Hubs and Stewards: A Proposed Expansion of the Seattle Community Emergency Hubs in West Seattle and the South End

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ABSTRACT

Hubs and Stewards: A Proposed Expansion of the
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Along with the increased frequency and severity of natural disasters our world, nation, and region of Seattle and the Puget Sound will face as a result of climate change, our region also lies in an area expected to experience a major earthquake – "the big one" – someday in the future. Facing such dangers, experts recognize that a key ingredient of community resilience can be found in local social capital – relationships between groups and individuals in a community – and that local social capital can be sourced and cultivated at community spaces and institutions which act as social infrastructure. A Seattle grassroots organization, the Community Emergency Hubs, has been created to mobilize local social capital for preparedness and relief, and spatially manifests itself as emergency "hubs" at various points of social infrastructure. As the damage caused by "the big one" could cause West Seattle and the South End to experience some degree of physical isolation in its aftermath, it is important that the emergency hubs in these areas make the most of the social capital and social infrastructure available to them, selecting appropriate community sites that promote safety, accessibility, and inclusivity, along with local organizations and institutions to partner with as "stewards."

DEDICATION

For Marlyn “Mike” Cornelius, Edward “Ed” Saari, and Angel Stueve Maldonado.
I wish we had more time, but you all taught me resilience in your own way.

See you on the other side, gentlemen . . .

And also for Jan E.V.W. Hanson.
A pillar of her community, an advocate for literacy and multiculturalism, and still probably the coolest boss I ever had.

See you on the other side too . . .

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Thanks also go to my parents, Barry and Laura Stueve, for their unwavering moral support and genuine interest in my thesis, as well as their willingness to incorporate outings to existing and potential emergency hub sites as part of their visits to Seattle (and for bringing their dog Agnes along for her peculiar and endearing sort of entertainment value).

And finally, I owe a big thanks to the volunteer members of the Seattle Community Emergency Hubs, including Ron Angeles, Jason Beardriel, Karin Beck, Anne Churchill, Ian Gallagher, Gabrielle Gerhard, Debbie Goetz, Erika Harnett, Jared Howe, Dale Johnson, Delores Kannas, Hugh Kelso, Darren Linker, Shelley Sachs, Jim Sander, Johnny Schmidt, Carolyn Stevens, and (most especially) Cindi Barker, for responding to my requests for information most forthrightly and enthusiastically. In particular, the details provided by founding Seattle Community Emergency Hubs member Cindi Barker were exceedingly valuable, being the type of first-person information one can’t always find in books and articles, and her feedback on this project played a key role in shaping the form it took.

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"He that hath two coats, let him impart to him that hath none; and he that hath meat, let him do likewise."

– John the Baptist (Luke 3:11)

"It is not the strongest of the species that survive, not the most intelligent, but the one most responsive to change."

– Charles Darwin

"It does not do to leave a live dragon out of your calculations, if you live near one."

– J.R.R. Tolkien

CHAPTER 1 – INTRODUCTION

- **Emergency Hubs – A Brief Introduction**
- **The Seattle Community Emergency Hubs – An Overview**
- **The Seattle Community Emergency Hubs in Action**

Emergency Hubs – A Brief Introduction

Seattle, someday in the near future …

"The big one" – a local colloquialism for an inevitable future earthquake – might happen in the middle of the night when you're at home and fast asleep, or it might happen in the daylight hours when you're out in public performing everyday activities. During this upcoming cataclysm, you might find yourself in a familiar place where you recognize the people around you, or you might be in a less familiar setting and amongst total strangers. You might find yourself fortunate enough to have ready access to water, food, shelter, electricity, transportation, medical supplies, telecommunications, and other useful resources, or you could find yourself in a situation where you have ready access to . . . well, nothing at all.

Although earthquakes are just one type of natural disaster that might befall Seattle and the surrounding Puget Sound region, the challenges an earthquake presents overlap with those of other potential emergency scenarios, including the worsening disasters that climate change will bring upon us. A large earthquake has the power to extensively damage buildings, mangle infrastructure, and disrupt services in and around our city, rendering many of these objects and systems unusable. Given the assured inevitability that a major earthquake will one day strike Seattle, harming or destroying many of the things that shape and enhance our lives, it is in our collective interest to take measures to improve our chances of surviving, recovering, adapting, and overall demonstrating community resilience.

But how do we do that?

Note that while I use the word "inevitable" to describe a future earthquake hitting Seattle, the word "predictable" wouldn't be as appropriate. Because while we should definitely expect an earthquake to occur here, it would be very unlikely for us to see it coming when it does. Numerous other natural disasters, from hurricanes to blizzards to tornadoes to volcanic eruptions, can actually be predicted in advance using science and technology. Although there are predictive seismic technologies being developed, as of this moment the location, timing, and severity of an earthquake



Figure 1.1 – Official map of the current Seattle Community Emergency Hubs as of January 2021 (*Community Emergency Hubs*, 2018).

are impossible to predict (Freitag et al., 2015). Because of these factors, it's sensible to promote local disaster resiliency not solely by seismically reinforcing buildings and infrastructure, but by enhancing the social assets found within our communities. One social asset that Seattle is lucky to have is its Community Emergency Hubs. This is a local volunteer organization that has selected a number of community sites where, in the event of a major emergency, they plan to join together, exchange information and resources, and support one another in whatever way they can in order to survive and recover from whatever disaster they are faced with. These Seattle Community Emergency Hubs are the topic of this thesis project.

While volunteer organizations and community gathering places are nothing new, and much has been written about them, this concept of a designated community emergency hub (or disaster hub, resilience hub, etc.) is a fairly new concept and, as result, there isn't the same wealth of scholarly writing specifically about such things. However, despite their relative newness, emergency hub programs have been explored and implemented in numerous cities around North America and elsewhere. North of Seattle in the Canadian city of Vancouver, BC, a metropolis with similar seismic concerns, are 25 officially designated Disaster Support Hubs where residents are meant to meet, share resources, and contribute their particular skillsets in the wake of a disaster, not unlike their counterparts in Seattle (*Disaster support hubs*, 2017). Other examples can be found to the south in Oregon, including Portland's BEECN (Basic Earthquake Emergency Communication Node) sites,

which number 50 in total and center around providing radio communications in a disaster (*BEECN*, 2021). In the town of Tigard, just outside Portland, the as-yet ongoing Coronavirus Pandemic prompted that municipality to set up Essential Needs Hubs, similar to other "mutual aid" programs we have seen during these difficult times, where locals can donate or obtain food, household items, and other necessities (*COVID-19 Essential Needs Hub*, n.d.). The Neighborhood Empowerment Network of San Francisco has its Empowered Communities Program's Neighborhood HUB initiative, which seeks to involve as many community organizations as possible in disaster preparedness planning, including ones that act as "anchor institutions" around which a wider resilience network is built (*The HUB Program*, n.d.). In Minneapolis, local government health and sustainability agencies are collaborating on a resilience hub program with residents at a public housing community, which is largely populated by Native Americans and other minorities (Rogerson & Narayan, 2020). Baltimore's Resiliency Hubs include several community buildings that perform everyday urban functions, with the expectation that they will switch over to performing emergency relief activities when the occasion arises (Curran & Pottiger, 2019). Meanwhile, across the ocean in New Zealand, the Community Emergency Hub program in and around Wellington operates much like the ones in Seattle and Vancouver, while also incorporating lessons learned in past earthquakes (*Community Emergency Hubs*, 2021).

While these different hub systems vary in setting, equipment, and style, they have the same overall function and objective of what Kristin Baja, Climate Resilience Officer at the Urban Sustainability Directors Network (USDN), calls "resilience hubs": that is to "(1) support residents and (2) coordinate resource distribution and services before, during, or after a natural hazard event" (Baja, 2018). USDN in general and Baja in particular are highly regarded authorities when it comes to matters of urban resilience and sustainability. In the course of my research, I found the USDN Resilience Hubs White Paper – which Baja penned and I just quoted from – to be widely-cited by others as a basic outline for establishing emergency hubs (or resilience hubs, or disaster hubs, or whatever particular moniker a community might select for its specific hubs.) This document also emphasizes a goal for hubs to "build local community power and leadership," and includes a short list of five recommended key components for hubs; these being "community desire and support," resources for extreme events, a "well-used and well-trusted site" or "buildings," energy systems, and everyday "community uses" (Baja, 2018). In its own unique hub system, the Seattle Community Emergency Hubs has incorporated most of these recommendations in some way (with the exception of the energy systems recommendation). However, in my conversations and correspondence with Seattle's hub participants, they never mentioned Kristin Baja or the USDN Resilience Hubs White

Paper. With the exception of some funding and guidance from local authorities, it seems Seattle's hub participants came up with their own hub system largely on their own, designing it in a way they felt best supported their community.

The Seattle Community Emergency Hubs – An Overview

In addition to some informative and amiable interactions with individual hub volunteers, I also had the opportunity to attend one of the Seattle Community Emergency Hubs' training events in February of 2020. Using the information I acquired there, as well as details their online resources and my correspondence with them, I shall outline the organizational structure, activities, and goals of this Seattle version of the resilience hubs phenomenon.

The Community Emergency Hubs were implemented in Seattle not long after a severe snowstorm in 2009. It had been some years since the city had experienced such a drastic winter weather event, and it was unprepared for the amount of snowfall that came (Landau, 2019). Roads and transportation were especially affected, and many Seattleites found themselves stranded in their homes and cut off from commercial and community amenities. West Seattleites, in particular, seemed particularly vulnerable when it came to medical services, as the bridges over the Duwamish River that connect them to the rest of the city could easily have been blocked by the snow, cutting them off from the main hospitals. Both municipal and community leaders recognized the challenges a major disaster could bring to the city, but also recognized that social connections and non-government resources in the community could be mobilized in such situations to assist those affected. Because of this, local residents and the city's Office of Emergency Management (OEM) came together to establish the Community Emergency Hubs (Barker, personal communication, August 7th, 2020).

While the OEM has provided some support for the hubs, the hubs themselves are not a municipal agency or facility. The hubs in essence are a grassroots organization, staffed and managed purely by volunteers from the community (Barker, personal communication, August 7th, 2020). Because these hubs are set up by local residents in their own particular communities with their own particular skills, resources, and geographic conditions, the individual hubs differ significantly from one another. The individual settings of the actual hubs vary, as hub volunteers will place their hubs at whatever site is available and preferable to them. As a result, parks, apartment complexes, schools, private businesses, houses of worship, cultural centers, community gardens, social non-profit

organizations, and parking lots have all been selected as sites for emergency hubs (Seattle Emergency Hubs, 2014).

Aside from their online web presence, much of what I learned about the hubs came from a lecture and training event held at Beacon United Methodist Church on February 29, 2020 by leading hub organizer Cindi Barker. I was pleased to find that the room hosting this event was full, with at least 20 attentive, engaging people of various racial backgrounds, ranging in age from teenagers to retirees. Cindi was a very enthusiastic and knowledgeable presenter, and was one of the leading community members that helped found the Community Emergency Hubs back in 2009 (Landau 2019). While there is, as Cindi said, no "one-size-fits-all" when it comes to the hubs there are still some organizational guidelines they are meant to follow when they "go live" in response to a disaster (Barker, personal communication, February 29th, 2020).



Figure 1.2 – Hub volunteers setting up. Three hub participants serving in the roles Hub Greeter, Hub Manager, and Hub Message Taker are all the volunteer personnel required to start a hub's operations (*Helping out at the Hub: Quake drill draws big volunteer turnout,* 2016).

Basically, it takes three people to get a hub operating. These are a Hub Manager to assign roles to others, monitor the volunteers' welfare, and prompt adaptations to changing conditions; a Message Taker who can coordinate and document communication, usually using written and verbal messages if telecommunication systems aren't working; and a Hub Greeter who can position themself at the perimeter of the hub, guide community members to different resources, and work to recruit more volunteers to help at the hub (Seattle Emergency Hubs, 2014).

As information and communication are the keys to obtaining and utilizing any resources in the surrounding community during a disaster, the hub will compile and manage at least five specific lists with relevant info, which ideally should be displayed in a visible place so everyone has access to said information. These lists, at minimum, should include one on local needs, one on local resources, one for general information, a written message board, and an official information board reserved for details provided by public agencies (Barker, personal communication, February 29th, 2020).

Depending on where the hub is and how visible it is from the nearby street or sidewalk, the hub volunteers might set up some sort of sign or marker to identify the hub to passersby. In some cases, if a hub is lucky enough to have an amateur radio enthusiast among they're regular volunteers, the hub can employ this enthusiast as their radio operator connecting them to a municipal EOC (Emergency Operations Center) being used by Seattle's OEM to coordinate its disaster response (Community Emergency Hubs, 2018).

The hubs also differ significantly not just in their respective settings, but in the items they come prepared with. During her presentation, Cindi described the Lake City Emergency Hub as an "uber hub" whose participants have organized secure storage for extra equipment – like a gasoline generator, tent awnings, and first aid kits – not found at other hubs (personal communication, February 29th, 2020). Contrasting with this "uber hub" and its additional stored supplies is the hub that Cindi said she carries with her in her purse: a mere pen and notebook. While this pen-and-paper hub initially seems less optimal than having an inventory of disaster preparedness stuff, the latter does have to be stored with one of the volunteers at their own residence, business, or some other secure site. It isn't hard to imagine that given the dangerous and chaotic nature of a severe earthquake or other disaster, the keeper of this hub disaster kit may be unable to access and utilize it. However, a motivated hub volunteer with a pen and notebook, arriving at a hub with fellow community members, can use those simple objects to begin organizing the hub's people and activities. A hub might start out with just a pen and paper, but with the simple organization and communication functions they perform this pen and paper can be used in the obtainment and usage of some volunteer message runners, an off-duty nurse, materials for temporary shelters, some sandbags, a couple of car mechanics, a chainsaw, and whatever other resources can be garnered from the surrounding area. Such a snowball effect can enable this pen-and-paper hub to evolve into an "uber hub" of its own.

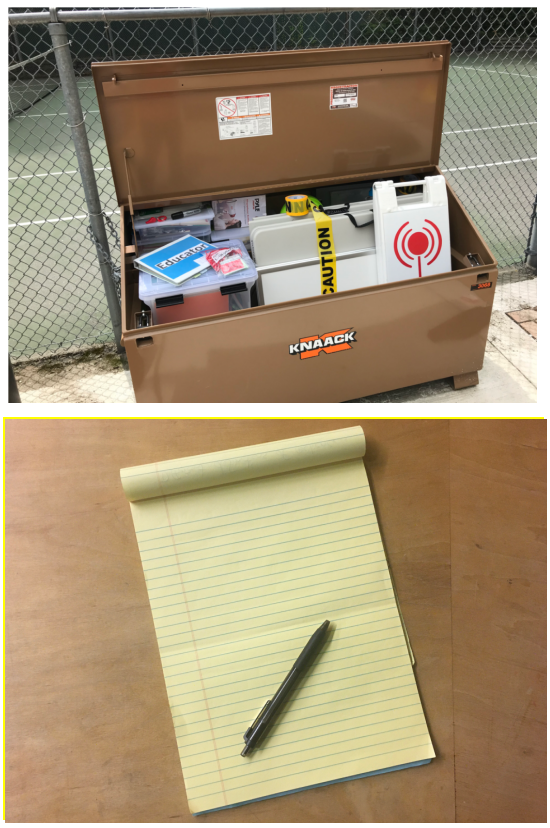


Figure 1.3 – Hub equipment. Two very different sets of equipment, neither of which should be considered less effective than the other (Johnson, 2019).

While these hubs are meant to harness the skills, resources, and civic spirit of their respective volunteers and neighbors, they aren't meant to operate totally ignorant of one another, and some joint coordination and training does take place (such as the meeting I attended in February 2020). A number of the Hub Managers or "Captains" – occupying one of the three main volunteer positions found at every hub – meet on a monthly basis to discuss best practices and find opportunities for collaboration (Barker, personal communication, August 7th, 2020). The hubs' training activities also feature input from outside programs, like SNAP (Seattle Neighborhoods Actively Prepare) which is associated with the Seattle OEM, and CERT (Community Emergency Response Team) which is associated with U.S. Federal Emergency Management Agency or FEMA (Seattle Emergency Hubs, 2014). Along with this, although the City of Seattle doesn't directly supervise the hubs, it has been known to provide financial support. For example, in recent years the Seattle Department of Neighborhoods has offered generous grants to residents seeking to start a new hub, in which they also can receive a "Hub-in-a-Box" containing basic medical supplies, various tools, radio equipment, waterproof tarps and ponchos, battery-operated lights, and other such useful items (*Receive up to $1,500 to start a Community Emergency Hub*, 2018).



Figure 1.4 – The most valuable thing found at an emergency hub? Information (*Helping out at the Hub: Quake drill draws big volunteer turnout,* 2016).

