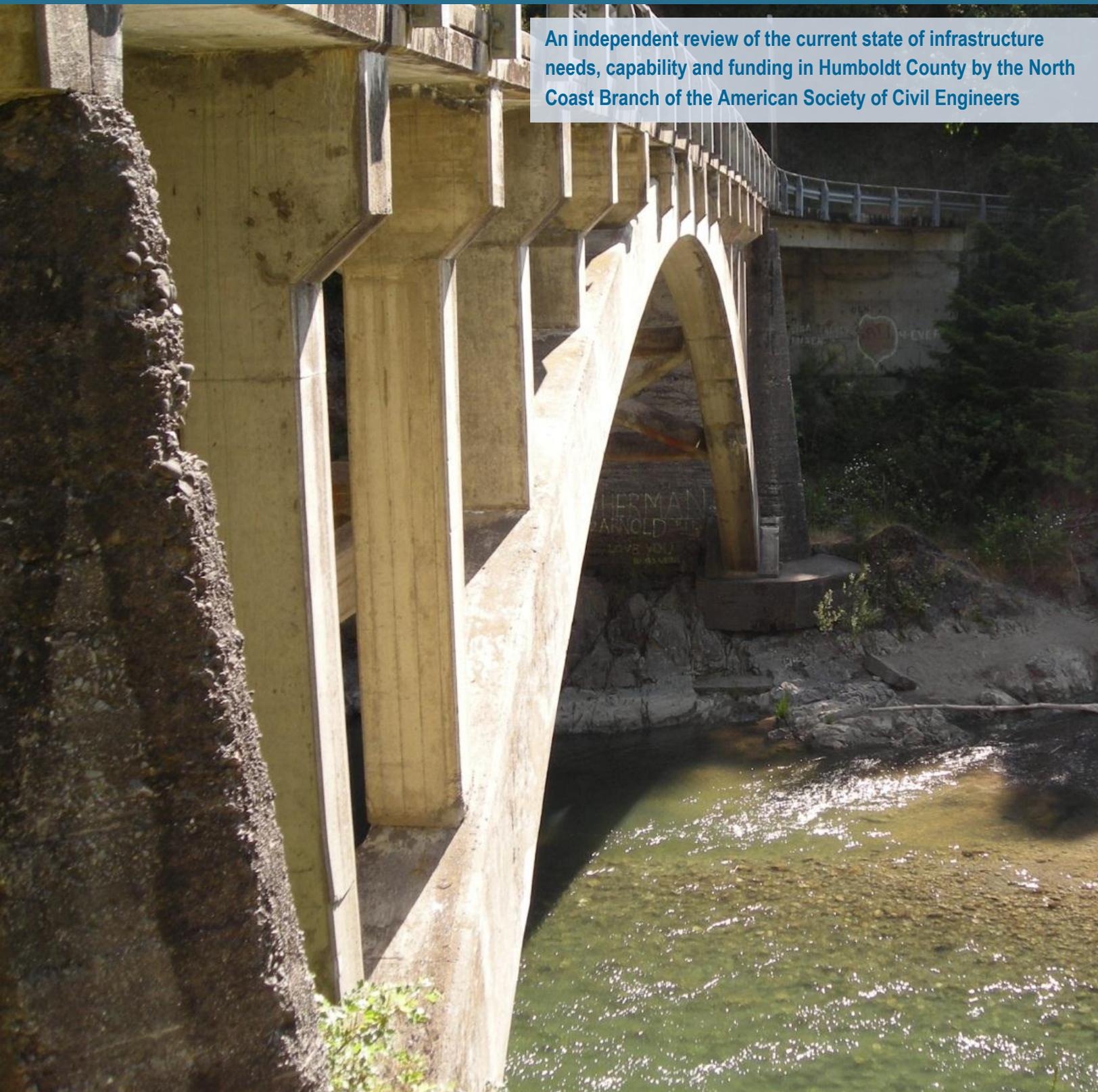




# 2014 REPORT CARD FOR HUMBOLDT COUNTY'S INFRASTRUCTURE

An independent review of the current state of infrastructure needs, capability and funding in Humboldt County by the North Coast Branch of the American Society of Civil Engineers





# EXECUTIVE SUMMARY

**The Report Card for Humboldt County's Infrastructure** assesses the roads and bridges that are maintained by the County, the Cities, and the Tribes within the Humboldt County area. Humboldt County's 3,568 square miles are primarily rural making transportation access and upkeep necessary for public safety. A community of 135,000 residents uses the 1,214 miles of local roads and 170 local bridges that were evaluated for the Report Card. For the Report Card, the road and bridges categories were assessed using seven fundamental criteria: condition, capacity, safety, operation and maintenance, resilience, funding and future need, and innovation.

**Table 1. Humboldt County Infrastructure and Demographics by Area**

Jurisdiction (City, Tribe, County, or Agency)	Area (sq. miles)	Population (2013) <sup>1</sup>	Population Density (per sq. mile)	Miles of Paved Roads	Number of Bridges
Arcata	9.1	17,836	1960	68.5	0
Blue Lake	0.6	1,260	2100	8.4	0
<b>Bureau of Land Management (BLM)</b>		n/a	n/a	114.2	0
Eureka	9.4	27,021	2875		1
Ferndale	1.0	1,366	1,336	7.4	1
Fortuna	4.9	11,885	2,426	45.2	7
Hoopa Valley Tribe	140.0	3,041	22	15.3	4
Karuk Tribe	1.1	506	460	3.6	0
Rio Dell	2.3	3,363	1,462	14.2	0
Trinidad	0.5	365	730	3.3	0
<b>Unincorporated County</b>	3,400.3	72,113	21	932.0	157
<b>Yurok Tribe</b>		1,238			

<sup>1</sup>State of California, Department of Finance (E-1 Population Estimates for Cities, Counties, and the State—January 2013). Tribal populations from "Hoopa Valley Long Range Transportation Plan (Nichols).

Reviewed and produced by a committee of local experts and officials, **the 2014 Report Card for Humboldt County gives a grade of D+ for the roads and a grade of C- for the bridges.** Humboldt County's roads and bridges infrastructure are in fair to poor condition, and the transportation infrastructure is showing signs of deterioration that requires attention. Some roads and bridges exhibit significant deficiencies in conditions and functionality, increasing risks to public safety and the local economy. The average pavement condition index (PCI), which is a key indicator of condition and future

needs, for entire Humboldt County area is 60.4 out of a possible 100 points. The facts revealed in the Roads and Bridges sections of the Report Card demonstrate that, overall, there is a need for additional work for Humboldt County to maintain the existing transportation network the community and the local economy rely on.

**Humboldt County roads and bridges require five times the amount of funds that are currently being invested to maintain this infrastructure at current condition.** To improve the condition of the roads and bridges in Humboldt County, local agencies estimate that \$426 million will be required over the next ten years. Table 2 summarizes Humboldt County’s maintenance and future needs according to current budgets and projections.

**Table 2. Maintenance and Future Needs of Humboldt County Roads and Bridges by Area**

Agency	Road Length	Number of Bridges	Available Annual Budget	Budget to maintain at current condition	Budget to maintain at a Higher PCI	Budget to maintain at Higher PCI over the next 10 Years
City of Eureka <sup>1</sup>	114.2	1	\$350,000	\$2,800,000	\$4,500,000	\$47,700,000
City of Arcata <sup>2</sup>	68.5	0	\$800,000	\$2,400,000	\$2,300,000	\$23,900,000
City of Fortuna <sup>3</sup>	45.2	7	\$125,000	\$1,500,000	\$2,500,000	\$24,900,000
City of Rio Dell <sup>4</sup>	14.2	0		\$300,000	\$400,000	\$5,500,000
City of Blue Lake <sup>5</sup>	8.4	0	\$70,000	\$200,000	\$300,000	\$3,000,000
City of Trinidad <sup>6</sup>	3.3	0		\$52,000		
Bear River Band of Rohnerville Rancheria <sup>7</sup>	2.0	0	\$120,000	\$10,000	\$20,000	\$100,000
Karuk Tribe <sup>8</sup>	3.6	0	\$671,240	\$1,000,000	\$2,000,000	\$10,000,000
Yurok Tribe <sup>9</sup>			\$1,100,000	\$7,000,000	\$10,000,000	\$100,000,000
Hoopa Valley Tribe <sup>10</sup>	15.3	4	\$119,000	\$400,000	\$500,000	\$5,000,000
County of Humboldt <sup>11</sup>	932.0	157	\$3,000,000	\$12,500,000	\$14,500,000	\$200,900,000
Bureau of Land Management (BLM) <sup>12</sup>	83.0	0	\$14,000	\$30,000	80,000	\$5,000,000
<b>Total</b>	<b>1,289.7</b>	<b>169</b>	<b>\$6,369,240</b>	<b>\$28,192,000</b>	<b>\$37,100,000</b>	<b>\$426,000,000</b>

Total road length includes unpaved roads, which were not evaluated in this report.

