

STRIDE

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Technology Transfer Final Report

STRIDE Project E

The Challenges of Predicting Shifting Travel Behavior Based on Estimating Trip Generation: Local Traffic Impact Assessment in Four Southeastern and Mid-Atlantic States

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1. Project Overview

Recently, transportation planning professionals have become aware of the need for transportation planning and engineering practices to be matched to the context and population in a geographic area. Communities, primarily urban ones, have struggled with conventional traffic impact assessments, which are thought to encourage single-use development in peripheral areas over infill and redevelopment projects. Research suggests that conventional traffic impact assessments (TIAs) do not reflect contemporary urban development, which includes substantial demand for non-automobile travel, and it overestimates traffic impacts in dense, mixed-use urban environments, leading to higher costs required to mitigate the transportation impacts.

In this research, we explore how state and regional governments develop a framework for local government traffic impact assessments (TIAs). We interviewed 93 local planners in four states with large urban areas – North Carolina, Florida, Maryland and Virginia – to understand how the innovations developed by local cities and counties have modified conventional traffic impact assessments to make them more multimodal and context sensitive.

2. Research Goals

The main objective of this research is to understand current practices and the extent to which new tools and guidelines around traffic impact and site design have impacted practices throughout the United States and, in particular, in the Southeastern United States. Sub-objectives in the research include understanding best practices traffic impact assessment for all modes of travel, understanding the role that states and regional transportation planning agencies take in assessing the impacts of development, understanding practices in state policies and guidance in southeastern states, and understanding how these practices are used in a sample of diverse urban communities throughout the southeastern United States.

3. Findings

The states studied have different regulations for land development and transportation planning, and various regulations related to their guidance for traffic impact assessment. Regional transportation agencies play a limited role in determining how local governments complete traffic impact assessments. We identified three categories of TIA – never adopters, conventional municipalities, and innovators. The never adopters either have no formal TIA policy, or they do not require TIA except when required by or in accordance with state Department of Transportation (DOT) policies. Municipalities that use conventional approaches either follow state DOT or other conventional TIA practices, and most adopt a few innovations that generally represent minor deviations from conventional approaches. The innovators use a variety of TIA practices that can be grouped into the following categories: leading, aspiring, following, or lagging. Innovations include prioritization of non-car modes of transportation, and/or development patterns that are intended to increase urban densities and to enhance walkability and livability. Florida's concurrency requirement

may have resulted in a higher level of innovation among local governments. All local governments in Florida use some form of innovative practice, but these practices could be grouped into three categories based upon their attitude towards growth – development oriented, mixed oriented, and multimodal emphasis.

4. Performance Metrics

Metric	# Completed
OUTPUTS	
Products: Number of new or improved tools, technologies, products, methods, practices, and processes created or improved	4
Technical Report: Number of client-based technical reports published	STRIDE Final Report
OUTCOMES	
Body of Knowledge: Number of trainings for transportation professionals	2
Professionals Trained: Number of professionals participating in trainings	166 (plus 68 YouTube views)
IMPACTS	
Stakeholders: Number of stakeholders you met with to encourage adoption or implementation of product(s)	2 (plus 93 stakeholders interviewed in study)
Adoption/Implementation: Number of incidences outputs of research have been implemented or adopted	0

5. Products

All products were developed to understand different aspects of the implementation of local traffic impact assessment (TIA). These tools will help to researchers understand the various dimensions of traffic impact assessment. The tools could be used by local practitioners who want to gather information on how TIAs are being conducted in nearby jurisdictions.

1) Structured Interview on TIA

A structured interview guide was developed to understand how municipal transportation planners and local governments approach the transportation impact assessment (TIA).

2) Protocol for Content Analysis

A protocol was developed for conducting general inductive content analysis of interview transcripts and notes. The program Atlas.ti 8.2 was used to find common themes.

3) Development of a TIA Framework

A framework for understanding the connection between state guidance and development of local traffic impact assessments (TIAs) was developed. We reviewed policies in states with reputations for good TIA practices and the policies of the four states in this study.

4) Strategies for Innovations in TIAs

Researchers Dr. Noreen McDonald and Dr. Tabitha Combs published a tool in the ITE Journal in September 2020 called *Reinventing TIA: Contemporary Approaches to Addressing the Traffic Impacts of Urban Development*. The tool describes a number of strategies that can be implemented for making TIAs more innovative.

(https://www.nxtbook.com/ygsreprints/ITE/ITE_Sept2020/index.php?startid=46#/p/46)

6. Who benefits/will benefit from your product(s)?

- Developers who are proposing projects in places with substantial demand for non-automobile travel, and dense, mixed-use urban environments may see reduced costs to mitigate the transportation impacts of development.
- Neighborhood residents who will have projects that include all modes of travel.
- Planners and elected officials who value communities that offer multiple choices of travel mode and who want to eliminate the barriers to achieving these goals.

