Organizational Manual

Version 2.0

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PREFACE

The National Science Foundation (NSF) awarded an EAGER grant (CMMI 1841667) to a consortium of universities to form the Structural Extreme Events Reconnaissance (StEER) Network (see https://www.steer.network for more details). StEER was renewed through a second award (CMMI 2103550) to further enhance its operational model and develop new capabilities for more efficient and impactful post-event reconnaissance. StEER builds societal resilience by generating new knowledge on the performance of the built environment through impactful post-disaster reconnaissance disseminated to affected communities. StEER achieves this vision by: (1) deepening structural engineers' capacity for post-event reconnaissance by promoting community-driven standards, best practices, and training, as well as their understanding of the effect of natural hazards on society; (2) coordination leveraging its distributed network of members and partners for early, efficient and impactful responses to disasters; and (3) collaboration that broadly engages communities of research, practice and policy to accelerate learning from disasters.

Under the banner of the Natural Hazards Engineering Research Infrastructure (NHERI) CONVERGE node, StEER works closely with the wider Extreme Events consortium to promote interdisciplinary disaster reconnaissance and research. The consortium includes the Geotechnical Extreme Events Reconnaissance (GEER) Association and the networks for Interdisciplinary Science and Engineering Extreme Events Research (ISEEER), Nearshore Extreme Event Reconnaissance (NEER), Operations and Systems Engineering Extreme Events Research (OSEEER), Social Science Extreme Events Research (SSEER), Sustainable Material Management Extreme Events Reconnaissance (SUMMEER), and Public Health Extreme Events Research (PHEER), as well as the NHERI RAPID facility, the NHERI Network Coordination Office (NCO), and NHERI DesignSafe CI, curation home for all StEER products.

While the StEER network currently consists of the three primary nodes located at the University of Notre Dame (Coordinating Node), University of Florida (Southeast Regional Node), and University of California, Berkeley (Pacific Regional Node), StEER is currently expanding its network of regional nodes worldwide to enable swift and high quality responses to major disasters globally.

StEER's founding organizational structure includes a governance layer comprised of core leadership with Associate Directors for each of the primary hazards as well as the cross-cutting area of Data Standards, led by the following individuals:

- **Tracy Kijewski-Correa (PI)**, University of Notre Dame, serves as StEER Director responsible for overseeing the design and operationalization of the network and representing StEER in the NHERI Converge Leadership Corps.
- **Khalid Mosalam (co-PI),** University of California, Berkeley, serves as StEER Associate Director for Seismic Hazards, serving as primary liaison to the Earthquake Engineering community.
- **David O. Prevatt (co-PI),** University of Florida, serves as StEER Associate Director for Wind Hazards, serving as primary liaison to the Wind Engineering community.
- **Mohammad S. Alam (co-PI),** University of Hawai'i at Manoa, serves as StEER Associate Director for Coastal Hazards, serving as a primary liaison to the coastal engineering community.
- **David Roueche (co-PI)**, Auburn University, serves as StEER Associate Director for Data Standards, ensuring StEER processes deliver reliable and standardized reconnaissance data suitable for re-use by the community.

This core leadership team works closely with StEER's Program Manager and Data Librarians in event responses, in consultation with its Advisory Boards for Coastal, Seismic and Wind Hazards.

DOCUMENT SCOPE & ACKNOWLEDGEMENTS

This document assembles basic information on StEER's organizational structure, operational model, and basic policies and should be reviewed by all members. Call out boxes throughout the document highlight common questions, key resources, or important qualifiers on our policies and processes.

This manual provides a foundation that is then built upon by other documents available at https://www.steer.network/resources provide additional guidance and instructions for specific StEER team functions. In addition to this document's formal statement of StEER policies for its members, StEER maintains a Frequently Asked Questions (FAQ) page on its website that provides more nuanced explanations of these policies in practice: https://www.steer.network/faq.

StEER wishes to further acknowledge that these policies, which will continue to evolve with input from the community and experience, were inspired greatly by the example of Geotechnical Extreme Events Reconnaissance (GEER) Association and the opportunities to exchange ideas and best practices among the members of the Natural Hazard Engineering Research Infrastructure (NHERI) Converge Leadership Corps.

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ABBREVIATIONS

Acronym	General Terms	Brief Description
--	DesignSafe	Data Repository
--	DesignSafe-CI	Academic Organization within NHERI
ASCE	American Society of Civil Engineers	Professional Organization
ASTM	American Society for Testing and Materials (now ASTM International)	Standards Body
ATC	Applied Technology Council	Professional Organization
BOCA	Building Officials and Code Administrators	Code Body
CC-BY	Creative Commons Attribution License	Code/Standard
CESMD	Center for Engineering Strong Motion Data	Governmental Agency
CI	Cyberinfrastructure	Research Asset
CLPE	Critical Load Path Elements	StEER Term
CMU	Concrete Masonry Unit	Building Material
CPIC	Center for Public Interest Communication	Research Support Organization within University of Florida to study, test and apply strategic communication for social change
CWA	Central Weather Administration	Taiwan Governmental Agency
DBE	Design Basis Earthquake	Design Terminology
DEQC	Data Enrichment and Quality Control	StEER Term
DOI	Digital Object Identifier	Common Term
EARR	Early Access Reconnaissance Report	StEER Term
EERI	Earthquake Engineering Research Institute	Professional Organization
EEFIT	Earthquake Engineering Field Investigation Team	Professional Organization
EF	Enhanced Fujita Scale	Hazard Intensity Scale
EF	Equipment Facility	Academic Organization within NHERI
EIFS	Exterior Insulation Finish System	Building Component
FAA	Federal Aviation Administration	Governmental Agency
FAQ	Frequently Asked Questions	Common Term
FAST	Field Assessment Structural Team	StEER Term
FEMA	Federal Emergency Management Agency	Governmental Agency

FIRM	Flood Insurance Rate Maps	Regulatory Product
GEER	Geotechnical Extreme Events Reconnaissance	Academic Organization within NHERI
GPS	Global Positioning System	Measurement Technology
GSA	Government Services Administration	Governmental Agency
HVAC	Heating, ventilation and air conditioning	Building System
HWM	High Water Mark	Intensity Measure
IBC	International Building Code	Code/Standard
ICC	International Code Council	Code Body
IRC	International Residential Code	Code/Standard
ISEEER	Interdisciplinary Science and Engineering Extreme Events Research	Academic Organization within NHERI
LiDAR	Light Detection and Ranging	Measurement Technology
MCE	Maximum Considered Earthquake	Design Terminology
ME&P	Mechanical, electrical and plumbing	Building System
MMI	Modified Mercalli Intensity	Hazard Intensity Scale
NBC	National Building Code	Code/Standard
NEER	Nearshore Extreme Event Reconnaissance	Academic Organization within NHERI
NFIP	National Flood Insurance Program	Government Program
NHERI	Natural Hazards Engineering Research Infrastructure	Academic Organization within NHERI
NIST	National Institute of Standards and Technology	Governmental Agency
NOAA	National Oceanic and Atmospheric Administration	Governmental Agency
NSF	National Science Foundation	Governmental Agency
NWS	National Weather Service	Governmental Agency
OSB	Oriented strand board	Construction Material
OSEEER	Operations and Systems Engineering Extreme Events Research	Academic Organization within NHERI
PEER	Pacific Earthquake Engineering Research center	Academic Organization (Earthquakes)
PGA	Peak Ground Acceleration	Intensity Measure
PHEER	Public Health Extreme Events Research	Academic Organization within NHERI
PVRR	Preliminary Virtual Reconnaissance Report	StEER Term

QC	Quality Control	Oversight process
RAPID	RAPID Grant	Funding Mechanism
RAPID-EF	RAPID Experimental Facility	Academic Organization within NHERI
RC	Reinforced Concrete	Building Material
SAR	Search and Rescue	Standard Hazards Terminology
SGI	Special Government Interest	FAA Process
SLP	Surface-Level Panoramas	Measurement Technology
SMS	Short Message Service	Communication Modality
SPC	Storm Prediction Center	Governmental Agency
SSEER	Social Science Extreme Events Research	Academic Organization within NHERI
StEER	Structural Extreme Events Reconnaissance network	Academic Organization within NHERI
SUMMEER	SUstainable Material Management Extreme Events Reconnaissance	Academic Organization within NHERI
TAS	Testing Application Standard	Technical Standard
UAS/V	Unmanned Aerial Survey/System/Vehicle	Measurement Technology
USD	US Dollar	Standard Currency
USGS	United States Geological Survey	Governmental Agency
VAST	Virtual Assessment Structural Team	StEER Term
WS	Windshield Survey	Measurement Technology

ABOUT StEER

Vision

StEER builds societal resilience by generating new knowledge on the performance of the built environment through impactful post-disaster reconnaissance disseminated to affected communities.

