

Champlain Towers South Collapse NCST Investigation Update

NCST Advisory Committee Meeting

October 19, 2022

Judith Mitrani-Reiser
Lead Investigator

Glenn R. Bell
Associate Lead Investigator

Champlain Towers South Investigation: Recent Activities



Champlain Towers South Investigation: Recent Activities



NCST Public Meeting
Procurement & Contracts
Warehouse Safety Preparation
Collapse Anniversary



2022

JUNE

JULY

AUGUST

SEPTEMBER

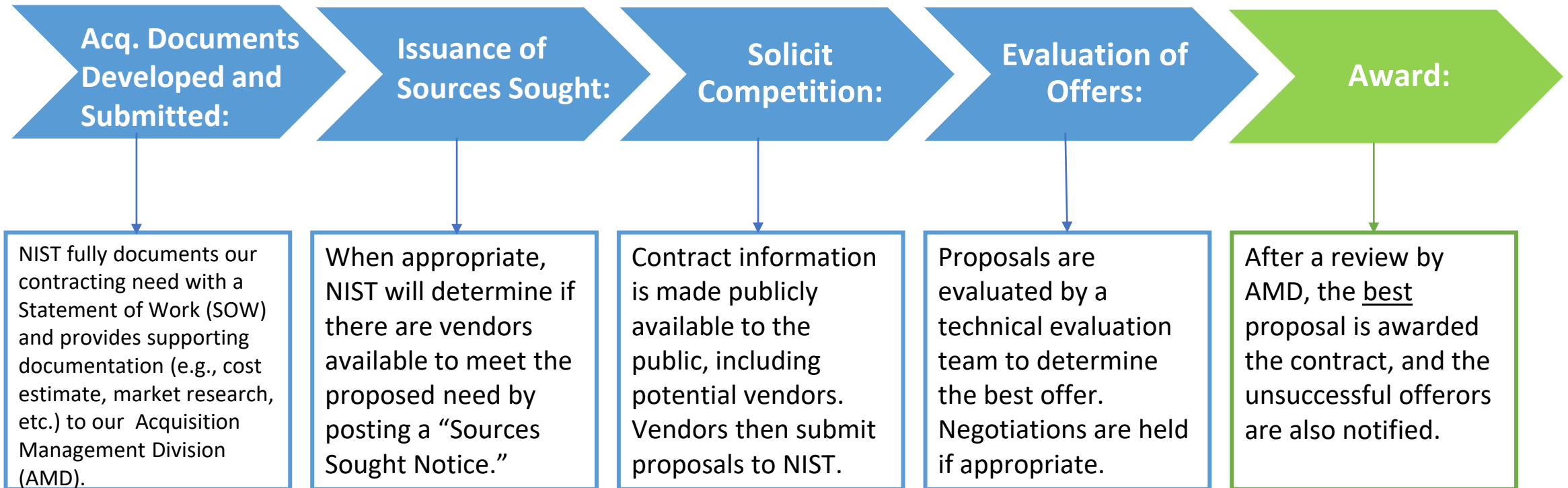
2022

Champlain Towers South Investigation: NCST AC Meeting

NIST



Contract Award Process Flow*



*Depending upon the type of acquisition (task order under an IDIQ or a new contract) and approach, some steps may vary. This is a high-level overview of the acquisition process followed by the CTS Investigation.

One Year Anniversary of CTS Collapse: June 24, 2022

NIST



Source: NIST

Champlain Towers South Investigation: Recent Activities



NCST Public Meeting
Procurement & Contracts
Warehouse Safety Preparation
Collapse Anniversary



2022

JUNE

JULY

AUGUST

SEPTEMBER

2022



NSF IAA Work Order Executed
Wave Attenuation Tests
Civil Litigation Sample Transfer
OMB Approved Data Collections

Champlain Towers South Investigation: Wave Attenuation Tests



Source: NIST



Source: NIST



Source: Utah State University

Champlain Towers South Investigation : Civil Litigation Samples Transfer to NIST



Source: NIST



Source: NIST

Champlain Towers South Investigation: OMB Clearance



Renewed on July 27, 2022 and expires July 31, 2025

Federal Register / Vol. 87, No. 118 / Tuesday, June 21, 2022 /

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DEPARTMENT OF COMMERCE

National Institute of Standards and Technology

Information Collection Activities; Submission to the Office of Management and Budget (OMB) for Review and Approval; Comment Request; Generic Clearance for Community Resilience Data Collections

The Department of Commerce will submit the following information collection request to the Office of Management and Budget (OMB) for review and clearance in accordance with the Paperwork Reduction Act of 1995, on or after the date of publication of this notice. We invite the general public and other Federal agencies to comment on proposed, and continuing information collections, which helps us assess the impact of our information collection requirements and minimize the public's reporting burden. Public comments were previously requested via the **Federal Register** on March 15, 2022 during a 60-day comment period. This notice allows for an additional 30 days for public comments.
Agency: National Institute of Standards and Technology (NIST), Commerce.
Title: Generic Clearance for Community Resilience Data Collections.
OMB Control Number: 0693-0078.

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SUPPORTING STATEMENT
U.S. Department of Commerce
National Institute of Standards and Technology
Generic Clearance for Community Resilience Data Collections
OMB Control No. 0693-0078

SUPPORTING STATEMENT PART A

Abstract

Through acts such as the National Construction Safety Team Act (NCSTA), the National Windstorm Impact Reduction Act (NWIRA) and the NIST Organic Act, among others, as well as the President's Climate Action Plan (2013), NIST conducts research and develops guidance and other related tools to promote and enhance the safety and well-being of people in the face of a hazard event. With this in mind, NIST proposes to conduct a number of data collection efforts within the topic areas of disaster and failure studies and community resilience and sustainability, including studies of specific disaster events (e.g., wildfire, urban fire, structure collapse, hurricane, earthquake, tornado, and flood events), assessments of community resilience and sustainability, and evaluations of the usability and utility of NIST resilience guidance or other products.

Champlain Towers South Investigation: Recent Activities



NCST Public Meeting
Procurement & Contracts
Warehouse Safety Preparation
Collapse Anniversary

Executed work order w/ BurRec
Executed MOU with FBI
Invasive Testing Program Workflow
Finalize New Warehouse Layout