7. Body of Knowledge & Professionals Trained

- 1) Dr. Tabitha Combs, UNC at Chapel Hill, and Melissa McMahan, Transportation Research and Site Plan Development Manager for Arlington County, Virginia’s Commuter Services Bureau, presented a TRB webinar *Traffic Impact Assessment: Two studies exploring the development and implementation of innovations in TIA in the US* on March 29, 2019 (<https://planning.org/events/eventsingle/9171658/>). Abstract: Cities and counties across the US are increasingly recognizing a need to update their TIA practices to support more sustainable, multimodal-oriented development patterns. This webinar presented recent research aimed at understanding and addressing the challenges faced by transportation and land use professionals as they seek to adopt new approaches to assessing and mitigating the impacts of urban development. Approximately 100 professionals attended.
- 2) Dr. Ruth Steiner, University of Florida, and Dr. Tabitha Combs, UNC at Chapel Hill, presented a STRIDE webinar *New Approaches to Conducting Traffic Impact Assessment (TIA) in the Southeastern United States* on October 21, 2020 with 66 professionals in attendance and 68 YouTube views (<https://www.youtube.com/watch?v=bzUAHUTsLVI>).

MEETING DETAILS		NARRATIVE DESCRIPTION
STRIDE Rep.	Researchers	Over the life of the study, we conducted 93 phone interviews and surveys with planners, traffic engineers, and
Date of Activity	Throughout study	
Type of Activity	Interviews	

Location	Phone	professionals involved in the development review process and employed in local government in 32 cities in NC, 17 cities and counties in VA, and 22 cities and counties in MD, and 22 cities and counties in FL.
Stakeholder(s)	Planners, traffic engineers	
STRIDE Rep.	Noreen McDonald	Presented and discussed preliminary findings from research on local changes in TIA practices with transportation professionals, researchers, and stakeholders at ULI's Chapter luncheon.
Date of Activity	Fall 2018	
Type of Activity	presentation	
Location	Raleigh, NC	
Stakeholder(s)	Urban Land Institute	
STRIDE Rep.	Noreen McDonald and Tabitha Combs	Researchers Noreen McDonald and Tabitha Combs published a tool in the ITE Journal in September 2020 called <i>Reinventing TIA: Contemporary Approaches to Addressing the Traffic Impacts of Urban Development</i> . ITE provides guides and manuals that help professionalize and standardize TIA practices.
Date of Activity	September 2020	
Type of Activity	Article	
Location	ITE Journal	
Stakeholder(s)	ITE	

10. Adoption/Implementation

Staff are key to driving change and, therefore, providing better education and support to empower planners is needed. The dissemination of the results of this research through publications and webinars can provide guidance and examples of multimodal, context-sensitive TIAs to planners who would like to adopt innovations in their own community.

11. Broader Impacts

The adoption of innovative techniques for traffic impact assessment (TIA) will help make communities more resilient by offering more choices of transportation in the community with the possibility of a reduction in automobile traffic.

Reinventing TIA: Contemporary Approaches to Addressing the Traffic Impacts of Urban Development

BY NOREEN C. McDONALD AND TABITHA S. COMBS

Communities across the United States use Traffic Impact Assessment (TIA) to align road infrastructure with mobility demands of new development. The practice emerged in the 1970s as a tool for local governments to negotiate the financial costs of providing road improvements with developers during the development approval process.¹ ITE has been instrumental in the professionalization and standardization of TIA practices through publication of trip generation guides and TIA manuals.



While TIA is a widespread and generally accepted tool for ensuring transportation infrastructure keeps pace with land development, practitioners, researchers, and advocates have raised concerns about the accuracy and unintended consequences of TIA as conventionally employed. Methodological concerns focus on whether the TIA process overpredicts future roadway traffic due to a lack of systematic consideration of land use context, presence of alternative modes, and shifting of traffic from previous destinations.²⁻⁵ Incorrect vehicle trip generation estimates could lead to unneeded infrastructure improvements and negatively affect other modes. For example, adding left-turn lanes at an intersection could make it harder to cross the street by foot.

