



FEMA

# Interagency Recovery Coordination

## CASE STUDY – Teaching Note

### Connecticut's Crumbling Concrete

Coordinating Federal Resources for a Non-Declared Event

**Learning Objective:** Examine the collaborative federal interagency assistance initiative in Connecticut to address a non-declared emergency event: crumbling concrete foundations in thousands of residential homes.

**Keywords:** Recovery, Non-Declared Disaster, State Government, Federal Support, Economic Recovery, Housing, Interagency Coordination, Identifying and Leveraging Resources, Hazard Mitigation

#### Instructor's Introduction

This teaching note is intended to prepare an instructor to use this case study in a classroom (live or virtually). The note expands on the lessons learned from this case study, which has been written to help students learn from a real-world disaster recovery experience. Selection of learning objectives, discussion questions, and activities can be customized based on audience and time allowance. The remainder of the guide provides suggestions of key concepts to explore as you teach the case. It is suggested that students read the Background and Challenges sections, pause to discuss the scenario, and then move on to read the remainder of the case.

This case study describes the federal interagency assistance provided to Connecticut for a unique non-declared disaster. From 2015 to 2017, the Connecticut Department of Consumer Protection (CDCP) received reports of over 550 homes with crumbling foundations, due to the presence of pyrrhotite, an iron sulfide that causes cracks to form in concrete, a condition which is not covered by homeowners insurance and costs \$100,000 to \$250,000 to correct. As many as 34,000 homes in northeastern Connecticut (built between 1983 and 2000) could be compromised by the presence of pyrrhotite. This could cause up to \$1 billion in damage to the state's housing market, posing a devastating threat to Connecticut's already struggling economy.

To become more familiar with the case content before teaching the case, please review the following:

- [Capitol Region Council of Governments: Crumbling Foundations](#)
- [Connecticut Department of Housing: Crumbling Foundations](#)
- [CDCP Deteriorating Concrete Foundations](#)
- [NBC Connecticut News Clip](#)
- [National Disaster Recovery Framework](#)

#### Student Learning Outcomes:

- Consider how federal interagency relationships and existing agency programs in a state, tribe, or territory can be used to address a non-Stafford Act crisis.
- Analyze the roles played by state and federal agencies to address Connecticut's housing crisis.
- Compare the interagency approach to recovery of this disaster to Stafford Act disasters.

#### Key Takeaways:

- Though the request for a Presidential declaration was denied, FEMA was able to appoint a Federal Liaison to coordinate Connecticut's engagement with federal agencies. The state financially supported solutions driven by federal agencies, in a reversal of typical roles played by state and federal governments.
- Resources within the core competencies of federal can be utilized to help individuals and businesses affected by non-Stafford act disasters.
- Because Connecticut brought this to national attention, future pyrrhotite issues in other parts of the country were mitigated through strengthened consumer protections and construction standards.

## PART ONE

### Background

As many as 34,000 homes constructed in northeastern Connecticut between 1983 and 2000 may have concrete foundations containing pyrrhotite and are at risk of cracking or crumbling. Pyrrhotite is an iron sulfide that can be found naturally in aggregates, or rocky materials such as gravel, sand, or stone that are added to cement to make concrete. When iron sulfides are exposed to oxygen and water, a series of chemical reactions convert the iron sulfides into other compounds.

These other compounds are expansive – take up more space than the original iron sulfides – and ultimately lead to cracks or holes in the concrete. The cracks in the concrete foundations grow over time, putting the inhabitants of the homes and structures at risk.

Reports of crumbling foundations first began in 2015. By May 2017, the Connecticut Department of Consumer Protection (CDCP) had received reports of more than 550 homes with faulty foundations, and in December 2017 began processing 522 verified reports to determine compensation eligibility.

Collectively, the potential economic impact to the Connecticut's housing market could approach up to \$1 billion. This issue is also devastating to individual homeowners, whose home values decrease significantly if pyrrhotite is present. Potentially, tens of thousands of Connecticut residents may be affected as the quarry believed to be the source of the contaminated material was widely used throughout the state

### Challenges

The only safe and effective method to fix a home that has tested positive for pyrrhotite is to lift the house off the existing foundation and completely replace all the concrete. According to the Connecticut Department of Housing, this process can cost anywhere from \$100,000 to \$250,000, often more than the total value of many affected homes.

