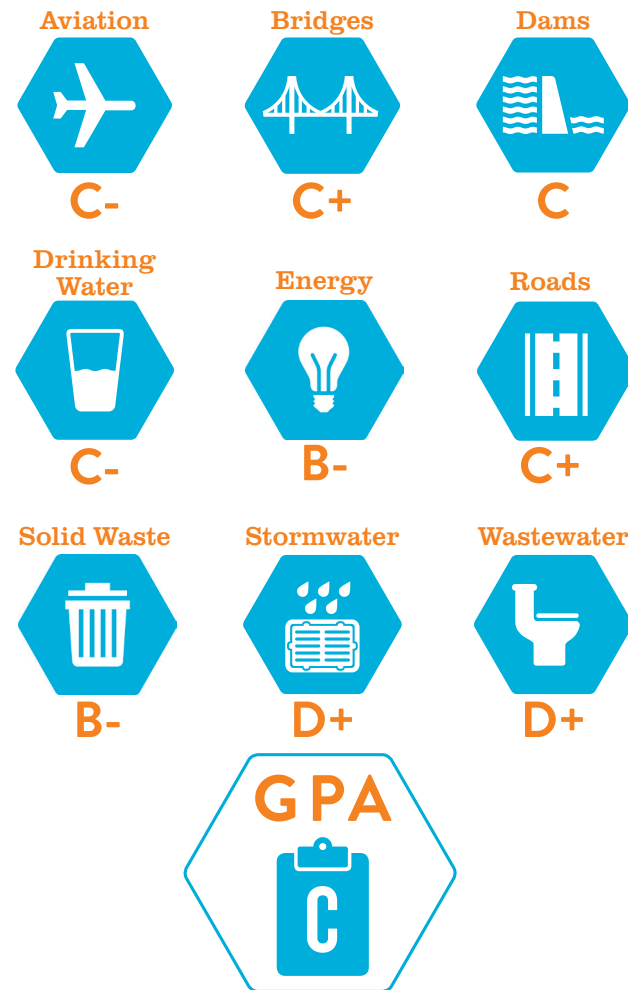
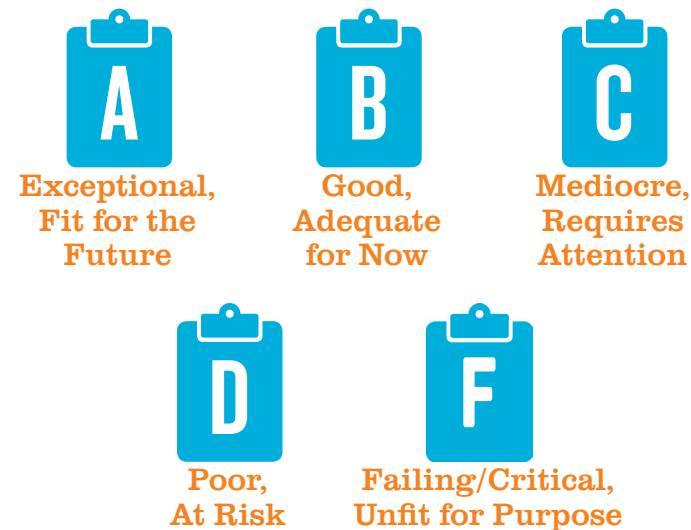


VERMONT'S GRADE



About the Grades

Infrastructure is graded based on eight criteria: **capacity, condition, funding, future need, operation and maintenance, public safety, resilience, and innovation.** ASCE grades on the following scale and defines these grades as:



6 STEPS WE CAN TAKE NOW

- PROMOTE INNOVATION AND FORWARD THINKING**
 Vermont's infrastructure is aging, and is challenged yearly by climate change and other external factors. To meet these challenges, an emphasis on adequate planning for future repairs, replacement, and new technologies is needed. Forward thinking can extend assets' lifespans, reduce costs, and improve the environment. Resilient infrastructure that can adapt with the times to provide economic and environmental benefits and utilizes emerging technologies should be promoted whenever possible.
- PREPARE FOR MORE SEVERE WEATHER CONDITIONS**
 Our key infrastructure systems must be resilient against the consequences of climate change. Our infrastructure should not only be able to withstand increasingly severe storms, but support emergency response and facilitate a return to regular order as efficiently as possible. State agencies have been putting systems in place to increase resiliency that should be supported, expanded, and maintained even as the memories of Tropical Storm Irene begin to fade.
- SUPPORT SUSTAINABLE LOCAL FUNDING SOURCES**
 While Vermont depends heavily on federal funding and financing to supplement our state budget, our leaders at both statewide and municipal levels must establish balanced and forward-thinking budgets that incorporate sustainable funding practices for infrastructure. Funding sources should consider the long-term cost of infrastructure over its full lifespan, including operation and maintenance. Much debate has occurred recently on how this will take shape as we work to improve our water quality and road infrastructure, but the conversation should be expanded to other categories of infrastructure.
- BALANCE THE NEEDS OF URBAN AND RURAL COMMUNITIES**
 Vermont's communities are very diverse in structure and density, with equally diverse infrastructure needs and investments required to meet individual community needs. Urban infrastructure projects may benefit a larger number of people, but funding for rural infrastructure ensures that all Vermonters have equitable access to jobs and a strong quality of life.
- INVEST IN WATER INFRASTRUCTURE**
 Vermont's water infrastructure, defined as stormwater, wastewater, and drinking water, are among the lowest scoring infrastructure categories in the state. Strategic planning and investment of time, innovative minds, and fiscal resources in these areas is important to ensure a healthy and prosperous environment and population for decades to come.
- ADVOCATE AND PARTICIPATE**
 Vermont has a proud tradition of advocacy and public involvement. We need to channel that energy toward improving the infrastructure that Vermonters rely upon. Talk to your legislators, reach out to decision-makers, and let them know about the importance of maintaining the public assets that protect our health, safety, and welfare.

About the Vermont Section

The Vermont Section of ASCE was originally founded 1955 and represents around 370 members across the State. The Vermont Section takes pride in advancing and promoting the profession of civil engineering through carrying out ASCE's mission of advancing technology, encouraging lifelong learning, developing civil engineer leaders, and advocating for infrastructure and environmental stewardship. Vermont achieves these goals through monthly meetings highlighting regional projects, providing members information through our newsletter, mentoring student members, and promoting the profession to the general public through special projects.

Contact Us

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2019 REPORT CARD FOR VERMONT'S INFRASTRUCTURE



Infrastructure Matters

Infrastructure is the backbone of our state and supports our economy and our way of life. Unfortunately, infrastructure and the important role it plays are sometimes overlooked – pipes deliver clean water, our light switches work, and bridges carry our cars and goods. We usually only notice these systems when things break down or stop working as they should.

Reliable and safe infrastructure requires sufficient investment, thoughtful planning, and preparation for the future. For a long time, underinvestment at all levels of government threatened our competitive advantage and the health, safety, and welfare of our residents. Fortunately, the state and many local governments have taken recent measures to provide additional support for our infrastructure. While the new funding and higher prioritization is welcome, additional steps can still be taken to ensure Vermont's infrastructure is fit for the future.

The Report Card was created to help Vermont understand the state of our infrastructure. As civil engineers, our job is to plan, design, construct, and maintain our infrastructure networks. This document allows us the opportunity to share that information with the public. The Report Card provides a snapshot for residents and policymakers to engage in a conversation about where we are and where we want to be. We hope this information provides the insight needed to start that conversation and ignite action.

How You Can Get Involved

- Get the full story behind this Report Card at www.infrastructurereportcard.org/vermont.
- Find out the condition of the infrastructure near you on the Save America's Infrastructure app available on iTunes.
- Ask your elected leaders what they're doing to make sure your infrastructure is reliable for the future. Use your zip code to find your list of elected officials at www.infrastructurereportcard.org/take-action.

2019 VERMONT'S INFRASTRUCTURE REPORT CARD

The 2019 Report Card for Vermont's Infrastructure gave the state an overall G.P.A. of C. Vermont's civil engineers studied nine infrastructure categories. Of those nine, two infrastructure categories are in good condition, five are in mediocre condition, and two are in poor condition.

