M7.0 Anchorage Earthquake:
Implementing new methods of reconnaissance collaboration through EERI

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Summary and Overview of the 2018 M7.0 Anchorage Earthquake

Response of the engineering community

Collaborations of EERI with other reconnaissance networks/teams

Virtual Earthquake Reconnaissance Team (VERT)

USGS science for a changing world

StEER

EERI Fulcrum Application

2018 M7.0 Anchorage Earthquake

Date: November 30th 2018, 8:29 am

Magnitude: Mw 7.0 (USGS).

Location:

- Epicenter located 12 km North of Anchorage
- 61.323°N latitude and 149.923°W longitude

Depth: 44.1 km (USGS)

Fault Mechanism: Intraslab fault, subduction zone earthquake

Significant amounts of aftershocks

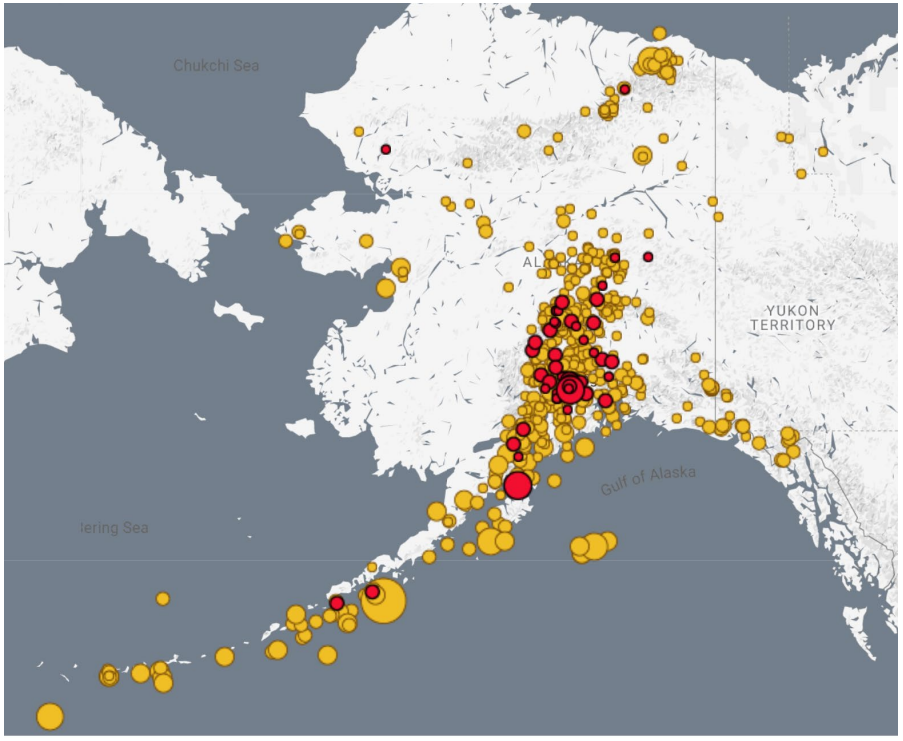
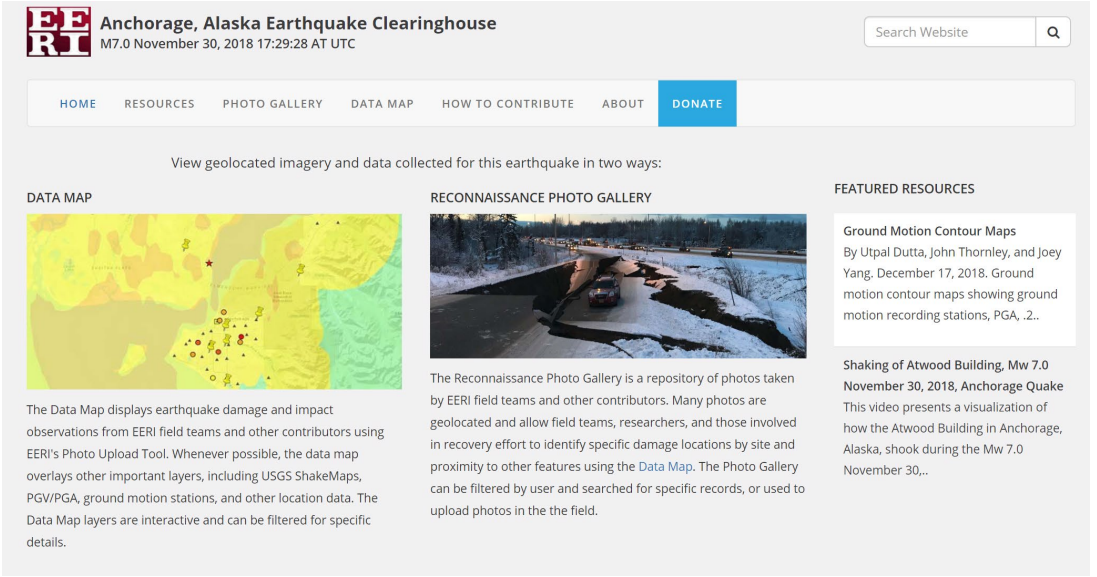