Sources:

- 1 October 2011, City of Eureka Pavement Management Program Draft Report prepared by Nichols Engineering and Environmental Services.
- 2 October 2011, City of Arcata Pavement Management Program Draft Report prepared by Nichols Engineering and Environmental Services.
- 3 October 2011, City of Fortuna Pavement Management Program Draft Report prepared by Nichols Engineering and Environmental Services.
- 4 Randy Jensen, City of Rio Dell
- 5 Mike Foget, City Engineer for the City of Blue Lake
- 6 Steve Allen, City Engineer and January 2012, City of Trinidad Pavement Management Program Draft Report prepared by Nichols Engineering and Environmental Services.
- 7 Bear River Band of Rohnerville Rancheria
- 8 Sandi Tripp, Karuk Tribe Department of Transportation
- 9 Joseph James, Yurok Tribe
- 10 Loren Norton, Director, Hoopa Tribal Roads Department, Aggregate & Ready-Mix Enterprises October 2008, Hoopa Valley Reservation Long Range Transportation Plan Final Report
- 11 December 2011, County of Humboldt Pavement Management Program Draft Report prepared by Nichols Engineering and Environmental Services.
- 12 Brad Joe, BLM

**With only three main routes in and out of the County, the geographic isolation of Humboldt County requires resilient infrastructure.** Road access to Humboldt County is limited to one north /south route, US 101, and two east/west routes, California Highways 299 and 36. The maintenance of each of these routes is challenging due to the mountainous terrain.

**Due to its location and environment, the infrastructure in Humboldt County is vulnerable to natural events such storms, flooding, earthquakes, and fires.** Humboldt County's geography has no shortage of natural disaster threats and there are many safety concerns on the local highways including landslides, falling rocks, and animals in the roadway. Natural disasters, such as floods and earthquakes, can threaten our roads and bridges, and low lying areas around Humboldt Bay and near the coast are susceptible to tsunamis.

**Transportation is particularly important to Humboldt County due to a robust tourism and agriculture economy.** With the Redwoods National and State Parks, Avenue of the Giants and Humboldt Redwoods State Park, each year the roads are filled with cars, bicycles, and RVs with people coming to see Humboldt County's Redwoods, pristine beaches, and rivers. Approximately 24% of the local economy is from accommodations and food service sales, making the health of the local roads and bridges essential to the local economy.

## RECOMMENDATIONS

### 1. Increase Leadership in Infrastructure Renewal

Humboldt County's infrastructure is a responsibility of local leaders, and leadership is needed to maintain and renew the infrastructure the generations before us have built. Bold leadership and a vision for how strategic infrastructure investment can help local communities are needed to reverse the current trends.

### 2. Promote Sustainability and Resilience

Today's infrastructure must meet the community's ongoing needs, and at the same time, protect and improve environmental quality. Sustainability, resiliency, and ongoing maintenance must be an integral part of improving the area's infrastructure. Today's transportation systems must be able to withstand both current and future challenges. Both structural and non-structural methods must be applied to meet challenges. Infrastructure systems must be designed to protect the natural environment and withstand both natural and man-made hazards, using sustainable practices, to ensure that future generations can use and enjoy what we build today, as we have benefited from past generations.

### **3. Develop and Fund Plans to Maintain and Enhance Humboldt County's Infrastructure**

Infrastructure investment must be increased at all levels, but it also should be prioritized and executed according to well-conceived plans that focus on the health and goals of the system. The goals should center on freight and passenger mobility, intermodality, and environmental stewardship, while encouraging resiliency and sustainability. The plans must reflect a better defined set of federal, state, local, and private sector roles and responsibilities and instill better discipline for setting priorities and focusing funding to solve the most pressing problems.



# ABOUT THE REPORT CARD

## INFRASTRUCTURE

Infrastructure is the basic physical and organizational structures and facilities (i.e. roads, power, water) needed to operate our community including:

- aviation
- bridges
- dams
- drinking water
- energy
- hazardous waste
- inland waterways
- levees
- public parks and recreation
- rail
- roads
- schools
- solid waste
- transit
- wastewater

## MISSION

This first *Report Card for Humboldt County's Infrastructure* assesses two important infrastructure categories: **local roads and bridges**.

The mission of this *Report Card for Humboldt's County's Infrastructure* is to prepare an assessment of Humboldt County's infrastructure to educate the public and civic leaders and build support for dedicated and consistent sources of funding needed to maintaining and improving infrastructure in a timely manner in order to get the most out of our public investments. Infrastructure failures not only

## VISION FOR INFRASTRUCTURE

**Long Term:** Well-maintained, efficient, safe and secure infrastructure facilities that are sufficient to meet the current needs and future needs of a growing State and that protect our quality of life.

**Short Term:** A public leadership that develops, enacts and implements the practices and funding mechanisms needed to get there.

**Mission:** To prepare an assessment of Humboldt County's infrastructure to educate the public and civic leaders, and build support for dedicated and consistent sources of funding needed to sustain the public infrastructure of local jurisdictions.

disrupt the community, they also ultimately make the community bear higher costs for repairs and emergency responses and can increase risk to public safety.

## REPORT CARD PROCESS

The North Coast Branch of the San Francisco Section of ASCE began creating a local Report Card in January of 2014 to tell the story of the infrastructure condition in Humboldt County. Transportation experts from the public and private entities within Humboldt County participated in the preparation of this Report Card, and local representative from Humboldt County, the cities, and the tribes all came together to assess the road and bridges infrastructure



*Figure 1. Bridge over North Fork Mad River near Korbel, CA*

of the County. The group was divided into two working committees: roads and bridges. Professional engineers from private engineering consulting firms either represented public entities or specifically assisted in quality assurance for the preparation of the report. California Department of Transportation professionals also assisted in preparing this report and provided reviews. Members of the ASCE North Coast Branch facilitated the discussion and assisted in preparation of the report. The result of this collaboration is a Report Card that brings to the forefront the road and bridges infrastructure needs for all residents living both in the rural and urban areas of Humboldt County.

The Committee chose to assess local roads and bridges for two reasons. First, road condition information for many cities and the County was readily available from an existing comprehensive pavement condition assessment and would reflect the local needs. Second, local engineers and community members surveyed felt roads and bridges should be assessed first. To be clear, the Report Card does not grade state highways or state bridges although these are assessed as part of the *2012 Report Card for California's Infrastructure*.



*Figure 2. Existing asphalt concrete deteriorating on Eel River Drive near Fortuna, CA.*

### Figure 3. Humboldt County Vicinity Map

Figure reproduced from: Draft HCAOG Regional Transportation Plan 2013/14 Update: Variety in Rural Options of Mobility (VROOM...).

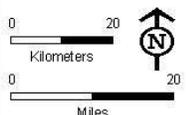


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Sources: USGS, ESRI, TANA, AND

