent of highway segments would currently exceed this value. The logic behind this is explained in the following subsection. The resulting ranges for these criteria are noted below.

- AADT, combination truck count: 0 - 5,230+
- AADT, passenger count: 0 - 33,500+
- AADT, single-unit truck count: 0 – 1,080+
- IRI: 0 - 195+

This step is represented in the first two columns of Table 2.2.

Normalization to common scale

The next step in the process was to normalize the ranges of possible values for the evaluation criteria to a common scale. This was done to establish a common base to which the weighting would eventually be applied. With the goal of ultimately creating a maximum composite rating of 100, a common scale of 1 to 10 was used for the seven criteria.

Another goal was to limit the summarization or "washing out" of data in this normalization process. Therefore, the ranges of possible values identified previously were distributed across the 1 to 10 scale in equal increments. This was also why the upper bounds for combination truck count, passenger count, and single-unit truck count were set at a level where only five percent of segments by mileage of the primary system would exceed this value, thus allowing for a high level of distinction between segments.

The ranges of possible values were assigned to the 1 to 10 scale in such a way that a lower value indicates poorer conditions/greater need/higher priority, and vice versa. For example, the lowest PCI values would be assigned a 1 and the highest PCI values would be assigned a 10. For other criteria, such as IRI, the scale was flipped where the highest IRI values would be assigned a 1 and the lowest IRI values would be assigned a 10. This step is represented in the third and fourth columns of Table 2.2.

Weighting and multipliers

Once the seven criteria had been normalized to a common scale, appropriate weighting could be examined. Again, given the goal of creating a maximum composite rating of 100, weighting was initially viewed in terms of a percentage. In other words, criteria that would have greater influence on the composite rating were assigned a higher percentage, and vice versa. Initial percentages were assigned following working group discussions, with minor refinements made after feedback was solicited from a broader group of internal stakeholders.

From these percentages, which summed to 100, multipliers were derived that would ultimately allow for a maximum composite rating of 100. The percent values were simply divided by 10 to identify the

multipliers for each criterion. For example, the structure sufficiency rating was given a weighting of 25 percent and a multiplier of 2.5. These multipliers would then be applied to the normalized value from the 1 to 10 scale for each criterion. For segments without a bridge, the sufficiency rating received a normalized value of 10, meaning a segment with no structures would receive no additional priority for that particular criterion.

After the multipliers are applied to each normalized value across all seven criteria, the values are summed to calculate the composite rating. This step is represented in the final three columns of Table 2.2. The process was then applied to every segment of the Primary Highway System, allowing for the comprehensive screening and prioritization that was initially envisioned.

It should be noted that, as part of the vetting process outlined in this section, a basic sensitivity analysis was conducted to measure the effects of different weighting. While the working group was pleased with the output that resulted from the weighting identified in Table 2.2, there was a desire to examine other weighting options and, specifically, the effects of shifting weight from the condition criteria to the traffic and congestion criteria. Generally, the results were not desirable as this shift resulted in an unreasonable bias toward urban areas and even urban segments that were recently improved. From these discussions, the working group concluded that the weighting presented in Table 2.2 was most appropriate.

AADT normalization and weighting structure

Due to the variation of AADT across the statewide primary system, a one size fits all approach would not work for developing a range of values used to calculate the normalizations. Thus, a different approach from the original weighting structure had to be taken. To address the variation of AADT across the state, the range values were broken up by the following route types.

- Interstate
- Non-interstate divided
- Non-divided

Each range for the three different route types was calculated based off of the top five percent of segments by mileage. After sorting by AADT, a cumulative sum of the mileage was calculated up to the five percent value of the total mileage. The associated AADT value at the five percent mark became the upper threshold. That AADT value was then divided by nine to define the different normalization breaks. Table 2.2 gives a detailed look at the breakout of the ICE criteria weighting structure.

Table 2.2: Infrastructure Condition Evaluation (ICE) normalization and weighting structure

		Interstate	Non-Interstate Divided	Non-Divided				
Criteria	**Value Range**	**Range**	**Range**	**Range**	**Normalized Value**	**Weighting**	**Multiplier**	**Max Score**
PCI	0 - 100	1 - 10			1	25%	2.5	25
		11 - 20			2			
		21 - 30			3			
		31 - 40			4			
		41 - 50			5			
		51 - 60			6			
		61 - 70			7			
		71 - 80			8			
		81 - 90			9			
		91 - 100			10			
Structure Sufficiency Rating	0 - 100	1 - 10			1	25%	2.5	25
		11 - 20			2			
		21 - 30			3			
		31 - 40			4			
		41 - 50			5			
		51 - 60			6			
		61 - 70			7			
		71 - 80			8			
		81 - 90			9			
		91 - 100			10			
IRI	0 - 195+	>195			1	15%	1.5	15
		173.33 - 195			2			
		151.67 - 173.33			3			
		130 - 151.67			4			
		108.33 - 130			5			
		86.67 - 108.33			6			
		65 - 86.67			7			
		43.33 - 65			8			
		21.67 - 43.33			9			
		0 - 21.67			10			
Combination Truck AADT	0 - 5000+	>5050	>860	>240	1	15%	1.5	15
		4489-5050	764-860	213-240	2			
		3928-4489	669-764	187-213	3			
		3367-3928	573-669	160-187	4			
		2806-3367	478-573	133-160	5			
		2244-2806	382-478	107-133	6			
		1683-2244	287-382	80-107	7			
		1122-1683	191-287	53-80	8			
		561-1122	96-191	27-53	9			
		0-561	0-96	0-27	10			
Single-Unit Truck AADT	0 - 1200+	>860	>350	>120	1	5%	0.5	5
		764-860	311-350	107-120	2			
		669-764	272-311	93-107	3			
		573-669	233-272	80-93	4			
		478-573	194-233	67-80	5			
		382-478	156-194	53-67	6			
		287-382	117-156	40-53	7			
		191-287	78-117	27-40	8			
		96-191	39-78	13-27	9			
		0-96	0-39	0-13	10			
Passenger AADT	0 - 35000+	>27050	>10610	>2680	1	5%	0.5	5
		24044-27050	9431-10610	2382-2680	2			
		21039-24044	8252-9431	2084-2382	3			
		18033-21039	7073-8252	1787-2084	4			
		15028-18033	5894-7073	1489-1787	5			
		12022-15028	4716-5894	1191-1489	6			
		9017-12022	3537-4716	893-1191	7			
		6011-9017	2358-3537	596-893	8			
		3006-6011	1179-2358	298-596	9			
		0-3006	0-1179	0-298	10			
Congestion Index (V/C)	0 - 1.00+	>1.00			1	10%	1.0	10
		0.89 - 1.00			2			
		0.78 - 0.88			3			
		0.67 - 0.77			4			
		0.56 - 0.66			5			
		0.45 - 0.55			6			
		0.34 - 0.44			7			
		0.23 - 0.33			8			
		0.12 - 0.22			9			
		0 - 0.11			10			
						100%		**100**

Safety factor addition

Using the Office of Traffic and Safety's crash data from 2010-2014, a segment level crash database was created and assigned a crash rate (crashes per hundred-million Vehicle-miles-traveled (VMT) from 2010 - 2014), among other data, to each segment within the Primary Highway Network. The calculated crash rate was based on a formula involving crashes per 100 million vehicle-miles of travel, multiple years of crash data, length of roadway, and AADT.

To define the normalization value, a threshold for the average weighted crash rate by corridor was defined in a similar approach as the AADT normalization process described in the previous section. Each range for the three different route types was calculated based off of the top five percent of segments by mileage. After sorting crash rate largest to smallest, a cumulative sum of the mileage was calculated up to the five percent value of the total mileage. The associated crash rate value at the five percent mark become the upper threshold and was divided by nine to define the normalization breaks. This process was repeated for each route type. This process was vetted as a sufficient evaluation of crash rate within the TSMO ICE-Ops analysis. Table 2.3 shows the normalized values for crash rates by route type.

This criterion is not directly included within the calculation of the final composite score and is meant to serve as an indicator for measuring safety at the corridor level within this report.

Table 2.3: Safety crash rate normalized and weighted structure

	Interstate	Non-interstate divided	Non-divided	Normalized value
Corridor Crash Rate 0 - 520+	>128	>263	>520.5	1
	118 - 128	234 – 263	463 - 521	2
	109 - 118	205 – 234	405 - 463	3
	99 - 109	175 – 205	347 - 405	4
	89 - 99	146 – 175	289 - 347	5
	80 - 89	117 – 146	231 - 289	6
	70 - 80	88 – 117	174 - 231	7
	60 - 70	58 – 88	116 - 174	8
	51 - 60	29 – 58	58 - 116	9
	0 - 51	0 - 29	0 - 58	10

2.4 Corridor definition

To expand upon the existing analysis of the Interstate Corridor Plan, a selection of corridors was created based on route segmentation. Each of the 283 corridors was derived from the following criteria.

National Highway System (NHS) corridors segmented at:

1) Interstate.
2) City with a population of 20,000 or greater (consistent with Commercial and Industrial Network definition).
3) Transition from two-lanes to four-lanes or vice versa.
4) Duplicate routes if current corridor is not the "primary through route."
   a) Criteria for duplicate route "primary through routes."
      i) Interstate routes take precedence over US routes.
      ii) US routes take precedence over Iowa routes.
      iii) Lower route numbers take precedence over higher route numbers.

Non-NHS corridors segmented at:

1) Interstate.
2) NHS routes.
3) See number 4 above.

These corridors serve as an analytical tool for evaluating roadways between natural breaks on the primary system. Table 2.4 shows a brief summary of these corridors by the number in each category.

Table 2.4: Corridor distribution by route type

Route system	Number of corridors
NHS	122
Interstate	21
Non-interstate divided	39
Non-divided	62
Non-NHS	161
Divided	3
Non-divided	158
Total	**283**

3. Corridor evaluation

The following section provides the results of the corridor analysis. Through the process of a weighted average, each corridor contains a value for each criterion that represents the average across multiple segments that make up the entire corridor. This analysis is meant to provide the reader with a more in-depth look at each individual criterion driving the final ICE rating of each corridor.

3.1 Iowa primary corridors by ICE rating

Symbol	Route type
I	Interstate
D	Non-interstate divided
ND	Non-divided
	Non-NHS
	NHS

Table 3.1: Corridor symbology

Table 3.2 contains the 283 corridors across the state prioritized by overall ICE rating. Also included are the ICE composite scores by corridor for 2014 and 2015. New to this year's data representation is the inclusion of a trend arrow. The 2015 composite score column shows the updated corridor ICE rating along with a red arrow pointing down, green pointing up, or yellow pointing horizontally to show change from the 2014 ICE rating. This representation is repeated throughout to also show the change in the normalization value for each criterion.

In addition to the trend arrows, the safety column in Table 3.2 is new to the 2015-2016 report and shows the weighted crash rate normalization value across each corridor. This normalization value is described in the previous section and is meant to serve as a corridor level safety indicator. Corridors that contain no safety data are marked by "N/A".

The symbols defined in Table 3.1 and used throughout Table 3.2 represent the makeup of the corridor. While there is only one column for passenger AADT, single-unit truck AADT, and combo truck AADT, the same traffic breakouts in Table 2.3 apply to each corresponding route type. PCI, IRI, structure sufficiency, and congestion were all measured using the same scale. The colored cells in the Rank column represent whether or not the corridor is located on the NHS as shown in Table 3.1.

Similar to last year's ICE analysis where the data seen throughout the report was from 2013 GIMS due to a one-year data lag, the 2015 composite scores and normalizations were calculated using a snapshot of the Iowa DOT's 2014 GIMS and PMIS data. In a few cases, recently completed or ongoing construction work performed by the Iowa DOT may not be reflected in the final ICE rating or within the individual criteria normalization scores on some corridors. To show this, the footnotes at the bottom of Table 3.2 identify such cases.

