Engineering Superior Infrastructure

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Have you ever been negatively affected by a power outage? Do you spend a large quantity of money on the internet that you often don't have access to or is operating extremely slow? Is there ever a time when you have to drive in the middle of the road in order to maneuver around numerous potholes? If the answer is yes, then you can relate to most of the population of West Virginia. According to U.S. News, West Virginia is ranked 50th overall out of all the US states in the category of infrastructure. Within that main category, West Virginia is ranked 49th in energy, internet access, and transportation. Therefore, it can be said that West Virginia has multiple problems with energy, internet access, and transportation.

The first problem with West Virginia's infrastructure correlates with energy. The main complication with energy in West Virginia is the power grid reliability. U.S News stated that, “Excluding major events, customers in both Arizona and Rhode Island experienced less than an hour of power outages in 2017, while customers in West Virginia experienced more than 7.5 hours of power outages in 2017.” This fact proves that the power grid reliability is in need of improvement. One idea that can be used to decrease the number of minutes West Virginians are without power is by using a fault current limiter. This device is used as a giant surge protector. The University of Arkansas, Fayetteville, wrote that it will regulate the amount of excess current that moves through the power grid when a surge occurs. The device will both decrease the number of locations that lose power and the amount of time the power is out.
The second group of problems with West Virginia’s infrastructure has to do with internet access. The primary problem is the fact that there is a large number of people who are unable to get broadband access. On top of that, there is also an issue with the number of people who have high-speed internet access. Some individuals may have access to the internet but it may be very slow and inconvenient. A solution to this problem is to place internet cables under the road every time one is redone or built. An alternative solution is to place the cables on guardrails alongside the road. After adding the cables, repeaters could also be used to extend the internet to homes off the road the cables are located. This would then provide isolated homes with internet access so they can communicate, be more connected, and complete necessary tasks that require the internet.

The last set of problems with West Virginia’s infrastructure corresponds with transportation. The most concerning difficulty is the bridge quality. A vast percentage of the bridges are considered structurally deficient and are in need of repair. Rob Dozier specified, “The states with the highest percentages of “structurally deficient” bridges include Iowa with 19.3 percent, West Virginia at 19.8 percent and Rhode Island with 23 percent.” This information supports the fact that there are several bridges in need of repair or replacement. In order to solve the situation, structurally strong bridges need to be created. The bridges will have to be done correctly even though it will be time-consuming and expensive. Ross Richardson says, “Triangles make for a strong structure because they work off compression and tension.” He also explains, “An arch is useful because it transfers the load instead of focusing the load on one spot.” If West
Virginia bridges are redone using these two methods, the bridges will last longer and withstand more weight. Another major problem with West Virginia's transportation is the road quality. Many roads in West Virginia have potholes or are cracked. This causes drivers to put forward more effort into avoiding these areas to try and prevent damaging their cars or getting injured. A way to solve this is by using a new type of road material, such as "self-healing" asphalt. The Conversation article, "Potholes: How Engineers Are Working To Fill In the Gaps", describes how tiny capsules full of sunflower oil or tall oil can be added to the material to act as asphalt rejuvenators. The capsules will break open when the road starts to crack and soften the asphalt so it can stick back together. This idea, if it is successful, will then fix the cracks and prevent potholes from forming.

In conclusion, it is very important for these problems to be solved because they affect individuals located in West Virginia daily. These issues can prevent people from doing necessary tasks, such as their job, and lead to severe injuries or damage. The effects of the problems will then have to be dealt with resulting in people having to spend money or do labor. However, if the engineering solutions are implemented, then the overall infrastructure of West Virginia will improve and additional problems will be prevented.
Bibliography

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