Figure 1.1  
Vicinity Map

-  Freeway
-  Highway
-  California Counties
-  Eureka City/Town

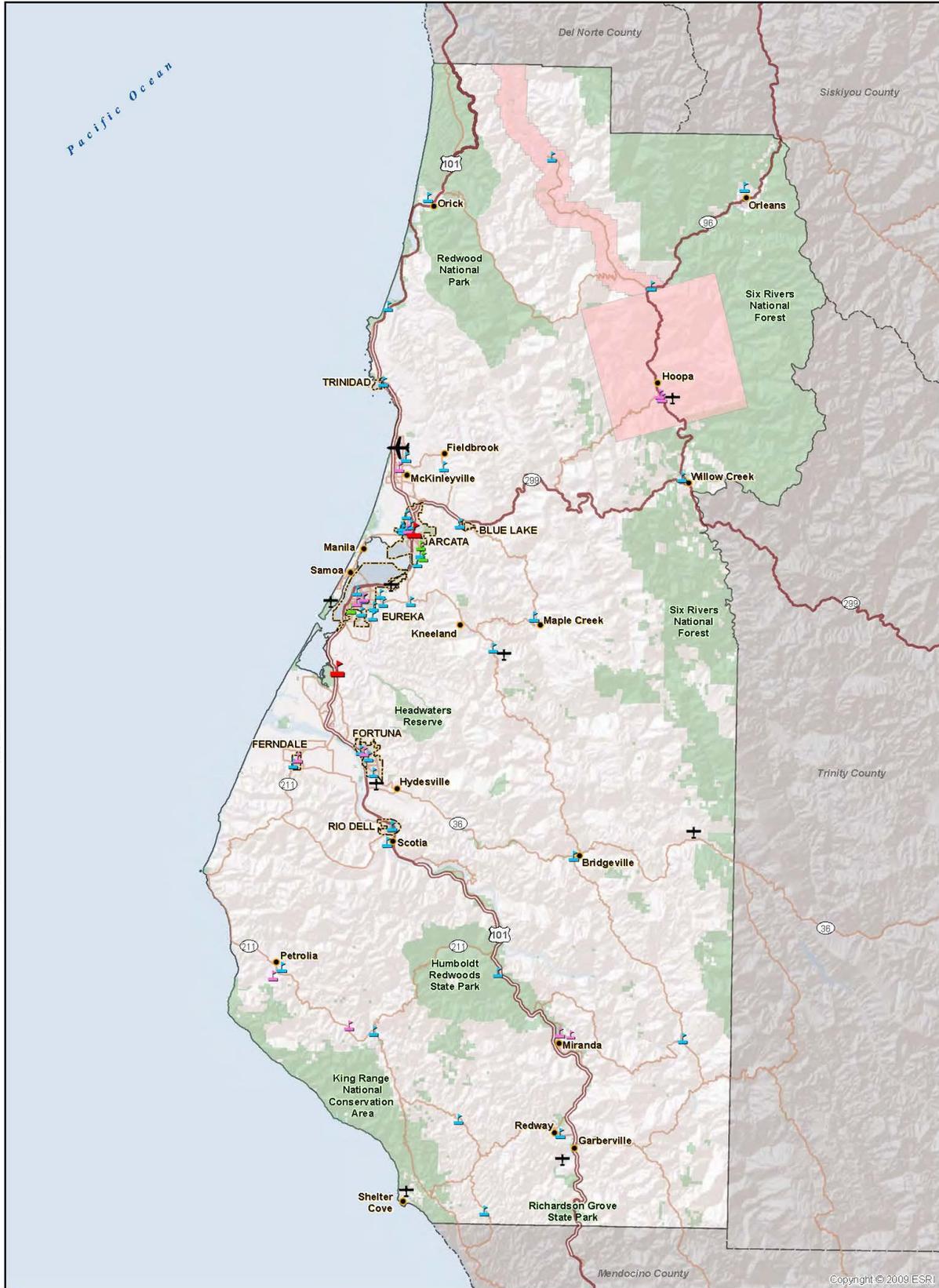


**This map is not a Transportation Route Guide**  
 This map is for illustrative and general planning purposes only, and though care has been taken to ensure that the data is accurate, maps and data are provided without warranty of any kind.  
 Data source: HCAOG; Humboldt County GIS; ESRI.  
 Map created by: amshows



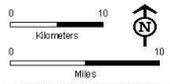
### Figure 4. Humboldt County Jurisdictions & Major Destinations

Figure reproduced from: Draft HCAOG Regional Transportation Plan 2013/14 Update: Variety in Rural Options of Mobility (VROOM...)



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- Unincorporated Town
- INCORPORATED CITY
- Elementary School
- Middle School
- High School
- College/University
- ✈ General Aviation Airport
- ✈ Commercial Airport
- Freeway
- Highway
- Major Road
- Native American Reservation/Rancheria
- Open Space/Park
- California Counties



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Figure 1.3a  
 Population Centers and Major Destinations: Countywide



# ABOUT HUMBOLDT COUNTY'S TRANSPORTATION SYSTEM

## CONNECTS RURAL COMMUNITIES

Humboldt County is a rural area. The County's southern border is 200 miles north of San Francisco; the northern border is 50 miles from the Oregon border. There are only seven incorporated cities in Humboldt County. The population countywide is less than 135,000. Distances between urbanized areas are even farther: the relatively urban Humboldt Bay Area is approximately 270 road miles north of the San Francisco Bay Area, 150 miles west of Redding, California, and 415 miles south of Portland, Oregon. Only one city, Eureka, the county seat, has a population greater than 20,000. The second largest city, Arcata, has a population of 17,836. And the third largest, Fortuna, has a population of 11,885. According to the U.S. Census Bureau, Humboldt County's population density averages out to 37.7 persons per square mile, compared to the statewide population density of 239.1 persons per square mile. Table 1 summarizes population, density, and road and bridge responsibilities of the entities participating in this Report Card.

Table 1. **Humboldt County Infrastructure and Demographics by Area**

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<sup>1</sup>State of California, Department of Finance (E-1 Population Estimates for Cities, Counties, and the State—January 2013). Tribal populations from "Hoopa Valley Long Range Transportation Plan (Nichols).

## SUPPORTS LOCAL TOURISM ECONOMY

Humboldt County is home to Redwoods National and State Parks, Avenue of the Giants and Humboldt Redwoods State Park. Each year the roads are filled with cars, bicycles, and RVs with people coming to see Humboldt County's Redwoods, pristine beaches, and rivers. Approximately 24% of the local economy is from accommodations and food service sales making the health of our roads is vital to the local economy.

## REQUIRES PLANNING FOR NATURAL HAZARDS

Road access to Humboldt County is limited to:

- US 101 (north /south route)
- California Highway 299 (east/west route)
- California Highway 36 (east/west route)

The maintenance of each of these routes is challenging due to the mountainous terrain. Humboldt County's geography has no shortage of natural disaster threats, and there are many safety concerns on the local highways including landslides, falling rocks, and animals in the roadway. Natural disasters, such as floods and earthquakes, can also threaten the area's roads and bridges, and low lying areas around Humboldt Bay and near the coast are susceptible to tsunamis. Recent events have shown that any of these disasters are possible. The table below represents some of the risks to which Humboldt County's infrastructure is exposed.

Table 2. Humboldt County **Natural Disaster Zone**  
**Acres (Source: Humboldt County GIS Data Base)**

<b>Natural Disaster Zone</b>	<b>Acres</b>	<b>Percentage of Total Area</b>
<i>Total County GIS Acres</i>	<i>2,292,640</i>	<i>100</i>
Tsunami Inundation Area	47,748	2.1
FEMA Flood Zone "A" (100 year zone)	111,185	4.9
FEMA Flood Zone "B" (500 year zone)	1,620	0.1
Seismic Safety		
0 - Relatively Stable	94,188	4.1
1 - Low Instability	169,067	7.4
2 - Moderate Instability	1,105,763	48.2
3 - High Instability	925,583	40.4
Landslide Historic	227,209	9.9
Alquist Priolo Zones (Earthquake hazard)	8,906	0.4

## REQUIRES FUNDING TO MEET FUTURE NEEDS

Government of all levels, from federal, state, county, regional, municipal, and native tribes contribute in the responsibility of accumulating and distributing funds for the improvement of infrastructure. The following is an overview of the current status of funding.

### Local Funding

Infrastructure and especially its maintenance can require a significant portion of many local entities budgets. Additionally, local sales taxes augments limited local, state, and federal allocations to Humboldt County and are often more predictable to budget for. Several jurisdictions in California have opted for sales tax initiatives to help their governments become more self-reliant. Additionally, cities and counties may add a local sales tax within their jurisdictions if voters approve. In Humboldt County, the following jurisdictions have recently had sales tax initiatives:

- City of Arcata, general purpose tax – Approved in 2008, Measure G, Transaction Use Tax (TUT) added an additional three-quarter percent ( $\frac{3}{4}\%$ ) retail transactions and use tax levied within the City of Arcata. The increased tax is estimated to generate approximately \$1.8 million per year for the City's general fund. The City has a TUT oversight to insure funds is distributed between roads and public safety.
- City of Eureka general purpose taxes – In November 2008, Eureka voters approved Measure D, adding one-quarter of one percent ( $\frac{1}{4}\%$ ) to the sales tax rate in the City of Eureka, and simultaneously repealing an existing 3% Utility Users Tax. In November, 2010, voters passed Measure O, levying a one-half of one percent ( $\frac{1}{2}\%$ ) increase to Eureka's sales tax rate through April 1, 2016. The City plans on placing a measure on the ballot in 2014 to renew the  $\frac{1}{2}\%$  sales tax.
- City of Rio Dell – Bonds for Street Improvements – In November, 2012, City of Rio Dell voters were asked to authorize the City Council to issue \$2 million in general obligation bonds to finance the costs of constructing street improvements. The bond measure failed. Although a majority (55.6%) of voters voted yes, a two-thirds ( $\frac{2}{3}$ ) approval was required to pass.
- City of Trinidad general purpose tax – In November, 2012, City of Trinidad voters approved extending, for four years, the  $\frac{3}{4}$  cent ( $\frac{3}{4}\%$ ) increase in the transaction and use tax. The extension is effective from April 1, 2013 through March 31, 2017.