The number of hubs involved in this system has fluctuated from time to time, as new volunteers join and new hubs are initiated (the process of starting a new hub is quite straightforward and consists of an easy online application through the Seattle OEM's website), and as some volunteers discontinue their involvement and some hubs are discontinued altogether (Barker, personal communication, August 7th, 2020). In November of 2016, a decade and a half after the Seattle Community Emergency Hubs were founded, there were 67 hub sites throughout Seattle (Landau, 2019). Their geographic distribution was somewhat irregular and scattered, leaving sizable sections of the city without a hub. However, that number has more than doubled as of this writing, as there are now 135 hubs throughout the city in a less uneven geographic distribution (Community Emergency Hubs, 2018). We can owe this largely to the fact that in April of 2017, the city's scores of beloved "P-Patch" community gardens were added to the list of hubs wholesale (Landau, 2019). This was done specifically because both the Seattle OEM and the Community Emergency Hubs realized that the hubs' visible association with a government agency was a disincentive for some locals to get

involved, specifically locals that might be wary of interacting with the authorities. The popular P-Patches, though associated with the Seattle Department of Neighborhoods, are more grassroots in their appearance, serve as natural public gathering spaces, and help in promoting social cohesion in their communities (Hou & Grohmann, 2018).

The Seattle Community Emergency Hubs in Action

Knowing what we know from the previous paragraphs, let's take a moment to visualize an example of how a hub might mobilize during an earthquake, and how it might organize and utilize local information and resources during that emergency situation.

After the ground has stopped convulsing, the three initial hub participants – Hub Manager (or "Captain"), Hub Message Taker, and Hub Greeter – have reached their designated hub site in a public park, and are ready to help mobilize their community's grassroots disaster response. A police car passes by, the two officers inside it see the hub volunteers, and they stop to speak with them. They offer up some helpful post-earthquake safety tips from their agency, including a request that any nearby resident who has a fire extinguisher should place it on the sidewalk in front of their home, in case a neighbor without an extinguisher needs to put out a fire elsewhere. The Hub Greeter thanks the officers and writes these details down on their official information board, which they've set up in addition to their general information and written message boards. Another group of local hub volunteers soon arrives, one of whom mentions that she has extra bottled water in her garage, and proceeds to add that as the first item of their general information board. A mother of two teenagers who lives a couple blocks away stops by the hub, asking to leave a message for her children to come back home, since she's uncertain of their whereabouts and can't contact them via the overloaded cell phone network. The hub Message Taker writes this on a paper sheet, and posts it on their written message board.



Figure 1.5 – Hub participants rehearsing for an earthquake during a practice drill (*Helping out at the Hub: Quake drill draws big volunteer turnout,* 2016).

As night falls, the hub volunteers pack up their materials, and agree to meet back at the hub the next morning to resume their activities. After they return the following day, another local resident walks up and says he's looking for his pet dog who ran off during the initial quake. He provides a description of the lost animal, along with his contact information, for the general information board

before departing to continue his search. Another neighbor walks over later, and states that the nearby community center has been set up as a temporary shelter for anyone who lost their housing due to yesterday's quake. This info is added to the resources board, and the neighbor who provided it agrees to stay and help at the hub. At this point most of the hub volunteers have cellphone service again, and one of them gets a call from a friend down the street. The caller states that his religious congregation has decided to distribute canned goods from their recent food drive to elderly neighbors, and while they have an abundance of food they could really use some volunteers with automobiles or wheeled carts to help with distribution. The volunteer documents this need on the needs board, and takes the initiative to send himself and another volunteer out to meet those needs.



Figure 1.6 – Hub volunteers practicing radio communications (*Helping out at the Hub: Quake drill draws big volunteer turnout,* 2016).

In regard to the temporal duration of the hub's activities during an actual disaster, it's estimated that they would continue like this for no more than a couple weeks (Barker, personal communication, August 7th, 2020). This is because the hubs aren't meant to be a long-term post-disaster rebuilding effort, but more of a stopgap measure that can address community needs that go unmet by public services (hospitals, fire fighters, FEMA, public utilities, the National Guard, etc.), as the latter undertake their own pre-planned disaster relief efforts (emergency medical services, repairing infrastructure, removing debris, search and rescue, etc.). As Cindi Barker informed me, this is because such public service providers will largely be operating "on autopilot" for those weeks, enacting the specific disaster responses they had planned and trained for (personal communication, August 7th, 2020). They will likely be unable to deviate from these contingency plans to address anything outside their specific purview, so the Community Emergency Hubs will spend those tumultuous weeks seeking to address any community needs that go unmet.

As we close out this introductory section, it's important to emphasize here that during a disaster the "snowball effect" of a hub collecting additional resources as they're identified in the community isn't just about getting more information, supplies, and equipment. It's also about recruiting more *people* that can help with information, supplies, and equipment. In the training events she conducts, Cindi Barker strongly encourages hub participants to "turn everyone into a volunteer" that can assist in disaster relief efforts (personal communication, February 29th, 2020). Appeals can be made to people that come to a hub looking for information and other resources that they

personally become involved in that hub's disaster response. And honestly, as we'll see in my literature review on grassroots community disaster responses, that shouldn't be a hard sell. A variety of experts and commentators on these matters have stated that it's in our nature as humans to help our fellows when disaster strikes. We can think of this as what sociologist and clergyman Samuel Henry Prince – whose pioneering work on "disaster studies" I'll reference later – would call "social pressure." In reflecting on how he witnessed the residents of Halifax, Nova Scotia assisting one another in the wake of a massive, accidental munitions explosion at their harbor in 1917, Prince writes that "Imitation is the foundation of custom. It [helping others] became the thing to do. The thing to do is social pressure. It may be unwilled and unintended, but it is inexorable" (1920).

And just as a preview as to what this thesis project is actually all about, let's briefly go over the main research question I'll be exploring here: in organizing a series of grassroots community emergency hubs, how can we best utilize local social capital and social infrastructure to make said hubs as safe, accessible, and inclusive as possible?

CHAPTER 2 – LITERATURE REVIEW

- **The Myth of the Solo Prepper**
- **Scott James and Bainbridge Prepares**
- **Social Capital and Social Infrastructure**
- **Disaster Studies – Panic? It's not as prevalent as you think . . .**
- **Community Resilience**
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- **Disabilities in Disasters and Universal Design**
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The Myth of the Solo Prepper

For some observers, the diverse, upbeat group of community volunteers that make up the Seattle Community Emergency Hubs may not be what comes to mind when we think of stereotypical disaster "preppers." Allow me to insert a brief anecdote here. During a landscape architecture design-build course earlier in my studies, I and a group of fellow students were in the process of assembling benches we had designed at their appointed site, a soon-to-be park in Seattle's Capitol Hill neighborhood. One of my classmates mentioned that her cell phone was nearly out of power, and we weren't sure if there were any outdoor electrical outlets nearby. I searched around in my pockets, and offered up my own external cell phone battery charger, which I joked was "my back-up to my back-up" (as my cell phone case has a built-in spare battery itself). My classmate thanked me and took the device, and another classmate half-jokingly asked if I was a "prepper."

I was slightly surprised by her humorous query. In my classmate's defense, due to the weather conditions I was wearing a wide-brim hat, a cold weather coat, and heavy boots that gave me a somewhat rural survivalist appearance. However, I felt that the paranoid, hermit-like, wilderness-dwelling stereotype we commonly associate with the term "prepper" was more than a little distant from how I saw myself – a college-educated, fairly sociable urbanite who would much rather live in a dynamic, cosmopolitan city than out in the boondocks. While I'm rather interested in the stories and techniques of resourceful, adaptable people who, when faced with a major disruption to their normal lives, rise to the occasion to overcome new challenges, the prepper label doesn't appeal to me for a couple different reasons. The solitary, geographically isolated, and untrusting nature of the cliché prepper runs contrary to my own personal outlook on life. Additionally, in the quest to become

a self-sufficient, ready-for-anything prepper one has to invest considerable time, money, and effort into acquiring the skills and materials one would need to be totally independent of society, as well as equipped to endure a variety of disaster scenarios. The whole undertaking just seems daunting, maybe even insurmountable. Can a single person (or household or nuclear family) really be prepared for any and all emergency situations? Can an individual really store up enough water to survive the worst drought AND produce enough food to survive the worst famine AND obtain all the needed medical supplies to treat every imaginable medical problem AND construct an abode that can withstand every sort of natural disaster AND develop encyclopedic knowledge on how to respond to every dangerous situation one might encounter ever in the history of everything AND … well, you get the picture.

Personally, I'm quite doubtful of such a notion. What's more, the literature review I undertook during this project validates my doubt. Not only is surviving a disaster more difficult and dangerous to do as a single, isolated individual, but there are numerous benefits to preparing for, withstanding, and recovering from a disaster as a member of an urban community with its social capital and social infrastructure. These two terms – social capital and social infrastructure – are key thematic concepts of this thesis, and we'll better define and explore them later in this chapter.

Scott James and Bainbridge Prepares

The first author in our literature review is an individual who is very active and knowledgeable in matters of community disaster preparation, and also decisively disagrees with the notion of disaster prepping being a rural and isolated one-man-show. This is Scott James, a resident of Bainbridge Island, which is in the Puget Sound due west of Seattle. James is a leading member of the community prepper group Bainbridge Prepares, and has written an acclaimed book on community-based disaster preparedness and relief, which was recommended to me by multiple people. He writes of coming to the conclusion after years of experience that "true self-sufficiency was not only unattainable but also undesirable" (2017). In addition to his own knowledge and experience, his book consults a variety of other disaster preparedness and relief experts he knows personally. He quotes one of these, author and "urban forager" Becky Lerner of Oregon, as saying the following: "Survival is a collective activity. The solo survivalist is a Western myth; ditch it now. The best insurance plan is an empowered community" (2017). Lerner explains further that while "it's hard to be a human Swiss army knife," as individuals we still possess "unique gifts, strengths, and abilities" which we can contribute to the collective benefit of our community in times of trouble. I've

heard Seattle hub participant Cindi Barker echo this concept too, pointing out that the various people one might enlist in a grassroots disaster response can contribute their own unique knowledge, skills, and resources for their community's recovery (personal communication, February 29th, 2020). As an emergency hub participant, you might be aware of the knowledge, skills, and resources of a retired doctor, a young electrician's apprentice, a former Eagle Scout, a well-connected social worker, an egalitarian clergyman, some dude you know who really likes to barbeque, or any number of other randomly useful characters in your community before disaster strikes. Or, you might find out about them and their capabilities later while organizing relief efforts after disaster strikes. Either way, everyone you encounter before, during, or after a disaster likely has something they can contribute to relief efforts.

Scott James recommends getting to know one's neighbors, working to build a neighborhood network of about 20 households, and striving to build both relationships and readiness through group activities that focus on disaster preparation, resiliency, and sustainability (2017). With such activities, one day James and his fellow Bainbridge Island residents might be coordinating what to plant in their gardens. On another day, they might be experimenting with solar panels. On yet another day, they might be brushing up on their first aid skills. All this is done with the goal of being ready to support themselves and one another in an emergency situation. And if you're a local resident of the more socially insular sort, who isn't inclined to show up at a bunch of community gatherings, simply waving at neighbors and knowing their faces is enough of a relational starting-off point for when disaster strikes. In the event of such a disaster, during which Bainbridge Island could very well be cut off from the mainland for a time, James hopes that the social connections, resources, and skills that have been developed through pre-disaster community activities will help residents survive, support one another, and recover and adapt post-disaster.



Figure 2.1 – Some of the community activities Scott James recommends in his book (2017).

Coincidentally, James's recommendations include specifying a "hub" (sound familiar?) where community members can congregate, pool resources, set up first aid for those who need that, and exchange information during a disaster (2017). He also states that the residents involved at the hub should make contact with hubs on other parts of the island, as well as Bainbridge's EOC (Emergency Operations Center), reaching out to them via amateur radio operators or message runners. James also recommends that hub volunteers be mindful of the "walkshed" around their hub, the area encompassing everything that is within easy walking distance of it (2017). Although his community is of a more suburban/exurban sort compared to Seattle – he even suggests that horses might be used as alternative transportation in the case of a gasoline shortage – much of what James describes aligns closely with the practices of the more urban Seattle Community Emergency Hubs across the water.

Social Capital and Social Infrastructure

Along with introducing us to grassroots disaster preparedness and relief, and the idea to center these activities around a hub, James's book is an excellent jumping-off point to talk about another important aspect of this thesis: social capital. If someone is unfamiliar with such matters, they might think that the "capital" in social capital refers to something like economic capital. You know, like money. Indeed, as French sociologist Pierre Bourdieu has indicated, there are multiple kinds of "capital" beyond the economic sort: symbolic capital, cultural capital, AND social capital (Aldrich & Meyer, 2015). In the case of this project, this latter version of capital is what's important to focus on here. Like these other forms of capital, social capital is something of value and an asset we can use to accomplish certain goals, even though – unlike economic capital – it's much harder to assign a dollar value to. Definitions of social capital vary somewhat depending on the source one consults, but it appears the term was coined by a West Virginian public school administrator, L. J. Hanifan, in the early 20th Century. In an academic paper he wrote, Hanifan describes social capital as "goodwill, fellowship, mutual sympathy and social intercourse among a group of individuals and families who make up a social unit" (1916). He precedes this by saying that by capital "I make no reference to the usual acceptation of the term *capital* […] I do not refer to real estate, or to personal property or to cold cash, but rather to that in life which tends to make these tangible substances count for most in the daily lives of a people […]" Another theorist on social capital, the sociologist James Samuel Coleman, builds on Hanifan's (and others') notions of this by pointing out that our connections to other people can also provide connections to valuable resources via those people (Aldrich & Meyer, 2015). This is an important consideration the Seattle Community Emergency

Hubs takes into account with its plans: that connections to people equate connections to resources one might have need of in a disaster scenario.

Part of what Scott James and his neighbors are trying to do in their community activities is not just practice disaster preparedness, but to connect to and cultivate social capital. As we'll see later in my chapter covering historic precedents, social capital has time and again played a fascinating, valuable, and even life-saving role in how communities respond when they are hit by disaster. "While disaster situations may typically call forth images of trained professionals and formal rescue operations," write researchers Daniel P. Aldrich and Michelle A. Meyer, "scholarship has shown that informal ties, particularly neighbors, regularly serve as actual first responders. Neighbors check on the wellbeing of others nearby and provide immediate lifesaving assistance" (2015). Yep, you read that right: *lifesaving*. Aldrich and Meyer also point out that larger disaster response entities, from the FEMA to the Australian Red Cross, have recognized this in recent years and have been working to promote cooperation between official government departments and grassroots community organizations, all in the hope of putting local social capital to effective use in emergency situations.

We should also recognize that such vital social capital can be physically sourced at what sociologist Eric Klinenberg calls "social infrastructure." In his book, *Palaces for the People: How Social Infrastructure Can Help Fight Inequality, Polarization, and the Decline of Civic Life*, Klinenberg defines social infrastructure as "the physical places and organizations that shape the way people interact" (2018). He describes a number of urban places where social infrastructure can foster social capital, including parks, libraries, community centers, and locally owned businesses. Amongst the key messages of Klingenberg's book, along with describing how social infrastructure can foster healthy public life and combat social isolation, is that physical places that function as social infrastructure can also – like the social capital they connect to – prove quite valuable in a local emergency. Furthermore, echoing Aldrich and Meyer, Klinenberg describes how throughout the United States, "grassroots organizations have been collaborating with nonprofits and local governments on social infrastructure projects that enhance resilience during weather disasters and dramatically improve residents' everyday lives too" (2018). He also demonstrates how in the recent past, localities with better developed social capital and social infrastructure were more resilient in the face of disasters, and the reverse was true for places with less-developed social capital and less plentiful social infrastructure.

Before proceeding further, I just want to say something about the "Seattle Freeze." This is the somewhat stereotypical notion that Seattleites, being a largely introverted and socially insular sort of

people, will "freeze out" unfamiliar individuals whom they encounter, though in other circumstances they might have socialized and built relationships with such people. I gather from my own personal experiences, and conversations with others on the matter, that the Seattle Freeze seems to be on the decline as of late. Personally, I attribute this largely to the influx of more sociable newcomers – the people I have gotten along with best while living in Seattle tend to be originally from elsewhere – but that's a whole other topic tangential to the subject of this thesis. However, I will say that while some celebrate the Seattle Freeze as one of the unique cultural intricacies of our metropolis, I vehemently believe that the Seattle Freeze has the potential to *get people killed*.