2022

JUNE

JULY

AUGUST

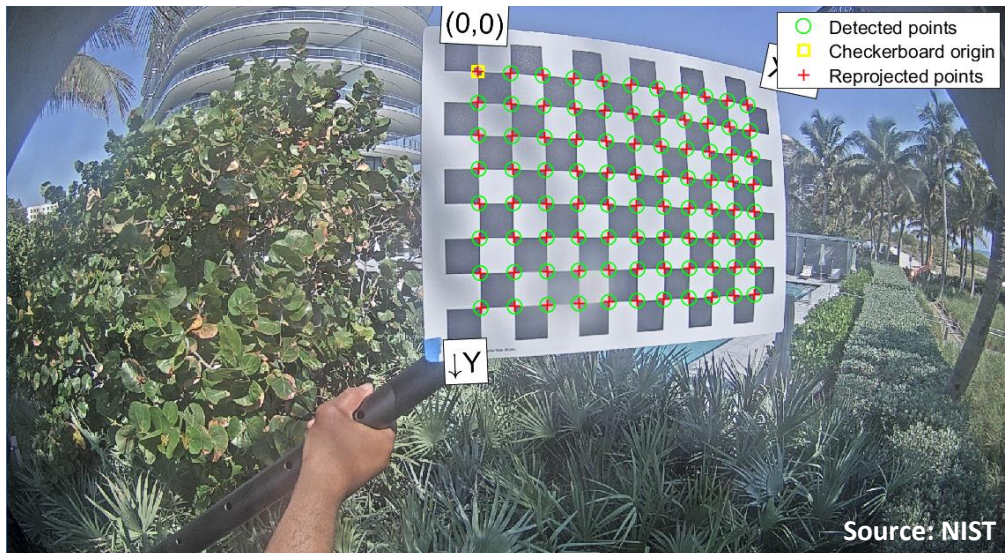
SEPTEMBER

2022

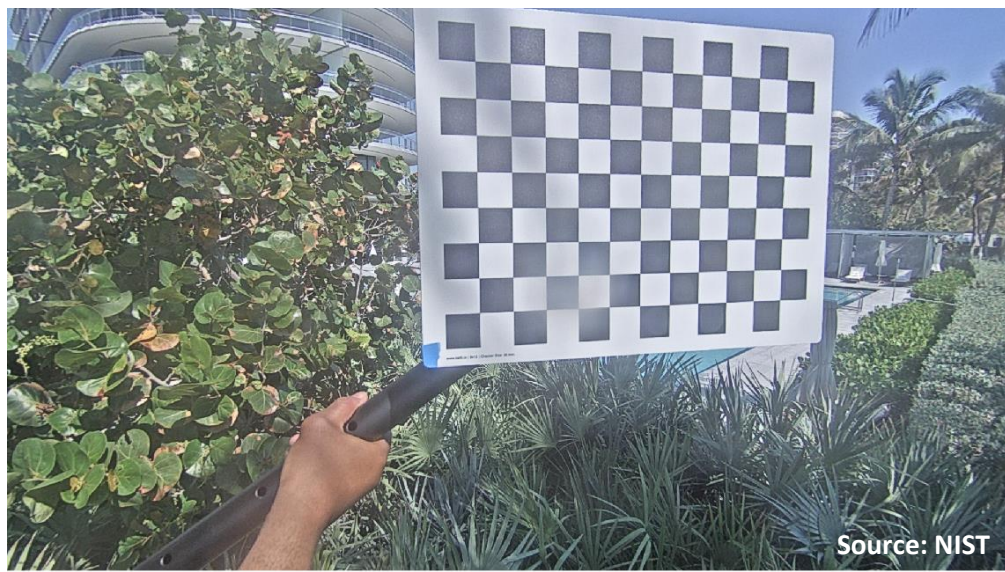
NSF IAA Work Order Executed
Wave Attenuation Tests
Civil Litigation Sample Transfer
OMB Approved Data Collections

