Thesis Project Portfolio

Soil and Water Contamination from Dry-cleaning: Evaluation of Remediation Techniques.

(Technical Report)

How Social Ideologies Hinder the Development of Passenger Rail in the U.S.

(STS Research Paper)

An Undergraduate Thesis

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Bachelor of Science, School of Engineering

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Sociotechnical Synthesis

Developing a sustainable society is key to the survival of humanity, but how can complex systems contribute to a more sustainable society?

The remediation of hazardous soil and groundwater is complex yet crucial to environmental restoration, protecting humans and wildlife, and preventing future disaster. An undergraduate team of 6 individuals investigated remediation techniques for contaminated groundwater and soil in Ypsilanti, Michigan, caused by chemical seepage from a dry-cleaning business. GeoSyntec is the partner company. Site investigation data was provided, and GIS software was used to model the system. The undergraduate team selected appropriate remediation techniques by first conducting research on available technologies and evaluating them for compatibility with our site characteristics. Then, methods that reduced trichloroethylene (TCE) and perchloroethylene (PCE) contaminant levels most effectively were chosen. The state's maximum contaminant levels must be observed, but lower cost was prioritized between two techniques of equal efficiency. The selected remediation techniques are soil vapor extraction and a permeable reactive barrier.

On a passenger-mile basis, public transportation can be far more energy efficient than private passenger cars, yet increasing its mode share is a difficult and complex problem. The U.S. lacks an extensive passenger rail system and struggles to advance rail projects. Ideologies engrained in American culture are among reasons for the hinderance of passenger rail development and are considered here separately from any geographic or policy inhibitions. Passenger rail is often classed as a mode of public transportation, therefore research on public transit is considered relevant. The ideologies which serve the greatest hinderance to passenger rail are American individualism, car dependence, social and financial perceptions, partisanship,

prioritization of private entities, government distrust, and climate bias. Arguments between citizens, rail companies, and political parties create a stalemate in the development of rail. These findings suggest that policy intervention or infrastructure enhancements alone will not increase the presence of passenger rail. Rather, the US needs an instigator to mobilize widespread social change to create a culture accepting of rail systems.