National Construction Safety Team Advisory Committee (NCSTAC)
Meeting Summary
National Institute of Standards and Technology (NIST)
Gaithersburg, Maryland
March 6-7, 2024
9:00 am – 5:00 pm

Advisory Committee Members:

José Izquierdo-Encarnación, Chair	PORTICUS CSP
Kimberley Shoaf, Vice Chair	Utah School of Medicine
Donald Dusenberry	Consulting Engineer
Lori Peek	University of Colorado, Boulder
Aspasia Zerva	Drexel University

NIST Leadership:

Jason Averill	Deputy Director, Engineering Laboratory
Jennifer Huergo	Director of Public Affairs and Family Liaison, Champlain Towers South NCST Investigation
Therese McAllister	Acting Chief, Materials & Structural Systems Division (MSSD)
Matthew Hoehler	Chief, Fire Research Division

NIST Staff and Associates (listed in alphabetical order):

Glenn Bell	Champlain Towers South NCST Associate Lead Investigator
Judy Bowie	Management and Program Analyst
Tanya Brown-Giammanco	Director, Disaster and Failure Studies
Maria Dillard	Hurricane Maria NCST Associate Lead Investigator
Tina Faecke	Designated Federal Officer
N. Emel Ganapati	Champlain Towers South NCST Project Leader
David Goodwin	Champlain Towers South NCST Project Leader
Jim Harris	Champlain Towers South NCST Project Leader
Ken Harrison	Hurricane Maria NCST Project Leader
Youssef Hashash	Champlain Towers South NCST Project Leader
Jennifer Helgeson	Hurricane Maria NCST Project Leader
Georgette Hlepas	Champlain Towers South NCST Project Leader
Ken Hover	Champlain Towers South NCST Project Leader
Katherine “Jo” Johnson	Hurricane Maria NCST Project Leader
Scott Jones	Champlain Towers South NCST Project Leader
Eric Link	Fire Protection Engineer
Joseph Main	Hurricane Maria NCST Lead Investigator

Judith Mitrani-Reiser	Champlain Towers South NCST Lead Investigator
Jack Moehle	Champlain Towers South NCST Project Leader
Sissy Nikolaou	Champlain Towers South NCST Project Leader
Rich Press	Director, Media Relations
Fahim Sadek	Champlain Towers South NCST Project Leader
Chris Segura	Champlain Towers South NCST Project Leader
Jonathan Weigand	Champlain Towers South NCST Project Leader
DongHun Yeo	Hurricane Maria NCST Project Leader

Public Speakers:
Pablo Langesfeld
Henry Lew

I. Welcome and Opening Remarks

Ms. Tina Faecke, serving as the Designated Federal Officer (DFO), called the meeting to order and noted the four Committee members in attendance, and one member attending virtually. She informed everyone the meeting would be recorded. Ms. Faecke then introduced Mr. Jason Averill, Deputy Director of the NIST Engineering Lab, who welcomed the Committee and Investigation Team members, and thanked them for their commitment and dedication to the success of the National Construction Safety Team Act. He welcomed Mr. Jose "Pepe" Izquierdo-Encarnación as the new Committee Chair and Dr. Kimberley Shoaf as Vice Chair. He noted the importance of the Committee, and highlighted key topics that would be presented.

II. Annual Ethics Briefing

Mr. Eric Weighaus from the Department of Commerce Ethics Law and Program Office provided the Committee with an overview of the mandatory annual ethics training for Special Government Employees (SGE).

III. Review of Meeting Goals

The NIST Director of Disaster and Failure Studies, Dr. Tanya Brown-Giammanco, described the meeting goals.

- Review NIST's Response to NCST 2023 Report to Congress,
- Review outputs from the Camp Fire research study,
- Review Disaster and Failures Studies Program scoring of events and readiness of teams,
- Review the status of the NCST investigation of Hurricane Maria's effects on Puerto Rico,
- Review the status of the NCST investigation of the partial collapse of Champlain Towers South in Surfside, Florida, and
- Develop the Committee's annual report to Congress.

IV. NIST Response to the NCSTAC's 2023 Report to Congress

Dr. Brown-Giammanco provided a brief overview of the NCST Act and the Committee's responsibilities under the NCSTAC Charter of 2020. She then provided a summary of each of the seven recommendations the Committee provided in their annual report, along with a NIST response to each. The presentation can be found here:
NIST Response to the NCSTAC's 2023 Report to Congress

Discussion: The Committee and NIST staff discussed the makeup of the Florida International University social science contract team for the Champlain Towers South NCST investigation. They also discussed the approach to deliver presentations prior to the investigations being completed, as well as the challenges associated with working in disaster scenarios and training options that may help for psychological stressors. They also discussed interagency agreement scopes and acquisition processes.