Champlain Towers South Collapse: Video Analysis

Original image with corners detected



Rectified image



Original video frame 135



Rectified video frame 135



Champlain Towers South Investigation: Evaluate Invasive Program Workflow



Champlain Towers South Investigation: Finalize New Warehouse Layout

NIST



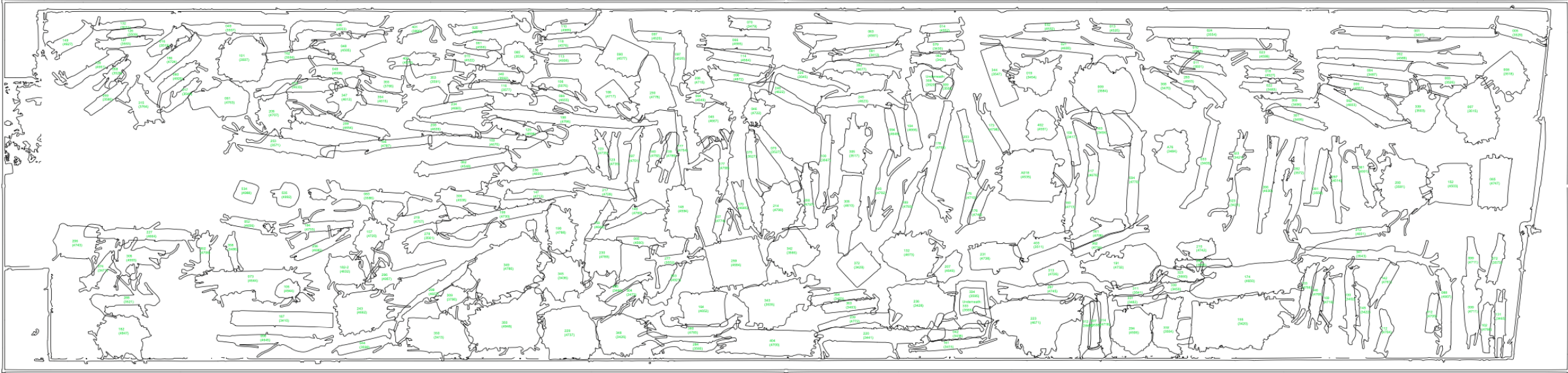
Source: NIST



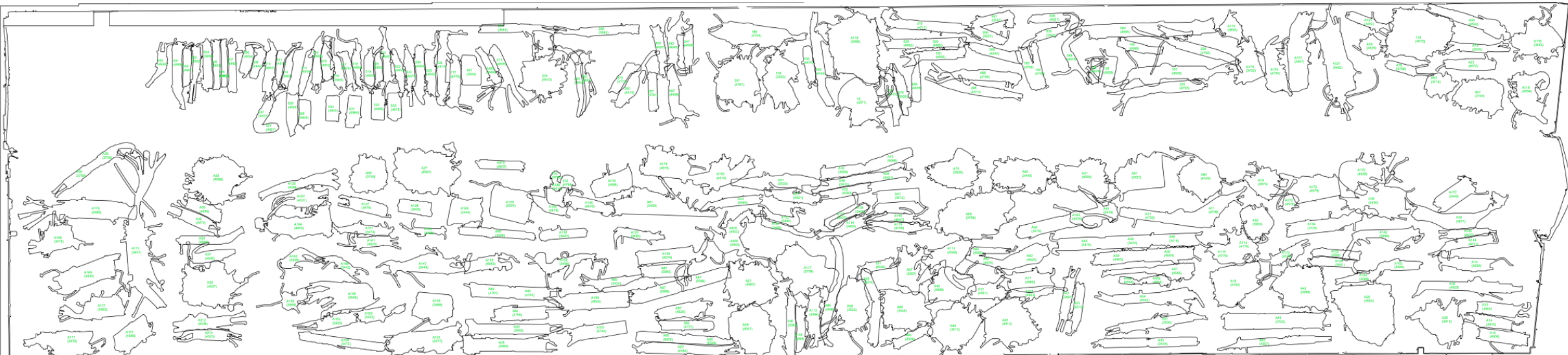
Source: NIST

Champlain Towers South Investigation: Finalize New Warehouse Layout

NIST

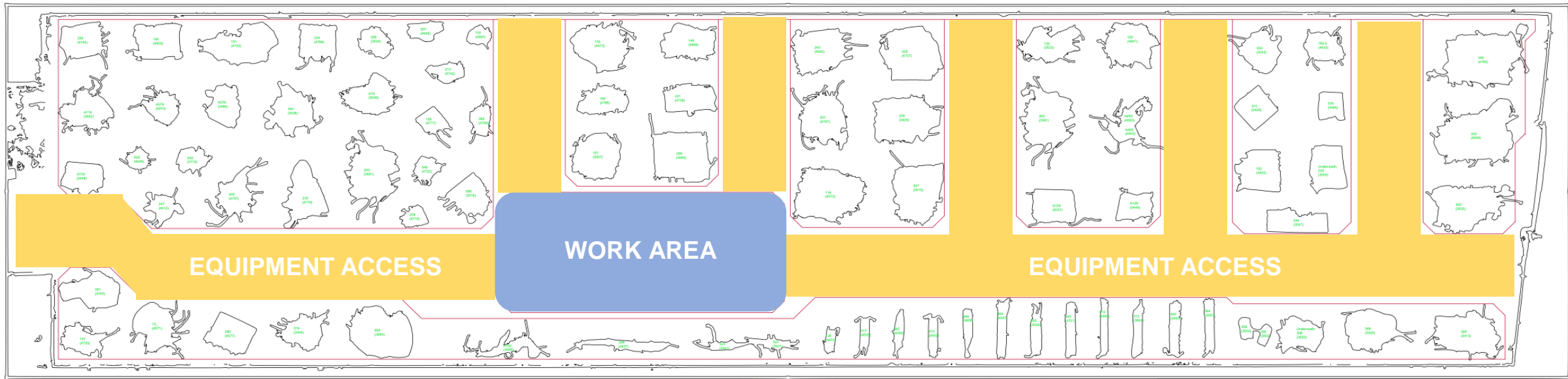


Source: NIST

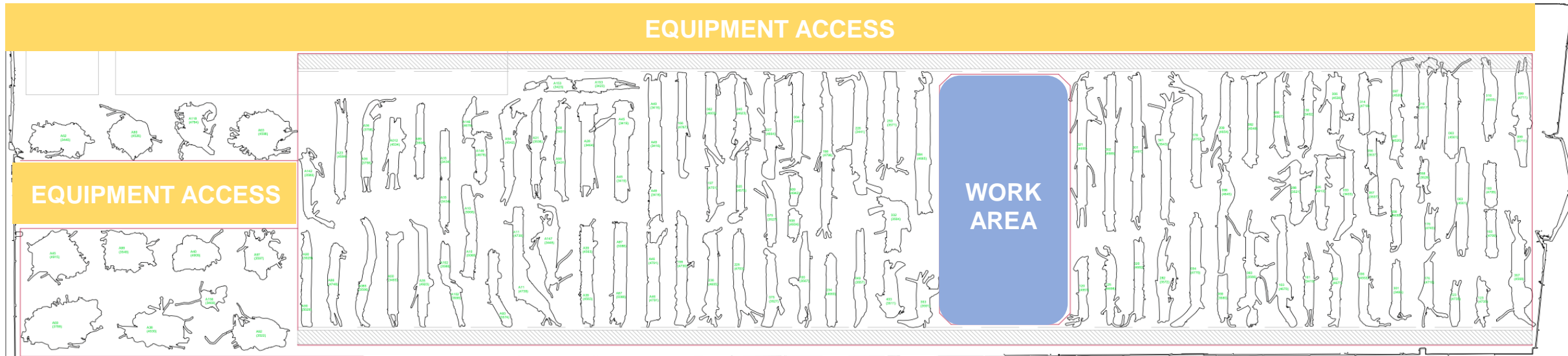


Source: NIST

Champlain Towers South Investigation: Finalize New Warehouse Layout

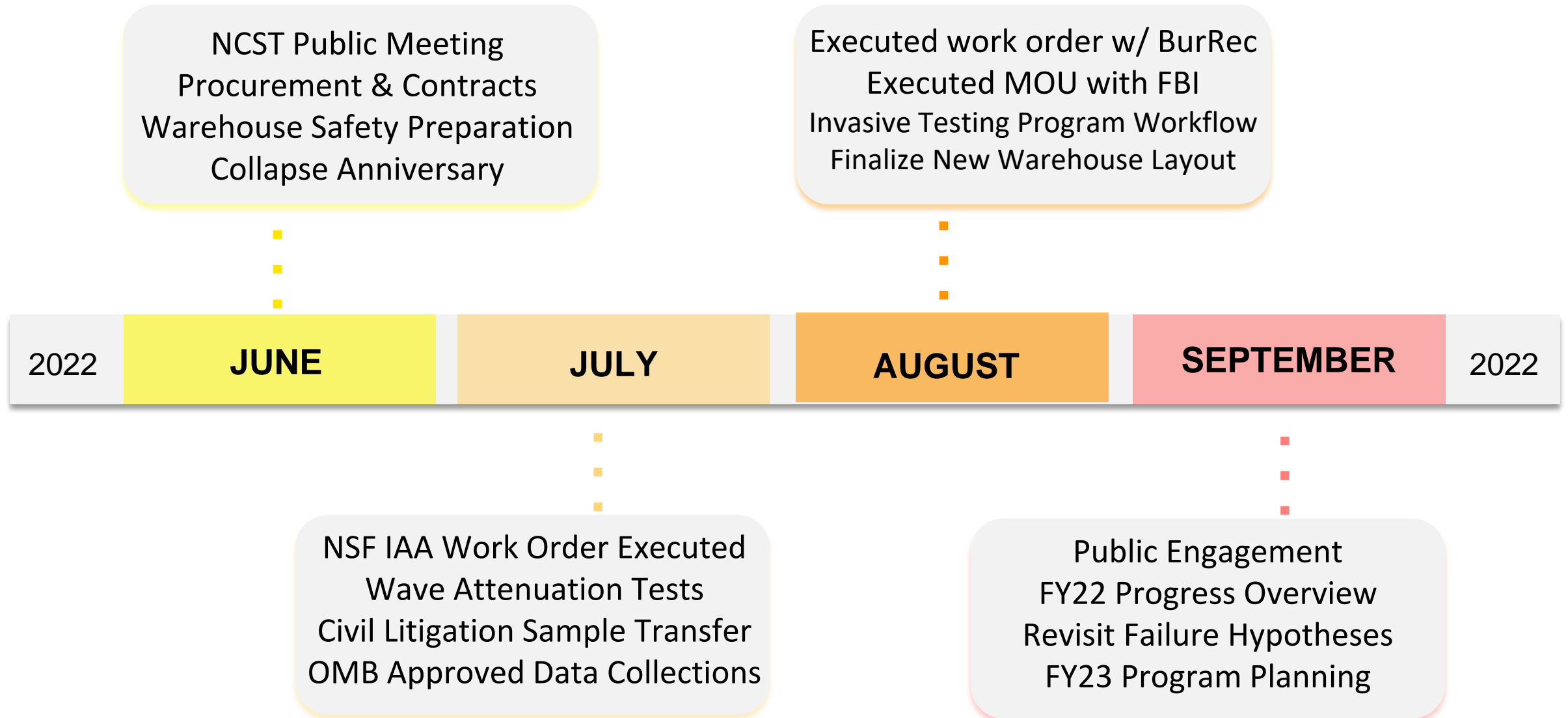


Source: NIST



Source: NIST

Champlain Towers South Investigation: Recent Activities



Champlain Towers South Investigation: Public Engagement

- Working with local partner to meet with families regularly
- Issued two news releases and updates since last meeting
- Released two additional video B-roll and photographs, live broadcast of committee meeting
- Use multiple methods to communicate:



Video



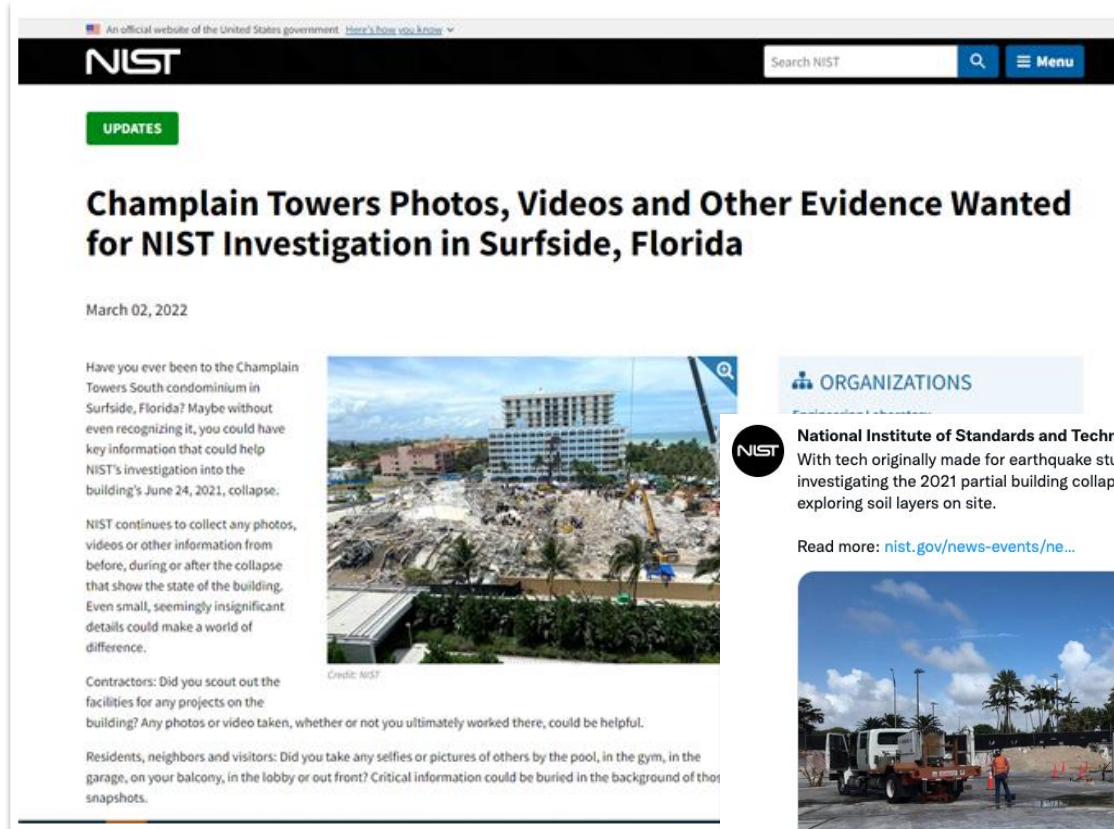
News releases



Blog



Social media



Source: NIST



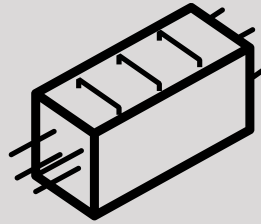
Source: NIST

Champlain Towers South Investigation: FY22 Progress Overview (by the numbers)



40+

NIST
EMPLOYEES



600+

EVIDENCE
SPECIMENS

**49% of Appropriated Funds
Spent in FY22**

Labor: \$ 3.9M (37%)

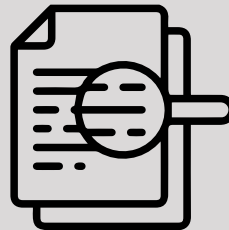
Other Objects*: \$ 6.8M (63%)