Figure from: https://earthquake.alaska.edu/earthquakes

2018 M7.0 Anchorage Earthquake – EERI Role

Immediately after earthquake:

- Established virtual earthquake clearinghouse website
- Hosted regular clearinghouse briefing calls
- Appointed two local reconnaissance leads



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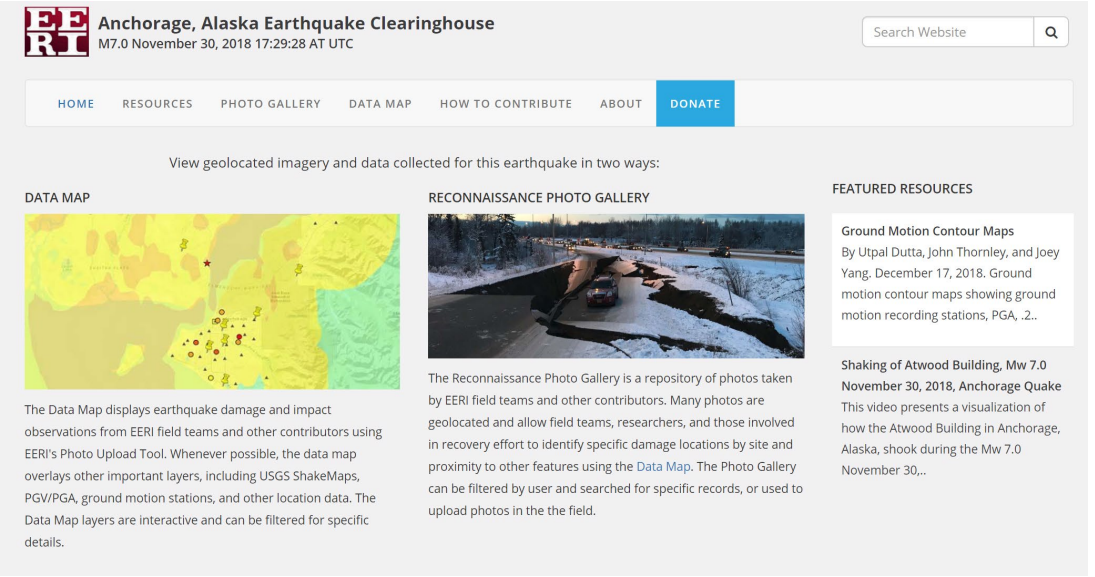
Future active reconnaissance:

- Deploying team to conduct Business Resilience Survey



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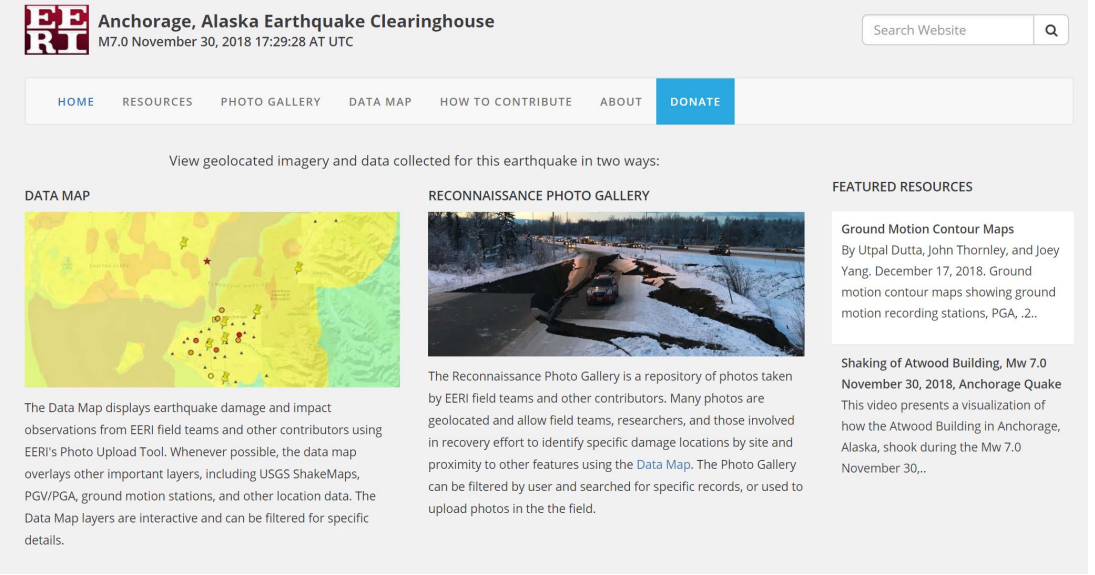

Dissemination of material:

- Developing joint LFE report *expected February 2019*
- Hosting Reconnaissance Briefing Webinar, *expected February 2019*
- Session at 2019 EERI Annual Meeting, *March 2019*

2018 M7.0 Anchorage Earthquake – Reconnaissance Teams

- Geotechnical impacts
- Performance of buildings
- Impacts to schools
- Impacts to hospitals
- Impacts to homes
- Non-structural damage
- Business Interruption
- Damage compared to 1964 Quake
- Reactivation of 1964 quake landslides

2018 M7.0 Anchorage Earthquake – Reconnaissance Teams

	Nov	December																								
	Fri	Sat	Sun	Mon	Tue	Wed	Thu	Fri	Sat	Sun	Mon	Tue	Wed	Thu	Fri	Sat	Sun	Mon	Tue	Wed	Thu	Fri	Sat	Sun	Mon	Tue
	30	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
Clearinghouse Briefing Calls		#1	#2	#3	#4	#5		#6			#7		#8					#9								
EERI Reconnaissance Leads																										
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2018 M7.0 Anchorage Earthquake – Reconnaissance Teams

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Damage to roads and engineered fills

Nonstructural damage in schools and hospitals

Damage to single family homes, especially foundation damage

2018 M7.0 Anchorage Earthquake

Response of engineering community

- 10+ teams deployed to the field
- EERI coordinated information dissemination and sharing
- More teams deploying in early 2019

Virtual Earthquake Reconnaissance Team (VERT)

Provide a virtual reconnaissance service to the engineering and social science community to improve the quality of data-driven in-field reconnaissance, and train the next generation of reconnaissance engineers.