Mission

StEER deepens the structural natural hazards engineering (NHE) community's capacity for reliable post-event reconnaissance through:

- **CAPACITY:** promoting community-driven standards, best practices, and training for field reconnaissance;
- **COORDINATION:** coordinating early, efficient and impactful event responses;
- **COLLABORATION:** broadly engaging communities of research, practice and policy to accelerate learning from disasters.

Our Contribution

StEER has worked to standardize its approach to assessing the impact of hazards on the built environment, developing specific processes, protocols, templates and guidance to support the community in these efforts. See Appendix A for a glossary of key terminology used by StEER.

Our Community

StEER broadly serves any and all stakeholders invested in or affected by the performance of buildings and other infrastructure, including academia, public and private sectors, government, non-profit, and public-at-large. While StEER directly funds a limited number of individuals to participate in its Field Assessment Structural Teams (FASTs), we engage the broader community through our Virtual Assessment Structural Teams (VASTs), unfunded collaborations with other organizations, and dissemination of data and findings to a wide range of individuals and organizations responding to and affected by disasters.

Under the banner of the Natural Hazards Engineering Research Infrastructure (NHERI) CONVERGE node, StEER works closely with the wider Extreme Events consortium to promote interdisciplinary disaster reconnaissance and research. The consortium includes the Geotechnical Extreme Events Reconnaissance (GEER) Association and the networks for Interdisciplinary Science and Engineering Extreme Events Research (ISEEER), Nearshore Extreme Event Reconnaissance (NEER), Operations and Systems Engineering Extreme Events Research (OSEEER), Social Science Extreme Events Research (SSEER), Sustainable Material Management Extreme Events Reconnaissance (SUMMEER), and Public Health Extreme

Events Research (PHEER), as well as the NHERI RAPID facility, the NHERI Network Coordination Office (NCO), and NHERI DesignSafe CI, curation home for all StEER products.

Hazards

StEER focuses on natural hazards causing structural damage to the built environment, including earthquakes, tsunamis, hurricanes, tornadoes and other extreme wind events. StEER does not respond to inland flooding or wildfire events; it similarly does not respond to blasts, fire and other destructive events not associated with an underlying natural hazard.

Organization & Structure

StEER's organizational model includes a Leadership Team, three hazard-specific Advisory Boards (Coastal, Earthquake, Wind), Working Groups, its Members, and its Support Team. See https://www.steer.network/about for the specific persons holding these roles currently.

Leadership Team

StEER's Leadership Team oversees its operations. The Leadership Team is composed of a Director and four Associate Directors, which are the Principal Investigators of the NSF Award. Associate Directors respectively represent coastal, earthquake and wind hazards, as well as the cross-cutting theme of data standards, to deliver support for the diverse needs of the structural engineering reconnaissance community. Each role is defined as follows:

- **Director:** responsible for overseeing the design and operations of the network and represents StEER in a number of external-facing functions, including holding a position on the NHERI Converge Leadership Corps.
- **Associate Director for Seismic Hazards**: serves as primary liaison to the Earthquake Engineering community and direct engagement of the Earthquake Hazard Advisory Board.
- **Associate Director for Wind Hazards:** serves as primary liaison to the Wind Engineering community and direct engagement of the Wind Hazard Advisory Board.
- **Associate Director for Coastal Hazards:** serves as primary liaison to the Coastal Engineering community and direct engagement of the Coastal Hazard Advisory Board.
- **Associate Director for Data Standards:** ensures StEER processes deliver reliable and standardized reconnaissance data suitable for re-use by the community, working closely with NHERI DesignSafe Cyberinfrastructure and NHERI RAPID facility.

Advisory Boards

These 5-person Advisory Boards are established separately for earthquake, wind and coastal communities of research and practice. Board members are selected by the respective Associate Director for that hazard from the ranks of Level 3 and 4 StEER members with expertise in that hazard, with special consideration of those who have been nominated/self-nominated through

an open call to the members. The board shall strive for diverse representation, ensuring at least one early-career member is included. Individuals serve a 2-year term, effective January 1 of their appointment year.

Working Groups

StEER will operationalize Working Groups dedicated to specific tasks that require dedicated design or operationalization. The Working Groups are open to any StEER member, but will be chaired by Level 3 or 4 StEER members. The Working Group may have support staff assigned to assist with tasks. Each working group will decide the cadence and format of their activities, which are generally conducted online. The Working Group will have a dedicated Slack channel for communications with its members. Currently StEER has one active Working Group:

- **Working Group on Performance Quantification:** This working group is charged with advancing StEER's standards for performance quantification, unifying these across hazards, implementing them in our unified mobile app, and formalizing guidance around this.

Members

StEER members are volunteers who meet the criteria established in the Membership Guidelines Section. The interactive map at https://www.steer.network/about provides the latest overview of StEER's membership distribution globally. These members will then engage with StEER in event response in one of two team formats: StEER's Virtual Assessment Structural Teams (VASTs) and Field Assessment Structural Teams (FASTs).

Virtual Assessment Structural Teams (VASTs) serve a number of vital roles for StEER. While StEER members of all levels participate on VASTs, VASTs serve as an important venue for members to build up their experience to eventually move into Field Assessment Structural Teams (FASTs) as trainees. As VAST participation is more flexible and voluntary, VAST becomes the primary means of engagement for most StEER members. VASTs play a central role in the Level 1 responses (see Response Protocol) by gathering publicly-available data, including social media posts, and synthesizing it to produce standardized products. For each event, VAST will have a lead (or possibly a co-lead), as well as other roles described in Response Protocol.

Field Assessment Structural Teams (FASTs) are responsible for collecting valuable ephemeral data as part of StEER event responses. FASTs oversee field data collection at Level 2 and Level 3 (see Response Protocol). Each FAST, which typically ranges from 2-6 members and will engage in a range of assessment technologies, from smartphone-based performance assessments to large-scale imaging efforts using unmanned aerial systems or vehicle-mounted panoramic imaging systems. FASTs are generally composed of StEER members at Level 3 or 4; however, each team will also have a Level 2 member as a trainee. Each FAST will have an

appointed Lead (Level 4 member) who will be responsible for guiding the team in the field and ensuring the protocols and standards for data collection are followed by each team member. FAST members are selected from interested and qualified StEER members based on experience, expertise and capacity, including abilities to operate specialized equipment. FAST members also assist with data curation tasks following their mission, such as ensuring data is transferred to DesignSafe and supplying relevant metadata or information needed to ensure the data can be re-used by the community. They also author reports and publications with findings derived from their data. Financial support policies for FASTs are outlined in Appendix B.