The Seattle Freeze isolates people, and social isolation should be of grave concern to us. Social isolation is detrimental to one's mental health, and poor mental health can cause the sufferer to fall into depression, substance abuse, or some other psychological malady. These conditions can shorten one's lifespan considerably, and can even end it abruptly if the sufferer gives in to suicidal ideation. Moreover, if we are isolated from our fellow humans, our ability to withstand and adapt to disruptions in our personal lives can be severely undermined. Although the causes of homelessness in and around Seattle are numerous and complicated, I imagine many of the thousands of people experiencing homelessness here would be less likely to fall into that situation if they had stronger social ties, and could call upon a wider network of fellow humans for help in their time of need. Additionally, social isolation reduces not just the personal resilience of an individual who faces personal hardship, but the resilience of a city, town, or neighborhood in which many of its citizens face the same hardship simultaneously.

Disaster Studies – Panic? It's not as prevalent as you think . . .

Similar to the impractical stereotype of the self-sufficient, solo prepper living out in the wilderness is another problematic idea: that, when disaster strikes, the people who are affected thereof will collectively lose their minds, their wits, and their marbles, and descend into a state of panic. Those who adhere to such a notion should discard it immediately. As Rebecca Solnit points out in her book *A Paradise Built in Hell: The Extraordinary Communities That Arise in Disaster*, popular culture has provided us for decades numerous movies about earthquakes, mega storms, volcanic eruptions, and even asteroid strikes that perpetuate this errorful concept (2009). In fact, Solnit claims, writings from the fields of sociology and "disaster studies" (a bona fide professional discipline) have demonstrated the opposite to be true; that in disaster situations many regular,

everyday people rise to the occasion and leap into action in a manner that is instinctive at the very least, and nothing short of heroic at the very best.

Solnit introduces us to two of the founders of the field of disaster studies. These are Samuel Henry Prince and Charles E. Fritz. Prince, who I briefly mentioned before, had earned graduate-level degrees in both psychology and divinity, and was working as an Anglican priest in Halifax, Nova Scotia beginning in 1910 (Scanlon, 1988). As previously mentioned, Prince was an eyewitness to the 1917 Halifax Explosion, which levelled two square kilometers of that city. An estimated 1,600 people died in the massive blast, another 400 perished in the aftermath of this cataclysm, and some returning WWI combat veterans claimed the devastation they saw there looked as bad – or possibly even worse – as what they had seen in war-ravaged France and Flanders (*Halifax Explosion: 100 years later*, 2017). The local community relief activities that followed, which Prince participated in himself, served as the basis for his doctoral dissertation while studying sociology at Columbia University three years later. Recognizing that he was treading new academic ground, Prince points out that his dissertation is "the first attempt to present a purely scientific and sociological treatment of any great disaster" (1920). And like Solnit almost a century later, Prince points out that while disasters are dangerous and tragic, they are times to "seize the moment" and "multiply immeasurably its power for social good."



Figure 2.2 – Samuel Henry Prince: clergyman, sociologist, and one of the pioneers of what we now call "disaster studies" (Dodd, 2018).

While many Halifax residents had to instinctively flee the rushing tsunami and outbreak of fire caused by a record-breakingly massive explosion (the result of a collision between ships in the harbor that touched off one's cargo of explosives), they displayed great presence of mind afterwards and people from all walks of life set about rescuing one another, setting up relief efforts, and beginning the hard work of rebuilding their city (Prince, 1920). Although they didn't explicitly call them emergency hubs, the people of Halifax set up numerous makeshift relief stations at local public spaces and institutions. These increased in number as more relief stations popped up, replicating the model set forth by the original citizen responders. As a psychologist and sociologist, Prince attributes part of Halifax's success at relief and recovery to the notion that just as a human body will heal itself after a grave injury, so too can a body of humans. One of Prince's takeaways

from the Halifax experience is that while the city mobilized quickly into recovery mode after the fact, it would be prudent to establish a "permanent vigilance committee" to prepare for future emergencies (1920). So here, we see Prince not only allude to community emergency hubs, but recommending a community organization active in disaster preparedness – much like the Community Emergency Hubs in present-day Seattle.

Also cited by Rebecca Solnit, Prince's natural intellectual successor seems to be Charles E. Fritz, who studied sociology at the University of Chicago and was given a leadership position at that institution's Disaster Research Project in 1950. While he was still a student, a friend of Fritz's recalls hearing him say, "My God, I'm trying to write a thesis about panic and I can't find any instances of it" (Solnit, 2009). As Solnit did more recently, Fritz and his colleague Harry B. Williams recognized that the cinematic portrayal of people in disasters as becoming "permanently deranged mentally" ran counter to the real-life reactions of people in disasters, which they studied extensively (1957). While people may seek to flee the initial danger of a disaster, Fritz and Williams encourage us not to confuse mindless panic with just running away from a very real threat of injury, death, and generalized danger. In fact, even when people are fleeing a disaster, they actually can be quite orderly and civilized about it. Moreover, even though we might see people running here and there and doing a variety of harried activities during an emergency, we shouldn't interpret that as panic. These people are likely responding proactively to the emergency, but just haven't yet coordinated their efforts with each other. It's better to see people take action than to "freeze up" and, according to Fritz and Williams, the former happens far more often than the latter when people are faced with some great calamity (1957).

Fritz and Williams also point out that even if disaster survivors are isolated in their predicament, cut off from the rest of society, they tend to start self-organizing their own recovery operations, sometimes even less than an hour after the original catastrophe (1957). Despite the fact that groups of citizens can be quite effective in mobilizing grassroots disaster relief, they may lack the wide-sweeping purview of official agencies, and their reach may be limited to their own social connections. This emphasizes the point Eric Klinenberg makes about fostering social capital and infrastructure prior to a disaster, and the point Prince makes about creating community groups for disaster preparedness. It also emphasizes the importance of the community networking and preparedness activities practiced by the Seattle Community Emergency Hubs.

While panic during a disaster shouldn't be as widespread as it's portrayed in the movies, it isn't entirely unheard of either. It's rather interesting to be able to consider and write this thesis during the 2020-2021 Coronavirus Pandemic. Although we can surely look forward to

comprehensive and in-depth social analysis being released after this pestilence has passed, at this point we have witnessed some level of human panic in our country, as well as our Puget Sound region. In earlier months, the news media was lousy with images and stories about people "panic buying," rushing into grocery stores and other businesses to purchase copious amounts of food and supplies. Looming large among these news stories are reports of a run on toilet paper, with entire stocks of this unexpectedly valuable product (why?) disappearing from store shelves.

In addition to this notion that intelligent humans will descend into panic during an emergency, another frightful concept that plays a big role in fictitious disaster stories is the rise of – along with panic – distrust, confrontation, and even violence between groups of people as society fractures along "tribal" lines. Referencing again our currently ongoing Coronavirus Pandemic, while we haven't seen something as extreme as the total breakdown of society and roving gangs of nomadic scavengers fighting one another, we have seen some examples of distrust, confrontation, and violence. Recently, the FBI has released a report stating that hate crimes against Asian Americans have increased in number during the outbreak, and they fear a further increase of such incidents going forward (Margolin, 2020). It has also been reported that some white supremacist elements in the U.S. have considered weaponizing Coronavirus by leaving infected saliva on doorhandles and elevator buttons (Sheth, 2020). Although such reports are disconcerting, division and conflict hasn't been the sole narrative of this pandemic. We have still seen numerous examples of charity, unity, and solidarity around the world, as we have witnessed similar human phenomena in past disasters.

Returning to Prince and his study of the Halifax Explosion, he shows us that in the immediate aftermath of this tragedy this city experienced far more unity and community than tribalism and balkanization. He describes a "general consciousness which seemed to draw all together into a fellowship of suffering as victims of a common calamity" (1920). He goes on to state that there "was neither male nor female, just nor unjust, bond nor free." They were all just survivors and relief-providers, united in solidarity by circumstance. It ought to be mentioned, however, as more time passed and Halifax continued in its recovery, those affected began to self-sort along denominational lines. In the temporary shelters that were set up, Prince (himself a member of the Christian clergy) points out that Catholics wanted to be together with Catholics, and Protestants with Protestants (1920). Fritz and Williams make similar points in their writing several decades later, saying that while people may reach across social divisions during a disaster to build "social solidarity," the same divisions may reemerge as time marches on (1957). Still, the coming together in common struggle at

the outset of a catastrophe, not the later straying apart into groups of one's own kind, is the more powerful and relevant lesson from Halifax and other cities which experienced disasters.

Community Resilience

Not only do the Seattle Community Emergency Hubs align with a civic-minded, community-based, largely altruistic disaster response paradigm outlined by James, Solnit, Prince, Fritz, and others – where our human nature motivates us to help one another in dire circumstances – but they also promote a disaster preparedness paradigm that generally enhances community resilience. As the word "resilience" can be a somewhat malleable term that is interpreted slightly differently by different commentators, we should cover two specific definitions of resilience here. First off, the authors of the article "Resilience, Adaptability and Transformability in Social–ecological Systems" describe resilience as "the capacity of a system to absorb disturbance and reorganize while undergoing change so as to still retain essentially the same function, structure, identity, and feedbacks" (Carpenter et al., 2004). In short, this definition entails that the system in question (or person, community, organization, or whatever other kind of

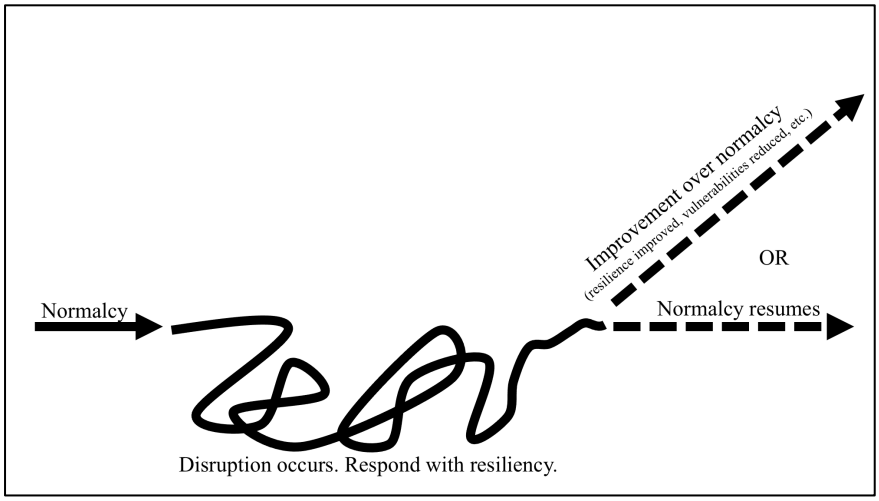


Figure 2.3 – Visual model of how resilience functions.

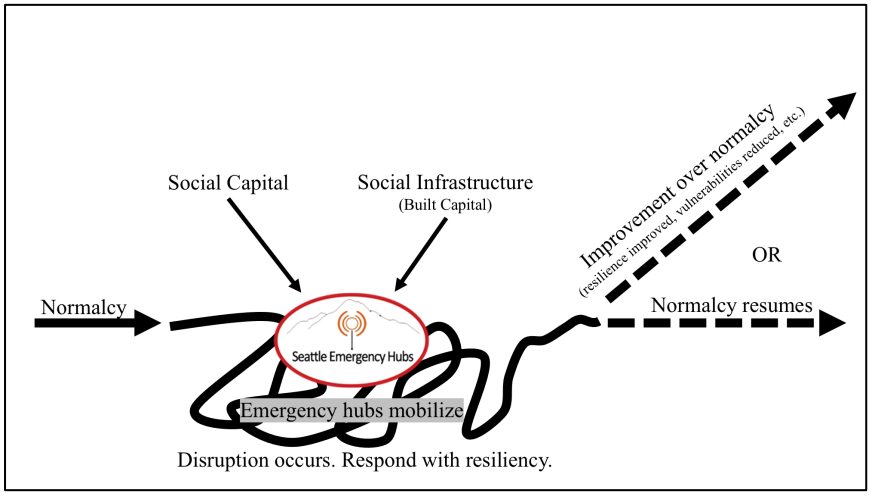


Figure 2.4 – Visual model of how resilience functions with emergency hubs.

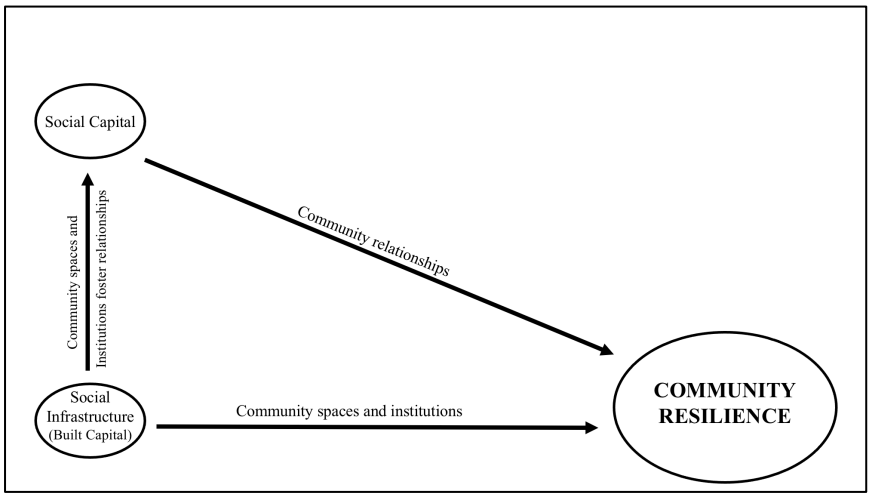


Figure 2.5 – Visual model of how social capital and social infrastructure contribute to resilience.

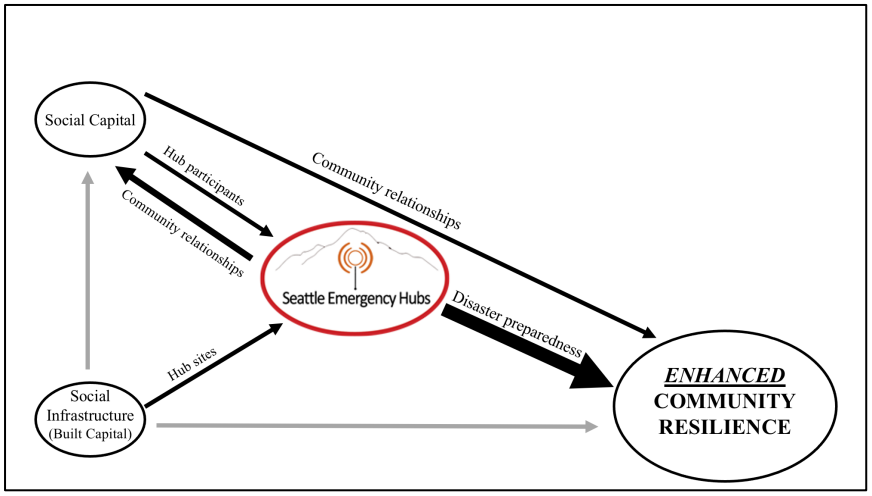


Figure 2.6 – Visual model of how social capital and social infrastructure contribute to resilience with emergency hubs.

entity) undergoes a disturbance (like an earthquake or another disaster), demonstrates its capacity to "absorb" and adapt to said disturbance, with the end result being a return to normalcy. Seems straightforward enough. However, there are those that have different understanding about what the end goal of resilience is meant to be.

For our second definition, we turn to professor and philanthropist Judith Rodin, author of *The Resilience Dividend: Being Strong in a World Where Things Go Wrong*. In this book, Rodin states that resilience "is the capacity of any entity—an individual, a community, an organization, or a natural system—to prepare for disruptions, to recover from shocks and stresses, and to adapt and grow from a disruptive experience" (2014). Compared to the first definition, what is the key difference in this definition of resilience? The difference is that the end goal of resilience is not a return to the status quo, but to "adapt and grow" and create something better than what existed before. This is a sentiment similar to what Rebecca Solnit describes in her *A Paradise Built in Hell*, where a primary theme of the book is that resilient community members hit by a disaster don't just withstand it, and then try to get things back to the way they were. Instead, Solnit claims that we should embrace "the suspension of the usual order and the failure of most systems," and take the disruption as an opportunity to be "free to live and act another way" (2009). So, the end goal of

resilience doesn't always need to be a return to normalcy. Rather, faced with hell, we can take a shot at building paradise.

And when we practice resilience as a community, both social capital and social infrastructure are invaluable resources that can come into play. The authors of the journal article "Whole Community Resilience: An Asset-Based Approach to Enhancing Adaptive Capacity Before a Disruption" remind us to consider such assets as "social capital" as well as "built capital" when we discuss a community's capacity for resilience (Freitag et al., 2015). The authors suggest that government and large-scale commercial entities may be less effective in supporting relief efforts after a disaster than personal social connections, grassroots organizations, and decentralized public resources like libraries and community centers. In the case of the latter, such decentralized, multipurpose facilities that function at the neighborhood level can surely be utilized for disaster recovery purposes, like assembly points, temporary shelters, and aid distribution centers. These are all items we might call, in the words of those authors, "built capital" (Freitag et al., 2015). Going off what we've learned from Eric Klinenberg, it's clear that some forms of "built capital" can also function as "social infrastructure." They can be used not only to enhance disaster resilience in a community, but to enhance social interconnectivity in a community, which in turn *also* enhances disaster resilience. This notion calls back to some of the ideas Scott James writes about in *Prepared Neighborhoods*, but also aligns with what the Community Emergency Hubs seek to accomplish in Seattle with their own disaster preparation activities – cultivating social capital before a crisis so it can be mobilized to better effect when a crisis does occur.