Table 3.2: Iowa Primary Highway System corridors by ICE rating

Rank	Route type	Corridor description	Corridor length (mi)	ICE rating: 2015 comp score	ICE rating: 2014 comp score	PCI	IRI	Suff	Pass	Single	Combo	V/C	Crash rate
1	ND	IA 136 (jct of US 151 to jct of US 20)	14	↓ 59.59	60.87	⇨ 5	⇨ 2	⇨ 8	⇨ 8	⇨ 4	⇨ 6	⇨ 9	6
2	I	I-35/80 (east jct of I-80/I-235 to west jct of I-80/I-235)	29	⇧ 61.83	59.85	⇧ 9	⇧ 6	⇨ 10	⇨ 2	⇧ 2	⇨ 2	⇩ 3	8
3	ND	IA 136 (jct of US 20 to jct of IA 3/US 52)	10	⇧ 62.23	60.51	⇧ 5	⇧ 3	⇨ 10	⇨ 5	⇧ 3	⇩ 6	⇨ 8	7
4	ND	US 69 (beginning of NHS on US 69 near Ankeny city limits to Ames south city limits)	15	⇧ 62.47	61.41	⇧ 5	⇨ 2	⇧ 10	⇨ 2	⇧ 6	⇨ 9	⇨ 7	8
5	ND	IA 22 (jct of IA 1 to jct of IA 70)	25	⇩ 62.61	63.91	⇨ 6	⇨ 4	⇨ 9	⇨ 5	⇨ 4	⇩ 4	⇨ 8	8
6	ND	US 30 (beginning of two-lane near jct of IA 1 to north jct of US30/US 61)	47	⇧ 62.66	58.58	⇧ 6	⇧ 4	⇨ 9	⇨ 5	⇨ 4	⇩ 3	⇨ 8	8
7	ND	IA 137 (jct of IA 5 to jct of US 63)	15	⇩ 63.62	64.64	⇨ 4	⇨ 4	⇨ 10	⇨ 7	⇩ 3	⇨ 6	⇨ 9	6
8	I	I-480 (full route)	2	⇩ 63.64	67.98	⇩ 4	⇩ 1	⇩ 8	⇧ 8	⇧ 8	⇨ 10	⇨ 8	4
9	ND	IA 415 (IA 415 NHS near Polk City city limits to jct of IA 141)	8	⇩ 64.32	64.45	⇧ 7	⇨ 3	⇨ 9	⇨ 1	⇩ 2	⇩ 9	⇨ 6	7
10	ND	US 67 (jct of I-74 to jct of I-80)	11	⇩ 64.69	65.11	⇧ 7	⇨ 4	⇨ 10	⇨ 1	⇨ 1	⇩ 3	⇩ 7	NA
11	ND	US 169 (jct of IA 92 to jct of I-80)	14	⇧ 65.41	64.41	⇨ 5	⇨ 4	⇨ 9	⇧ 5	⇧ 5	⇨ 8	⇨ 8	7
12	D	US 67 (jct of US 61/US 67 to jct of I-74)	6	⇧ 65.53	63.18	⇨ 6	⇨ 3	⇨ 9	⇧ 4	⇧ 3	⇨ 7	⇩ 5	NA
13	ND	US 30 (Nebraska state line to beginning of four-lane near jct of US 169)	130	⇧ 65.56	65.25	⇨ 7	⇨ 6	⇨ 9	⇨ 5	⇨ 3	⇨ 1	⇨ 8	8
14	ND	IA 5 (Missouri border to start of IA 5 NHS)	14	⇩ 65.57	65.82	⇨ 5	⇨ 2	⇨ 8	⇩ 7	⇩ 7	⇨ 9	⇨ 9	6
15	ND	IA 150 (jct of US 218 to south jct of IA 3)	44	⇩ 65.89	68.21	⇩ 6	⇨ 5	⇨ 9	⇧ 5	⇩ 3	⇨ 5	⇨ 8	8
16	ND	IA 38 (jct of I-80 to jct of US 30)	18	⇩ 66.14	66.31	⇨ 6	⇨ 3	⇨ 9	⇩ 6	⇨ 5	⇨ 6	⇨ 9	6
17	ND	US 169 (jct of I-80 to east jct of US 30/US 169)	33	⇧ 66.19	62.77	⇧ 6	⇨ 4	⇨ 9	⇨ 5	⇨ 4	⇧ 7	⇩ 8	8
18	ND	IA 22 (from Buffalo city limits to jct of IA 22/IA 38 in Muscatine)	20	⇧ 66.57	64.24	⇧ 5	⇨ 2	⇨ 10	⇨ 7	⇧ 7	⇨ 8	⇨ 9	6
19	D	US 6 (jct of I-280 to jct of I-74)	16	⇧ 66.59	66.59	⇨ 6	⇨ 3	⇨ 10	⇩ 2	⇩ 5	⇩ 7	⇨ 5	NA
20	ND	IA 141 (jct of US 71 to jct of US 59)	21	⇩ 66.84	69.63	⇨ 5	⇩ 2	⇨ 10	⇨ 8	⇨ 7	⇨ 7	⇨ 9	9
21	ND	IA 7 (jct of IA 3 to Storm lake city limits)	14	⇩ 66.88	68.27	⇨ 5	⇩ 3	⇨ 10	⇨ 6	⇨ 7	⇨ 7	⇨ 8	6
22	ND	US 6 (jct of I-80 to jct of IA 38)	5	⇧ 66.98	66.87	⇨ 8	⇨ 6	⇨ 8	⇨ 5	⇨ 4	⇨ 3	⇨ 9	8
23	ND	IA 21 (jct of IA 78 to jct of IA 92)	12	⇧ 67.11	67.09	⇨ 3	⇨ 1	⇨ 10	⇨ 10	⇨ 9	⇨ 9	⇨ 10	4
24	ND	US 65 (jct of US 18 to beginning of four-lane highway on north side of Mason City)	9	⇩ 67.14	67.56	⇨ 5	⇨ 3	⇨ 10	⇨ 1	⇩ 1	⇩ 3	⇨ 9	NA
25	ND	IA 4 (jct of US 20 to jct of US 18)	26	⇩ 67.27	68.82	⇨ 6	⇨ 4	⇨ 9	⇨ 7	⇨ 7	⇨ 5	⇨ 9	9
26	ND	US 218 (jct of US 30 to jct of IA 150)	13	⇩ 67.29	68.48	⇨ 5	⇨ 4	⇩ 9	⇨ 7	⇨ 5	⇩ 7	⇨ 9	3
27	ND	US 18 (South Dakota state line to jct of I-35)	174	⇧ 67.53	66.51	⇨ 7	⇨ 5	⇩ 9	⇨ 5	⇨ 5	⇨ 3	⇨ 8	8
28	I	I-35 (east jct of I-80/I-235 to jct of US 30)	49	⇩ 67.56	69.56	⇧ 8	⇨ 7	⇩ 8	⇧ 5	⇩ 2	⇩ 5	⇩ 4	6
29	D	US 69 (jct of I-235 to jct of I-35/I-80)	6	⇧ 67.58	62.90	⇨ 6	⇨ 4	⇨ 10	⇨ 4	⇧ 3	⇧ 8	⇧ 6	1
30	ND	IA 39 (jct of IA 175 to near jct of US 30 / US 59)	24	⇩ 67.81	73.68	⇩ 6	⇩ 5	⇩ 9	⇧ 8	⇩ 7	⇩ 3	⇨ 9	7
31	ND	IA 14 (jct of US 30 to jct of US 20)	42	⇧ 67.88	67.52	⇧ 7	⇧ 5	⇩ 9	⇨ 5	⇩ 4	⇩ 4	⇨ 8	8
32	ND	IA 10 (from Nebraska border to start of IA 10 NHS near Orange City)	24	⇩ 67.96	70.48	⇨ 5	⇨ 4	⇨ 10	⇧ 8	⇨ 7	⇨ 7	⇨ 9	9
33	ND	US 67 (jct of I-80 to jct of US 30)	22	⇧ 67.99	63.58	⇧ 6	⇧ 4	⇨ 10	⇨ 5	⇩ 2	⇩ 5	⇨ 8	6
34	I	I-380 (jct of US 30 to jct of IA-100)	16	⇧ 68.16	59.83	⇧ 8	⇧ 5	⇨ 10	⇧ 2	⇨ 1	⇨ 6	⇨ 5	9
35	ND	US 61 (beginning of four-lane highway at Burlington to Louisa/Muscatine county line)	35	⇧ 68.41	67.38	⇨ 7	⇨ 7	⇨ 10	⇨ 3	⇨ 3	⇧ 3	⇩ 7	7
36	ND	US 71 (jct of I-80 to beginning of two-lane near jct of US 18)	138	⇩ 68.50	68.70	⇨ 6	⇨ 5	⇨ 10	⇨ 6	⇩ 5	⇨ 4	⇨ 9	8
37	ND	US 30 (beginning of two-lane near jct of US 63 to beginning of four-lane near jct of US 218)	26	⇩ 68.63	70.46	⇨ 9	⇨ 8	⇨ 9	⇨ 4	⇩ 2	⇩ 1	⇩ 7	8
38	ND	US 63 (jct of US 18 to Minnesota border)	35	⇩ 68.64	82.19	⇩ 7	⇩ 6	⇨ 10	⇧ 6	⇧ 5	⇩ 1	⇨ 9	8
39	ND	IA 2 (jct of US 218 to jct of US 61)	9	⇩ 68.71	71.23	⇨ 7	⇨ 2	⇨ 10	⇨ 6	⇧ 6	⇩ 7	⇨ 9	1
40	D	US 30 (beginning of four-lane near jct of US 218 to beginning of two-lane near jct of IA 1)	61	⇧ 68.75	68.66	⇧ 8	⇨ 5	⇨ 10	⇨ 5	⇧ 5	⇩ 4	⇩ 6	8
41	I	I-80 (jct of I-380 to Illinois state line)	135	⇧ 69.07	68.12	⇧ 9	⇨ 7	⇩ 9	⇨ 7	⇨ 5	⇨ 2	⇨ 5	9
42	ND	IA 14 (jct of IA 2 to jct of US 34)	17	⇩ 69.26	70.10	⇨ 5	⇨ 2	⇨ 10	⇨ 8	⇨ 8	⇨ 9	⇨ 9	6
43	ND	US 75 (jct of IA 60/US 75 to jct of US 18)	26	⇩ 69.29	71.08	⇨ 8	⇩ 6	⇨ 10	⇧ 5	⇧ 3	⇨ 2	⇨ 8	8
44	D	US 20 (jct of I-35 to jct of I-380)	134	⇧ 69.42	68.97	⇨ 8	⇨ 6	⇨ 10	⇨ 7	⇩ 5	⇨ 2	⇨ 7	8
45	ND	IA 38 (jct of US 151 to jct of IA 3)	34	⇧ 69.43	68.42	⇨ 5	⇨ 2	⇩ 9	⇨ 8	⇧ 7	⇧ 9	⇨ 9	7
46	ND	US 59 (jct of IA 3 to jct of US 18)	33	⇩ 69.54	70.01	⇨ 5	⇨ 3	⇨ 10	⇨ 9	⇨ 8	⇨ 7	⇨ 10	9
47	ND	US 20 (beginning of two-lane near Moville to beginning of four-lane near jct of US 71)	45	⇩ 69.55	72.80	⇨ 8	⇨ 6	⇨ 10	⇩ 5	⇩ 4	⇩ 1	⇩ 8	8
48	ND	IA 62 (jct of US 52 to Maquoketa city limits)	20	⇩ 69.59	72.28	⇩ 5	⇩ 1	⇩ 9	⇨ 8	⇨ 8	⇨ 10	⇩ 9	8
49	D	US 218 (jct of US 34/US 218 to jct of I-80)	104	⇧ 69.64	68.25	⇨ 8	⇨ 6	⇨ 10	⇨ 6	⇧ 6	⇨ 2	⇩ 6	6
50	ND	IA 224 (jct of I-80 to jct of IA 14)	11	⇧ 69.80	69.28	⇧ 4	⇧ 2	⇨ 10	⇨ 9	⇧ 9	⇨ 10	⇨ 10	7
51	ND	IA 330 (jct of US 30 to jct of IA 14)*	12	⇩ 69.82	70.92	⇨ 6	⇩ 4	⇨ 9	⇨ 7	⇧ 8	⇧ 7	⇨ 9	5
52	ND	IA 92 (south jct of IA 1 to jct of US 61)	27	⇧ 69.86	68.36	⇨ 7	⇨ 6	⇨ 10	⇧ 6	⇨ 5	⇨ 3	⇩ 8	7
53	ND	US 18 (jct of IA 14 to north jct of US 18/US 63)	19	⇩ 70.04	74.21	⇩ 6	⇩ 4	⇨ 10	⇧ 7	⇧ 7	⇨ 7	⇨ 9	7
54	D	US 69 (jct of IA 5 to jct of I-235)	15	⇧ 70.07	68.27	⇧ 7	⇨ 4	⇨ 10	⇧ 3	⇨ 5	⇧ 10	⇨ 4	NA
55	ND	US 63 (jct of I-80 to jct of US 20)	63	⇧ 70.10	67.96	⇨ 7	⇨ 4	⇨ 10	⇨ 6	⇨ 5	⇧ 5	⇨ 9	8
56	ND	IA 21 (jct of IA 92 to jct of I-80)	25	⇩ 70.12	70.58	⇨ 6	⇧ 5	⇨ 9	⇩ 8	⇧ 8	⇨ 6	⇩ 9	8
57	ND	IA 92 (east jct of IA5/IA 92 to north jct of IA 1)	75	⇧ 70.22	69.62	⇨ 6	⇨ 4	⇨ 10	⇩ 6	⇩ 5	⇩ 6	⇨ 9	8
58	ND	US 6 (jct of I-80 to jct of IA 70/US 6)	24	⇩ 70.27	71.42	⇩ 7	⇨ 5	⇨ 10	⇩ 2	⇩ 2	⇩ 4	⇩ 6	7
59	ND	IA 23 (jct of IA 149/IA 78 to end of IA 23 NHS)	13	⇧ 70.28	67.85	⇨ 5	⇨ 4	⇧ 9	⇩ 7	⇧ 7	⇨ 8	⇨ 9	9
60	ND	IA 13 (jct of E16 in Central City to east jct of IA 3/IA 13)	33	⇧ 70.32	69.46	⇨ 7	⇨ 4	⇨ 10	⇧ 5	⇧ 5	⇨ 6	⇨ 8	8
61	ND	IA 9 (end of IA 9 NHS to Illinois border/IA 26)	33	⇩ 70.56	72.66	⇨ 6	⇩ 3	⇨ 10	⇧ 7	⇧ 7	⇩ 7	⇨ 9	8
62	I	I-235 (full route)	30	⇩ 70.72	71.40	⇧ 8	⇨ 6	⇨ 10	⇧ 2	⇩ 2	⇩ 8	⇩ 3	1
63	D	IA 461 (jct of I-280 to jct of I-80)	21	⇧ 70.78	70.50	⇧ 7	⇨ 4	⇨ 9	⇧ 6	⇨ 5	⇨ 9	⇩ 6	NA
64	ND	IA 17 (jct of US 20 to jct of IA 3)	20	⇧ 71.17	69.34	⇨ 7	⇨ 5	⇨ 10	⇨ 7	⇨ 6	⇨ 3	⇨ 9	8
65	D	US 218 (jct of US 20 to jct of IA 14)	102	⇩ 71.22	72.68	⇨ 8	⇩ 6	⇨ 10	⇨ 6	⇨ 6	⇨ 3	⇨ 7	9
66	ND	IA 3 (jct of US 75 to jct of I-35)	147	⇧ 71.26	70.75	⇨ 7	⇨ 6	⇨ 9	⇧ 8	⇨ 7	⇨ 4	⇨ 9	8
67	ND	IA 4 (jct of IA 44 to jct of IA 141)	10	⇧ 71.27	69.29	⇨ 5	⇨ 3	⇨ 9	⇨ 8	⇧ 8	⇨ 9	⇨ 9	7

68	ND	IA 2 (jct of I-35 to jct of US 65)	18	⇧ 71.30	67.97	⇧ 5	⇨ 3	⇧ 10	⇨ 8	⇨ 7	⇧ 9	⇨ 10	8
69	ND	IA 2 (jct of US 65 to jct of IA 5)	34	⇧ 71.33	69.62	⇨ 5	⇨ 4	⇨ 10	⇧ 8	⇧ 6	⇨ 8	⇨ 9	7
70	ND	IA 146 (jct of US 30 to Grinnell city limits at IA 146 NHS start)	21	⇩ 71.42	71.95	⇩ 5	⇧ 5	⇨ 9	⇨ 7	⇨ 6	⇨ 8	⇨ 9	7
71	D	US 65 (beginning of non-divided near Indianola to jct of I-80)	45	⇧ 71.54	70.10	⇨ 8	⇨ 7	⇨ 9	⇧ 4	⇧ 4	⇧ 6	⇨ 5	7
72	ND	US 151 (jct of I-80 to west jct of US 30/US 151)	25	⇩ 71.62	77.87	⇨ 7	⇨ 4	⇨ 10	⇧ 4	⇧ 6	⇩ 6	⇨ 8	7
73	ND	IA 92 (from jct of I-29 to jct of US 59)	25	⇧ 71.67	71.26	⇨ 7	⇨ 5	⇩ 9	⇨ 4	⇩ 4	⇩ 5	⇩ 7	7
74	ND	US 141 (jct of US 59 to jct of I-29)	53	⇩ 71.68	73.05	⇨ 6	⇩ 4	⇨ 9	⇨ 8	⇨ 7	⇧ 8	⇨ 9	7
75	ND	US 59 (Missouri border to jct of US 71)	11	⇩ 71.83	73.34	⇨ 6	⇨ 2	⇨ 10	⇨ 8	⇨ 9	⇩ 7	⇩ 9	7
76	ND	IA 9 (from South Dakota border to jct of IA 60)	43	⇩ 71.89	73.12	⇨ 6	⇩ 5	⇨ 10	⇨ 7	⇨ 6	⇨ 6	⇨ 9	8
77	ND	IA 4 (jct of US 20 to jct of IA 3)	20	⇧ 71.93	70.29	⇨ 7	⇨ 6	⇨ 10	⇨ 7	⇨ 7	⇨ 3	⇩ 8	9
78	ND	US 18 (south jct of US 18/US 63 to Wisconsin state line)	67	⇩ 71.98	73.02	⇨ 7	⇨ 6	⇨ 10	⇨ 7	⇩ 5	⇨ 4	⇨ 9	5
79	ND	IA 44 (jct of US 169 to jct of IA 141)	13	⇧ 72.02	71.98	⇨ 7	⇨ 4	⇨ 10	⇩ 3	⇧ 4	⇨ 8	⇨ 7	7
80	ND	IA 92 (jct of US 169 to west jct of IA5/IA 92)	42	⇧ 72.05	70.64	⇨ 6	⇨ 5	⇨ 10	⇧ 6	⇨ 3	⇨ 8	⇧ 9	6
81	D	US 75 (jct of US 20 to jct of IA 60/US 75)	53	⇧ 72.09	69.12	⇨ 8	⇨ 6	⇩ 9	⇨ 6	⇧ 6	⇧ 5	⇨ 7	8
82	ND	IA 21 (jct of US 30 to Waterloo city limits)	34	⇩ 72.13	73.17	⇨ 6	⇨ 4	⇨ 9	⇨ 8	⇨ 7	⇨ 8	⇨ 9	9
83	D	US 20 (South Dakota state line to beginning of two-lane near Moville)	42	⇩ 72.18	72.34	⇨ 7	⇨ 5	⇨ 10	⇨ 7	⇨ 6	⇩ 6	⇩ 7	7
84	D	US 18 (jct of I-35 to jct of IA 14)	79	⇧ 72.29	71.49	⇨ 8	⇨ 6	⇨ 10	⇩ 7	⇨ 7	⇨ 2	⇨ 8	8
85	I	I-80 (Nebraska state line to west jct of I-80/I-235)	246	⇧ 72.40	72.19	⇨ 8	⇨ 6	⇨ 9	⇨ 8	⇩ 6	⇨ 4	⇨ 7	9
86	ND	IA 316 (jct of IA 5 to Runnels city limits)	6	⇩ 72.55	73.15	⇧ 6	⇨ 3	⇩ 8	⇧ 10	⇧ 10	⇨ 10	⇨ 10	7
87	ND	IA 14 (jct of IA 5 to jct of I-80)	28	⇧ 72.57	71.07	⇨ 7	⇨ 5	⇨ 9	⇨ 5	⇧ 5	⇨ 6	⇨ 9	8
88	ND	US 65 (Mason City limits to Minnesota border)	21	⇩ 72.59	76.14	⇩ 7	⇩ 5	⇨ 10	⇨ 6	⇧ 6	⇩ 4	⇩ 8	8
89	D	US 69 (jct of I-35/I-80 to north Ankeny corporate limit)	13	⇧ 72.66	69.81	⇨ 7	⇨ 5	⇨ 10	⇩ 1	⇩ 3	⇩ 4	⇨ 5	N/A
90	ND	IA 2 (from jct of I-29 to jct of US 59)	20	⇩ 72.68	73.48	⇧ 7	⇨ 4	⇨ 9	⇨ 8	⇩ 7	⇩ 7	⇨ 9	8
91	ND	US 65 (west jct of US 34/US 65 to beginning of non-divided near Indianola)	28	⇧ 72.81	69.68	⇨ 6	⇨ 4	⇨ 10	⇧ 7	⇨ 6	⇨ 7	⇨ 9	6
92	ND	IA 191 (jct of I-80 to jct of IA 37)	23	⇩ 72.81	74.47	⇨ 7	⇨ 2	⇨ 9	⇨ 9	⇧ 9	⇧ 9	⇨ 10	8
93	I	I-80 (east jct of I-80/I-235 to jct of I-380)	208	⇧ 72.88	72.44	⇨ 8	⇨ 7	⇨ 9	⇧ 8	⇩ 5	⇧ 4	⇨ 6	9
94	ND	IA 175 (jct of IA 14 to jct of US 63)	16	⇩ 72.89	78.96	⇩ 6	⇩ 4	⇨ 10	⇨ 8	⇨ 7	⇩ 7	⇨ 9	7
95	ND	US 69 (jct of US 18 to Minnesota border)	33	⇩ 73.01	74.00	⇨ 6	⇨ 6	⇨ 9	⇨ 7	⇨ 6	⇨ 8	⇨ 9	9
96	ND	IA 48 (jct of US 34 to jct of US 6)	22	⇩ 73.03	82.05	⇩ 5	⇩ 4	⇨ 10	⇨ 8	⇨ 7	⇨ 9	⇩ 9	8
97	ND	US 218 (jct of IA 9 to Minnesota border)	36	⇧ 73.05	71.20	⇨ 7	⇧ 6	⇨ 9	⇨ 8	⇨ 6	⇩ 5	⇨ 9	9
98	ND	IA 149 (jct of IA 78 to jct of IA 92)	28	⇩ 73.20	73.72	⇨ 6	⇨ 5	⇨ 9	⇨ 7	⇩ 5	⇩ 7	⇨ 9	8
99	ND	IA 175 (jct of US 71 to jct of US 169)	27	⇩ 73.26	74.82	⇨ 7	⇩ 5	⇩ 9	⇨ 8	⇨ 7	⇨ 5	⇨ 9	7
100	ND	US 34 (jct of I-35 to east jct of US 34/US 63)	74	⇧ 73.39	70.16	⇧ 8	⇨ 6	⇨ 9	⇨ 6	⇧ 5	⇨ 4	⇨ 9	7
101	ND	US 218 (jct of US 61/US 218 to jct of IA 27/US 218)	13	⇧ 73.44	71.45	⇨ 7	⇨ 4	⇨ 10	⇨ 5	⇩ 5	⇧ 7	⇨ 9	6
102	ND	IA 22 (east jct of IA 70 to jct of US 61)	14	⇧ 73.47	67.36	⇨ 8	⇧ 6	⇨ 10	⇨ 5	⇩ 5	⇧ 5	⇨ 8	8
103	D	US 61 (jct of I-80 to Wisconsin border)	135	⇧ 73.70	72.13	⇧ 8	⇨ 6	⇨ 10	⇨ 6	⇨ 6	⇧ 5	⇨ 7	7
104	D	IA 5 (jct of IA 5/US 65 to jct of I-35)	24	⇧ 73.70	69.40	⇨ 8	⇨ 6	⇨ 10	⇧ 3	⇧ 6	⇧ 6	⇨ 5	NA
105	ND	US 59 (jct of IA 2 to jct of I-80)	55	⇩ 73.71	75.37	⇨ 7	⇩ 4	⇩ 9	⇨ 8	⇨ 7	⇨ 7	⇨ 10	7
106	ND	IA 14 (jct of US 18 to Minnesota border)	28	⇩ 73.75	76.38	⇩ 6	⇩ 5	⇨ 9	⇨ 8	⇨ 8	⇨ 7	⇨ 9	5
107	ND	US 52 (west jct of US 18/US 52 to Minnesota border)	42	⇩ 73.77	74.63	⇨ 7	⇨ 5	⇨ 10	⇧ 7	⇨ 5	⇨ 6	⇨ 9	7
108	D	US 61 (Louisa/Muscatine county line to jct of I-280)	71	⇧ 73.77	72.60	⇧ 8	⇨ 5	⇨ 10	⇨ 7	⇧ 6	⇨ 5	⇩ 7	7
109	ND	IA 150 (north jct of IA 3 to jct of US 52)	39	⇧ 73.79	72.73	⇨ 7	⇨ 4	⇨ 10	⇨ 7	⇨ 5	⇨ 7	⇨ 9	7
110	ND	IA 5 (jct of IA 2 to east jct of IA 5/IA 92)	47	⇧ 73.85	71.02	⇧ 7	⇨ 6	⇨ 9	⇧ 6	⇩ 4	⇨ 7	⇨ 9	7
111	ND	IA 149 (jct of IA 92 to jct of I-80)	29	⇧ 73.88	72.78	⇨ 5	⇨ 3	⇨ 10	⇨ 8	⇨ 8	⇨ 9	⇨ 9	6
112	ND	US 52 (jct of IA 64 to jct of US 20)	40	⇧ 73.93	72.05	⇧ 6	⇨ 4	⇨ 10	⇨ 7	⇨ 7	⇨ 9	⇨ 9	7
113	ND	IA 220 (jct of US 6 to jct of US 151)	7	⇧ 73.94	71.78	⇨ 6	⇨ 4	⇨ 9	⇧ 7	⇨ 9	⇨ 9	⇧ 9	4
114	ND	IA 78 (jct of IA 149 to jct of IA 1)	13	⇩ 74.15	75.60	⇨ 7	⇨ 7	⇩ 8	⇨ 8	⇧ 6	⇨ 7	⇨ 9	8
115	ND	US 65 (jct of US 20 to jct of US 18)	49	⇧ 74.21	74.19	⇧ 8	⇧ 6	⇨ 9	⇨ 6	⇧ 6	⇩ 6	⇨ 9	8
116	ND	US 218 (jct of IA 8 to US 218 outside Waterloo city limits)	29	⇩ 74.49	76.11	⇧ 7	⇨ 5	⇨ 9	⇨ 7	⇩ 6	⇨ 8	⇨ 9	8
117	ND	US 34 (beginning of two-lane near jct of US 275 to jct of I-35)	105	⇧ 74.74	73.67	⇨ 8	⇨ 7	⇨ 9	⇩ 5	⇨ 4	⇩ 3	⇨ 9	9
118	I	I-129 (full route)	1	⇩ 74.84	77.78	⇧ 8	⇩ 3	⇩ 8	⇨ 8	⇧ 8	⇨ 10	⇧ 9	1
119	ND	IA 51 (jct of US 18 to jct of IA 9)	11	⇩ 74.88	76.10	⇩ 6	⇨ 6	⇨ 9	⇨ 8	⇧ 7	⇨ 7	⇨ 10	8
120	I	I-29 (jct of US 20 to South Dakota state line)*	17	⇩ 75.04	76.01	⇨ 8	⇨ 6	⇨ 9	⇧ 6	⇩ 5	⇨ 8	⇨ 6	2
121	ND	IA 2 (jct of US 59 to jct of US 71)	19	⇩ 75.11	78.72	⇨ 8	⇨ 4	⇨ 10	⇧ 7	⇩ 6	⇩ 6	⇨ 9	7
		NHS systemwide average		⇧ 75.11	74.06								
122	ND	US 59 (jct of I-80 to jct of IA 3)	97	⇧ 75.12	72.02	⇨ 8	⇨ 6	⇩ 9	⇩ 6	⇩ 5	⇨ 3	⇨ 9	7
123	D	US 20 (jct of I-380 to Illinois state line)	163	⇧ 75.26	74.69	⇨ 8	⇧ 7	⇨ 10	⇨ 7	⇨ 5	⇨ 5	⇨ 7	8
124	D	IA 149 (jct of US 34 to jct of US 63)	11	⇩ 75.29	76.65	⇨ 7	⇨ 5	⇨ 10	⇨ 6	⇨ 7	⇩ 9	⇩ 6	N/A
125	ND	IA 38 (jct US 30 to jct of US 151)	26	⇧ 75.29	74.96	⇨ 6	⇨ 4	⇨ 9	⇨ 9	⇨ 8	⇧ 9	⇨ 10	6
126	D	US 20 (jct of US 169 to jct of I-35)	66	⇧ 75.34	73.05	⇨ 8	⇨ 6	⇨ 10	⇨ 8	⇧ 8	⇧ 4	⇨ 8	8
127	ND	IA 12 (Sioux City limits to jct of IA 10)	29	⇩ 75.39	79.57	⇨ 7	⇩ 6	⇩ 8	⇨ 9	⇨ 8	⇨ 7	⇩ 9	6
128	I	I-380 (jct of I-80 to jct of US 30)	31	⇧ 75.42	75.01	⇨ 9	⇨ 8	⇨ 10	⇧ 5	⇩ 3	⇩ 5	⇨ 4	9
129	ND	IA 140 (jct of US 20 to jct of IA 3)	26	⇩ 75.63	78.15	⇩ 5	⇩ 4	⇨ 10	⇧ 9	⇨ 9	⇨ 9	⇨ 10	8
130	ND	IA 1 (unction of US 6 to jct of US 151)	36	⇧ 75.66	69.99	⇧ 9	⇧ 6	⇨ 9	⇨ 3	⇨ 3	⇩ 6	⇨ 7	8
131	ND	IA 17 (jct of US 30 to jct of US 20)	30	⇧ 75.79	72.47	⇧ 7	⇨ 4	⇨ 10	⇨ 7	⇨ 6	⇧ 8	⇨ 9	7
132	ND	IA 78 (jct of IA 1 to jct of US 61)	38	⇧ 75.87	75.71	⇨ 6	⇨ 4	⇨ 9	⇨ 9	⇧ 9	⇩ 8	⇨ 10	5
133	D	IA 163 (jct of US 69 to jct of US 63)	122	⇧ 75.90	75.01	⇨ 8	⇨ 6	⇨ 10	⇨ 7	⇧ 6	⇧ 6	⇩ 7	9
134	D	US 63 (east jct of US 34/US 63 to jct of IA 163/US 63)	54	⇧ 75.93	75.73	⇨ 8	⇨ 6	⇨ 10	⇨ 8	⇧ 7	⇨ 5	⇨ 8	7
135	D	IA 141 (beginning of four-lane near Perry to jct of I-35/I-80)	54	⇧ 75.95	72.71	⇧ 7	⇨ 5	⇨ 10	⇨ 6	⇧ 7	⇨ 8	⇨ 7	6
136	D	US 218 (jct of IA 27/US 218 to south jct of US 34/US 218)	50	⇧ 76.07	73.36	⇨ 8	⇨ 6	⇨ 10	⇨ 8	⇨ 8	⇨ 3	⇨ 8	6
137	ND	IA 92 (from jct of US 59 to jct of US 71)	22	⇧ 76.09	74.69	⇨ 6	⇨ 5	⇨ 9	⇨ 9	⇩ 7	⇨ 8	⇨ 10	8