FAST Collaborations with Private and Public Sector

StEER has shared its plan for fieldwork with other interested self-funded groups, who will possibly coordinate in the field with StEER, but handle their own logistics. In other cases, these individuals may embed into a StEER FAST. Whether working independently, in loose coordination, or tightly coordinated/embedded, these teams are encouraged to adopt StEER's data collection platforms and standards and share the workload collaboratively to cover larger portions of the affected area, particularly if there is a shared commitment to data sharing. Moreover, anyone can adopt StEER's data collection platforms and collect data in compliance with the StEER standards, so even if self-funded, StEER hopes this platform can minimally help self-funded researchers collect consistent, high-quality data.

Support Team

StEER's operations coordinated and supported by different configurations of the following personnel:

- **Program Coordinator:** A staff member based at the lead institution (currently Notre Dame) that is responsible for various operational and logistical support of StEER and its members, particularly during event responses and back-end curation tasks.
- **Research Associates:** Graduate and postdoctoral associates based at any of the Leadership Team's institutions may be hired onto the StEER project to help build out research infrastructure and protocols.
- **Student Administrator:** A student based at the lead institution (currently Notre Dame) that works under the Program Coordinator to manage membership workflows, database management, and related administrative duties.
- **Data Librarians:** A geographically distributed team (typically graduate and undergraduate students) engaged in a rigorous Data Enrichment and Quality Control (DE/QC) process involving review, quality assurance, and enrichment of the collected data in preparation for final curation in DesignSafe.

MEMBERSHIP GUIDELINES

By joining StEER, members will receive regular communications from StEER, have access to StEER resources and technical guidance, and the opportunity to participate in StEER VASTs or FASTs, as eligibility permits. Note that since StEER has only limited FAST slots, VASTs serve as the primary platform for participation in StEER.

Membership Process

To join StEER, members should:

1. Have formal training or experience as a:
    a. Structural engineer, either as an academic (researcher, faculty, staff, student) or practicing engineer (public or private sector);
    b. Member of allied field of natural hazard engineering that can support structural engineering assessments of damage due to natural hazards, e.g., coastal engineer;
2. Have an active DesignSafe account with an active Slack account. (Slack is used for all FAST and VAST coordination.)
    a. If individuals do not yet have a DesignSafe account, please visit https://www.designsafe-ci.org/account/register/ and create one before completing the StEER membership application.
    b. If individuals already have a DesignSafe account, but it was decommissioned due to lack of activity and/or have never activated or used their Slack account on DesignSafe, please create a ticket with DesignSafe at https://www.designsafe-ci.org/help/new-ticket/ to get your account activated.
3. Complete this StEER membership application available at https://www.steer.network/membership.

Membership Levels

Based on experience level, individuals will be assigned a membership level within StEER. The assigned level will be communicated in the member's welcome email. Membership level assignments are reviewed annually and updated based on each member's evolving experience conducting field reconnaissance and training, with official communication to the member by email. Currently, StEER membership levels are designated as:

- Level 1: No prior field experience and/or no repeated participation on VASTs (not eligible for FASTs)
- Level 2: Repeated substantive participation on VASTs and/or specialized training in data capture (eligible as FAST trainee)
- Level 3: Some prior field experience (eligible for FAST, Working Group Chair)
- Level 4: Significant prior field experience (eligible for FAST Lead, Working Group Chair)

Eligibility for event responses is dependent upon membership level and/or expertise relevant to that hazard or region. Members at Level 3 or 4 are automatically eligible for FASTs, with Level 4 eligible to serve as the StEER FAST Lead. StEER will reserve at least one slot on each FAST for a Level 2 member's participation as a FAST trainee, mentoring under more seasoned reconnaissance professionals.

Getting to the Field

Individuals without prior field experience or repeated substantive participation on StEER VASTs (defined as Level 1) can advance their membership to Level 2 by one or more of the following:

1. Participate regularly and actively in StEER VASTs.
2. Complete Converge Trainings (https://converge.colorado.edu/resources/training-modules/).
3. Participate in other non-StEER-funded field reconnaissance, e.g., NSF-funded RAPID grant.
4. Complete training/certification/licensing in any of the specialized equipment rented by the NHERI RAPID Facility.

COMMITMENTS

The commitments between StEER and its members are essential to maintaining a healthy organization, strong partnerships and the good standing of its members. Members who are no longer able to honor their commitments to StEER accept StEER's right to revoke their membership and in so doing their ability to participate on StEER FASTs or VASTs.

In support of event responses, StEER commits to:

- Coordinate event responses by activating VASTs and FASTs and connecting these teams with relevant actors within NHERI and the wider hazards community as part of an overall response strategy;
- Make available a wide-range of resources (policies, protocols, templates, mobile apps, data standards, training materials, etc.) to support its FASTs and VASTs;
- Advance the talents and capabilities of its members including training to perform safe, ethical and effective post-event reconnaissance;
- Guide the entire data to knowledge life cycle for an event, including strategy development, data collection, data processing and analysis, quality assurance, curation, and dissemination;
- Direct the financial and human resources necessary to execute the event strategy;
- Communicate the products and impacts of StEER and its members widely;
- Remain responsive to the feedback, concerns and needs of its members.

In support of event responses, StEER's members commit to:

- Provide their time and talents as a voluntary contribution to the mission of StEER and to do so in a manner that is unbiased and objective;
- Work collectively in a mutually beneficial and respectful manner with fellow StEER members, as well as other partners, to swiftly assemble and generate high-quality reconnaissance data suitable for re-use with the wider hazard community;
- Share any data and resources that can be of assistance to the event response on Slack;
- Work within the leadership structure of the FAST or VAST and their assigned role in the response;
- Remain responsive to StEER requests during the entire data-to-knowledge life cycle, including strategy development, data collection, data processing and analysis, quality assurance and curation, and dissemination to ensure data and findings can be swiftly shared;
- Conduct themselves in a manner that preserves the safety and security of themselves, their team members, and those they interact with;
- Ensure these efforts are in compliance with:
    - the event strategy outlined by StEER and its stated priorities, regardless of their own personal interests;
    - the policies and protocols developed by StEER, including all aspects of this document and VAST and FAST Handbooks;
    - the policies of NSF including those explicitly stated in the latest PAPPG https://new.nsf.gov/policies/pappg/23-1;
    - the laws and declarations enacted by officials/agencies in the affected areas.
- As representatives of StEER and in turn of its sponsor, the National Science Foundation, follow high standards of professionalism. This includes:
    - Treating all persons with respect, including refraining from conduct that is aggressive, harassing, discriminatory or insensitive;
    - Respecting local customs, traditions, privacy, and rights of affected communities;
    - Extending empathy for the fact that colleagues and individuals living or working in the impacted area may also have personally been victims of the event and thus are operating under abnormal conditions.

Advancing Your Research Agenda

Please note that StEER does not conduct *hypothesis-driven research*. StEER's mandate is to collect perishable data swiftly and systematically in order to inform the continued study of a disaster through subsequent in-depth data collection that addresses specific research questions. While involvement in StEER or the examination of StEER data and reports undoubtedly helps to illuminate new research questions, these questions should be addressed through a researcher's own follow-on proposal to NSF (through mechanisms such as the RAPID grants) or other agencies.

RESPONSE PROTOCOL

StEER has a three-level response model that is summarized in the following table. The decision to activate and escalate is guided by the criteria in Appendix C. At each level, StEER employs specific personnel models to produce specific response products. Financial support policies for Level 2 and 3 responses are outlined in Appendix B.