Spatial Considerations for Social Infrastructure

In preparation for exploring the Seattle Community Emergency Hubs, so far we've examined the *social* aspects of social infrastructure, but we must recognize that there are *spatial* aspects to consider as well. Each component of social infrastructure has its own design elements and surrounding

geographic context to consider. These spatial factors can either enhance or detract from its usefulness as social infrastructure, whether during everyday life or during a disaster. Ideas on what design elements to consider while examining the physical attributes of the Community Emergency Hubs are largely drawn from two sources here. The first is Oscar Newman's *Defensible Space: Crime Prevention Through Urban Design*, the seminal book on the tenets of CPTED (pronounced "SEP-ted") or "Crime Prevention Through Environmental Design." The second is the book *Safe Cities:*

Guidelines From Planning, Design and Management by Gerda R. Wekerle and Carolyn Whitzman, which was a product of the "safe cities" movement that came after CPTED in the 1990s, and similarly advocated improving security in urban settings using design.



Figure 2.7 – Oscar Newman, author of *Defensible Space: Crime Prevention Through Urban Design* (Terblanche, n.d.).

Much of what Newman recommends for improving safety through urban design has to do with mitigating "visually deprived" spaces by providing natural "surveillance opportunities" (1973). For example, if a secluded alcove in a park looks like an opportune place for criminals to ambush unsuspecting pedestrians, then this alcove should be redesigned with clearer sightlines for better natural surveillance from the outside. Newman also points out that if a park or other public space has clearly defined entrances, has a mixture of building types surrounding it to support different activities throughout the day, and has neighboring residences along most of its periphery, these factors will improve opportunities for natural surveillance, allow the neighboring residents to establish a sense of agency over the space, and make the space a more attractive and comfortable setting for users. Of course, a lot of the Seattle Community Emergency Hubs have been placed at public spaces, so Newman's ideas on safety through design might prove useful in determining whether these spaces are well suited to act as hubs. In essence, if the design of a public space makes its visitors feel safer, lessens opportunity for criminal misdeeds, and provides for naturally occurring surveillance, then it should be more popular amongst locals during everyday life, and therefore more recognizable as an emergency hub during a disaster.

Gerda R. Wekerle and Carolyn Whitzman acknowledge Newman and CPTED as important to their own "safe cities" work, and augment his recommendations with recommendations of their own (1994). They provide criteria and typologies with which to evaluate the design and surrounding features of urban open spaces, including parks and plazas. Many of their individual recommendations are probably too exacting for the purpose of this thesis project, like quantifying artificial lighting at night using "footcandles" as a unit of measurement. However, others are worth considering. Like Newman, they emphasize that if the buildings surrounding a public space serve multiple different purposes, that will foster more human activity around the space at different times of the day, and that will result in more natural surveillance.

Wekerle and Whitzman also suggest that having an "active edge" along the periphery of a public space – metaphorically like a sort of storefront window where passersby can view (and access) the activity within the space – can help attract more users and help with natural surveillance (1994). We could make the argument that if such a space is then requisitioned as an emergency hub, the active edge will help attract more volunteers as well as maintain open communication with the hub and the surrounding neighborhood. Wekerle and Whitzman also recommend that public spaces have an open area within them which can be used for special events and other programming purposes. Having an open event space at an emergency hub would also be ideal, providing a useful area for relief activities, as well as pre-disaster preparedness training. More generally, Wekerle and Whitzman point out that a space with more diverse amenities and uses (seating, greenspace, vendors, a playground, public art, or whatever else) will attract a more diverse set of users. If more users from various walks of life visit a public space on a regular day, then they're more likely to be aware of a hub that is set up there when disaster strikes. Finally, continuing with Newman's ideas on natural surveillance, Wekerle and Whitzman explain that having unobstructed sightlines from the exterior of a space to its interior helps in making it a safe, recognizable, and popular community amenity. Overall, a space that possesses these spatial qualities is better equipped to be a successful emergency hub.



Figure 2.8 – Gerda Wekerle, co-author of *Safe Cities: Guidelines From Planning, Design and Management* (*The City Seminar: "Unearthing the Other Stories" - November 6*, 2015.).



Figure 2.9 – Carolyn Whitzman, co-author of *Safe Cities: Guidelines From Planning, Design and Management* (*Carolyn Whitzman*, n.d.).

Disabilities in Disasters and Universal Design

With our consideration of what design principles make an ideal emergency hub, we should also be mindful of the concept of Universal Design. The architect Ronald "Ron" Mace, himself requiring the use of a wheelchair as a result of a childhood case of polio, described Universal Design as "the design of products and environments to be usable by all people, to the greatest extent possible, without the need for adaptation or specialized design" (*What is Universal Design?*, n.d.). In plainer terms, Universal Design can be understood as making accommodation for people with

disabilities and other physical limitations, and it is important for us to include some understanding of Universal Design in this project. This is because while we are all vulnerable to the dangers of a natural disaster, someone living with a disability can be even more vulnerable, particularly if their disability limits their physical mobility (Mitchell & Karr, 2014).



Figure 2.10 – Ronald "Ron" Mace, pioneer of Universal Design, reminds us that design should be "usable by all people" (*Universal Design Principles and Guidelines,* 2014).

Globally, it is estimated (or at least it was estimated as recent as 2014) that there are a billion people worldwide that deal with some sort of disability (Mitchell & Karr, 2014). Proportionally, this is about 15 percent of the humans that live on this planet. Closer to home, according to our own U.S. Centers for Disease Control and Prevention (CDC), 61 million adult Americans experience a disability, and this equates to about 25.6 percent of our adult population (Centers for Disease Control and Prevention, 2019). For Washington state, that number is a little lower at 23.5 percent, but that's still a lot of people. Of course, while there are a variety of disabilities out there, for the purpose of this project I am focusing on people facing disabilities that limit their physical mobility. The multifaceted topic of how people with cognitive or sensory disabilities experience the built environment, and how those disabilities and the built environment might affect them during a sudden earthquake or other disaster, undoubtedly is a fascinating and relevant matter to explore. However, it lies outside the purview of this thesis project. That being said, the CDC points out that about 12.9 percent of American adults have a disability specifically affecting their physical mobility (2019). For the state of Washington that number is a smaller, but still considerable, 10.5 percent.

Not only do disabled folks make up a large part of our global, national, and state populations, but they also tend to experience additional dangers and privations in a disaster that others may not. In numerous disasters, including earthquakes in Haiti (2010) and Japan (2011), victims with disabilities experienced higher mortality rates than the non-disabled (Mitchell & Karr, 2014). The physical obstacles that come with disasters, like fallen trees and knee-deep water, can be a greater hindrance to those with limited mobility than those who are able-bodied. Additionally, injuries inflicted during a disaster upon people who previously had no disability can cause them to experience a disability going forward, either temporarily or permanently. And the additional layers of misfortune the disabled experience in a disaster come not just from physical forces, but social ones too. The disaster might throw up barriers between the disabled and their social support (family, caregivers, fellow disabled, etc.), cultural stigmas can cause the disabled to be excluded in the planning and undertaking

of disaster relief, and they might face blatant prejudice and exclusion in the provision of disaster relief resources. Those of us who remember when Hurricane Katrina hit New Orleans in 2004 might recall how the disabled, elderly, chronically ill, and other physically vulnerable people were overlooked and left out of evacuation efforts. More horrifyingly, in the 1906 San Francisco earthquake and fire (a historic event which I will come back to later), many of the infirm in hospitals that couldn't be evacuated were essentially euthanized, either with a deadly dose of chloroform or with a bullet to the head (Hansen & Hansen, 2013).

Much of the information on disabilities and disasters we've covered here comes from an anthology of articles, released as part of the proceedings of the Fifth Annual Shaffalah Forum ("Crisis, Conflicts and Disability: Ensuring Equality") in Qatar back in 2012. The authors of these writings, which included a variety of experienced professionals and academics, also offered recommendations on how to be more inclusive of people with disabilities when it comes to disaster preparation, survival, and recovery. Government and grassroots organizations that help communities prepare for disasters, and respond when they strike, should make sure they're actively including people with disabilities in their planning efforts, so that their needs and perspectives aren't overlooked (Mitchell & Karr, 2014). This will be both empowering for disabled community members, and educational for any non-disabled people involved. Moreover, some disabled folks have their own social subcultures of solidarity and activism which they belong to, and these are examples of additional social capital that also can be utilized. Organizations that provide disaster relief should make sure that relief is making it to people with disabilities, that aid sites are accessible to the disabled, and that the disabled are included in reconstruction activities. And of course, several of these experts pointed out that accommodations made for the disabled will benefit everyone, regardless of physical or cognitive ability. We see this in Universal Design specifically, where designers recognize that a space created with the lowest possible barriers to entry and use will benefit everyone, not just the disabled. For example, many senior citizens have experiences similar to physically disabled folks – namely impairments to their personal mobility – whether the former might consider themselves disabled or not (Mitchell & Karr, 2014). The goal here, in Universal Design, is to establish a sort of common denominator where everyone can participate.

Literature Review Summary

In order to better examine and contextualize the Seattle Community Emergency Hubs, it was best to assemble a literature review that draws on sources from a variety of disciplines. It was

important early on to undertake a bit of iconoclasm by rejecting the myth of the solo prepper, as well as the largely fictitious social chaos and panic narratives we commonly attach to disaster stories. Scott James, Samuel Henry Prince, Charles B. Fritz, Rebecca Solnit, and other writers involved in the field of "disaster studies" show us that general panic and hostile tribalism in the face of catastrophe may not be entirely unheard of, but it certainly is not the norm. Indeed, we find that in communities experiencing a real-life disaster, such predicted selfishness and parochialism is greatly eclipsed by altruism and solidarity, even across social divisions.

When a community mobilizes itself in response to a disruption, sociologists like Eric Klinenberg have shown us that social capital and social infrastructure are truly invaluable. The interpersonal relationships and community spaces we experience don't just provide human relationships. The forms of social infrastructure we visit in our everyday lives have a role to play as emergency hubs when disaster strikes. Moreover, authoritative sources proclaim that in an emergency situation, social capital has the capacity to truly save lives. Remember, as Daniel P. Aldrich and Michelle A. Meyer have written, the "actual first responders" don't always come from government agencies – they are often our own neighbors (2015). More generally, social capital and social infrastructure can also support wider community resilience, helping us not just "return to normal" after a disruption, but to replace the status quo with something better.

Finally, in considering writings by Oscar Newman, Gerda R. Wekerle, Carolyn Whitzman, and others who have studied the physical built environment, we should recognize that natural surveillance, universal design, and other spatial features and concepts should be considered when talking about emergency hubs. Having urban spaces that are accessible and inclusive is important not just on normal days, but on days when disaster strikes, especially for those with physical mobility limitations.

CHAPTER 3 – METHODS

- **My Research Question**
- **My Study Area and the Dangers of Ground Liquefaction**
- **Overview of Study Methods**
- **Avoiding Quake Hazards**
- **Considering Physical Accessibility**
- **Hub Site Design Evaluations**
- **Mapping Hub "Walksheds"**
- **Quantifying Social Capital via "Degree Centrality"**
- **Selecting Potential New Hub Sites**

My Research Question

Having defined the Seattle Community Emergency Hubs as the topic of this thesis, and examined some of the literature pertaining to relevant social and design matters, it's time to define the research question, study area, and methods for this thesis project. I'll start with re-stating my research question . . .

In organizing a series of grassroots emergency hubs for community resilience, how can we best utilize local social capital and social infrastructure to make said hubs as safe, accessible, and inclusive as possible?

"Grassroots" is a key term that I have used several times already in the course of this document, but it is important to state it again in my actual research question. I've used it specifically when describing the Seattle Community Emergency Hubs, and I'll use it again in the next chapter when I examine pertinent historical examples of community-based disaster relief efforts. As we explore emergency hubs for Seattle later in my case study, we should remember that these hubs aren't meant to be a top-down program overseen directly by the government, but more of a *bottom-up* program – that is largely *grassroots* – where ordinary community members organize and oversee the hubs directly with minimal official management and assistance. And whereas "grassroots" describes the overarching essence of these emergency hubs, community "resilience" is the overarching objective they seek to accomplish, as these hubs are meant to help the community withstand and recover from a major disruption.

So, if "grassroots" is the essence of the hubs and "resilience" is their objective, then the "social capital" and "social infrastructure" mentioned in my research question – and described conceptually in some detail above – are the actual components that make up the hub system, with social capital being the human components and social infrastructure being the spatial components. And ideally, as my research question entails, it would be beneficial that the spatial components these hubs consist of be "safe" and "accessible," and their social components be as "inclusive as possible." This means that the spatial components, being the specific hub sites, ought to be safe from potential hazards that could cause physical harm, and should be as accessible to as many people as possible regardless of their degree of physical mobility. As for the social components, these being the individuals and organizations involved with the hubs, inclusivity entails that as many people from as many backgrounds as possible are given the opportunity to be involved with the hubs, so that they may contribute to and benefit from a more resilient community.

The study area for examining this research question is laid out to encompass the neighborhoods found in Seattle's South End and West Seattle, and generally aligns with the Southeast (SE) Sector and Southwest (SW) Sector of the Community Emergency Hubs, which has a total of seven sectors throughout the city (Community Emergency Hubs, 2018). My reasoning for selecting these parts of Seattle relate to their geographic features, including the presence of earthquake hazards, which I'll describe next.

My Study Area and the Dangers of Ground Liquefaction

Recall that since our emergency hubs ought to be prepared to respond to the most devastating and unpredictable disaster possible in Seattle, for the purposes of this project we're considering the scenario of a large earthquake. Similar to the concerns that prompted the founding of the Community Emergency Hubs following the snowstorm of 2009, a severe earthquake could damage – or even collapse – the notoriously unsound bridges that span the Duwamish River and connect West Seattle (or the SW Sector) to the rest of the city. Another effect we can expect from a major quake is ground liquefaction. This is when sandy soil, often found in spots in the ground that have been filled in due to the human regrading of the topography (this has been done a lot in Seattle) turns to what local science journalist Sandi Doughton calls "watery slop" (2013). In less severe cases, ground liquefaction might cause roadways to crack and building foundations to shift. In the most extreme cases, the ground might behave quite like quicksand and built structures, vehicles, and other large objects might become partially submerged. The website of the Pacific Northwest Seismic Network

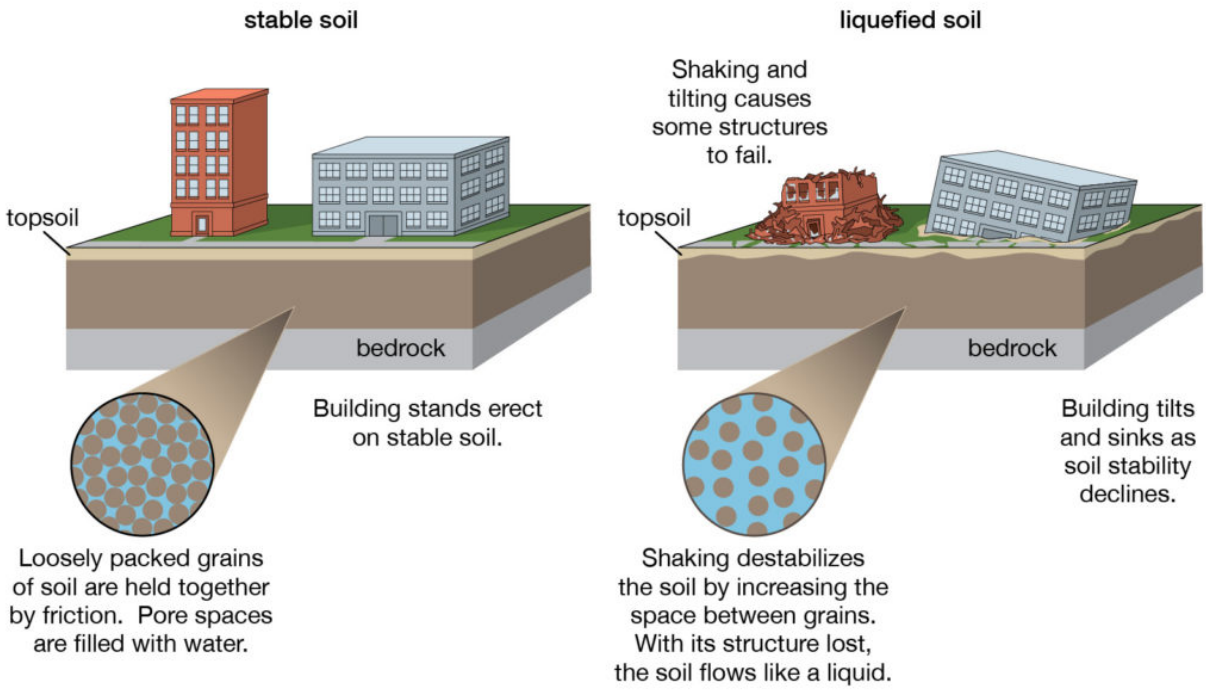


Figure 3.1 – How ground liquefaction occurs and causes damage (*Liquefaction*, 2021).

points out that "Liquefaction and related phenomena have been responsible for tremendous amounts of damage in historical earthquakes around the world" (*Liquefaction*, n.d.). This website also details more descriptively some of the effects of ground liquefaction, including the loss of support underneath the foundations of built structures, stronger lateral seismic forces against retaining walls, and the "flotation" of subsurface components of infrastructure (such as water tanks and sewer pipes) causing them to poke out of the ground, and the lateral spreading of watery sediment.

