

Turning islands into bridges: Community-based response after a catastrophic earthquake

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ABSTRACT

The workforce rallying point model is intended to activate within the first 24 hours after a catastrophic earthquake. Its purpose is to provide employees with access to critical information and early response assignments following a Cascadia subduction zone-type event. The consequences from a catastrophic event could include loss of communication with departmental leadership, as well as loss of safe worksite facilities. A systems failure of this

magnitude requires rethinking traditional centralised disaster response models. Building from lessons learned in past catastrophes, the City of Seattle is rewriting its earthquake response plan to account for an unknown period of isolation. The Seattle Office of Emergency Management has identified eight sites as potential workforce rallying points based on anticipated impacts to bridges, roadways and other infrastructure. Workforce rallying points serve four primary purposes: (1) citywide communications connectivity for consequence management activities, (2) City of Seattle staff collection and assignment points, (3) impact assessment and reporting hubs, and (4) public information distribution points, including the availability of in-language community messaging. The new plan embraces decentralised decision making, through workforce rallying points, and by supporting community empowerment through spontaneous community response efforts.

Keywords: *workforce rallying point, community lifelines, earthquake, catastrophe, isolation phase, Cascadia*

INTRODUCTION

The City of Seattle is vulnerable to multiple potentially catastrophic earthquake faults. Historic development trends have led to a built environment that is highly vulnerable to earthquake impacts. Building codes have been updated, and efforts are underway in departments across the City to mitigate the risk to buildings and infrastructure. However, because seismic mitigation is extremely time and resource-intensive, the Seattle Office of Emergency Management (OEM) is concurrently developing response plans to tackle the consequences of a catastrophic earthquake, including widespread communications disruptions, failures of transportation infrastructure both into and within the city, and the tremendous human impacts to residents and the city's workforce.

Seattle's earthquake vulnerability

In 1889, the Great Seattle Fire^{1,2} burned 25 city blocks, or 125 acres, including the entire business district, four of the city's wharves, and the city's railroad terminals. To prevent this catastrophe from occurring again, city leaders required all new construction downtown to be constructed from brick or stone, or what is now known as unreinforced masonry (URM). This has resulted in a city-wide development legacy of over 1,100 rigid, URM buildings which are known for their vulnerability to earthquakes.³

Early Seattleites 'did such a good job of burying these stories under garbage and sawdust and sand and asphalt and concrete and buildings [that] they have blinded many Seattleites to the instability of [the city's] former topography'.⁴

Removal of the extensive debris would come at immense cost and required considerable manpower. The city therefore elected to build the new downtown business district on top of the rubble that already lay on tideflats and glacial moraines.⁵ The Duwamish River delta and valley were therefore filled in with assorted debris (Figure 1).⁶ This was largely unengineered, unconsolidated fill — including sawdust from the Yesler Mill.⁷⁻⁹

As a result of the above actions, 15 per cent of the city area is now vulnerable to ground failure in the event of an earthquake.

In the 1980s and 1990s, geo-scientists began to explore the evidence of regular megathrust earthquakes in both the geologic record and the oral traditions of the Native people of the Pacific Northwest.¹⁰ Through partnerships with the Northwest Seismic Network, University of Washington, and a variety of federal and private sector partners, the City is continuing to develop its understanding of the local seismic risks.

Figure 2 displays the location of known URM buildings and liquefaction-prone soil in Seattle, while Figure 3 illustrates