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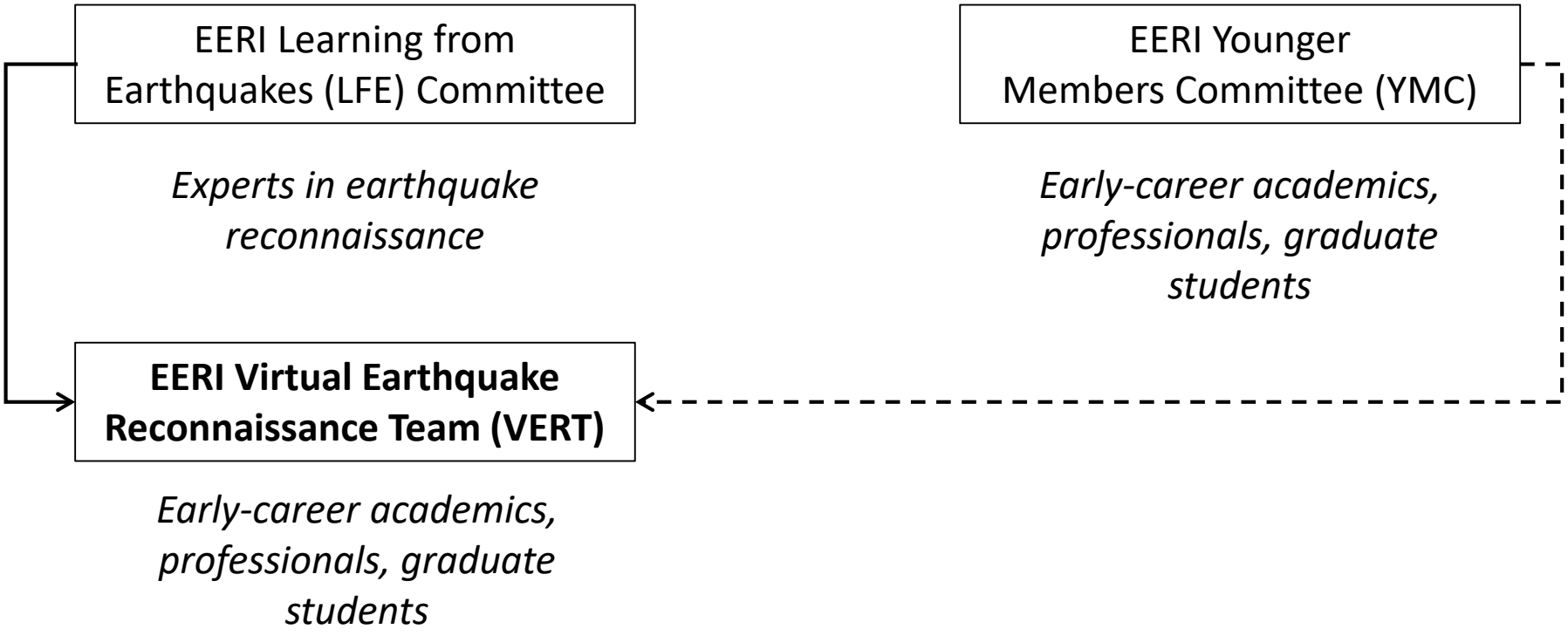
Inform the reconnaissance community after an earthquake

- *48 hours reports*
- *Assistance to organizations (i.e. USGS)*
- *Assistance to prepare teams before they deploy (EERI, StEER)*
- *Benchmarking scientific data collection algorithms*

Virtual Earthquake Reconnaissance Team (VERT)

Provide a virtual reconnaissance service to the engineering and social science community to improve the quality of data-driven in-field reconnaissance, and train the next generation of reconnaissance engineers.



Virtual Earthquake Reconnaissance Team (VERT)

Before in-field deployment	During in-field deployment	After in-field deployment

Phase 1

48 hrs

Phase 2

48 hrs – 1 week

Provide information to groups to make informed decisions

Phase 3

1 week-6 weeks

Provide information to reconnaissance teams to help with data-driven informed reconnaissance

Virtual Earthquake Reconnaissance Team (VERT)

Before in-field deployment	During in-field deployment	After in-field deployment
Phase 1 *48 hrs*	**Phase 3** *1 week-6 weeks*	*Provide local expertise to in-field reconnaissance teams* *Provide virtual support to in-field reconnaissance teams*
Phase 2 *48 hrs – 1 week*	**Phase 4** *2 week-6 months*	*Provide data analysis support for in-field reconnaissance team*
Phase 3 *1 week-6 weeks*		

Virtual Earthquake Reconnaissance Team (VERT)

Before in-field deployment	During in-field deployment	After in-field deployment

Phase 1

48 hrs

Phase 2

48 hrs – 1 week

Phase 3

1 week-6 weeks

Phase 3

1 week-6 weeks

Phase 4

2 week-6 months

Phase 5

1 year – 1.5 year

Summarize results from in-field reconnaissance teams and VERT Provide perspective for resilience and recovery metric of communities

All products published through the LFE Clearinghouse and DesignSafe-CI

VERT M7.0 Anchorage Earthquake Response

Phase 1:
Activation: November 30, afternoon
Publication of material: Monday, December 3

