

**State of Texas Resiliency Working Group**  
Summary Report on March 30th, 2021 Virtual Meeting

**Attendance**

Airiohuodion, Charles	Garza, Sara	Muno, Travis
Al Hweil, Mohammad	Gick, Brittney	Neal, Jeffrey
Bales, Genevieve (FHWA)	Gonzalez, Brigida	Nelson, Christopher
Barnett, Lin	Granger, Ryan	Nelson, Uryan
Benthul, Bart	Hernandez, Hugo	Norton, Laura
Blazosky, Allie	Jones, David	Overman, John
Bolin, Michael	Jones, ReaDonna	Perez, Sonia A.
Boulan, Yoshiko	Keen Stephen	Prozzi, Jolanda
Boyd, Marty	Lomax, Tim	Puppala, Anand Jagadeesh
Brookins, Latasha	Lowder, Lily	Pusch, Christopher
Bruechert, Tom (FHWA)	MacDonald, Robert	Rajput, Akhil Anil
Calle, Carlos	Madrid, Pete	Ramirez Huerta, Ana
Canon, Andrew	Maley, Barbara (FHWA)	Ramirez, Robert
Carrizales, Daniel	Mao, Andrew	Rodriguez, Melanie
Casper, Craig	McCreight, Catherine	Sanchez, Raymond
Collins, Ryan	McGill, James	Schultz, Chelsea
Diaz, Luis	McKeown, Chad	Shiraz, Mansour
Dominguez, Javier	McLemore, Kent	Smetana, Elise
Ene, Roxana	Meeting End Time	Temple, Janie
English, Jeffrey	Meeting Start Time	Tindall, Phillip
Esmalian, Amir	Meeting Summary	Total Number of Participants
Fauver, Kirk	Meeting Title	Vo, Kathryn
Frawley, Bill	Mendieta, Victor	Wolff, Catherine
Full Name	Miller, Matt	Yuan, Faxi
Garcia, Eva	Mostafavidarani, Ali	Zamora, Rudolfo

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**Introductions**

Jeffrey Neal made brief introductory remarks in reviewing the agenda.

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**Presentations**

**The Regional Vulnerability & Resilience Framework**

Uryan Nelson,  
Killeen-Temple Metropolitan Planning Organization

Uryan Nelson made the following key observations:

1. KTMPO developed its regional vulnerability and resilience framework in four stages: a) identify 4 primary regional climate and extreme weather/event stressors; b) gather and evaluate data for each stressor; c) integrate these into project planning; d) update regional vulnerability and resilience framework based on findings.
2. Developed data framework using a quarter mile mapping grid covering the entire study area, to be able to manage the vulnerability / exposure caused by each stressor.
3. Data for each stressor (rainfall, dam breach, wildfire, drought or high temperature) came from different sources and led to different scales on the map, which required KTMPO to fit it to a shared scale and assign.

The audience had several questions for Becky including:

1. *Did the local governments, members of the TMA need training to provide appropriate detail on their project submittals to be used in the scoring?* Answer: I wouldn't say local governments required any additional training. They were very involved though in the process as we updated our scoring methodology so they were aware of what details were going to be needed as we moved forward.
2. *Is the travel demand model a time-of-day model? Is it maintained and updated by the TMA/MPO or TxDOT?* Answer: Our TDM is a time of day model that is maintained by TxDOT with MPO assistance.
3. *Do you have an example of the completed project submittal forms on your website? Or could share the details provided with the project submittal?* Answer: Not answered.

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## Resiliency Pilot & Planning

Kathryn Vo  
Houston-Galveston Area Council

Kathryn Vo made the following key observations:

1. The H-GAC region conducted a resiliency pilot evaluating the impact of inland and coastal flooding as high priority stressors in the H-GAC region.
2. H-GAC conducted the pilot going step-by-step, a) collecting data; b) conducting separate criticality of infrastructure (ties to health, safety, emergency preparedness, usage, and socio-economic importance), and vulnerability (ties to stressor exposure, sensitivity to stressor, adaptive capacity) of infrastructure assessments; c) developing a criticality/vulnerability framework matrix.
3. In the criticality and vulnerability assessment, centerline miles are used and split between major streets and freeways.
4. Detailed segment names alongside scores enables H-GAC to look at a project to see if it has any of the high criticality-vulnerability assignments for project selection weighting.