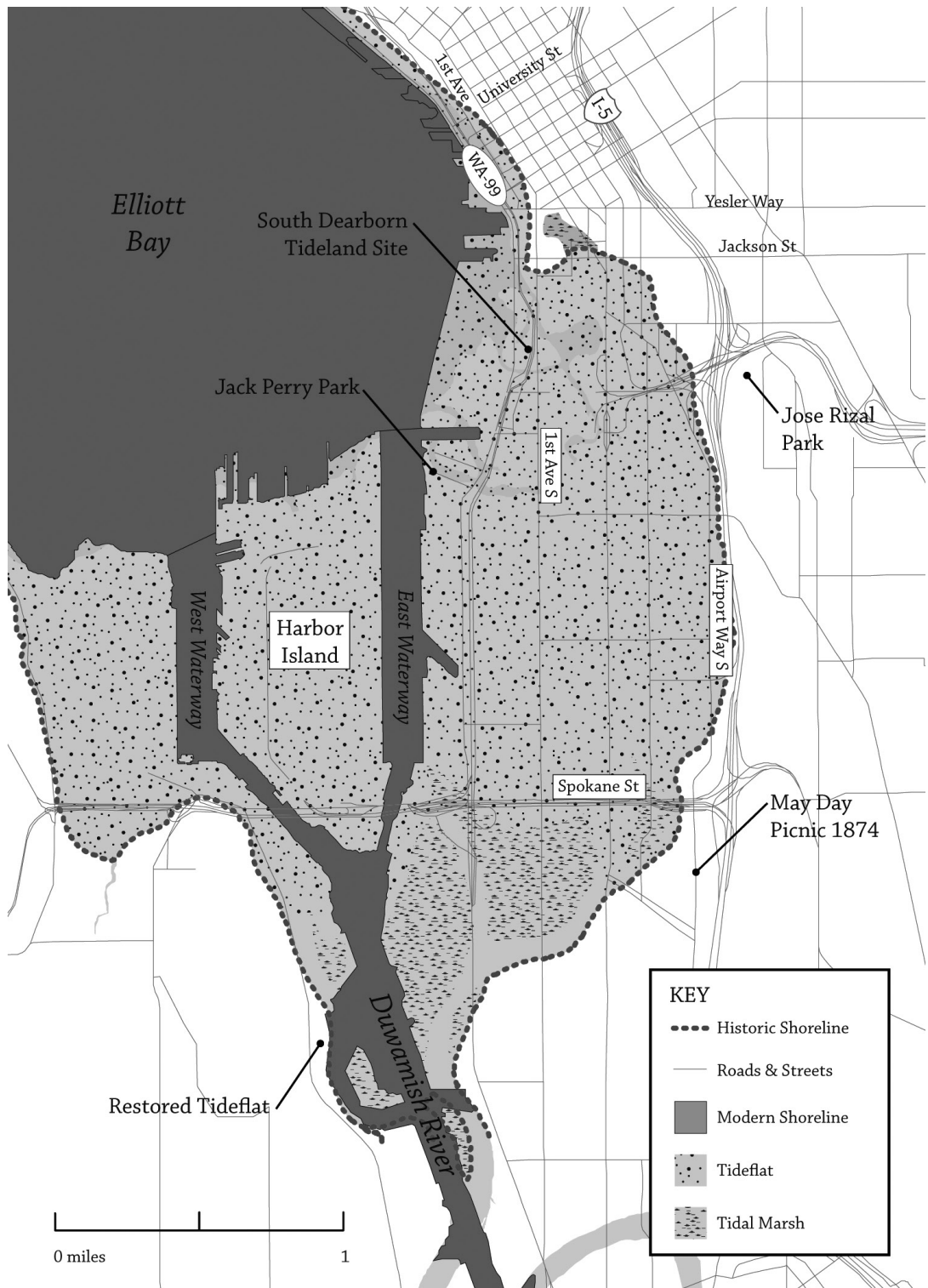


Figure 1 The Duwamish River tideflats

Source: Williams D.B. (2015) 'Too High and Too Steep: Reshaping Seattle's Topography', Courtesy of Puget Sound River History Project, University of Washington Press.

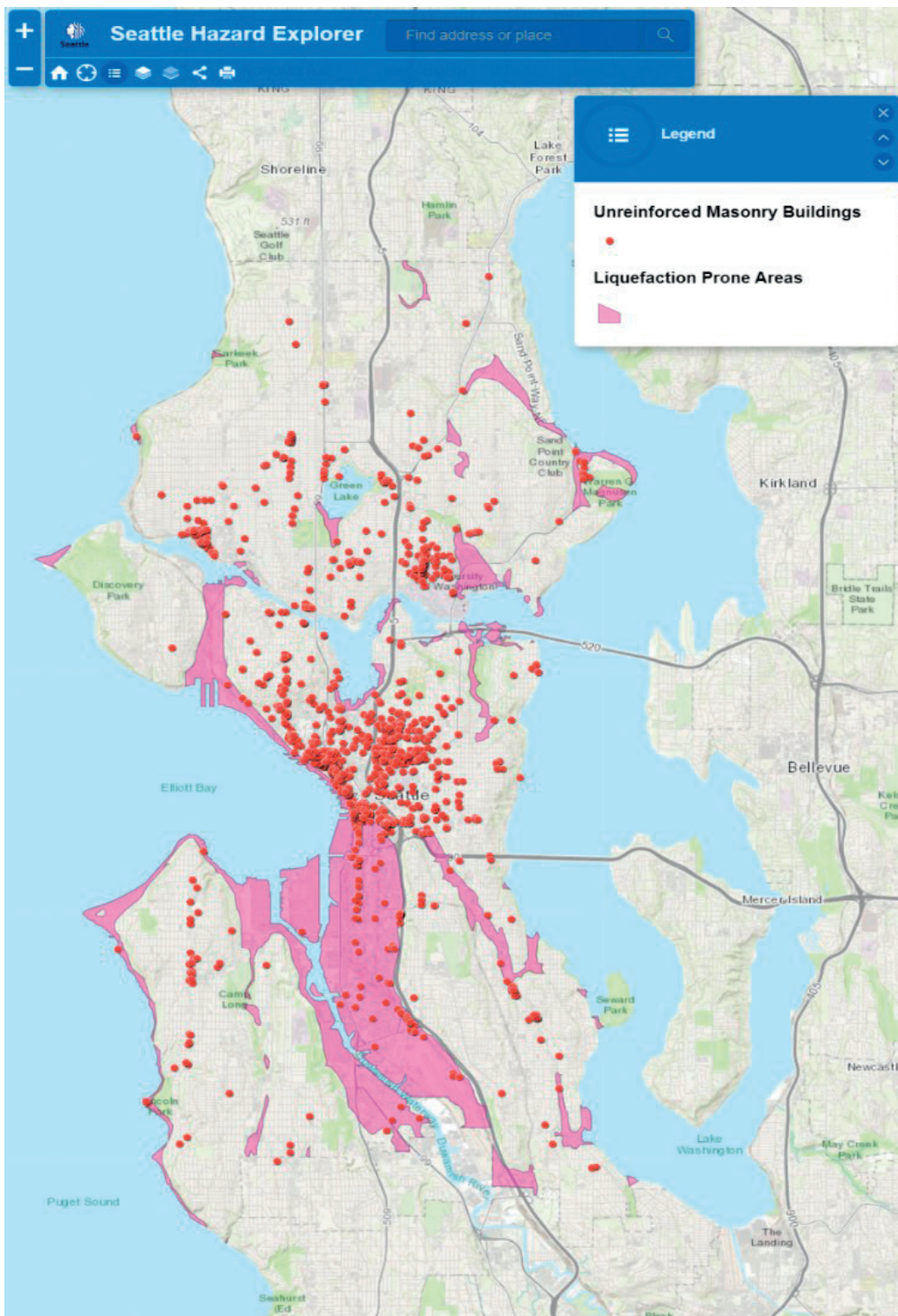


Figure 2 Unreinforced masonry buildings

Source: Seattle Hazard Explorer, available at: <https://www.arcgis.com/apps/MapSeries/index.html?appid=0489a95dad4e42148dbef571076f9b5b> (accessed 16th November, 2022).