Hakhamaneshi, Manouchehr; Fischer, Erica, (2018-12-05), "EERI VERT M7.0 Phase 1 Report" , DesignSafe-CI [publisher], Dataset, doi:10.17603/DS2RD7W

VERT M7.0 Anchorage Earthquake Response

Phase 1:
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Earthquake characteristics
Tsunami Warning
Aftershocks
Impacts on lifelines
Emergency response
Hospitals
Schools
Geotechnical damage

Transportation networks
Other building damage
Housing

Hakhamaneshi, Manouchehr; Fischer, Erica, (2018-12-05), "EERI VERT M7.0 Phase 1 Report" , DesignSafe-CI [publisher], Dataset, doi:10.17603/DS2RD7W

VERT M7.0 Anchorage Earthquake Response

Phase 1:
Activation: November 30, afternoon
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Full report included as Appendix in:

STEER - EERI ALASKA EARTHQUAKE: PRELIMINARY VIRTUAL ASSESSMENT TEAM (P-VAT) JOINT REPORT

Hakhamaneshi, Manouchehr; Fischer, Erica, (2018-12-05), "EERI VERT M7.0 Phase 1 Report" , DesignSafe-CI [publisher], Dataset, doi:10.17603/DS2RD7W
Mosalam, Khalid; Kijewski-Correa, Tracy; Hassan, Wael; Archbold, Jorge; Marshall, Justin; Mavroeidis, George; Muin, Sifat; mulchandani, Harish; Peng, Han; Pretell Ductram, Anthony Renmin; Prevatt, David; Robertson, Ian; Roueche, David, (2018-12-07), "STEER - EERI ALASKA EARTHQUAKE: PRELIMINARY VIRTUAL ASSESSMENT TEAM (P-VAT) JOINT REPORT" , DesignSafe-CI [publisher], Dataset, doi:10.17603/DS2MQ38

VERT M7.0 Anchorage Earthquake Response

Phase 2:
Activation: December 13
Ongoing

Scope:
Search for CCTV footage on Twitter to demonstrate effectiveness of ShakeAlert

VERT M7.0 Anchorage Earthquake Response

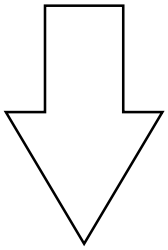
Phase 3:
Activation: December 22
Ongoing

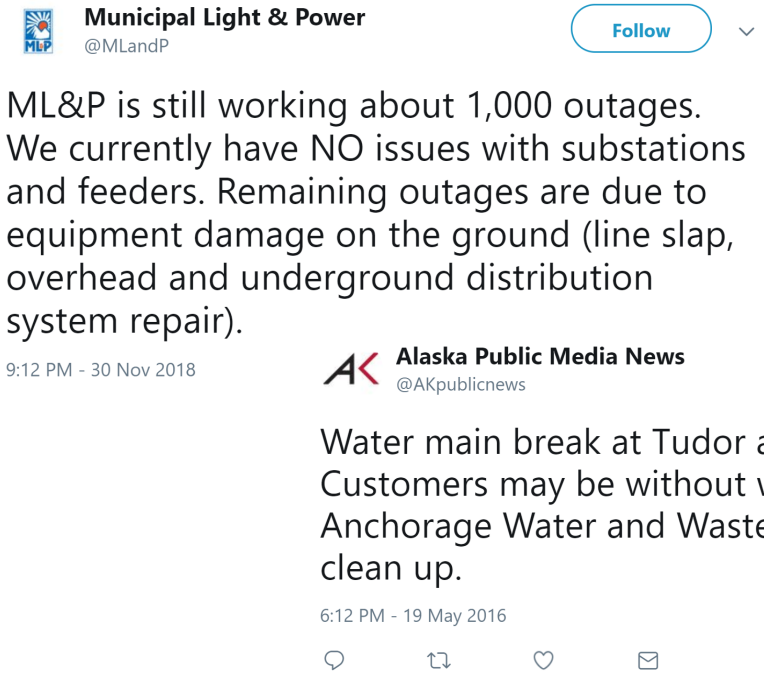
Reconnaissance team assistance: EERI Business Resilience Survey

Scope:
Mapping out businesses affected by the earthquake by business type, location, and damage (structural versus non-structural).