**contracts, equipment,
travel, misc.*



15+

LOCAL AND
FEDERAL AGENCIES



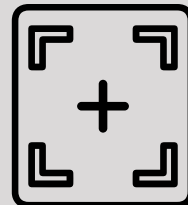
24+

FAILURE
HYPOTHESES



12+

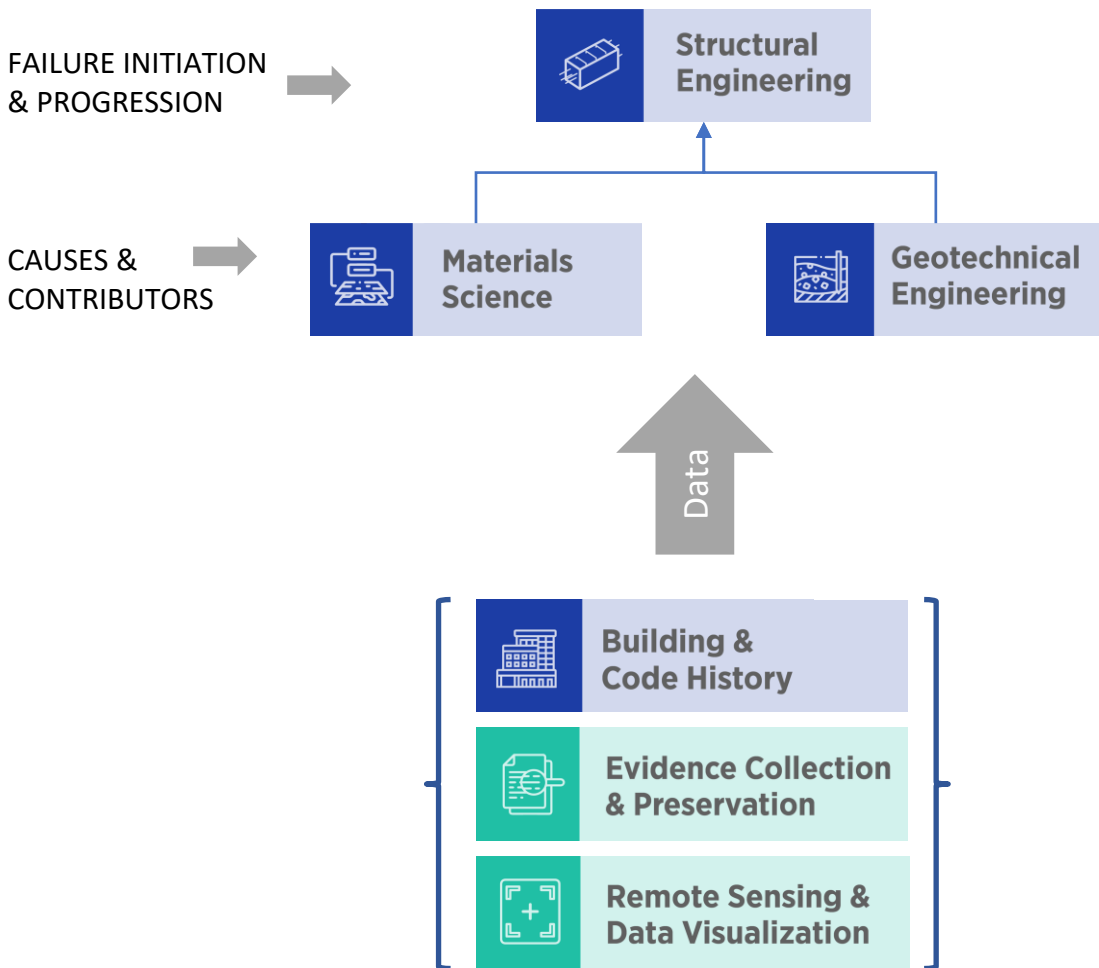
WORK ORDERS AND
CONTRACTS AWARDED



3+ TB

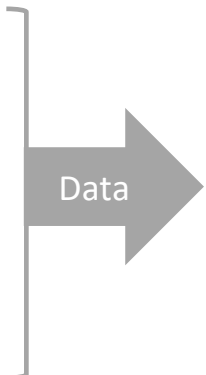
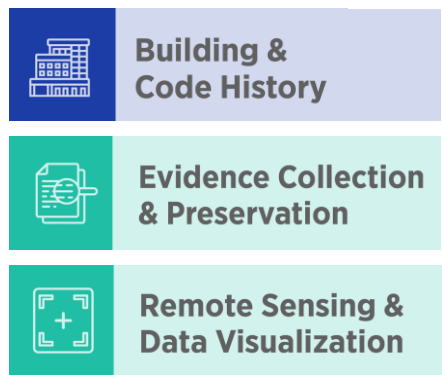
PHOTOS
AND VIDEOS

Champlain Towers South Investigation: Update Failure Hypotheses & FY23 Program Planning



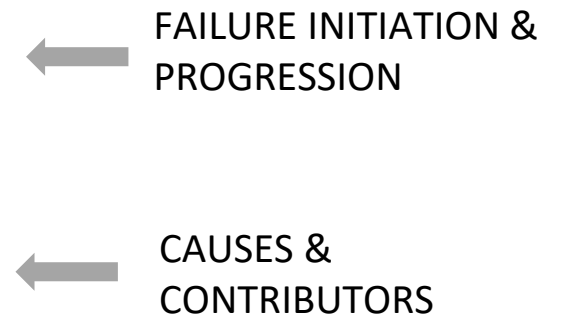
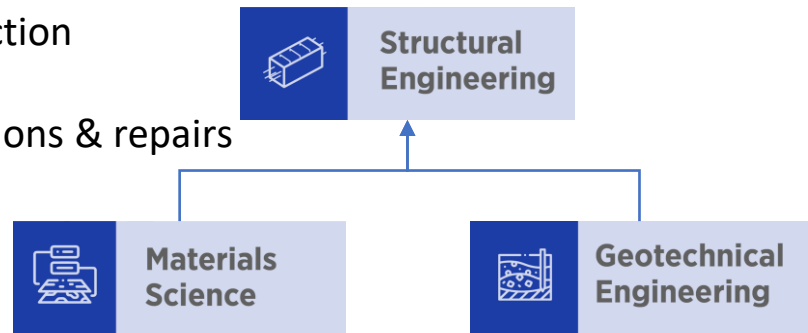
- 1 • Develop Project Objectives
- 2 • Develop FY23 Milestones & Interdependencies
- 3 • Develop Outyear Milestones
- 4 • Identify Staffing and Equipment Needs
- 5 • Identify Contract, Equipment, & Travel Needs
- 6 • Implement FY23 Plans
- 7 • Assess at Midyear & Update FY23 Plans
- 8 • Develop FY24 Plans
- 9 • Assess FY23 Accomplishments & Update FY24 Plans

Organization for Failure Hypotheses



Cause & contributor examples:

- Design
- Construction
- Loading
- Renovations & repairs



Cause & contributor examples:

- Corrosion
- Material degradation
- Poor mixing & placement
- Strength of materials

Cause & contributor examples

- Settlement
- Buoyancy
- Construction vibrations
- Perimeter wall behavior

quantification and propagation of uncertainty

Information from Civil Litigation

Documents from Discovery

Deposition Transcripts

Specimens from Collapse Site

Test Results

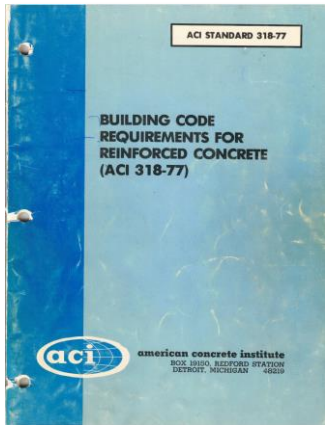
Presentations and Correspondence with Expert Teams



Source: NIST



Analysis of Codes & Standards



source: ACI

Procurement of Wind History Study



Wikimedia Commons: Public Domain, NOAA

Priority Condo Records

Condo Association Records

Goal: Summarize & index public and private records pertaining to the CTS building

- Invoices, CTSCA Meeting Minutes, Photos (Building Managers), Proposals (Repair work/Maintenance), Manager Reports

permission Miami-Dade County

Phase 1 As-Built & Pre-Collapse Conditions

As-Built Dimensions & Detailing - Slabs

Exportable Output from Database

Specimen ID	Structural Measurements	Global Measurements	Rebar Observations	Bar Spacing & Cover
350 (49448)	Slab / Shear Wall Overall Observations			

Notice: Variable numbers of entries

source: NIST

Condo Association Records

INVOICE

SAMMET POOLS, INC.
1917 West Boulevard Blvd., #104
Plantation, FL 33317
954.251.1915 Phone • 954.308.0801 Fax
Lic. & Insured CPC040094

Date: 4-16-13
To: Champlain Towers South Condo Association
From: John Sammet
Subject: Inverse Site Pool and Spa Renovation
Location: 8777 Collins Avenue, Northlake, FL 33156

Invoice

Uniforms Conditions:

- Excessive Diamond Britconcrete removed from pool floor - upon demolishing entire finish, we found four (4) old layers of Diamond Stone and a diamond concrete substrate. Upon review by Engineers we were instructed to remove all layers and substrate to original shell. This work took an additional 5 days to complete. Add \$ 6,200.00
- Estimated 522 square feet hand of pavers. Originally we were to install new pavers due to too many broken pavers, we had to remove existentially. In order to maintain the required slope as per HBX code, we had to remove additional existing pavers and add more sand and relevel to proper slope. Add \$ 2,800.00

AMOUNT DUE \$ 9,000.00
Total Amount Due \$ 14,340.00

permission Miami-Dade County



Measure & Document Physical Evidence

Basic Structural Measurements and Documentation

Columns and Beams

Slabs and Walls

Structural Measurements: **Sample: 450 DEMO**

Column/Beam Overall Observations

Design Width: 10 Design Depth: 12 Sample Height (columns)/Sample Length (beams): 120