Thanks to geographic data available from the University of Washington, we know of several large areas in Seattle where such ground liquefaction is a likely quake hazard. These "liquefaction zones" are going to be a significant consideration in this project. The largest ones can be found in what's called the South End (SE Sector) and, to a lesser but still considerable extent, in West Seattle (SW Sector). In mapping these zones, we can see that like in the case of West Seattle and its bridges, the South End might become at least partially cut-off from the rest of Seattle. Not only do these zones run along the Duwamish River between the South End and West Seattle, but they also extend to the area between the South End and the northern remainder of the city. And in the parts of this stretch of land where there aren't liquefaction zones, instead we find the elevated and subterranean

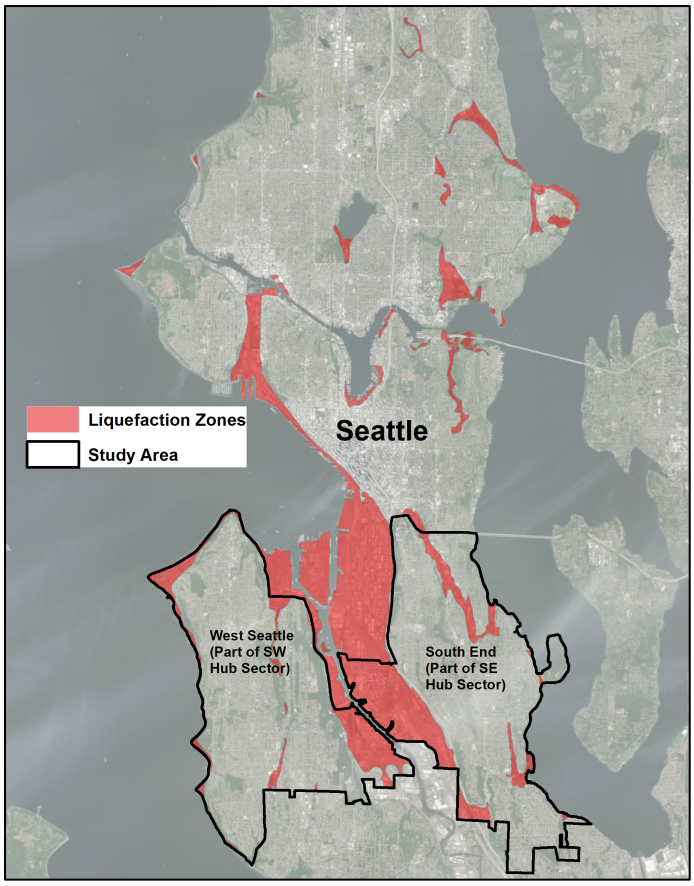


Figure 3.2 – Map of known ground liquefaction zones in Seattle.

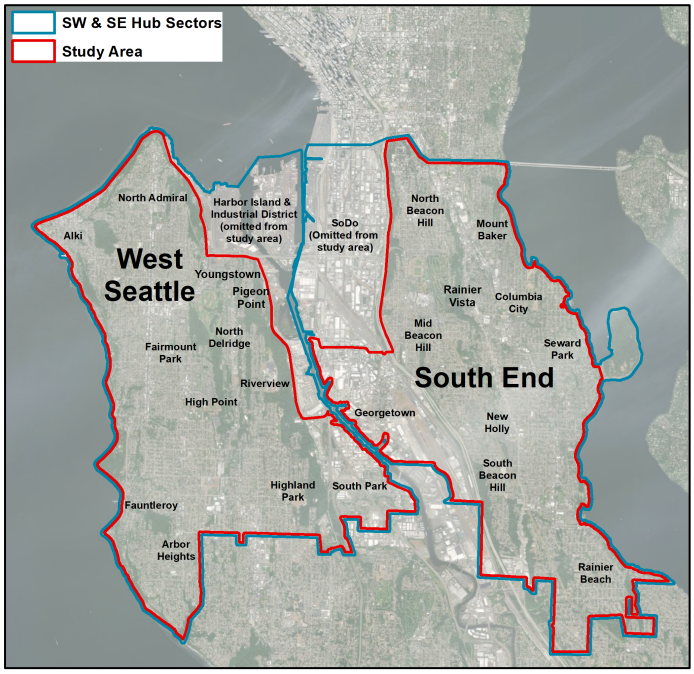


Figure 3.3 – Map of my study area (with neighborhood names mentioned in my case study).

roadways that make up Interstate 5 and Interstate 90. While these pieces of hard infrastructure may not have the same unstable reputation as the West Seattle bridges, it's not unimaginable that a major earthquake would damage them, and a combination of this damage and ground liquefaction might make this area impassable in places. It seems reasonable to say that in the event of a large quake, West Seattle and the South End may become at least somewhat secluded for a time. Because of this potential seclusion, people in these areas may have to exercise a greater degree of self-reliance in their community disaster relief activities. Therefore, it would be ideal for the hubs in these areas to utilize as many suitable forms of social infrastructure and social capital as they can locally source.

In selecting my study area, I recognize that while the South End and West Seattle (or SE Sector and SW Sector) are pertinent areas to focus on, I need not include them in their entirety. It seems that the Community Emergency Hubs would function best in the sort of neighborhoods where people experience both home life AND public life. Someone connected to a particular neighborhood may only reside there and actually work someplace else. Meanwhile, a different individual may

work in the neighborhood, but go home to a different part of the city. Or maybe someone's connection to a neighborhood is recreational activities they attend there, or a cultural institution they're involved with. The point is, a hub will be more valuable to an area if the area in which it's located has a real depth and diversity to its human activities, if it's in a neighborhood where people work *and* play *and* eat *and* sleep *and* so on. This goes back to my literature review, and the idea promoted by Newman, Wekerle, and Whitzman that neighborhoods are safer and more functional if they possess variety in their building uses, and in the human activities which they host. This is why I'll be examining both the South End and West Seattle, but I'll be omitting from my actual study area some sections within these parts that are of a more homogenous appearance and function. These sections include SoDo ("South of Downtown"), Harbor Island, and the Industrial District on the west side of the Duwamish. Because these industrial areas primarily consist of workplaces, but are lacking in private residences and public amenities, it'd be difficult to treat them as fully-fledged communities which could host one of the Community Emergency Hubs. I'll also eliminate the peninsula in Lake Washington that Denny Park occupies, as this large public greenspace doesn't have any homes and businesses, so it's also largely homogenous in appearance and function.

Methods Summary

1. Identify hazards at existing hub sites in study area, and disqualify hazardous hubs from further consideration.

2. Evaluate design features at remaining (non-hazardous) existing hub sites.

3. Map "walksheds" around remaining existing hub sites.

4. Quantify social capital "degree centrality" scores of remaining existing hub sites.

5. Identify potential new hub sites within study area.

6. Evaluate design features of potential new hub sites.

7. Map "walksheds" of remaining existing *and* new potential hub sites.

8. Identify local "steward" organizations to partner with hub sites.

9. Quantify new social capital "degree centrality" scores at combined remaining existing and potential new hubs.

Table 3.1 – Summary of my methods.

Overview of Study Methods

Having now settled on a study area, let's next lay out my methods. Firstly, I'll (1) identify any existing hub sites in the study area that intersect at their location with any of three specific earthquake hazards, these being ground liquefaction zones, overhead electrical power lines, and unreinforced masonry buildings. After identifying and eliminating from further consideration any existing hubs that are located close to said hazards, I'll (2) evaluate the design

features of the remaining existing hubs, using a set of criteria derived from my foundational literature sources, to determine whether they are suitable to continue to act as hubs. As part of these hub site evaluations, I'll also measure the ground slopes on the walkable approaches to the hubs, to see if their gradient is between a zero percent and five percent slope, and therefore is better suitable for individuals with limited mobility. Next, using Geographic Information Systems software, or GIS, I'll (3) map out the 15-minute "walksheds" around the remaining hubs – similar to what Scott James mentioned in in his book – and see what percentage of the study area their combined walkshed coverage areas encompass. Along with this geographic analysis of the existing hubs, I can (4) quantify the connections of social capital they have with other organizations in the community, resulting in a "degree centrality" score for each remaining hub.

Having eliminated unsuitable existing hubs, mapped out the walksheds of the remaining ones, and quantified the social capital they have access to, I can move on to recommending *new* hubs. I should begin by (5) seeing if there are potential sites for new hubs throughout the study area. I should ensure that these potential new hubs aren't close to any of the three quake hazards of ground liquefaction zones, power lines, or unreinforced masonry buildings. I should also (6) run them through the same set of criteria I used in considering the design features and pedestrian approaches to the existing hubs, and seek to find new hubs that fulfill as much of that criteria as possible. I can then (7) add the newly chosen hubs to my GIS map, and see what percentage of the entire study area their new collective walksheds now cover. Finally, in an effort to expand the social capital "degree centrality" scores for the new system of existing *and* potential hubs, I can (8) search for nearby community organizations and institutions that could support their local hub as a partnered "steward," and then (9) recalculate the new "degree centrality" values for the finalized network of hubs to see how much of a theoretical improvement could be made in connecting the hubs to more local social capital.

Avoiding Quake Hazards

As I said in the introduction to this thesis, scholarly articles which examine programs like the Seattle Community Emergency Hubs aren't terribly plentiful. However, one study performed by Alexander de Roode and Ivo Martinac at the KTH Royal Institute of Technology in Stockholm, in which they scour the Hawaiian island of Maui for suitable resilience hub sites, has a similar methodology to mine when it comes to avoiding potential hazards. In their report, de Roode and Martinac write that in the process of "selecting a potential site for developing a resilience hub, it is

critical to assess the potential vulnerabilities and level of exposure to various hazards that a prospective site may be exposed to given its geographic and topographic location" (2020). The report goes on to recommend hub sites on Maui that avoid areas where wildfires, tsunamis, sea level rise, inland and coastal flooding, and coastal erosion are likely to occur. I have done something similar with my own project, but in my case the hazards being considered are all related to earthquakes. These are ground liquefaction zones, overhead power lines, and unreinforced masonry buildings.

Using GIS data available from the Washington State Geospatial Data Archive (WAGDA) at the University of Washington, we can use the software ArcMap to display the locations of the ground liquefaction zones in my study area. Observers present during and after our region's most recent notable quake, the 2001 Nisqually Earthquake, witnessed for themselves some of the real-life results of ground liquefaction, including sinkholes, cracks in paved surfaces, and even geysers of wet mud spewing from the earth (Doughton, 2013). Overall, we can assume that in a major earthquake, perhaps closer to the 8.5 quake that hit San Francisco in 1906 than the more modest 6.8 Nisqually Earthquake, the parts of Seattle built over liquefaction zones will experience greater damage, will be more difficult to traverse as roads and bridges are made impassable, and any emergency hubs placed in these areas could very well be rendered unusable (Hansen & Hansen, 2013). A hub placed at a hardscape plaza within a liquefaction zone could lose the level, paved ground it provides as a quake causes it to buckle and become inundated with water. A hub placed at an enclosed building within a liquefaction zone could lose the use of that building in a quake, as the unstable earth beneath it compromises its foundation and causes it to fall over, or even get sucked down into the ground. Therefore, we should consider these liquefaction zones as exclusionary areas where no hubs should be located.



Figure 3.4 – Washington Gov. Gary Locke inspecting damaged roadway following 2001 Nisqually Earthquake (Vorenberg, 2012).

While ground liquefaction is a major hazard to consider in the placement of these hubs, it is not the only hazard I ought to take into account. There are two others that should be considered: overhead electrical power lines and unreinforced masonry structures. In his personal account of

exploring Europe as a young man, author Bill Bryson writes that in Switzerland they "are great ones for stringing wires," and that when it comes to electrical infrastructure it "seems not to have occurred to them that there might be a more attractive way of arranging things" (1993). I would add not just *attractive*, but *safer* as well. Here too, in the United States, the majority of power distribution wires that provide electricity to our American homes, businesses, public buildings, and industrial facilities can be found above ground, making them vulnerable to falling objects and unstable ground during a natural disaster (Klinenberg, 2015). Some of us might recall from childhood the brochures, videos, and other media from public safety campaigns meant to educate us about the deadly dangers of downed, live power lines. Since we're meant not to be in close proximity to these downed lines for our personal safety, and we want these hubs to be places of safety, it would be unwise to place hubs at a site that lies directly underneath power lines, or sits in close proximity to them.



Figure 3.5 – Electrical power lines running over the Maa Nyei Lai Ndeic P-Patch, part of the reason the existing hub site there was disqualified from further consideration during the course of this study (Stueve, 2020).

According to the Electrical Safety Foundation International, the ground around a downed power line can be energized as far as 35 feet (or a little more than 10 meters) away from it (*Power Lines Safety Tips*, 2015). So not only should these hubs be placed outside of known ground liquefaction zones, but they should be placed at least 35 feet away from power lines as best we can. While the location of liquefaction zones are provided to us in the digital form of GIS data, locating power lines at existing or potential hub sites will require using a different sort of tool. For this, I will use what they call in the US Army the "Mark 1 Eyeball," an item most people come pre-equipped with, having two included in their anatomy. If we look at an existing or potential hub site and see it has no power lines overhead and no power lines within approximately 35 feet of it, or at least the site contains enough space that any overhead or adjacent power lines could be avoided if they come down inside it, then this may indeed be a suitable spot for a hub. If there are power lines above the hub site, or power lines situated immediately adjacent to it, and the site is of a size where physically avoiding these power lines isn't possible, then the hub in question probably shouldn't be placed there and we'd best find another location.

Rounding off this (Un)Holy Trinity of hazards to consider are "unreinforced masonry buildings," which are commonly abbreviated as URMs in official reports. In layman's terms, the designation "URM" basically means "this structure is about 100 years old, made of ancient bricks and mortar, and because of this it will likely collapse on top of you in a major earthquake, so . . . good luck?" (Interestingly enough, I'm writing this thesis while sitting in my very own URM, a historic SRO – single-room occupancy – apartment building in Seattle's Chinatown-International District, in which I rent a unit.) Ironically, this construction style was introduced as a disaster mitigation strategy itself. URMs were meant to be fire-proof alternatives to wooden buildings in the wake of the 1889 Great Seattle Fire, but after realizing the seismic hazard the posed the City of Seattle made the decision in 1977 to prohibit any new URMs being built (Chalana & Wiser, 2013). Just like with the ground liquefaction zones, we got a local taste of how URMs will respond to a seismic event during the 2001 Nisqually Earthquake. A total of 31 buildings in Seattle were marked as unsafe to enter following the quake, having sustained enough damage to require inspection, repairs, and retrofit, and 20 of these happened to be URMs (City of Seattle, 2007). If you were present in Seattle at this time, or at least saw images of the damage on television, one visual that might stand out to you would be large piles of bricks on the street, these having tumbled off of nearby buildings, leaving huge holes in their exteriors. More than likely, this sight was probably the result of a URM giving way to the shaking of the ground, causing damage and falling debris.



Figure 3.6 – An example of some of the damage inflicted on (and by) URMs as part of the 2001 Nisqually Earthquake (KING 5 Staff, 2021).

Seattle locals might think that because the historic Pioneer Square neighborhood is composed largely of brick buildings, and this was where much of the visible damage took place in the 2001 quake, this is where most of Seattle's URMs are concentrated. Although there is such a concentration thereabouts, other large clusters of URMs can be found throughout the city (Fesler, 2017). There are about 1,100 URMs in Seattle – at least counting the ones that *haven't* undergone any seismic retrofitting – including schools, apartments, commercial buildings, retirement homes, and more (Miles, 2017). Additionally, as we can see in a report from the Seattle Department of Construction

and Inspections (SDCI), there is a smattering of URMs in the study area for this thesis (*Unreinforced Masonry Buildings*, 2020). A most useful resource, this report lists every URM in Seattle, gives their addresses, categorizes their current risk and retrofit status, and is about as up-to-date as can be at the time of this writing.