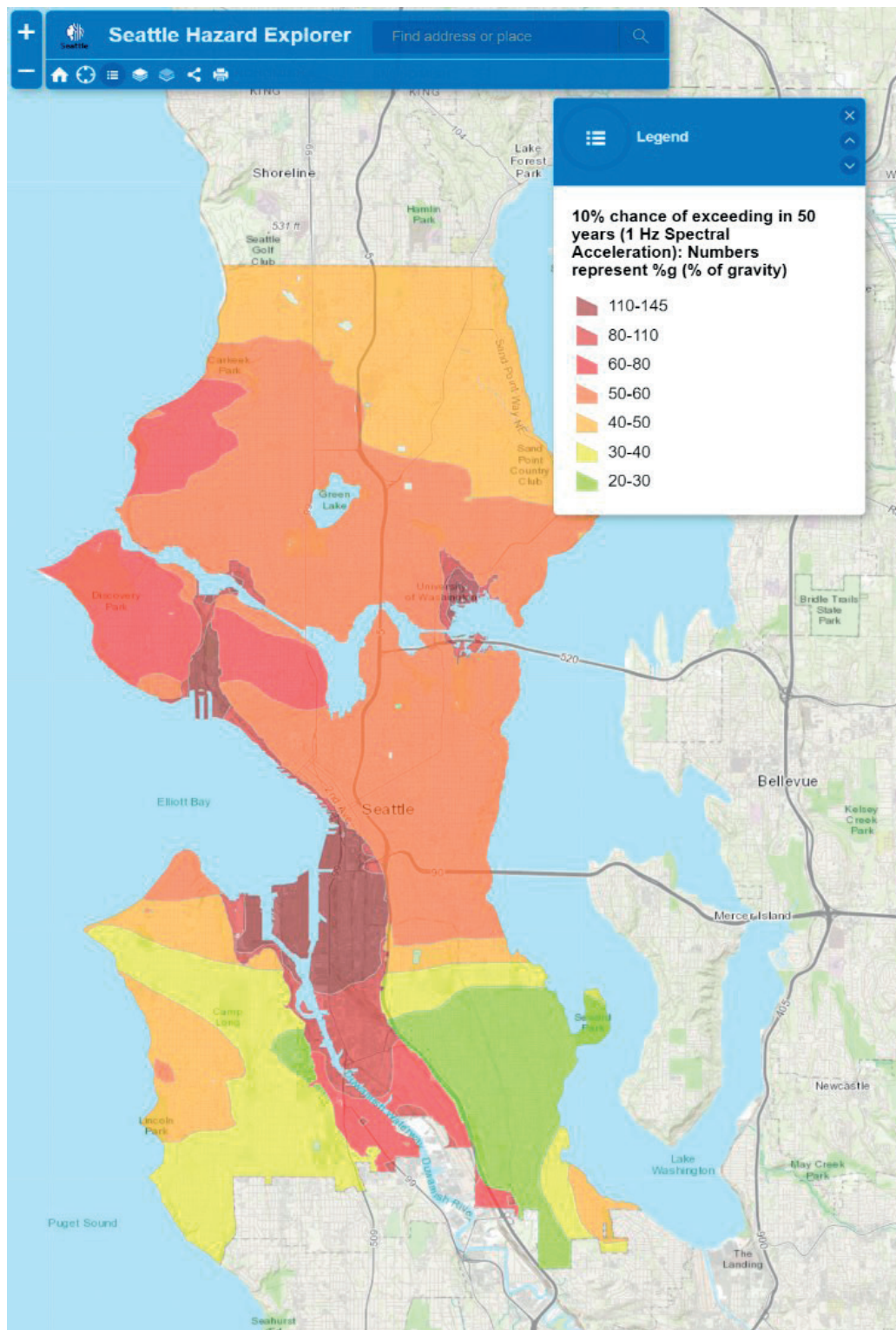


Figure 3 Spectral ground acceleration exceedance and liquefaction-prone areas

Source: Seattle Hazard Explorer, available at: <https://www.arcgis.com/apps/MapSeries/index.html?appid=0489a95dad4e42148dbef571076f9b5b> (accessed 16th November, 2022).

the level of ground-shaking in different areas of the city that there is a 10 per cent chance of exceeding in the next 100 years.

Using artificial intelligence modelling, consultant One Concern created images of the greatest seismic hazards in Seattle. The images compare the city's potentially catastrophic earthquake scenarios (Figure 4, centre and right) with the documented impacts of the 2001 Nisqually earthquake. The models show block-by-block damage estimates — depicting the most common damage-type expected on a block and the percentage of buildings that might experience such damage. The lighter greyscales indicate that less than 10 per cent of buildings are expected to have any damage at all or primarily non-structural, aesthetic damage to potentially

10 per cent of buildings. The darker shades of greyscale indicate a variety of damage, but mostly non-structural yet significant damage that would interfere with the building use, ranging from a collapsed chimney to property being unsuitable for overnight inhabitation. Those same blocks may also contain a few destroyed buildings. The darkest greyscale indicates where more buildings are expected to have lost structural integrity — with the darker blocks highlighting where over half the buildings are expected to meet the engineering definition of collapsed.

In 2017, the US Department of Homeland Security's Cybersecurity and Infrastructure Security Agency sponsored the Washington State Transportation Systems Regional Resiliency Assessment