### State Funding

*State Highway Operation and Protection Program (SHOPP)* funds are “for major capital improvements that are necessary to preserve and protect the state highway system....limited to capital improvements relative to maintenance, safety, and rehabilitation of state highways and bridges which do not add a new traffic lane to the system.” Caltrans reports that projected State Highway Account funding available for the SHOPP is \$1.8 billion a year, which is only 24 percent of the estimated need. Because funding is insufficient to preserve and maintain the existing transportation infrastructure, Caltrans is focusing available resources on the most critical categories of projects in the SHOPP - safety, bridge, and

pavement preservation.<sup>1</sup> The State has allocated, over a four-year period through fiscal year 2011-12, \$159.3 million in SHOPP funds for Humboldt County.

*Regional Surface Transportation Program (RSTP)* funds projects on Federal-aid highways and bridges (e.g., projects to construct, reconstruct, rehabilitate, resurface, restore, or improve operations), including mitigating RSTP-related damage to wildlife, habitat, and ecosystems; Capital costs for public transit projects; carpool projects; bicycle and pedestrian transportation; and surface transportation planning programs. For the past several years, the regional portion of RSTP funds was \$1,147,300 annually. In fiscal year 2012-13, HCAOG received \$1,318,500.

*Gas tax subventions* also help support transportation projects. Gas tax subventions are statewide gas tax revenues returned by the State of California to each jurisdiction for the purpose of maintaining roadways. Humboldt County and the Cities directly receive a total of \$4.5 million per year in gas tax subventions. These funds can be used for any roadway expense, from engineering to maintenance.

### **Federal Funding**

*Secure Rural Roads/Schools Act* funding provided by the USDA Forest for rural counties and schools located near National Forests. Management of the national forests and funding methods for local agencies with national forests are changing. This funding may not be as reliable a source as in years past.

*The U.S. Federal Transportation Program* provides some federal funding for Humboldt County through transportation programs governed by The Moving Ahead for Progress in the 21st Century Act (MAP-21) law. However, this law and the funding for these programs through the Highway Trust Fund will expire on May 31, 2015 unless Congress acts. Unfortunately, the long-term funding outlook is unclear, and this uncertainty could impact the amount of federal funding Humboldt County receives. To learn more, visit [www.fixthetrustfund.org](http://www.fixthetrustfund.org).

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<sup>1</sup> Caltrans, "2011 Ten-Year State Highway Operation and Protection Program Plan: Fiscal Years 2012–2013 Through 2021–2022."

# METHODOLOGY & GRADING

## METHODOLOGY

This Report Card follows *ASCE Report Card for America's Infrastructure* methodology of letter grades that grade the infrastructure according to key criteria ([www.infrastructurereportcard.org](http://www.infrastructurereportcard.org)). The Report Card grades are based on the following scale:

**A** EXCEPTIONAL: FIT FOR THE FUTURE

The infrastructure in the system or network is generally in excellent condition, typically new or recently rehabilitated, and meets capacity needs for the future. A few elements show signs of general deterioration that require attention. Facilities meet modern standards for functionality and resilience to withstand most disasters and severe weather events.

**B** GOOD: ADEQUATE FOR NOW

The infrastructure in the system or network is in good to excellent condition; some elements show signs of general deterioration that require attention. A few elements exhibit significant deficiencies. Safe and reliable with minimal capacity issues and minimal risk.

**C** MEDIOCRE: REQUIRES ATTENTION

The infrastructure in the system or network is in fair to good condition; it shows general signs of deterioration and requires attention. Some elements exhibit significant deficiencies in conditions and functionality, with increasing vulnerability to risk.

**D** POOR: AT RISK

The infrastructure is in poor to fair condition and mostly below standard, with many elements approaching the end of their service life. A large portion of the system exhibits significant deterioration. Condition and capacity are of significant concern with strong risk of failure.

**F FAILING/CRITICAL: UNFIT FOR PURPOSE**

The infrastructure in the system is in unacceptable condition with widespread advanced signs of deterioration. Many of the components of the system exhibit signs of imminent failure.

## GRADING CRITERIA

Seven fundamental criteria were used, to evaluate Humboldt County’s roads and bridges. Each category’s grade was determined by using a weighted average of elements of each criterion. Five of the criteria have equal weights of 19%; the innovation criteria, has a weight of 5%; and funding and future need were identified through the needs in the other criteria.

### Condition

The condition criterion grades the existing and near-future conditions of the infrastructure. Roadways are graded from A to F using the Pavement Condition Index (PCI), which grades on a scale of 0 to 100; a PCI number of 100 represents a newly paved road and 20 or below are roads in critical condition.

The condition of bridges was graded based on their sufficiency ratings. The sufficiency rating indicates a bridge’s overall “health” based on its structural adequacy and safety, serviceability and functional obsolescence, and essentiality for public use. The bridge sufficiency rating formula used by Caltrans and was used to assess bridge condition in this report.

According to this method, *structural adequacy and safety* account for 55%, *serviceability and functional obsolescence* attribute 30%, and *essentiality for public use* attributes 15% and *special reductions* accounting for detour length, traffic safety patterns, and structure type account for the remaining 13% of the sufficiency formula. An overall sufficiency rating of 80 - 51 indicates that the bridge could require rehabilitation, and a sufficiency rating of 50 and below indicates that the bridge could require replacement. Bridges with low

Condition Grade	Pavement Condition	PCI Category
A	Excelent/ Exceptional	100
B	Good	85
C	Fair/ Mediocre	68
D	Poor	50
F	Critical	20
		0 or gravel road

Figure 5. Road Condition Criteria

Condition Grade	Bridge Condition	Sufficiency Rating
A	Excelent/ Exceptional	100
B	Good	81
C	Fair/ Mediocre	65
D	Poor	51
F	Critical	30
		0

Figure 6. Bridge Condition Criteria

sufficiency ratings can qualify for federal funding for rehabilitation and replacement.

### Capacity

The capacity criteria evaluates the infrastructure’s existing capacity, i.e. the ability of the road and bridge network to accommodate the current demands of the community’s current population. The existing capacity can also be used to evaluate how well infrastructure will be able to sustain the future community. Factors affecting road capacity include Average Daily Traffic (ADT), congestion at major intersections or on/off ramps a peak hours, pedestrian and bicycle facilities.

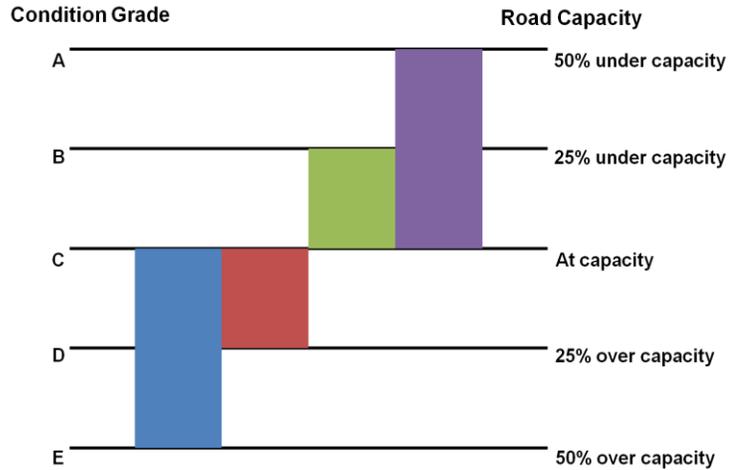


Figure 7. Road Capacity Grading Criteria

Not included are the roads in Humboldt County that are managed by Caltrans.