138	ND	IA 9 (jct of US 63 to east of Decorah east corporate limit)	33	⇧ 76.15	70.43	⇧ 8	⇧ 6	⇨ 10	⇧ 6	⇨ 3	⇨ 7	⇨ 9	8
139	ND	IA 13 (jct of IA 3 to jct of US 52)	26	⇩ 76.18	76.84	⇩ 7	⇨ 6	⇨ 10	⇧ 8	⇨ 5	⇨ 6	⇨ 9	7
140	ND	IA 28 (jct of IA 92 to Norwalk city limits)	9	⇩ 76.22	78.16	⇩ 6	⇨ 5	⇨ 10	⇨ 6	⇨ 7	⇧ 10	⇨ 9	6
		Systemwide average		⇧ 76.26	75.00								
141	ND	IA 9 (jct of I-35 to jct of US 63)	54	⇩ 76.34	76.85	⇩ 6	⇨ 6	⇨ 10	⇨ 8	⇧ 7	⇧ 8	⇨ 9	9
142	ND	IA 139 (jct of IA 9 to Minnesota border)	11	⇩ 76.35	83.36	⇩ 6	⇩ 4	⇨ 10	⇨ 9	⇩ 8	⇩ 8	⇨ 10	4
143	ND	IA 38 (jct of US 61 to jct of US 6)	8	⇧ 76.38	70.76	⇧ 9	⇨ 7	⇨ 10	⇧ 4	⇧ 4	⇧ 5	⇨ 8	9
144	ND	IA 81 (full route)	2	⇩ 76.50	77.00	⇨ 5	⇨ 3	⇨ 10	⇨ 10	⇩ 9	⇨ 10	⇨ 10	6
145	ND	IA 117 (ct of IA 163 to jct of I-80)	8	⇧ 76.51	74.18	⇨ 6	⇨ 4	⇨ 10	⇨ 7	⇧ 8	⇧ 9	⇨ 9	9
146	ND	US 59 (jct of US 18 to Minnesota border)	22	⇩ 76.54	79.84	⇩ 6	⇨ 5	⇨ 10	⇧ 10	⇧ 9	⇨ 6	⇧ 10	8
147	ND	US 69 (jct of IA 3 to jct of US 18)	25	⇩ 76.54	79.25	⇩ 7	⇨ 7	⇨ 9	⇧ 8	⇧ 5	⇨ 8	⇨ 9	9
148	D	US 30 (south jct of US 30/US 61 to Illinois state line)	44	⇧ 76.56	75.08	⇧ 8	⇨ 7	⇨ 10	⇨ 7	⇨ 6	⇩ 5	⇨ 8	7
149	ND	IA 110 (jct of US 20 to end of IA 110 NHS)	13	⇩ 76.60	78.20	⇨ 6	⇩ 4	⇨ 10	⇨ 8	⇨ 8	⇨ 9	⇨ 9	8
150	ND	US 63 (Missouri border to west jct of US 34/US 63)	34	⇧ 76.64	73.42	⇨ 8	⇨ 8	⇨ 9	⇨ 5	⇨ 4	⇧ 5	⇨ 8	8
151	D	IA 122 (from Clear Lake city limits to Mason City city limits)	9	⇧ 76.73	76.65	⇨ 7	⇨ 6	⇨ 10	⇨ 5	⇨ 6	⇨ 9	⇨ 6	8
152	ND	IA 175 (from Nebraska border to jct of US 59)	50	⇩ 76.73	77.81	⇨ 7	⇨ 5	⇨ 9	⇨ 8	⇨ 7	⇨ 8	⇨ 9	7
153	D	IA 27 (Missouri border to jct of IA 27/US 218)	21	⇩ 76.77	78.28	⇨ 8	⇨ 6	⇨ 10	⇨ 9	⇩ 8	⇩ 3	⇨ 9	7
154	ND	IA 3 (jct of I-35 to jct of US 52)	130	⇩ 76.85	77.45	⇨ 7	⇨ 6	⇨ 10	⇨ 7	⇧ 7	⇩ 7	⇨ 9	7
155	ND	US 6 (jct of US 151 to jct of I-380/Tiffin)	16	⇧ 76.87	75.61	⇨ 8	⇨ 6	⇨ 9	⇩ 4	⇨ 5	⇩ 7	⇩ 7	4
156	ND	IA 25 (jct of US 34 to jct of I-80)	33	⇩ 76.96	79.24	⇨ 7	⇨ 7	⇨ 9	⇨ 8	⇩ 6	⇨ 8	⇨ 9	8
157	ND	IA 141 (jct of IA 4 to jct of US 71)	25	⇧ 76.99	76.85	⇨ 8	⇨ 6	⇨ 8	⇨ 9	⇨ 9	⇨ 7	⇨ 10	7
158	I	I-280 (full route)**	20	⇩ 77.05	77.90	⇧ 8	⇨ 6	⇨ 9	⇨ 8	⇩ 7	⇩ 7	⇨ 8	9
159	ND	IA 93 (jct of US 63 to jct of IA 150)	30	⇩ 77.24	80.94	⇩ 6	⇨ 4	⇨ 10	⇨ 8	⇩ 7	⇩ 9	⇨ 10	6
160	ND	IA 1 (jct of US 34 to jct of US 6)	65	⇧ 77.28	68.58	⇧ 8	⇧ 6	⇨ 9	⇨ 5	⇨ 5	⇩ 7	⇨ 8	8
161	D	US 151 (jct of US 30 to jct of US 61/US 151)	129	⇧ 77.34	71.58	⇨ 8	⇩ 6	⇨ 10	⇨ 7	⇨ 6	⇩ 5	⇩ 7	6
162	D	US 6 (jct of US 169 to start of US 6 NHS in Waukee)	16	⇧ 77.42	75.90	⇨ 6	⇨ 6	⇨ 10	⇨ 6	⇩ 5	⇨ 9	⇨ 7	6
163	ND	US 6 (jct of US 63 to jct of IA 151)	40	⇩ 77.52	79.10	⇨ 7	⇧ 5	⇩ 9	⇨ 8	⇩ 7	⇨ 9	⇨ 9	7
164	ND	IA 56 (jct of IA 150 to jct of IA 13)	25	⇧ 77.83	73.80	⇨ 6	⇧ 3	⇨ 10	⇨ 10	⇧ 9	⇧ 10	⇨ 10	6
165	ND	IA 136 (jct of US 61 to jct of US 151)	42	⇩ 78.02	80.36	⇩ 6	⇨ 5	⇨ 9	⇨ 9	⇧ 9	⇨ 9	⇨ 10	6
166	ND	IA 14 (jct of US 6 to jct of US 30)	29	⇧ 78.04	76.26	⇨ 7	⇨ 5	⇨ 9	⇨ 7	⇧ 7	⇧ 9	⇨ 9	6
167	ND	IA 10 (from jct of IA 60 to jct of US 71)	40	⇧ 78.05	77.54	⇨ 7	⇧ 5	⇨ 10	⇨ 9	⇨ 8	⇨ 8	⇩ 9	8
168	ND	IA 64 (from Maquoketa city limits to Illinois border)	29	⇧ 78.06	76.20	⇧ 7	⇨ 5	⇨ 9	⇨ 8	⇨ 7	⇨ 9	⇨ 9	8
		Non-NHS systemwide average		⇧ 78.43	78.08								
169	I	I-35 (jct of US 30 to jct of US 20)*	61	⇩ 78.14	78.43	⇧ 9	⇨ 7	⇨ 10	⇨ 8	⇩ 5	⇩ 6	⇨ 7	9
170	ND	IA 196 (jct of US 71 to jct of US 20)	10	⇧ 78.14	74.71	⇨ 9	⇨ 8	⇧ 6	⇨ 9	⇨ 8	⇨ 6	⇨ 10	8
171	ND	IA 187 (jct of US 20 to jct of IA 150)	29	⇩ 78.17	80.96	⇨ 7	⇨ 6	⇩ 9	⇧ 9	⇨ 8	⇩ 8	⇧ 10	7
172	ND	US 6 (jct of US 59 to start of US 6 NHS near Atlantic)	21	⇩ 78.40	85.07	⇩ 7	⇩ 6	⇩ 9	⇨ 8	⇧ 8	⇨ 9	⇨ 10	7
173	ND	IA 173 (jct of IA 83 to jct of IA 44)	17	⇩ 78.56	79.94	⇩ 6	⇨ 4	⇨ 10	⇨ 8	⇨ 8	⇧ 10	⇩ 9	7
174	ND	IA 210 (jct of IA 141 to jct of I-35)	20	⇧ 78.56	77.38	⇨ 7	⇨ 5	⇨ 10	⇨ 6	⇨ 7	⇨ 9	⇨ 9	8
175	ND	IA 9 (jct of IA 60 to jct of US 71)	27	⇩ 78.63	80.23	⇩ 8	⇨ 7	⇨ 10	⇨ 7	⇨ 7	⇨ 6	⇨ 9	8
176	ND	US 52 (n jct of US 52/US 61 to east jct of US 18/52)	61	⇩ 78.82	80.43	⇨ 8	⇩ 6	⇨ 10	⇨ 7	⇨ 6	⇩ 6	⇨ 9	6
177	ND	IA 25 (jct of IA 2 to jct of US 34)	18	⇧ 78.86	78.49	⇧ 7	⇨ 4	⇨ 10	⇨ 9	⇩ 8	⇨ 9	⇨ 10	9
178	D	US 34 (Nebraska state line to beginning of two-lane near jct of US 275)	15	⇧ 78.86	74.26	⇧ 8	⇨ 6	⇧ 10	⇨ 7	⇩ 6	⇩ 7	⇩ 8	6
179	D	US 34 (east jct of US 34/US 63 to Illinois state line)	165	⇧ 78.90	77.73	⇧ 8	⇨ 6	⇨ 10	⇨ 8	⇧ 8	⇨ 6	⇩ 8	6
180	ND	IA 144 (jct of IA 141 to jct of IA 175)	34	⇧ 79.11	78.06	⇨ 6	⇨ 5	⇨ 9	⇨ 9	⇩ 7	⇧ 9	⇨ 10	7
181	ND	IA 17 (jct of IA 3 to jct of US 18)	25	⇩ 79.26	82.62	⇩ 7	⇩ 6	⇨ 10	⇨ 10	⇨ 8	⇨ 6	⇨ 10	9
182	ND	US 65 (jct of US 30 to jct of US 20)	33	⇧ 79.39	77.26	⇨ 7	⇨ 6	⇨ 10	⇨ 8	⇨ 8	⇨ 6	⇨ 9	8
183	ND	IA 128 (jct of IA 13 to jct of US 52)	7	⇧ 79.40	78.33	⇨ 7	⇩ 5	⇨ 9	⇨ 9	⇩ 6	⇧ 9	⇨ 10	8
184	ND	US 75 (jct of US 18 to South Dakota border)	21	⇩ 79.41	81.62	⇨ 8	⇩ 6	⇨ 10	⇨ 8	⇧ 8	⇨ 6	⇨ 9	7
185	ND	US 63 (jct of IA 163/US 63 to jct of I-80)	33	⇧ 79.50	77.51	⇧ 9	⇧ 7	⇧ 10	⇨ 7	⇧ 6	⇩ 5	⇨ 9	7
186	ND	IA 15 (jct of US 20 to jct of US 18)	29	⇩ 79.53	81.50	⇨ 7	⇩ 4	⇨ 10	⇨ 9	⇨ 9	⇨ 8	⇨ 10	7
187	ND	IA 7 (jct of US 71 to jct of US 169)	48	⇧ 79.58	79.52	⇨ 8	⇩ 6	⇨ 10	⇧ 8	⇨ 6	⇨ 6	⇨ 9	8
188	I	I-680 (full route)	41	⇧ 79.66	78.77	⇨ 6	⇨ 6	⇨ 9	⇨ 10	⇧ 10	⇨ 9	⇨ 10	8
189	ND	IA 183 (jct of IA 141 to jct of IA 127)	29	⇧ 79.69	79.26	⇨ 7	⇩ 4	⇧ 10	⇨ 10	⇧ 9	⇨ 9	⇨ 10	6
190	D	US 30 (beginning of four-lane near jct of US 169 to jct of I-35)	54	⇧ 79.71	77.75	⇧ 9	⇨ 7	⇨ 10	⇨ 5	⇨ 6	⇨ 7	⇨ 7	6
191	ND	IA 21 (jct of I-80 to jct of US 30)	20	⇧ 79.81	77.01	⇧ 7	⇨ 5	⇨ 10	⇨ 8	⇩ 7	⇨ 8	⇨ 10	6
192	ND	US 69 (jct of US 20 to jct of IA 3)	20	⇩ 79.90	80.51	⇨ 7	⇨ 7	⇨ 10	⇨ 9	⇨ 8	⇨ 6	⇨ 10	8
193	D	US 71 (beginning of two-lane near jct of US 18 to Minnesota border)	41	⇧ 79.92	75.94	⇨ 8	⇧ 6	⇨ 10	⇩ 4	⇩ 4	⇩ 5	⇨ 8	7
194	ND	IA 10 (jct of US 71 to jct of IA 4)	24	⇩ 79.94	81.24	⇨ 7	⇩ 5	⇨ 10	⇨ 9	⇨ 9	⇨ 7	⇨ 10	8
195	ND	IA 57 (jct of US 65 to Cedar Falls city limits)	39	⇧ 79.99	79.60	⇧ 7	⇨ 6	⇨ 10	⇨ 8	⇧ 8	⇨ 9	⇨ 9	8
196	ND	US 65 (jct of US 65/IA 330 to jct of US 30)	14	⇧ 80.08	74.71	⇧ 7	⇨ 6	⇨ 10	⇧ 8	⇨ 8	⇧ 8	⇨ 9	9
197	ND	IA 148 (Missouri border to jct of US 34)	30	⇧ 80.33	78.74	⇧ 7	⇨ 5	⇨ 10	⇨ 9	⇩ 8	⇨ 8	⇨ 10	9
198	I	I-380 (jct of IA 100 to Waterloo)	98	⇧ 80.36	78.20	⇨ 8	⇧ 6	⇨ 10	⇨ 8	⇨ 7	⇨ 8	⇩ 7	7
199	ND	IA 175 (jct of I-35 to jct of IA 14)	32	⇧ 80.71	78.19	⇨ 7	⇨ 6	⇨ 10	⇨ 8	⇧ 7	⇨ 8	⇨ 9	7
200	ND	US 69 (jct of US 34 to jct of US 65)	24	⇧ 80.89	79.75	⇧ 7	⇨ 5	⇨ 10	⇨ 8	⇨ 8	⇨ 10	⇨ 9	3
201	I	I-74 (full route)	11	⇧ 81.01	80.37	⇧ 9	⇧ 7	⇨ 9	⇧ 6	⇨ 7	⇩ 9	⇨ 6	4
202	ND	US 169 (jct of US 34 to jct of IA 92)	24	⇩ 81.04	81.24	⇨ 7	⇨ 6	⇨ 10	⇨ 8	⇨ 8	⇩ 8	⇨ 10	8
203	ND	US 169 (jct of US 20 to Minnesota border)	86	⇧ 81.12	79.00	⇧ 9	⇨ 7	⇨ 10	⇨ 6	⇨ 5	⇨ 5	⇨ 9	9
204	ND	IA 96 (jct of IA 14 to jct of US 63)	17	⇧ 81.17	78.12	⇧ 7	⇨ 7	⇩ 9	⇨ 9	⇧ 8	⇨ 8	⇨ 10	7
205	ND	IA 70 (jct of IA 92 to jct of IA 22)	15	⇧ 81.17	80.11	⇧ 7	⇨ 6	⇨ 10	⇨ 8	⇨ 8	⇨ 9	⇨ 9	7
206	D	US 63 (jct of US 20 to jct of US 18)	87	⇩ 81.23	81.39	⇨ 8	⇨ 6	⇨ 10	⇨ 8	⇨ 8	⇩ 7	⇨ 9	8

