seattle pulse

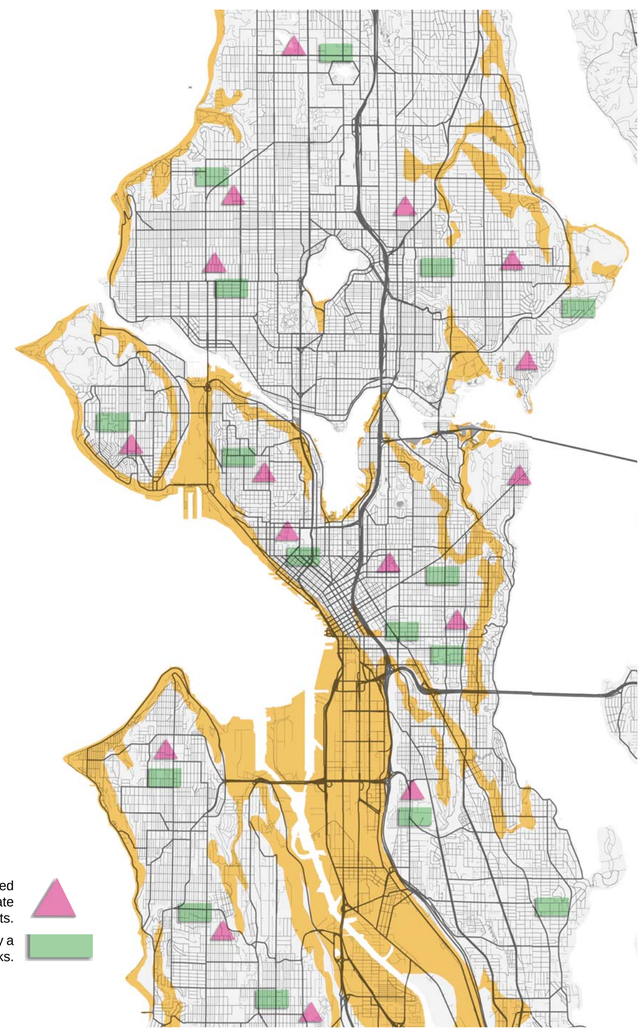
A Phased Implementation Plan for Earthquake Readiness in Seattle

disaster could strike

any moment. Within the next 50 years, scientists predict that there is an 80% chance of a magnitude 6.8 earthquake and a 15% chance of a magnitude 9 hitting earthquake Seattle due to our precarious position on top of the Seattle Fault and close proximity to the Cascadia Subduction Zone. With that in mind, it is important to establish a disaster plan that can be easily implemented in case of an earthquake.

Proposed is a three-pronged solution that begins working long before an earthquake even strikes by increasing awareness. The installation of Wayfinding Signals at the intersections of prominent streets and in locations of heavy pedestrian and tourist traffic, earthquake preparedness becomes a part of the fabric of the city.

Once an earthquake does occur, these Wayfinding Signals specify the way to the nearest Pulse Points. Pulse Points serve as communication hubs immediately following an earthquake allowing for dissemination of resources, assistance in finding short-term shelter, and location of services for displaced people. For those in need of shelter, select schools will serve as Safe Havens, complete with stores of food and water.



PULSE POINTS are check in databases located in parks and open spaces serving as immediate information and medical outlets.

SAFE HAVENS would sustain those displaced by a seismic event for up to two weeks.

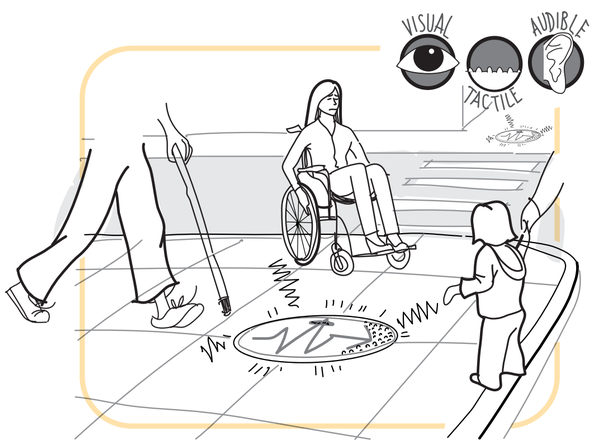
primary objectives

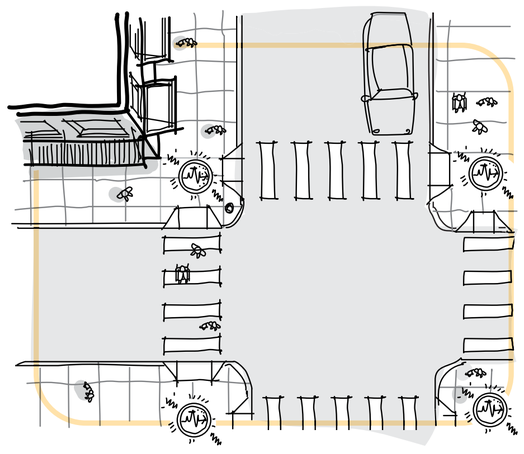
- Raise earthquake awareness and highlight preparedness BEFORE an earthquake hits
- Guide population to safety with multi-sensory wayfinding signals
- Connect people to resources quickly and efficiently post-quake
- Aid in locating and reconnecting people with family and friends

before

WAYFINDING SIGNALS

- everyday reminders of where to go when disaster strikes (Pulse Points).
- implemented at prominent street corners in existing or new storm grates.
- designed with different types of warning for all ability levels.