VERT M7.0 Anchorage Earthquake Response

Phase 3:
Activation: January 3, 2019
Ongoing





Scope:
Benchmarking social media data mining algorithms using the information and data collected by VERT during the Phase 1 and 2 activations of VERT.

VERT M7.0 Anchorage Earthquake Response

Phase 1

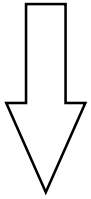
12/03: Phase 1 report published on DesignSafe-CI
12/05: Phase 1 report included as Appendix in StEER report published on DesignSafe-CI

Phase 2

Collaboration with USGS for further reseach

Phase 3

Preparing EERI team for field
Benchmarking social media data mining algorithms



… and more!

LFE Reconnaissance Data Collection

Data collection methods:
Both methods feed into the Virtual Clearinghouse photo gallery and data map

1. Batch Upload Tool: desktop app for uploading batches of geotagged photos

LFE Reconnaissance Data Collection

Data collection methods:
Both methods feed into the Virtual Clearinghouse photo gallery and data map

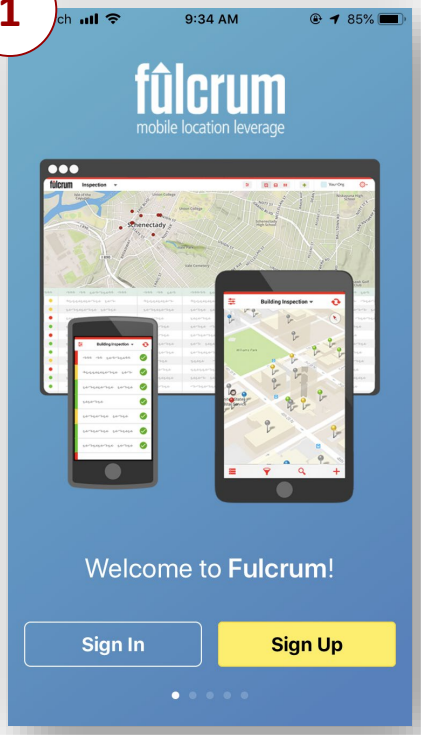
1. Batch Upload Tool: desktop app for uploading batches of geotagged photos

2. Fulcrum Data Collection App: smartphone app for use in the field

Third-party Mobile App for Android and iPhone
Flexible form builder
Intuitive design
Collects data and photos
GPS enabled
Data can be collected offline