207	ND	IA 17 (jct of IA 141 to jct of US 30)	20	⇧ 81.33	78.67	⇧ 9	⇨ 7	⇨ 10	⇧ 4	⇧ 5	⇨ 8	⇧ 8	8
208	D	US 61 (Missouri border to beginning of four-lane in Burlington)	81	⇩ 81.59	81.87	⇨ 8	⇨ 7	⇨ 10	⇩ 7	⇩ 6	⇨ 8	⇩ 8	4
209	ND	US 275 (Missouri border to jct of US 34)	34	⇧ 81.60	78.79	⇧ 7	⇨ 5	⇨ 10	⇨ 8	⇩ 7	⇨ 9	⇨ 10	7
210	ND	IA 2 (jct of US 63 to jct of US 218/IA 27)	51	⇧ 81.67	79.36	⇧ 8	⇨ 6	⇨ 9	⇨ 9	⇧ 8	⇨ 8	⇨ 10	8
211	ND	IA 175 (jct of US 59 to jct of US 71)	10	⇧ 81.73	80.74	⇨ 9	⇨ 7	⇨ 9	⇨ 8	⇨ 8	⇧ 6	⇨ 9	7
212	ND	IA 44 (jct of US 71 to jct of US 169)	47	⇧ 81.77	81.45	⇨ 8	⇨ 6	⇨ 9	⇨ 7	⇨ 6	⇩ 8	⇨ 9	7
213	D	IA 5 (east jct of IA 5/IA 92 to west juction of IA 5/US 65)	59	⇧ 81.80	81.35	⇧ 8	⇨ 6	⇨ 10	⇨ 8	⇨ 7	⇨ 9	⇩ 8	6
214	ND	IA 31 (jct of US 59 to jct of IA 141)	38	⇩ 81.82	82.21	⇨ 7	⇩ 5	⇨ 9	⇨ 9	⇨ 8	⇨ 9	⇨ 10	6
215	ND	IA 143 (from jct of IA 10 to jct of IA 3)	12	⇧ 81.94	81.56	⇨ 9	⇨ 7	⇨ 10	⇨ 9	⇧ 9	⇨ 5	⇨ 10	10
216	ND	IA 16 (jct of US 218/IA 27 to jct of US 61)	20	⇩ 82.00	84.18	⇨ 7	⇨ 6	⇨ 10	⇧ 9	⇩ 5	⇩ 9	⇨ 10	5
217	D	IA 13 (jct of US 151 to jct of E16 in Central City)	24	⇧ 82.01	82.01	⇨ 8	⇨ 6	⇨ 10	⇨ 8	⇩ 6	⇩ 8	⇨ 8	6
218	D	US 30 (jct of IA 14 to beginning of two-lane near jct of US 63)	42	⇩ 82.06	83.03	⇧ 9	⇨ 7	⇨ 10	⇩ 7	⇨ 8	⇩ 7	⇩ 8	6
219	ND	IA 3 (from Nebraska border to jct of US 75)	26	⇧ 82.09	78.30	⇧ 8	⇧ 5	⇨ 9	⇨ 8	⇧ 9	⇨ 8	⇨ 10	8
220	ND	IA 4 (jct of US 30 to jct of US 20)	43	⇧ 82.10	81.35	⇧ 8	⇨ 6	⇨ 10	⇨ 9	⇨ 8	⇨ 7	⇨ 10	9
221	ND	IA 92 (from jct of US 71 to jct of US 169)	51	⇧ 82.19	74.19	⇧ 8	⇧ 6	⇨ 9	⇨ 8	⇨ 7	⇨ 8	⇩ 9	8
222	D	IA 330 (jct of US 65 to jct of US 30)	42	⇧ 82.27	80.93	⇨ 8	⇩ 6	⇨ 10	⇨ 8	⇧ 7	⇧ 8	⇨ 9	6
223	D	US 30 (jct of I-35 to jct of IA 14)	68	⇧ 82.30	82.10	⇨ 8	⇨ 6	⇨ 10	⇨ 8	⇨ 8	⇨ 8	⇨ 8	7
224	D	US 65 (jct of I-80 to jct of IA 330)	31	⇧ 82.36	80.14	⇨ 8	⇧ 7	⇨ 10	⇨ 7	⇨ 7	⇨ 7	⇨ 8	8
225	ND	US 6 (jct of IA 70 to jct of IA 38)	12	⇧ 82.38	80.62	⇧ 9	⇨ 7	⇨ 10	⇨ 8	⇩ 4	⇨ 7	⇨ 9	8
226	ND	IA 14 (jct of US 34 to end of IA 14 NHS)	25	⇧ 82.48	80.06	⇧ 9	⇨ 7	⇨ 10	⇨ 7	⇩ 4	⇨ 6	⇨ 9	6
227	ND	US 71 (Missouri border to jct of I-80)	69	⇧ 82.49	80.40	⇧ 9	⇧ 7	⇨ 10	⇩ 7	⇩ 6	⇩ 6	⇩ 9	9
228	ND	IA 22 (jct of IA 21 to jct of IA 1)	34	⇧ 82.54	81.13	⇨ 7	⇨ 6	⇨ 10	⇧ 9	⇧ 8	⇨ 9	⇨ 10	6
229	ND	IA 64 (jct of US 151 to start of NHS on IA 64 near US 61 jct)	33	⇩ 82.77	83.45	⇨ 8	⇨ 7	⇨ 10	⇧ 8	⇨ 7	⇨ 8	⇨ 9	7
230	ND	IA 16 (jct of US 34 to jct of US 218)	44	⇧ 82.79	81.64	⇨ 7	⇨ 6	⇨ 10	⇨ 9	⇩ 7	⇨ 9	⇨ 10	8
231	ND	IA 136 (jct of US 61 to start of IA 136 NHS near Clinton)	29	⇩ 82.87	84.73	⇨ 7	⇨ 6	⇨ 9	⇨ 9	⇨ 8	⇨ 10	⇨ 10	2
232	ND	IA 76 (jct of US 18 to Minnesota border)	42	⇧ 82.98	80.45	⇧ 8	⇨ 6	⇨ 10	⇧ 9	⇩ 6	⇨ 8	⇨ 9	7
233	ND	IA 2 (jct of IA 5 to west jct of IA 2/US 63)	20	⇧ 83.06	81.37	⇧ 8	⇨ 7	⇨ 10	⇨ 8	⇧ 7	⇨ 7	⇨ 9	6
234	I	I-35 (Missouri state line to west jct of I-80/I-235)*	147	⇧ 83.12	82.89	⇧ 9	⇩ 7	⇨ 10	⇧ 9	⇩ 7	⇨ 7	⇨ 8	8
235	ND	IA 148 (jct of US 34 to jct of I-80)	37	⇧ 83.33	82.40	⇧ 8	⇨ 6	⇨ 9	⇩ 9	⇧ 8	⇧ 9	⇨ 10	8
236	ND	IA 15 (jct of US 18 to Minnesota border)	33	⇩ 83.36	83.39	⇨ 8	⇨ 7	⇨ 9	⇨ 9	⇨ 9	⇧ 9	⇨ 10	8
237	ND	IA 44 (jct of US 30 to jct of US 59)	21	⇩ 83.36	87.43	⇩ 7	⇩ 6	⇨ 10	⇨ 9	⇩ 7	⇨ 9	⇨ 10	6
238	ND	IA 83 (jct of US 59 to jct of IA 148)	27	⇩ 83.36	83.42	⇧ 8	⇨ 6	⇩ 9	⇧ 9	⇨ 7	⇨ 10	⇨ 10	8
239	ND	IA 9 (jct of US 169 to jct of I-35)	38	⇧ 83.38	81.47	⇧ 9	⇨ 7	⇧ 10	⇨ 8	⇨ 6	⇨ 7	⇨ 9	9
240	ND	IA 141 (jct of IA 4 to beginning of four-lane near Perry)	14	⇧ 83.69	83.15	⇧ 10	⇨ 8	⇨ 10	⇨ 6	⇩ 6	⇩ 5	⇨ 9	8
241	ND	US 169 (jct of US 30/US 169 to jct of US 20)	33	⇧ 83.71	74.66	⇧ 9	⇧ 6	⇨ 10	⇨ 7	⇩ 6	⇨ 7	⇨ 9	9
242	ND	US 6 (from jct of US 59 to jct of I-80)	20	⇧ 83.72	78.09	⇨ 9	⇧ 8	⇨ 10	⇨ 6	⇩ 2	⇧ 8	⇨ 8	6
243	ND	IA 37 (jct of IA 175 to jct of US 30)	23	⇧ 83.81	82.02	⇨ 8	⇨ 6	⇨ 9	⇨ 9	⇨ 8	⇧ 9	⇨ 10	6
244	ND	IA 24 (jct of US 63 to jct of US 52/IA 150)	28	⇧ 83.83	81.68	⇧ 9	⇨ 7	⇨ 10	⇧ 8	⇧ 7	⇩ 7	⇨ 9	8
245	ND	IA 8 (jct of US 63 to jct of US 218)	14	⇧ 83.84	82.29	⇨ 8	⇨ 7	⇨ 9	⇨ 8	⇩ 7	⇧ 8	⇨ 9	9
246	ND	IA 48 (jct of US 59 to jct of US 34)	24	⇧ 83.87	70.72	⇧ 8	⇧ 6	⇩ 9	⇧ 9	⇩ 7	⇧ 9	⇧ 10	9
247	I	I-29 (east jct of I-29/I-80 to jct of I-680)	39	⇧ 84.15	81.14	⇧ 9	⇧ 7	⇨ 10	⇨ 8	⇧ 7	⇨ 8	⇧ 8	8
248	ND	IA 37 (jct of US 30 to jct of US 59)	17	⇩ 84.22	86.02	⇩ 8	⇩ 6	⇨ 9	⇨ 10	⇨ 7	⇨ 9	⇨ 10	7
249	ND	IA 281 (from Waterloo city limits to jct of IA 150)	28	⇩ 84.31	86.12	⇨ 8	⇨ 7	⇨ 9	⇨ 8	⇩ 7	⇩ 8	⇨ 9	5
250	ND	IA 188 (jct of IA 3 to jct of US 63)	24	⇧ 84.32	81.79	⇧ 8	⇧ 6	⇨ 9	⇨ 9	⇧ 9	⇩ 9	⇨ 10	8
251	I	I-29 (jct of I-680 to jct of US 20)	146	⇧ 84.34	83.58	⇧ 9	⇨ 7	⇨ 10	⇨ 9	⇩ 7	⇧ 8	⇨ 8	10
252	ND	US 69 (Ames N City limits/US 69 NHS start to jct of US 20)	27	⇧ 84.57	83.53	⇨ 8	⇨ 7	⇨ 9	⇨ 7	⇨ 8	⇧ 10	⇨ 9	8
253	ND	US 65 (Missouri border to east jct of US 34/US 65)	32	⇧ 84.57	77.52	⇧ 9	⇧ 7	⇩ 9	⇨ 9	⇨ 8	⇩ 7	⇨ 10	8
254	I	I-35 (jct of US 20 to Minnesota state line)*	152	⇧ 84.94	84.33	⇨ 9	⇨ 8	⇨ 10	⇨ 9	⇧ 8	⇩ 7	⇨ 8	10
255	ND	IA 86 (from Minnesota border to jct of IA 9)	5	⇧ 84.96	76.62	⇧ 10	⇧ 8	⇨ 10	⇨ 7	⇩ 6	⇩ 5	⇨ 9	7
256	ND	IA 346 (jct of US 218 to jct of US 63)	12	⇩ 85.12	85.58	⇨ 9	⇨ 8	⇨ 10	⇨ 8	⇩ 7	⇨ 7	⇨ 9	8
257	D	IA 60 (jct of US 75 to Minnesota border)	117	⇧ 85.12	83.14	⇧ 9	⇨ 7	⇨ 10	⇨ 9	⇨ 9	⇧ 7	⇨ 9	7
258	ND	US 69 (Missouri border to jct of US 34)	40	⇧ 85.21	83.06	⇧ 8	⇨ 6	⇨ 10	⇨ 8	⇧ 8	⇨ 9	⇧ 10	6
259	ND	IA 1 (jct of US 34 to jct of IA 2)	23	⇧ 85.34	84.42	⇨ 9	⇨ 7	⇨ 10	⇨ 7	⇨ 7	⇨ 9	⇨ 9	7
260	ND	IA 44 (jct of US 59 to jct of US 71)	23	⇩ 85.56	87.28	⇩ 8	⇨ 7	⇨ 10	⇨ 8	⇩ 6	⇨ 8	⇨ 10	8
261	ND	IA 4 (jct of IA 141 to juncton US 30)	14	⇩ 85.57	85.61	⇨ 9	⇩ 7	⇨ 10	⇧ 8	⇨ 7	⇨ 7	⇨ 10	8
262	ND	IA 9 (east jct of US 71 to west jct of US 169)	40	⇧ 85.69	82.87	⇧ 9	⇧ 8	⇨ 10	⇨ 7	⇨ 7	⇧ 7	⇨ 9	8
263	ND	IA 182 (jct of US 218 to jct of IA 9)	9	⇧ 85.70	82.79	⇧ 10	⇧ 8	⇨ 9	⇧ 8	⇨ 7	⇨ 7	⇨ 9	8
264	I	I-29 (Missouri state line to east jct of I-29/I-80)*	99	⇧ 86.24	83.71	⇧ 9	⇨ 8	⇨ 10	⇨ 9	⇧ 8	⇨ 8	⇨ 8	10
265	ND	US 169 (Missouri border to jct of US 34)	38	⇩ 86.46	88.17	⇨ 8	⇨ 7	⇩ 9	⇨ 9	⇨ 8	⇨ 9	⇨ 10	9
266	ND	US 67 (Clinton N city limits to jct of US 52)	12	⇧ 87.26	84.97	⇧ 9	⇨ 6	⇨ 10	⇨ 8	⇨ 7	⇨ 10	⇩ 9	3
267	ND	IA 2 (from jct of US 71 to jct of I-35)	67	⇧ 87.75	86.58	⇧ 9	⇨ 7	⇨ 10	⇨ 8	⇨ 7	⇨ 8	⇨ 10	9
268	D	US 20 (jct of US 71 to jct of US 169)*	103	⇧ 87.85	87.76	⇨ 9	⇧ 8	⇨ 10	⇩ 9	⇨ 9	⇨ 7	⇩ 9	9
269	ND	IA 212 (jct of IA 21 to jct of US 6)	12	⇩ 88.08	89.49	⇨ 9	⇨ 7	⇨ 9	⇨ 9	⇩ 8	⇨ 10	⇨ 10	2
270	ND	IA 127 (jct of I-29 to jct of US 30)	16	⇩ 88.41	88.83	⇨ 8	⇨ 7	⇨ 10	⇨ 9	⇨ 8	⇨ 10	⇨ 10	4
271	ND	US 6 (from end of NHS on US 6 near Kellogg to start of US 6 NHS near Grinnell)	15	⇧ 88.50	85.14	⇧ 9	⇨ 7	⇨ 9	⇨ 7	⇧ 8	⇧ 10	⇨ 9	7
272	ND	IA 85 (jct of US 63 to jct of IA 21)	9	⇧ 88.74	86.93	⇨ 9	⇨ 8	⇧ 9	⇨ 9	⇨ 8	⇩ 9	⇨ 10	8
273	ND	IA 25 (jct of I-80 to jct of US 30)	43	⇧ 89.07	88.05	⇨ 9	⇨ 7	⇨ 10	⇨ 9	⇧ 9	⇨ 8	⇨ 10	7
274	ND	IA 14 (jct of US 20 to jct of IA 3)	20	⇧ 89.75	85.58	⇨ 9	⇩ 7	⇨ 10	⇧ 8	⇧ 8	⇧ 9	⇨ 9	9
275	ND	IA 70 (east jct of IA 22 to jct of US 6)	6	⇧ 89.76	81.32	⇧ 10	⇨ 8	⇨ 10	⇨ 7	⇧ 7	⇧ 8	⇨ 9	8
276	ND	IA 146 (jct of I-80 to jct of US 63)	19	⇧ 90.27	89.96	⇨ 10	⇨ 9	⇨ 10	⇩ 7	⇧ 7	⇨ 8	⇨ 9	8
277	ND	IA 202 (Missouri border to jct of IA 2)	10	⇧ 90.49	89.61	⇨ 8	⇨ 7	⇨ 10	⇧ 10	⇨ 9	⇨ 10	⇨ 10	4
278	ND	IA 14 (jct of IA 3 to jct of US 18 in Charles City)	29	⇧ 90.88	86.92	⇧ 10	⇧ 8	⇨ 10	⇨ 8	⇨ 7	⇨ 9	⇨ 9	7

279	ND	IA 26 (jct of IA 9 to Wisconsin border)	11	↑ 91.36	90.87	→ 9	↓ 8	→ 10	→ 9	→ 8	↑ 10	→ 10	8
280	ND	IA 130 (jct of I-80 to jct of IA 38/IA130)	33	↑ 92.30	78.25	↑ 10	↑ 8	→ 9	↓ 8	→ 8	→ 10	→ 10	7
281	ND	IA 210 (jct of I-35 to jct of US 65)	14	↑ 92.51	89.68	↑ 10	→ 8	↑ 10	→ 9	→ 9	→ 10	→ 10	3
282	ND	IA 175 (jct of US 169 to jct of I-35)	30	↑ 93.03	91.78	→ 9	↓ 7	→ 10	→ 9	→ 9	→ 10	→ 10	7
283	ND	IA 117 (jct of I-80 to jct of US 65)	10	↑ 93.31	89.39	↑ 10	→ 8	→ 10	→ 9	→ 9	↑ 9	→ 10	8

* Grade and pavement work performed along the corridor in 2014
** Grade and pavement work performed along the corridor in 2015

3.2 Lowest-rated corridors by individual criterion

To highlight the corridors with the poorest normalization values and raw data values for each of the seven criteria, the "ten lowest-rated" corridor lists were developed to show the bottommost corridors across the entire system. Each table includes a mixture of interstate, non-interstate divided, and non-divided routes across the system. The charts below provide a look at these corridors by each individual criterion, which are sorted by the lowest normalization values first, then by raw values. The corridors new to each list in this year's report are designated with an asterisk.

