

JOINT TRANSPORTATION RESEARCH PROGRAM

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Cost and Benefit Analysis of Installing Fiber Optics on INDOT Projects

Introduction

The Indiana Department of Transportation (INDOT), tasked with the stewardship of billions of dollars worth of public-invested highway infrastructure, continually seeks not only design and operational policies that foster cost-effective project delivery and procurement but also opportunities for revenue generation. The issue of revenue generation is important in the current era where revenue per vehicle and overall revenues continue to fall because the state's revenue is dominated by the gas tax, which is in turn heavily influenced by fuel consumption.

One opportunity for generating revenue is to lease

the right-of-way. With the growing population and increased demand for online connectivity and global information transmission, the fiber-optic cable industry has experienced rapid growth over the past few years. ICT companies have long sought to achieve higher economic productivity by installing fiber optic cables in the ROW (right-of-way) of access controlled highways. These utilities may be carried in a conduit constructed by ICT companies or constructed by INDOT and leased to the ICT companies. If such an initiative were to be realized, INDOT may stand to collect administrative and monitoring fees and will be entitled to receive fair market value for the permitted use of the agency's ROW. The use of INDOT's facilities to generate revenue should be part of the vision of the current Indiana administration.

Findings

The right-of-way can be used for conduit infrastructure constructed by the state of Indiana which can then be leased to ICT companies. The benefit to the state government would be future revenues and the opportunity to increase economic development and productivity. The project therefore had two phases. Phase 1 focused on the overview of access-controlled highway systems, identification of potential points where ICT companies may seek permits, the governor's rural broadband initiatives, and the current practices in other states. Phase 2 focused on building a county-level database in order to develop a relationship between the potential economic condition and broadband development and examining the potential benefit of leasing conduits laid along the Indiana state highways. Based on the research results it was concluded that a relationship exists between the economic condition (usually measured by increase in

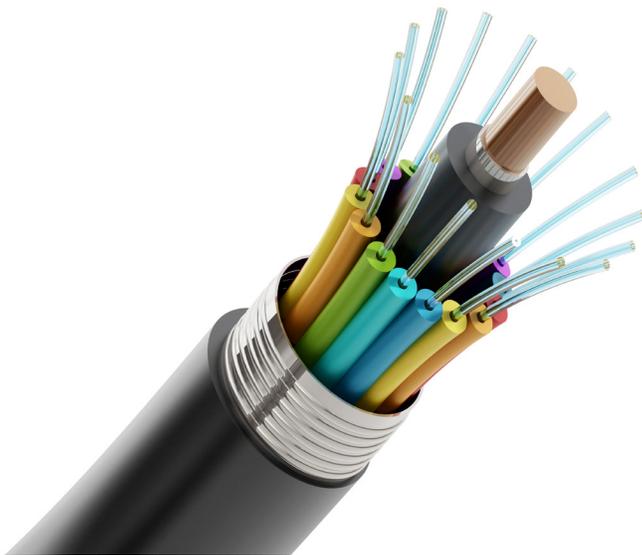


Illustration of pipe-encased cable containing optic fibers.

cigdem. (Photographer). (n.d.) Fiber optical cable detail isolated on white background [Digital image]. Shutterstock. Retrieved March 30, 2021, from <https://www.shutterstock.com/image-illustration/fiber-optical-cable->

GDP) and broadband provision.

Based on this conclusion, an experiment was conducted to measure the economic impact the state. To determine this impact, a database was developed, compartmentalizing the analysis into GDP per county per industry type, the natural growth of GDP as a factor, and the extent of contribution of broadband in the growth of GDP. A general formula was developed to incorporate the adjusted median income on an industry and county level along with a broadband contribution factor. This formula was used to evaluate policies that can yield positive economic outcomes.

The Pareto method was used to determine the county or city that would have a major economic impact on the state. Pareto analysis also helped determine which industry would have a major impact on the state's economy. Thus, 80% of the projected revenue can be generated by emphasizing the resources on the development of 20% of the highly impactful infrastructure. Finally, it can determine which highways should be targeted for conduit leasing initiatives.

Implementation

This project led to the development of a general formula which helps measure the total economic impact of the

broadband initiative. The general formula considers parameters that include GDP per county per industry type, natural growth based on employment opportunities, and broadband contribution factor. In addition to targeting the highways for conduit leasing initiative, the data estimated from this formula can be further scrutinized for further research inquiry.

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