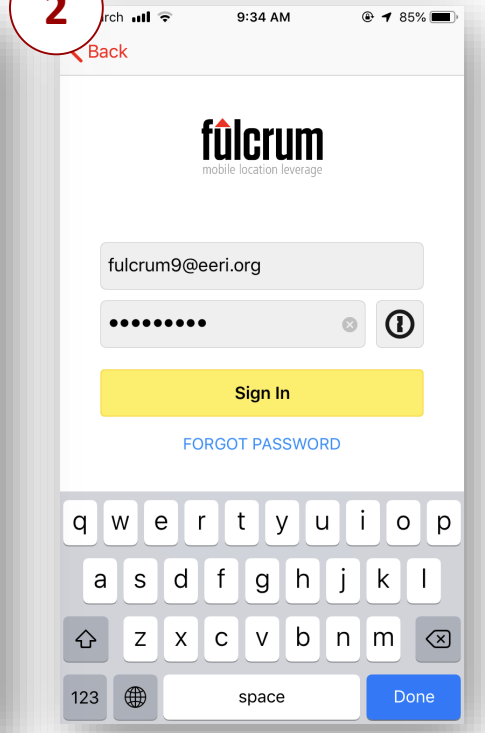
LFE Reconnaissance Form in Fulcrum

1



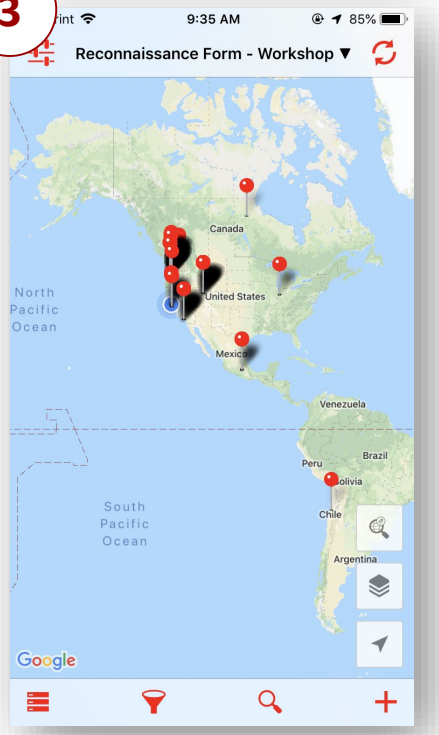
Sign in

2



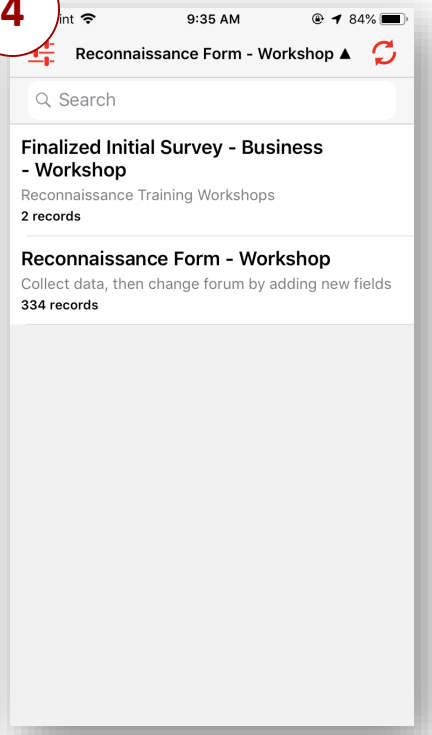
Email: fulcrum9@eeri.org
Password: Quakes123