Table 3.3: Lowest-rated corridors by PCI

			2015		2014		
Rank	Corridor description	Route type	Comp score	PCI	Comp score	PCI	Trend
1	IA 21 (jct of IA 78 to jct of IA 92)	ND	67.11	27.3	67.09	25.3	↑
2	IA 224 (jct of I-80 to jct of IA 14)	ND	69.80	28.7	69.28	26.4	↑
3	I-480 (full route)*	I	63.64	40.1	67.98	46.1	↓
4	IA 141 (jct of US 71 to jct of US 59)*	ND	66.84	40.2	69.63	48.3	↓
5	IA 136 (jct of US 151 to jct of US 20)	ND	59.59	40.5	60.87	39.7	↑
6	IA 10 (from Nebraska border to start of IA 10 NHS near Orange City)*	ND	67.96	40.9	70.48	50.5	↓
7	IA 22 (from Buffalo city limits to jct of IA 22/IA 38 in Muscatine)	ND	66.57	42.2	64.24	40.3	↑
8	IA 137 (jct of IA 5 to jct of US 63)	ND	63.62	42.4	64.64	39.4	↑
9	IA 7 (jct of IA 3 to Storm lake city limits)*	ND	66.88	43.2	68.27	48.0	↑
10	IA 2 (jct of I-35 to jct of US 65)	ND	71.30	43.4	67.97	40.0	↑

Table 3.4: Lowest-rated corridors by IRI

			2015		2014		
Rank	Corridor description	Route type	Comp score	IRI	Comp score	IRI	Trend
1	IA 21 (jct of IA 78 to jct of IA 92)	ND	67.11	217	67.09	217	⇨
2	IA 224 (jct of I-80 to jct of IA 14)	ND	69.80	198	69.28	199	⇧
3	IA 38 (jct of US 151 to jct of IA 3)	ND	69.43	196	68.42	197	⇧
4	I-480 (full route)*	I	63.64	196	67.98	171	⇩
5	IA 2 (jct of US 218 to jct of US 61)	ND	68.71	194	71.23	192	⇩
6	IA 62 (jct of US 52 to Maquoketa city limits)	ND	69.59	193	72.28	192	⇩
7	IA 14 (jct of IA 2 to jct of US 34)	ND	69.26	190	70.10	190	⇨
8	IA 191 (jct of I-80 to jct of IA 37)*	ND	72.81	183	74.47	183	⇨
9	US 69 (beginning of NHS on US 69 near Ankeny city limits to Ames south city limits)	ND	62.47	183	61.41	183	⇨
10	US 59 (Missouri border to jct of US 71)*	ND	71.83	179	73.34	180	⇧

Table 3.5: Lowest-rated corridors by Structure sufficiency rating

			2015		2014		
Rank	Corridor description	Route type	Comp score	Suff	Comp score	Suff	Trend
1	IA 196 (jct of US 71 to jct of US 20)	ND	78.14	39	74.71	39	⇨
2	I-480 (full route)*	I	63.64	50	67.98	71	⇩
3	IA 78 (jct of IA 149 to jct of IA 1)	ND	74.15	53	75.60	53	⇨
4	IA 316 (jct of IA 5 to Runnels city limits)	ND	72.55	55	73.15	55	⇨
5	IA 5 (Missouri border to start of IA 5 NHS)*	ND	65.57	60	65.82	60	⇨
6	IA 141 (jct of IA 4 to jct of US 71)	ND	76.99	73	76.85	70	⇧
7	I-129 (full route)	I	74.84	74	77.78	74	⇨
8	US 6 (jct of I-80 to jct of IA 38)	ND	66.98	74	66.87	74	⇨
9	IA 136 (jct of US 151 to jct of US 20)*	ND	59.59	74	60.87	74	⇨
10	IA 12 (Sioux City limits to jct of IA 10)	ND	75.39	80	79.57	81	⇩

Table 3.6: Lowest-rated corridors by passenger AADT

			2015		2014		
Rank	Corridor description	Route type	Comp score	Pass	Comp score	Pass	Trend
1	US 65 (jct of US 18 to beginning of four-lane highway on north side of Mason City)	ND	67.14	6665	67.56	6682	⇧
2	US 67 (jct of I-74 to jct of I-80)	ND	64.69	10582	65.11	9985	⇩
3	IA 415 (IA 415 NHS near Polk City city limits to jct of IA 141)	ND	64.32	6892	64.45	6175	⇩
4	US 69 (jct of I-35/I-80 to north Ankeny corporate limit)*	D	72.66	14482	69.81	13355	⇩
5	I-235 (full route)	I	70.72	84214	71.40	75176	⇩
6	US 6 (jct of I-280 to jct of I-74)*	D	66.59	19697	66.59	17888	⇩
7	I-35/80 (east jct of I-80/I-235 to west jct of I-80/I-235)	I	61.83	72280	59.85	66647	⇩
8	US 6 (jct of I-80 to jct of IA 70/US 6)*	ND	70.27	13095	71.42	11464	⇩
9	US 69 (beginning of NHS on US 69 near Ankeny city limits to Ames south city limits)	ND	62.47	5671	61.41	5568	⇩
10	I-380 (jct of US 30 to jct of IA-100)	I	68.16	60184	59.83	60592	⇧

Table 3.7: Lowest-rated corridors by single-unit truck AADT

			2015		2014		
Rank	Corridor description	Route type	Comp score	Single	Comp score	Single	Trend
1	US 67 (jct of I-74 to jct of I-80)	ND	64.69	588	65.11	525	↓
2	US 65 (jct of US 18 to beginning of four-lane highway on north side of Mason City)	ND	67.14	208	67.56	215	↑
3	I-380 (jct of US 30 to jct of IA-100)	I	68.16	2247	59.83	2157	↓
4	US 6 (jct of I-80 to jct of IA 70/US 6)*	ND	70.27	421	71.42	359	↓
5	I-35/80 (east jct of I-80/I-235 to west jct of I-80/I-235)	I	61.83	2794	59.85	2957	↑
6	US 6 (from jct of US 59 to jct of I-80)*	ND	83.72	251	78.09	142	↓
7	IA 415 (IA 415 NHS near Polk City city limits to jct of IA 141)*	ND	64.32	263	64.45	170	↓
8	US 30 (beginning of two-lane near jct of US 63 to beginning of four-lane near jct of US 218)*	ND	68.63	261	70.46	210	↓
9	I-35 (east jct of I-80/I-235 to jct of US 30)*	I	67.56	2020	69.56	1525	↓
10	I-235 (full route)	I	70.72	2069	71.40	1601	↓

Table 3.8: Lowest-rated corridors by combo-unit truck AADT

			2015		2014		
Rank	Corridor description	Route type	Comp score	Combo	Comp score	Combo	Trend
1	US 63 (jct of US 18 to Minnesota border)*	ND	68.64	768	82.19	562	↓
2	US 20 (beginning of two-lane near Moville to beginning of four-lane near jct of US 71)	ND	69.55	706	72.80	562	↓
3	US 30 (beginning of two-lane near jct of US 63 to beginning of four-lane near jct of US 218)	ND	68.63	824	70.46	540	↓
4	US 30 (Nebraska state line to beginning of four-lane near jct of US 169)	ND	65.56	600	65.25	609	↑
5	US 18 (jct of I-35 to jct of IA 14)	D	72.29	1958	71.49	1682	↓
6	US 20 (jct of I-35 to jct of I-380)	D	69.42	2081	68.97	1708	↓
7	I-35/80 (east jct of I-80/I-235 to west jct of I-80/I-235)	I	61.83	9964	59.85	9290	↓
8	I-80 (jct of I-380 to Illinois state line)	I	69.07	9940	68.12	9433	↓
9	US 218 (jct of US 34/US 218 to jct of I-80)	D	69.64	1865	68.25	1776	↓
10	US 75 (jct of IA 60/US 75 to jct of US 18)*	ND	69.29	482	71.08	469	↓

Table 3.9: Lowest-rated corridors by Congestion (V/C ratio)

			2015		2014		
Rank	Corridor description	Route type	Comp score	V/C	Comp score	V/C	Trend
1	I-35/80 (east jct of I-80/I-235 to west jct of I-80/I-235)	I	61.83	0.86	59.85	0.77	↓
2	I-380 (jct of I-80 to jct of US 30)	I	75.42	0.80	75.01	0.64	↓
3	I-235 (full route)	I	70.72	0.79	71.40	0.67	↓
4	US 69 (jct of IA 5 to jct of I-235)	D	70.07	0.72	68.27	0.67	↓
5	I-35 (east jct of I-80/I-235 to jct of US 30)	I	67.56	0.69	69.56	0.64	↓
6	IA 5 (jct of IA 5/US 65 to jct of I-35)	D	73.70	0.64	69.40	0.66	↑
7	I-380 (jct of US 30 to jct of IA-100)	I	68.16	0.64	59.83	0.63	↓
8	US 6 (jct of I-280 to jct of I-74)	D	66.59	0.63	66.59	0.58	↓
9	US 65 (beginning of non-divided near Indianola to jct of I-80)	D	71.54	0.62	70.10	0.59	↓
10	US 67 (jct of US 61/US 67 to jct of I-74)*	D	65.53	0.60	63.18	0.52	↓

Table 3.10 Lowest rated-corridors by average crash rate

Rank	Corridor description	Route type	2015 comp score	Crash rate	Norm
1	IA 2 (jct of US 218 to jct of US 61)	ND	71.23	534.8	1
2	I-129 (full route)	I	77.78	257.0	1
3	I-235 (full route)	I	71.40	128.3	1
4	US 69 (jct of I-235 to jct of I-35/I-80)	D	67.58	265.8	1
5	IA 212 (jct of IA 21 to jct of US 6)	ND	89.49	516.6	2
6	IA 136 (jct of US 61 to start of IA 136 NHS near Clinton)	ND	84.73	518.5	2
7	I-29 (jct of US 20 to South Dakota state line)	I	76.01	121.9	2
8	US 69 (jct of US 34 to jct of US 65)	ND	79.75	416.8	3
9	US 67 (Clinton N city limits to jct of US 52)	ND	84.97	410.0	3
10	IA 210 (jct of I-35 to jct of US 65)	ND	89.68	417.9	3

Criteria across multiple corridors

Table 3.11 shows the list of corridors that were found in more than one of the preceding lowest-rated corridor lists. This can be used to help identify corridors that are performing among the worst across the system on multiple levels. However, although the corridors may have multiple criteria that rank in the bottommost part of the system, the seven-factor ICE rating of the corridor may not be among the worst of the 283 statewide corridors.

Table 3.11: Lowest-rated corridors across multiple criteria

Corridor	2015 ICE rating	2014 ICE rating	PCI	IRI	Suff	Pass AADT	Single AADT	Combo AADT	V/C
I-35/80 (east jct of I-80/I-235 to west jct of I-80/I-235)	61.83	59.85				x	x	x	x
I-480 (full route)	63.64	67.98	x	x	x				
I-380 (jct of US 30 to jct of IA-100)	68.16	59.83				x	x		x
I-235 (full route)	70.72	71.40				x	x		x
IA 136 (jct of US 151 to jct of US 20)	59.59	60.87	x		x				
US 69 (beginning of NHS on US 69 near Ankeny city limits to Ames south city limits)	62.47	61.41		x		x			
IA 415 (IA 415 NHS near Polk City city limits to jct of IA 141)	64.32	64.45				x	x		
US 67 (jct of I-74 to jct of I-80)	64.69	63.18				x	x		
US 6 (jct of I-280 to jct of I-74)	66.59	66.59				x			x
IA 21 (jct of IA 78 to jct of IA 92)	67.11	67.09	x	x					

US 65 (jct of US 18 to beginning of four-lane highway on north side of Mason City)	67.14	67.56				x	x		
I-35 (east jct of I-80/I-235 to jct of US 30)	67.56	69.56					x		x
US 30 (beginning of two-lane near jct of US 63 to beginning of four-lane near jct of US 218)	68.63	65.25					x	x	
IA 224 (jct of I-80 to jct of IA 14)	69.80	69.28	x	x					
US 6 (jct of I-80 to jct of IA 70/US 6)	70.27	71.42				x	x		

3.4 Mapping analysis

The following section provides a series of statewide and maintenance district maps showing the ICE rating for non-divided and divided highways, including interstates.