As with ground liquefaction zones and overhead power lines, emergency hubs shouldn't be placed at or adjacent to a site that has one of these precarious URMs. This is somewhat unfortunate, as many URMs also happen to be buildings of historic and cultural importance in Seattle, as they are in many cities throughout the United States. What's more, FEMA has recommended that such meaningful community buildings ought to be utilized as rallying points and gathering areas during a disaster, since they tend to stand out as landmarks anyhow (Chalana & Wiser, 2013). It would seem in one respect that using such buildings as hubs would be beneficial, as many city dwellers might recognize and remember them more easily than other less-notable urban locations, and therefore be more familiar with an emergency hub situated there. Nevertheless, as I'm examining the current hubs and proposing new ones, I should cross-check the hubs' street addresses with those of the URMs using the SDCI report, so I can avoid these hazards the same way I'm avoiding liquefaction zones and power lines.

Considering Physical Accessibility

That concludes the identifying-hazards-around-existing-hubs part of my study methods. We can now move on to the next part: evaluating the design features and pedestrian approaches to the remaining existing hubs, to see whether or not they fulfill our Universal Design considerations. Evaluating how accessible the pedestrian approaches to the hub sites are, in order to determine whether or not people with physical mobility limitations should be able to get to them, can be explained more succinctly, so let's start there. The pedestrian approaches will be defined as the walkable routes which extend out from a hub site, in each direction on which one can travel on foot (or via wheelchair), to the nearest three- or four-way intersection which has no dead-end streets. The reason I'm looking at walkable routes which go from a hub to such a convolutedly described destination is because I'm looking for the veritable "pedestrian crossroads," so to speak, from which one might travel outwards from to reach the hub in question. These pedestrian approaches will consist mainly of sidewalks, but for routes that lack sidewalks I will consider the roadway itself as a pedestrian approach. This is because people should still be able to traverse that surface on foot or via wheelchair if they have need to, even if they may have to share it with motorized vehicles. This may

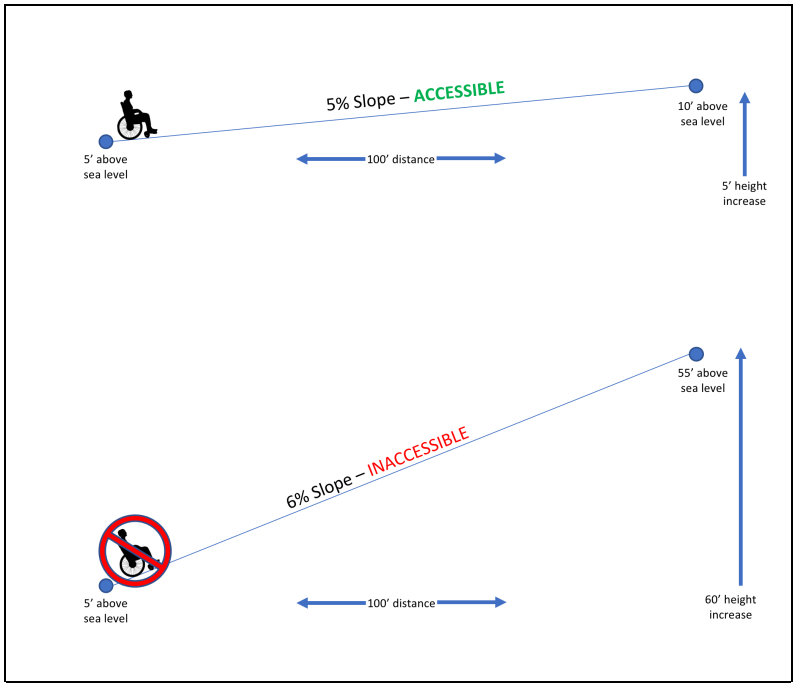


Figure 3.7 – Visualization of an accessible slope versus an inaccessible slope. Remember, for the purposes of this study, a slope that is 5% or less is considered *accessible*. A slope that is steeper than that is considered *inaccessible*, at least from a Universal Design standpoint (U.S. Department of Justice, 2010).

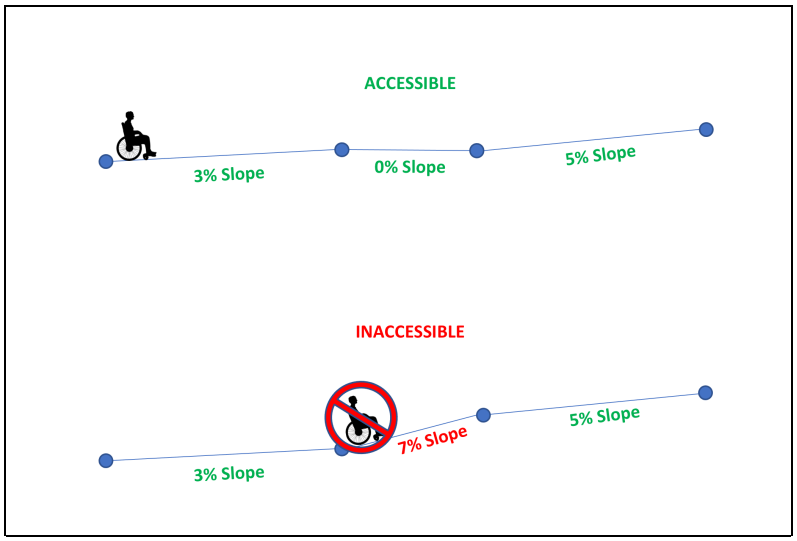


Figure 3.8 – Of course, some pedestrian approaches don't maintain a constant slope along their entire length, and vary in their gradient. In these situations, if even a fraction of a pedestrian approach is steeper than 5% – as demonstrated here – it will be categorized as inaccessible in its entirety.

not be as preferable as an actual sidewalk, but it's not entirely impractical. Because what else are you going to do if you're trying to get to an emergency hub, but there isn't a sidewalk along the road you're using?

I specifically want to see whether or not these pedestrian approaches run along an incline, and whether or not that incline is steeper than five percent. This percentage comes from the specifications outlined in the Americans with Disabilities Act, passed in the United States in 1990 and updated in 2009. According to these rules, "accessible routes" should consist of "walking surfaces with a running slope not steeper than 1:20," which equates to a five percent grade (U.S. Department of Justice, 2010). I can measure the slope percentage for each of our pedestrian approaches using the Google Earth software, with which I'll measure out the length and elevation change in each pedestrian approach, and then use the slope formula where the change in elevation divided by the length of the route (commonly explained as "rise over run")

equals the slope percentage. For instance, if I measure the elevation change along a specific approach as five feet and divide it by its length of 100 feet, I'll get a slope of exactly five percent. If the percentage comes up as a decimal, say 3.33%, then for simplicity's sake I'll round it to the nearest whole number, which would be three percent. Additionally, since some pedestrian approaches vary in the steepness of their gradient, becoming more or less steep along their route to or from the hub site, if only a segment of a route exceeds 5% but the remainder of it doesn't, then that approach too will be considered inaccessible. This may not be a super, super exacting and technical method, but for the purpose of this project it should suffice.

Once I measure out the slope percentages of all the approaches leading to a hub, I can then compile them to get an overall "accessibility percentage." To illustrate, let's say there's a hub site that has four individual approaches, and their slope percentages are zero (completely flat), two, five, and six. This means that three out of the four slopes should be considered adequately accessible to those with mobility limitations, but the one measuring six percent is just a smidge too steep. With three out of four of these routes having an accessible slope, we can consider this hub to be "75% accessible." Now, it would be nice to say I'll only accept existing or (later in this study) potential hubs which meet a minimum required overall accessibility percentage, like 50% or 75%, and any hubs that don't meet that requirement will be disqualified. Unfortunately, this may not be doable. While it would be excellent to only include hub sites with mostly accessible approaches, we should expect situations where the only viable hub site – one which is free of the quake hazards I covered earlier – in a sizable area also happens to have a comparatively low overall accessibility score, as the majority of the routes approaching it are on slopes steeper than five percent. Because of this, while we should try to favor hubs with the highest possible accessibility score, we might have to make exceptions if parts of my study area lack other appropriate sites at which to place a hub. At minimum, hopefully at least one of the approaches to each hub will be accessible for those with limited mobility.



Figure 3.9 – As an example, the hub site at Ercolini Park in West Seattle has three accessible approaches and one inaccessible one, according to my measurements. Therefore, its "accessibility percentage" is 75%. Not bad.

Hub Site Design Evaluations

For my design evaluations of the actual hub sites, I'll use a set of 12 criteria primarily derived from the writings covered in my literature review. The first of the criteria we're checking for is the presence of signage and landmarks, which are important for a couple reasons. Firstly, signs and landmarks can be used to identify a hub site during a disaster. Someone who's involved with a hub, and is hoping to direct more people towards it during a disaster, could use a sign or landmark as a reference point for others. Perhaps they might send out a message runner into the community, who can tell other people to "meet up by the statue in the park" or to "look for the sign for the community center" if they want to get involved with the hub in question. Maybe during their pre-disaster training exercises, hub participants might agree on a sign or landmark at their hub which will act as their initial rallying point, especially if their hub is placed in a larger space like a park or college campus. Some current hub sites even have signs that explicitly identify the existence of a hub there, a bit like fallout shelters during the time of the Cold War.

Design Evaluation Criteria

1. Are there signs or landmarks present at the site (for recognition)?
2. Is the perimeter free of large barriers obstructing – or partially obstructing – sightlines between the hub and the adjacent street?
3. Is there at least 4700 sq ft (or at the very minimum 100 sq ft) of open, level, paved ground on/near hub?
4. Is there an enclosed building onsite that can be utilized?
5. Do nearby residences and businesses overlook the site and provide natural surveillance?
6. Is there a mixture of building types and uses around the site?
7. Does the site offer multiple amenities or forms of programming that can attract a variety of users during everyday life?
8. Is there an adjacent roadway for automobile traffic?
9. Are there adjacent sidewalks?
10. Are there adjacent cycle routes or designated sharelanes?
11. Are there transit stops nearby?
12. Is the interior the site accessible for those with limited physical mobility?

Table 3.2 – Summary of my design evaluation criteria.

The second reason signs and landmarks are important is that they can make people aware of the sites which host emergency hubs prior to any disaster, even if they aren't privy to the hubs themselves. Conspicuous signage and landmarks can make a community space or institution stand out in the larger urban landscape. They also might attract users and visitors to these spaces and institutions that otherwise might just pass them by. For example, a pedestrian walking past a fairly ordinary park might be more likely to stop and explore it if it has a prominently placed piece of

public art to grab their attention. As another example, a local resident with no interest in visiting the community center near their home might change their mind, having spotted some event posters on the community center's notice board that pique their interest. The urbanist Kevin Lynch recognizes the importance of landmarks in his well-known book *The Image of the City*, as they act as navigational points of reference and help define the aesthetic character of urban districts (1960). Going back to CPTED, Oscar Newman points out that public spaces with clearly defined entrances are more appealing to visitors, and signs (and landmarks too) certainly can help in defining a space's entrance (1973). So, if a hub site has signs and landmarks that stand out and identify it, I'll add a point to its final score out of 12.



Figure 3.10 – Signs and landmarks may vary in their appearance, function, and subject matter, with the end the goal being to let people know the site is there (Stueve, 2020).



Figure 3.11 – It's easy to see into the parking lot of Fauntleroy Church from the roadway, so a hub placed there would be easy to spot from the street or sidewalk (Stueve, 2020).

Newman's writings on CPTED also play into the second item in my site design evaluation criteria. This is determining if visual barriers, partially or entirely, obscure sightlines between the hub site and the adjacent street from which people will access it. Simply put, if passersby can see clearly into a public space, they will not only be encouraged to enter into it but will feel safer in doing so (Newman, 1973). If they can't see into the space, then they'll likely be less willing to enter it, and will assume the space is less safe as hidden unknown hazards might be concealed behind the visual

barriers. Of course, Gerda R. Wekerle and Carolyn Whitzman take Newman's CPTED ideas further with their writings on "safe cities," pointing out the benefit of public spaces having a porous and engaging "active edge," which will attract users and display the amenities and activities within the space (1994). These notions of visible accessibility apply for the hubs both as everyday community spaces and institutions, and as emergency hubs during a disaster. A hub with visual barriers along its perimeter will feel less safe and welcoming, both during everyday life and during a disaster scenario. So, if a hub has no barriers obstructing the view from the outside, I'll add another point towards its final design score. If the view is partially, but not entirely, obscured I'll give it half (0.5) a point. If the view into the hub from the street is entirely obscured by some visual barrier, then its resulting score for this item will be zero.

Although the operations of an individual hub will be customized as needed, any hub activity from first aid to radio communications to temporary shelter to water purification will work best if there is some open, paved, and fairly level space available onsite. Such useful hardscapes might come in the form of courtyards, parking lots, athletic courts, or something else along those lines. Wekerle and Whitzman in their "safe cities" writings have recommended that urban public spaces include open areas which can accommodate special events and programs (1994). This recommendation especially applies for public spaces designated to serve as community emergency hubs, as any open areas will prove useful for the relief activities they undertake. Researchers Miho Mazereeuw and Elizabeth Yarina add some other reasons for having open space at emergency hubs. In an article I'll come to later as part of the precedents section of this thesis (concerning potential future technological developments for emergency hubs), Mazereeuw and Yarina point out that during a seismic event having an open space around can help make a very dangerous situation a little safer. Falling debris, collapsing structures, power lines, and the other items that become dangerous in an earthquake are easier to avoid if you can get to a wide, open space, away from those potential hazards (2017). And remember, earthquakes don't just happen and then stop. They can be rather drawn-out affairs. Tremors preceding the main quake and aftershocks afterwards can occur sporadically, so if you and your fellow survivors have found a suitable outdoor space in which to hunker down, why not stick around? The earth's convulsions may have paused, but they could start up again and the threat of falling objects could certainly return.

At minimum, it would be best if a hub has enough flat, open, stable ground to accommodate at minimum a 10-feet-by-10-feet tent awning, or approximately 100 square feet of such space. This would be enough room for a hub to set up their information display boards and, if they have it, radio communications. What would be more advantageous, however, would be to have a level, paved



Figure 3.12 – The Salvation Army Seattle White Center has a parking lot that fulfills a desired space requirement of 4,700 sq ft, and is the site of an existing emergency hub (Stueve, 2020).

space as large as a basketball court. A space of this size, around 4,700 square feet, is sufficient for accommodating about 100 hub participants and whatever disaster relief activities they undertake (Barker, personal communication, August 9th, 2020). It would specifically be ideal for setting up temporary living quarters for those with damaged or destroyed homes, in the form of tents or some other improvised shelter, if this was needed following an earthquake in Seattle. (We'll see examples of this later when I come to the 1906 earthquake and fire in San Francisco). Like with the topic of visual barriers, I'll grade the hubs' quantity of hardscape surfacing using whole points and half points. If a hub has at least 100 square feet of paved, level, open space then I'll award it half (0.5) a point for its final score out of 12. If it has the more advantageous quantity of at least 4,700 square feet, then I'll award it a whole point instead for this part of the site evaluation.



Figure 3.13 – Mixed-use buildings around Hope Lutheran Church provide "natural surveillance" for this existing hub site, and also contribute to a variety of nearby land uses and human activities (Stueve, 2020).

Next on our list of design criteria are buildings. No, not the hazardous, potentially fally-downy URMs, which I will have already accounted for by cross-checking the hub addresses with the list of URM addresses. Because I went through that prior step, any buildings left on my list of existing hubs should be more modern and sturdy. We shouldn't consider

these non-URM buildings as entirely invincible to quake-related harm. A strong enough seismic event can damage or destroy any building, regardless of its engineering or vintage. Still, buildings at hub sites that survive a quake should be considered valuable assets for the work of community disaster relief. Delores Kannas is the "captain" for the hub at Hope Lutheran Church in West Seattle, and has informed me that Hope Lutheran has a plan with the American Red Cross to act as a temporary shelter in the event of a disaster, opening the buildings which house their fellowship hall, kitchen, and elementary school to those in the community who need shelter and support (personal communication, August 21st, 2020). Of course, this is assuming their buildings survive fairly intact. Not only can a building at a hub site provide shelter to those affected, but if it still has water and electrical power after the fact it can utilize those for the good of the community too. So, when it comes to having a non-URM building at the hub sites, I'll treat that as a benefit rather than a liability, and add another point to their final design evaluation score out of 12.