Capacity of roadways were rated using the average daily traffic (ADT) at the major streets where traffic count data was available and compared it to the rural ranges for each roads functional classification as recommended by Caltrans and listed in Table 3 below. Caltrans designates functional classes to the roads based on the connectivity within the road network. The roads are ranked from Highways to local roads. In addition the available ADT data was use to estimate vehicle-to-capacity ratio (v/c) to determine Level of Service (LOS) for the road segments. The v/c ratio and the corresponding LOS is depicted in Table 4.

Table 3. Suggested ADT Range for the Functional Class

2008 Functional Classification	Urban ADT range	Rural ADT range
1 Interstate	35,000 to 129,000	12,000 to 34,000
2 Other Freeway of Expressway	13,000 to 55,000	4,000 to 18,500
Principal Arterial	7,000 to 27,000	2,000 to 8,500
Minor Arterial	3,000 to 14,000	1,500 to 6,000
Major Collector	1,100 to 6,300	300 to 2,600
Minor Collector	1,100 to 6,300	150 to 1,110
Local	80 to 700	15 to 400

Table 4. Level of Service (LOS) Criteria

Maximum Vehicle to Capacity Ratio ( V/C)*	Level Of Service (LOS)
0.26	A
0.43	B
0.62	C
0.82	D
1	E

\*These ratios are based on the free-flow speed of 45 miles per hour or less.

Capacity of bridges were rated using load capacities compiled from Caltrans bridge inspection reports. Caltrans reported the load capacity as inventory ratings or operating ratings:

- The bridge *inventory rating* measures its degree of serviceability which is defined as the load can safely utilize an existing structure for an indefinite period. The inventory rating is based on design specifications and current conditions.
- The bridge *operating rating* is the load-carrying capacity of a structure for a standard lane. Operating rating has a smaller load factor applied to live load than is applied for inventory rating. It represents the maximum safe load carrying capacity of the structure.

Humboldt County designates the bridge load capacities using a color coding scheme where purple permits maximum weight of 60,000lb on tandem axles (based on spans between axles), green permits a maximum of 52,000 lb and orange permits a maximum of 42,800 lb. Contractors requiring mobilizing equipment across bridges are required to obtain a transportation permit (Purple, Green or Orange Permit) from Humboldt County. Each bridge is designated with a permit rating that designates the maximum allowable rate for 5, 7, 9, 11 and 13 axle vehicles. Rarely are 11 and 13 axle vehicles used. Most construction equipment carried across the bridges are 9 axle vehicles, in which the data provided is based upon. Bridge capacity considers weight limits as well as the capacity factors for roads.

Table 5. Bridge Capacity Grading Criteria

Bridge Capacity Rating	Grade
Purple Rating (60,000 lbs)	Exceptional
Green Rating (52,000 lbs)	Good
Orange Rating (42,800 lbs)	Mediocre
No Rating	Failing

### Operations and Maintenance

How much and how well infrastructure is maintained affects the future condition of the roadway pavement and bridge structures. This criterion for grading operations and maintenance is the assessment of the amount of funds allocated for maintaining roads or bridges, including costs for environmental compliance and fuel. The overall for operation and maintenance may not change but as

the operation costs increase, the amount of maintenance that can be accomplished decreases. A failing grade was considered as strictly correlated to lack of funds to maintain current roadway pavement and bridge structures. On the other hand, a maximum grade was given to the infrastructure with enough funds to maintain and improve current condition.

Table 6. Roads and Bridges Operation and Maintenance Grading Criteria

Bridges O&M Budget	Grade
Sufficient Funding for Maintenance and Replacement	Exceptional
Sufficient Funding for Maintenance	Good
Marginal Funding for Maintenance	Mediocre
Funding for Managing Degradation	Poor
Funding only for Critical Repairs	Failing

### Safety

The California Office of Traffic Safety data is reported to National Highway Traffic Safety Administration (NHSTA) and is quantified by the number of fatalities, number of serious injuries, number of fatalities/100 Million Vehicle Miles Traveled (VMT), and number of serious injuries/100 Million Vehicle Miles Traveled (VMT). The grading for this criterion compared the Humboldt County fatality rate to the California state fatality rate for vehicle deaths, motorcycle deaths, and pedestrian deaths from 2008 to 2011 excluding 2010. The 2010 data could not be used because of an anomaly we discovered in VMT traveled in Humboldt County as presented by the California Office of Traffic Safety (OTS). OTS did not publish data for the year of 2012, and therefore, a comparison for 2012 was not included. The VMT for Humboldt County was estimated by converting the Daily Vehicle Miles Traveled (DVMT) for Humboldt County provided by the OTS. The OTS website only provides this data for cities with populations over 25,000; Eureka is the only City in Humboldt County that qualifies. However, no data was available for the City of Eureka. Therefore, a direct comparison was made only between National, State and Humboldt County data for the overall grade.

“Toward zero deaths, every 1 counts” is the vision statement of the California Office of Traffic Safety. To align with this statement, the safety criteria for local roadways is the total number of fatalities per 100 million Vehicle Miles Traveled (VMT), and total fatalities and injuries for pedestrians, bicyclists, and motorcyclists. Safety grades are based on how local fatality/injury rates compare to the California average.

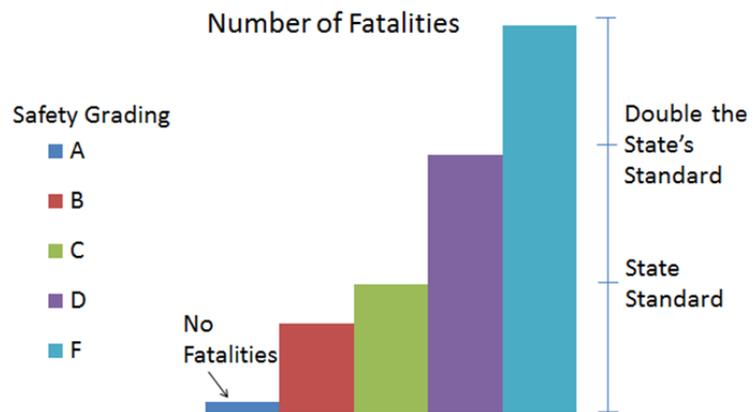


Figure 8. Grading Scale for Roads Safety Criteria

The safety grade for bridges considers their sufficiency ratings as compared to the average rating for all bridges in the State of California. For Humboldt County’s Report Card, we used the same sufficiency rating to grade bridge condition because the safety rating of a bridge is directly correlated to the structure’s condition. Therefore, the grade for bridge conditions in Humboldt is the same as for bridge safety. The safety of a bridge is reflected in the sufficiency rating determined during routine inspections (as defined under the Condition section above). There are ten levels of condition ratings, ranging from excellent to failed. Most importantly, a bridge is considered structurally deficient if it is rated to be in poor condition or worse for the deck, superstructures, substructures, or culvert and retaining walls. A bridge may also be considered structurally deficient if the structural condition or waterway adequacy is basically intolerable, must be replaced, or if the bridge is closed. Bridges with sufficiency ratings of 80 and below are considered to be deficient by the Federal Highway Administration and should be rehabilitated or replaced. There are 61 structurally deficient bridges in Humboldt County (2013 Report for America’s Infrastructure).

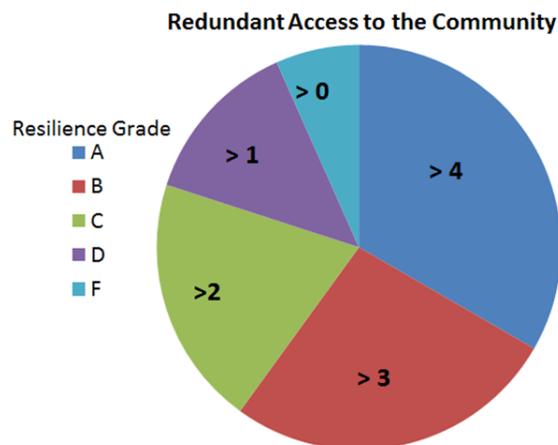
Table 7. Redundant Access to the Community

Redundant Access	Grade
> 4	Exceptional
>3	Good
>2	Mediocre
>1	Poor
0	Failing

## Resilience

In the event of a natural disaster, road systems and bridges that are resilient to natural disasters are desirable. Resilience, also called robustness, reduces the probability of failure. The resilience grades are based on the number of redundant access ways that exist for roadways and bridges.

Figure 9. Road Resilience



## Innovation

Innovation can be described in two ways:

1. New technologies, materials and/or processes to improve efficiency or quality of the overall product (road or bridge);
2. Using alternative funding sources to complete maintenance or capital improvement projects. There are many innovative methods available that increase the sustainability of roads and decrease maintenance costs.