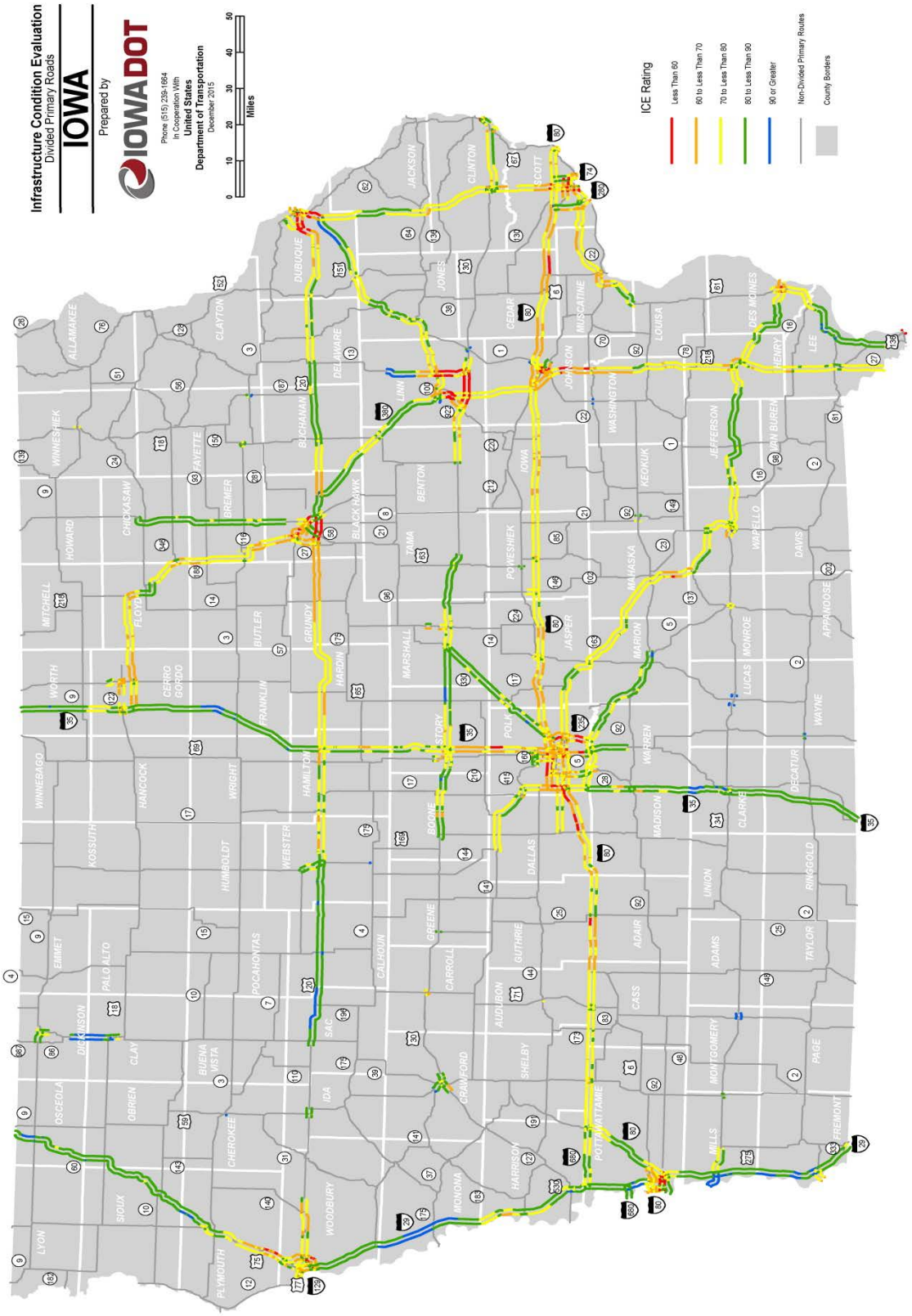


Figure 3.1: Statewide divided primary roads

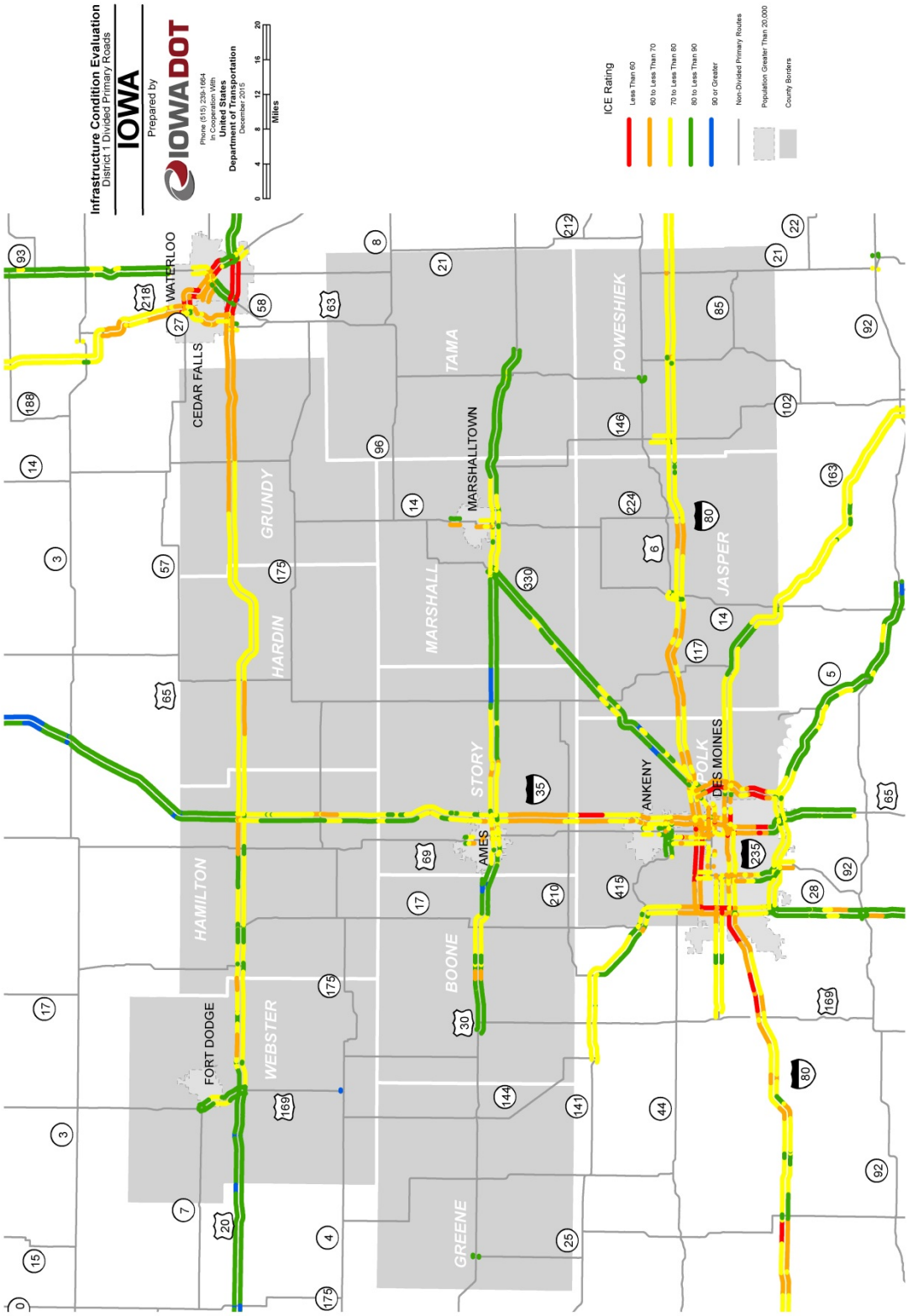


Figure 3.2: District 1 divided primary roads

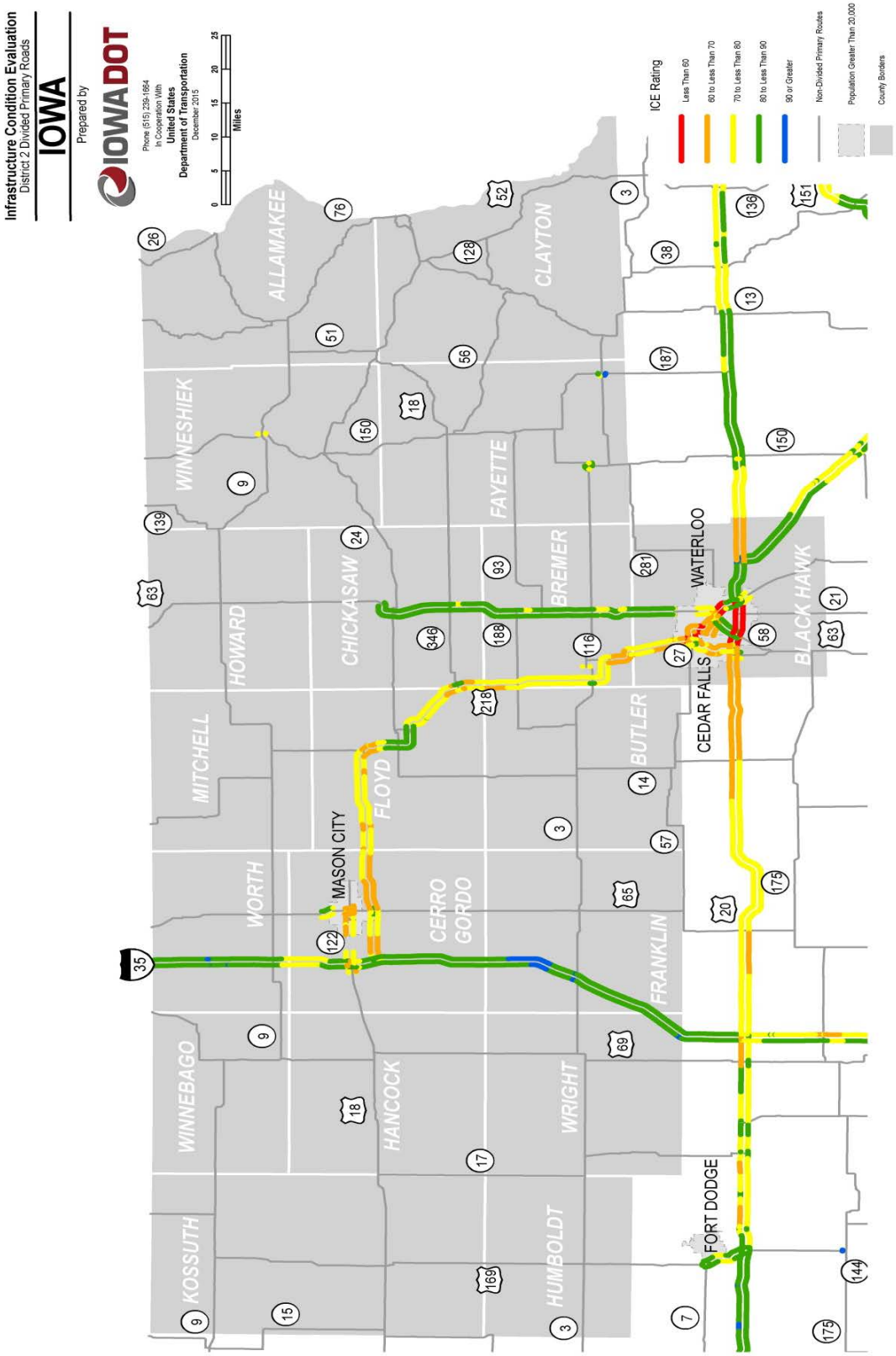
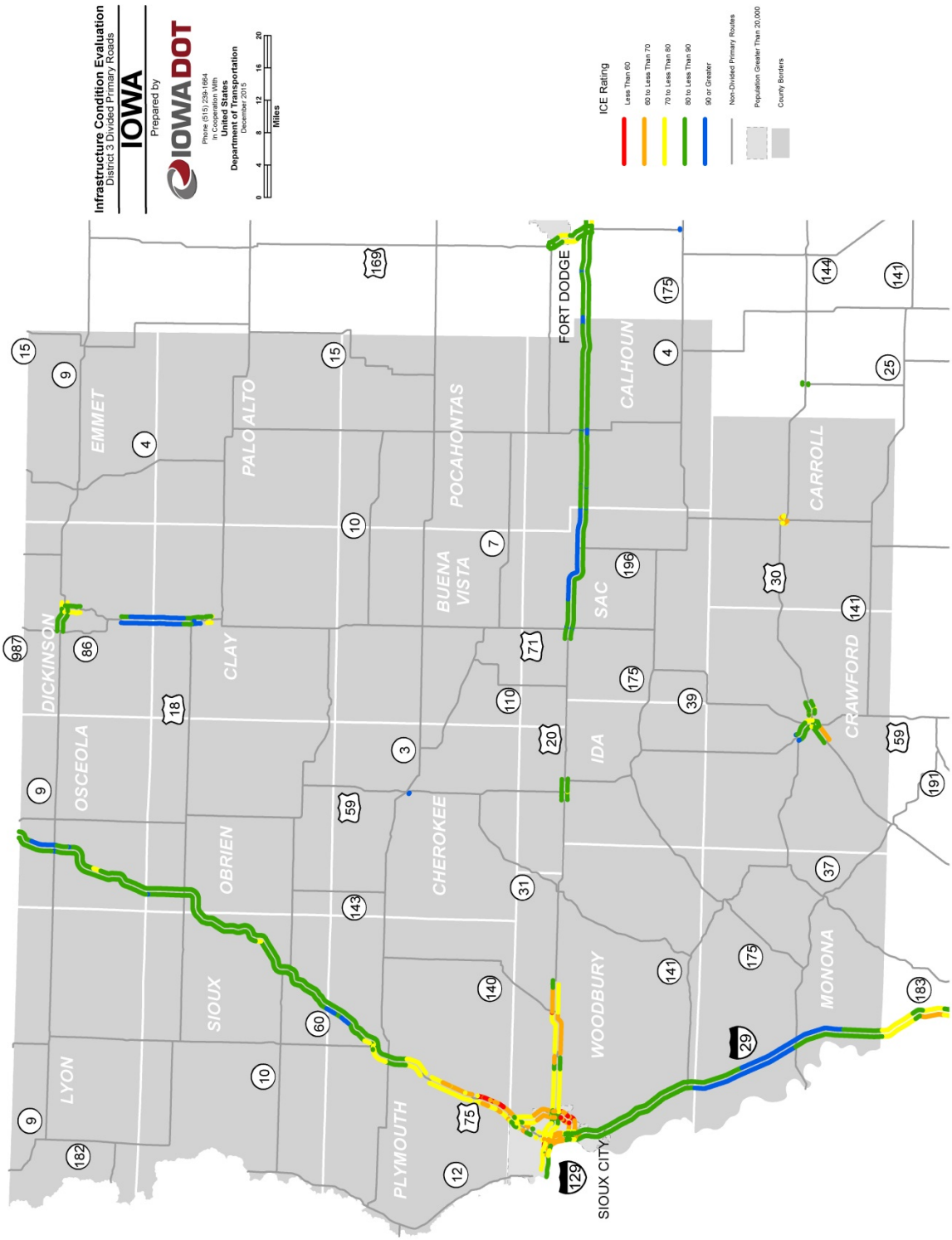