The next item I'll look for in the existing hub sites is the opportunity for "natural surveillance" to take place. This is another concept I'm borrowing from Oscar Newman and his tenets of CPTED (1973). A decade before Newman wrote about this, the urbanist Jane Jacobs coined the term "eyes on the street" (1961). Essentially what both these terms address is that the nearby residents of homes, purveyors of businesses, and members of the general public add to the security and vitality of urban spaces by observing the activities taking place there from the vantage point of nearby buildings. As an example, if a city park has amongst its neighboring structures some commercial buildings whose entrances are oriented towards it, or nearby apartment blocks which have windows that look out over it, Newman and Jacobs theorize that the community members who reside and work in those buildings should feel a real sense of agency over that park. They'll be motivated to visit the park, participate in its programming, and try to ensure that it remains a safe place for everyone. Any single-family homes, multi-unit housing, local businesses, civic institutions, or other buildings overlooking the hubs will create opportunities for this "natural surveillance" or "eyes on the street." Not only will this help promote safety and human activity at these hubs in their non-disaster roles, but it can benefit the hubs during a future disaster. Following a quake, nearby residents and workers are likely to see relief activities being organized over at a hub, and might feel the "social pressure" to go get involved there. So for any of the hubs I'm evaluating, if there are any buildings that look out over the site and provide that natural surveillance, I'll add another point to their final site evaluation score.

Another teaching from both Jacobs and Newman I'm considering here is that urban settings in which there are a mixture of building types and functions tend to be more dynamic, and play host

to more human activity than they would if they were monolithic in these respects. Wekerle and Whitzman seek to promote this idea as well, pointing out that a public space with numerous and varied activities taking place around it will have more people doing more things at more times of the day, and this will increase the human visitorship and "natural surveillance" at that public space (1994). As I already established, more visitors and natural surveillance at a designated hub site during a normal day should equal more public participation at that hub during a disaster. So for the hubs in the study area, if the buildings in the surrounding city blocks are varied in their functions, I'll add another point to their scoring. If the buildings around the hub only have a single role, like they're only residential or only commercial, then they'll miss out on that point.



Figure 3.14 – West Crest Park is an excellent example of a hub site with multiple amenities, as it includes a P-Patch, hiking trails, playgrounds, seating, large grassy lawns, off-leash dog areas, public art, and panoramic views of Seattle and nearby Bellevue (Stueve, 2020).

This recognition of the benefit of diversity in the buildings and activities *surrounding* the hubs also transfers to the amenities and activities found *inside* the hubs. This is something else Wekerle and Whitzman write about, pointing out that just as variety in the external built environment will attract a variety of people at a variety of occasions, variety in the amenities offered within a potential hub site will also attract a variety of people at a variety of occasions (1994). For example, a city park that has a children's playground, an off-leash dog area, and barbecue pits might attract a parent with young children, a retiree who owns a dog, and a large family that decides to gather there for an outdoor potluck. These people, who might otherwise never meet, might socialize with one another at this park and make informal connections with their fellow community members. Our theoretical park's multiple amenities and activities strengthen its value as a piece of social infrastructure, and the social capital that is fostered here should prove beneficial if the surrounding community experiences a disaster in the future. Indeed, its role as social infrastructure makes it a potentially useful site for an emergency hub. Consider, also, the example of a community center that hosts a senior citizen fitness class in the morning, an adult education program in the afternoon, and a youth martial arts event in the evening. Because of this, different

kinds of people who might not have much in common, other than that they live in the surrounding area, all will become familiar with this community center as an important, multifaceted community institution. Like the example of the city park with its assorted amenities, the community center's multifarious activities enhance its ability to act as social infrastructure, and it too might make an excellent emergency hub as a result. Even if visitors to the park and community center only learn to recognize each other's faces, without necessarily learning more personal details about one another, that loosest form of relationship is a foundation that can be built upon for community disaster relief (James, 2017). So, when I look at existing emergency hubs in my study area, I'll add another point to their final score if they host multiple amenities and activities.

An urban space or institution is better suited to serve as an emergency hub if more people who reside in, work in, or just visit the community are personally familiar with its specific site. Having diverse amenities and activities both inside and around the hubs helps with this, but so does having diverse modes of transportation that circulate around it. Even if you never actually visit a hub site pre-disaster, you might spot some of them while travelling around Seattle, thereby becoming at least somewhat familiar with them. Maybe the bus you commute on stops near one of the hubs, or perhaps a cycle route you enjoy on the weekend goes right by one. While the main goal in considering the transportation modes adjacent to the hubs is to account for how transportation makes the hub sites more "visible" to community members, a hub that has more modes of transportation around it might prove more accessible during a disaster. While we can't be certain what routes of travel might still be usable after a quake, it would be helpful to have more than one way of getting to a hub. That way, if one mode of transportation is halted by fallen debris, cracks in the ground, or some other result of seismic activity, people in the affected area can try using another option. So, as I'm scoring the existing hubs, I'll add a point to their final score for each of the transportation modes they're in close proximity to. If there's a roadway next to the hub, I'll add a point for that. If there's a sidewalk or some other pedestrian path that runs alongside the hub, I'll add a point. I'll also add a point if there's a cycle path or designated "shared lane" that passes by the hub. And if there's a transit stop for buses or light rail within a couple blocks of the hub, I'll add a point for that too. In total, a hub can score up to four points in this category, if all four transportation modes are present there.

The final issue we'll consider in evaluating the physical attributes of the hubs is whether or not the interiors of these sites are accessible to those with limited mobility. Earlier I outlined how I'll measure out the actual slope percentages of the external routes leading to the hubs, to determine whether or not we should consider them at least minimally accessible. However, for considering

whether or not the interior areas of the hubs are accessible, we'll be more observational than technical. If a site has a smooth-surfaced transition from the adjacent street, has paved surfaces on which a wheelchair can move, and has ADA ramps to accompany any stairs and grade changes, I'll consider the site's interior to be adequately accessible and add another point to its score. If the site has only unpaved surfaces that would inhibit wheelchair access, like gravel parking lots or dirt paths or grass lawns, and lacks any accessibility accommodations with which to overcome those obstacles, I won't award it that point for interior accessibility. It should be mentioned that while I'm looking at the outdoor areas and any building entrances found at the hubs for this part, I won't be looking at the actual interiors of any buildings. Since they are legally required to conform to ADA standards, I will assume accommodations for those with mobility issues have already been made.

Just like with the hubs' accessibility percentages for their pedestrian approaches, at first it seems appropriate to require a minimum number of points (out of 12) on a hub's design evaluation for it to be included in the Seattle Community Emergency Hubs. However, this too would create a situation where I disqualify existing and potential hub sites in parts of our study area for not scoring high enough, but find that there just aren't any suitable alternative sites in that same area. So just like with the site accessibility percentages, I'll try to include as many hubs as possible that score high on their site evaluations; but if I find that part of my study area just doesn't have a lot of options for hub sites, then we'll have to work with what's there and include hubs with a lower site evaluation score. While we want a system of hubs that are as accessible, visible, and useful as possible, it's not like we can magically conjure up the perfect hub site where there isn't one. However, if I see a spot close to an existing hub that might make for a more suitable site, I ought to consider it and see how it measures up as an alternative. Either way, we're just going to have to work with what we got.



Figure 3.15 – The Colman Park P-Patch was disqualified later in this study, largely because its uneven terrain with physical obstacles makes it quite inaccessible to people with impaired mobility (Stueve, 2020).

Mapping Hub "Walksheds"

Now, let's move on in describing my methods, from evaluating the existing hubs to mapping out their walksheds. Ideally, emergency hubs in Seattle should be placed not only to avoid the hazards of ground liquefaction zones, power lines, and URMs, but to provide optimal geographic coverage so that a hub can be reached within a 15-minute walk from anywhere in the city, or at least in my specific study area. I may not be able to provide complete coverage of this sort, but we can certainly see how far we can get in my attempts to do so. For this, I'll return to the same GIS I used to map liquefaction zones – ArcMap – and map out the hubs in my study area on Seattle's street grid. I can then use this software to establish "walksheds" around each hub, similar to what Scott James advises in his book on community disaster preparation (2017). "Walkshed" is also a term found in transportation planning, where it is defined as the radius of convenient access around a transit stop. If a potential transit rider finds themself within that radius, they are more likely to hop on the bus or train that services that stop, rather than use some other mode of getting around. In most cases, transportation planners consider this radius to be 400 meters, which is comparable to about 1,300 feet, or five minutes of walking time (Daniels & Mulley, 2013). Since the extraordinary conditions of a disaster in Seattle might prompt people to walk further than five minutes in order to find and obtain something they needed, it seems sensible to map these walksheds out to 3,900 feet (about 1,200 meters) which would be about 15 minutes walking time.

In ArcMap, I can map out the 15-minute walksheds using the Network Analyst tool of that software. This will calculate how far 3,900 feet measures out from each existing hub, running along Seattle's streets and pedestrian paths, and will visually generate a 15-minute walkshed for each of them. Merged together, these walksheds can model the wider area of walkshed coverage for the hubs. A home, business, public building, or some other item found within this larger coverage area will theoretically be within a 15-minute walk from a hub, one way or another. The one drawback from using this method is that it will ignore Seattle's topography. While I can make sure we're sticking to Seattle's street grid as I calculate out 3,900 feet from the hubs, adhering to actual walkable routes and not just drawing something arbitrary, this measurement will act as a horizontal line instead of one that goes up and down Seattle's many hills. Unfortunately, while ArcMap as a software is the professional standard for GIS work, this is one of its limitations. Another one of its software tools can easily show changes in the topography, but after spending numerous hours experimenting with ArcMap it appears that there is no way to combine topographical changes with the street grid as part of the Network Analyst calculation. So, while having this flaw, my method of mapping the coverage

area will have to suffice as it is. Because of the uneven geographic distribution of the existing hubs, and the fact that we'll have eliminated hubs which could be affected by ground liquefaction, power lines, and URMs, there are sure to be gaps in the walkshed coverage of my study area. Later, I'll specifically be looking for potential hub sites to expand the walkshed coverage area, and hopefully reduce any coverage gaps as best I can.

Of course, the design features and geographic placement of the hubs aren't the only aspects we'll be examining. Remember that these hub sites also function as everyday pieces of social infrastructure, and are therefore linked to sources of social capital in the community. Some sites, like parks, can act as social infrastructure while not having a formalized onsite form of social capital. Other hub have a formalized institution on site, and such social capital is a resource the hub participants can utilize, both during pre-disaster preparation activities and when disaster actually strikes. A hub located at a place of worship might find social capital in the congregants who attend its services. A hub located at a neighborhood clubhouse might derive social capital from the local residents involved with it. And in some cases, volunteers connected to an emergency hub are also involved with the separate onsite organization present there. To give an example, some participants volunteering at a hub based at a church might also happen to worship there on Sundays (D. Kannas, personal communication, August 21st, 2020). Or the participants of a hub located at a neighborhood clubhouse might also be members of that same clubhouse (R. Angeles, personal communication, August 20th, 2020). And while the connections between one hub and the rest of the hubs might be strong or weak, as only some hubs currently communicate with each other via radio and collaborate during trainings and exercises (and some unfortunately don't), a source of social capital at one hub might be utilized in turn by the other hubs.

Quantifying Social Capital via "Degree Centrality"

For quantifying the forms of social capital connected to existing hubs (and for potential new hubs I later identify) I'll be using a concept called "degree centrality" and a software called Gephi. Remember how I said about 35 pages back that it's hard to put a dollar value on social capital? Well, it turns out that we can use "degree centrality" as a means for assigning value to social capital instead. In the general context of a network model, "degree centrality" is the number of vertices that connect to a particular node or, in the case of human social networks, the quantity of social connections a person or organization is linked to (Hansen, Shneiderman, & Smith, 2011). As an example, we can say a hub that is linked via radio to ten other hubs, and also has a relationship with

the congregation at the church where it is located, and which cooperates with a local neighborhood social club has a degree centrality of 12 (10 other hubs + 1 church congregation + 1 neighborhood social club = 12 forms of social capital). The software Gephi can be used to visually model a network of connections using "nodes" (which in our case are hubs and any external entities they cooperate with) and vertices referred to as "edges" (the relationships connecting the hubs and other entities).

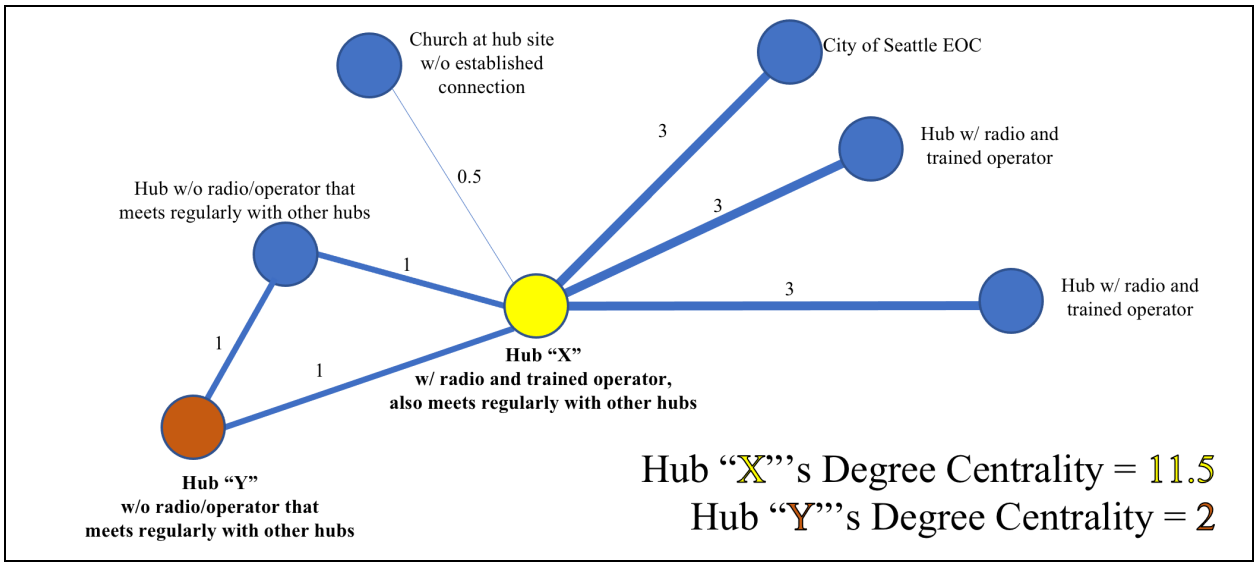


Figure 3.16 – A visual example of "degree centrality" calculations, using the imaginary hubs "X" and "Y" and their theoretical connections – symbolized by "weighted" vertices – to other hubs and organizations.

Currently, some relationships hubs have with outside groups and with other hubs are stronger than others. In order to demonstrate the varying strengths of said relationships, I'll add some fractional "weights" to the vertices in my model to show how some current connections amongst hubs and their community partners are stronger, while others are weaker. If I can confirm that direct cooperation takes place between a hub and another hub or an outside entity, I'll give the vertices showing this connection in the Gephi model a weight of one. In some cases, volunteers at existing hubs have made overtures to as-yet-unassociated external organizations, usually ones at or adjacent to their designated site, with the hope they might undertake closer cooperation in the future. For these potential future connections, I will assign the vertices symbolizing them a halved weight (0.5). As previously mentioned, some hubs are equipped with a radio with which to communicate with a City of Seattle EOC (Emergency Operations Center) and other radio-equipped hubs. These communication links should prove valuable in a disaster scenario, but as of right now not every hub has a radio, and not every hub with a radio has volunteers who are trained at using it (Barker, personal communication, August 10th, 2020). So, if a hub has a radio but no one to operate it, I'll add

an additional weight value of one to the vertices modelling their connections to other hubs, bringing the total weight of those vertices to two. If a hub has a radio *and* someone who knows how to operate it, I'll add an additional weight value of two, bringing the total vertices weight to three and demonstrating that this hub has stronger connections with other radio-equipped hubs.

Selecting Potential New Hub Sites

Okay, so everything you've read thus far in the methods section has been in regards to the *existing* geographic, design, and social aspects of the hubs in the study area, as they currently are. Now, I'm going to focus for the rest of this section on how we can select new *potential* hubs to augment the existing ones, whereby we can expand the hubs' overall "walkshed" coverage area to include as much of the study area as possible, and also increase the "degree centrality" scores of individual hubs by connecting them to additional forms of local social capital. Having already run the eligible existing hubs through the Network Analyst function in ArcMap, in order to display the aforementioned combined walkshed coverage area, I can visually identify any gaps that exist in that coverage and set about in finding potential new hubs in or around those gaps. I'll do so by physically walking around and scouring these parts of Seattle in person, and exploring them virtually via the Google Maps website.

The geographic layout of the liquefaction zones in the study area is going to be an obstacle to work around as I consider where to look for potential new hub sites. Not only do these zones threaten to create physical obstructions that divide portions of the study area, but they actually threaten entire neighborhoods therein. The largest liquefaction zone in Seattle encompasses practically all of Georgetown and most of South Park, neighborhoods situated in the South End (SE Sector) and West Seattle (SW Sector), respectively, and are just across the Duwamish River from one another. Regrettably, if I'm going to adhere to my project guidelines and not place any hubs in liquefaction zones, this means I can't place a new hub almost *anywhere* in Georgetown and South Park. I might be able to propose new hubs along the periphery of Georgetown and South Park, just outside the liquefaction zone, so that their walksheds might at least partially extend into those areas. Still, I can tell already that it's probably impossible to give this entire section of the city the hub walkshed coverage I'm hoping to achieve.