Response Level	Personnel Model	Products
Level 1: Virtual Data Gathering	VAST (Virtual) assembling of available data and information	Preliminary Virtual Reconnaissance Report (PVRR)
Level 2: Rapid Field Assessment	FAST - 1 (Scout) with rapid imaging capability	Early Access Reconnaissance Report (EARR) Curated dataset (I)
Level 3: Detailed Field Assessment	FAST - 2 (Field Investigation) with in-depth assessment capability	Data Paper (Journal Paper) Curated dataset (II)

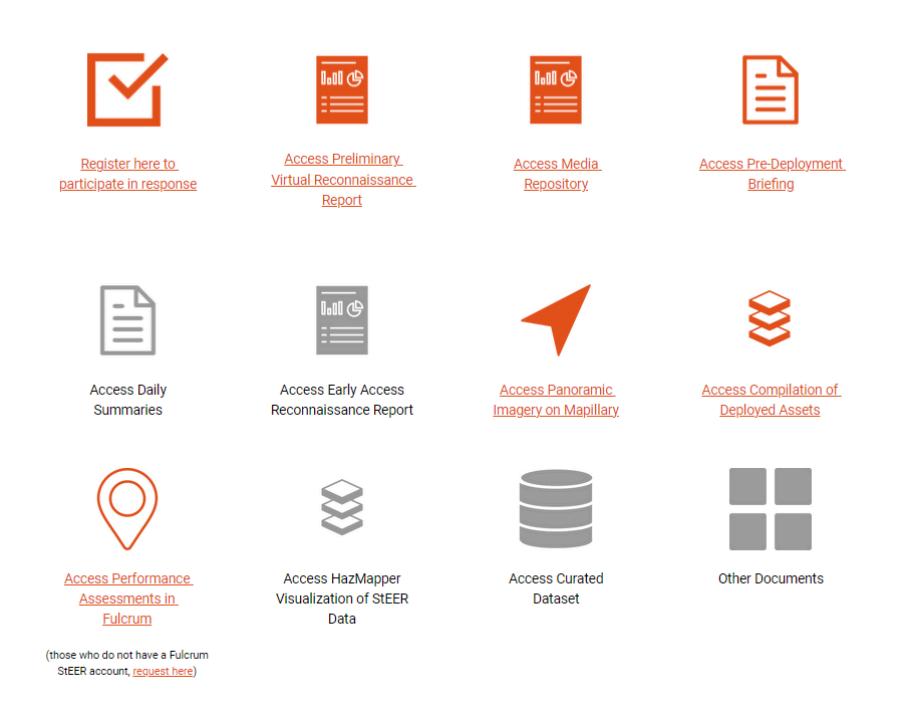
Qualifying Events

StEER's mandate is to investigate structural performance under natural hazards with emphasis on those causing structural damage to the built environment, generally due to dynamic load effects. This would include hurricanes (wind, wave and storm surge), tornadoes and other wind events, earthquakes, and tsunamis. While wind-driven rain is considered as part of the cascading hazards encountered in wind events like hurricanes, other forms of water damage due to inland flooding are generally not investigated by StEER. Similarly, while cascading hazards such as fire after earthquakes could be investigated as part of an earthquake response, StEER would not respond to a wildfire event in and of itself.

This decision to activate is based primarily on whether or not the event represents a potential opportunity to deepen collective understanding of the structural performance of the built environment under a given hazard. Characteristics of the hazard, the building inventory/infrastructure in the affected region, or possibly the unique history, policies or practices around structural mitigation in that region are all factored into this decision.

Key Resource: Response Page

A dedicated response page is created for each StEER Event at https://www.steer.network/responses. Response pages are curated at this website with all relevant information and assets for a given event response linked. When a response is active, this page will progressively update (by turning red) as assets go live or products are released (see example below).



Level 1 Response

1. **Network Activation:** The response is instigated by the StEER leadership team in consultation with relevant Hazard Advisory Boards, generally within 24-48 hours of the event. Decision is based upon the event satisfying the majority of the Level 1 Activation Criteria in Appendix C.
2. **Team Formation:** Call for participation is released to members by email and Slack. Those registering on the provided Google Form are included on the Virtual Assessment Structural Team (VAST) and invited to a private Slack channel for the response. A VAST Lead is appointed along with a dedicated author for each major section of the Preliminary Virtual Reconnaissance Report (PVRR). The Registration Form is linked on the event response page on StEER's website.
3. **Virtual Assessment:** VAST members compile imagery from the event in the Media Repository with detailed descriptions and commentary. Section editors review the repository and bring the most notable commentary and visuals into the PVRR. These efforts typically span a week.

4. **Product Release:** Level 1 closes with the publication of the Media Repository and PVRR (and accompanying Outage & Restoration Database, if applicable) on DesignSafe, each with their own DOI and authors contributing to each included in the citation. The availability of these products are announced to members by email and Slack. These assets are linked on the event response page on StEER's website.

Level 2 Sequence

1. **Network Escalation:** Decision to escalate is informed by the information in the PVRR, based upon the event satisfying the majority of the Level 2 Activation Criteria in Appendix C. The decision is announced at the time of the Level 1 product release.
2. **Mission Design:** Given that StEER needs to broadly sample performance at this level of response, the Leadership Team will identify geographies and routes for data collection, captured in a Pre-Deployment Briefing.
3. **Imagery Collection:** A small scout team is formed from members expressing interest with the primary responsibility of scouting affected areas and capturing street-level panoramic imagery with vehicle-mounted systems. These Field Assessment Structural Teams (FAST) complete Daily Summaries on their impressions and level of access. Data collection typically concludes within a week.
4. **Product Development:** The collected imagery is hosted on a web viewer such as Mapillary for ease of access and is prepared for long-term curation on DesignSafe. Impressions from Daily Summaries are compiled into an Early Access Reconnaissance Report (EARR).
5. **Product Release:** Level 2 closes with the publication of the EARR on DesignSafe, with its own DOI. All FAST members receive authorship on the EARR's DOI. The availability of this product is announced to members by email and Slack. These assets are linked on the event response page on StEER's website.
6. **Data Enrichment & Quality Control:** Data collected at Level 2 is enriched and quality controlled by StEER Data Librarians in preparation for long-term curation on DesignSafe, under a unique DOI that includes all FAST members involved in data collection at Level 2. The dataset is accompanied by a Data Report to aid in the re-use of data by others.[1]

Level 3 Sequence

1. **Network Escalation:** Decision is informed by the information in the EARR, based upon the event satisfying the majority of the Level 3 Activation Criteria in Appendix C. The decision is announced at the time of the Level 2 product release.
2. **Mission Design:** StEER Leadership and the relevant Advisory Board will design the objectives, sampling strategy, and geographies for the mission. One or more Field Assessment Structural Teams (FAST) will be formed from interested qualified members

[1] If the response escalates to Level 3, this step will roll into the Data Enrichment & Quality Control step in Level 3.

based on expertise and availability, adding at least one trainee. The number of participants and event phases of the data collection will vary, based on the objectives. Mission design will also consider relevant assessment technologies, including use of RAPID Facility hardware.

3. **Data Collection:** This mission strategy is executed by FAST in possibly multiple phases spanning weeks. In this phase, an in-depth assessment of hazards and the performance of selected infrastructure is documented using the StEER mobile app, LiDAR scanners, and other non-destructive in situ measurements, alongside sample collection for laboratory testing. Additionally, if necessary, aerial imagery of the affected area is captured by a dedicated drone team to document the performance of roofs and other structural elements not visible from the ground.
4. **Data Enrichment & Quality Control:** Data is enriched and quality controlled by StEER Data Librarians in preparation for long-term curation on DesignSafe, under a unique DOI that includes all FAST members involved in data collection at Level 2 or 3. The dataset is accompanied by a Data Report to aid in the re-use of data by others.
5. **Product Release:** The availability of these products are announced to members by email and Slack. These assets are linked on the event response page on StEER's website.
6. **Product Development:** FAST members are invited to participate in the authorship of a Data Paper to be published in an archival version to overview the mission and introduce the dataset and key learnings.