Commonly, however, cost increases with innovation. Innovation was evaluated on the number of innovations used, referred to as Process Innovation in Table 8, factored with associated costs. Process Innovation is defined, for the purpose of this report, as all the available innovative techniques, including ways to raise funds, innovative construction materials, and methods of construction.

Table 8. **Bridge and Road Innovation Criteria**

<b>Process Innovation</b>	<b>Grade</b>
> 15	Exceptional
>12	Good
>9	Mediocre
>6	Poor
>3	Failing



# ROADS D+

Table 9. Summary of Roads Grading

<i>Criteria</i>	<i>Grade</i>
Condition	Mediocre
Existing Capacity	Mediocre
Operation and Maintenance	Poor
Safety	Poor
Resilience	Mediocre
Innovation	Mediocre
<b>Overall Grade</b>	<b>D+</b>

A total of 1,214 miles of roads that are maintained by the County, seven Cities, and three Tribes within Humboldt County were assessed. The D+ grade indicates that the road infrastructure of Humboldt County is in poor condition and is showing signs of deterioration and requires repairs. In some cases the roads exhibit significant deficiencies in condition and functionality.

The roads in Humboldt County range from unpaved gravel one lane roads to four-lane freeways. The roads are maintained by various entities including Humboldt County, Cities, Tribes, Bureau of Land Management (BLM), and National/State Parks. Approximately 77% of the paved local roads within Humboldt County are maintained by Humboldt County. The County maintains approximately 1,205 miles of roads; 932 miles are paved and 273 miles are unpaved roads. The Cities maintain 21.5%, and Tribes the remaining 1.5%. This report focuses primarily on the paved roads rather than the unpaved roads.

## ROAD CONDITION

In 2009, HCAOG (Humboldt County Association of Governments) conducted an inventory of the roads and implemented a regional Pavement Management Program (PMP). The regional pavement management program provides a county wide inventory that can be easily compared. The roads were assessed using the Pavement Condition Index (PCI) methodology that uses a scale of 0 to 100. The intention of the PMP is to provide a tool to local governments for prioritizing maintenance and allocating funds.

In addition, the Hoopa Valley Tribe, the Bear River Band of Rohnerville Rancheria, and the Karuk Tribe conducted individual inventories of their paved roads. The assessment (good, fair, or poor road condition) was converted for the purpose of this report to an average PCI score. The Hoopa Valley Indian Reservation Transportation Plan conducted an inventory of roads from 2002-2008. The paved roads within the Hoopa Valley Tribe were given an average PCI of 65. The majority of the roads within the Bear

River Band of Rohnerville Rancheria are newly constructed and were given an average PCI of 95. The majorities of the paved roads within the Karuk Tribe were constructed in 2001 and are considered to be in good condition and, therefore, were given an average PCI of 80.

The condition of the roads based on PCI led the following findings:

- The average PCI for entire Humboldt County area, weighted by road miles, is 60.4 with a range from 58 to 95.
- The Bear River of Rohnerville Rancheria has the highest individual PCI rating.
- The Cities of Eureka, Fortuna, Arcata, Trinidad and the Karuk Tribe have PCI ranging from 69 to 80 which is a good rating.
- The County of Humboldt, City of Ferndale, City of Blue Lake, City of Rio Dell, and the Hoopa Valley Tribe have a PCI ranging from 58 to 65 which is a mediocre rating.



Figure 10. Butler Valley Road has a PCI of 60, representative of the overall grade in Humboldt County

Table 10. Average PCI for Humboldt County Roads

Agency	Length (mi)	Average PCI	Weight (%)	Weighted Average
County of Humboldt	932.0	58	0.77	44.52
City of Ferndale	7.4	58	0.01	0.35
City of Blue Lake	8.4	58	0.01	0.40
City of Rio Dell	14.2	62	0.01	0.72
Hoopa Valley Tribe	15.3	65	0.01	0.82
City of Eureka	114.2	69	0.09	6.49
City of Fortuna	45.2	69	0.04	2.57
City of Arcata	68.5	70	0.06	3.96
City of Trinidad	3.3	75	0.00	0.20
Karuk Tribe	3.6	80	0.003	0.24
Bear River Band of Rohnerville Rancheria	2.0	95	0.002	0.16
	<b>1,214.1</b>		<b>1.00</b>	<b>60.44</b>

## ROAD CAPACITY

The majority of congestion is typically where the major collector, US Highway 101, in Humboldt County intersects minor arterials. Traffic count data was provided by the County of Humboldt, City of Arcata, and the City of Fortuna and compared to the recommended rural ADT.

The traffic counts provided by the City of Arcata and City of Fortuna show that the roads are either at capacity or up to 25% above the maximum capacity. The data for the County of Humboldt showed an average of extremes, either the roads are 50% above capacity or 50% under capacity. The overall assessment for Capacity received a mediocre score.

## ROAD OPERATION AND MAINTENANCE

Humboldt County, the Cities and the Tribes each have a single budget for operation and maintenance of both bridges and roads. Therefore, the same grade was assigned when assessing the operation and maintenance for both roads and bridges. The allowable annual budget for each of the entities are shown in the table below. The higher target PCI was determined to be, the most cost-effective the PCI to maintain the pavements with preventive maintenance strategies.

**Table 11. Maintenance and Future Needs of Humboldt County Roads and Bridges by Area**

Agency	Road Length	Number of Bridges	Available Annual Budget	Budget to maintain at current condition	Budget to maintain at a Higher PCI	Budget to maintain at Higher PCI over the next 10 Years
City of Eureka <sup>1</sup>	114.2	1	\$350,000	\$2,800,000	\$4,500,000	\$47,700,000
City of Arcata <sup>2</sup>	68.5	0	\$800,000	\$2,400,000	\$2,300,000	\$23,900,000
City of Fortuna <sup>3</sup>	45.2	7	\$125,000	\$1,500,000	\$2,500,000	\$24,900,000
City of Rio Dell <sup>4</sup>	14.2	0		\$300,000	\$400,000	\$5,500,000
City of Blue Lake <sup>5</sup>	8.4	0	\$70,000	\$200,000	\$300,000	\$3,000,000
City of Trinidad <sup>6</sup>	3.3	0		\$52,000		
Bear River Band of Rohnerville Rancheria <sup>7</sup>	2.0	0	\$120,000	\$10,000	\$20,000	\$100,000
Karuk Tribe <sup>8</sup>	3.6	0	\$671,240	\$1,000,000	\$2,000,000	\$10,000,000
Yurok Tribe <sup>9</sup>			\$1,100,000	\$7,000,000	\$10,000,000	\$100,000,000
Hoopa Valley Tribe <sup>10</sup>	15.3	4	\$119,000	\$400,000	\$500,000	\$5,000,000
County of Humboldt <sup>11</sup>	932.0	157	\$3,000,000	\$12,500,000	\$14,500,000	\$200,900,000
Beurau of Land Management (BLM) <sup>12</sup>	83.0	0	\$14,000	\$30,000	80,000	\$5,000,000
<b>Total</b>	<b>1,289.7</b>	<b>169</b>	<b>\$6,369,240</b>	<b>\$28,192,000</b>	<b>\$37,100,000</b>	<b>\$426,000,000</b>

Sources: See Table 2 Source Information

Note: Estimates of the pavement condition in 10 years for the Cities of Eureka, Arcata, Fortuna and Humboldt County if the roadways were not maintained or rehabilitated are provided in the Pavement and Management Reports. Cost estimates are provided to maintain the cities roadways at current or better PCI. The following describes the assessment for the Cities of Eureka, Arcata, Fortuna and Humboldt County.

### Assessment by City

- The City of Eureka will require \$47.7 M to increase the average road PCI to 84 over the next 10 years. Approximately 12% of the budget would be allocated for preventive maintenance and the remainder for rehabilitation and reconstruction of roads. If no maintenance or rehabilitation would occur over the next 10 years, the City of Eureka road network PCI would drop to 45. The City currently has an annual budget of \$350,000 per year for road improvements. The City will require \$2,800,000 or an increase of 800% in the current budget to maintain the current PCI.

The City of Eureka cannot maintain their road condition at current PCI with the budget available and, therefore, received an overall grade of poor.

