# NHERI FACILITY SCHEDULING PROTOCOL

## INTRODUCTION

The Network Coordination Office (NCO) in partnership with the NHERI Experimental Facilities (EF) covered by this protocol will endeavor to promote and facilitate access for the entire research community to these shared-use laboratories equipped with high-quality hardware and dedicated and capable technical staff. This access and support will contribute to broadening the research directions by allowing a greater number of researchers to contribute to the experiments.

This partnership will enable efficient testing and user support and a totally safe environment. The NCO will centrally coordinate the schedule during NHERI time and facilitate shared technical knowledge and best practices among the Experimental Facilities including the RAPID facility through the scheduling dashboard in DesignSafe-CI. A shared, transparent, understandable, and on-time access protocol enables researchers to make use of laboratories and receive technical support to perform the needed experiments and simulations.

The scheduling protocol described in this document provides the framework for scheduling the usage of RAPID Facility resources based on the requirements in the solicitation. Given the schedule for commissioning, the NCO will work with the University of Washington RAPID facility to implement it and monitor progress at the appropriate time. It may be necessary for instance to modify the scheduling protocol to reflect the nature and objectives of the potential users to access it in a collapsed schedule. The NCO envisions that the scheduling might be more intense and expeditious around events, with some necessary periodic training and research support activities during the year.

Implementation of the protocol should be completed by January 30, 2017. In order to achieve this goal, the NCO with input from the NHERI Council will begin work in September 2016 to implement the protocol including necessary forms. With concurrence from the NSF, the NCO and Council will also seek input from the other Governance groups, Network Independent Advisory Committee (NIAC), and User Forum as these are populated. The NCO proposed protocol addresses scheduling roles, responsibilities, procedures for user access, and metrics for measuring wait time in queues and throughput. The proposed protocol also defines procedures related to the important aspects of schedule changes and conflict resolution.

## IMPLEMENTATION

The NCO will collaborate through its Facility Scheduler and Operations Coordinator (FSOC) and the IT specialist with the professional staff of DesignSafe-CI to implement the Facility Scheduling Dashboard for facility resources and users. The Facility Scheduling Dashboard will be accessible at the NHERI website likely inside the tab of Experimental Facilities (including the RAPID facility) with links pointing to this location at various places in DesignSafe-CI. The dashboard will contain appropriate links directing the user community to forms and protocols for access. The forms to request access are described in the next section. These forms are for Research Principal Investigator (RPI) to initially request facility utilization and registration during NHERI time. *The NHERI time is defined as the time the facility has committed for shared use access in the NHERI cooperative agreement with NSF*. Through the scheduling portal, users will be able to register and request access, to request appointments with the scheduler and/or facility, and to receive and send instructions. The dashboard will also permit the NCO Facility Scheduler and Operations Coordinator (FSOC) and facilities to easily access relevant user information and view the scheduling status. In addition to tracking the schedule of a user at a single facility, our scheduling system will allow us to manage the scheduling of multiple facilities at multiple locations for the same user. Scheduling changes made at one facility will be automatically updated with all facilities serving the same registered user. It will permit access to scheduling status on a weekly view and permit sorting users by status.

## FORMS AND TIMELINE FOR SUBMISSION

The key elements for user access are: (i) registering users in DesignSafe-CI; (ii) following user scheduling process including necessary forms (Fig. 1); and (iii) monitoring of the registered user schedule progress, with regular status

reminders to user and facility. The forms that will contribute to properly register and implement the scheduling of a user are described below for submission as detailed in the timeline illustrated in Figure 1.

1. ESPCC – Equipment Site Policy Compliance Check. ESPCC form is utilized by the EF to document an initial evaluation of the proposed project in the areas of project feasibility, safety, budget, schedule, and data.

2. SURF – Site Utilization Request Form utilized by the RPI and the EF to make an initial request to access a NHERI EF during NHERI time as defined in the previous section. The SURF will include the dates for the first two project phases as described in Figure 2. This form is required for all NSF and non-NSF funded research projects using the NHERI time.