RESPONSE PRODUCTS

StEER produces the following standard products, possibly with additional supplemental files. With the exception of the Journal Papers, all of the products of a given event are curated in DesignSafe, all housed under the same project (designated by a unique identifier: PRJ-####). Each will be published under its own DOI.

Level 1

Preliminary Virtual Reconnaissance Report (PVRR): This is the primary product of a Level 1 response, prepared by StEER's Virtual Assessment Structural Teams (VAST) based on available third party data, including news reports and social media posts. The PVRR compiles publicly-available information on the event, including hazard characteristics, impacts to various elements of the built environment, regulatory context, conditions within impacted communities, and establishes the topics worthy of further study. It is accompanied by a **Damage and Restoration Database**. This database compiles time-evolving outage data and time-evolving restoration data for different utilities and services, as well as transportation, if available. Dedicated VAST members will be assigned to each section of the PVRR and the Damage and Restoration Database, as well as one to lead the overall VAST effort, based on their expertise

and their willingness to play a leadership role in the response. They will receive authorship on the PVRR.

The **Media Repository,** a separate product released at the same time as the PVRR, is a curated slide deck organized by different sections (Hazard Characteristics, Buildings by Class, Infrastructure by Class, and Geotechnical & Coastal Protective Systems). Each slide provides imagery, with annotations, and standard metadata. All VAST members not taking a leadership role in the PVRR contribute to the Media Repository. It receives its own DOI.

The media repository and damage and restoration database inform the writing of the PVRR.

Level 2

Early Access Reconnaissance Report (EARR): This is the primary product of a Level 2 response, based on data collected by the Field Assessment Structural Teams (FAST). The EARR builds upon the PVRR by providing synopses of the observations from Level 2 data collection, organized by structure class and/or geography, as well as recommended areas of further study.

Dataset: This product is initiated during the data collection process by a Field Assessment Structural Team (FAST) at Level 2. The quality-assured data in a standard structure, as well as a **Data Report** providing details of the data collection and post-processing. If the response escalates to Level 3, the dataset will include the entirety of the data collected at both levels and will be released after Level 3 completes.

Level 3

Data Paper: FAST participants in a Level 3 response are encouraged to create a peer-reviewed archival publication that introduces the mission and generated dataset, as well a summary of observed performance with specific case studies.

StEER Products & Attribution Policies

StEER may issue up to three products as part of an event response, each of which is curated at NHERI DesignSafe as a unique project with a dedicated DOI explicitly to promote re-use by the community. StEER strongly encourages the community's exploration, analysis and dissemination of new knowledge generated from these standard StEER reports and datasets. Authorship on these products is defined below:

- **Preliminary Virtual Reconnaissance Report (PVRR):** Authorship on this DOI includes the VAST Lead(S) and all VAST members who served as section authors, followed by editors (normally StEER Leadership Team). Authorship order is VAST Lead(s), followed by the section authors (in the same order as the sections of this report), the Outage and

Restoration Database Lead, followed by the editors in alphabetical order. The Outage and Restoration Database is published with the PVRR under the same DOI.

    - **Media Repository:** This product is published under its own DOI with authorship order as follows: the Repository Curator(s) and all Repository Contributors, in order by number of records contributed.

- **Early Access Reconnaissance Report (EARR):** Authorship on this DOI includes all FAST members who collected data. Authorship order is as follows: FAST Lead(s), FAST members in alphabetical order, Event Coordinator, VAST Lead or master editor, other VAST contributors to the EARR in alphabetical order, and editors (typically StEER Leadership Team), in alphabetical order.
- **Quality-Assured Dataset:** Authorship order includes everyone who collected data at Level 2 and/or 3 as well as everyone who supported the Data Enrichment and Quality Control process. Authorship order is as follows: FAST Lead(s), Data Standards Lead, Mission Coordinator, remaining FAST Members (in alphabetical order), Data Librarians/VAST (lead followed by others in alphabetical order), Data Report Lead, and Rapid EF.
- **Data Papers:** Data paper authorship will be dictated by the practices and guidelines of the publishing journal.

Related to the above products, StEER applies the following products and practices:

- StEER adopts a CC-BY (Creative Commons) Attribution License when publishing on DesignSafe, which implies that licensees may copy, distribute, display and make derivative works based on these products, but only if they provide appropriate attribution, preferably through direct citation using the associated DOI.
    - Specifically, any publications describing findings from StEER reports should cite its DOI.
    - Similarly any publications presenting, analyzing or making use of event data shall reference the dataset DOI.
- Beyond the Data Paper, FAST and VAST members associated with an event response are free to author other journal articles and conference papers at their discretion, though with the following expectations:
    - Corresponding authors are expected to report full citation information for any publication resulting from StEER data to admin@steer.network.
    - The acknowledgements of the publication or presentation include the following statement: *This material is based upon data generated by the Structural Extreme Events Reconnaissance* (*StEER*) *network, which is supported by the National Science Foundation under Grant No. CMMI 2103550. Any opinions, findings, and conclusions or recommendations expressed in this material are those of the authors and do not necessarily reflect the views of StEER or the National Science Foundation.*

    - Data Availability Statement should indicate that this data can be accessed at NHERI DesignSafe [INSERT URL FOR DOI].
    - The data should be cited, via DOI, upon its first use or introduction, in the manuscript. If the data is not yet published on DesignSafe due to the data still undergoing data enrichment and quality control, please contact admin@steer.network and the raw data can be published (with disclaimers) as version 1 of the dataset on DesignSafe with a DOI in support of your publication.
- It is further hoped that FAST and VAST members pursue, when appropriate, additional funding from NSF or other agencies/organizations to explore hypotheses inspired by StEER event data. While StEER has no oversight role or responsibility for those follow-on activities, it strongly encourages that:
    - The PI informs StEER of this proposal effort (particularly if funded) through an email to admin@steer.network.
    - The proposal includes appropriate acknowledgement of StEER's role in generating the data or Recommendations for Future Study that informed this hypothesis, with citation to the relevant StEER reports and/or dataset using their official DOIs.
    - The PI continues to follow the commitments, practices and standards modeled by StEER (when appropriate), both because they are considered to represent good practice to maintain consistency in structural field reconnaissance data and because of the likelihood that the PI may continue to be perceived as a representative of StEER.

StEER Product Archives
As StEER reports are released, they become available in NHERI DesignSafe's Published section of the Data Depot at https://www.designsafe-ci.org. By typing "StEER" in the search bar, all datasets and reports issued by StEER should be listed. StEER also maintains a listing of all its response pages at https://www.steer.network/responses. Response pages include linkages to all published reports and data papers. Since all StEER datasets undergo a rigorous quality assurance process, the full datasets are not curated until months after the event. In the interim, available data products are listed on these event-specific Response Pages.

StEER RESOURCES

Badge

StEER members have access to a badge template that can be customized, printed and laminated as a credential for use during StEER activities. Email StEER at admin@steer.network if you cannot locate the email with the link to download and create your badge.

Fulcrum Mobile App

All StEER members are given access to StEER's Fulcrum account and its web-based dashboard (https://www.fulcrumapp.com) to access all StEER's Fulcrum Mobile Apps and assessment data. Members will receive an email from Fulcrum prompting them to set up their account. Members can also access that data by downloading the Fulcrum App on their phones.

Google Shared Drive

All StEER members are given access to the **StEER Members** Shared Drive on Google (see Figure 1), which contains the following directories:

- **Events:** folders used to coordinate responses to specific events, grouped by year
- **Communications:** Logos and other promotional materials for member use
- **Resources:** Shortcuts to handbooks, guidance documents, policies and templates

Ensure the email used in your registration (and not another personal or institutional account) is the one logged into your web browser when you attempt to access this Shared Drive.