Number of stories: 1

Cross Sections

Individual Longitudinal Reinforcing Bar Observations (1)

Location: A ASTM standard: A615 Production mill: S Steel type: S Bar size: #3

Grade mark: 60.0000 Inner dia.: 0.93000 Outer dia.: 1.13300 Notes:

Priority 1 Interviews

Interviewee roles

- Residents
- Family members
- Building management & maintenance
- Visitors to CTS
- NGO officials (incl. faith-based leaders & mental health professionals)

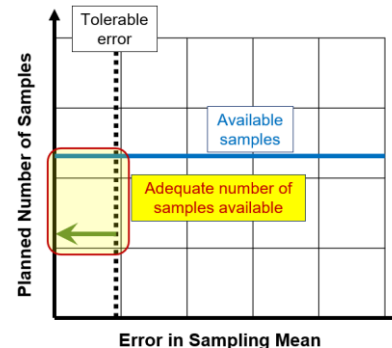
Subject matter

- Building conditions
- Unit conditions
- Clues to collapse initiation & progression
- Search, rescue & recovery
- Evidence Collection/preservation
- Policies

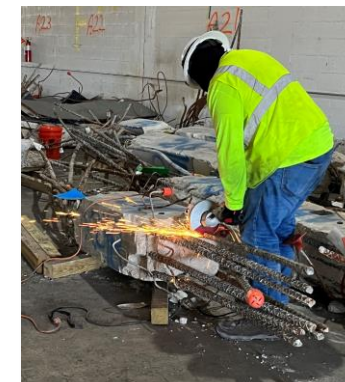
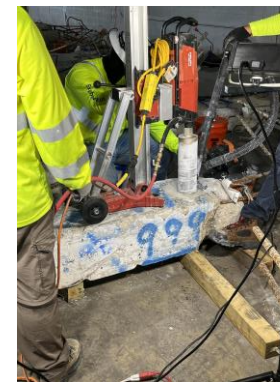
Invasive Testing Program Planning & Initiation

Concrete & Reinforcing Steel

Representative Samples & Targeted Samples



source all images: NIST





Remote Sensing & Data Visualization

Lidar & Drone Images

Develop Targeted Image Tagging

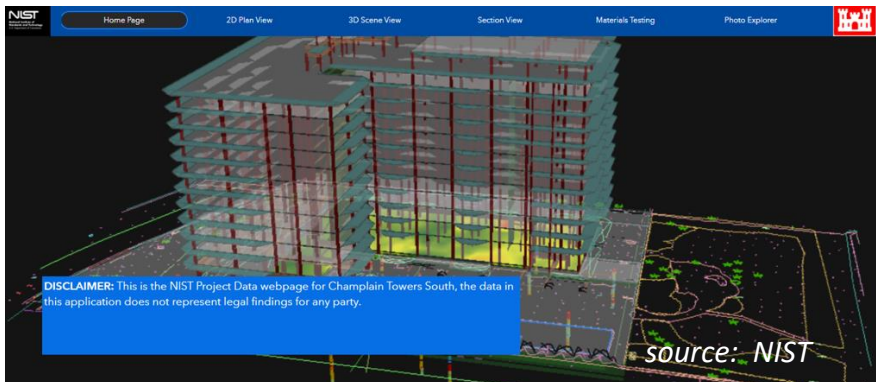


source: NIST

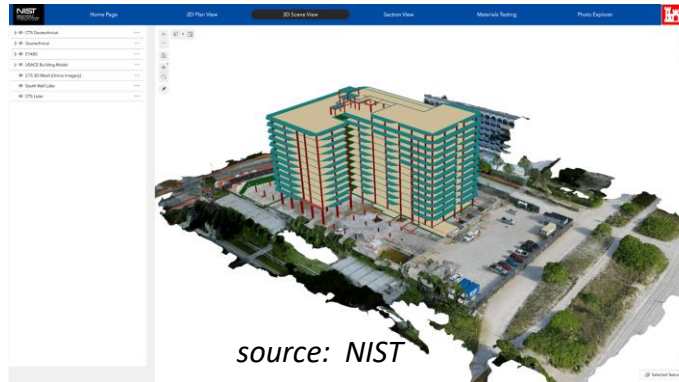
Example: Corrosion of top-of-slab reinforcing steel in the pool deck slab. Relevant evidence is found in:

- Concrete casting zones
- Top-of-slab rebar cover and detailing
- Topography & drainage of the slab
- Repairs and evidence of leakage
- Evidence of corrosion of top-of-slab rebar and column rebar

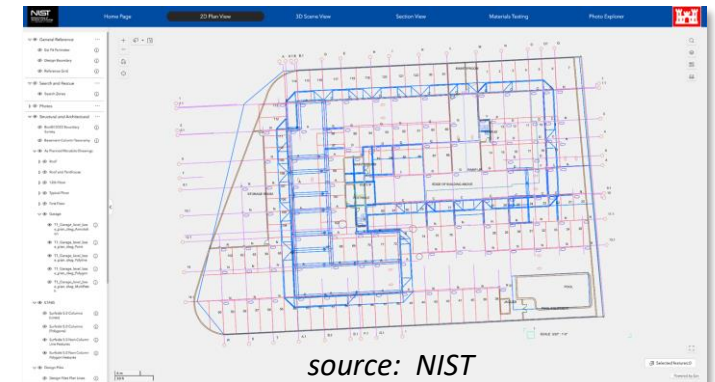
Launch 3-D Model & Interactive Tool



source: NIST



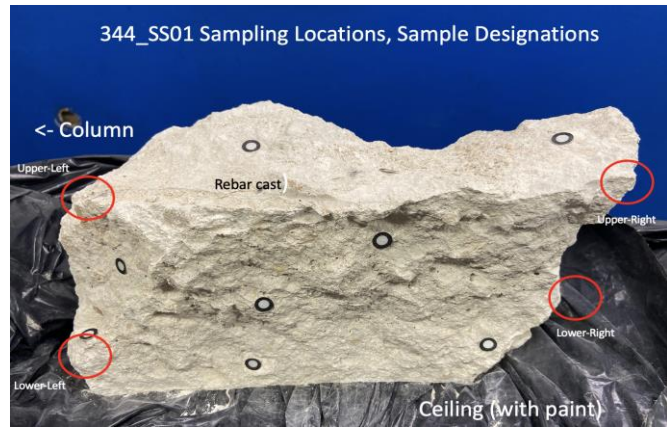
source: NIST



source: NIST

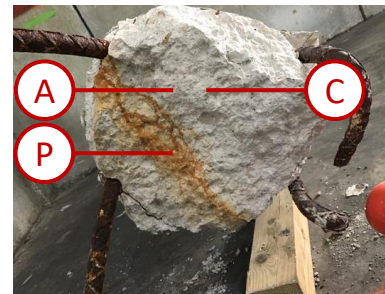


Initial Laboratory Analysis

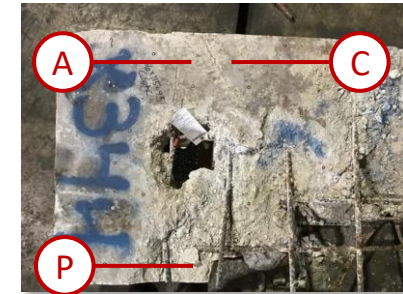


Chips removed from surface for SEM and XRD
source: NIST

Development of Materials Aspects of Invasive Testing Program Focused on Failure Hypotheses Causes & Contributors