3. SURFA – Site Utilization Request Form- Abbreviated. The SURFA is utilized by the EF manager on behalf of the RPI to allocate non-NHERI time to the project in the facility overall schedule. The SURFA will include the start and end dates of the project and an ID designation, i.e. Project A. This form is to be used by research projects not using NHERI time. The SURFA form will be the only form needed for users of the facility during non-NHERI time and is to be submitted by the Experimental Facility (EF) manager on behalf of these users.

4. ETP - Experimental Test Plan. The ETP is a detailed document that outlines the specific testing that will be conducted at the EF. At minimum, the ETP should contain the following items:

a. Project scope including( for example) details of specimens, fabrication location, erection, instrumentation, data acquisition, testing plans, and demolition.

b. Detailed list of equipment to be used at the NHERI EF and detailed list of researcher-provided equipment. The number of days of equipment site use for Phases 3-6 (Figure 2) should be included and encompass the entire duration of the experimental activities such as: time for fabrication, erection, testing and data uploading, and demolition.

c. Any project-specific safety requirements.

d. Anticipated project schedule for Phases 3-6 (start and end date for each phase and each component to be scheduled of the facility).

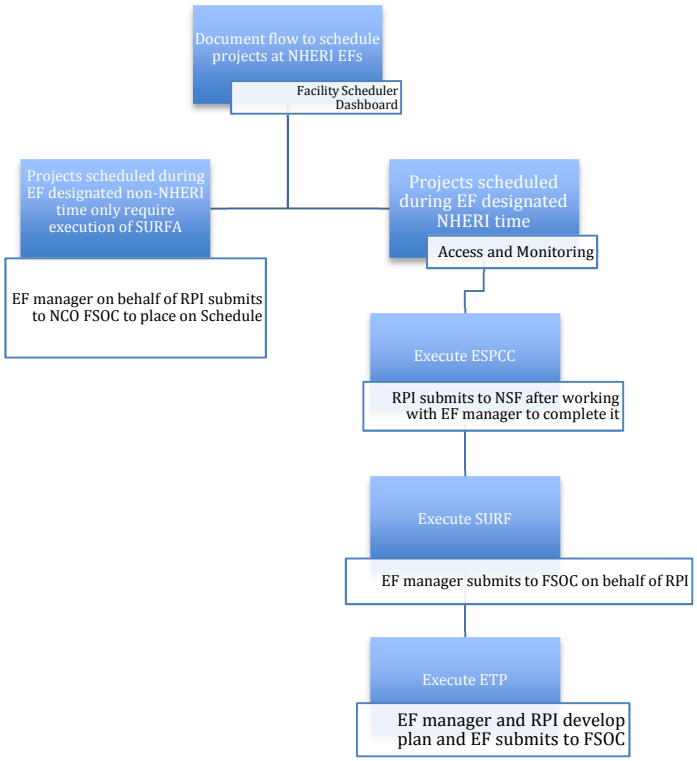

**Figure 1. Document Flow**

ELEMENTS OF NHERI SCHEDULING PROTOCOL

The scheduling protocol consists of six Phases (Figure 2). It describes the necessary components for transparent and clear management and oversight of the scheduling of research projects within NHERI. The goal of this protocol is to deliver open and on-time access to the users. This protocol is to be used to schedule all research conducted at the NHERI experimental facilities including the RAPID, whether funded by NSF or by another entity, during the days supported through the NHERI cooperative agreement between NSF and the NHERI EF, i.e. NHERI time. Table 1 illustrates interactions, timelines, roles, and responsibilities among the NCO FSOC, the Experimental Facility (EF) manager(s), and Research Principal Investigator (RPI). The process for scheduling projects is described next.

1. ESPCC is generated by the RPI and the EF manager after NSF has contacted the RPI and established the intention to make an award. RPI downloads the form from DesignSafe-CI and works with the EF manager to complete it. ESPCC form is submitted to NSF by the RPI signed by both EF manager and RPI with copy sent to FSOC. After the project has been awarded, the RPI informs the NCO via the FSOC. In the event of projects involving the use of multiple facilities, an ESPCC for each facility must be submitted. For non-NSF funded projects to be executed during NHERI time, the ESPCC is generated by the EF manager and RPI and submitted to the FSOC by the EF manager on behalf of the RPI to initiate scheduling process. ***Projects to be executed outside NHERI time do not require filing an ESPCC with the FSOC.***

2. After completion of Step 1, the RPI downloads SURF from DesignSafe-CI and works with EF manager to complete it. For projects to be executed during non-NHERI time, the EF manager downloads the SURFA form from DesignSafe-CI and works with the RPI to complete it. EF manager submits to FSOC either SURF or SURFA on behalf of the RPI.