Figure 3.3: District 2 divided primary roads

Figure 3.4: District 3 divided primary roads



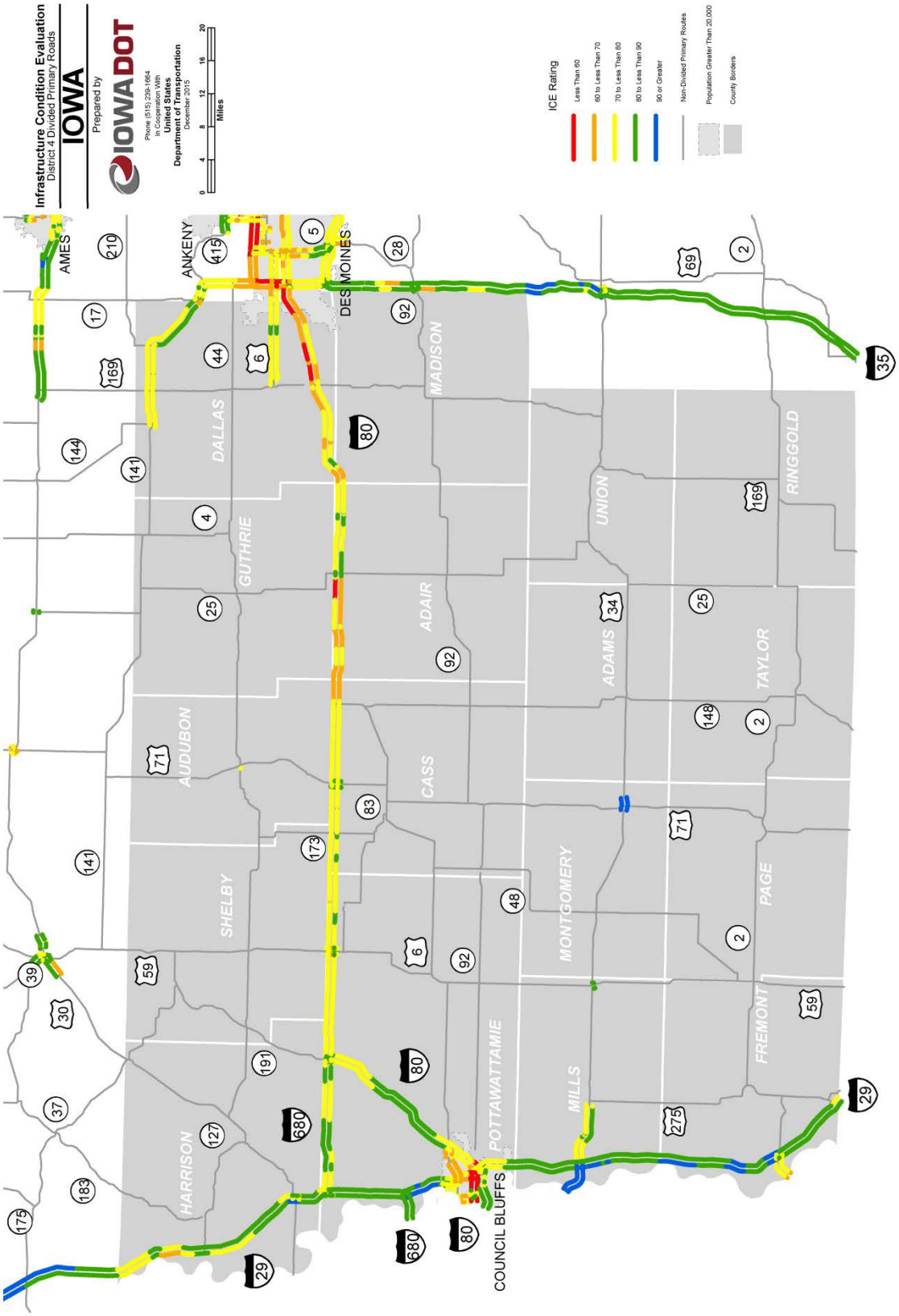


Figure 3.5: District 4 divided primary roads

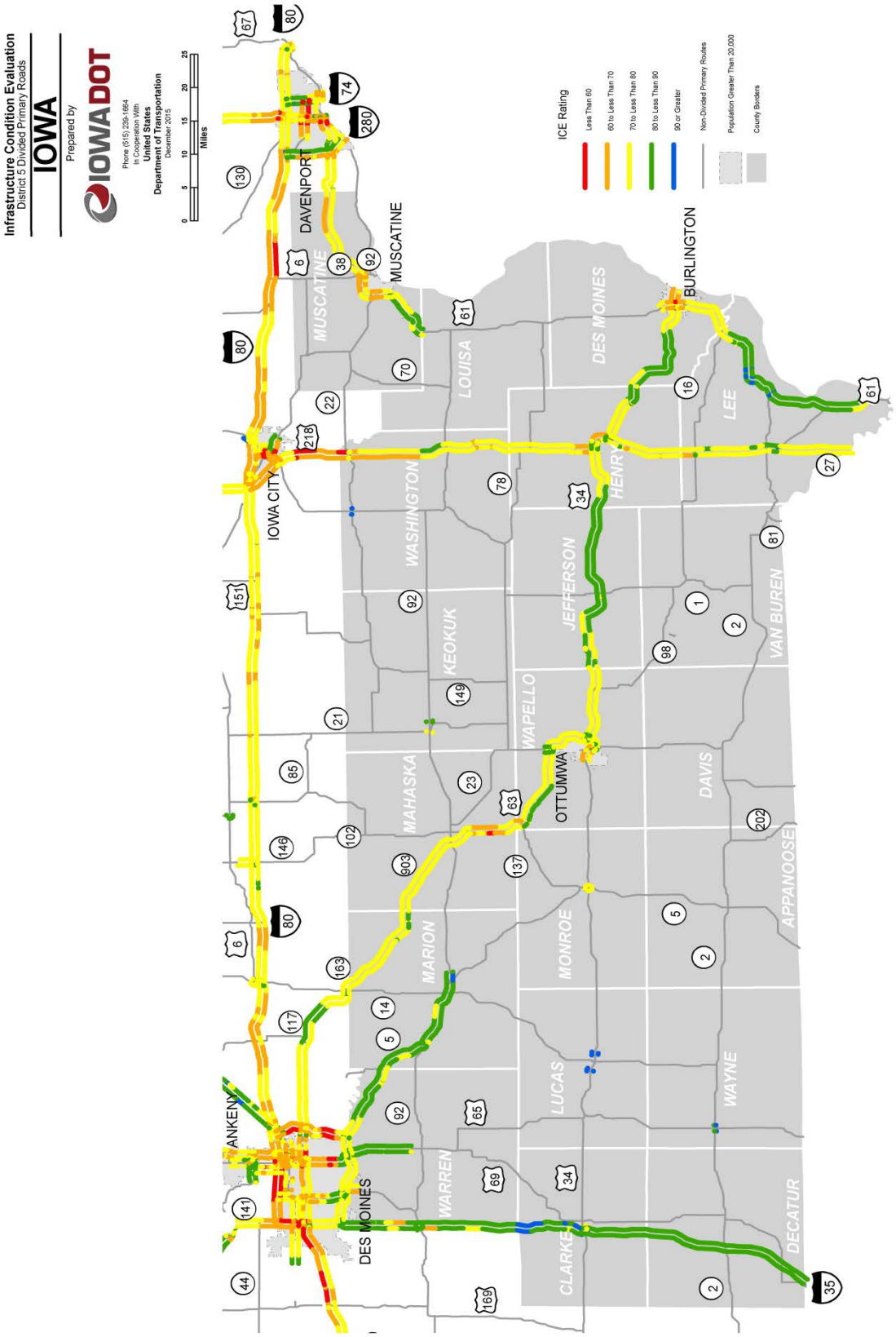


Figure 3.6: District 5 divided primary roads

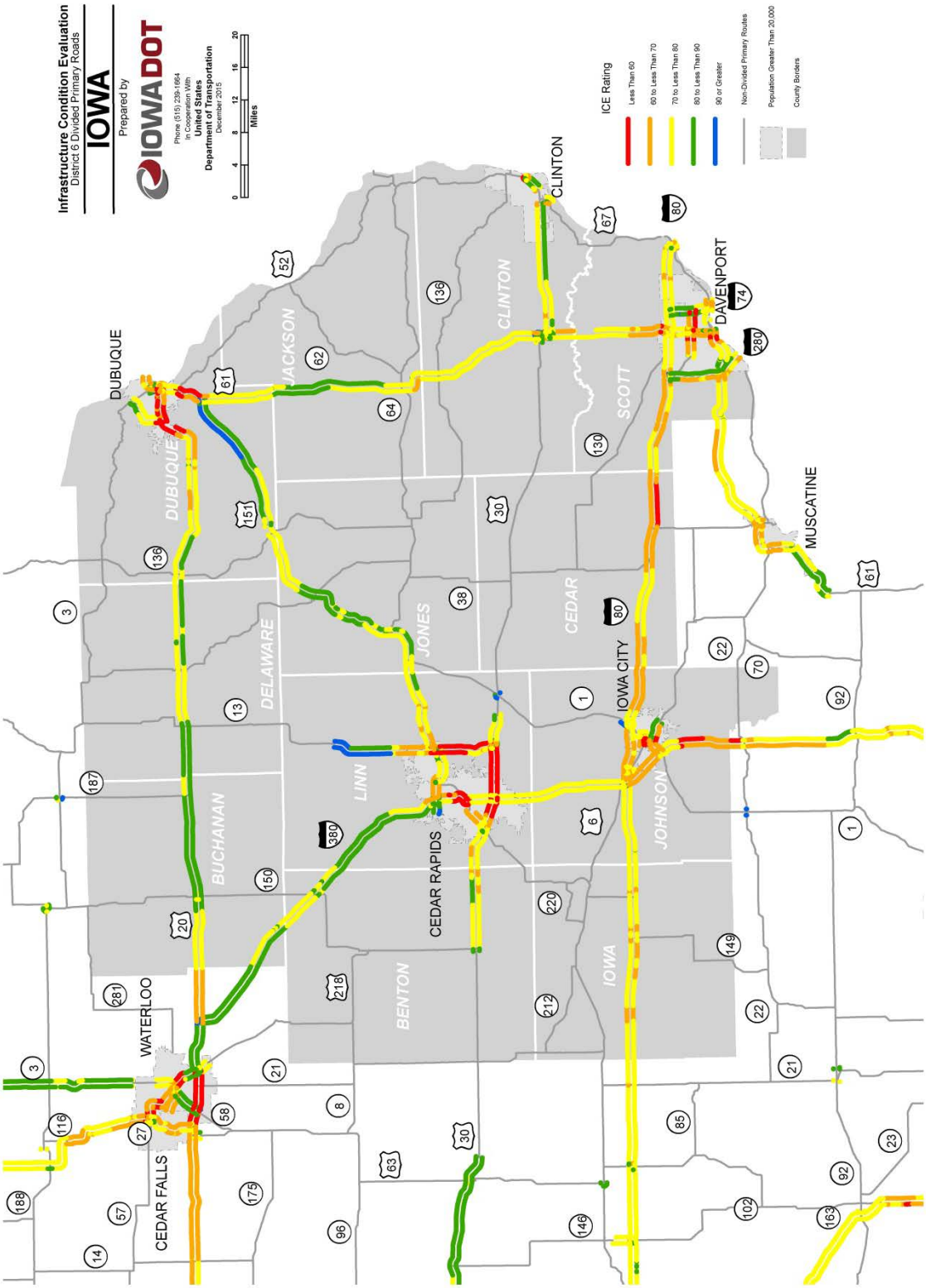


Figure 3.7: District 6 divided primary roads

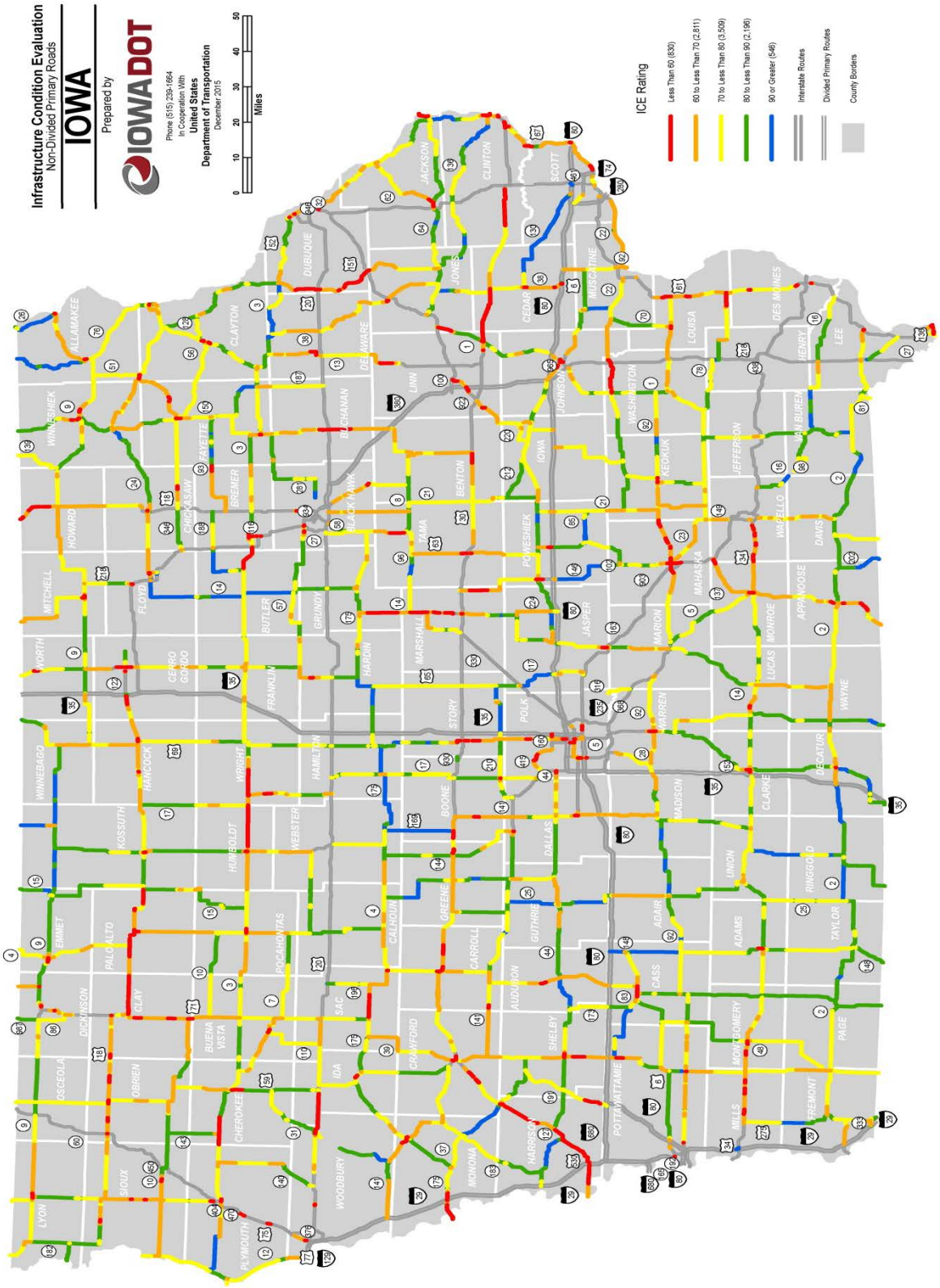


Figure 3.8: Statewide non-divided primary roads

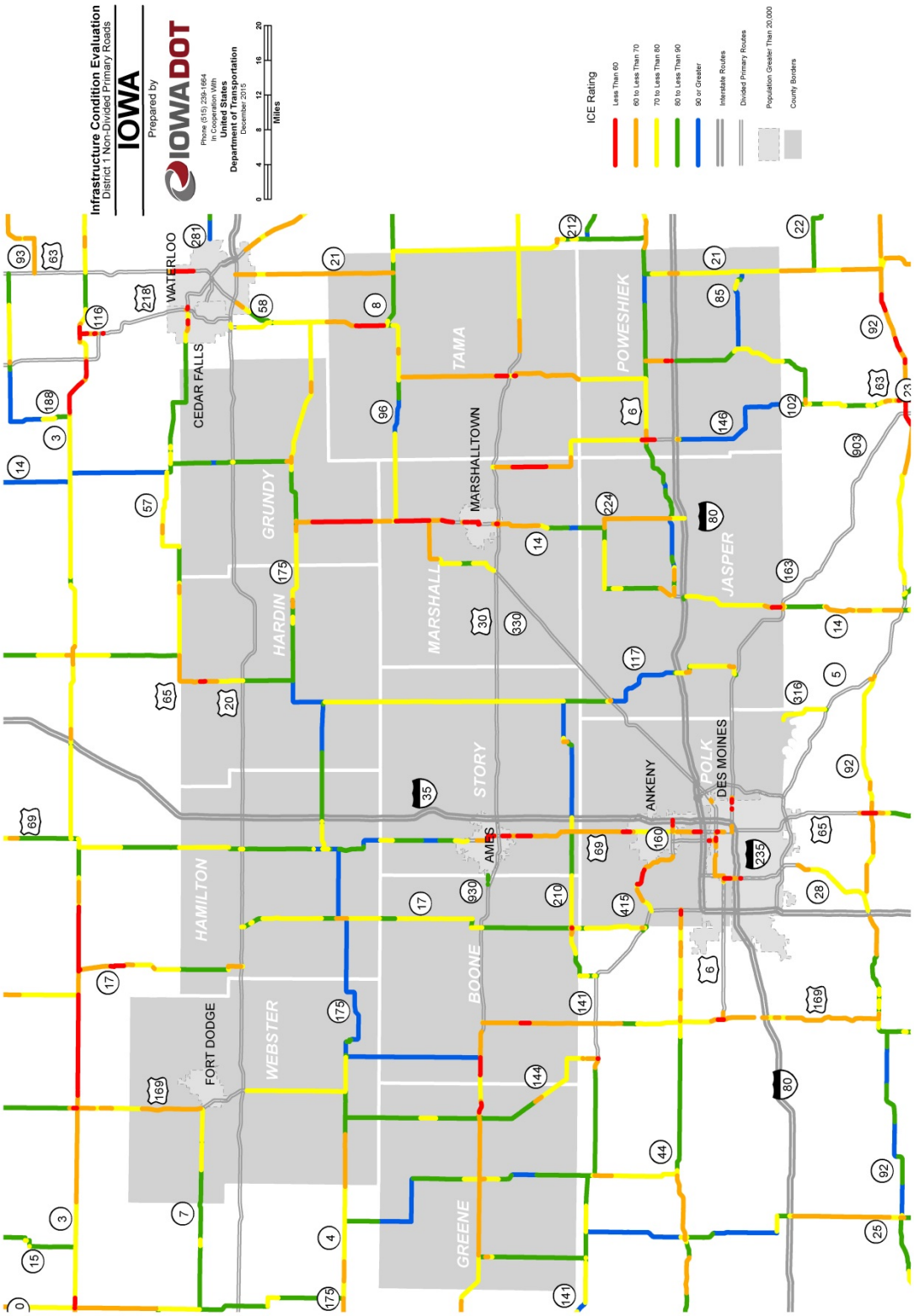


Figure 3.9: District 1 non-divided primary roads

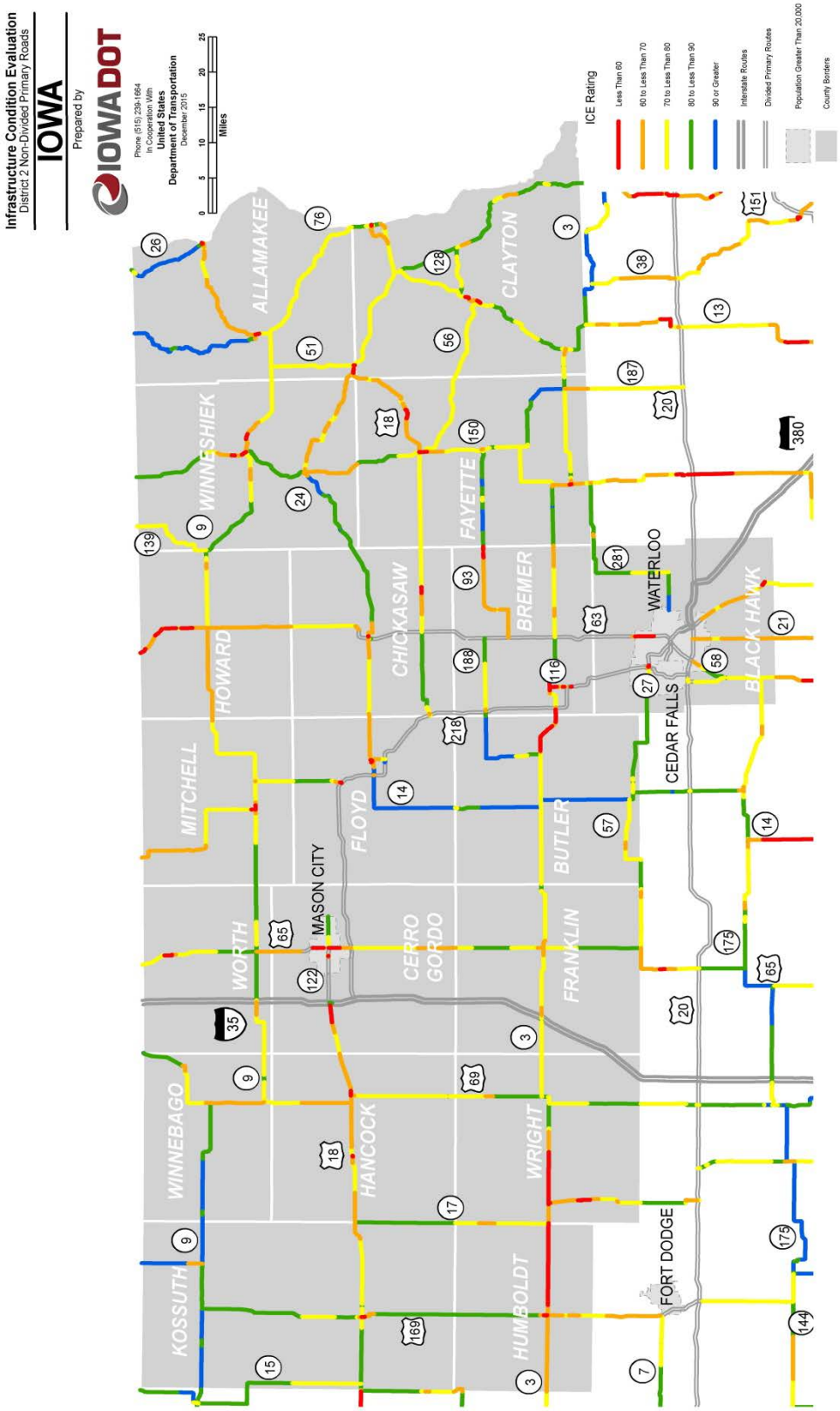


Figure 3.10: District 2 non-divided primary roads

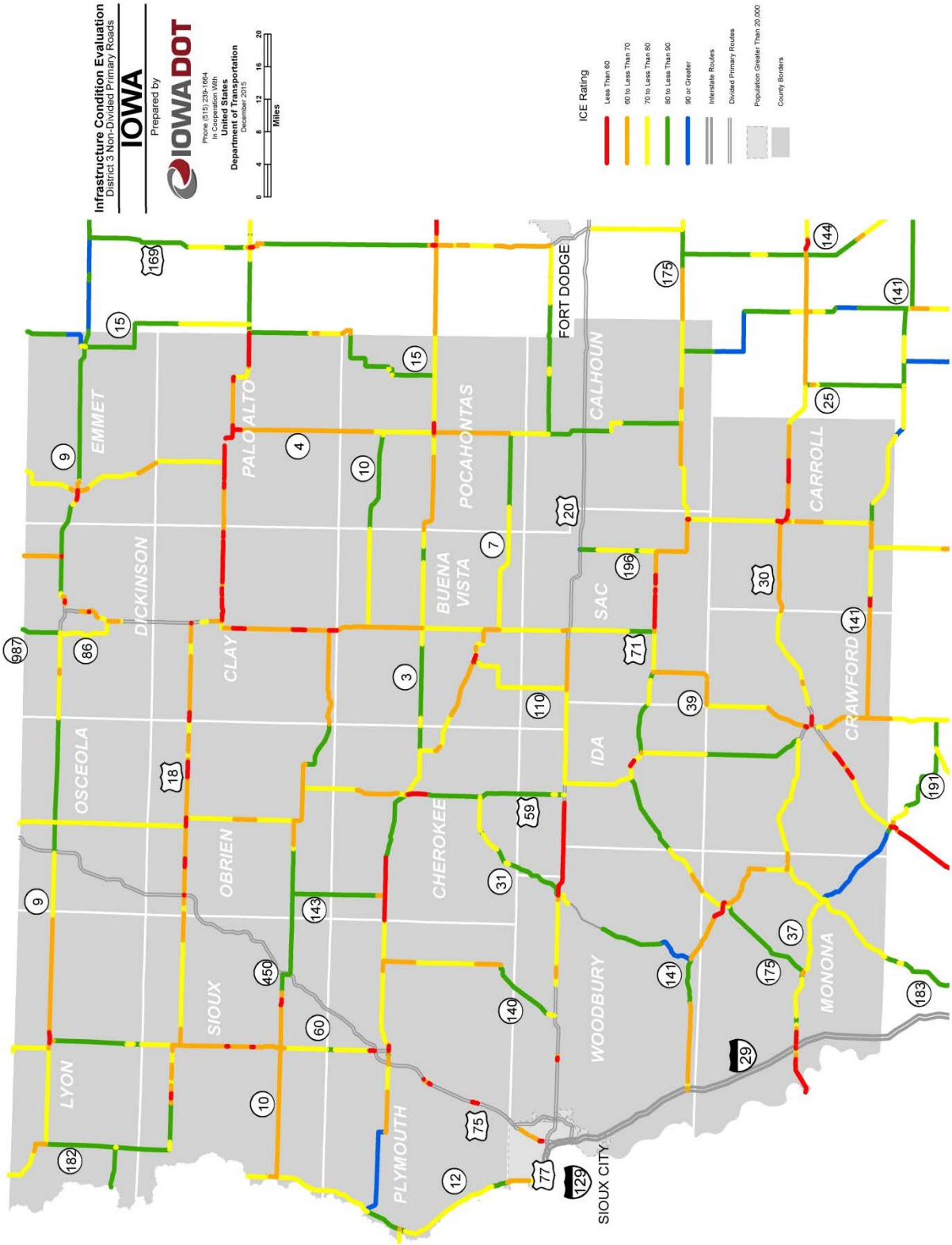


Figure 3.11: District 3 non-divided primary roads

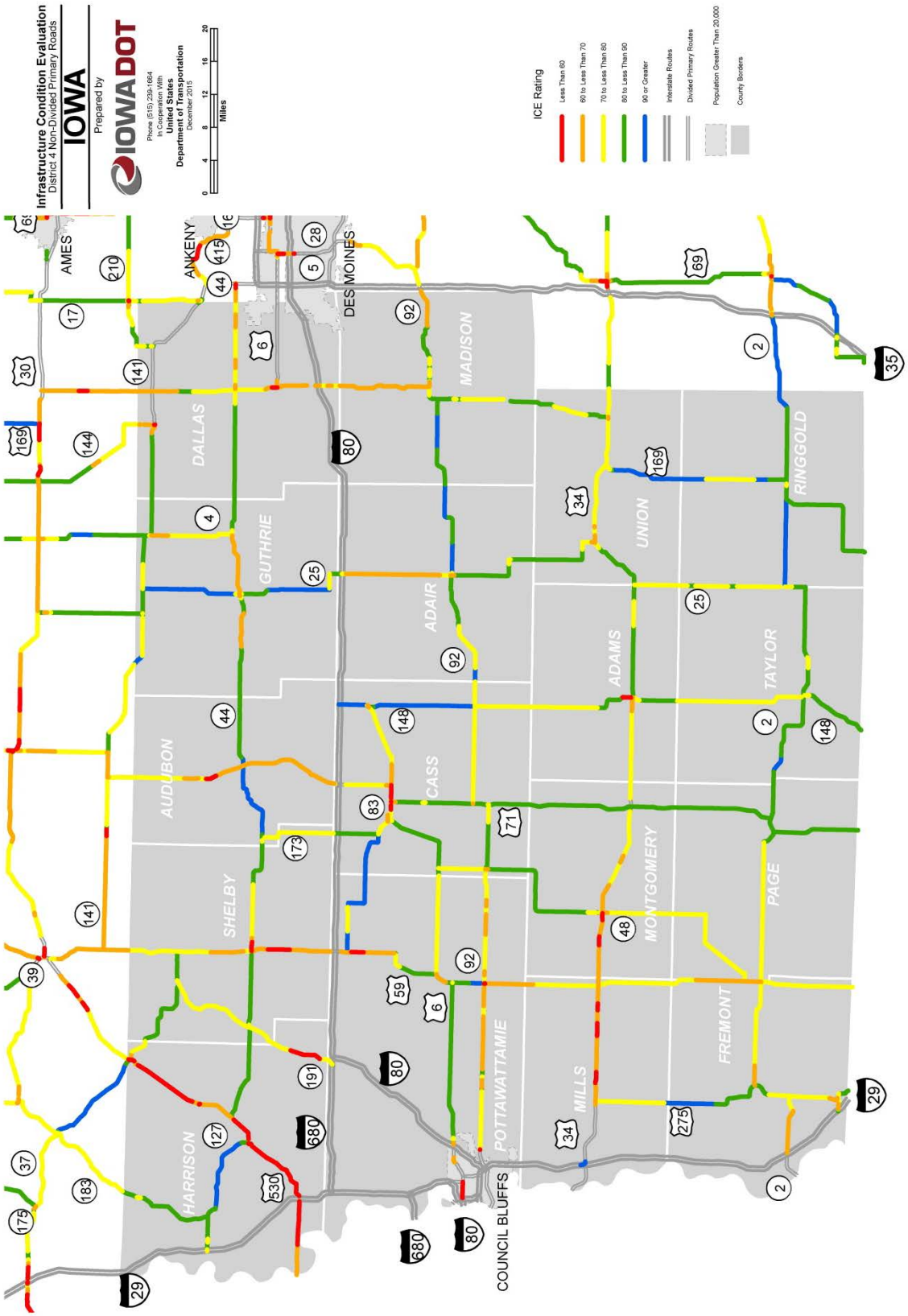


Figure 3.12: District 4 non-divided primary roads

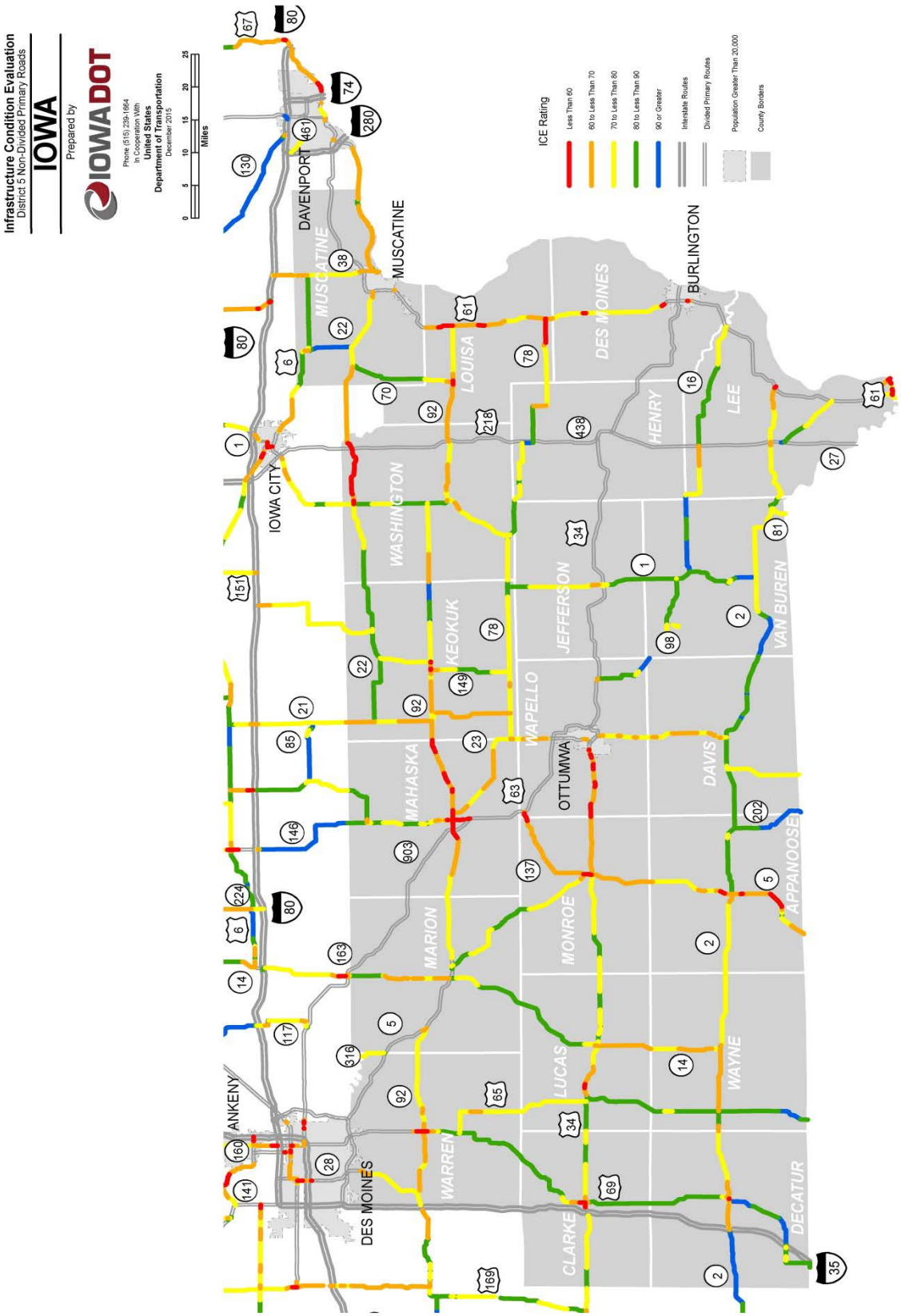


Figure 3.13: District 5 non-divided primary roads

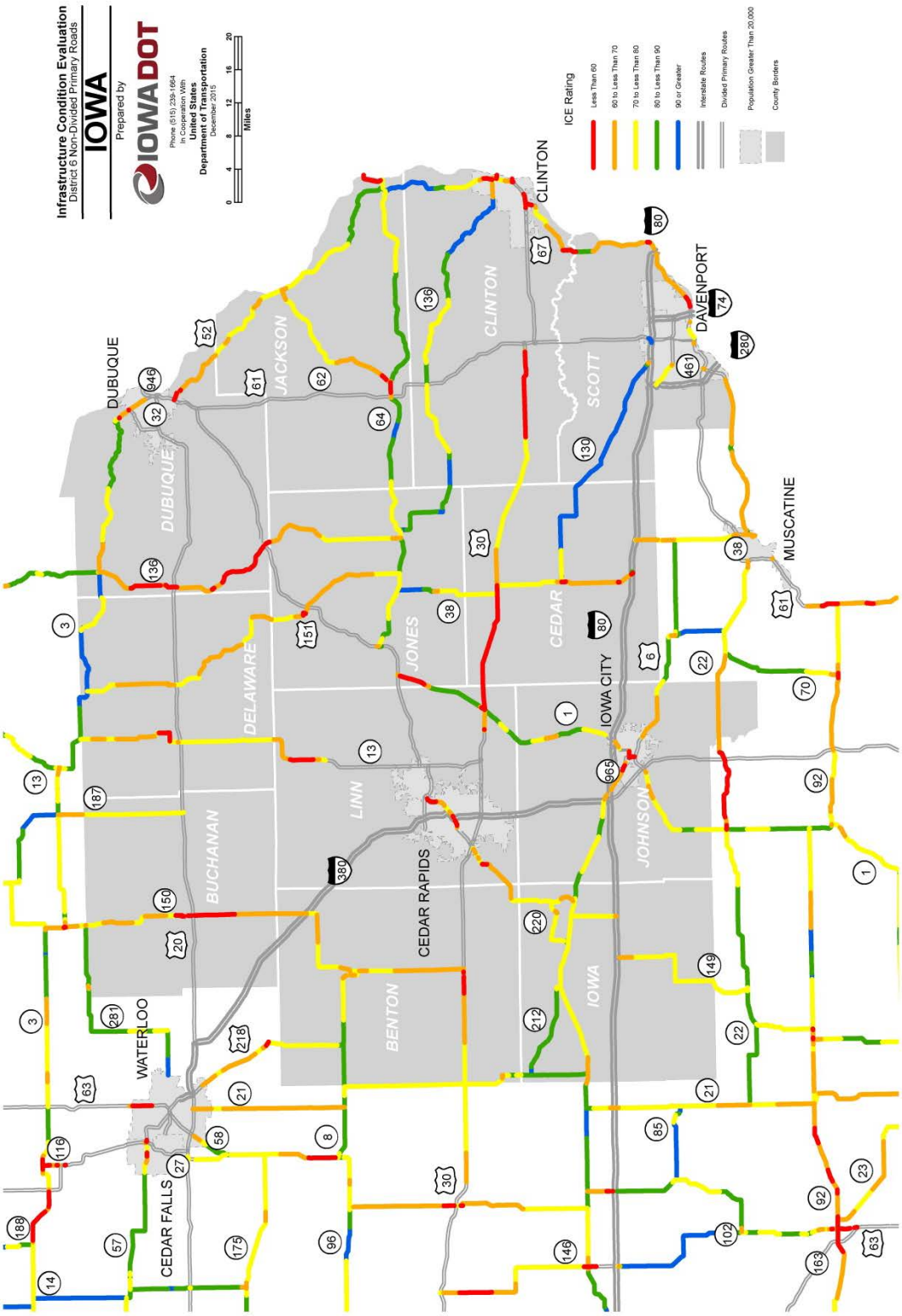


Figure 3.14: District 6 non-divided primary roads

4. System conditions and trends

This chapter provides a brief summary of Iowa's highway system, and examines some of the key trends that have impacted the system and are projected to impact the system into the future. This information was evaluated using the ICE results from the two most recent years and is meant to provide analysis on system performance for the entire Primary Highway System.

4.1 System condition summary

The overall distribution of the ICE ratings in 2015 across the entire Primary Highway System ranged from a low of 25 to a few segments that were rated 100, with the systemwide average at 76.26. The systemwide average across the different route types all experienced positive change. Those segments that were located within urban areas continued to hold the lowest average ICE rating at just above 70 while the rural highways, interstates, and non-NHS system were all rated above the systemwide average of 76.26. The non-NHS held the highest average ICE rating at 78.43 seeing a slight increase from 2014. These averages can be seen in Table 4.1.

Table 4.1: Systemwide average ICE rating

	ICE rating	
Route Type	2014	2015
Urban highways	69.92	71.33
Rural highways	76.32	77.32
NHS	74.06	75.11
Interstate	76.64	77.37
Non-NHS	78.08	78.43
Systemwide	**75.00**	**76.26**

Condition by route type

Table 4.2 shows the distribution of the system by route type and the percentage of segmentation within each ICE rating cohort. The conditions of each route type are compared to each other to give some context on how each is performing. The NHS makes up the greatest percentage of the total system at 51 percent. Of those segments that make up the NHS mileage total, 69 percent are within the 70-90 ICE rating range, which is an increase of four percent from last year. The non-divided NHS system saw the most notable change as more segments shifted into the 80-90 ICE rating range. While divided non-NHS had the lowest mileage, it contained the highest percentage of segments between the 70-80

range. As for the non-divided NHS, there was a positive shift in ICE rating stemming from the reduction of percentage within the 80-90 range moving into the 90+ range. Of all interstate segments that add to the total interstate mileage, 38 percent have an ICE rating in the 70-80 range and another 40 percent have a rating in the 80-90 range. The most notable change in interstate ICE ratings was the increase in the share of segments in the 90+ range increasing from zero percent to five percent. All other cohort percentages saw little to no change from the 2014-2015 report.

Table 4.2: ICE rating cohort by route type

Systemwide by Route Type		<60	60-70	70-80	80-90	90+	
Route Type	**% of Total System**	**% by Route Type**	**% by Route Type**	**% by Route Type**	**% by Route Type**	**% by Route Type**	**Year**
Interstates	14%	**3%**	**15%**	**38%**	**39%**	**5%**	**2015**
		3%	17%	40%	39%	0%	2014
NHS	51%	**7%**	**22%**	**41%**	**28%**	**3%**	**2015**
		7%	27%	40%	25%	1%	2014
Non-divided	26%	**10%**	**29%**	**37%**	**21%**	**3%**	**2015**
		9%	36%	37%	17%	1%	2014
Divided	25%	**3%**	**15%**	**45%**	**34%**	**3%**	**2015**
		5%	18%	44%	33%	1%	2014
Non NHS	35%	**2%**	**16%**	**39%**	**31%**	**12%**	**2015**
		2%	15%	38%	35%	9%	2014
Non-divided	35%	**2%**	**16%**	**39%**	**31%**	**12%**	**2015**
		2%	15%	40%	37%	9%	2014
Divided	1%	**0%**	**16%**	**57%**	**21%**	**6%**	**2015**
		2%	13%	63%	19%	2%	2014
Totals	**100%**	**4%**	**19%**	**40%**	**31%**	**6%**	**2015**
		5%	21%	40%	31%	4%	2014

Overall, the distribution of cohort percentages across different route types was fairly similar. The majority of the segments were rated between the 70-90 range and the lowest percentages across all route types were those segments rated below 60. In comparison, 2015 saw an overall increase in composite score, which is partly due to the change of the PCI formula included in this year's update.

Interstates

Table 4.3 shows the composite ICE ratings across the entire interstate system organized by route for 2014-2015. While I-480 continues to hold the lowest ICE rating, it accounts for the lowest amount of mileage on the system with just over four miles. I-29 continued to hold the highest average ICE rating,

increasing from last year. I-35, I-129, I-235, I-280, and I-680 were among those corridors that saw a decrease in composite score. The I-129 corridor saw the largest decrease followed by I-280. I-380 saw the largest increase from the previous year increasing by five points. This is partially due to the completion of resurfacing work on a large portion of the corridor.

Table 4.3: Interstate average ICE rating, weighted by segment length

	ICE rating	
Route	2014	2015
I-29	81.7	84.4
I-35	81.5	81.2
I-74	79.6	81.0
I-80	70.5	71.3
I-129	78.5	74.8
I-235	71.3	70.9
I-280	80.1	77.0
I-380	72.9	77.9
I-480	65.2	62.6
I-680	80.6	79.6

Condition by district

To compare the condition breakdown by district, Table 4.4 shows the average ICE rating for segments located in each Iowa DOT district and the lowest-rated corridor. District 6 held the lowest average ICE rating with a score of 71.78 in 2014 and continues to be the lowest average rated Iowa DOT district in 2015. The second lowest average rating was District 3, which is a change from District 1 in 2014. District 1 saw the highest degree of change increasing by nearly three points. At the top of the list, District 4 continues to hold the highest average ICE rating of 77.96.

Table 4.4: Districtwide average ICE rating

	ICE rating		
District	2014	2015	Lowest-rated corridor
1	73.54	76.15	I-35/80 (east junction of I-80/235 to west junction of I-80/235)
2	74.75	76.63	IA 136 (jct of US 151 to jct of US 20)*
3	74.17	75.95	IA 141 (jct of US 71 to jct of US 59)*
4	75.36	77.96	US 169 (junction of I-80 to junction of IA 92)
5	75.23	76.93	IA 22 (jct of IA 1 to jct of IA 70)*
6	71.78	73.87	US 30 (beginning of two-lane near junction of IA 1 to north junction of US30/US 61)

* Represents corridors that have changed from the 2014-2015 report

5. Conclusion

