

CTP – Identify Existing Deficiency (Resilience)

Description

The purpose of this guidance is to assist transportation planners and community leaders in evaluating transportation assets' vulnerability and risk under existing condition, identifying existing deficiency related to transportation system resilience, and inform the development of transportation resilience needs in the community. This section should leverage results from the NCDOT Resilience Improvement Plan and draw on existing conditions and historic data from the Traveler Information Management System (TIMS), high water marks database (NC Emergency Management), Flood Inundation Mapping and Alert Network for Transportation (FIMAN-T), Coastal Roadway Inundation Simulator (CRIS), Bridge Watch, the Comprehensive Transportation Plan (CTP) Geodatabase, and any survey information.

Responsibility

Transportation Planning Division (TPD) Engineer

Procedure

Step	Action
1	<p>The data that was collected during the CTP Set-Up through CUR, CTP Steering Committee, and NCDOT Division staff input will be used to conduct the existing deficiency analysis.</p> <ul style="list-style-type: none"> • Open the Template for the CTP Resilience Map in the geodatabase. • Add collected resilience data. • Add your planning area boundary shapefile to the map and clip all remaining layers to your planning area boundary. • Check to ensure the symbols for all the resilience shapefiles added to the map match the standard resilience symbols from the template. <p>Save the Resilience Map(s) to the CTP folder on the shared drive.</p>
2	<p>Map and evaluate existing transportation assets' vulnerability and risk under existing conditions to identify locations where damage to assets and/or disruption to traffic may occur due to impact from hazards.</p> <p>This process should use results from the NCDOT Resilience Improvement Plan where available, follow state of the practice vulnerability and risk analysis frameworks, leverage resilience data and tools compiled in "Collect Data" guidance, inputs collected in the Goals and Objective Survey, and any findings from relevant vulnerability analysis conducted in the CTP study area.</p> <p>Example Data Sources and Tools:</p> <ul style="list-style-type: none"> • Resilience Improvement Plan – Maps and priority list of critical and vulnerable locations (prioritization available for roadways, bridges, National Bridge Inventory (NBI) culverts, and railroads) • Coastal Roadway Inundation Simulator (CRIS) Historic Storm Hindcast Module – Visualizes and quantifies the effects of past hurricanes on North Carolina's transportation system. • FIMAN-T – Flood Inundation Mapping Alert Network for Transportation - Historic flood impacts to roads and bridges within limited areas around riverine and coastal gages

Step	Action
	<ul style="list-style-type: none"> • BridgeWatch – Real-time bridge flooding warning system • Traveler Information Management System – Records of road closures due to weather events
3	<p>Optionally, the list of existing resilience deficiencies can be further refined by evaluating whether the vulnerable situations identified in the previous step exceed the level of acceptable risk in the community.</p> <p>Similar to using Level of Service (LOS) D to define roadway capacity deficiencies, the level of acceptable risk threshold is a basis to identify resilience deficiencies and recommend adaptation solutions before the risk of vulnerable assets cause disruption to the local transportation network. The criticality of the asset (regarding its importance to the local transportation system and the community) should be considered when determining the risk thresholds; assets with higher criticality usually have lower risk tolerance. For example, a community may tolerate occasional, shallow inundation on a local collector roadway but may not accept any flood inundation to designated evacuation routes given their critical role. Other factors to consider include:</p> <ul style="list-style-type: none"> • Duration and Frequency of the Event • Availability of Alternative Routes • Length of Delay/Detour • Impact to Emergency Operation • Cost of Repair <p>This process can leverage the vulnerability maps, criticality maps, and combined maps developed in the NCDOT Resilience Improvement Plan.</p> <p>Once the level of acceptable risk threshold is established, it should be compared with the vulnerable situations identified in Step 1; vulnerable locations with risk exceeding acceptable levels should be identified as resilience deficiencies. For example, if the level of acceptable risk threshold for flooding is 0.5 foot¹ for a road, locations with flooding from recent events that exceed 0.5 foot are considered as existing resilience deficiencies.</p> <p>For references:</p> <ul style="list-style-type: none"> • 6 inches of fast-moving flood water can knock over an adult • 12 inches of rushing water to carry away most cars • 2 feet of rushing water can carry away SUVs and trucks <p>In addition, these locations with resilience deficiencies should also be cross-referenced against the State Transportation Improvement Program (STIP) and Division Engineer to confirm if capital improvements or maintenance activities are already underway or committed to address the deficiency.</p>
4	<p>Documents existing conditions and deficiency findings from the survey, mapping exercise, and scan of past planning documents in the <i>Resiliency</i> section of the Transportation Planning Data Appendix.</p>

¹ Six inches of water will reach the bottom of most passenger cars causing loss of control and possible stalling ([National Weather Service](#)).

Approved: MMMM d, yyyy

Revised: MMMM d, yyyy

Version X

Record of Revision

The information contained in this procedure is deemed accurate and complete when posted. Content may change at any time without notice. We cannot guarantee the accuracy or completeness of printed copies. Please refer to the online procedure for the most current version. Contact TPD Staff Engineer with all the questions about this procedure.

Version	Section Affected	Description	Effective Date
X			