The good news is there are solutions to all these challenges, and we can raise Vermont's infrastructure grades. By learning more today about the conditions of the infrastructure you use every day, you too can help raise the grade.

AVIATION



Vermont is home to 16 public-use airports, 12 of which are included in the National Plan of Integrated Airport Systems. Vermont's one primary commercial airport – the Burlington International Airport (BTV) – is classified as a small hub. Flights out of BTV are concentrated between 6 and 10 am to allow for connecting flights at large hub airports, contributing to capacity constraints both in the terminal and at airport parking positions. Fortunately, the pavement condition at BTV is in good condition and construction is underway to create a full-length parallel taxiway for the primary runway. However, the aviation system at-large is underfunded. From 2017 to 2021, it is estimated that approximately 80% of state airport needs would go unmet, while approximately 60% of BTV's needs would go unmet. Airport taxes, predominately generated at the primary commercial airport, are insufficient to support facilities and services at civil aviation airports throughout the state. This is compounded by funding shortfalls at the national level.

BRIDGES



Vermont has made excellent progress over the last five years in reducing the number of structurally deficient bridges in its inventory. On average, approximately 5% of bridges are structurally deficient, compared with 9.6% in 2012. The decrease in structurally deficient bridges has been accomplished despite a recent shortfall in funding. However, progress could be slowed or even reversed without a clear and consistent funding mechanism that provides long-term support for bridge infrastructure. In addition, there are many bridges that are functionally obsolete, which places constraints on traffic flows and impacts economic activity. Finally, Vermont's bridges are an average of 57 years old, much higher than the national average of 43 years, resulting in many functionally obsolete bridges. Aging and functionally obsolete bridges require increased funding for additional maintenance and repairs.

DAMS



Vermont's 1,014 dams serve a variety of purposes, including recreation, flood control, and hydropower. Eight percent of Vermont's dams are high-hazard potential, meaning should they fail, loss of life is expected. Statewide, 77% of these high-hazard potential dams have emergency action plans in place. With the large number of deteriorating dams and predicted increases in flooding, additional funding is required to mitigate the risk of dam failures, especially for the 155 dams listed as in poor condition. Vermont has been fortunate to not experience a recent dam failure leading to loss of life or property damages, despite limited funding for inspections, maintenance, and repairs. The Vermont Department of Environmental Conservation (VTDEC) Rulemaking is now underway to formalize methods for dam inventory, hazard classification, inspection, and design. Removal of obsolete and decaying dams that typically do not meet dam safety standards is taking place to improve public safety and restore aquatic ecosystems. Nineteen dams have been removed over the last five years. The state needs additional resources to increase staffing levels in the VTDEC Dam Safety Program and River Management Program to properly manage dams in the state and maintain public safety.

DRINKING WATER



Vermont's approximately 1,391 public water systems consist of sources, treatment, reservoirs, pumping facilities, and pipes, which deliver quality water to customers. Overall, Vermont's public water systems have shown an improving compliance rate. However, the system is aging. In 2016, a leak detection service surveyed approximately 257 miles of pipe across 32 systems and identified 117 leaks. An estimated 963,720 gallons per day of drinking water was being lost through these leaks. The Environmental Protection Agency (EPA) estimates that Vermont drinking water infrastructure will need \$642.9 million over the next 20 years. This estimate is a large increase from previous EPA total needs numbers, and reflects that much of Vermont's drinking water infrastructure is aging and will need to be replaced and upgraded to maintain compliance and ensure quality drinking water to customers. Vermont's aging and rural populations are especially vulnerable to the costs associated with replacing aging assets and addressing emerging contaminants. The cost to maintain, replace and upgrade the infrastructure will ultimately be the responsibility of the water users. Smaller communities with low median household incomes will need to continue to utilize loan programs to offset needed improvements.