Other critiques of TIA have centered on how well the process aligns with efforts to address the affordable housing crisis through increased production, as developers of new residential properties pass the cost of roadway expansions on to consumers. TIA may also interfere with Vision Zero initiatives to eliminate roadway fatalities, given the absence of safety as an explicit consideration in most communities' TIA processes. Finally, there are concerns about the way TIA prioritizes mitigation of motor vehicle congestion. By applying rigid congestion-based metrics to the results of precisely specified analyses, reliance on TIA results in a “what gets measured is what matters” approach to public decision making and imposes a “cars first” norm on land use and transportation planning.⁶

The Institute of Transportation Engineers (ITE), the U.S. Environmental Protection Agency (EPA), and agencies have been leading efforts to address these concerns. California, USA has changed its environmental review requirements to focus on generation of vehicle miles of travel rather than generation of trips.⁷ EPA and ITE have provided guidance on how to better address the land use and develop multimodal trip generation estimates.^{8,9} The *Highway Capacity Manual* incorporated multimodal level of service to recognize the importance of LOS tradeoffs across modes.^{10,11} Some jurisdictions, such as the District of Columbia, USA have developed databases to better predict trip generation impacts locally.¹² These efforts address methodological concerns behind TIA. However, they are often limited to geographic areas where state departments of transportation are supporting development of new tools, or to communities with the financial capacity to hire consultants to implement new approaches to collecting, modelling, and interpreting trip generation data. To date, there is no evidence of widespread adoption of any of these approaches, outside of a handful of examples.

Yet innovation in TIA practices is occurring. In this article, we draw from a research effort to document current TIA practices among local governments in the United States, and to identify and describe the strategies that are being used to address growing concerns over the conventional approach to TIA.¹³ We interviewed transportation engineers and planners involved in the development

review process in 36 U.S. cities and counties in North Carolina, Virginia, and Maryland to understand whether, how, and why they are changing their TIA practices. Here we describe a sample of the practice changes we found, and the contexts in which we found them. Our intent is to illustrate the range of alternative approaches to TIA communities are adopting, as a starting point for transportation professionals looking to improve the TIA process in their communities. For readers looking for a more comprehensive analysis of evolving TIA practices, we have published a lengthier paper elsewhere, freely available at <https://doi.org/10.1177/0739456X20908928>.

A Wide Range of Adaptations in Local TIA Practices

Through content analysis of transcripts of more than 19 hours of interviews, we found that communities—ranging from major metropolitan areas to college towns to sparsely populated rural counties—were employing a rich and diverse set of practices with wide variation in scale and scope. Communities are modifying their approach to TIA at all stages of the development review process, including changes to when and where TIA is required, tweaks to the TIA process, adjustments in how results are interpreted, and changes to mitigation criteria required to receive project approval. The changes taking place also vary widely in terms of cost and difficulty of implementation, from “low hanging fruit” changes likely to be within the capacity of most communities, to technically, financial, and/or politically challenging changes accessible to a constrained set.

Low Hanging Fruit

Across our entire sample, and especially in smaller cities and cities outside major metropolitan areas, we documented relatively simple changes that require little to no additional staff time, technical capacity, or political involvement. They do not require changes to the mechanics of TIA. Instead, they focus on changes to when and where TIA is applied, what sorts of mitigations can be exacted from applicants, and how to achieve public development goals beyond the limits of TIA. Changes such as these may already be enabled through existing ordinances or plans, though in some cases may require approval by elected representatives. Examples include:

Exempt development proposals from the TIA process based on location, land use, project size, or parcel history. Exemptions are the most commonly used alternative strategy in our study. They are useful when communities want to encourage development in particular areas, or when the community has longer term plans for managing increased travel demand (such as new transit lines). For example, one city designated zones for higher intensity development and eliminated TIA requirements entirely for projects proposed within those zones. Several other cities have done away with TIAs for redevelopment of existing parcels, regardless of land use, as a means to encourage conversion of low productivity or abandoned

downtown properties. In both examples, conventional TIAs are required where not explicitly exempted.

Allow or require developers to pay impact fees into a public infrastructure improvement funds instead of mitigating impacts themselves through capacity improvements. Where allowed by law, impact fees afford local government more control over infrastructure improvements and enables corridor-based improvements rather than site-based improvements. This approach is useful along regionally important corridors with small or piecemeal development.

Require accommodations outside the TIA process for non-car travel modes as precondition for development approval. When projects are expected to either generate non-car trips or negatively affect safety or convenience for non-car travelers, but modeling those impacts is beyond the community's capacity, extra-TIA non-car accommodations is a common approach. These requirements are typically negotiated informally during the development review process or stipulated by ordinance.

Technically Simple but Politically or Financially Demanding

Many communities are also pursuing changes that, while not necessarily technically challenging, do require higher levels of political support (potentially including adoption of new plans or ordinances) and/or staff resources. Similar to low hanging fruit, these sorts of changes generally leave the *process* of TIA alone, but change the way the city responds (or asks the applicant to respond) to the *results* of the TIA. In our sample, public interest was often a driving force behind these sorts of changes. Technically simple but politically or financially demanding changes we observed include:

Limit allowable traffic mitigation strategies. A handful of communities in our study have pre-determined which sorts of congestion mitigation strategies would be allowed in certain areas, and only approve development proposals whose projected traffic impacts that can be satisfactorily mitigated by those strategies. For example, prescriptive roadway guidelines, adopted via ordinance or comprehensive plan, establish exactly what improvements are required or allowed along specified corridors, forcing developers to propose projects that fit within those guidelines.