3



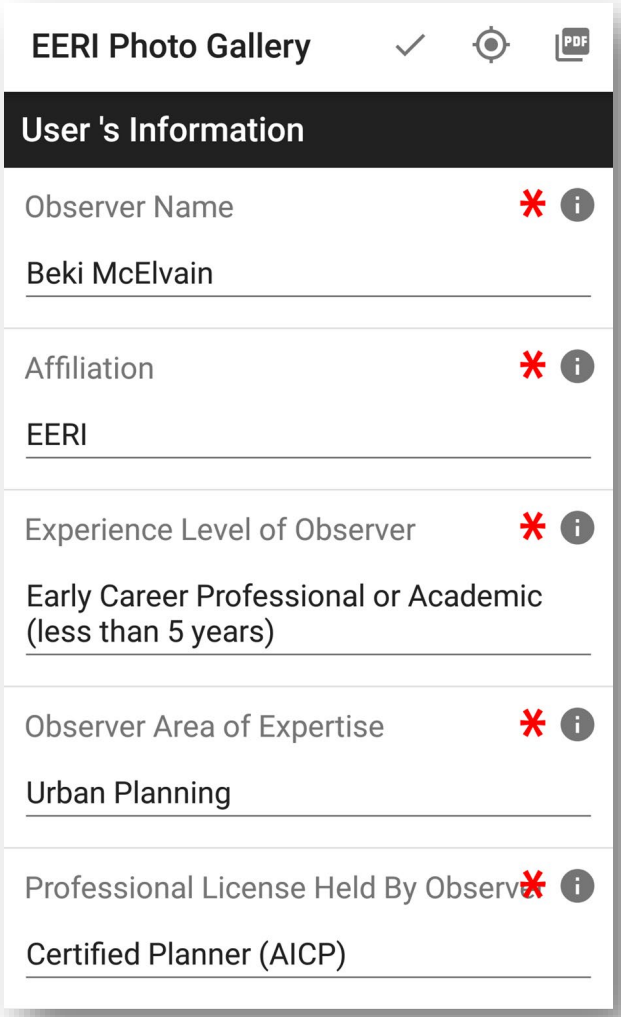
Add a new record

4



Choose your form

LFE Reconnaissance Form in Fulcrum



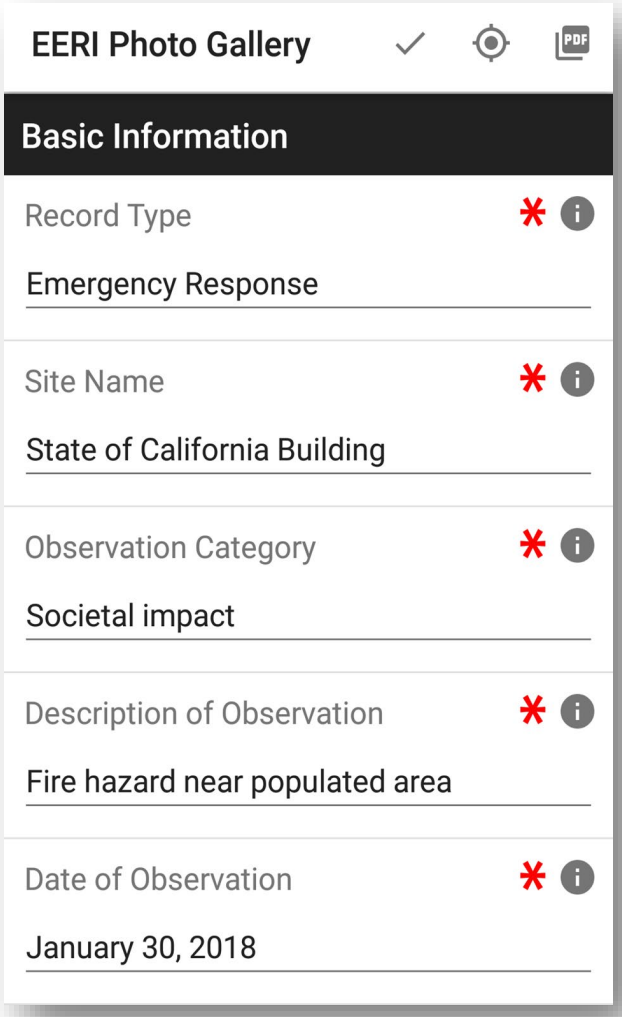


Photo Gallery

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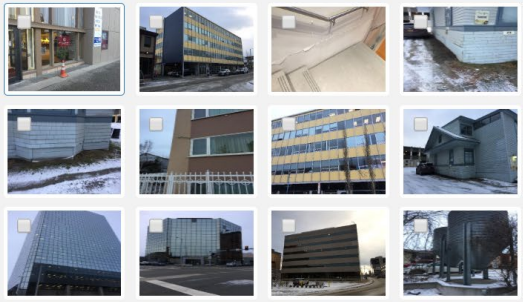

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Photo Details

Click on a thumbnail for more information about that photo

Next >>

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Observation Category: Buildings

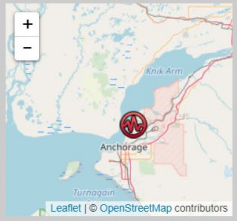

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Photo Information More Information

Attachment ID	:	27
Caption/Description	:	
Latitude	:	0
Longitude	:	0
Date Taken	:	2018-12-01 00:00:00
Data Copyright Holder	:	Patrick Murren

Additional Information More Information

Record Id	:	1
Observer Name	:	
Observer Email	:	patrick.murren@som.com
Experience Level of Observer	:	
Observation Category	:	Buildings
Description	:	Exterior Reconnaissance
Date and Time of Observation	:	2018-12-01 00:00:00
Type of Operation	:	

Next Photo >>

LFE Reconnaissance Form in Fulcrum

Use these e-mail accounts to ***login*** to the Fulcrum App only...

Username	Password
fulcrum9@eeri.org	Quakes123

...But use ***your own*** e-mail accounts when recording observations!

Thank you!

emails:

Erica Fischer (erica.fischer@oregonstate.edu)
Manny Hakhamaneshi (manny.hakhamaneshi@dot.ca.gov)
Maggie Ortiz (maggie@eeri.org)
Zoe Yin (zoe@eeri.org)

http://www.learningfromearthquakes.org/2018-11-30-anchorage-alaska/
https://web.fulcrumapp.com/