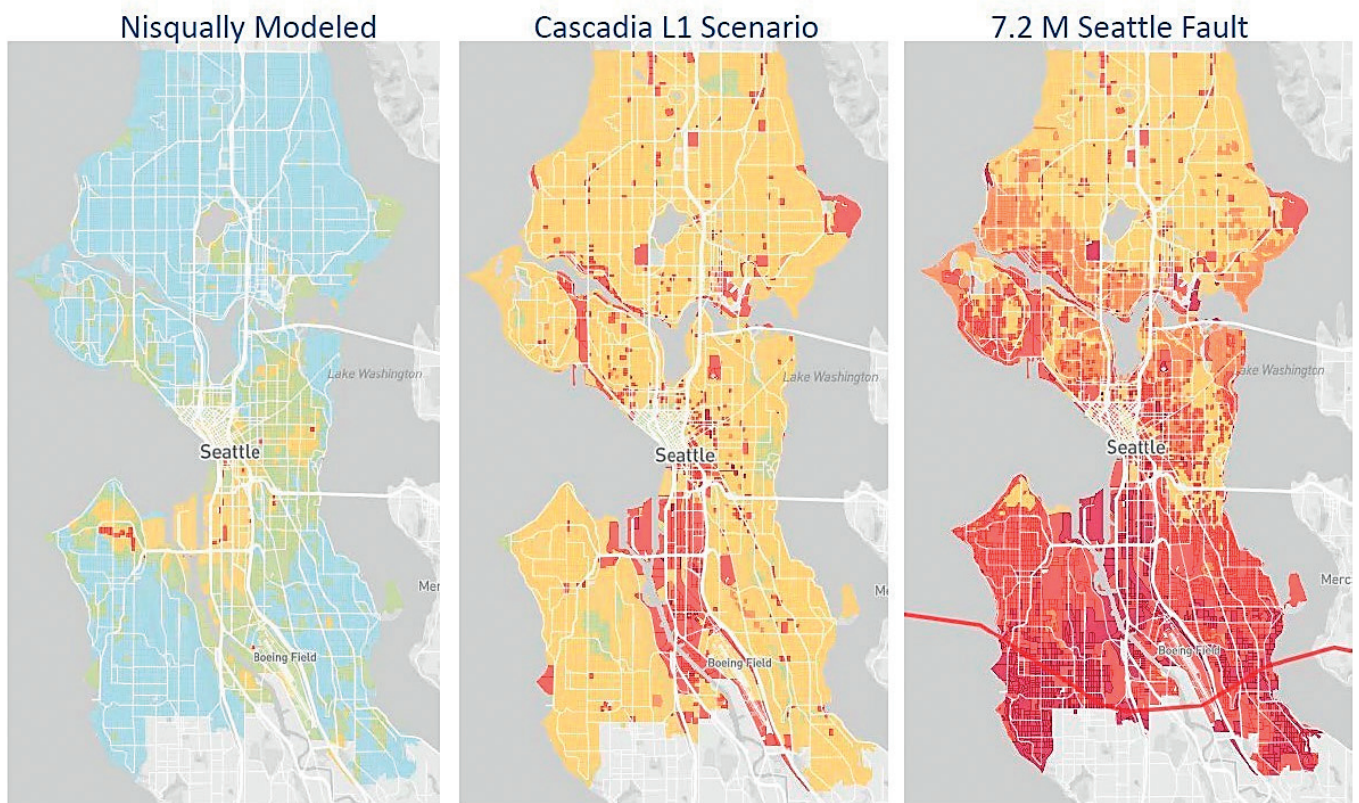


Figure 4 Nisqually, Cascadia and Seattle Fault damage models

Source: Image developed via the One Concern Resilience Software Platform, available at: <https://oneconcern.com/en/> (accessed 16th November, 2022).

Program (RRAP) project in coordination with the Washington Emergency Management Division, Washington State Department of Transportation, and other regional stakeholders. This project focused on assessing the impacts of a Cascadia Subduction Zone (CSZ) earthquake on state-owned transportation infrastructure and how those impacts may affect emergency response efforts. The intended outcome of this analysis was the prioritisation of transportation routes and modes for additional investments to enhance their resilience.

In Figure 5, each dot represents a state-owned bridge or other elevated road structure (eg highway on/off ramp or interchanges). The colour of each dot represents the anticipated amount of time it should take to restore that structure for emergency use, assuming there are no resource shortages for restoration efforts. Overall, this assessment showed that even though a CSZ event presents the city

with less immediate local damage, in many ways it represents a worst-case scenario because the impacts will be so widespread that any incoming aid, assuming it can get in, will be spread across multiple states.

ISOLATION PLANNING

Whether the city is looking at more intense localised damage from a Seattle Fault earthquake, or more widespread damage pursuant to a CSZ scenario, outside resources will have challenges getting into the city. The first step that Seattle OEM took to incorporate catastrophic planning considerations into the city's earthquake plans was to introduce an 'isolation phase' into the earthquake annex. This 'isolation phase' refers to the time duration where the city is cut off from incoming resources. This could be due to infrastructure damage alone — like bridges and roads being impassable — or

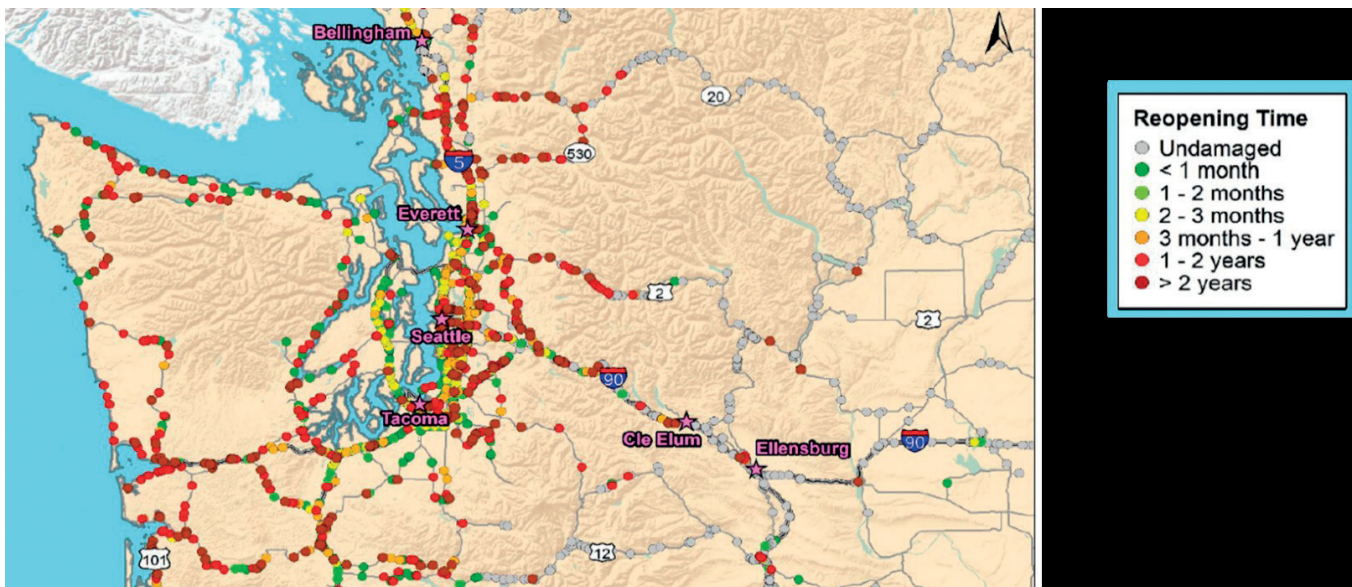


Figure 5 Washington Statewide Bridge impacts from Cascadia subduction earthquake

Source: Bergerson, J., Wall, T., Schlueter, S., Wilson, D. and Scroggins, G. (2019) 'Washington State Highway Bridge Seismic Screening Tool', Technical Report ANL/DIS 19/1, 1581518, 157924, available at: <https://www.osti.gov/servlets/purl/1581518/> (accessed 16th November, 2022).

a combination of local damage and more severe impacts in other parts of the state diverting available resources elsewhere. Whether the isolation phase is brief or extended will depend on the impacts of the earthquake; what is certain, however, is that during this period, the city will be on its own and will need to make do with whatever resources are already within its boundaries.

To initiate planning for a potential isolation phase, OEM held a series of five workshops. The first three workshops explored the functional areas of life-safety (eg emergency medical, search and rescue, police), infrastructure, and human services, respectively. These workshops looked at the objectives in the template consolidated action plan, and how the tasks which support the objectives would have to change if assets were limited to what could be obtained within city boundaries. For the purposes of this exercise, participants were allowed to consider resources that were owned by the private sector or other government entities, provided that the resource was physically located within the city. The fourth and fifth workshops explored the logistical and public information challenges that would need to be overcome to support the first three functional areas.

Estimated impacts from a 7.2 Seattle Fault earthquake were used to guide the discussion, specifically:

- 90 per cent of the city immediately without power;
- 25,000 people in need of shelter;
- Widespread damage to roads and bridges;
- Approximately 40 structure fires; and
- 50 per cent of the city without water within 12 hours, with potential to increase to 95 per cent over the following three days as the water system drains out.

It became clear that no matter the size of the earthquake, the City would need to do the same basic things. In other words, there would be no change in its objectives. How these objectives would be accomplished during an isolation phase, however, would have to change drastically. Unsurprisingly, all functions identified the need to rely heavily on community resources during a potential isolation phase. In some cases, this involved adding new tasks in support of objectives, such as operational departments needing to deploy personnel directly to fire department battalions to support lifesaving operations. In a normal response, fire incident commanders would request resources through established processes. In a catastrophic earthquake, anticipated communications challenges require on-scene liaisons at each of the fire department area commands. In other cases, existing tasks were simply modified by relying more heavily on the community. For example, in a moderate earthquake, public health would provide information to health-care providers and first responders on the proper disposition of bodies. In a major earthquake, the number of fatalities might exceed the immediate capacity of official resources, so the public health sector would also need to provide such guidance directly to the public.

These workshops were invaluable in helping partners conceptualise catastrophic response and how everyone would need to think creatively to rise to the challenge.

The planning exercise identified two major shortcomings:

- The assumption that all resources within the city's limits would be accessible was overly simplistic, as transportation impacts would impede the ability to move resources around the city, as well as into the city; and
- When responding during an event that causes system-wide failures within a

society, it is not enough simply to shift government response tactics — it requires a complete shift in philosophy.

RESPONDING TO SYSTEMS FAILURE

The first step was looking at other systems-failure events for inspiration. During Hurricane Katrina, the US Coast Guard demonstrated nimbleness despite massive impacts to the population and communications and transportation networks. This has been credited to the agency's decentralised organisation structure.^{11,12} Captains of vessels are empowered to make decisions without seeking orders or approval from higher up the chain of command. Seattle OEM has set out to create an environment that similarly empowers people to act — both the city's workforce and the members of its community.

The following steps were taken to create an empowering environment during disaster response:

- (1) Separate incident management from consequence management;
- (2) Establish simple statements of intent for the leaders of each department; and
- (3) Decentralise operations wherever possible.

Separate incident management from consequence management

The City of Seattle's response to an earthquake is a balance between addressing immediate life-safety and rescue operations, as well as managing the ongoing consequences of the earthquake by providing for the basic needs of the impacted community. The city will coordinate with governmental and non-governmental partners as well as the community itself to rise to meet the tremendous need.

The Seattle Fire Department (SFD) will lead unified command with initial

lifesaving priorities of fire-fighting, urban search and rescue, and emergency medical care. It is important that fire-fighters have all the support they need from operational departments and can focus on the enormous life-safety tasks at hand. However, many of the likely earthquake impacts, such as an imminent lack of drinking water, will become life-safety issues if not addressed immediately. The OEM and the emergency operations centre (EOC) were positioned as the lead for a consequence management structure that will stand up immediately, drawing from approximately 10,000 City workers who would not otherwise be involved in immediate life-safety response activities. This structure would be focused on immediately addressing life-sustaining needs such as water, food and shelter, enabling the city to initiate critical incident stabilisation tasks concurrently with life-safety operations.

Establish statements of intent for the leaders of each department

During a major earthquake, the City of Seattle may not have resources to address all immediate life-safety needs, such as controlling fires, providing emergency medical care, or performing search and rescue. In such cases, SFD personnel are trained to prioritise the incidents 'with the greatest potential to save the most lives'. This simple mantra provides the department with an easy-to-remember 'north star' to guide decision making at every level of the organisation.

As all City departments will be similarly constrained in terms of resources and communications, Seattle OEM determined that the various operational departments would benefit from the adoption of equally clear and widely understood statements of intent in order to cultivate empowerment at all levels. Emergency managers from each operational department were thus tasked with formulating with a basic

statement of intent based on the simple question: ‘if staff were cut off from their chain of command, what is the one thing they could do and be confident that they are doing the most important mission possible?’.

The responses varied widely across departments, although all are now codified in the City’s earthquake annex.

The statement provided by the Police Department was straightforward: ‘Support the Fire Department’s lifesaving operations’. The water utility department likewise stated: ‘Preserve and move water to support fire-fighting operations’.

While it is not the role of Seattle OEM to instruct operational personnel on exactly what they must do on the day of an earthquake, having leader’s intent statements in the City’s plan enables those personnel to use their subject matter expertise from their day-to-day roles to figure out how to accomplish the mission.

Decentralise operations whenever possible

One of the outcomes of the 2017 RRAP¹³ bridge assessment was to raise awareness that every single one of the city’s 185 state-owned bridges and overpasses is likely to be unusable for at least two weeks after a CSZ earthquake. This will deeply impact travel within the city, not just into it. This will not make Seattle an island — it will make it an archipelago.

As part of a regional catastrophic preparedness grant funded by the Federal Emergency Management Agency (FEMA) and coordinated by neighbours to the north in Snohomish County, Seattle OEM worked with the consultant CNA to take the modelled bridge and road impacts from the RRAP and identify the ‘islands’ that will be created by the damage. There are approximately 20 ‘island’ areas within the city. After removing the islands that are either

tiny and/or limited to industrial use or greenspace, there are eight islands where consequence management activities would need to take place.

Many of the City’s operational departments already have some type of decentralised operations model. For example, if an earthquake causes significant damage, SFD will decentralise operations into battalions. Individual battalions will report their priority incidents to the SFD resource management centre, which will reallocate resources among battalions so that the incidents with the highest likelihood of saving lives across the city will get priority for resources. Other operational departments — initially police, transportation, public utilities, information technology, amateur radio, and other departments as requested — will have resources report to the battalions to establish unified command and support lifesaving operations.

Seattle OEM found few to no equivalent decentralised structures for life-sustaining operations. The City had created a management structure to guide consequence management but had no people on the ground to do the assessments or provide the support to the community. This led to the development of the workforce rallying point (WRP) project.

WORKFORCE RALLYING POINTS

A catastrophic earthquake will damage transportation and communications infrastructure, preventing city staff from reaching their work assignments and preventing remote work, while simultaneously creating an unprecedented need for skilled workers. WRPs represent the City’s primary strategy to address this conflict.

WRPs serve four primary purposes:

- Citywide communications connectivity for consequence management activities;

- City of Seattle staff collection and assignment points;
- Impact assessment and reporting hubs; and
- Public information distribution points, including the availability of in-language community messaging.

Communications connectivity

Standard communication methods will be compromised by physical damage, overuse and heavy traffic, and possibly malicious intent. An amateur HAM radio operator from Auxiliary Communications Service (ACS) will report to each WRP, allowing communications with the EOC in even the most extreme circumstances. The ACS — a volunteer-run HAM radio operator group — has organised to respond and provide alternative communication capabilities at each WRP. During the response period, ACS volunteers would:

- Proceed to the EOC;
- Document collected local activities and situation information;
- Collect resources and immediate needs assessments; and
- Relay that information between ACS volunteers or the EOC.

Workforce collection

Staff who can make it to their assigned work location, or a department-identified alternative site, should go to those locations. Staff who are unable to make it to an appropriate worksite facility, or who have been identified in departmental plans as 'available for reassignment', should proceed to their nearest WRP for reassignment and integration into the citywide response.

As staff arrive at a WRP, they will be screened for pre-identified priority skill sets — such as language skills, or heavy equipment operator certifications. City staff who report to their nearest WRP will receive work assignments based on

their overall skill set and be assigned to an appropriate role. Skillset-based activities can include language and interpretation skills, certified childcare providers, or food handlers. Those who have screened for high-priority skill sets that are needed elsewhere will be assigned roles while transportation routing is secured. These roles may include, bridge inspectors, heavy equipment operators, or first responders. People with general skill sets, will be provided just-in-time training or job aids to receive an assignment, such as damage and impact assessments, which can change over time as conditions and need change.

Impact assessment and reporting

Damage and impact assessments are used to determine, document and report the nature and extent of the loss, suffering and/or harm to the community resulting from catastrophe, and are critical when planning the response to address the needs of the people affected in order to avoid a potential humanitarian crisis. Each WRP location will have a binder that includes just-in-time training, damage and impact assessment forms, and maps of critical community lifeline locations to enable staff to enter into the surrounding neighbourhood, collect information on the community's needs and spontaneous response efforts, and report that information back to the EOC. These forms will not be technical infrastructure assessments — there are different processes for that; rather, these forms are for *human needs assessment*. The question will not be whether a specific bridge is structurally sound, but whether people are able to move around the area and get what they need.

There will likely be spontaneous community-based response efforts across the city. Many of these efforts may be confined to the initial response (eg transporting injured people to hospitals or helping perform light rescue), but others may be

sustained efforts (eg emergency shelters or community food banks). WRP staff will support communities by helping to identify supply gaps and subsequently filling in as needed while performing their assignment. For example, if the community has already set up an *ad hoc* shelter, the role of WRP assessors is to:

- Find out what is needed to keep the shelter operating;
- Find out who might not be adequately served by that shelter, such as people with profound medical needs;
- Focus government response on addressing those identified gaps; and
- Report what has been learned back to the EOC.

The gaps may consist of specific resource needs or support services such as language translation, supplies request documentation and information sharing with the community. What Seattle EOC means by impact assessment goes beyond what is broken to what is *needed*. The question is not how many houses are uninhabitable but rather how many people have become unhoused or need access to shelter, food and clean water?

Public information distribution

In the immediate aftermath of a catastrophic earthquake, staff at WRPs may be the community's only source of reliable information. Each WRP will be pre-stocked with accessible, in-language flyers of brief standard safety messaging as well as materials to make additional flyers under the guidance of public information personnel at the EOC. The Joint Information Center may release public messaging to help inform community-run response efforts (eg sanitation guidance), and request that WRP personnel help disseminate that information into the community.

BUILDING OUT THE WORKFORCE RALLYING POINTS

When it comes to catastrophic events, there is much that cannot be predicted or planned for — the next earthquake might be tomorrow or it might wait another century. To address this lack of certainty, structures have been built out to empower whoever is working that day to make sound decisions. These include, among other things:

- An employee home zip code analysis to validate planning assumptions about who might be available to work that day;
- Purchasing basic supplies and equipment;
- Defining WRP roles and staffing recommendations;
- Just-in-time training and job aids to support workers with their most critical tasks; and
- Community engagement/cheat sheets to help staff understand how/where to plug in with the community.

Employee zip code analysis

Many of Seattle's key workers and skilled tradespeople live outside of the city limits. However, response efforts cannot operate effectively if employees are unable to reach their assigned work location without risking potential harm along the way. People with general skill sets will be provided just-in-time training or tools to perform new assignments, such as damage and impact assessments. These assignments will change over time as conditions and needs change. The EOC will coordinate with WRPs to redistribute resources among consequence management activities. WRPs will likely have to manage for a time with the resources available onsite, and within the community, to provide mutual aid.

The Seattle OEM planning team conducted an inter-departmental zip code analysis to assist with predictive planning

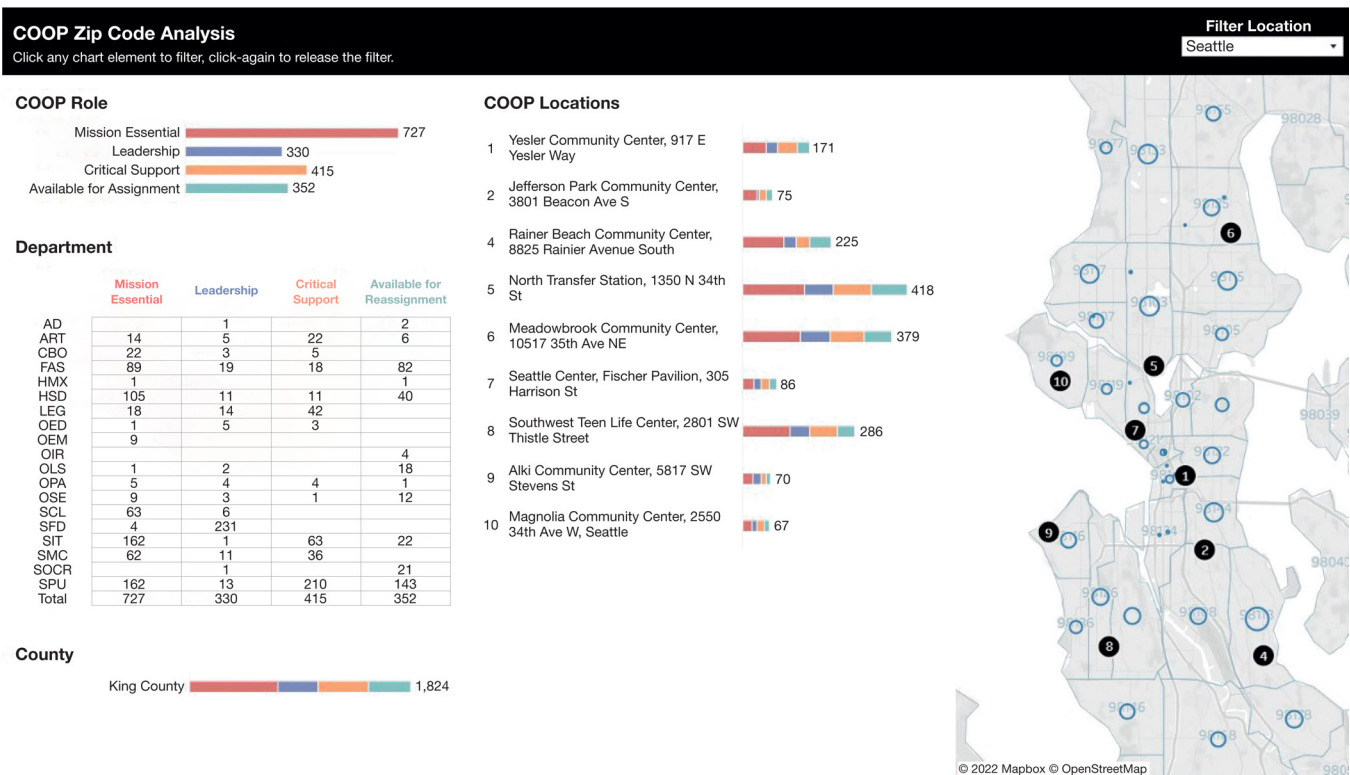


Figure 6 City of Seattle employee zip code analysis

Source: City of Seattle Office of Emergency Management (2022) Workforce rallying points draft training binder.

of who would respond to a workforce rallying point, what professional skill sets they would bring with them and consideration for any reassignment they might receive. Departmental continuity of operations planning (COOP) coordinators were asked to provide three points of deidentified information from their departmental staff roster. The three points of information collected from their rosters included the employees' home residence zip code, their departmental COOP role, and their City of Seattle job classification.

The zip code analysis assists in planning and considerations of:

- Where employees live in relation to a WRP;
- Where employees live in relation to their regular work assignment;

- Who is available for reassignment;
- What impacts they may experience after a catastrophic earthquake and getting to their work assignments or a WRP.

The COOP role and job classification information identified City employees who are in:

- Leadership roles;
- Critical support, or employees performing logistical support to a mission-essential function;
- Essential response, or employees performing a direct supporting response function; and
- Employees with non-essential roles who are available for reassignment, based on their skill set.

This information has guided OEM and City departments on how to plan for staff arrival, supply needs and the potential for transportation needs for reassigned or stranded staff.

Stocking WRPs with supplies and equipment

A supplies container will be permanently stored at each WRP location. The container includes just-in-time training and guidance materials for a variety of potential roles, including instructions on communications with the media and general public, along with checklists such as:

- WRP activation checklist;
- List of known community lifelines;
- Injury treatment record;
- Check-in/check-out log;
- Communication log;
- Equipment log;
- Flyers in multiple languages with immediate need information for safety and resources; and
- Damage and impact assessment forms.

The container will also contain supplies to help sustain operations to staff until assistance arrives or the situation has shifted, and staff have been reassigned to other locations. Supplies include the following:

- *Maps:*
 - WRP locations
 - Maps of the WRP area
 - Maps with routes and target check-in sites
 - Mapping and potential area hazards
 - Seattle potential road damage map
- *Site and field gear:*
 - Batteries
 - Flashlights
 - Glow sticks
 - Tarp/plastic sheeting

- Garbage bags
- multi-purpose tool/wrench/pliers/trowel
- Duct tape
- Rope/twine
- Carabiners
- Bike tool/tyre pump/tyre patch kit
- *Administrative supplies:*
 - T-cards and holders
 - Pens
 - Pencils
 - Markers
 - Highlighters
 - Notepads
 - Post-it notes
 - Paper and binder clips
 - Clipboards
 - Scissors
 - Contact list on a lanyard
- *Health and safety:*
 - Water purifier
 - First-aid kit
 - Stop the bleed kit
 - Space blankets
 - Personal protective equipment
 - Ear plugs
 - Whistle
 - NARCAN

As conditions and need change during a city-wide response, WRP staff may be deployed to other assignments, such as community points of distribution work or other city-based response activities.

WRP roles and staffing recommendations

In conditions as uncertain and unpredictable as the aftermath of a catastrophic earthquake, it is impossible to predict how the staff in each WRP neighbourhood will be affected or what skill sets will be available to aid with response efforts, once those employees make it to the WRP. Any attempt to assign roles and training to specific staff in anticipation of an event that only has a 10 per cent chance of occurring

in the next 50 years is ultimately unsustainable. As such, Seattle OEM has taken a higher-level approach by outlining guidance for determining a chain of command at each site.

The first City employee reporting to the WRP is assigned as the site manager until relieved by a more senior member of staff. The manager will identify a dispatch coordinator who is responsible for assigning staff to an activity and overseeing the execution of damage and impact assessments. One or more runners will be assigned by the site dispatch coordinator and will be responsible for carrying messages between teams and the EOC and other assigned tasks that may be allocated by the manager or dispatch coordinator. The dispatch coordinator will assign field observers to conduct damage and impact assessments to determine, document and report the nature and extent of the loss, suffering and/or harm to the community. An ACS HAM radio operator will share the results of these assessments back to the EOC to support citywide planning and coordination to address the needs of the affected people to avoid a potential humanitarian crisis. All assigned staff will debrief the dispatch coordinator before leaving the site or being relieved from duty. The manager and dispatch coordinator will debrief their replacements before leaving the site or ending their shift.