The analysis contained in the preceding chapters sought to answer the fundamental planning question presented in Chapter 1 related to investment in the Primary Highway System: Where do we need to be looking to next? In summary, the primary purpose of the ICE tool and this report is to provide an objective look at the system to aid decision makers in identifying what areas are worth additional consideration.

5.1 Periodic re-evaluation

As a planning tool, it is critical that the most recent data available be routinely incorporated into this report. As a result, the working group felt it was necessary to define a set schedule for a periodic reevaluation and update. Taking into account the data used in the development of this report, an annual update provides a logical time frame as the majority of the data is updated on an annual basis.

While the report includes analysis from the results of the previous two years, a rigorous evaluation was performed to ensure the data within this document and the tool itself was vetted and accurate. The beginning of this process started in October 2015 and continued into December. During this time, a number of stakeholder meetings were held to discuss the analysis within the updated report. Input from all of the involved parties is reflected in the analysis as well as the report itself. Moving forward, this process will continually seek input to facilitate the annual update and address any new stakeholder needs.

Annual schedule

The next step in the re-evaluation process was to identify an approximate date when all relevant annual data updates should be expected to be completed. The planning team determined that, in a typical year, all new data could be expected to be available by July 1. Table 5.1 builds from this date, and presents a timeline that ultimately defines when the primary outputs of this report (i.e., maps and corridor listings) would be updated and available for review.

Table 5.1: Annual re-evaluation and update timeline

Update milestone	Anticipated annual date
Updated input data available	July 1st – Aug. 1st
Data processing complete	Sept. 1st
Data analysis	Oct. 1st – Nov. 1st
Planning report update complete	Jan. 1st
Web Map update complete	Jan 1st

With an anticipated data analysis completion date in November, this information would be made available for each new programming cycle initiated towards the end of the calendar year. In addition to providing another tool for facilitating programming discussions, the annual update cycle will allow for trend analysis, which was discussed in Section 1.1, Purpose and need for an annual report.

5.2 Future enhancements

Data warehousing

Throughout 2016, the Iowa DOT will be beginning the transformation into a new data warehouse that includes the Iowa DOT's LRS and Roadway Asset Management System (RAMS). The transition away from GIMS will provide better support for the Iowa DOT's objectives and analytics within the ICE analysis. One of the major advantages of the transition as it relates to ICE is a less complicated linear overlay which will lead to less data cleanup. Once RAMS is fully implemented, the Office of System Planning and the Performance and Technology division will learn and adapt to the changes from the previous system to administer an identical ICE linear overlay process.

PCI formula update

The Office of Construction and Materials (OCM) is also leading work on another iteration of PCI that will likely be called PCI 3.0, which is intended to be in use starting with the 2015 data. This will represent another substantial overhaul in how pavement condition is calculated. With PCI 2.0, OCM introduced the concept of separate index values for ride, cracking, rutting, and faulting, among other changes. PCI 2.1 then fixed a few of the minor problems within 2.0, which raised some of the averages across the system. PCI 3.0 will introduce a structural index that will indicate the degree to which the pavement is in need of structural improvement. Additionally, there will be changes in the process to ensure more timely delivery of pavement condition data in the future.

Trend analysis

The routine update discussed in the previous section, coupled with a consistent evaluation structure, will continually allow for trend analysis to be incorporated into planning efforts. Beginning in this year's report, system conditions and trends were calculated both by route and on a system level. This analysis is meant to provide decision makers a gauge to measure and monitor the rate of deterioration for specific segments as well as the impact of investments on the system over time. In addition to trend analysis, iTRAM could aid in incorporating traffic forecasts into the ICE results along with forecasts for PCI and IRI as a measurement of deterioration.

Safety component

As mentioned in Section 2.1, Data selection and significance, incorporating a safety factor will be another priority enhancement. With completion of the segment level crash analysis by the Office of Traffic and Safety, this year's safety factor served as a 'value-added' component outside the seven core criteria. The calculated normalization values as part of the safety analysis were meant to serve as a way to compare corridors by a weighted crash rate. Another application of a safety component could be adding the segment level crash data as the eighth core criteria which would directly influence the final ICE rating. However, future discussions with key stakeholders will be needed to decide on how to evaluate safety on a segment-level analysis.

iTRAM data forecasting

With the development of the second generation iTRAM model completed, the idea of forecasting the ICE results has been discussed as a potential enhancement. To forecast the future traffic conditions, the ICE segmentation and data would be integrated into iTRAM, which would then be utilized to perform model runs to estimate the effects of AADT on the system in the forecast year. To measure forecast condition data, the Iowa DOT will need formulas to help measure the deterioration of the pavement and structures under various scenarios.

Dashboarding capabilities

In addition to simple trend analysis, ICE data could be used as part of a broader performance measurement process such as the establishment of system performance targets. Ultimately, this performance information could be communicated in an easier to use format outside of this report, perhaps through some sort of performance "dashboard." Users would ideally be able to manipulate the charts and receive information intuitively. An example of what an ICE dashboard could look like is shown in Figure 5.1. Over the past months, the Iowa DOT has tested a trial subscription of a dashboarding system that was successfully beta tested within the Office of Systems Planning using the

ICE data. The Iowa DOT is currently in discussions for purchasing software meant to support future and current dashboarding needs.

Figure 5.1: Example performance dashboard

*The figure above represents a dashboard not associated with the Iowa DOT

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