3. NCO FSOC schedules project Phases 1-2 on central calendar using agreed upon SURF. SURFA dates are used by the FSOC to schedule entire project duration outside NHERI time.

4. RPI and EF develop Experimental Test Plan (ETP) for projects executed during NHERI time.

5. ETP signed by RPI and EF manager, containing the start and end dates of each Phase 3-6, is submitted to the FSOC by the EF manger before the end date of Phase 2. The FSOC will then proceed to schedule project Phases 3-6 using the dates given in the ETP.

6. Schedule changes will require filing of the Schedule Change Request (SCR) Form to be filed with the FSOC. The request must contain at least the reason/justification for the request, potential cost impact, new start and end date for each phase to be modified, and must be signed by the EF manager, RPI of the project to be rescheduled, and other RPIs potentially affected by the change down the line. Final approval or disapproval of the SCR is the responsibility of the FSOC and the Central Scheduling Committee (CSC).

Table 1. Schedule Protocol Roles and Responsibilities

| NHERI Entity | Roles and Responsibilities |
|---|---|
| NHERI Experimental Facility (EF), including RAPID | Operates under NHERI cooperative agreement with NSF to enable research to mitigate the impact of earthquakes,windstorms and related natural hazards of tsunami and storm surge on the civil infrastructure. The EF will follow the Scheduling Protocol and work with both the NCO FSOC and RPI to ensure that research project phases are completed in a timely and efficient manner. The EF (through the FSOC) will update their schedules on the Scheduling Dashboard at the DesignSafe-CI website **weekly**. Any expected delay must be communicated to the FSOC **within 24 hours**. Communication between EF and RPI will play a significant role in ensuring that project experiments are executed in a timely manner. EF is expected to maintain regular communication with RPI informing of schedule updates and key |

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|---|---|
| | information. As a project approaches its start date, communication will increase to ensure seamless transition from one project to the next. |
| EF Manager | Responsible (with the EF PI) for ensuring the EF fulfills protocol responsibilities and updating EF schedule weekly through the FSOC on the Scheduling Dashboard. Will execute the ESPCC with the RPI to document an initial evaluation of a project feasibility, safety, budget, schedule, and data management plan. Will work with the RPI in the development of the SURF for an NSF and non-NSF funded projects using NHERI time and the SURFA in projects not using NHERI time and will submit to FSOC. Responsible through the professional staff of the facility for ensuring the upload of all unprocessed (raw) data to NHERI central data repository. |
| NCO | Responsible for the oversight and implementation of the centralized schedule of the EF and tracking/reporting monthly metrics showing the wait time in queues and EF throughput. The NCO through its professional staff working with the EF will maintain a Scheduling Dashboard on the DesignSafe-CI website that will display current EF schedules and metrics in a clear and transparent fashion. Will make the forms required to schedule projects available on the Dashboard. |
| Strategic Committee (SC) | Strategic leadership committee of the NCO responsible for setting the strategy for the NCO. Final arbiter with concurrence from NSF in scheduling conflict resolutions. |
| Facility Scheduler and Operations Coordinator (FSOC) | Will work with EF manager, RPI, NSF and the CSC to ensure EF schedules are current and accurate. Will calculate metrics and ensure the Scheduling Dashboard on DesignSafe-CI website is accurate and operational. Serves as main point of contact for all scheduling questions and issues at all EFs and will collect and maintain copies of all relevant forms and paperwork associated with EF scheduling. |
| Central Scheduling Committee (CSC) | Appointed by the Strategic Committee. Will consist of a balanced representation of the NCO, EFs, and User Forum. The FSOC will be ex-officio voting member of the CSC. A six-member committee named post award will meet monthly via teleconferencing to review scheduling metrics and any scheduling conflicts that arise. Should a situation develop that requires more immediate action, the FSOC will convene the CSC. Should a situation involve one of the members of the CSC directly, that member will be excused from participating during the discussion and from any votes concerning that situation. If necessary, the SC will temporarily appoint an independent party to fill in. |
| Research PI (RPI) | Responsible for working with the EF Manager to develop the ESPCC, SURF and Experimental Test Plan (ETP) along with an accurate schedule for projects executed during NHERI time. RPI will follow agreed-upon ETP and avoid scope creep that negatively affects schedule. RPI will maintain regular communication with FSOC and EF to ensure that schedule is maintained, appropriate user support is provided by the facility, and issues are quickly addressed to avoid impeding project progress. |