Just-in-time training materials and job aids

In building out the WRP materials, efforts were made to take the guesswork out of a stressful situation for reassigned employees. The binders include impact assessment forms to determine the overall extent of damage and provide a citywide snapshot of the impacts, enabling the prioritisation and allocation of resources citywide. The training materials are clear and concise to acknowledge the physical and emotional

strain of reporting staff. For example, a conversion table of quotidian urban landscape features is provided for more accurate spatial assessment. In recognition of the diversity within the city, measurements are provided in both imperial and metric units, for example:

- *Brick*: 2.5in, 6.35cm
- *House siding*: 4in or 8in, 10.16cm or 20.32cm
- *Stair risers*: 7in or 17.78cm
- *Cinder block*: 8in or 20.32cm
- *Standard doors*: 6.8ft or 2m
- *Doorknobs*: 36in or 0.91m above floor
- *Standard fire hydrant*: 2.17ft or 66cm
- *Arterial utility pole*: 34ft or 10.3m

Providing the information in this form helps to keep people as safe as possible by removing the need to get too close to an impacted site when conducting a damage assessment.

Community engagement and community lifelines

Seattle currently has an estimated population of nearly 800,000 people, making it the 18th largest city in the USA and the largest city in the Pacific Northwest, with an annual growth rate of 1.71 per cent.¹⁴ Over 163 languages are spoken in the State of Washington, with most of those being represented or spoken in Seattle. This makes emergency management planning challenging when working to create comprehensive and equitable response plans for everyone when a disaster happens.

To make sure everyone is equitably represented in the City's planning and response efforts, it is important to understand the different communities within the city and work closely with community members all over Seattle. Seattle's neighbourhoods are immensely different from one another. For example, the North Transfer Station WRP site is in a maritime-based area with

sturdy seawalls, where recreational water activities are in abundance and young tech professionals and families reside. Conversely, the South Park WRP site is also maritime-based and is located near a Super Fund site in the Duwamish River delta near one of the busiest shipping ports in the western hemisphere and is home to one of the city's largest immigrant communities. This area is at extreme risk for severe and life-threatening water inundation after a catastrophic earthquake.

Stabilisation occurs when basic lifeline services and capabilities are provided to survivors — even if temporarily. Achieving incident stabilisation will require coordinating the repair and restoration of complex systems with many interdependencies. The US National Response Framework includes seven community lifelines, which describe the systems that are essential to sustaining human health and safety and are necessary to enable the continuous operation of government functions and critical business. These lifelines help incident personnel prioritise, sequence and focus response efforts towards maintaining or restoring the most critical services and infrastructure.

Community lifeline checklists have been developed for each WRP to identify key community locations in that neighbourhood, organised by lifelines. This has been achieved by mapping the methadone clinics, food banks, community health clinics, grocery stores, etc. that the community relies on. The City works with communities on an ongoing basis to identify the coffee shops and public spaces where members of the neighbourhood habitually gather, as well as where formal volunteer and mutual aid groups have determined they will stand up their own response operations.

WRP staff work to ensure that the members of their community are responsible for deciding how best to serve people

and help support the empowerment of their community via existing service providers and community lifelines. When it comes to the needs of local citizens, community-based organisations, such as grocery stores and food banks, know far more than the government does. Thus, with the right support, communities can continue to do what they know how to do.

In the immediate aftermath of a catastrophic earthquake, WRP staff may be the only source of reliable information that a community can access. Each WRP will be pre-stocked with accessible, in-language flyers of standard safety messaging as well as materials to make additional flyers under the guidance of public information personnel at the EOC. Seattle OEM continues to hold community-informed focus groups to address gaps that can be mitigated before a catastrophic event occurs, while considering the gaps that communities face daily with food security, socioeconomics and lack of information to aid in making the best decisions for their families.

The City is taking the following steps to keep people safe and keep working toward stability after an earthquake:

- *Working with labour unions:* The City is mindful that certain skill sets may need to be recruited from the surrounding community. That the majority of Seattle's tradespeople live outside the city limits was an expected finding from the zip code analysis; nevertheless, the city is home to various skilled workers who work for other industries. One such example would be members of the union of theatre workers who can assemble and dismantle pulleys and rigging safely and effectively when and where needed. It is important to keep all skilled labour working when they cannot reach their worksites;

- *Talking with identified area businesses:* The City is creating partnerships with local businesses to assist communities to fill needed gaps until help arrives;
- *Identifying cultural spaces:* The City is connecting with its communities to identify cultural spaces that are used by local communities as safe spaces where people gather to share information and meet up with loved ones;
- *Partnering with community-based organizations:* Like ACS volunteers who are partnered with OEM to respond to WRPs, Cascade Bicycle Club is community-based bicycle enthusiast nonprofit that is also partnering with OEM. Their team has organised a sub-group devoted to bicycle-based, community-inclusive emergency response and WRP information sharing. They are organising community-based trainings and exercises to respond to disasters by tapping into the large, avid bicycle community in Seattle to respond with bicycles, cargo bikes, motorised bikes, camping and hiking gear, and other common multi-purpose household items.

SUMMARY

Planning for a catastrophic event that the city and region have not experienced in modern times is challenging. Seattle OEM is reliant on a number of planning assumptions and the lessons it has learned from other jurisdictions' experiences. In assessing the likely impacts of a catastrophic earthquake, the OEM has taken various factors into consideration, including the city's population type and size, lifestyle, and geo-physical and structural aspects. It has also employed an employee zip code analysis to validate planning assumptions about who might be coming in that day.

Seattle-based WRPs have been planned for a densely populated, mid-sized maritime-based, urban environment with a

diverse community with equally diverse needs. This model can be scaled up or down to accommodate almost any jurisdiction's needs. The WRP model has been designed to be simple and decipherable to anyone in a time of crisis. Community engagement guidance and information assists staff in understanding how and where to connect with and support the community. Just-in-time training and job aids support workers with their most critical tasks and help define roles, responsibilities and recommendations. The WRP model also provides staff with a predetermined location for collection and assignment points. When infrastructure is compromised, they act as information hubs for incoming and outgoing messaging, and receiving assignments or reassignments based on employee skill sets and triaged needs. The model embraces decentralised decision making and supporting community empowerment through spontaneous community response efforts.

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