source: NIST



source: NIST

Continued Specimen NDT

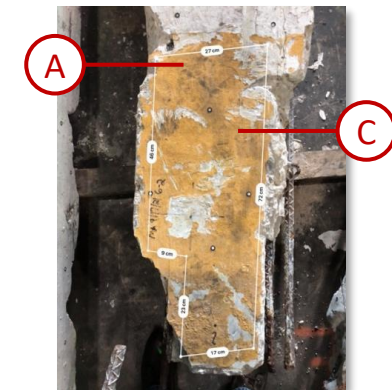


source: NIST

Trial Mix Design



source: Hover, not CTS



source: NIST



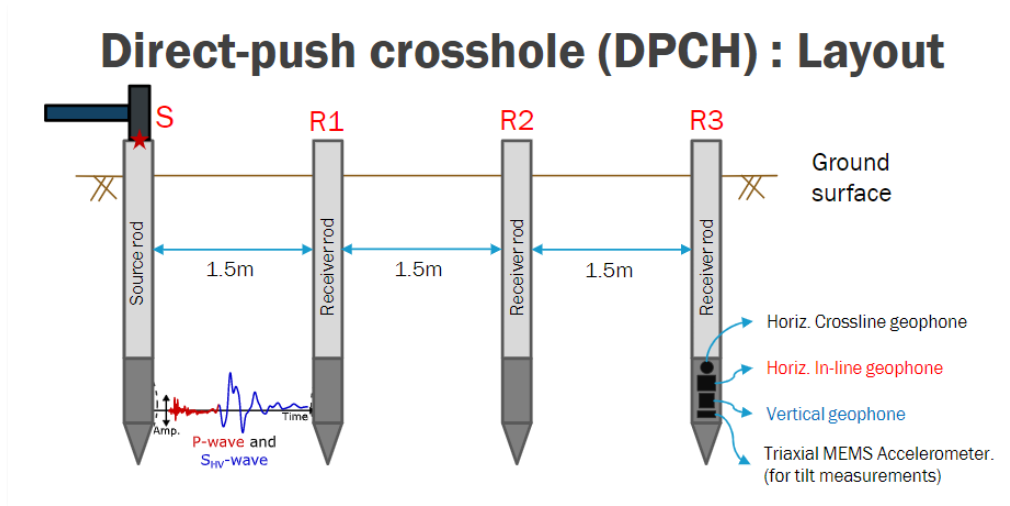
Site Geomorphology & Geotechnical Data



source: NIST
(Image intentionally blurred)

On-site Vibration Testing

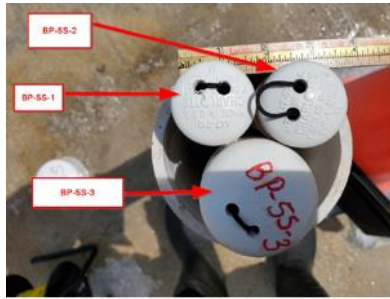
source: Utah State University | Subsurface Imaging and Earthquake Engineering Lab



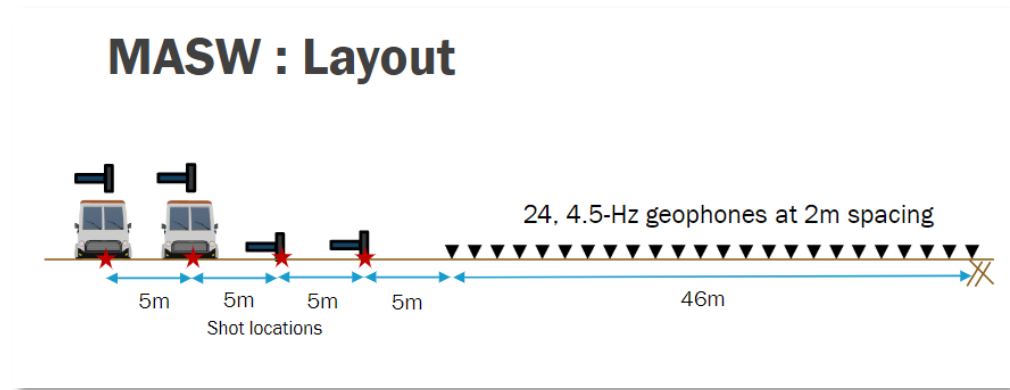
Groundwater Effects



source: NIST



source: NIST





Structural Engineering

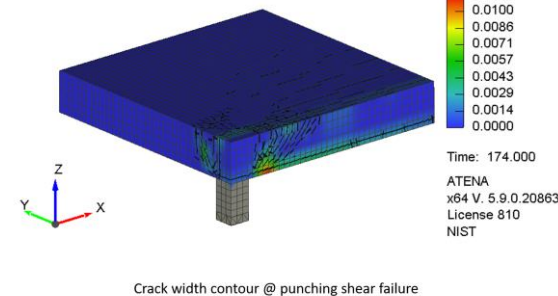
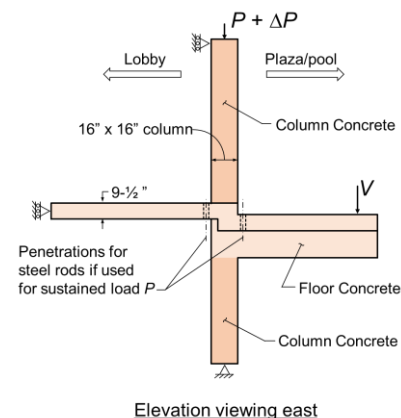
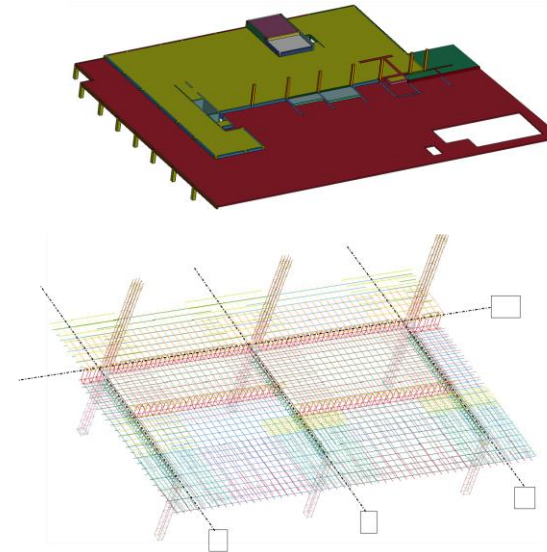
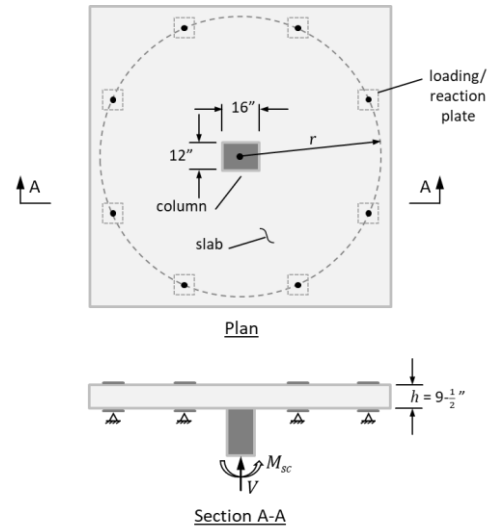
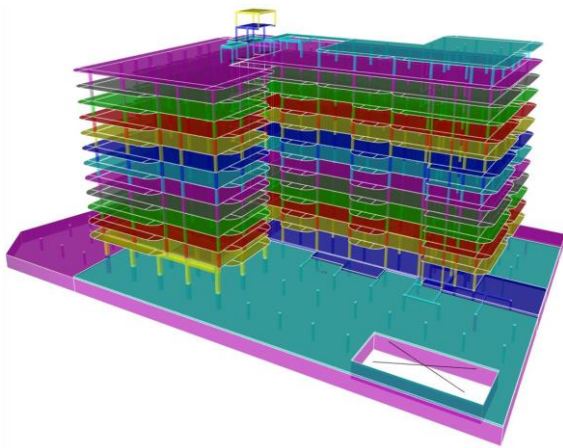