- City of Arcata will require \$23.9 M to increase the average road PCI to 83 over the next 10 years. 20% of the budget would be allocated for preventive maintenance and the remainder for rehabilitation and reconstruction of roads. If no maintenance or rehabilitation would occur over the next 10 years, the City of Arcata's PCI would drop to 51. The City of Arcata will require approximately \$1 M in additional funding to maintain the current PCI. The City currently has an annual budget of \$800,000 per year for road improvements. The City of Arcata cannot maintain their road condition at current PCI with the budget available and, therefore, received an overall grade of poor.
- The City of Fortuna will require \$24.9 M to increase the average road PCI to 80 over the next 10 years. Approximately 12% of the budget would be allocated for preventive maintenance and the remainder for rehabilitation and reconstruction of roads. If no maintenance or rehabilitation would occur over the next 10 years, the City of Fortuna road network PCI would drop to 47. The City currently has an annual budget of \$125,000 per year for road improvements. The City will require \$1,500,000 or an increase of %1,200 in the current budget to maintain the current PCI. The City of Fortuna cannot maintain their road condition at current PCI with the budget available and, therefore, received an overall grade of poor.
- Humboldt County will require \$200.9 M to increase the average road PCI to 84 over the next 10 years. Approximately 12% of the budget would be allocated for preventive maintenance and the remainder for rehabilitation and reconstruction of roads. If no maintenance or rehabilitation would occur over the next 10 years, the Humboldt County road network average PCI would drop to 39. The City currently has an annual budget of \$3,000,000 per year for road improvements. Humboldt County will require \$12,500,000 or an increase of approximately 415% in the current budget to maintain the current PCI. The County cannot maintain their road condition at current PCI with the budget available and, therefore, received an overall grade of poor.

The overall assessment for operation and maintenance based only the requirements for road repair and maintenance is considered poor.

## ROAD SAFETY

The overall road safety grade was assessed as poor, and when compared vehicle safety was most problematic followed by motorcycle safety and then pedestrian safety. The vehicular death rate for Humboldt County is approximately double the state rate according to the California Highway Safety Plan for 2014.

A large percentage of the pedestrian and bicycle fatalities and serious injuries are in Eureka. However, the California Office of Traffic Safety data for Humboldt County and Eureka does not differentiate between fatalities and serious injuries and a direct comparison with the data provided by NHSTA is not applicable. The overall average is 112 fatalities and serious injuries to bicyclists and pedestrians per year. The California OTS ranks the number of casualties and fatalities to other cities/counties of comparable size. Eureka was ranked 1 out of 93 cities of comparable size for pedestrian fatalities and serious injuries in 2010 and 2 out of 93 cities of comparable size for pedestrian fatalities and serious injuries in 2011. The data available from 2008, 2009, and 2011 compiled and converted and the associated grades are listed in Table 12.

**Table 12. Comparison of State and County Safety Data**

Fatality Rates													
Year		Total Fatalities	Motorcycle	Pedestrian	Bicyclist	Daily Vehicle Miles Traveled	Total Vehicle miles traveled (millions)	Fatalities per 100 million vehicle mile traveled	Motorcycle fatalities per 100 million VMT	Pedestrian Fatalities per 100 million VMT	Vehicle Grade	Motorcycle Grade	Pedestrian Grade
2008	NHTSA	California	3,434.00	560.00	620.00		327,286.00	1.05	0.17	0.19	Poor	Poor	Mediocre
		US	37,423.00				2,976,528.00	1.26					
		Humboldt	24.00	5.00	3.00	1.00		1,236.31	1.94	0.40	0.24	Poor	Poor
	2014 CA HSP	Rural CA						2.26					
	OTS*	Humboldt	954.00	66.00	47.00	47.00	3,387,153.00	1,236.31					
		Eureka	302.00	10.00	25.00	24.00	341,427.00	124.62					
2009	NHTSA	California	3,090.00	394.00	567.00		324,486.00	0.95	0.12	0.17	Failing	Good	Mediocre
		US	33,883.00				2,956,764.00	1.15					
		Humboldt	26.00	1.00	3.00	0.00		1,260.22	2.06	0.08	0.24	Poor	Exceptional
	2014 CA HSP	Rural CA						2.27					
	OTS*	Humboldt	966.00	22.00	57.00	71.00	3,452,667.00	1,260.22					
		Eureka	370.00	11.00	33.00	32.00	360,930.00	131.74					
2011	NHTSA	California	2,816.00	415.00	633.00		320,784.00	0.88	0.13	0.20	Failing	Failing	Failing
		US	32,479.00				2,946,131.00	1.10					
		Humboldt	29.00	4.00	5.00	2.00		1,245.38	2.33	0.32	0.40	Failing	Failing
	OTS*	Humboldt	908.00	53.00	57.00	58.00	3,412,007.00	1,245.38					
		Eureka	336.00	13.00	34.00	20.00	368,975.00	134.68					

## ROAD RESILIENCE



Figure 11. **A section of Bald Hills Road following paving in 2012; This road provides an alternative access between the Wietchpec and Orick (HWY 101).**

Humboldt County is susceptible to a variety of natural disasters with floods, earthquakes, tsunamis, and forest fires being the most imminent threats to the connectivity between the communities. Two 100-year flood events (a flood event that has a 1% probability of occurring in any given year) occurred in 1955 and 1964 that caused severe damage to the infrastructure. Overall, there have been 29 hazard events declared since 1954 ranging from floods, tsunamis, earthquakes and wildfires Statewide, according to the Humboldt County Hazard Mitigation Plan Update. Prior to 1964 the declared disasters were statewide and not Humboldt County specific; FEMA did not start distinguishing declarations by county until 1964. According to Caltrans Bridge Humboldt Region Bridge List, seven bridges were built between 1955 and 1957 and 15 bridges were built from 1964 to 1966. These bridges were most likely either destroyed or severely damaged by the 100-year flood events.

Connectivity is critical for evacuation routes as well as providing rescue and receiving supplies. Due to the isolation of Humboldt County from the rest of California, connecting the communities within Humboldt County could potentially be a matter of life or death in the event of a large natural disaster. Emergency facilities are located in the Cities of Arcata, Eureka, Fortuna and in the unincorporated Garberville. There is also an ambulatory clinic located in Hoopa Valley.

The entities along Humboldt Bay have greater redundancy within the road network between the communities. The majority of communities in Humboldt County rely on Highways 101, 96 and 299 for minimum points of access. If Highways 101, 96, or 299 are blocked in one or both directions, there are alternate access routes to and from the communities along Humboldt Bay. However, some communities, have only one access road such as the Yurok Tribe, Karuk Tribe, Bear River Band of

Rohnerville Rancheria, Shelter Cove, and Big Lagoon. Possible alternate routes to bypass the communities are presented in Table 13 below.

Table 13. Redundancy within Humboldt County

Community	# Possible Routes	Possible Route
City of Arcata	3	Fickle Hill/Samoa/West End Road
City of Eureka	2	Mrytle Ave to Kneeland Route out to 36/ Herrick to 101
City of Fortuna	2	Tompkins Hill/Rohnerville road
City of Ferndale	2	Mattole/ Blue Slide Road
City of Rio Dell	1	Grizzly bluff to Ferndale and out Mattole
City of Trinidad	1	Stage Coach Road
Hoopa Valley Tribe	2	Bald Hills Road/Bear Road
Garberville/Redway	2	Alderpoint to Bell Springs/ Briceland Thorne to Mendo?
Shelter Cove	0	
Yurok Tribe	2	Bald Hills Road/Dowd Road
Blue Lake Rancheria	2	Maple Creek to Kneeland/Snow Camp Road to 299/ West Hatchery Road/ Glendale Road
Mckinleyville	3	Dows Praire to litle river, fieldbrook road, north bank road
Petrolia/honeydew	2	Etterberg and Mattole road
Orleans	1	Bald Hills Road/Dowd Road
Big Lagoon	0	
Bridgeville	2	Kneeland road/ Alderpoint Road
Bear River Band of Rohnerville Rancheria	0	

For the Karuk Tribe located in Orleans, the FEMA designated floodplain map for this area has been created specifically for Tribal Lands, which show a low risk for most Tribal properties. However, this community is subject to isolation and severe flooding. The floods of 1955 and 1964 constitute the dominant events in the last century. During the New Year’s Eve flood of 2006 massive debris slides east and west of Orleans isolated the community from any assistance. As the overflow from streams and rivers dropped, the flood debris, landslides, washouts, and roads that were undermined continued to present hazards and block road access. Residents and travelers were stranded in Orleans and other small isolated communities in northern Humboldt County for three days or longer. Orleans has one major highway to access the community. There are various forest roads that may also be used to access the community, but they may be impassable in the event of a major disaster.