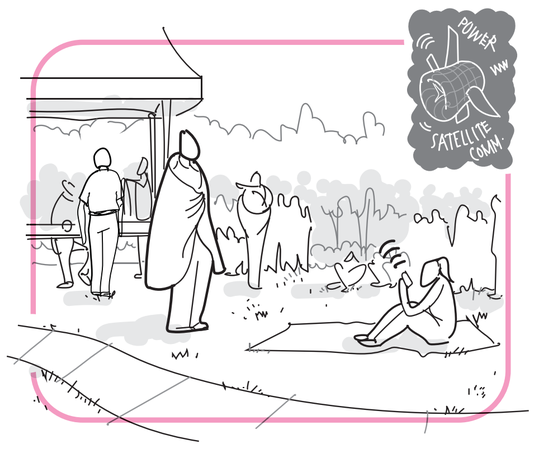


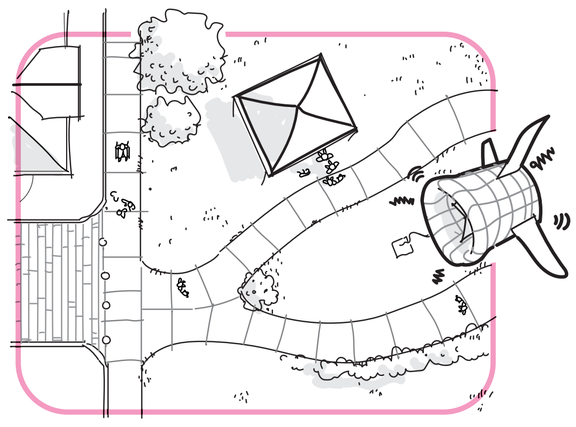


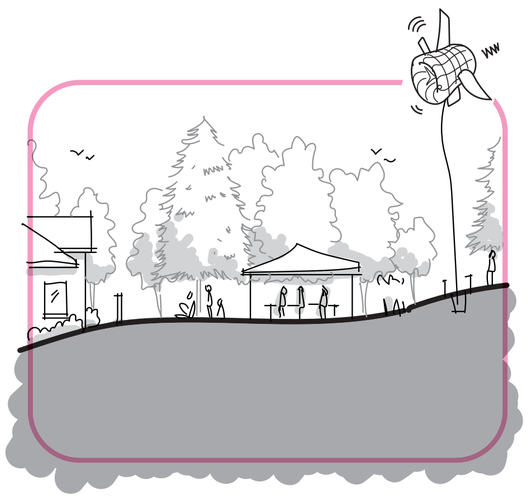
during

PULSE POINTS

- Check-In database helps locate displaced people.
- Radio communication disseminates news updates.
- Resource distribution center that directs people towards aid and/or shelter as necessary.
- High altitude wind generator produces power and serves as additional wayfinding tool.
- Located in open space to prevent injury from falling debris during earthquake or aftershocks.



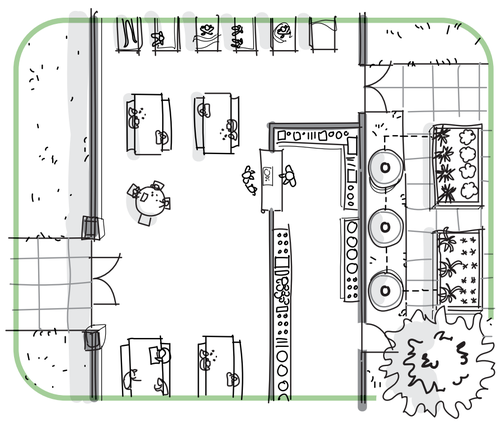




after

SAFE HAVENS

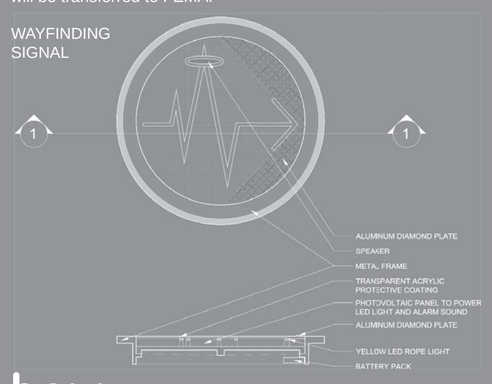
- Provides Short-Term (up to two weeks) shelter for displaced persons.
- Food programs utilize current growing programs and create new ones.
- Rations are kept at school and rotated out to ensure freshness.