Slack Channel

All StEER members are also invited to the DesignSafe Slack channel for StEER (#steer). This serves as StEER's primary communications platform. All members are encouraged to install the Slack Mobile App and/or Desktop App and monitor activity on this channel.

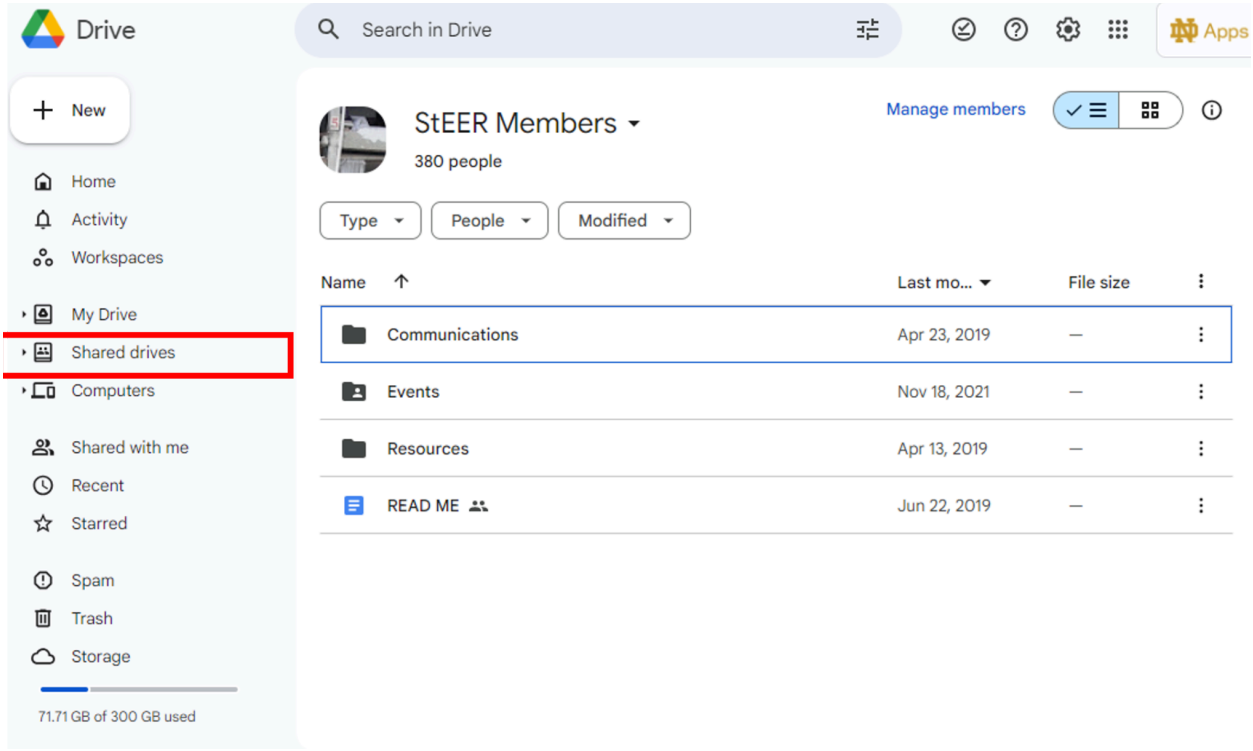


Figure 1. Accessing StEER Members Shared Drive through the left hand menu of Google Drive.

Website

StEER's outward presence is maintained on its website (www.steer.network), which includes information on event responses, membership guidelines, and all StEER's official products. All StEER members (who have opted in) are displayed on the About page of the StEER website. Members can also access key resources from the Resources page on the StEER website.

Email

StEER maintains an organizational email (admin@steer.network) for general inquiries and communications. StEER members are encouraged to outreach directly to the StEER Leadership by email or via direct message in Slack. Contact information for StEER leadership is maintained at: https://www.steer.network/contact.

APPENDIX A. GLOSSARY

Version Number	1.10	**Updated**	July 29, 2024
Term	**Acronym**	**Class**	**Description**
Response Levels			
Level 1: Virtual Data Gathering	L1	Response Level	virtual mission gathering and synthesizing publicly available online data, including high resolution satellite imagery; used in major hazard events that have potential to generate new knowledge relevant to StEER's mandate
Level 2: Rapid Field Assessment	L2	Response Level	field scout; wide-canvassing smaller FAST operating out of regional node for a rapid survey of the entire affected area to collect highly perishable data; used in major hazard events with ability to generate new knowledge relevant to StEER's mandate
Level 3: Detailed Field Assessment	L3	Response Level	full field investigation with systematic target selection using interdisciplinary teams with the objective of developing detailed case studies through tiered performance assessment with increasing fidelity levels including Basic Assessment (BA) - documenting high level global performance, Load Path Assessment (LPA) - documenting performance of elements along the critical load paths, and Direct Component Assessment (DCA) - documenting detailed information of components including dimensional data, material properties, and sample collection for lab investigation, conducted on a robust statistical sampling of the inventory; used in major hazard events where knowledge can be gained through in-depth evaluation of select structures
Mission Document Classes		Sub-division	Standard StEER sub-division of data, focused on written products
Planning Documents		Document Class	Standard StEER document class, encompasses assets produced to guide a Level 2 or Level 3 response
Pre-Deployment Briefing	--	Internal Document	Standard StEER document, defines mission scope, target areas and structures to visit, technologies, and team configuration
Daily Summaries	--	Document Subclass	Standard StEER document, submitted daily to document mission coverage and observed performance
Data Classes		Sub-divisi	Standard StEER sub-division of data, focused on

		on	observations and measurements
Performance Assessment	PA	Data Class	Standard StEER data class, direct evaluation of structural performance using StEER's standard assessment frameworks (often using StEER mobile apps)
PA: Coastal Buildings	PA-CB	Data Subclass	Standard StEER data subclass, direct evaluation of structural performance of buildings under coastal hazards
PA: Coastal Non-Buildings	PA-CNB	Data Subclass	Standard StEER data subclass, direct evaluation of structural performance of non-buildings under coastal hazards
PA: Earthquake Buildings	PA-EB	Data Subclass	Standard StEER data subclass, direct evaluation of structural performance of buildings under seismic hazards
PA: Earthquake Non-Buildings	PA-ENB	Data Subclass	Standard StEER data subclass, direct evaluation of structural performance of non-buildings under seismic hazards
PA: Windstorms Buildings	PA-WB	Data Subclass	Standard StEER data subclass, direct evaluation of structural performance of buildings under wind hazards
PA: Windstorms Non-Buildings	PA-WNB	Data Subclass	Standard StEER data subclass, direct evaluation of structural performance of non-buildings under wind hazards
Surface-Level Panoramas	SLP	Data Class	Standard StEER data class, rapid imaging technique collecting 360 photographic evidence
SLP: car-mounted systems	SLP-C	Data Subclass	Standard StEER data subclass, rapid imaging technique collecting 360 photographic evidence using cars
SLP: boat-mounted systems	SLP-B	Data Subclass	Standard StEER data subclass, rapid imaging technique collecting 360 photographic evidence using boat
SLP: backpack-mounted systems	SLP-BP	Data Subclass	Standard StEER data subclass, rapid imaging technique collecting 360 photographic evidence using backpack mounts
SLP: handheld systems	SLP-HH	Data Subclass	Standard StEER data subclass, rapid imaging technique collecting 360 photographic evidence using handheld
Unmanned Aerial Systems	UAS	Data Class	Standard StEER data class, common mode of aerial data collection in the field
Free-Flight	UAS-FF	Data Subclass	Standard StEER data subclass, unmanned aerial system in free-flight
Panoramas	UAS-P	Data Subclass	Standard StEER data subclass, unmanned aerial system generating panoramas
3D Models	UAS-3D	Data	Standard StEER data subclass, unmanned aerial system