The Karuk Tribe that resides in Orleans has no established professional Medical or Structural Emergency Response departments and relies exclusively on an all-Volunteer Department for immediate emergency assistance. The average response time from the beginning of an incident to the arrival of a professional responder is approximately two hours, depending on time of day and closest available resources. For critical medical emergencies an air ambulance may be requested. Air ambulances arrive on scene within 25 to 45 minutes, depending on availability of closest air responder, time of day and weather conditions. Other tribes residing off of Highway 96 experience the same situation and lack redundancy of access

roads to their community, which is amplified by the lack of emergency services in the vicinity of these communities.

## Road Innovation

Humboldt County, Cities, and the Tribes have been sharing resources and implementing special policies in the following ways (in no specific order):

- Humboldt County has partnered with the Tribes to place some County roads into the Bureau of Indian Affairs (BIA) inventory in order to allow the Tribes to use BIA funds for improvements to these roads.
- Humboldt County partners regularly with the Cities to construct larger road projects, which helps reduce costs for the participating entities.
- Humboldt County shares construction costs with citizens living in rural communities if they provide the materials; normally, the County does not do major work in these rural areas.
- Humboldt County works with timber companies on public roads that the companies use to access timber harvest sites.
- Humboldt County has obtained special grants from the State Regional Water Quality Control Board to improve the County roads and reduce sedimentation.
- Humboldt County share resources across counties. For example, the County performed a gravel extraction/crushing operation in Trinity County and provided the crusher; both counties provided personnel. Both Humboldt and Trinity Counties benefited from the coordination.

Those are several innovative financial ways Humboldt County supports the road and bridge infrastructure. Humboldt County also uses the following innovative construction materials and methods for road construction and repair (in no specific order):

- Humboldt County, Cities, and the Tribes have implemented fish culvert projects that reduce flooding, increase habitat, and also create tunnels for deer and other animals to reduce animal related car accidents while improving the habitat and the road.
- Innovative striping is being included in local projects. Humboldt County included Wet Night Enhanced Striping in two projects constructed in 2014.
- Light-Emitting Diodes (LED) street light were installed by the Cities of Arcata, Eureka, and Fortuna.
- Microwave vehicle detection sensors for street lights have been installed by the City of Fortuna.
- Bids for two micro-surfacing projects have been combined by the City of Arcata, City of Fortuna, City of Eureka, and Humboldt County. Micro-processing is an innovative paving mix used to seal low-severity cracks. It also addresses raveling, friction loss, moisture infiltration, bleeding, and roughness.
- There are five innovative construction materials and methods used in Humboldt County.

Thus, a total of eleven innovative processes are used for roads in Humboldt County, which correspond to a mediocre grade.



# BRIDGES C-

Table 14. Summary of Bridge Grading

Criteria	Grade
Condition	Mediocre
Load Capacity	Poor
Operation and Maintenance	Mediocre
Safety	Mediocre
Resilience	Mediocre
Innovation	Mediocre
<b>Overall Grade</b>	<b>C-</b>

A total 170 bridges that are maintained by the County, three Cities, and one Tribe within Humboldt County were assessed. The C- grade indicates that bridges show general signs of deterioration and require attention. Only bridges that are managed by Humboldt County, the Cities and the Tribes were assessed.

Bridges must have a minimum span of twenty feet to be included in the National Bridge Inventory (NBI), and therefore, are eligible for federal bridge funding. Structures with a span less than 20-feet are generally considered to be culverts (structures that allows water to flow under a road, railroad, trail, or similar obstruction and are typically embedded by soil). The NBI only includes bridges that affect car and truck traffic, whether they carry or overcross car and truck vehicular traffic.

The County of Humboldt owns and maintains some bridges that are not on the NBI. For example, Raes Creek Bridge spans seventeen feet, and, therefore, does not meet the criteria. Another example is the Hammond Trail Bridge, which is for bicyclist and pedestrian use only. The Hammond Trail Bridge spans the Mad River, and therefore does not overcross any traffic.



Figure 12. Concrete Spandrel Arch Bridge Over the Mattole River

# BRIDGE CONDITION

The condition of each bridge was graded based on its sufficiency rating, which is an overall indicator of the quality and safety of the structure. The sufficiency rating summarizes the condition of each bridge on the basis of structural adequacy, safety, serviceability, functional obsolescence, and essentiality for public use. A summary of the data shows that the average sufficiency rating for Humboldt County area bridges is 71.28, which corresponds to a mediocre rating.

Table 15. Bridge Grading Based On Condition

Agency	Number of Bridges	Average	Standard Deviation	Worst Sufficiency
County of Humboldt	157	70.89	22.37	5.00
City of Fortuna	7	83.40	9.54	70.50
City of Eureka	1	67.30	N/A	N/A
City of Ferndale	1	97.00	N/A	N/A
Hoopa Valley Tribe	4	60.00	N/A	N/A
<b>Total</b>	<b>170</b>	<b>71.28</b>		

# BRIDGE CAPACITY

The capacity criteria for bridges are based on loading rates, i.e., the weight load that the bridge can carry. Bridges that can carry 60,000 pounds can allow heavy construction equipment to mobilize across the bridge. As discussed previously, a bridge with a load capacity of 60,000 pounds corresponds to a rating of exceptional. The number and the corresponding percentage of bridges corresponding to each bridge load capacity rating is provided in the table below.

Table 16. Summary of Bridge Load Capacities

Bridge Capacity Rating	Number of Bridges	Percentage of Bridges
Purple Rating (60,000lb)	103	64%
Green Rating (52,000lb)	12	7%
Orange Rating (42,800lb)	24	15%
No Rating	23	14%

The overall rating for bridge capacity is mediocre. The data from Caltrans most recent inspection reports indicates that from the 153 Humboldt County owned bridges:

- 96 are rated for a maximum weight of 60,000lb on tandem axles,
- 11 bridges are rated for 52,000lb,
- 23 bridges are rated 42,800lb, and
- 23 bridges have no permit capacity.

From the seven of the City of Fortuna bridges, five are rated for 60,000lb, one is rated for 52,000lb and one is rated for 42,800lb. The single bridges owned by the City of Eureka and the City of Ferndale are rated for 60,000lb.

## BRIDGE OPERATION AND MAINTENANCE

Humboldt County, the Cities, and the Tribes each have a single budget for Operation and Maintenance that includes both roads and bridges, therefore one grade was assigned for this category. Table 6 “Roads and Bridges Operation and Maintenance Grading Criteria” (p. 17) shows the criteria for grading operation and maintenance for bridges. Bridges O&M received a rating of poor.

## BRIDGE RESILIENCE

Bridge resilience was evaluated based on whether there is a bypass (alternate route) or a temporary structure that motorists can use in the event that a bridge fails or is closed for emergency. As a temporary structure, we considered if a 90-foot-long railroad flatcar bridge could be used to keep the bridge open. Approximately 63% of the bridges can be bypassed using either alternate routes or can be kept open utilizing a railroad flatcar. A railroad flatcar can be used to keep approximately 30% of the bridges (50 out of 170) in Humboldt County, which are shorter than 90-feet. Approximately, 17% of the bridges can be bypassed and a temporary structure can be used.

Temporary bridges were also considered that the US National Guard in Eureka could employ around Humboldt Bay. The National Guard has a floating bridge at least 150 feet long called an improved ribbon bridge (IRB) and a medium girder bridge (MGB). The overall rating for bridge resilience is mediocre.

## BRIDGES SAFETY

The sufficiency rating of each bridge is not only a reflection of the condition, but also a reflection of the bridge’s overall safety. Structural adequacy and safety account for 55% in the sufficiency rating formula. Each bridge was graded on both safety and condition based on the sufficiency rating. The summary table of the condition ratings for Humboldt County bridges shows the average sufficiency rating is 71.28, which corresponds to a rating of mediocre (Table 15).

## BRIDGES INNOVATION

Humboldt County, the Cities, and the Tribes have been sharing resources and implementing special policies for both roads and bridges. Innovations include partnering with nearby cities or counties, applying for new funding programs, partnering with Tribes to deliver larger projects and access different funding sources, and implementing new construction methods. The innovative financing and construction methods support the infrastructure for both roads and bridges. Innovation for bridges received a mediocre rating.

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