SITE REDESIGN AT CROZET ELEMENTARY

HARMFUL EMISSIONS: HOW DIESEL FUELED SCHOOL BUSES ARE HARMING STUDENTS

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SOCIOTECHNICAL SYNTHESIS

One of the biggest threats to global health can be attributed to air pollution to the environment. As human population increases, the need for the adequate infrastructure to support it will only be emphasized and with this comes an increase in environmental footprint by humans. The technical project consisted of redesigning the site layout of Crozet Elementary School which is construction an additional academic wing in order to accommodate a projected increase in student population. The goal of this capstone project was to work with guidance from the design firm of Timmons Group to develop and design site improvements at Crozet Elementary in order to grasp the numerous factors and constraints accounted for in a design project. One of these constraints was to maintain or improve existing environmental conditions on site, which included air quality. The STS research paper focused on this constraint by analyzing the impact that engineers, the government, and urban planners can have on air quality on local communities.

In recent years, Crozet has increased in population and Crozet Elementary has effectively been overcrowded. To address this, they have constructed an additional academic wing to support the increased student population and in doing so, need to redesign the site in order to improve traffic conditions on site and mitigate clashes between the different modes of transportation. The site redesign focused specifically on the school parking and traffic circulation while adhering to a number of foals and requirements including: 136 parking spaces (5 of which needed to be handicap accessible), 12 dedicated bus spaces, separate bus and car circulation, and improving or maintaining existing environmental conditions on site. The capstone team created several design iterations in Civil 3D while attempting to meet these requirements before developing a viable layout. Upon drafting a feasible design layout, the Capstone team worked to

create a complete sheet set of construction documents while adhering to state and county standards. These sheets included: demolition, grading, stormwater, erosion and sediment control, and site layout plans. As there were limitations in knowledge of advanced Civil 3D concepts and skills, the spring semester centered around workshops given by Timmons Group that explained them to the Capstone team. Despite successfully completing these, the redesign will not be implemented nor considered in the field as the official academic addition design was finalized by Timmons Group and finished construction before the start of the 2022-23 school year.

The STS research focused on the question of how can engineers, the government, and urban planners improve air quality in local communities. Much of the focus today is centered around the federal government and providing adequate funding for the issue at hand on a national level; while this research does not refute its importance, it does emphasize the importance of addressing the issue on a bottom-up approach by analyzing it on a local level. In order to sufficiently analyze the issue at hand through a socio-ethical lens, Actor Network Theory (ANT) was applied to the current efforts at redressing the air quality issues experienced among different communities. By analyzing the relationships between the actors at hand, an enhanced understanding of a correct course of action was able to be formulated that would help redress current inequalities regarding air quality among different communities. Research on the issue at hand showed that there was a multitude of initiatives that could be taken by the three actors in order to help mitigate air pollution in local communities. The government should focus on providing adequate funding that addresses adequately addresses the energy poverty nexus and the systemic changes to ensure feasibility and sustainability of cleaner air in these communities. Engineers should focus on local projects and advocate for environmental protection through reusing and recycling materials on site and advocate for low carbon materials, such as mass

timber. Planners should advocate for more green spaces and green infrastructure to be implemented within communities as they provide immediate and long-term benefits environmentally. The research showed that the responsibility of improving air quality should be a collective effort.

As urbanization increases, the need to extensively mitigate the damages environmentally and systemically caused by humans will only be emphasized in order to ensure a sustainable life for future generations. A local example of this would be Crozet Elementary School in which the site was redesigned to support the increased vehicular presence on site and had to address environmental concerns to ensure feasibility including air pollution. The issue of air quality should not be viewed through a top-up approach as there are numerous actions that can be taken on a local level by engineers, the government, and planners.

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