V. Summary of the Camp Fire Research and Outputs

Dr. Eric Link, a fire protection engineer in NIST's Fire Research Division, provided a brief overview of NIST's research study on the 2018 Camp Fire. He described the approach to wildfire research, outcomes of previous studies, the reconstruction of the Camp Fire timeline, data collection methods, the framework for reports, and findings and recommendations for best practices. The presentation can be found here:
Camp Fire Research and Outputs

Discussion: The Committee and NIST staff discussed the challenges of informing communities of their risks, efforts to create hazard maps, and how the risks constantly evolve because of droughts. They also discussed the impact fires have on communities when the single hospital in rural areas is affected or even evacuated. They also discussed pre-fire reconnaissance efforts, and rapid screening protocols used for other hazards like earthquakes, and how a similar framework could be used for wildfire risk.

VI. Disaster and Failure Studies (DFS) Program Updates

Dr. Brown-Giammanco presented an update on the DFS Program's scoring of events. No preliminary reconnaissance missions were undertaken since the committee last met in September 2023. She also discussed some of the categories used in the scoring process, and recent efforts to evaluate these for possible updates. She also discussed updates to the committee's charter, new staffing, and several topics for cross-investigation coordination. The presentation can be found here:
Disaster and Failure Studies Program Updates

Discussion: The Committee and NIST staff discussed the numeric rubric for event scoring, as well as the challenge of relating numerical hazard intensities to damage.

IV. Hurricane Maria NCST and NWIRP Updates

- **Summary of Hurricane Maria NCST Investigation Progress**

Dr. Maria Dillard, Associate Team Lead of the Hurricane Maria NCST, provided a summary of the Hurricane Maria Program. She provided an overview of the program and projects and recent highlights. She also provided an update on the status of data collection and analyses, including statistical analyses, as well as new contract actions, and staffing and stakeholder outreach and engagement. She concluded by providing a preview of the rest of the Hurricane Maria presentations. The presentation can be found here:
Hurricane Maria Summary of Progress

Discussion: The Committee and NIST staff discussed several challenging areas of the investigation. They discussed two different weighting schemes in relation to the differences between household-level and individual-level survey questions, and ways to account for differences in demographics with these data. They also discussed possible recall-bias due to delays in administering interviews and surveys.

- **Cross-Project Panel Theme 1: Hazard Exposure**

Dr. DongHun Yeo, Dr. Joseph Main and Dr. Dillard presented the first cross-project panel on hazard exposure. They highlighted the cross-project integration of data and analyses, including geospatial analysis of wind, rain, flood, and landslides and incorporation of survey data, and the analysis of wind loads on hospitals, wind damage to communications towers, and the role of and impact to vegetation. Characteristics of the wind field model were also discussed. The presentation can be found here:
Hurricane Maria Cross-Project Panel Theme 1: Hazard Exposure

Discussion: The Committee and NIST staff discussed flood maps, and water entry caused by flood water vs. rainwater and the ability of respondents to distinguish between the two in surveys or interviews. They also discussed the difference between flood risk maps, public perception of flooding, and the actual flooding experienced during Hurricane Maria. The Team has access to flood risk maps published by FEMA but has not made a comparison between the maps and the actual flooding.

- **Cross-Project Panel Theme 2: Hospital Functionality and Infrastructure Dependencies**

Dr. Dillard, Dr. Main, and Dr. Kenneth Harrison presented the cross-project panel on hospital functionality and infrastructure dependencies. The panelists highlighted the cross-project integration of data and analyses and described how interviews and surveys provided insights on hospital performance and impacts of water intrusion. They also described how disruptions to the transportation and electric power network affected hospital functionality and access. The presentation can be found here:

Hurricane Maria Cross-Project Panel Theme 2: Hospital Functionality and Infrastructure Dependencies

Discussion: The Committee and NIST staff discussed the transportation study, the inaccessibility index, and the relationship between whether hospitals were operational. They discussed challenges hospitals experienced with locating critical systems to avoid exposure to flooding and water intrusion.

- **Cross-Project Panel Theme 3: Protective Actions and Preparedness**

Dr. Jennifer Helgeson, Dr. Katherine Johnson and Dr. Judith Mitrani-Reiser presented the cross-project panel on protective action and preparedness. The panelists highlighted the cross-project integration of data and analyses. They demonstrated how a comprehensive understanding of protective action and preparedness before and during Hurricane Maria is being obtained from surveys and interviews as part of projects that examine the performance of critical buildings, morbidity and mortality, and the recovery of social functions and businesses. The presentation can be found here:
Hurricane Maria Cross-Project Panel Theme 3: Protective Action and Preparedness

Discussion: The Committee and NIST staff discussed the data related to the school and shelter plans and the variability of effectiveness. They also discussed the protective actions typical residents took and the ability of the team to evaluate the efficacy of these approaches. They also discussed analyses of mortality records.