Even before this issue came to light, Connecticut was facing economic challenges. Major industries leaving the state have led to a loss of jobs for residents, and the state's fiscal reserves had begun to falter. A localized housing market crash could be devastating to Connecticut's economy, which would make the state's current budget crisis much harder to overcome.

Most insurance companies will not cover a foundation collapse that occurs slowly over time (as opposed to a sudden, devastating collapse), forcing affected homeowners to pay for repairs out-of-pocket or absorb the lost value of their home. For those who had sunk most of their assets into their home, the devaluation of their property left them with both a potentially unsafe place to live and loss of their primary investment. Without a private sector solution in sight, Governor Malloy sought federal assistance to avoid the looming economic crisis.

Adding to the challenges faced by the Governor's administration, the event did not meet the requirements of a Stafford Act declaration and Connecticut would be unable to receive federal financial assistance through Stafford Act programs. The Governor was told that even in the absence of a Presidential declaration, FEMA, along with other federal agencies, would be able to provide technical assistance for this incident.



Figure 1. A crack in a home's foundation caused by pyrrhotite in the concrete.

## Part One Discussion Activities

### Activity 1: Discuss Portrayal of the Crisis by Local Media

**Duration:** 5-10 min

**Setup:** Have the video clip included in the case materials downloaded to your computer and ready to play.

**Instructions:** Watch the video clip (2 min) from NBC Connecticut about the state's response to this crisis. After, as a group discuss what you learned from the video. Consider asking the students how the first-person view of the crisis changed their perception of the situation in Connecticut, or what their biggest concerns would be if they were a state official or resident.

### Activity 2 (Optional): Evaluating Key Players' Actions

**Duration:** 30-45 minutes

**Setup:** Students will work in small groups of 3-5 individuals.

**Instructions:** Students will imagine they are state officials hearing about this situation for the first time, considering its potential financial impacts to homeowners and the Connecticut's economy. Each group will produce an initial plan of action to deal with safety hazards and the financial implications on behalf of the Governor's office. The plans can be formed of short bullet points, but should include major areas of concern and actionable ideas to address them. After 15-20 minutes, bring the class back together to share each group's initial strategies.

**Discussion:** Ask volunteers to share some actionable portions of their strategy. Consider asking the following:

1. What type of a crisis do you think the state government is trying to prevent? What's their main objective?  
(*Teaching Note: preventing a contagion crisis, or the abandonment of the housing stock with cascading devaluation of other homes throughout the state*)
2. Where would you have gone for assistance if you were in the Governor's staff?

## PART TWO

### Actions

Although this incident did not meet the requirements of a Stafford Act declaration, FEMA did appoint a Senior Federal Liaison to facilitate Connecticut's engagement with other federal agencies in November 2016. The goal of the Federal Liaison appointment was to leverage federal authorities and available resources to support the state and local community efforts in assisting citizens with compromised foundations.

Interagency collaboration was emphasized from the beginning of federal involvement in Connecticut. The National Coordinators of all six Recovery Support Functions (RSFs) were briefed on the situation and brought together to discuss the support they could potentially provide.

HUD assumed the role of lead federal coordinating agency, offering their local office in Hartford, Connecticut for use as the base of the federal interagency effort. The HUD Community Development Block Grant (CDBG) Coordinator worked to develop a loan program that could be applied to concrete foundation testing efforts. Approximately \$60 million in loan funds were made available through this program.

#### Key Federal Agency Partners

- U.S. Army Corps of Engineers (USACE)
- U.S. Department of Housing and Urban Development (HUD)
- U.S. Department of Agriculture (USDA)
- U.S. Economic Development Administration (EDA)
- U.S. Internal Revenue Service (IRS)
- U.S. Small Business Administration (SBA)
- U.S. Department of Veterans Affairs (VA)
- Federal Emergency Management Agency (FEMA)



*Figure 2. A crumbling foundation due to pyrrhotite in the concrete.*

Roughly 60% of the affected homes fell within a USDA Rural Development area and were therefore eligible for a low-interest USDA rural homeowner loan. USDA regional staff worked with homeowners that had existing USDA loans to identify any additional sources of assistance. USDA loans were also made available for low- and super low-income homeowners who did not already have an existing USDA loan.

