National Capital Region
Transportation Planning Board

Regional Transportation Resilience Program: GIS Analysis and Mapping "Wish List"

TPB's GIS team has capacity to work on a variety of analyses and mapping products as part of our program, and staff is working on a list that would benefit members and the region. Input from our subcommittee members on this list is crucial. Therefore, the overall purpose of this exercise is to **identify and prioritize GIS-based analyses to support regional transportation resilience planning**. This information will be presented and discussed at the May 30, 2025 (Q2) meeting of the Regional Transportation Resilience Subcommittee meeting, a poll will be held during the meeting and emailed afterwards to gauge interest on analyses and mapping projects to prioritize in the coming fiscal year.

1. REPORTED REGIONAL ROADWAY CLOSURES FROM FLOODING: RITIS DATA

This analysis maps reported road closures due to flooding from the Regional Integrated Transportation Information System (RITIS) and compares it to FEMA 100 and 500-year floodplain extents. This project is currently in preliminary stages but can be advanced in many ways. Some potential avenues:

- Re-run analysis with Fathom flood model extents to either map (if or as our contract with Fathom will allow) or analyze in some way the percentage of reported road closures that are within or outside the FEMA floodplains
- Integrate this analysis into existing Resilience Mapping Tool
- Storymap or animation to better visualize the results with a narrative
- Visualize data based on year / month to better understand potential trends over the course of a calendar year / over time
- Combine each reported closure with weather data to potentially understand the type of weather event that led to (or didn't lead to) the closure

2. EXTREME HEAT

The Vulnerability and Risk Assessment and subsequent TRIP used median surface temperature to evaluate the potential vulnerabilities and risks of transportation assets to the hazard of extreme heat. While this datapoint is useful, there are other potential data to explore that can measure heat in a more meaningful way. We could potentially explore other ways to measure/map/analyze extreme heat and develop a robust menu of options of best practices for mitigating the impacts specific to transportation assets, and more specifically public transit riders, of extreme heat.

3. LAND-USE ANALYSIS

Staff could use imagery to better understand the impact of current and/or planned development in the region, specifically with respect to transit-oriented development. This analysis could build into the above extreme heat analysis as different types of development can impact the region in different ways, especially with respect to pervious and impervious pavement. This would likely be a joint project with COG's Department of Environmental Programs.

4. LINK ANALYSIS/TRAVEL DEMAND MODEL (TDM) SCENARIOS

Link analysis in transportation resilience contexts refers to evaluating individual segments or links of a transportation network (e.g., roads, railways, bridges) to assess their vulnerability to disruptions, such as those caused by extreme weather events. Staff would work with the GIS and TDM team to select input scenarios to run through the model, for example a Sandy-level storm, to get an understanding of how travel throughout the region might be affected, and perhaps more importantly, what critical infrastructure might be affected and what populations could lose access? There are a variety of scenarios that could be run here, and the subcommittee would be integral in choosing the potentially most useful inputs.

5. CRITICAL INFRASTRUCTURE ANALYSIS

Similar to the above idea, there are many options for better understanding access to critical infrastructure in the face of natural hazards. Staff has a draft map of critical infrastructure in the region, which includes locations like healthcare facilities, schools, fire stations, etc.

6. EVACUATION ROUTE ANALYSIS

Overlay existing evacuation routes with at-risk roadways in the region to understand the potential vulnerabilities in the event of an emergency evacuation during an extreme weather event. Calculate percentage of evacuation routes at risk vs. not at risk, or low/medium/high risk vs. not at risk. Special focus could be paid to vulnerable communities who rely heavily on transit.

7. TIP AND/OR TRIP PROJECTS INTO RESILIENCE MAPPING TOOL

Staff can add layers of TIP and/or TRIP projects into the resilience mapping tool, potentially overlaying planned or proposed projects with at-risk transportation assets or areas.

8. FATHOM DATA: ANY OTHER ANALYSIS

Discussed in item 1 but could be completed separate from RITIS project. Run additional analyses with Fathom flood model extents as our contract with Fathom will allow. Staff is open to ideas on how your locality or agency might be interested in using this data while we still have access to it, with the understanding that we are not allowed to publicly release any analysis that would allow a viewer to potentially reverse engineer the original raw data.

9. RESILIENCE AND DISASTER RECOVERY (RDR) TOOL

The RDR Tool Suite enables transportation agencies to assess resilience return on investment (ROI) for specific transportation assets over a range of potential future conditions and hazard scenarios, which can then be used as a consideration in project prioritization processes. The tool suite utilizes established Robust Decision-Making concepts developed to build on current TDM analyses and address deeply uncertain future scenarios. The RDR Tool Suite was developed at the USDOT's Volpe National Transportation Systems Center in support of FHWA and the Office of the Secretary of Transportation. Hampton Roads Transportation Planning Organization (HRTPO) has piloted this tool and has had success in using it for their project prioritization process. Tool information can be found here: https://volpeusdot.github.io/RDR-Public/