- **Hurricane Maria NCST Investigation Concluding Remarks and Next Steps**

Dr. Main concluded the Hurricane Maria presentations by providing a high-level conclusion and summary of the next steps. He described NWIRP data collection that will conclude this summer. Among the next steps for the HM team are completion of reports, publication of datasets and models, and beginning the implementation of recommendations and findings. Dr. Main described the process and timeline for completing internal and interagency reviews, as well as an outline for an integrated investigation summary report and draft report volumes by project. He also described study efforts related to Hurricane Fiona's impacts on the recovery from Hurricane Maria. The presentation can be found here:
Hurricane Maria Concluding Remarks and Next Steps

Discussion: The Committee and NIST staff discussed the timeline for the completion of the final report and opportunities to promote availability of investigation data for the research community. They also discussed the complexities associated with qualitative and social science data in light of the need to de-identify and maintain confidentiality.

VII. NCSTAC Preparation of Annual Report to Congress

The Committee Chair, Mr. Izquierdo-Encarnación provided final remarks on the day's presentations. He thanked the NIST staff and Committee members for their participation in the meetings and opened the floor to the Committee members to discuss preparation for the annual report to Congress.

Discussion: The Committee discussed the various presentations on Day 1 and the themes that should be included in their annual report to Congress. They discussed the value that NIST could bring by developing methodological papers when the investigations and studies conclude, and the value of continuing to focus on hospital access and functionality. They also discussed the opportunities and value for communities in raising awareness of Camp Fire findings and tools. They discussed the overall approach and outline for the annual report and began to assign tasks to specific Committee members to draft text based on the March meeting consensus discussion, for further discussion at the September meeting. They discussed topics surrounding mental health and training for team members.

Ms. Faecke adjourned the Day 1 portion of the meeting at approximately 5:00 pm ET.

VIII. Champlain Towers South NCST Updates

- **Summary of Champlain Towers South NCST Investigation Progress**

Dr. Judith Mitrani-Reiser, Team Lead of the Champlain Towers South NCST, provided a summary of activities that have occurred over the last six months. She highlighted the integrated nature of the technical projects; the contracting process, timeline, and efficiencies; the invasive testing program and workflow; updates on the structural testing program; coordination with local officials; efforts to search for additional video footage enhancing and analyzing of the collapse; outreach activities; and progress on evaluating failure hypotheses. She concluded her presentation by describing the technical updates that would follow using multidisciplinary thematic panels. The presentation can be found here:
Champlain Towers South Summary of Progress

Discussion: The Committee and staff discussed the funding level of the investigation.

- **Cross Project Panel Theme 1: Timeline and Evidence Collection**

Dr. Mitrani-Reiser, Dr. Emel Ganapati, Dr. David Goodwin, Dr. Christopher Segura, Dr. Jonathan Weigand, Dr. Kamel Saidi, and Dr. Jack Moehle presented the cross-project panel on timeline and evidence collection. The panel provided an overview of the evidence that has been collected to help understand the events that led to the initiation and progression of the Champlain Towers South collapse. They discussed work to evaluate the history of the site's development, the design and construction, and the 40-year history of the building, leading up to the partial collapse. The team stepped through key observations made from videos obtained from various sources. The presentation can be found here:
Cross Project Panel Theme 1: Timeline and Evidence Collection

Discussion: The Committee and NIST staff discussed time stamp coordination on the various videos collected. They also discussed the sounds eyewitnesses have described in interviews, implications for timing of the collapse and the initiation of the collapse, and how bidirectional information exchange between social scientists and engineers contributes to evaluation of failure hypotheses. They also discussed several details seen in the videos presented, and comparisons between physical and video evidence to information obtained from eyewitness interviews. NIST staff also noted that interview consent forms prevent the team from disclosing the names and positions of all of those who have been interviewed, but that the team had a comprehensive, prioritized approach for their interviews.