5. TDM team developed economic impact analysis examining roads that were flooded and out of commission and assigning millions of dollars lost as a result of their outage and using within scenarios.
6. Adaptive strategies split between stormwater management, maintenance, planning, infrastructure, and other (primarily ocean front hardening) categories.
7. Developed resilience webtool for public outreach and communication: <http://datalab.h-gac.com/resilience>
8. The datalabs webtool has also been used as a central repository to house raw GIS data, sub-regional profiles, street profiles, and method descriptions.
9. Can use the webtool and pilot findings to profile individual community-level segments (e.g., Egypt Community/Honea Egypt Road) and look at through lens of vulnerability and criticality to establish need for adaptive strategies.

The audience had several questions for Kathryn including:

1. *How much interface was there between this effort and the Texas Coastal Resiliency Master Plan from General Land Office?* Answer: Response Pending from Kathryn.
2. *Has H-GAC selected resiliency projects in the current TIP/MTP based on your efforts?* – Answer: We are in the process of reevaluating our TIP criteria. We haven't selected any projects for the TIP yet, but we are integrating what we have learned in the pilot and creating criteria.
3. *Given that you are able to hone in on different scales, whether regional or community based, in your project selection and criteria updates conversation, when it comes to planning, how do you account for the spatial differences so that it may be easier to evaluate projects on an apples to apples basis?* Answer: In the sub regional study with Montgomery county precinct 2, we work with a good stakeholder committee and listen to community to help figure out ground truthing information we have gathered. So its really using this information and integrating it into other sub regional studies. 3 major studies underway- Montgomery precinct 2 is one. We are testing all this resilience pilot finding on a sub regional level. It is still in process.
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## Project 0-7079: Establish TxDOT Transportation Resilience Planning Scorecard and Best Practices

Dr. Ali Mostafaviradani  
Texas A&M University

Dr. Mostafaviradani made the following key observations:

1. Goal is to evaluate current state of practice for agencies involved in planning and project development, including MPOs.
2. The second objective is the implementation of vulnerability assessment of the road network. Using a transportation resiliency scorecard is part of the tool to promote resilience in project selection and project development and design.

3. This will end up in a guide document for TxDOT along with training like workshops and webinars to facilitate the dissemination of the information to participants. This group would be a great group to work with.
4. The survey and interviews as part of first phase of the project helped identify where resilience measures are being actively developed or put into use to evaluate hazards exposure.
5. The focus is on the state level, but we have identified areas with good case studies to focus on areas that may be ready to demonstrate the tool.
6. Vulnerability and Criticality assessment is from quantitative approach valuing scoring methods. There are networks/models in network and graph analysis to evaluate critical components of the network.
  - a. The project is using a mixture of state and district level analyses that account criticality of road segments based on:
    - i. proximity to 8 essential facilities (power stations, hospitals, etc.).
    - ii. exposure to regional stressors.
    - iii. provide connectivity through AADT and volume metrics.
  - b. These will be combined to prioritize roadways for resilience improvements.
7. A transportation resilience scorecard will be developed to help evaluate state and metropolitan transportation plans to evaluate extent to which plans pay attention to high criticality links, and extent to which account for vulnerable links and road segments; and 2<sup>nd</sup>- establish a resilience capability maturity model (achievement level assessment).

Resilience Characteristic	Achievement Level
Expected service disruptions and restoration of upstream and downstream transportation systems are evaluated	1: No information is collected regarding disruptions and restoration of upstream and downstream transportation systems.
	2: Plans have been developed to evaluate disruptions and restoration of upstream and downstream transportation systems.
	3: Scenario analysis has been implemented; disruptions and restoration of transportation systems have been determined.
	4: Disruptions and restoration of transportation systems have been determined and strategies have been implemented to mitigate the impacts.
Resilience Characteristic	Achievement Level
Future hazard impacts and vulnerabilities are determined	1: No information is collected regarding future hazard impacts and vulnerabilities.
	2: Plans have been developed to evaluate future hazard impacts and vulnerabilities.
	3: Scenario analysis has been implemented; future hazard impacts and vulnerabilities have been determined.
	4: Future hazard impacts and vulnerabilities have been determined and strategies have been implemented to mitigate the impacts.