ENERGY



Vermont has the lowest energy production in the nation, at 174 GWh in July of 2018, though it is a small state with a low population and low energy demands. Hydroelectric is by far the state's largest source of local electric power generation at close to 60% of total generation, followed by around 20% from biomass, over 12% from wind, and over 6% from solar. Vermont has an advanced and well-connected smart grid thanks to a 2012 effort to install smart meters throughout the state, upgrade and install new grid automation controls, and expand the fiber optic backbone connecting the state's substations. Vermont is committed to a goal of 90% renewable energy by 2050 across all energy uses, with no coal or nuclear power plants and insignificant amounts of petroleum energy production. However, the state currently still relies on energy imports from its neighbors, especially fossil fuels for transportation and natural gas for heating. Though it has an advanced grid, it is also home to some of the highest electricity costs, at around \$0.17 per kWh in 2017.

ROADS



In 2017, the Vermont transportation network included 14,174 total miles of local and state roadways, 806 miles of the National Highway System, 2,709 miles of State Highway System, and 139 miles of Class 1 town highways. The Vermont Agency of Transportation (VTTrans) has prioritized maintenance of state roadways, and the percentage of miles in good and fair condition has grown since 2013. The state also experiences little congestion. However, future needs are significant. By one measure, the state currently only has approximately two-thirds of the funding it needs to maintain its assets in a state of good repair. Increasingly severe winter storms are also challenging for regular highway system operations and maintenance. Fortunately, VTTrans recently developed a Transportation Resilience Planning Tool, a web-based application designed to help integrate climate risk and transportation resiliency into the agency's planning process for a more resilient network.

SOLID WASTE



In 2016, approximately 585,789 tons of municipal solid waste (MSW) were generated in the State of Vermont. Of that, about 211,152 tons of material were recycled or otherwise diverted from landfills or incinerators. That 36% diversion rate is relatively high when compared to the 30-36% percent diversion rate over the last 17 years. The statewide goal is to reduce the disposal of municipal solid waste from the current 5.18 pounds per person to 2.76 pounds per person, and to increase diversion rates to 50% by 2022. The Solid Waste Infrastructure Advisory Committee determined that approximately \$12 million was needed to meet the proposed state share of infrastructure investments estimated to implement these changes. Though progress has been statistically stagnant in years prior, Vermont is beginning to see indications of positive change in the diversion and disposal rates of MSW.

STORMWATER



Stormwater is runoff caused by rain events or snowmelt that must be collected and treated in a safe and efficient manner to ensure the safety of our roads, buildings, wastewater systems, waterbodies, and various forms of human transport. Stormwater management is vital to maintaining Vermont's resources, including water quality, habitat, stream geomorphology, or flood protection. In 2015, Vermont passed Act 64, a new Clean Water Act. For the state to reach compliance as outlined by Act 64, it will be necessary for the state and its municipalities to invest \$2.3 billion over the next 20 years. Revenues from funding sources already in place within that timeframe are projected at \$1.06 billion, leaving an investment gap of \$1.24 billion. As a small and largely rural state, Vermont lacks stormwater utilities, full-time town managers, and public works directors with capacity to plan for and manage stormwater infrastructure needs. Despite these challenges, Vermont is making measurable gains, with substantial emphasis on installing Green Stormwater Infrastructure and utilizing Low Impact Development techniques wherever feasible.

WASTE WATER



Vermont processes over 15 billion gallons of wastewater annually in its 92 municipal direct discharging permitted wastewater treatment plants (WWTPs) used by half the state's population, and even more in its soil based wastewater treatment systems, such as septic systems, used by the other half. The WWTPs and septic systems, along with piping networks and pumping stations, make up Vermont's wastewater infrastructure. Many of these systems are in need of expensive upgrades, especially in communities with combined sewer systems, where overflows pose potential for public safety concerns, and in WWTPs required to meet new phosphorus standards. In 2015, the passage of Vermont's Clean Water Act focused available resources toward addressing impaired waters across the state. As a result of this higher prioritization and concerted efforts by the state, increased state and federal dollars, including an increased Lake Champlain Basin Program award, the funding gap between what wastewater infrastructure needs and what revenues provide was reduced. In 2017, the Vermont Treasurer's Clean Water Report estimated an average annual gap, between wastewater infrastructure need and available revenues, of \$13.7 million for each of the next twenty years, to upgrade and maintain Vermont's municipal wastewater direct discharge infrastructure.

VERMONT REPORT CARD COMMITTEE AUTHORS 2019 UPDATE

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