## IMPLEMENTATION OF PROTOCOL

**Purpose:** Ensure clear and transparent access for Research Principal Investigators (RPIs) and their research teams to NHERI EF resources, including RAPID facility during the facility NHERI time.

**NHERI time:** Days supported through the NHERI cooperative agreement between NSF and the NHERI Experimental Facilities.

**Process:** NHERI Scheduling process is illustrated in Figure 2. It consists of six phases and describes the necessary components for transparent and clear oversight of the scheduling of research projects within NHERI facilities to deliver open and on-time access to users. This protocol will be used to schedule all research conducted during the NHERI time at the NHERI EFs including RAPID. Eligible research (research funded by NSF) will receive highest priority in scheduling or by another entity during the days supported through the NHERI cooperative agreement (NHERI time) between NSF and the NHERI EF. After the NCO FSOC receives a complete scheduling request, they will issue a response within five working days. Research projects executed outside NHERI time require notice to the

FSOC using the SURFA as soon as the facility has agreed to take on the project. The FSOC will place the project on the overall facility schedule within 24 hours.

**Facility Scheduling Dashboard:** Accessible through the DesignSafe-CI website. It makes available processes for NSF-supported and non-NSF supported investigators (or for an EF on their behalf) to request access during NHERI time.

**Metrics:** The protocol metrics for measuring wait time in queues and throughput are:

1. Wait time in queues. Wait time will be measured using two metrics, *Start On-time* and *End On-time*. A project phase may start or end early. Only Phases 3-6 will be measured. Metrics will be an average of the *Start* and *End* times scheduled for that month and will be reported monthly and available through the Scheduling Dashboard. The target for both is 0.
   *Start On-time*: Number of days Phases 3-6 start past planned date.
   *End On-time*: Number of days Phases 3-6 end past planned date.

2. Throughput. Number of days of over or under the planned duration of Phases 3-6. Finishing a phase in less time than scheduled allows results in a positive number of days. Taking longer than planned days results in a negative number of days. The metric will be an average of durations of phases year-to-date. It is reported monthly and available through the Scheduling Dashboard.

**Schedule Changes:** All schedules will be updated through the Scheduling Dashboard by each EF at least weekly. The facility will input the **actual** *Start* and *End* dates of each phase (see Figure 2). If future dates needed to be adjusted, the EF will contact the FSOC as soon as possible and file a request to change the schedule. Phase 1 and 2 may happen concurrently with the phases of other projects as long as they do not interfere with testing schedules and can offer the opportunity for schedule changes to expedite movement of projects. However, once the dates for Phases 3-6 have been established, these dates, especially the end date for Phase 4, will not change without a schedule change request to the FSOC.

**Conflict Resolution:** Should a conflict arise, the FSOC working with CSC will develop a solution with input from the RPI and EF. If a mutually satisfactory solution cannot be reached, the CSC will submit a recommendation to the SC, whose decision after NSF's concurrence will be final.

**Glossary of Acronyms:**

CSC: Central Scheduling Committee
DesignSafe-CI: Web address and cyberinfrastructure provider of the Natural Hazards Engineering Research Infrastructure
EF: Experimental Facility
EF PI: Experimental Facility Principal Investigator
ETP: Experimental Test Plan
ESPCC: Equipment Site Policy Compliance Check
FSOC: Facility Scheduler and Operations Coordinator
NCO: Network Coordination Office
NHERI: Natural Hazards Engineering Research Infrastructure
NIAC: Network Independent Advisory Committee
NSF: National Science Foundation
RAPID: Post-Disaster, Rapid Response Research Facility
RPI: Research Principal Investigator
SC: Strategic Committee
SCR: Schedule Change Request
SURF: Site Utilization Request Form
SURFA: Site Utilization Request Form Abbreviated

