Tsunami Wayfinding: Techniques and Technology

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The wayfinding project

• An urban escape tsunami wayfinding system
• A pattern language for escape and wayfinding
• Escape and wayfinding sequences for particular populations
The wayfinding chain is a series of elements in the environment that aid an evacuee in the process of moving from a starting point to safety during a tsunami event.
A Survival Language: Tsunami Escape Wayfinding

Before
1. Multi-Purpose Infrastructure
2. Recognizable Wayfinding Chain
3. Information Station
4. Know What Zone
5. Public-Private Partnership
6. Mapping Your Neighborhood
7. Relocate to High Ground
8. Route Safety

During
9. My Personal Escape Route
10. Intuitive Signs
11. The Space Between
12. Distance Matters
13. Primary Route Clarity
14. Other Forms of Signage
15. Lights at Night
16. Follow the Leader
17. Alternate Evacuation

After
18. Safety Zone Threshold
19. Assembly Area Essentials
20. ‘How-To-Guide’
21. Triage and Registration
22. Campsites
22. Assembly Area .1 Campsite
22. Safe House .2 Campsite
22. Cache Site .3 Campsite
23. Sense of Place
24. MultiPurpose CacheSite

Oregon Office of Emergency Management
Multiple Functions

Tsunami Evacuation Maps
Become city information hubs that incorporate tsunami mapping/awareness, while including city maps, visitors information, and interesting facts about the area.

Primary Route Lighting
Guides evacuees during a night evacuation, while also enhancing those primary arteries through visibility and edge clarity.

Assembly Area Parklets
Encourages people to visit them for everyday use, making their location in people’s cognitive maps more identifiable.

Cache Sites
Helps evacuees set up a post-disaster camp, but can be used everyday as gardens or for community events, which would support awareness and be functional camp attributes.

Vertical Evacuation Towers
Ensures alternative safe evacuation routes for lower inundation areas, but function everyday as a city hall, respondent center, mixed use hotels, or even a tsunami research and preparedness facility.

Related Patterns
Preparedness Patterns
2, 3, 5, 7
Evacuation Patterns
9, 14, 15, 17
Response Patterns
18, 22, 23, 24

MULTI-PURPOSE INFRASTRUCTURE

Design and implementation of a robust tsunami wayfinding system in coastal communities can often feel like a burden.

Due to the wide variety in cost, scale, and type of actions that a city can take to increase their tsunami readiness, it is difficult to know where to exert most effort. While some cities are prepared to spend a large amount of their budget on disaster preparedness, other cities prioritize a variety of other local issues that they face on regular basis. While all cities are required to include routes and signs, some cities are willing to find alternative ways to prepare their population. Even for communities that prioritize government spending on tsunami readiness, all cities installation and maintenance budgets for emergency infrastructure are limited.

Many current wayfinding paths are well established, and, when looking, can be found and followed up to high ground. However, evacuation signage often blends into the urban fabric of the city, and is rarely noticed or practiced by residents and tourists. These signs or maps are entrusted to evacuate inundation areas during an event, but do not actively engage people before the event. Although it is possible that a wayfinding system can be effective for first time users, a complex plan is only as good as it is practiced. It is important to create dynamic wayfinding elements that help prepare people through familiarization.

PREPAREDNESS PATTERNS

Public Art
Tsunami Evacuation signs could be placed on individual posts that incorporate artistic elements designed by local artists. By dedicating these signposts to tsunami-related information and designing an interesting aesthetic, people are more likely to notice and examine the information on the post.

Increased expenses from newly installed and upgraded tsunami infrastructure can be offset by additional funding from other sources. Consider multi-functional elements that tap into alternative funding sources from private and public building development, local business participation, park departments, ODOT improvements, transit stops/routes, or public art/events. Finding new sources of funding fosters a more robust and integrated system, because invested members of the community, city, and state are given the opportunity to participate in its design and implementation. This type of collaboration develops new public-private partnership which benefit from a diverse set of community input and involvement.

If certain elements of the wayfinding system are used by residents and tourists every day before an event, it is certain that they will be more effective during and after an event. Tsunami wayfinding signs and maps do not have to be monofunctional, which is a common attribute that often causes these signs to be ignored by residents and tourists. Making these elements dynamic and serve multiple purposes, allows tsunami awareness to no longer be fear inducing, but rather to engage inhabitants of the city to participate and prepare for a disastrous event.
Public tsunami evacuation maps do engage users or provide substantial information about the threat of tsunami and how to evacuate.

Although current tsunami evacuation maps are visually attractive, they are not being fully utilized by tourists to learn about tsunami evacuation. This may be due to their lack of clarity, their placement around the city, or their inability to engage users. These maps are the most accessible resource that tourists have, even though it seems that they are not fulfilling their purpose: to raise tsunami awareness, indicate proper evacuation routes, and convey the city’s emergency plan.

Most commonly these maps are too impersonal, making it difficult for people to identify their location and their personal escape route. Because of the multitude of different types of signs around the beach, these evacuation route maps suffer from “sign fatigue” and are overlooked by the people who need the information the most. When placed in locations with a lot of movement, they do not incorporate a comfortable place to be studied, making most people glance over the sign for a short period of time before continuing their route to the beach. Because these signs are often the only resource that visitors will see, it is essential that they do a better job of preparing them through information, mapping, and additional resources.

**Therefore:** Establish designed ‘places’ at high traffic pedestrian areas that include clear and engaging tsunami evacuation information.

Public tsunami evacuation route maps should incorporate engaging informational graphics about the history of the Cascadia Fault line, different inundation zones, and precise evacuation routes. They should include enough information to prepare visitors with no prior knowledge of the threat of an earthquake with an accompanying tsunami, and the tools and instructions of how and when to evacuate to high ground.

These maps can be placed with other features and public amenities such as benches, ATM’s, and tourist information in order to make them more attractive. Although people may not be drawn to a 2D evacuation route map on a sign post, a comfortable place to relax with interesting maps and infographics about tsunamis and the city that will engage passersby in a way that 2D signs will not.

Placing these stations in high traffic areas such as beach entrances and other popular public places (bus stops, retail corridors, urban squares, viewpoints, parks and recreation, etc), will increase the number of people that will see the signs. By increasing passersby and providing usable space and signs, more people who have never been exposed to the information will engage with and become more prepared for possible evacuation.
UP AND OUT 2

Oregon Tsunami Wayfinding Research Project
A Study in Seaside and Warrenton

Prepared by: The Portland Urban Architecture Research Lab (PUARL)
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For: The Oregon Office of Emergency Management OEM
Primary Pattern
Other Forms of Signage

Reinforce traditional Tsunami Evacuation Route Signs with paint in the road that can highlight evacuation routes as a durable form of signage that will remain intact after the earthquake.

Tsunami evacuation wayfinding signage is limited to two dimensional metal signs. Common traffic wayfinding systems, use road paint to establish lanes, enforce stops, indicate speed, or provide instruction. While road paint for tsunami signage may not be seen as an appropriate solution for some cities, different projects in New Zealand and Japan have successfully implemented these types of signs. In Wellington, New Zealand, they have adapted the blue wave symbol, and created an effective road sign that is painted into the ground. It includes an arrow above a wave with the text ‘Tsunami Safe Zone’, and the distance to that safe zone. The Japanese road sign uses different colors and design, but incorporates similar directives. This type of road paint is more noticeable to people before and during an event. They can be placed in between signs to enhance route connectivity, and are more likely withstand from destructive impact of the earthquake.

Related Patterns
Recognizable Wayfinding Chain, Know What Zone, Mapping Your Neighborhood, My Personal Escape Route, Intuitive Signs, The Space Between, Distance Matters, Primary Route Clarity, Lights at Night, Safety Zone, Threshold
1. ALDER CREEK BRIDGE

The area around the bridge consists mostly of an at risk elderly population. This is especially concerning because the bridge will likely be destroyed by a major earthquake. It is crucial that signage is clear and that the route to safety, whether over an upgraded bridge or in the opposite direction towards high ground, is very clearly marked.

2. PRIMARY ROUTE CLARITY

A pedestrian route to high ground is not extremely visible and clear in the city of Warrenton. It is important that it is clear that people are supposed to evacuate on foot and what direction they need to be heading. Route clarity is established not only from traditional signs on posts, but also paint in the ground, lights and other color coding.
Part of helping people know that they are on the right path to safety includes being able to see the next indicator while you are between wayfinding markers. Having elements that are prominent, repetitive, and highly visible allows people to make a mental map of their route before a tsunami event, and aid them in using it during the event.

Even though the downtown area of Warrenton is less crowded, it is still a place where locals and tourists take a moment to pause and shop. It is important to have clear information on escape wayfinding and the dangers of a tsunami in this place to allow as many people as possible to have a frame of reference during an event. The goal of this kiosk is to provide the information necessary for an evacuation in the clearest most unobtrusive way while still being eye catching.
A bus stop is a great place for information to be placed where someone sitting and waiting can take in some of the information for the escape route from that place. These places are underutilized canvases within the city that are frequently used.

There is a distinct need for all towns on the coast to have signs that clarify evacuation routes. Part of this wayfinding clarity comes from the sign suite that the PUARL team designed (covered in 4.5). Signs need to communicate clearly direction, intent, and distance between people and the goal of safety. These signs need to be placed in a ‘breadcrumb’ trail style, where the next sign is visible from the current one. Route clarity is established not only from traditional signs on posts, but also paint in the ground, lights and other color coding. In Warrenton, these elements are applied to create route clarity since there is a greater distance to cover along the whole evacuation route. The primary area of concern when creating route clarity in Warrenton, is to have elements that are prominent and repetitive to allow people to make mental maps of their route.
Part of route clarity for all wayfinding chains is how to command and navigate turns. In Warrenton, the primary route turns several times. These turns are important because it would be detrimental for people, when in a panic, to wander away from their evacuation route. These turns also need to have repetitive forms of signage, such as paint in the ground, lights, painted posts and signs. This will help tremendously when the streets are filled with debris after an event.

Here is a 50% chance that the earthquake/tsunami event will occur at night. Clarity of routes in low light conditions is extremely important in the case of a nighttime earthquake occurrence. They need to be not only beacons that give direction and quickly clarify information. It is important also that each light is based upon its own solar power, and not linked. The power will go out during the event, so having them not linked to a grid will guarantee they can still work during the event. Painting lights with reflective paint in the ground or having lights directly in the ground also will add clarity when it is pitch black outside.
The safety zone threshold represents the transitional juncture between evacuation and response. This instantaneous moment paves the way for a long, post-disaster experience. Establishing an early path for gathering, organizing, and surviving in group isolation by clearly notifying evacuees when they are safe is a critical part of any tsunami wayfinding chain. A new sign, paint in the ground, and light are all visual markers that people can see when approaching to let them know that they have almost made it to their destination. These simple designs overlap and guarantee that there will be a maker after the event.

The assembly area may be small, but is still important that, as with all assembly areas, there is a sense of place and arrival. The assembly area will be a key point of triage and survival after the event. There needs to be ample information on the event and how to react, as well as the resources for the evacuation leaders that will hopefully make it to the assembly areas. Multiple forms of markings are necessary including paint in the ground, signs with lights, information kiosks and continued instruction to cash site access or safe-house method of triage. The surrounding neighborhood will need to be active members in the planning of this triage, but these different elements are essential for the primary and secondary assembly areas.