Authors' Commentary: Drafting a Roadmap to a Better City

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New Shared Communities

This problem explores the growing interest in the encouragement in the Infrastructure Investment and Jobs Act (also known as the Bipartisan Infrastructure Law) [117th Congress 2021] for cities to remove highways and reconnect communities divided during the construction of transportation systems. While highway removal isn't a novel concept, the current focus is on improving impacted communities without negative impact on transportation. One particularly interesting aspect is considering the communities that were present when these highways were built and the choices made that affected them.

The notion of reverting to a pre-highway integrated community system after decades of separation seems short-sighted. The real challenge lies in reconnecting urban communities that currently lack interaction and envisioning what a new, shared community could become. Often, urban communities are predominantly low-income or minority communities, potentially located in less desirable areas. Moreover, these highways frequently bisected low-income or diverse neighborhoods, fracturing existing cultural cohesion. Instances where one side of a highway becomes more affluent

The UMAP Journal 46 (3) (2025) 215–220.

than the other raise concerns about further gentrification following highway removal. Alteration to a neighborhood, especially changes in its residents' demographics, will inevitably reshape its culture, a significant concern for all involved.

Therefore, this issue extends beyond mere transportation requirements and urban changes; it encompasses the human element for the residents directly affected. As is common, obtaining concrete data that captures the essence of people, culture, and neighborhoods within a city proves difficult. Demographics alone fail to convey the lived experience of a place. While the core problem revolves around reuniting or reframing these neighborhoods, expecting teams without direct experience to fully grasp these nuanced issues can be unrealistic. These challenges have often been amplified in the United States due to historical demographics and cultural landscapes—as seen in West Baltimore neighborhoods, where the construction of the "Highway to Nowhere" in the 1970s displaced nearly 1500 residents (predominantly Black communities), divided neighborhoods, and left lasting scars on the cultural and physical landscape of the city [Baltimore City Department of Transportation 2025].

Role of Transportation Systems

However, this problem highlights the profound value and impact of transportation systems on the health and vitality of a city's residents. It underscores how transportation influences their access to goods, services, different parts of the city, community engagement, and culturally significant locations. The problem's foundation rests on considering transportation's impact on residents.

The 2024 Francis Scott Key Bridge collapse in Baltimore has unfortunately drawn attention to that city's already strained transportation system. Baltimore serves as an example of culturally distinct neighborhoods with varying degrees of access to other parts of the city and external opportunities. This makes it a relevant setting for this problem, offering teams a chance to explore the original question regarding the highway system's impact. Highway systems have indeed bifurcated many neighborhoods, dividing cities into regions and limiting mobility and access for numerous individuals, either hindering access to jobs or confining them within their immediate community. Furthermore, many infrastructure projects have commenced without significant progress or have failed to serve the community as intended.

Locating Data

A significant hurdle in the writing of this problem was acquiring quality data. While both Baltimore and the state of Maryland offer traffic data online, inconsistencies in metadata systems made it difficult to integrate different parts of the city into a unified, accessible format. Even within the same website, varying coding systems were used due to the nature and intended purpose of the data. Consequently, obtaining accurate and usable data presented a considerable challenge.

The primary struggle by both the problem writers and modeling teams involved linking the network-based road system with the traffic camera locations provided by the state. Such linking was intended to allow access to actual traffic data for various locations. However, only the camera locations were provided, not the traffic flow along road segments. This difference necessitated matching camera locations to the nearest intersection or road name. Many teams understandably found this task frustrating, due to the inevitable incomplete matching, since not every road has traffic cameras, and camera locations don't always align with the network data.

To address this challenge, many teams decided either to:

- extrapolate traffic flow from individual data points to the roadway (network-based modeling), or
- employ other available metrics within the dataset for each road, such as speed limits and the number of lanes, instead of real-time traffic information (modeling from data).

The ICM judges found the diverse approaches that teams took to be insightful, whether using the limited traffic data and propagating it or relying on other road characteristics. As the authorship team, we anticipated this data-matching difficulty but believed that providing this partial data would encourage teams to engage with the transportation system beyond simply locating datasets. The most frequent feedback received was frustration regarding the missing data or requests for better data integration. We were not surprised by this frustration and had anticipated this challenge. It was impressive to witness the teams' resilience and creativity in performing their modeling to overcome this barrier.