The USACE Engineering Research and Development Center (ERDC) sent their Chief of Concrete to brief the Governor of Connecticut on the proposed testing and analysis procedures. The ERDC suggested a simple drill test to determine whether pyrrhotite is present in a concrete foundation, with an estimated cost of \$200 per test. Additional testing of core samples could cost up to \$4000 per home, depending on the number of tests required and the laboratory used for test

processing. Affected homeowners could submit applications for testing reimbursement for two samples, up to 50% of the cost, for a maximum of \$2000 in reimbursement.

Although the U.S. Economic Development Administration (EDA) was not able to provide money directly to affected homeowners, they supported the state's effort to bring in remediation companies from out-of-state to support repair efforts. Similarly, the U.S. Small Business Administration (SBA) provided technical assistance for affected small businesses and landlords. The U.S. Department of Veterans Affairs (VA) committed to tracking the number of disabled veterans in affected homes and reaching out to support VA Home Loan Guarantee applications through direct contact with local member banks. The U.S. Internal Revenue Service (IRS) facilitated tax relief by allowing affected homeowners to claim a deduction for any out-of-pocket repair costs not covered by another federal program, and extended the claim period for repair costs through 2021.

In addition to the work of federal agencies, Connecticut set aside \$5 million of its own funds for testing and \$108 million for remediation efforts. The state also created a captive insurance fund as a public-private endeavor to administer money for foundation repairs by approved contractors.

A workshop in October 2018 brought together over 100 stakeholders and sought to provide the state with sufficient information to develop a path forward in supporting affected residents. Attendees at the workshop worked to produce an Infrastructure Resilience Guidebook and other materials that would strengthen the state's capacity to address the concrete foundation issue threatening the Connecticut housing market.

## Results

Typically, in disaster recovery, the state identifies actions it wishes to pursue and then requests funding from federal agencies to implement those actions. In this case, however, the state provided funding for testing and remediation efforts, while a FEMA Senior Federal Liaison and other federal agencies provided expertise to scope the concrete issue and give recommendations. Federal partners also coordinated to identify potential sources of funding, particularly from programs already in place at the state level.

Early in the process, USACE was determined as the subject matter expert and key partner for the testing efforts, due to their infrastructure and engineering expertise, as outlined in the National Disaster Recovery Framework (NDRF) and Recovery Federal Interagency Operational Plan (FIOP). In response to a request by the state's governor, USACE provided recommendations for plans to implement low-cost testing of homes, quarry testing and development of standards, and remediation methods for affected homes. In October 2018, USACE released a report recommending regulation of the amount of pyrrhotite allowed in concrete aggregates, and a standardized testing process for existing concrete foundations based on existing regulations currently in place in Canada and Europe. The Connecticut State Legislature has allocated over \$100 million to implement the plan ahead.

As of November 2018, the federal interagency support has transitioned its efforts to the state. Governor Malloy's administration has stated that although the Stafford Declaration was denied, the federal government has provided the very best technical expertise on all the deteriorating concrete issues. The USACE and federal partners provided short, medium, and long-range recommendations for the state leaders to make the best-informed decisions that support the effort to keep this housing and economic issue from becoming even more dire. The information provided by USACE significantly enhanced the state's ability to develop an action plan to protect the state's economy and housing in the affected communities. This information was provided at no cost to the state. **It is clear that no one group "owns" this problem, and it will take a federal, state, and local partnership to move forward.**



*Figure 3. A crumbling foundation caused by the presence of pyrrhotite.*

## Lessons Learned

- Interagency collaboration was crucial for Connecticut to effectively and efficiently address the crumbling concrete foundations affecting homeowners in the state.
- The strong working relationships among federal partners, state leadership and in particular, the state's emergency management agency, and stakeholders led to informed decisions that leveraged federal resources for state-level assistance.
- In a non-declared event, federal partners can still provide resources, expertise, communication networks, and other assistance for local recovery efforts.