Structural Design Evaluation

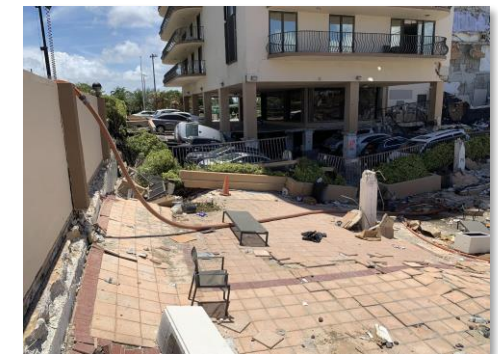
Structural Lab Replica Test Development

Validation of As-Designed Non-linear Collapse Model

Analysis of Collapse Evidence



permission Miami-Dade County



source all images unless otherwise noted: NIST

contract awarded to



Permission Cagley & Associates

Crack width contour @ punching shear failure

Next Six Months - Highlights

Analysis of Failure Hypotheses

Invasive Testing Program



Building & Code History

- Wind load history contract
- Continued determination of pre-collapse conditions
- Analysis of data from civil litigation



Materials Science

- Materials testing at NIST and outside labs
- Contracts for durability, NDT, petrography
- Analysis of concrete mixing & placement



Evidence Collection & Preservation

- Manage invasive extraction program
- Track evidence during invasive testing
- Priority 1 > Priority 2 interviews



Geotechnical Engineering

- Geotechnical support services contract
- SSI analysis with Structural Engineering
- Analysis of possible geotechnical contributors to failure hypotheses



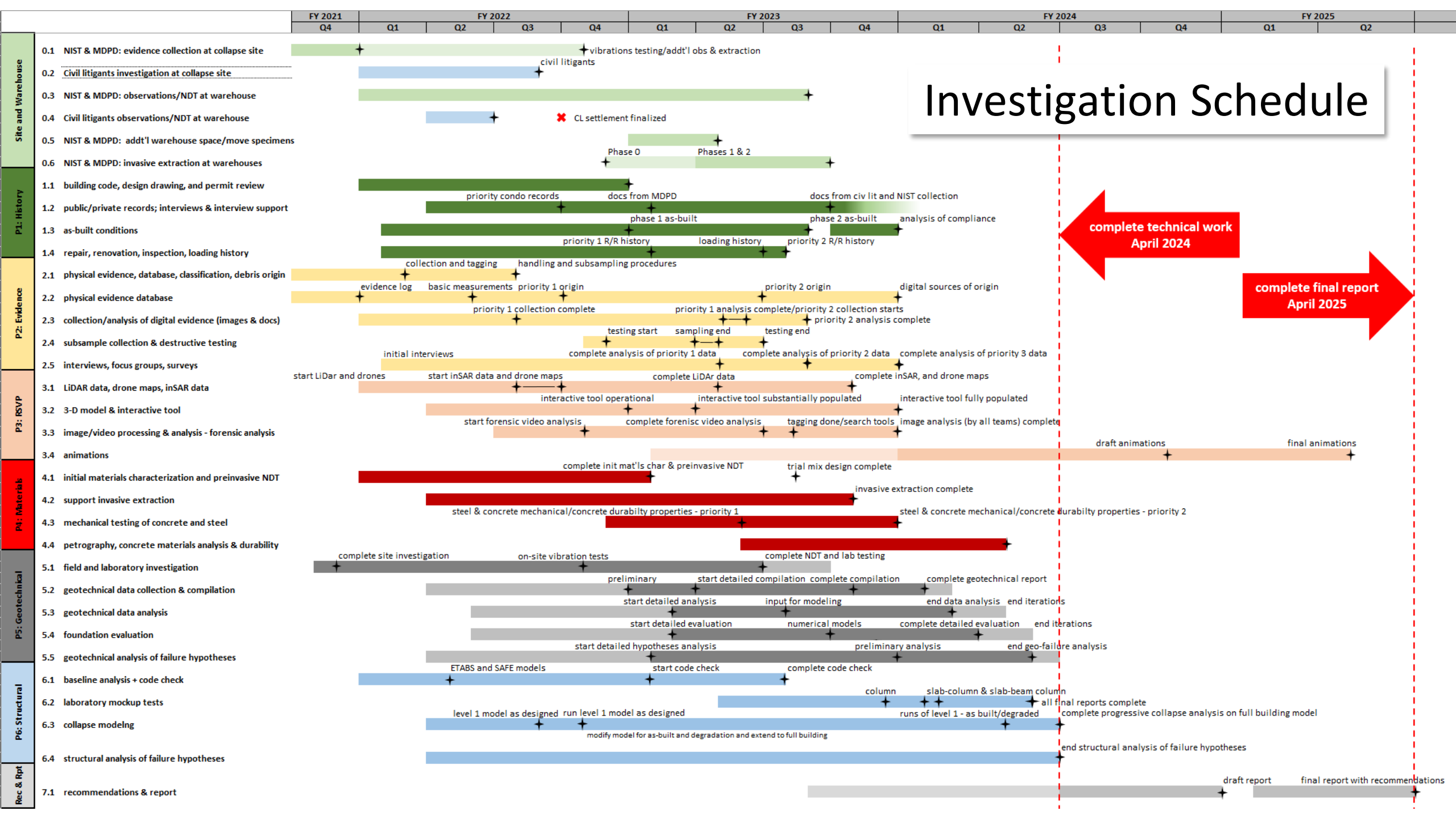
Remote Sensing & Data Visualization

- Complete LiDAR/advance drone maps
- Populate 3-D model
- Image/video processing
- Targeted tagging of images



Structural Engineering

- Building and code checks contract
- Laboratory replica test contract
- Advance computer collapse analyses



NCST Investigation of the Champlain Towers South Collapse

Investigation Overview & Update



Judith Mitrani-Reiser
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