Encourage creative mitigation strategies. Where conventional roadway capacity expansions conflict with other local objectives, communities have allowed or encouraged development applicants to propose creative mitigation strategies that offset projected traffic impacts through alternative improvements (e.g., TDM programs). These strategies are often negotiated with the developer during the permit approval process but require a high level of political support and acceptance of the alternative approaches.

Re-scale ITE's trip generation estimates by a pre-determined factor to account for greater expected rates of non-car travel. One community in our study—a mid-size city with a robust transit

system serving a large population of college students—reduces trip generation estimates by 10 percent in transit-served areas. The success of such approaches is contingent on continued support for non-car travel modes, which may be politically charged in some communities.

Adjust allowable levels of congestion or delay. This approach works best in places where alternative travel modes are available or where capacity expansions required to prevent an increase in congestion or motorist delay LOS would have negative impacts on safety or convenience for other travel modes. While simple in concept, this change is potentially politically challenging in that it explicitly allows for increases in congestion, which is a stated barrier to enacting change in many communities we studied.

Challenging but Impactful

A minority of communities in our sample have also experimented with more process-oriented changes that are potentially highly impactful, but politically and technically challenging. Communities pursuing such changes tend to be relatively dense, are experiencing heavy development pressures, have higher non-car mode shares, and have strong political support for changing TIA practices. Changes in these communities are nearly always driven by staff, supported by elected officials, and informed through professional development activities: these sorts of process-oriented changes require knowledgeable, committed staff and elected leadership. Challenging but impactful process-oriented changes we observed include:

Change data or models to reduce overprediction. Some communities in our study are substituting ITE's trip generation estimates with context-sensitive estimates based on locally collected data; a few have pushed further by developing in-house models calibrated to local context and expected impacts. These strategies can help correct "over-prediction" challenges associated with the conventional TIA approach in dense areas with heavy use of non-car travel modes. They are costly, however, as they require a robust, on-going system for collecting travel data and monitoring impacts of new developments over time, as well as the capacity to develop and implement complex traffic models.

Shift the focus away from motor vehicle congestion. A couple of communities in our study are working to shift the focus away from motor vehicle congestion by a) changing outcome of interest in TIA from motor vehicle trips to person trips or all trips (including by non-car modes) and b) replacing LOS with other metrics, such as multimodal LOS (MMLoS), vehicle miles generated, or overall network delay. These approaches allow for a more system-wide assessment of potential travel impacts, reducing the possibility that vehicle congestion-focused mitigations will have negative consequences for other modes. They may also encourage more compact, multimodal-supportive development patterns by enabling applicants to capitalize on supports for non-car travel modes and reducing permit costs for infill parcels relative to suburban and greenfield parcels.

What Impedes Change?

Across the whole sample, the most common impediments to broader practice change, regardless of the types of changes communities were pursuing were a lack of knowledge, tools, and technical capacity, followed closely by concerns by the public and elected officials that changes to the standard practice would not result in desired multimodal outcomes and/or would exacerbate existing congestion problems.

This finding points to a critical research need for the planning and engineering communities to develop and disseminate more accessible, evidence-based techniques for estimating and communicating system-wide impacts of land development in contemporary urban contexts. To date, data are unavailable on the efficacy and impacts of the alternative TIA practices defined here, particularly with respect to congestion management, safer streets, supports for non-car modes, or contributions to economic vitality. Given the importance of public and political support in changing practices, demonstrations of potential impacts of new practices is critical.

Conclusion

TIA is built on the philosophy that burdens placed on transportation systems by land development should be mitigated by those generating that burden. While this philosophy has wide acceptance in local governments across the United States, thinking is evolving regarding where, how, and even whether traffic impacts of new developments ought to be evaluated and accommodated. There was a strong sense across the 36 cities and counties we studied that the conventional approach to TIA imposes interpretations of “impacts” and “mitigations” that are inconsistent with current societal norms and values. However, absent realistic actionable guidance on alternative practices for ensuring transportation infrastructure keeps pace with development, TIA remains the dominant approach. This article shared examples of how some places are working to modify their TIA practices. In doing so, we hope to empower transportation professionals to explore the potential for alternative approaches in their own jurisdictions, and to encourage rigorous **evaluation of alternative practices by the research community. itej**

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