The audience had several questions for Dr. Mostafaviradani including:

1. *How will the criticality maps and data shown today be shared with the State of Texas' MPOs?*  
 Answer: We plan to share the maps as part of the guide document, as well as web-based dashboards.

## Discussion

Poll Everywhere was used to query participants. The results are below.

Is your MPO Interested in development of a resiliency plan to protect vulnerable structures and transportation systems?	
MPO	Yes/No
7	Yes
From the results of the resiliency survey, what are your top three concerns or issues for your MPO region?	
MPO	Concerns
H-GAC	Data, funding, implementation
NCTCOG	Priority, buy-in, funding
Abilene MPO	Funding, staffing, planning
RGVMPO	Needing a resilience plan
Waco MPO	Climate, data, funding
EPMPO	Priority
Random Guests	Climate, enforcement, emergencies, funding, growth
Alamo Area MPO	Actionable
Corpus Christi MPO	Funding, data collection, local priority
TxDOT LRTP Planning Manager	Resources, buy-in, mandate
Would it be helpful to have a central repository of resiliency tools, data, techniques, best practices, roles and responsibilities, etc. on a Sharepoint or website?	
MPO	Choice
10	Yes
In general, for questions ranked 3 or lower please select the below options explaining the reasoning behind your ranking, or choose other if unsure. (Please provide clarifications in chat)	
MPO	Choice
8	Because it is too costly given available resources.
1	Other
In general, for questions ranked 4 or above, please select the below options explaining the reasoning behind your ranking, or choose other if unsure. (Please provide clarifications in chat).	
7	Because your region considers it a higher need among your resiliency planning efforts.
1	Because your region has invested in or accomplished this resilience element or activity and you are relaying in the survey response the respective value of your investment.
1	Other

### Ranked Resiliency Elements and Potential Framework

	Average Score (Out of 5)	Short-term (< 2 year)	Medium-term (2 to 4 years)	Long-term (>4 years)	Staff Resources	Funding / Costs	Order of Completion	Knowledge Resources/Technique Description/Case Studies Available
1. Identifying alternative routes if vulnerable routes become impassible.	4.12	40%	60%	0%				
2. Developing adaptable resiliency framework.	4.05	20%	40%	40%				
3. Applying analytic strategies (e.g., Benefit-Cost, Life-Cycle Cost Analysis, etc.) to promote resilience of the regional transportation system	4.00	10%	30%	60%				
4. Identifying critical regional transportation infrastructure	3.87	50%	40%	10%				
5. Assessing transportation vulnerability to climate change and extreme weather	3.82	60%	20%	20%				
6. Defining transportation resilience goals.	3.82	80%	0%	20%				
7. Defining transportation resiliency	3.76	70%	10%	20%				
8. Developing transportation resilience measures	3.76	60%	20%	20%				
9. Identifying/applying data to analyze regional transportation system risk to climate change/extreme weather and man-made events	3.73	40%	50%	10%				
10. Identifying available tools/methods to analyze regional transportation system risk to climate change/extreme weather and man-made events	3.68	40%	40%	20%				
11. Identifying primary regional human-made factors	3.69	30%	30%	40%				
12. Estimating regional transportation response to climate change/extreme weather events.	3.69	20%	30%	50%				
13. Estimating regional transportation response to major human-made events.	3.69	30%	40%	30%				
14. Identifying weather trends and extreme weather event frequency	3.63	50%	10%	40%				
15. Identifying primary regional climate factors	3.56	30%	30%	40%				
16. Determining risks/likelihood of major human-made events occurring.	3.56	30%	30%	40%				
17. Analyzing impacts of extreme weather events/climate factors, and human-made events on regional transportation assets (e.g., bridges, pavements).	3.38	30%	20%	50%				
18. Determining risk /likelihood of climate change/extreme weather events occurring.	3.25	30%	30%	40%				