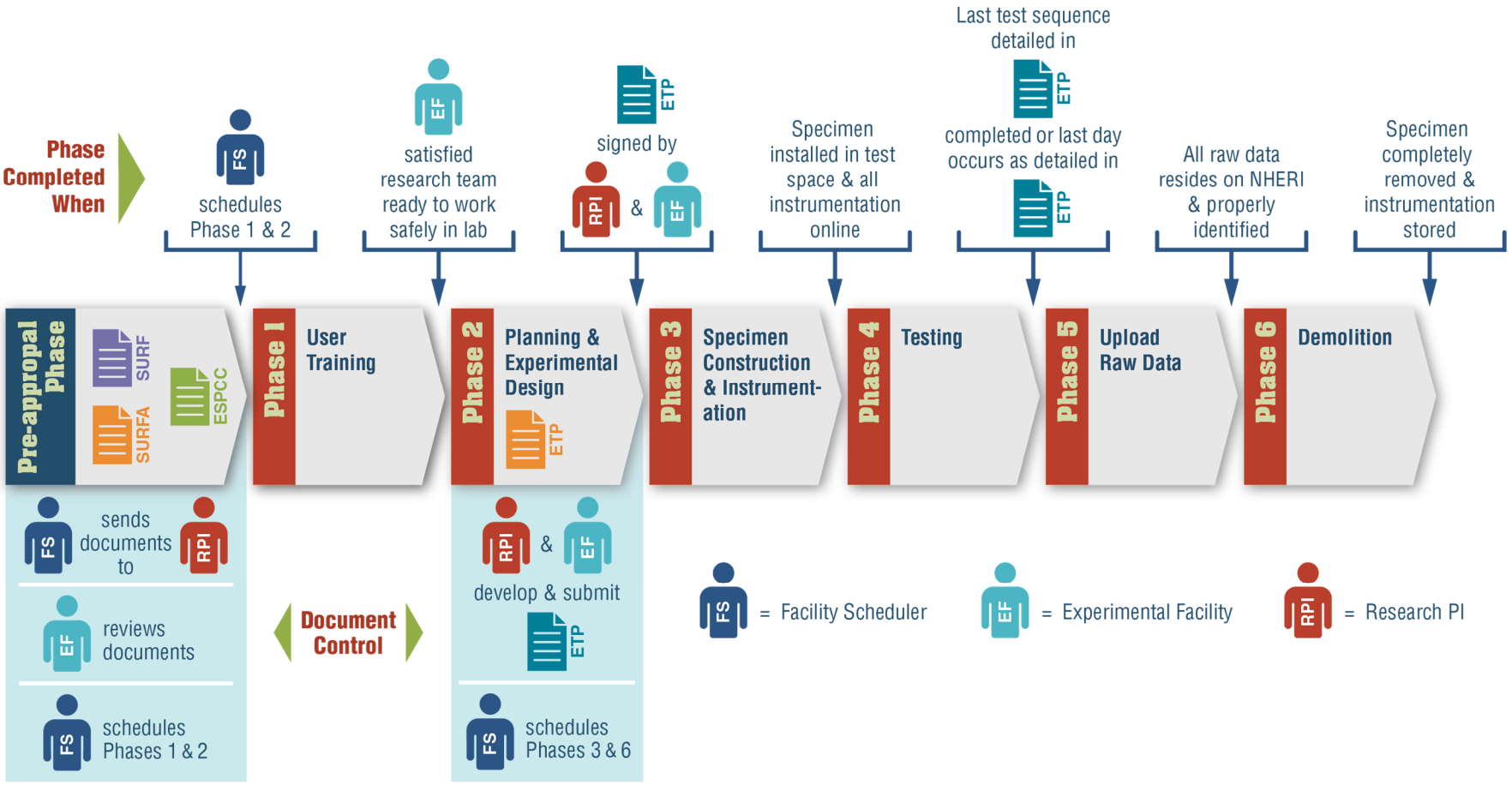


**Figure 2. NCO Scheduling protocol project process**