why

Not only is Seattle directly on a fault line, the topography of the city itself actually creates more hazards. The yellow portion on the map shown above highlights the most at-risk areas during an earthquake due to ground liquefaction, landslides, flooding, or a combination of all three. Pulse Points and Safe Havens are located outside of these high risk areas, yet close enough to be accessible to those in an at-risk zone after an earthquake. Pulse Points are located in open parks away from buildings that could potentially be dangerous with falling debris as a result of the earthquake or an aftershock. Safe Havens are located in schools that have been built or retrofitted to withstand a large earthquake. All locations were chosen as recognizable locations by people in the community and are natural gathering points.

Pulse Points and Safe Havens are designed to be in use for up to two weeks after an earthquake while Seattle is cut off from the rest of the world. This predicated on the estimate that 50-60% of people who are displaced will only need shelter for up to two weeks. This two-week figure also gives the local government time to reestablish connection to, and order within, the city. Once local government control has been restored, the disaster relief efforts will be transferred to FEMA.



how

When an earthquake hits, accelerometers activate the Wayfinding Signals once shaking has reached a pre-determined intensity. These signals not only indicate disaster but also direct people to the nearest Pulse Point using light, sound, and texture. To visually indicate direction, an LED strip light illuminates. Additionally, speakers inside the signal begin giving simple, pre-programed directions for those who are visually impaired or in case falling debris obstructs the indicator light. Pre-preprogrammed instructions are simple, such as "go [cardinal direction] until you reach [location]." For those needing a tactile cue, a raised surface designates the route.

The signals would be located at busy intersections and traffic-heavy areas across Seattle, as well as at tourist destinations. Data was pulled from traffic, pedestrian, and cycling reports in order to determine the locations that would effectively reach the most people. Initially, Wayfinding Signals would be placed in the downtown core and along the waterfront, and expand outward to the rest of the city as the project continues. In residential neighborhoods, wayfinding signals would be placed along the main thoroughfares so that those who live in the area have engrained knowledge of where to go in case an earthquake strikes.

At Pulse Points, pop-up tents stored on location are erected to serve as communication hubs. A high-altitude wind turbine automatically inflates and is released from below-ground storage when the shaking reaches a pre-determined intensity. This serves as the power source for the Pulse Point and any nearby Safe Havens. Beyond that, the wind turbine acts as a transmitter for satellite communication and assists in wayfinding through the placement of lights along a portion of its tether. This allows the Pulse Point to be located even at night or in inclement weather. Once a person arrives at a Pulse Point, they are checked in to a searchable database. This helps locate missing and displaced persons immediately after the earthquake. Arrivals are led to health services and shelter as needed, and the Pulse Point serves as a distribution center for those in the community who may need food and water but are able to stay elsewhere.

Safe Havens serve as short-term shelter for up to two-weeks. Food and collected rainwater are stored on-site to act as provisions in case of emergency and are rotated out in order to ensure freshness, with surplus either being used in kids lunches or being donated. By utilizing current gardening programs at select Seattle schools and by implementing more, the Safe Haven itself is able to produce some of the resources it requires and serves as an education tool for students prior to an earthquake. An expansion of these existing school garden programs is proposed include food preservation in order to better serve the community after a natural disaster. If people need shelter beyond two weeks, FEMA – which will be established in the city by then – will provide mid- and long-term housing.

elderly man

"My eyes aren't what they used to be but I know when I come across one of the city's wayfinding signals. The textured surface lets me know which way to go to find relief should an earthquake strike."

visiting couple

"We're visiting family here in Seattle and it's a comfort to know there are places anywhere in the city that we can find immediate relief and support in the event of a major quake. It's a relief to know we'll be able to find and communicate with our loved ones."

young student

"My school is a Safe Haven and can help those whose houses aren't safe anymore. We're collecting rainwater and growing our own food! I know just what to do when the big one comes along."

implementation

Funding the Wayfinding Signal sidewalk installations, Pulse Point outfits, and general retrofits and additions to community schools to serve as Safe Havens could be modeled from the City of Chicago's Percent for Art Ordinance. Unanimously approved by Chicago's City Council in 1978, the ordinance stipulates that a 1.33% of the cost of constructing or renovating municipal buildings and public spaces be devoted to original artwork on the premises. The program has been hugely successful over the last 38 years, Chicago hosts a wealth of public art, and today more than 200 similar programs exist in cities across the United States.

A similar program could be applied to fund this project. Ideally, city government construction projects and even private building projects that exceed a certain construction cost or meet a set of criteria would devote a small percentage of their budget to Seattle's own Percent for Seismic Preparedness. The spectrum for contribution could vary, and perhaps a scale based on total construction cost or building size would determine at what percent the project would contribute. In Seattle's building economy this would generate the funding that would be needed to accommodate our proposal.