

Engineering and Field Parameters for Preliminary Design of On-site Earthquake Early Warning, EEW, and Structural Health and Integrity Monitoring, SHM, Systems in seismically active regions.

The information requested in this scoping questionnaire will be used by Weir-Jones Engineering to establish the functional description and general architecture EEW and SHM systems in seismically active regions. The answers to some of the questions may not be readily available. In these cases please ignore the question, even incomplete information will be helpful.

The deployment of the EEW and SHM systems as contemplated by this questionnaire use dynamic monitoring as the basis for their evaluations. In the case of SHM Systems other factors can contribute to the reduction in structural integrity of a building or industrial facility. These include aging and the progressive deterioration of the structure, modifications to the facility, and changed environmental or ambient conditions. Typically in these situations other, quasi-static, parameters are monitored.

The system's design will only be finalized after discussions with the stakeholders, typically the owner, their structural engineers and Weir-Jones personnel.

General Considerations

1. Objectives of system: Meet regulatory requirements
 Meet operational / safety requirements

2. Is this a new , existing structure or project , other _____

3. If this is an existing structure, when was it built? _____

4. Please provide a map reference for the building/facility. _____

5. When the facility was built did the applicable construction/building codes incorporate seismic design criteria:
 Yes No Other _____

6. Will you provide us with these criteria and references to the code(s):
 Yes No Other _____

7. Have the seismic design criteria in the code been upgraded since construction:
 Yes No Other _____

8. Have any seismic upgrades been carried out at the facility:
 Yes No Other _____

9. Is there a Structural Engineer of Record for this structure/project:
 Yes No Other _____
10. Are the structural design drawings available:
 Yes No Other _____
11. Is the building a multi-tenant facility:
 Yes No Other _____
12. Are you directly or indirectly the property owner:
 Yes No Other _____
13. What is the footprint of the building / facility: _____ft² _____m²
14. How many stories are there at the facility: _____
15. What type of roof construction: _____
16. What is the construction of the facility:
- | | | | |
|----------------------|--------------------------|---------------------------|--------------------------|
| Unreinforced masonry | <input type="checkbox"/> | Steel | <input type="checkbox"/> |
| Reinforced masonry | <input type="checkbox"/> | Steel frame with cladding | <input type="checkbox"/> |
| Reinforced concrete | <input type="checkbox"/> | Other | <input type="checkbox"/> |
| Tilt up | <input type="checkbox"/> | | |
17. What type of materials are produced/stored in the facility: _____
18. Does the structure/facility have a basement or excavations below grade:
 Yes No Other _____
19. Do you have information or design criteria for the foundations and subgrade:
 Yes No Other _____
20. Is the building/facility supported on:
Footings Slab on grade Piles Bedrock
21. Are there any geotechnical reports available about local soil conditions: Yes No

Functional and Logistical Characteristics of the Earthquake Early Warning Systems

The EEWS is intended to reduce the risk to building occupants and mitigate the post earthquake losses of goods and equipment. Potential water and fire damage can be reduced if utilities are shut down prior to the main shock. Critical inventories can be protected by use of barriers on racking systems.

1. What type of alarm would you like for personnel warning:
Siren/Strobe lights Verbal Annunciation Email to key personnel off site

2. Do you require shutoffs/shutdowns for utilities?
Water Gas HVAC Elevators/Escalators

3. Do you require shutoffs/shutdowns for process materials and equipment?
Process fluids Conveyors Pumps Rotating equipment
Other _____

4. Do you require activation of other equipment?
Open Doors Close restricted access barriers
Deploy shutters on storage racks Venting to atmosphere

5. Do you need to activate emergency services?
Standby Generators Pumps Lighting Perimeter Security

6. What is your time frame for system deployment:
Urgent Planned but not urgent Possible in the future

7. Does your application require having a redundant system or hot spares?
 Yes No Other _____

8. Would you like Weir-Jones to oversee the functionality of your monitoring system?
 Yes No Other _____

9. Is there any additional information which you feel may be relevant:

Functional and Logistical Characteristics of the Structural Health Monitoring System

In a seismically active region the primary purpose of installing a SHM system at a facility is to determine if its structural integrity has been compromised by the abnormal forces induced in the structure by the ground motions caused by the earthquake. Post event analysis of the data stored in the SHM system by the Structural Engineer of Record will facilitate decisions regarding the ongoing integrity of the facility and the possible involvement of insurers.

The Structural Engineer of Record will provide the threshold values for accelerators at various locations in the facility. These must not be exceeded under normal operating conditions. If they are exceeded, the system is capable of triggering an alarm and initiating a shutdown of critical processes. In this situation the pre-trigger and post-trigger data will have been recorded and stored.

1. What do you see as the end-product of the SHM system at your facility:
Identification of potential structural degradation after an earthquake Alarm system
Visualization of critical parameters Other _____
2. What type of alarm, if required, would you like for personnel warning:
Siren/Strobe lights Verbal Annunciation Email to key personnel off site
3. Do you require shutoffs/shutdowns for utilities?
Water Gas HVAC Elevators/Escalators
4. How would you like to notify the Structural Engineer of Record?
Via email No notification Other _____
5. What is your time frame for system deployment:
Urgent Planned but not urgent Possible in the future
6. Does your application require having a redundant system or hot spares?
 Yes No Other _____
7. Would you like Weir-Jones to oversee the functionality of your monitoring system?
 Yes No Other _____
8. Is there any additional information which you feel may be relevant:

