A GIS emergency response framework in ArcGIS Online for rapid evaluation of critical facility status following a catastrophic incident in the City of Puyallup, Washington

Capstone Final Report
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for Geography 596A at Penn State University, World Campus
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Contents

Section 1. Introduction

Across the world, the risk of natural and technological disasters is a reality for every community. The range of potential disasters vary by location and can include natural disasters like floods, severe-weather, earthquakes, or volcanoes, or technological (human-caused) disasters like dam failures, hazardous material spills, or communicable disease outbreaks. These catastrophic incidents can result in extraordinary levels of mass casualties, damage, or destruction that severely affects the population, infrastructure, environment, economy, national morale, or government functions ("Washington State Comprehensive Emergency Management Plan". 2019). When a catastrophic incident occurs, it is critical that "the right information gets to the right people at the right time" so that emergency managers have the data available to make informed decisions to allocate resources and relief efforts (World Health Organization. 2019.) to protect human life and safety.

In the spring of 2018, the City of Puyallup, Washington's Emergency Operations Center (EOC) began a project to identify facilities critical to city function and emergency response in the event of a disaster. These "critical facilities" were identified, categorized, mapped, and an activation procedure was created to collect information about facility status following an event. This project implemented a web geographic information system (GIS) to create a digital, interactive, responsive, and modern critical facilities activation plan. This new critical facilities framework allows emergency personnel and building inspectors to quickly and accurately collect and digitize information about the operating state of critical facilities following a natural disaster. Returning data quickly from the field allows EOC staff to improve the City's response time and more efficiently allocate emergency resources.

This project produced a GIS feature layer containing shape, location, pertinent information, and current status of all city-identified critical facilities. This feature layer was integrated into the City's ArcGIS Online platform and existing EOC tools. An interactive form, accessible through both a web interface and mobile platforms, was created in Survey123 to collect field status data from city staff and rapid evaluation safety assessments (Applied Technology Council. 2019.) completed by designated building inspectors. The collected data was integrated into an interactive web map and internal emergency management dashboard to show location of critical facilities, inspection status, damaged facilities, and estimated damage cost estimate.

Section 2. Background

Section 2.1. Study Area: City of Puyallup, Washington

The City of Puyallup, Washington (the City) is a suburban city of 43,000 people situated at the confluence of the Puyallup and White Rivers and located approximately 30 miles northwest of Mount Rainier, an active stratovolcano in the Cascade Mountain Range of Washington State (Figure 1). The City is best known in the region for hosting the Washington State Fair, an event held biannually and drawing over a million visitors.

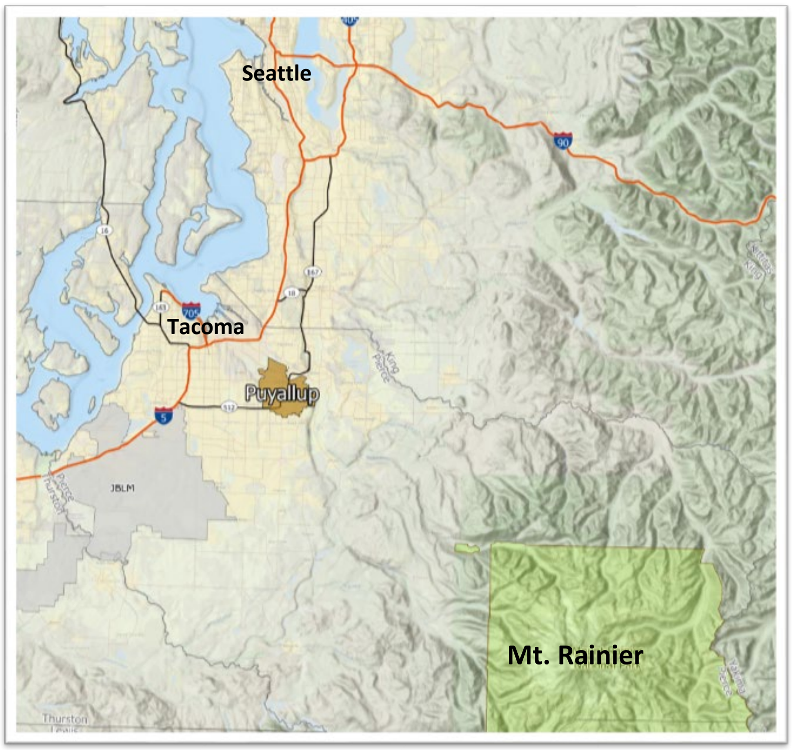


Figure 1. Regional setting for the City of Puyallup, with proximity to the cities of Tacoma and Seattle, and the Mount Rainier volcano.

Because of the City's geographic and geologic setting (Figure 2), as well as its proximity to Mount Rainier, the primary hazards of concern are flooding, severe weather, earthquake, landslide, volcanic eruption/lahar, and technological or human-caused hazards ("City of Puyallup Addendum A-11 Region 5 All Hazard Mitigation Plan 2020-2025 Edition" 2020). The City's emergency response plan must be flexible enough to handle hazards of all scales, from small-scale events such as a few buildings flooding to the large-scale catastrophic damage that could occur from a magnitude 9.0 earthquake or lahar from the eruption of Mount Rainier.

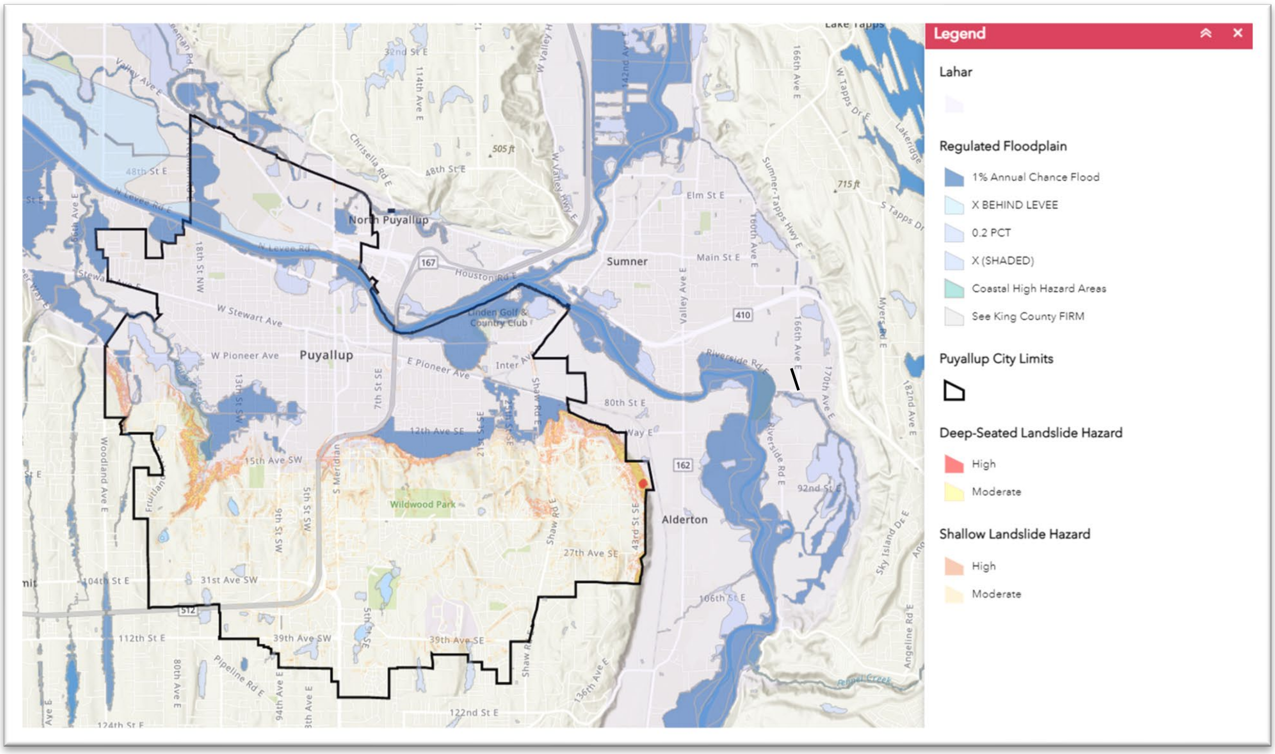


Figure 2. Geographic distribution of natural hazards of concern for the city of Puyallup, including flooding (blue), lahar (lavender), and landslide (orange/red). Other hazards of concern include earthquakes, wildfires, and hazardous material containment breach.

Section 2.2. Emergency management at Puyallup

The City of Puyallup Emergency Operations Center (EOC) has 3 dedicated staff members and over 50 extended team members that can be mobilized from other departments in the event of an emergency. The goal of the EOC is to provide off-site incident management, including coordination between the emergency response team(s) managing the crisis on-site, the crisis communication team that keeps the public informed, and all relevant city, county, state, and federal emergency response partners. In addition, the EOC prioritizes response activities and allocates all available resources to resolve the emergency as quickly as possible while minimizing impact on human life, property, or community function (Ready.gov. n.d.).

To facilitate communication and coordination, the EOC needs to be able to receive, store, and transmit response information quickly. The Puyallup EOC is building a comprehensive and interactive emergency response kit using digital geospatial assets and interactive maps and dashboards to supplement more traditional emergency response plan binders and call lists. These digital assets allow EOC staff to quickly map areas of concern, allocate available resources to affected areas, track the response effort, and update public messaging in near-real-time. As part of this project, tools were built to map, identify, and report status of critical facilities within the city as part of this new emergency response kit.

Section 2.3. Critical Facilities Activation Procedure

Critical facilities are those at the highest priority for maintaining or restoring human health and safety. The Puyallup Municipal Code defines critical facilities as including "schools, nursing homes, hospitals, police, fire and emergency response installations, and installations which produce, use, or store hazardous materials or hazardous waste" (City of Puyallup. n.d.). When an emergency occurs, the EOC follows an activation procedure (Figure 3) to map the areas of concern, identify which critical facilities may be affected, create a prioritized inspection list of affected facilities, dispatch inspectors to each facility to conduct rapid evaluation safety assessments to determine building status, and finally return that status data to the EOC to aid in response planning. Prior to this project, the EOC used a printed map of critical facilities, printed building inspection reports, and cellular communication between the EOC and field staff.

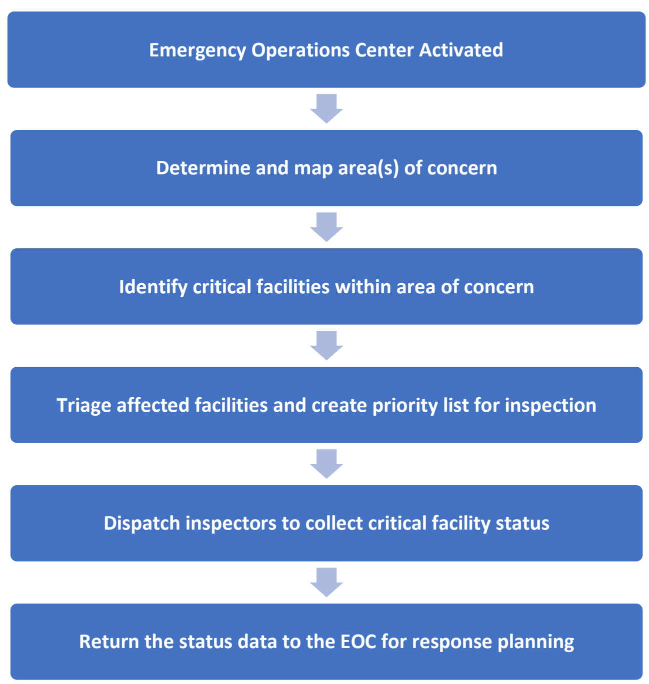


Figure 3. The designated activation procedure to gather information about the building safety status of critical facilities in the event of an emergency in Puyallup, Washington.

This project built a survey, mobile application, and reporting dashboard in ArcGIS Online, Survey123, and Experience Builder to provide the structure to digitally assess inspection priority and collect digital building safety assessment reports from the field. EOC staff are now able to quickly map critical facilities in the area of concern, update facility status, and display facility status on the EOC dashboard for easier decision making, better information tracking, and faster allocation of limited resources.

Section 3. Project Implementation

Section 3.1 Project Overview

This project was a collaboration between researchers at The Pennsylvania State University Department of Geography (Penn State) and City of Puyallup (the City) staff to build a digital framework to collect, store, and disseminate the building safety status of critical facilities that might be affected in the event of an emergency. By implementing a digital structure for critical facility tracking, the City is better able to prioritize limited resources, decrease response time, and protect human health and safety.

Section 3.2. Project Timeline

This project was completed over 8 months, between October 2021 and May 2022. Project work was completed by the project lead, with feedback provided at each stage by the project sponsor, technical specialist, and local subject matter experts as needed. Project roles and responsibilities are detailed in section 3.3.

Project Milestone	*Start*	*End*
Task 1: Project Preparation	**October 2021**	**December 2021**
Supporting research / Literature review		
Needs assessment		
Project proposal	………………	December 15
Feedback cycle: Advisor and stakeholder refinement of project proposal		
Task 2: Project Development	**January 2022**	**April 2022**
Development of critical facilities feature layer		
Database integration		
Survey development		
Feedback cycle: User feedback on database and survey design		

Application development

Feedback cycle: User testing and refinement of application

Task 3: Project Integration and Testing	**April 2022**	**May 2022**
Integrate application into GIS emergency management dashboard		
Full-scale lahar evacuation exercise, testing of EOC GIS framework	………………	April 29
Feedback cycle: Final application refinement from exercise feedback		
Final application delivery		

Task 4: Project Documentation and Presentation	**May 2022**	**May 2022**
Project writeup and presentation preparation		
30-minute oral presentation at Washington GIS Association conference	………………	May 24, 2022

Section 3.3. Description of Tasks and Deliverables

Task 1: Project Preparation

Timeline: October 2021 – January 2022

Deliverables: Literature Review, needs assessment, project proposal

Preparation for this project included a literature review, needs assessment, and creation of a project proposal. The literature review investigated the use of GIS to gather field data in emergency response planning; reviewed existing local, regional, and state emergency response plans as they pertain to critical facility status; and identified the critical facility data that should be collected following an emergency. A needs assessment was completed through meetings between the project lead and EOC staff before and after the literature review. The needs assessment identified research questions that should be investigated in the literature review, confirmed the critical facility data to be collected, and approved the proposed project structure. The literature review and needs assessment were combined to create a project proposal.

Task 2: Project Development

Timeline: January – March 2022

Deliverables: feature layer of critical facilities, database structure, field survey

In task two, the existing shapefile of critical facilities was cleaned, updated, and integrated into the Emergency Operations ArcGIS Online database. The attribute table was updated to store critical facility name, facility category and subcategory, and current inspection status. A field survey to collect building safety status was created in Survey123 (Figure 4) and was based on the FEMA Rapid Evaluation Building Safety Assessment form, as adopted by the Washington Safety Assessment of Facilities Evaluators (WASafe) coalition of building safety inspectors (WAsafe. n.d.). A survey report template was also created to output survey responses to a standardized printable form (Figure 5). The field survey was integrated into the existing EOC framework and a simplified version of the survey was created to allow EOC staff to update critical facility status without an official building inspection.

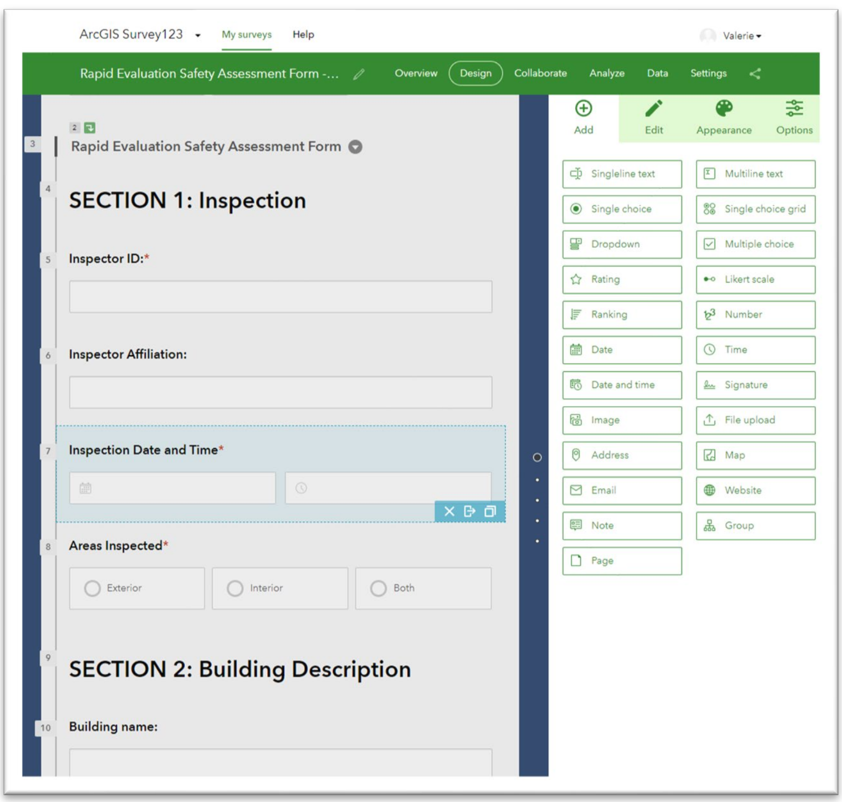
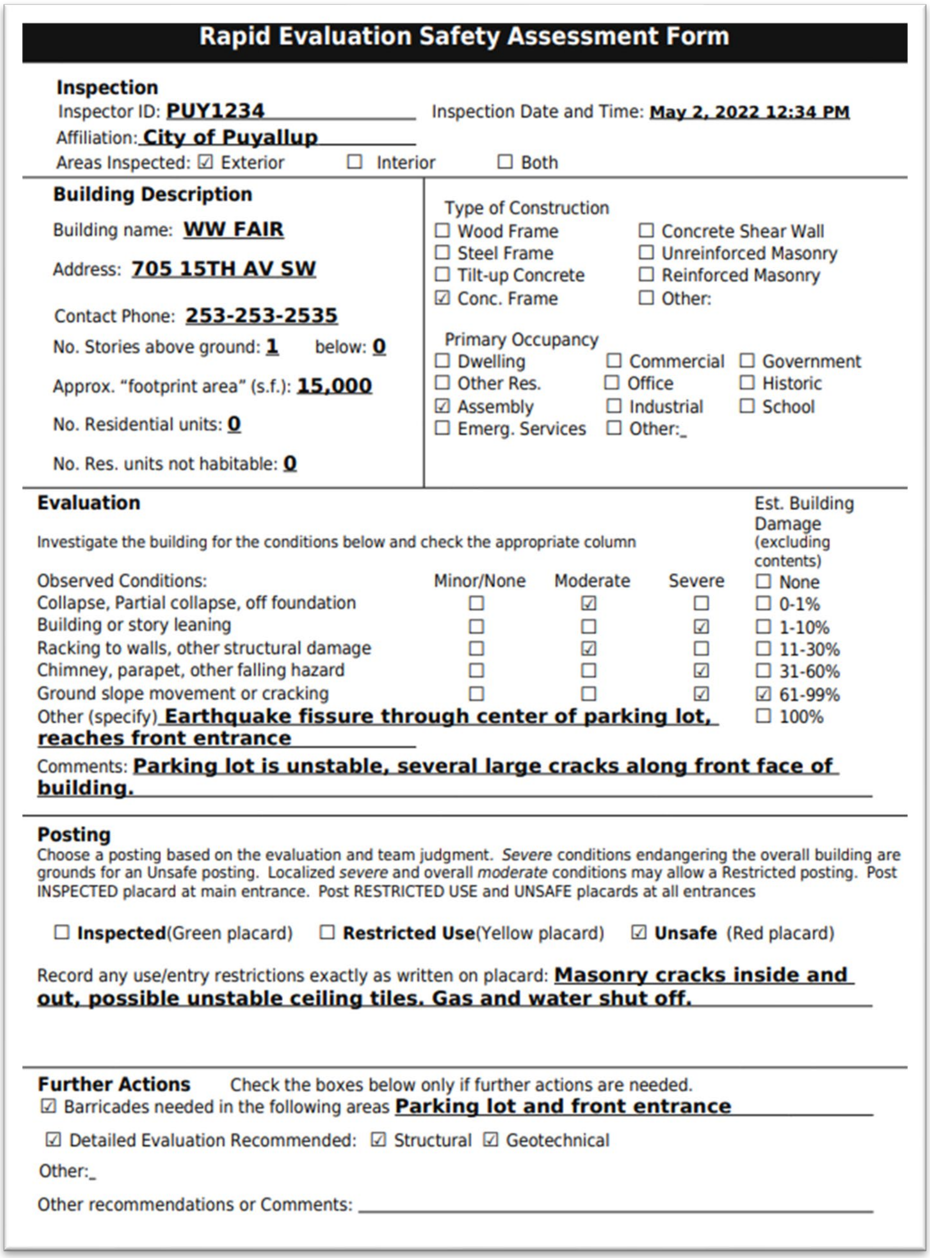


Figure 4. Screenshot of the Rapid Evaluation Safety form built in Survey123 using the web interface.



Rapid Evaluation Safety Assessment Form

Inspection

Inspector ID: **PUY1234** Inspection Date and Time: **May 2, 2022 12:34 PM**

Affiliation: **City of Puyallup**

Areas Inspected: ☑ Exterior ☐ Interior ☐ Both

Building Description

Building name: **WW FAIR**

Address: **705 15TH AV SW**

Contact Phone: **253-253-2535**

No. Stories above ground: **1** below: **0**

Approx. "footprint area" (s.f.): **15,000**

No. Residential units: **0**

No. Res. units not habitable: **0**

Type of Construction

☐ Wood Frame ☐ Concrete Shear Wall
☐ Steel Frame ☐ Unreinforced Masonry
☐ Tilt-up Concrete ☐ Reinforced Masonry
☑ Conc. Frame ☐ Other:

Primary Occupancy

☐ Dwelling ☐ Commercial ☐ Government
☐ Other Res. ☐ Office ☐ Historic
☑ Assembly ☐ Industrial ☐ School
☐ Emerg. Services ☐ Other:_

Evaluation

Investigate the building for the conditions below and check the appropriate column

Observed Conditions:	Minor/None	Moderate	Severe
Collapse, Partial collapse, off foundation	☐	☑	☐
Building or story leaning	☐	☐	☑
Racking to walls, other structural damage	☐	☑	☐
Chimney, parapet, other falling hazard	☐	☐	☑
Ground slope movement or cracking	☐	☐	☑

Other (specify) **Earthquake fissure through center of parking lot, reaches front entrance**

Est. Building Damage (excluding contents)
☐ None
☐ 0-1%
☐ 1-10%
☐ 11-30%
☐ 31-60%
☑ 61-99%
☐ 100%

Comments: **Parking lot is unstable, several large cracks along front face of building.**

Posting

Choose a posting based on the evaluation and team judgment. *Severe* conditions endangering the overall building are grounds for an Unsafe posting. Localized *severe* and overall *moderate* conditions may allow a Restricted posting. Post INSPECTED placard at main entrance. Post RESTRICTED USE and UNSAFE placards at all entrances

☐ **Inspected**(Green placard) ☐ **Restricted Use**(Yellow placard) ☑ **Unsafe** (Red placard)

Record any use/entry restrictions exactly as written on placard: **Masonry cracks inside and out, possible unstable ceiling tiles. Gas and water shut off.**

Further Actions Check the boxes below only if further actions are needed.

☑ Barricades needed in the following areas **Parking lot and front entrance**

☑ Detailed Evaluation Recommended: ☑ Structural ☑ Geotechnical

Other:_

Other recommendations or Comments:

Figure 5. Printable output from Rapid Evaluation Safety Assessment survey. Bold text and checked checkboxes are automatically filled from the survey database table using the Survey123 Reports feature.

Task 3: Project Integration and Testing

Timeline: March – May 2022

Deliverables: Web map and mobile application

During task three, a mobile application was built in Experience Builder that combined a map of tax parcels and the survey to allow for quick field data collection (Figure 6). The survey results, critical facilities feature layer, and tax parcels were combined into a web map and Experience Builder dashboard to display facility inspection status and building damage (Figure 7). The web map and mobile application were tested by the City of Puyallup GIS coordinator and EOC staff. Following testing, a calculation was created to assess magnitude of the cost of the emergency by multiplying improvement value from the tax parcel layer by estimated building damage percentage from the survey. The application was stress tested during a full-scale school lahar evacuation exercise on April 29, 2022.

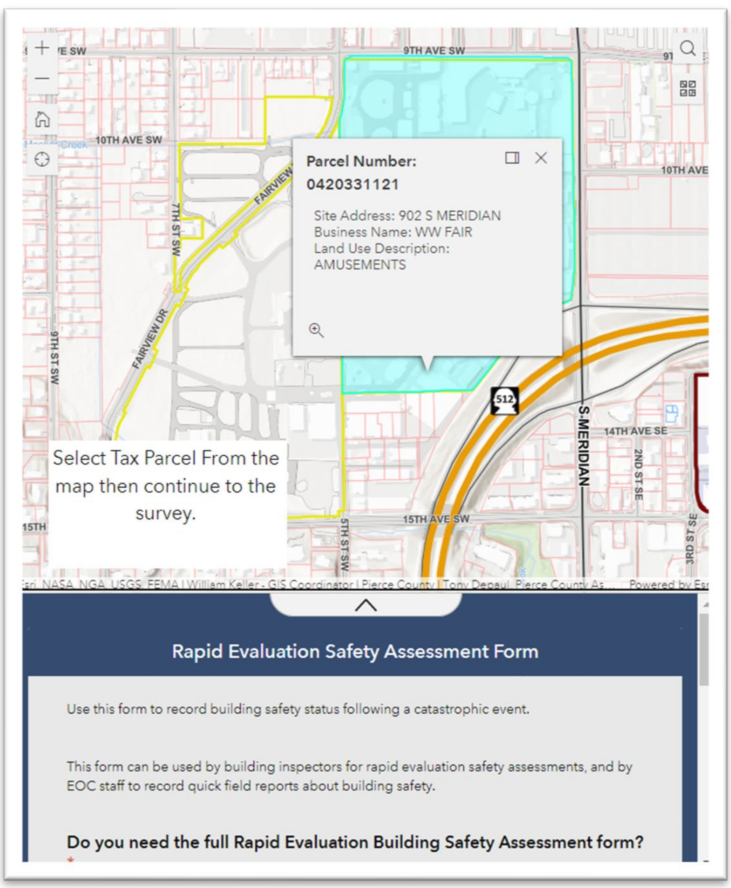


Figure 6. Mobile and web field data collection application that combines a web map of tax parcels with the Rapid Evaluation Safety Assessment survey. Data from the web map is linked to the survey to automatically fill selected fields with information from the tax parcel dataset.

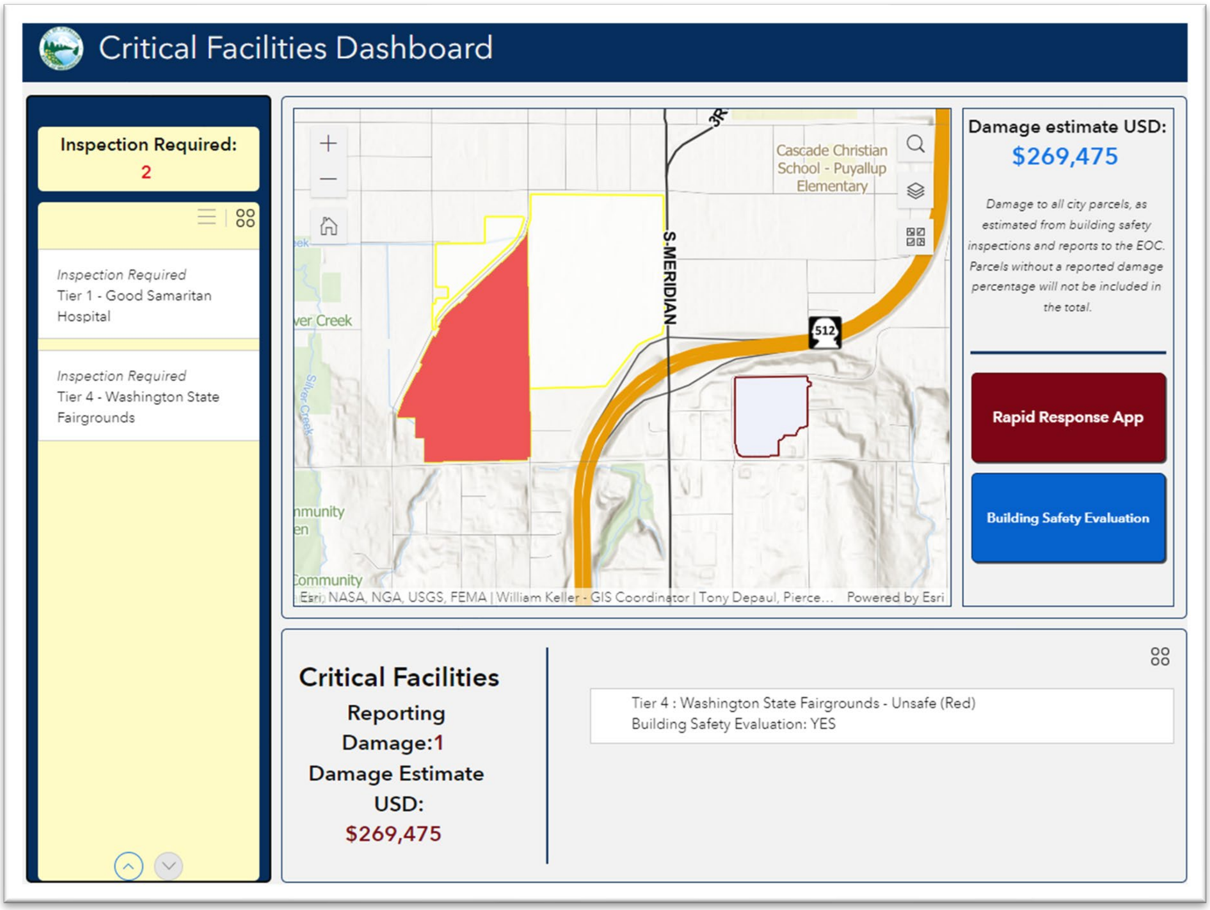


Figure 7. Critical facilities dashboard, built in Experience Builder, displaying facility inspection status, safety status, location, damage estimate, and buttons linking to external applications needed to update the dashboard.

Task 4: Project Documentation and Presentation

Timeline: April – May 2022

Deliverables: project summary, training materials, public template, oral conference presentation

The final task provided project documentation, including a project report, training materials, and an oral conference presentation. The project report documents project goals, methods, deliverables, outcomes, and ongoing maintenance requirements. Training documentation was written for EOC staff unfamiliar with GIS and any necessary future training sessions will be hosted by the GIS coordinator. Results from this project were shared with other Washington State GIS professionals at the Washington GIS Association Conference in May 2022.

Section 3.4. Project Team and Primary Responsibilities

The project team was composed of three primary members, with additional technical support from subject matter experts (figure 8). Project roles are defined below.

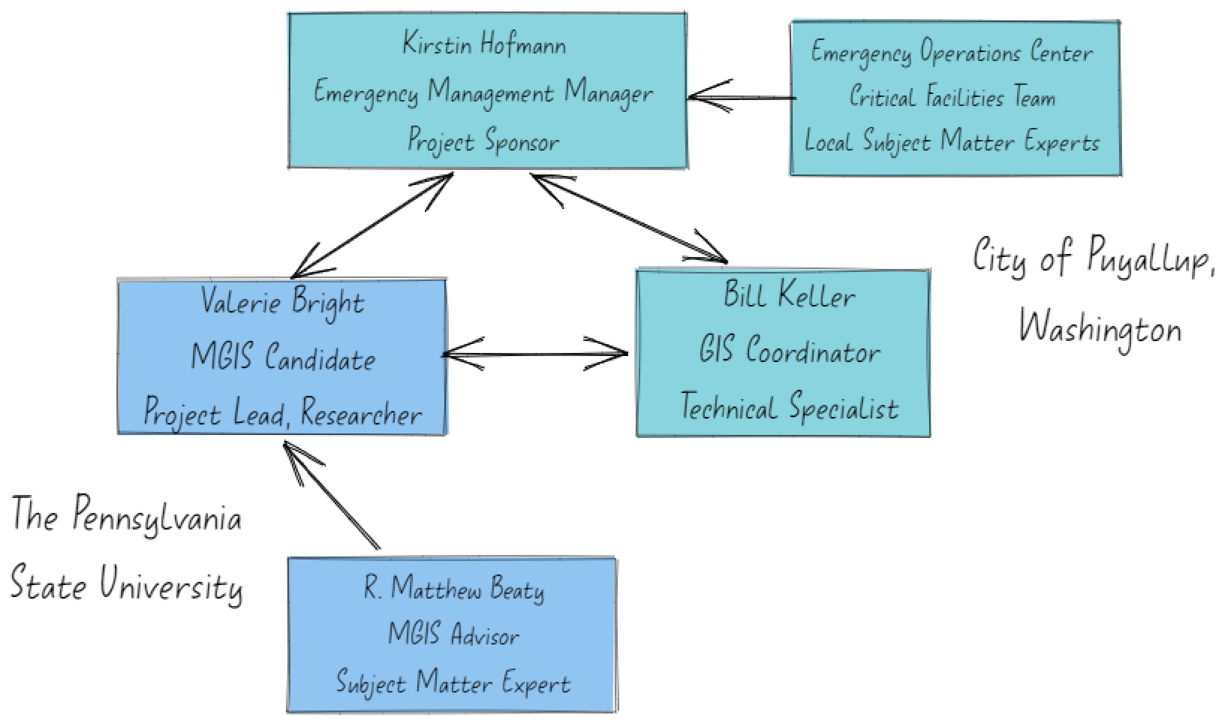


Figure 8. Chart illustrating the project team structure and relationship between project team members at Penn State (blue) and the City of Puyallup (green).

Project sponsor

Kirstin Hofmann, Emergency Management Manager, City of Puyallup. Responsible for championing the project, providing a needs assessment and communicating City requirements, and facilitating meetings between subject matter experts.

Project lead

Valerie Bright, MGIS Candidate, Penn State Geography. Responsible for project management and design, leading research and providing solutions for City needs, designing and implementing new GIS structure, and incorporating user feedback.

Technical Specialist

Bill Keller, GIS Coordinator, City of Puyallup. Responsible for furnishing data, providing input on technical specifications of the City's GIS structure, and ensuring deliverables integrate with existing Emergency Management structure.

Local Subject Matter Experts

Critical Facilities Team, City of Puyallup. Subject matter experts assembled from city, county, and state emergency management officials, responsible for providing project design critique and user testing.

Academic subject matter expert

R. Matt Beaty, MGIS Advisor, Penn State Geography. Responsible for providing expertise on emergency management best practices and academic advice to ensure Penn State project requirements are met.

Section 3.5. Project Budget

The project lead completed this work as a volunteer for the City of Puyallup, in exchange for academic credit from The Pennsylvania State University toward a Master's degree in Geographic Information Systems. Project assistance from City of Puyallup employees fell within normal expected duties and salary cost was minimal. Salary costs were not calculated for City employees. Hardware and software needed to complete this project were covered by currently available city resources. No additional hardware or software was needed.

Section 4. Technical Methods

The City of Puyallup has an Esri ArcGIS hybrid enterprise architecture that utilizes two discreet GIS structures working in tandem - ArcGIS Enterprise with locally-hosted ArcGIS Servers for use within the City's intranet and ArcGIS Online for web access to the City GIS using an organization login or for publicly available apps and data. The Emergency Operations Center (EOC) has chosen to use ArcGIS Online to host its data and applications so that emergency data can be accessed from any location, as long as the user has a data connection. Data stored in ArcGIS Online are hosted on Amazon Web Services servers outside of the immediate geographic area of Puyallup, minimizing the risk that servers was inaccessible in the event of a local emergency. Access to the EOC's data layers are restricted to members of the EOC GIS users group within ArcGIS Online, with some layers shared with all City GIS users, and selected layers shared with the public for emergency messaging through the public response dashboard (www.cityofpuyallup.org/eocdashboard). This project utilizes the existing ArcGIS Online platform and tools available from the city to minimize cost, complexity, and maintenance.

The first GIS deliverable was a polygon vector feature layer that holds geographic and descriptive information on the City's identified critical facilities. This layer includes tax parcel number, facility category (emergency response, medical, sanitation, shelter), and priority tier designation for response planning (Figure 9). Existing critical facilities data was cleaned, updated, and integrated into the existing EOC ArcGIS Online data structure with appropriate permissions and metadata.

Critical Facilities (Features: 147, Selected: 0)

Facility ID	Tax Parcel	Facility Tier	Facility Name	Facility Type	Facility SubType	Facility Status	Jurisdiction	Site Address
2,031		2		Shelter	School	Not Affected	Puyallup	
2,032		2		Shelter	School	Not Affected	Puyallup	
2,034		2		Shelter	School	Not Affected	Puyallup	
1,015		1		Sanitation	Sanitation	Not Affected	Puyallup	
1,019		1		Sanitation	Sanitation	Not Affected	Puyallup	
1,020		1		Sanitation	Sanitation	Not Affected	Puyallup	
1,021		1		Sanitation	Sanitation	Not Affected	Puyallup	
1,022		1		Sanitation	Sanitation	Not Affected	Puyallup	
1,023		1		Sanitation	Sanitation	Not Affected	Puyallup	
1,024		1		Sanitation	Sanitation	Not Affected	Puyallup	
3,001		3		Medical	Long Term Care	Not Affected	Puyallup	
3,002		3		Medical	Long Term Care	Not Affected	Puyallup	

Figure 9. Portion of the attribute table for the Critical Facilities polygon feature layer. Tax parcel number, facility name, and site address have been redacted for security reasons.

A web survey was designed in Survey123 using the Rapid Evaluation Safety Assessment Form, published by FEMA and adopted by the WASafe coalition of emergency building safety responders to provide a statewide standardized template for rapid structural condition evaluations of buildings following a disaster (WAsafe. 2018). The survey was expanded to include options for EOC staff to update the building status without an official building inspection and stores official inspections and unofficial survey results separately (Figure 10). When an official inspection is submitted, the results are printed to a report template that closely matches the default Rapid Evaluation form and is saved as a document on City servers (Figure 11).

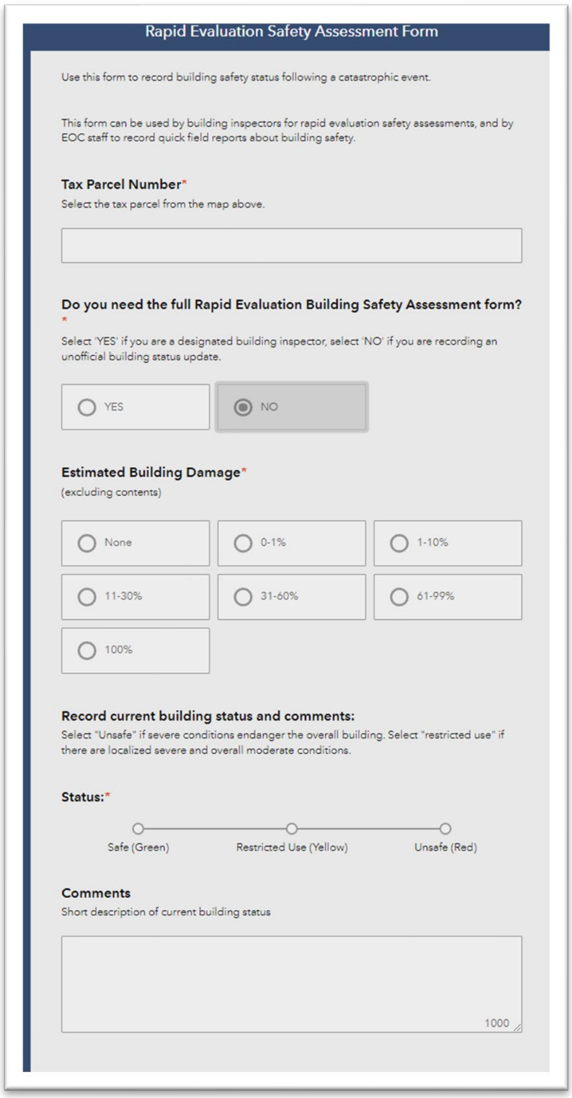
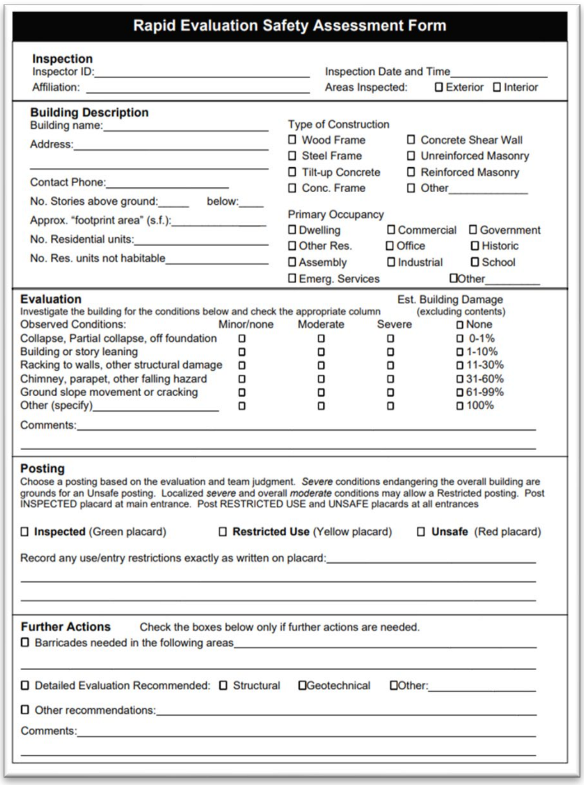


Figure 10. Simplified version of the survey designed for emergency operations staff to record quick status updates without a full building inspection. Selecting "Yes" on the "Do you need the full Rapid Evaluation Building Safety Assessment form?" question would expand options for the full survey.



Rapid Evaluation Safety Assessment Form

Inspection
Inspector ID:________ Inspection Date and Time________
Affiliation: ________ Areas Inspected: ☐ Exterior ☐ Interior

Building Description
Building name:________
Address:________
Contact Phone:________
No. Stories above ground:_____ below:____
Approx. "footprint area" (s.f.):________
No. Residential units:________
No. Res. units not habitable________

Type of Construction
☐ Wood Frame ☐ Concrete Shear Wall
☐ Steel Frame ☐ Unreinforced Masonry
☐ Tilt-up Concrete ☐ Reinforced Masonry
☐ Conc. Frame ☐ Other________

Primary Occupancy
☐ Dwelling ☐ Commercial ☐ Government
☐ Other Res. ☐ Office ☐ Historic
☐ Assembly ☐ Industrial ☐ School
☐ Emerg. Services ☐ Other________

Evaluation
Investigate the building for the conditions below and check the appropriate column

Observed Conditions:	Minor/none	Moderate	Severe	Est. Building Damage (excluding contents)
				☐ None
Collapse, Partial collapse, off foundation	☐	☐	☐	☐ 0-1%
Building or story leaning	☐	☐	☐	☐ 1-10%
Racking to walls, other structural damage	☐	☐	☐	☐ 11-30%
Chimney, parapet, other falling hazard	☐	☐	☐	☐ 31-60%
Ground slope movement or cracking	☐	☐	☐	☐ 61-99%
Other (specify)________	☐	☐	☐	☐ 100%

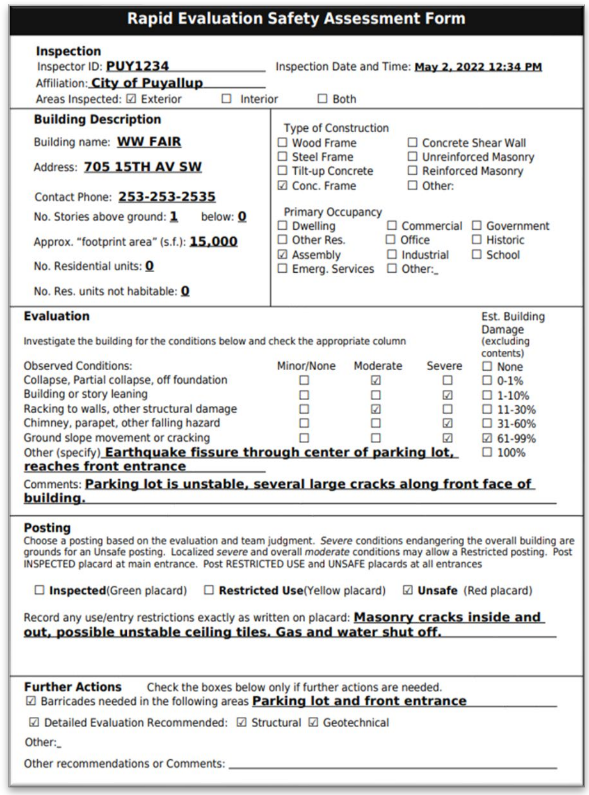
Comments:________

Posting
Choose a posting based on the evaluation and team judgment. *Severe* conditions endangering the overall building are grounds for an Unsafe posting. Localized *severe* and overall *moderate* conditions may allow a Restricted posting. Post INSPECTED placard at main entrance. Post RESTRICTED USE and UNSAFE placards at all entrances

☐ **Inspected** (Green placard) ☐ **Restricted Use** (Yellow placard) ☐ **Unsafe** (Red placard)

Record any use/entry restrictions exactly as written on placard:________

Further Actions Check the boxes below only if further actions are needed.
☐ Barricades needed in the following areas________
☐ Detailed Evaluation Recommended: ☐ Structural ☐ Geotechnical ☐ Other:________
☐ Other recommendations:________
Comments:________



Rapid Evaluation Safety Assessment Form

Inspection
Inspector ID: **PUY1234** Inspection Date and Time: **May 2, 2022 12:34 PM**
Affiliation: **City of Puyallup**
Areas Inspected: ☑ Exterior ☐ Interior ☐ Both

Building Description
Building name: **WW FAIR**
Address: **705 15TH AV SW**
Contact Phone: **253-253-2535**
No. Stories above ground: **1** below: **0**
Approx. "footprint area" (s.f.): **15,000**
No. Residential units: **0**
No. Res. units not habitable: **0**

Type of Construction
☐ Wood Frame ☐ Concrete Shear Wall
☐ Steel Frame ☐ Unreinforced Masonry
☐ Tilt-up Concrete ☐ Reinforced Masonry
☑ Conc. Frame ☐ Other:

Primary Occupancy
☐ Dwelling ☐ Commercial ☐ Government
☐ Other Res. ☐ Office ☐ Historic
☑ Assembly ☐ Industrial ☐ School
☐ Emerg. Services ☐ Other:_

Evaluation
Investigate the building for the conditions below and check the appropriate column

Observed Conditions:	Minor/None	Moderate	Severe	Est. Building Damage (excluding contents)
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Chimney, parapet, other falling hazard	☐	☐	☑	☐ 31-60%
Ground slope movement or cracking	☐	☐	☑	☑ 61-99%
Other (specify) **Earthquake fissure through center of parking lot, reaches front entrance**				☐ 100%

Comments: **Parking lot is unstable, several large cracks along front face of building.**

Posting
Choose a posting based on the evaluation and team judgment. *Severe* conditions endangering the overall building are grounds for an Unsafe posting. Localized *severe* and overall *moderate* conditions may allow a Restricted posting. Post INSPECTED placard at main entrance. Post RESTRICTED USE and UNSAFE placards at all entrances

☐ **Inspected**(Green placard) ☐ **Restricted Use**(Yellow placard) ☑ **Unsafe** (Red placard)

Record any use/entry restrictions exactly as written on placard: **Masonry cracks inside and out, possible unstable ceiling tiles. Gas and water shut off.**

Further Actions Check the boxes below only if further actions are needed.
☑ Barricades needed in the following areas **Parking lot and front entrance**
☑ Detailed Evaluation Recommended: ☑ Structural ☑ Geotechnical
Other:_
Other recommendations or Comments: ________

Figure 11. Rapid Evaluation Safety Assessment Form, as published by WASafe (left), and the automatically generated report filled with survey results from Survey123 (right).

When a survey is published using Survey123, Survey123 automatically generates a table with pre-defined database structure in ArcGIS Online to store survey results. The default field names were updated in the table schema for clarity. To meet City needs, the survey was updated after initial testing to capture "land improvement value" from the tax parcel layer when a survey is completed. Improvement value is the assessed value of buildings on a tax parcel. The improvement value for a tax parcel is multiplied by the estimated damage percent of the parcel from the evaluation to create an estimated damage cost estimate for use in determining magnitude of an emergency and requesting government aid. Survey123 is included in the City's existing ArcGIS online platform for no additional cost.

To create the Experience Builder dashboard, first several joins were created using the tax parcel layer, critical facilities layer, and Rapid Evaluation Safety Assessment results layer. Hosted feature layer views were created by joining the survey to tax parcels and the survey to critical facilities. The hosted feature layer view is a dynamic join, meaning that the view updates whenever new data are submitted. Static joins, in contrast, take a snapshot of the data at the time of joining.

The Experience Builder dashboard was created using a combination of a web map, dynamic text, two list widgets, and two button widgets (Figure 12). The inspection required list is populated using a query from the Critical Facilities layer where "Facility Status" is any of "Inspection Required" or "Inspector Dispatched." The damaged facilities list is populated using a query from the joined Rapid Evaluation survey + critical facilities layer where survey creation date is in the last 2 months. This query can be adjusted based on current incident length and time since last incident. The count of damaged critical facilities needing inspection, critical facilities damaged, critical facility damage estimate, and damage estimate from all tax parcels were created using dynamic text, either as a count of features in a joined layer or the sum of a calculation field built into the layer. The web map displays inspection status, damage status, and hazard location by default, with the ability to turn on additional layers as needed. Two buttons link to the Rapid Response App, used to update inspection status, and the Rapid Evaluation survey to update building safety status.

Figure 12. Snapshot of the Experience Builder user interface for the Critical Facilities Dashboard with lists (A, C), dynamic text (B, E), buttons (D), and web map (F).

Experience Builder was chosen for the dashboard because it is an application development platform that does not require specialized coding knowledge, but can be expanded by web developers in the future if the need arises. It is also designed to easily build dashboards that are web, tablet, and mobile friendly. Flexibility of view will be important in an emergency when desktop computer access may be limited. Experience Builder is included in the City's existing ArcGIS online platform for no additional cost.

Section 5. Conclusion

Emergency response following a catastrophic incident involves fast-paced and complex data collection, coordination, and communication between many different agencies and organizations. The primary hazards of concern for the City of Puyallup range from single-site incidents to catastrophic regional events and include flooding, severe weather, earthquake, landslide, volcanic eruption/lahar, and technological or human-caused hazards. The City has a dedicated Emergency Operations Center (EOC) and is building GIS tools to expand the ability to display complex data quickly.

The critical facility feature class, mobile-friendly survey, and critical facilities dashboard created during this project build on existing procedures and allow the city to more quickly and accurately organize, store, use, query and disseminate critical facility status. The framework was built using ArcGIS Online and designed to handle incidents of any size. The field survey allows unofficial facility status input from EOC staff and official building safety inspections from designated building inspectors. The field survey was tested to ensure that it can be used with no specialized training needed, so that it is practical to use during an emergency. Design decisions were made with ease of maintenance and upkeep in mind. Deliverables were integrated into existing Emergency Operations Center tools and available as a template for City staff to build additional status-tracking features as needed in the future.

This project was completed over the course of 8 months at no additional cost to the City and findings were presented at the Washington GIS Association Conference in May 2022.

Section 6: References

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