Making It Local

Another crucial aspect of the problem involved considering how projects impact specific neighborhoods. This encouraged teams to take a localized perspective on the broader issue, recognizing that individual projects directly influence surrounding communities. Many teams thoughtfully examined how projects and modifications could enhance the lives of resi-

dents in these areas. The authors served as ICM judges and were encouraged to see a focus on the well-being of these communities rather than solely on optimizing efficiency through infrastructure changes. As highlighted in the larger context, the specific demographics or culture of a neighborhood were largely absent from readily available data. Understanding such information remotely or through demographic statistics online is challenging. We appreciated the efforts of teams who attempted this, acknowledging the inherent limitations. However, the perspectives of teams that did consider socioeconomic status and neighborhood demographics and explored how transportation improvements could enhance opportunities, were refreshing and welcome. These perspectives went beyond simply improving coverage or ensuring accessible bus stops; it addressed how transportation impacts a neighborhood's ability to connect with the wider city, access opportunities for employment and education, and ultimately improve their integration within Baltimore.

Interconnections

We asked teams to analyze various interconnected issues:

- how the loss of a bridge disrupts a city's transportation network,
- how individual projects affect neighborhoods, and
- how a single project can contribute to the overall improvement of a city.

Ultimately, we hoped that the analysis should culminate in a narrative about the impact, value, and necessity of such projects. This is the purpose of the letter to the mayor—to communicate not just technical analysis but the inherent value of the proposed solutions.

For teams that centered their analysis on the residents of Baltimore, the letter to the mayor became more personal and impactful, resonating with the mayor's concern for the city's inhabitants. While the efficiency of the transportation network is important, it is secondary to the livelihood of the residents. Therefore, effectively connecting these two aspects in the letter is crucial.

It is also important that the letter remain focused on the modeling and analysis conducted in the paper. For instance, if no cost modeling was performed, then detailed cost figures for proposed projects should not be included. Conversely, if existing proposals were modeled using publicly available data, this analysis should be included, clearly indicating that it pertains to an already proposed project.

We hoped that teams would consider Baltimore's ongoing efforts, recognizing that the city is actively working on these issues. However, Baltimore serves as an example where both holistic, interdisciplinary modeling and transportation development are essential to make meaningful progress in

addressing urban challenges. We were deeply inspired by the teams who approached this problem thoughtfully, considering the diverse aspects of Baltimore and its various stakeholders in their modeling practices. This approach reflects how real infrastructure change happens, how informed decisions are made, and how funding opportunities are secured—through compelling storytelling that highlights the needs and potential improvements for the people.

As the Francis Scott Key Bridge is rebuilt and communities reconnect, and as transportation flows are modeled and reorganized, it is valuable to reflect on how addressing these broader issues of community integration through transportation can enhance the lives of residents. We commend the teams for engaging with this complex issue and hope that they carry these insights and their modeling experiences back to their own communities, considering how transportation improvements can create enhancements and opportunities locally.

References

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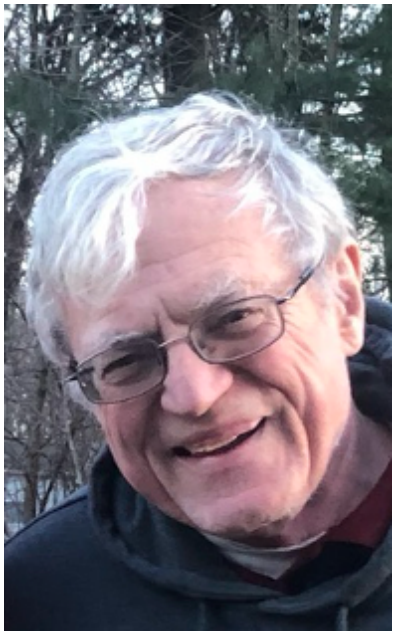
About the Authors



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