- **Cross Project Panel Theme 2: Analysis and Testing Updates**

Dr. Fahim Sadek, Dr. James Harris, Dr. Christopher Segura, Dr. Kenneth Hover, Dr. Jack Moehle, and Dr. Sissy Nikolaou presented the cross-project panel on analysis and testing updates. The panel discussed the code checks of the structural design and construction details compared to building code requirements or standard practice, and investigation testing and analysis of concrete and reinforcing bars extracted from the physical evidence. They also discussed investigations of concrete mixtures and corrosion, and laboratory and field testing for structural and geotechnical engineering components. They also discussed advances in the structural collapse modeling. The presentation can be found here:
Cross-Project Panel Theme 2: Analysis and Testing Updates

Discussion: The Committee and NIST staff discussed inspections of the building, and code compliance. They also discussed modeling and methods used today and 40 years ago for checking code compliance, and details of upcoming structural testing. Additionally, they discussed details of the models being developed to simulate conditions that were present at the time of the collapse, including sample finishes inside the apartments, and challenges with and solutions for obtaining materials for physical testing that match the original characteristics of the building. Corrosion observed, and how to match it for testing using accelerated aging protocols, was also discussed.

- **Cross Project Panel Theme 3: Failure Hypotheses**

Mr. Glenn Bell, Dr. Sadek, Dr. Georgette Hlepas, Dr. Scott Jones, Dr. Harris, and Dr. Youssef Hashash presented the cross-project panel on failure hypotheses. They described the team's approach to evaluate these hypotheses, and discussed two examples of hypotheses that are currently ranked as high probability, which include pool deck-slab column connections and columns along south edge of tower, and two examples low probability hypotheses, including formation of karstic features and differential settling and failure of tower columns above the first story. The team illustrated examples of how evidence is analyzed for and against each hypothesis.

Discussion: The committee and NIST staff discussed the details of specific failure and collapse progression hypotheses presented, as well as a few that are being considered that were

not used as examples for the presentation. The team described how there are more than 100 individual possible failure points that are grouped into hypotheses for analysis and consideration. The group also discussed the resourcing dedicated to lower and higher probability failure hypotheses, and how that affects the team's approach to gathering evidence. Additionally, the implications of the investigation findings on a broader, national scale were discussed.

- **Champlain Towers South NCST Investigation Concluding Remarks and Next Steps**

Mr. Bell provided concluding remarks on the Champlain Towers South progress made since last September. He summarized the current understanding of the failure sequence and the results of the preliminary data and analysis, the methodology used to rate the likelihood of various failure hypotheses, and the team's plans for the final report and other means of communicating the findings and recommendations. He provided an overview of the investigation schedule and a snapshot of the next six months. Mr. Bell described trends in delays the team has experienced when securing contracts and obtaining approvals for interview instruments, as well as updates on the recently awarded geotechnical and social science contracts.

Discussion: The committee thanked the Champlain Towers South Team for the dedication and commitment across a multitude of disciplines within engineering and social sciences to contribute to the investigation. NIST described the tiers of reports envisioned and the committee provided feedback on the draft report outline that was presented. They also discussed cracks in the concrete that had been observed in the pool deck

IX. Public Comment Period

Ms. Faecke opened the public comment period. Mr. Pablo Langesfeld, father of Nicole Langesfeld who was killed in the Champlain Towers South collapse, described his disappointment with the delay in determining why the Champlain Towers South building collapsed. He noted frustrations of families seeking justice and accountability, and that the state attorney is waiting for the release of the final report to determine if there will be any criminal charges or accountability. He also noted concerns that the building was not up to code when constructed and expressed concerns for the safety of the land itself for new construction. He also expressed concern for FEMA flood map revisions that would remove the flood zone from the area, even though water pumps are still operating on the site. Mr. Langesfeld urged NIST to work collaboratively with the town of Surfside's hired forensic engineer and concluded his statement by expressing his desire to have the investigation completed as soon as possible.

Mr. Henry Lew, a local builder in South Florida and private citizen whose mother used to live in Champlain Towers South, described his concerns with potential differential settlement. He described his understanding of structural failures as an instant reaction and noted that buildings in South Florida are constructed on a coral base. He described conversations with his mother

about the constant repairs of Champlain Towers South, and expressed concerns over his fear that the same thing could happen to the Champlain Towers North building.

X. Closing Remarks

Mr. Averill gave the closing remarks. He thanked the staff members involved in hosting the meetings, the Committee members for their participation and advice, and the members of the public who have submitted information to the NIST disaster data portal or have agreed to participate in surveys and interviews. He encouraged other members of the public to participate in the same way. He also thanked the presenters and provided a brief recap of the topics presented. He also described NIST leadership's commitment to team members' physical and emotional health and safety and described efforts to wrap up the investigations as quickly as possible.

XI. NCSTAC Preparation of Annual Report to Congress

The Committee used the remainder of the meeting time to begin their preparation for their annual report to Congress. They discussed assignments for completing the report and next steps.

Following the Committee's discussion, Ms. Faecke adjourned the meeting at approximately 4:45 pm ET.