## Part Two Discussion Activities

### Discussion Questions:

1. Tackling this crisis required dedicated investment of resources and the creation of a new loan program from the state, as well as specific technical advice and assistance from the US Army Corps of Engineers and other federal agencies. How would the outcome of remediation options have changed for affected citizens if any of these key partners had not shown such commitment to the issue?
2. Though reimbursement for the cost of testing concrete was available to homeowners, the cost of replacing a compromised foundation (up to \$250,000) or absorbing the lost value of the home remained the homeowner's burden. Discuss if the state's captive insurance program and low-interest loans for repairs was appropriate, given the state's objectives. Do you think this was the right level of dedication of resources at the state level to stem the crisis? What would you have done differently?
3. Scenario Analysis: A) How would the response and interagency relationships have changed if there was a severe weather event, such as a minor earthquake, that compounded the impacts of the compromised foundations and caused severe damage to thousands of homes with compromised foundations? B) How could the pyrrhotite easily lead to a housing crisis and substantial devaluing of all property in the region leading to a collapse of state revenues?
4. What other types of events or situations do you think could impact property values and public safety on such a large scale, that might not receive Stafford Act declarations? (*Teaching Note: examples include privately-owned dam failures, water contaminations similar to the Flint, MI incident, droughts, etc.*)

### Activity 3 (Optional): Analyze Interagency Roles

**Duration:** 30-45 minutes

**Setup:** Students will work in teams of 6-8 individuals.

**Instructions:** The National Disaster Recovery Support Functions (RSFs) Coordinators were called in by FEMA's Senior Federal Liaison to be asked what they could do to help Connecticut. You are going to reenact their first coordination meeting. Designate the following roles in each group:

- Senior Federal Liaison – FEMA Recovery Coordinator
- Housing RSF Coordinator – Department of Housing and Urban Development
- Health and Social Services RSF Coordinator – Department of Health and Human Services
- Economic Recovery RSF Coordinator – Department of Commerce, Economic Development Administration, or Small Business Administration
- Community Planning and Capacity Building (CPCB) RSF Coordinator – FEMA CPCB Branch
- Infrastructure Systems RSF Coordinator – U.S. Army Corps of Engineers
- Natural and Cultural Resources RSF Coordinator – Department of Interior

Give each stakeholder three to five minutes to prepare a short statement including describing the challenges that may be relevant to their RSF, any programs or technical abilities within their wheelhouse that may be available to assist, and desired outcomes from their perspective. Then, the FEMA Liaison will lead a ~15-minute discussion among the group to learn what each coordinator believes their role is. Think about the working relationships required among these representatives for this type of disaster. Afterwards, the class will come back together for a report-out.

*Teaching Note: Students may find more information on each RSF to inform their role on pages 36-40 of the National Disaster Recovery Framework, 2<sup>nd</sup> Ed. Consider giving students more time, such as via a homework*

*assignment, to prepare statements on behalf of their agencies if they will need more time to research and become familiar with each federal agency's role and responsibilities in disaster recovery.*

### **Report Out Discussion Questions:**

1. What types of baseline understandings would you want to have common among all the federal agencies in this type of meeting? Did any of the groups set any ground rules? (*Teaching Note: The Federal Liaison suggested no one promise Connecticut funding, no one thinks they can fix this on their own, and that this must be a joint effort, so no one ends up undercutting others' programs.*)
2. The federal government, in this case, provided technical expertise on deteriorating concrete issues, helping state actors make informed decisions that mitigated the impacts of the situation. Based on what you know, which of the 108 federal agencies have the core capacity to be activated to be activated in another potential non-Stafford Act disaster? (*Teaching Note: The Federal Liaison, who was Region 1's FDRC at this time, noted only 6 agencies could be activated to assist with non-declared disasters – USACE, IRS, SBA, USDA, VA, and FEMA.*)

## **Follow up with the FEMA Guidance Development Office**

The Guidance Development Office (GDO) develops and distributes FEMA's Interagency Recovery Coordination (IRC) case studies. Our team would appreciate your feedback on these case studies and accompanying teaching notes. Please let us know how you have used this case study for a learning experience and your thoughts on what went well or could have been improved. To get in contact with our team, please email [FEMA-RECOVERY-ICD-GDO@fema.dhs.gov](mailto:FEMA-RECOVERY-ICD-GDO@fema.dhs.gov). Thank you.