		Subclass	generating 3D models
Terrestrial Scanning Technologies		Data Class	Standard StEER data class, Light Detection and Ranging measurements collected by various platforms
LiDAR-Based Instruments: Fixed	F-LBI	Data Subclass	LBI subclass; fixed/stationary mode for ground-based data collection
LiDAR-Based Instruments: Mobile	M-LBI	Data Subclass	LBI subclass; mobile mode for ground-based data collection
LiDAR-Based Instruments: Aerial	A-LBI	Data Subclass	LBI subclass; aerial mode for data collection
Site Hazard Assessment	SHA	Data Class	Standard StEER data class, forensic evidence of hazard intensity
SHA: Coastal Surveys	SHA-C	Data Subclass	SHA subclass, documenting coastal impacts after hurricanes/tsunamis
SHA: Windfield Indicators	SHA-W	Data Subclass	SHA data subclass, documenting evidence of wind speed such as tree fall patterns
SHA: Earth Movement/Rupture	SHA-E	Data Subclass	SHA data subclass, documenting evidence of earthquake intensity and ground shaking in ground surface
Other Ground-Based Observations	GBO	Data Class	Standard StEER data class, general category of observations using other data collection platforms beyond those in other standard data collection platforms such as photographs and videos captured outside of StEER mobile apps
Digital single-lens reflex camera	DSLR	Data Subclass	GBO subclass, documented using DSLR cameras
Other camera	--	Data Subclass	GBO subclass, documented using other types of cameras
Geospatial Positioning Data	GPD	Data Class	Standard StEER data class, coordinates or tracks that define locations of data collection
GPD: GPS Locations	GPD-L	Data Subclass	Standard StEER data subclass, coordinates of point data collection
GPD: GPS Routes	GPD-R	Data Subclass	Standard StEER data subclass, coordinates of data collection routes
Sampling Strategies			
Statistical Sample		Sampling Strategy	Sampling every Nth building in a cluster or along a route for performance assessment
Critical Case Sampling		Sampling Strategy	Sampling buildings that meet specific criteria, e.g., instrumented, or performance characteristics
Cluster-Based Sampling		Sampling Strategy	Sampling buildings within a defined radius of a point, e.g., ground motion station

Transect-Based Sampling		Sampling Strategy	Sampling buildings along a path that moves across the hazard intensity gradient
Quota-Based Sampling		Sampling Strategy	Sampling buildings to achieve a representative sample based on characteristics of underlying building inventory
Opportunistic Sampling		Sampling Strategy	Assessment of structure not included in initial sampling strategy, based upon unique features or performance observed in the field
Activities			
Windshield Survey	WS	Activity	Manual collection of photographs from a vehicle, while gathering broad impressions of the surrounding environment.
Basic Assessment	BA	Activity	Lowest fidelity performance assessment, includes high-level global damage assessment for identifying damage gradient in affected communities following a hazard event
Load Path Assessment	LPA	Activity	Moderate fidelity performance assessment, includes in-depth performance assessment of Critical Load Path Elements (CLPE) including identification of (a) geolocation of damaged elements, (b) damage measures/modes, (c) component damage ratings
Detailed Component Assessment	DCA	Activity	Highest fidelity performance assessment, involves collecting detailed information on components, including dimensional data and/or material properties, as well as hazard intensity measures
Reconnaissance Engagement And Communication Hub	REACH	Activity	Communication and dissemination of findings to audiences in academia, policy and practice
Data Enrichment Quality Control	DEQC		Review and supplementing of assessment data to improve its quality and richness
Dissemination Products			Outputs of StEER Missions
Standard StEER Products			
Data Report	--	Product	Standard StEER Product; accompanies curated data in DesignSafe to detail the scope and structure of data
Event Briefing	EB	Product	Standard StEER Product, released in Level 1 response to synthesize the findings from VAST efforts
Early Access Reconnaissance	EARR	Product	Standard StEER Product, released after FAST-1 in a Level 2 or Level 3 response, summarizes the data

Report			collection process and major observations
Preliminary Virtual Reconnaissance Report	PVRR	Product	Standard StEER Product, released in Level 1 response to synthesize the findings from VAST efforts
Other Academic Products			
Conference Paper		Product	StEER document subclass, external communications of findings at conference venues
Journal Papers		Product	StEER document subclass, external communications of findings in journals
Other Products		Product	StEER document subclass, external communications of findings in other venues/audiences
Personnel Models			
Field Assessment Structural Team	FAST	Personnel Model	Standard StEER personnel model, comprised of StEER members charged with field data collection in a Level 2 and Level 3 response; may be multiple sequential or parallel teams numbered FAST-1, FAST-2, etc.
Virtual Assessment Structural Team	VAST	Personnel Model	Standard StEER personnel model, comprised of StEER members charged with virtual data collection and synthesis
Data Librarians		Personnel Model	Undergraduate students responsible for data enrichment and quality control tasks
Research Associates		Personnel Model	Postdoctoral scholars who support overall operations and research/development activities
Student Administrator		Personnel Model	Undergraduate student who manages member records, correspondence
Board of Directors		Personnel Model	Highest unit of governance, includes director, associate directors for each hazard, associate director for data standards (PIs on NSF Award)
StEERing Committee		Personnel Model	10-person governing body, which includes a representative from each Working Group (2) and Hazard Advisory Board (3), two elected at-large StEER members and three elected regional node representatives will be responsible for making activation decisions under the tiered regional response model and will lead the science planning activities
Hazard Advisory Boards		Personnel Model	5-member elected boards dedicated to wind, coastal and earthquake hazards, led by the respective Associate Directors, to guide StEER activities/protocols from each hazard perspective

Working Groups		Personnel Model	Collaboratives focused on specific tasks/capabilities, open to StEER members at all ranks, with an appointed chair

APPENDIX B. FINANCIAL SUPPORT

Support for StEER Members

StEER is a volunteer organization. Members who participate on VASTs or FASTs do so without formal compensation for their time/efforts. StEER does provide financial support for travel in two instances:

- Reimbursement of costs associated with field data collection by FASTs
- Reimbursement of costs of member participation in StEER workshops or planning meetings

While StEER welcomes collaboration with foreign partners, only individuals affiliated with US organizations are eligible for financial support from StEER. Those affiliated with US institutions need not be US citizens.

Financial support for StEER-sanctioned activities is guided by the following policies:

- For workshop or meeting support, travel allowance is a flat rate for all participants as designated in the workshop or meeting budget request to NSF, e.g., $750, and can be applied toward any eligible travel expense (defined subsequently).
- For FAST support, the level of budget allocated will be commensurate with projected costs of travel to the field site. Due to the shortage of accommodations and transport near impacted areas, this allocation presumes sharing of rooms (respecting gender distribution of the team) and vehicles.
- In both cases, StEER members will be reimbursed for actual travel expenses according to policies of the Lead Institution (currently University of Notre Dame), in accordance with NSF policies, and capped at this budget allocation for that event. Costs in excess of the budget allocation are the responsibility of the individual traveler.
- Eligible travel expenses include personal vehicle mileage, vehicle rental (including gas and fees), coach/economy airfare or other forms of ground transport, lodging and per diem.
    - Per Diem allowance is based on the GSA (domestic) or Department of State (international) rate for the destination. No receipts are required to claim per diem, which is assumed to offset the cost of food, telecommunications (data plan on personal phone running relevant mobile applications), and other incidentals associated with travel to the workshop/meeting or conduct of field work.
    - Note that when meals are provided by StEER during the workshop/meeting, then per diem amounts will be reduced accordingly.
- Receipts are required for all travel expenses, except for per diem, and must show evidence of the amount paid (normally through a zero balance or amount charged to a credit card) and not just the invoiced amount. Credit card or bank statements are another means to prove the amount paid if the original receipt or invoice does not.

- In addition to individual travel allocations, FASTs may make use of NHERI RAPID facility equipment, in which case equipment rental, shipping from the RAPID facility and any other data processing costs will be paid directly by StEER. A FAST member will normally need to ship the equipment back to the RAPID facility and StEER will directly reimburse these shipping costs to that individual.
- As reimbursements will be made directly to each StEER member (not their university) following the event, members should use personal credit cards/funds for all bookings.
- Following the event response or workshop/meeting, StEER will circulate a Google Form to all participants collecting required information and receipts for typical expense classes.
    - Reimbursements will require a mailing address along with citizenship status, since standard policy is to mail checks for all reimbursements.
    - Non-US citizens will need to provide a copy of their passport and other visa/entry documents. This information will be maintained in a secure file and deleted once the reimbursement has been issued.
- Reimbursements will be processed by the Lead Institution (University of Notre Dame) within 30 days of the event or workshop/meeting.

LEGAL ELIGIBILITY & TAX LIABILITY

For members who are not permanent residents or US citizens, compensation for your voluntary participation on a FAST can be issued only if you have appropriate immigration documentation. These documents will be requested at the time of your reimbursement request. It is always advisable to check with your Designated School Official (DSO) to ensure that your participation is not considered “working” for another institution in violation of your visa. This is especially important for students on F or J visas, including those on CPTs.

While travel expenses are generally not taxable as they are viewed under US tax code as legitimate business expenses, there are some circumstances where they may be taxed. Specifically, if voluntary participation does not involve an overnight stay, e.g., disaster strikes within driving distance of your residence and you drive daily to participate in data collection. To qualify as a travel reimbursement, you must travel away from your home and engage in an overnight stay. The implications vary based on immigration status:

- For those on a foreign visa, any compensation for expenses without an overnight stay will be taxable and taxes must be withheld from the payment at varying rates (depending on visa type). In such instances, StEER will gross up the payment, e.g., will increase the payment by 14% or 35% (depending on tax rate for that visa) to offset the automatic withholdings so individuals receive a net payment that fully compensates their eligible expenses.
- For US Citizens, the income is taxable and should be self-reported but taxes will not be withheld. If the compensation is over $600, a 1099 will be issued by StEER through the University of Notre Dame. Since tax rates are variable for persons in this category,

StEER will not gross up the payment.

- Any participation outside the 50 US states is considered foreign activities and not subject to these tax regulations. By this definition, data collection in Puerto Rico and the US Virgin Islands is considered (by tax law) as overseas activity.

NSF FINANCIAL SUPPORT FOR StEER AND ITS RELATION TO NSF RAPID AWARDS

StEER's current funding supports StEER's operations and provides modest funds to support FASTs in data collection activities.

StEER event response is independent of the NSF RAPID program, in that the decision to respond to a given event, the budget to be allocated, and the members to be involved are all determined by StEER (though StEER maintains close communications with NSF program directors throughout this process). As StEER is interested in swift event response and dissemination of preliminary findings with a very targeted strategy for sampling damage in the affected area, it does not have the mandate or capacity for comprehensive response to a major disaster or to undertake in-depth hypothesis-driven research.

StEER reports (PVRR, EARR) identify recommended areas for future study, open to the community to pursue, possibly through a NSF RAPID grant. NSF works closely with StEER to avoid duplication of effort and expects to see hypothesis-driven research in any follow-on, ideally informed by these recommendations from StEER (with direct citation to those reports). StEER does not directly influence the awarding of NSF RAPID grants, other than making its recommendations known to program directors and informing them of who is participating on StEER's FASTs. Note there is precedent for individuals participating on a StEER FAST successfully leveraging that experience (and the research questions it revealed) to secure additional funds from NSF or other sponsors for a more intensive, hypothesis-driven investigation of the event or re-use and expansion of StEER's collected data.

Support for StEER Data Librarians

StEER has limited funding for hourly support of data librarians to execute standard data enhancement and quality control procedures in preparation for publishing data on DesignSafe. Data librarians may be undergraduate or graduate students at any US institution. Tasks may include reviewing pre- and post-event imagery and other sources to confirm, standardize, or enrich geometric, structural, non-structural, or other performance-related features that are part of StEERs standard data collection protocols on structures or hazard indicators assessed during the FAST mission(s).

APPENDIX C. ACTIVATION PROTOCOL

The criteria in these tables define the potential conditions under which StEER may activate at Level 1, and once activated, subsequently escalate to Level 2 or 3. A simple majority of the criteria at each level must be satisfied to issue a recommendation for that level.

Level 1: Major hazard event with potential to generate new knowledge meets one or more of the following criteria:		
Hazard	**Exposure**	**Feasibility**
• Major intensity event (e.g., EF4, Cat 3, M5.5, Tsunami alert issued) • Long-duration events (e.g., slow moving lower intensity hurricane) • Notable joint/compounding hazards • Succession of events (e.g., sequence of earthquakes/ aftershocks, tornado outbreak, multiple hurricanes in a season)	• Sufficiently populated area to create measurable impacts • Noteworthy code or construction practices (e.g., test of revised codes, mitigation measures/retrofits) • Critical infrastructure • Under-documented structure classes • Existence of models or measurements, e.g., instrumented structures, digital twins, testbeds • Communities with history of recovery OR those rarely exposed • Communities with unique vulnerability	• Availability/interest of members • • Sufficient media/social media coverage on event, including the potential to automate mining of information • Bandwidth of StEER support team (e.g., multiple concurrent responses)

Level 2: Major hazard event with evidence of the ability to generate new knowledge meets one or more Level 1 criteria as well as the following criteria:		
Hazard	**Exposure**	**Feasibility**
• Design-level event (hazard intensity for non-tornadic event meets or exceeds code requirements and/or corresponding Mean Recurrence Intervals within PBE framework) • Hazard characteristics are unique (verified upon inspection of field observations/records)	• Significant loss of life • Highly vulnerable structures with severe damage or collapse and/or highly engineered structures with lower damage states • Recurring cases of nonstructural damage and the potential of prolonged downtime and recovery • For international: construction practices consistent with or analogous to US practice	• Availability of necessary equipment (e.g., imaging hardware) • Driving access to affected areas (e.g., curfews or restrictions can be navigated) • Safety (security, public health, etc.) • Availability/interest of members near impacted region • Availability of sufficient support from regional nodes • Deployment of other EERs or other initiatives collecting field observations

Level 3: Major hazard event with identified knowledge gaps meets one or more Level 2 criteria as well as the following criteria:		
Hazard	**Exposure**	**Feasibility**
• Some aspects of the event exceed code requirements (above code wind/ground shaking/coastal flooding, etc.) • Site-specific hazards require up-close evaluation, e.g., evidence of ground failures, scour, debris fields, localized wind effects, treefall patterns	• Performance/failures observed requires direct access to load path or other details to ascertain causes • Identification of multiple structures suitable for in-depth forensic investigation • Extent of damage (greater than localized Level 2 event) requiring multiple field teams or multiple field visits • Full range of damage levels present for fragility function development. • Variety of building typologies, occupancies, code eras • Conditions conducive to longitudinal studies of community response and recovery • Availability of as-built and retrofitted structures • Evidence of structural performance affecting community resilience • Sufficient instrumented structures and sensor data available	• On-site/up-close access to targeted structures is anticipated • Availability/interest of members with logistics plan to travel to site (including international locations with visa and other travel restrictions) • For international: Availability of local colleagues/engineers/sources to facilitate and guide the planned visits