Next, I'll be in the process of looking for potential new hubs in and around the walkshed gaps, but outside the ground liquefaction zones. Once I've located a potential hub site, I need to

visually check to see if there are power lines running over or adjacent to – ideally not within 35 feet – this site. If there are power lines situated as such, I won't consider the site any further (but I might make an exception if the site is so large that the power lines can be safely avoided). If the site passes that test, I'll cross-check the site's street address with the address list of URMs. I can also judge from the street addresses of URMs which of these troublesome buildings may not be on the actual site, but may sit directly adjacent to the site and still pose a hazard. If the site is free of liquefaction zones, power lines, and on-site/adjacent URMs, then I'll calculate the slope percentages of the pedestrian approaches that connect to it, measuring out along streets and sidewalks from the site to the nearest three- or four-way intersection which has no dead-end streets, and calculating their combined accessibility percentage. Of course, I should do my best to find sites with the highest possible accessibility percentage, but we can settle for a site with just one completely accessible approach, if that's all we can get in a particular part of the study area. I can then evaluate its design using the same 12 criteria I used to judge the existing hubs. I ought to select potential new sites that fulfill as many of the 12 criteria as possible. However, if an area in which I'm searching only has sites that fulfill just a fraction of these 12 criteria, and there are no higher-scoring sites nearby, I may just have to settle for including it anyway.

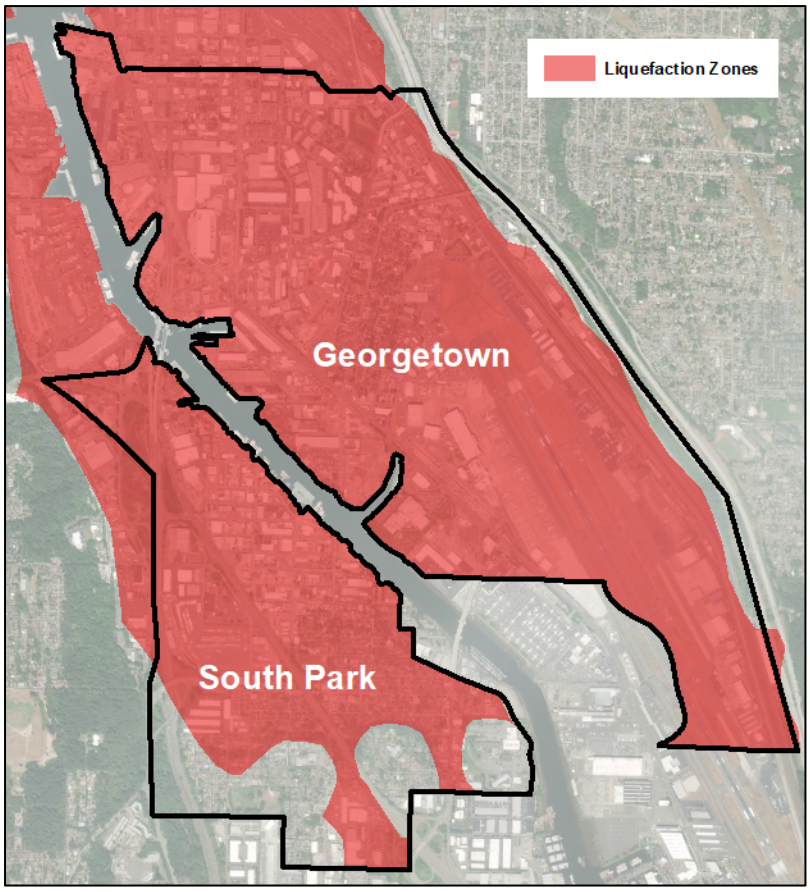


Figure 3.17 – Ground liquefaction zones in Georgetown and South Park.

Having selected new potential hub sites that avoid potential hazards, are as accessible as possible, and hopefully fulfill most of my 12 design criteria, I can add them to my GIS map in ArcMap, and re-run the Network Analyst function on the combined set of remaining existing and potential new hubs to map out a new combined walkshed coverage

area. The objective here is to see if we can cover as much of the study area as possible with the new combined walksheds. Unfortunately, due to the large ground liquefaction zones in the areas of Georgetown, South Park, and Alki, we can already see that we likely won't be able to include much of those parts in the walksheds, since I can't place hubs in those liquefaction zones. That being said, I can still try to cover as much of the remaining study areas as possible with the walksheds of the combined existing and potential hubs, doing my best to make sure that any spot outside the liquefaction zones is theoretically within a 15-minute walk of a hub.

Regarding social capital, we've already talked a bit about while some existing and potential hubs have a potential onsite partner organization with which to collaborate, other existing and potential hubs don't have this. An example of the latter could be a park or parking lot, which likely lacks any sort of community institution associated with it. In order to expand the links to local social capital the entire hub system can draw from, but specifically to help hub sites with no onsite partners, I can identify organizations in the surrounding area which might act as additional "stewards" for hub sites. While she used different terminology, establishing partnerships between hubs and local community groups was another specific recommendation Kristin Baja of the Urban Sustainability Directors Network included in her White Paper (2018). Connecting these external steward organizations, which might include schools, volunteer groups, religious congregations, ethnoracial cultural organizations, charities, community centers, and so on, with hub sites accomplishes a few things. Obviously, they can provide additional people and resources to support the Seattle Community Emergency Hubs. In a rapidly changing city like Seattle where people are moving in, moving out of, and moving around, some individuals that might enroll as hub participants might have to later discontinue their involvement, as the circumstances of their lives change (Barker, August 7th, 2020). Connecting hubs to established "steward" organizations in the community, some of which have been in existence for decades, will afford them a more consistent source of social capital that can help anchor them in place as hub participants come and go. And of course, connecting the hubs to more community organizations will expand the quantities of social capital they can draw from, and I can demonstrate this by adding nodes, re-drawing vertices, and re-calculating degree centrality values using Gephi.

As I'm hoping for a future situation where all hubs and offsite partners engage fully with one another and cooperate closely, I'll "weigh" the vertices on my Gephi model a little differently this time around. In an ideal situation, where we wouldn't have any hubs or stewards which are only loosely affiliated with one another, and all these relationships well-established, we shouldn't expect to weigh any vertices as 0.5 (which I did previously for any less developed connections in the

existing hub network). Any vertices in this phase should have a minimum weight of one. I'm also assuming in this future ideal situation not only are hubs closely working with other hubs and with stewards, but that every hub has a radio and its participants are trained on how to use it. Following what I did in my earlier Gephi modelling, vertices connecting hubs to other hubs will have a total weight of three (one plus the additional weight of two for a radio and radio training). With these stronger connections amongst the hubs, and with their expanded local sources of social capital, we should expect higher scores of degree centrality for the hubs in our new-and-improved network, symbolizing their greater level of integration with the surrounding community.

As to selecting these steward organizations (which I'll simply refer to as "stewards" hereafter for the sake of brevity), there's a couple things we're going to keep an eye out for that should make a potential steward more useful as a partner organization for the Seattle Community Emergency Hubs. One primary characteristic I'm looking for in a steward is that the social capital it can contribute is largely, shall we say, locally sourced. The student bodies of public schools, for instance, consist of young people who reside in a localized "attendance area" around their place of learning. Many schools also have a democratically elected Associated Student Body (ASB) leadership council, as well as a Parent Teacher Association (PTA) made up of civic-minded educators and guardians. So ASBs, PTAs, and public schools in general (with the exception of any school distract employees that reside further afield), can be seen as locally sourced forms of social capital. Therefore, a public school should make a suitable steward for a hub, whether that hub is on the school property or located nearby in the neighborhood. We should also consider volunteer groups, fraternal societies, neighborhood associations, ethnoracial cultural centers and support agencies, religious organizations, and other civic entities as suitable stewards. The key is that they are both physically located in the study area *and* tap into social capital that is truly local.

Speaking of religious organizations, I should address *why* I'm considering them as potential stewards to partner with the Seattle Community Emergency Hubs. Indeed, there are already a number of hubs located at churches, but religion can be a point of contention for a lot of people, especially in a strongly secular city like Seattle. Some might be concerned that if faith groups play an active role in the hubs program, disagreements might arise surrounding religious differences. Perhaps arguments could arise over religious beliefs at the hubs, as different people from different faiths interact and stumble upon dogmatic points of difference. Others might worry that faith groups will treat their involvement as an opportunity to proselytize at the hubs, with the expectation that others will convert to their respective religion. It is well known that some religions – Evangelical Christians, Jehovah's Witnesses, and Mormons in particular – have missionary outreach programs that seem rather

enthusiastic, or even aggressive. Another concern could be that having religious institutions involved at the hubs might inadvertently discourage non-religious people, who may thereby feel like they possess less agency at the hubs, from also getting involved. Or maybe people of a more specific demographic identity, like homosexuals and transexuals, might be dissuaded from attending a hub with a religious steward, as religious teachings have been used time and again to justify homophobia, transphobia, and other forms of bigotry.

These are all valid concerns, but at the same time there are valid benefits to be had by inviting religious groups to get involved as hub stewards. In my conversations with her, Cindi Barker described how a future goal of the Seattle Community Emergency Hubs is to reach out to ethnoracial minorities, enlist additional participation from them, and achieve a higher degree of multiculturalism in the hub program (personal communication, August 7th, 2020). Many of the faith institutions in my study area specifically serve the ethnoracial minorities which Cindi and her fellows hope to connect with. We see this in many of the names of many local places of worship, with monikers like Samoan Community Church, Sephardic Bikur Holim Congregation, Iglesia Adventista del Séptimo Día White Center, Our Lady of Zarvanycia Ukrainian Greek Catholic Church, and Wat Lao Dhammacetiyaram. Along with the diverse student bodies of local public schools, and ethnoracial cultural centers and support agencies with names like Horn of Africa Services and El Centro De La Raza, the minority religious congregations of the study area offer the Seattle Community Emergency Hubs an opportunity to embrace a more deliberate degree of multiculturalism. Considering them as stewards will help the hubs to tap into local diversity, and offer minorities greater opportunities to get involved.

As the hubs in the study area currently stand, the religious organizations involved consist only of four Christian churches and a single Buddhist center. (We also might consider the hub at Providence Mount St. Vincent, which is a Catholic retirement home, but there doesn't currently seem to be any active cooperation between the hub and that establishment, other than using their parking lot for a hub site.) This is hardly representative of the rich religious landscape of these parts of Seattle, especially around the wonderfully diverse South End. Greater involvement by faith communities at the Seattle Community Emergency Hubs can make it more religiously inclusive – and therefore more multicultural – giving Jews, Muslims, Christian Scientists, Mormons, Jehovah's Witnesses, practitioners of Iglesia ni Cristo, and others the opportunity to get involved. Additionally, urban religious congregations commonly display a strong ethos of charity and social justice. Many work to serve and advocate on behalf of the vulnerable in their communities, and do so whether or not those vulnerable are of the same faith. In exploring which religious institutions to serve as

stewards, I can take a look at their website to see what their community involvement looks like, and try to select congregations who are active in helping their neighbors. Such community-minded stewards should make useful partners for emergency hubs.

Although people of differing belief systems can respectfully and amiable coexist with one another in a pluralistic urban society – as they do in Seattle – the possibility of disagreement and hostility between hub participants and steward groups over religious differences is not entirely impossible. Although not entirely preventable, we might reduce the opportunities for conflict a few different ways. The Seattle Community Emergency Hubs might establish amongst its religious partners a set of norms to promote civility and to prevent unwanted proselytizing. In addition, as I pair hub sites with off-site stewards, we should bear in mind the American civic norm of "separation of church and state," and avoid assigning a religious congregation as a steward for a hub based at a public school, or assigning the ASB or PTA of a public school as the steward of a house of worship.

Since we've talked about what local organizations would make suitable hub stewards, there are some kinds of organizations that might seem useful at first but may not have the community connections we're looking for. Since the hub program is meant to be primarily a grassroots organization, operating with minimal government support and oversight, I won't be considering public agencies as potential stewards. Part of this is to maintain the grassroots identity of the Seattle Community Emergency Hubs, but also because (again) during a disaster the government agencies involved in relief and recovery will be following their own contingency plans. These plans are entirely separate from the plans of the hub program, and while the hubs and local authorities collaborate on training events and radio communications, the hubs still primarily lie outside the purview of any public agency (Barker, personal communication, August 7th, 2020). The hubs are meant to utilize the skills, social connections, and other resources held by private citizens out in the community. They aren't meant to be fully integrated and in lock step with municipal authorities. Moreover, even though there are several facilities operated by the Seattle Housing Authority and Seattle Parks and Recreation in the study area, we can't assume that the civil servants employed there also reside in the study area. They might commute from outside Seattle, and thereby lack the knowledge of, social connections with, and personal investment in the local community that an actual resident would have. During an actual disaster they might be required to work in Seattle as part of the official government response efforts, or they might just try to get home to Kent, Issaquah, Federal Way, or wherever else they commute from. Either way, it's less likely they'll be able to be present at the hubs during a disaster scenario.

For similar reasons, though they do perform valuable work, I won't automatically include as hub stewards every non-profit non-governmental organization (NGO) that works in local social justice, neighborhood activities, and community development. NGOs with names like West Seattle Junction Association, Highland Park Improvement Club, and Rainier Beach Action Coalition make a stronger case for themselves as hub stewards, since they're work is tied directly to a specific part of Seattle. I'll also keep a look out for community-based organizations that perform a variety of activities, instead of ones with just a singular role (such as employment centers or food banks), as the former should be more capable and adaptable. Similar to government employees, the staff at many larger NGOs that have multiple offices throughout western Washington, like Catholic Community Services and WorkSource, might not actually reside in the area. Furthermore, since such organizations won't have the same hyperlocal focus as others, it seems they have less to offer when compared to more localized organizations, and probably wouldn't be as effective as hub stewards.

The goal of this lengthy set of methods, in seeking to answer my research question, is to see how the Community Emergency Hubs in West Seattle and the South End can fully benefit from the social infrastructure and capital found in those areas. Now, in our upcoming set of precedent studies, we'll get into some historical examples that demonstrate the real value of organizing local residents, harnessing social capital, and adapting social infrastructure for relief activities along the same lines as the Seattle Community Emergency Hubs during an urban disaster.

CHAPTER 4 – PRECEDENT STUDIES

- **The Great San Francisco Earthquake and Fire – 1906**
- **The Halifax Explosion – 1917**
- **The Chicago Heat Wave – 1995**
- **Hurricane Sandy in Rockaway – 2012**
- **PREPHubs – The shape of things to come . . .**

The Great San Francisco Earthquake and Fire – 1906

As an earthquake is the disaster scenario which I'm considering in this examination of the Seattle Community Emergency Hubs, it makes sense to consider adaptations of social infrastructure that resulted during one of our nation's most famous earthquakes. This is the one that hit San Francisco in 1906. At 5:12 AM on April 18th of that year, a smaller initial quake measuring 4.0 on the Richter scale jostled San Francisco for 25 seconds (Hansen & Hansen, 2013). Not bad, but that was the easy bit.



Figure 4.1 – Massive fires engulf San Francisco following the earthquake (Taylor, 2016).

Half a minute later the ground shook again, this time with a massive 8.5 quake that lasted an entire terrifying 60 seconds, and could be felt as far away as Los Angeles, Oregon, and Nevada (Hansen & Hansen, 2013). Numerous brick buildings in the city collapsed, killing an estimated 3,000 people and trapping still-living survivors underneath rubble (Solnit, 2009). No structure in the city went undamaged by this massive seismic event, but the destruction was only just getting started. About 30 fires broke out, spreading and growing until the massive infernos engulfed 490 city blocks, consumed about 25,000 buildings, and caused trillions of dollars worth of damage in today's currency (Hansen & Hansen, 2013). The fires grew to be so massive that they created actual drafts of wind by hungrily sucking in more oxygen, and these fiery urban spectacles wouldn't be matched in scale and ferocity until modern militaries surpassed them with aerial bombardment campaigns later in the century (Solnit, 2009). The blazes lasted for days, and while local firefighters and volunteers worked heroically to combat them, they only really subsided once every possible source of fuel was consumed (Hansen & Hansen, 2013).

The writer Jack London was living with his wife some 40 miles from San Francisco when the quake struck. He went to go see its effects for himself, and later documented his astounded impressions of the scene in a news periodical. "San Francisco is gone. Nothing remains of it but memories and a fringe of dwelling-houses on its outskirts. Its industrial section is wiped out. Its business section is wiped out. Its social and residential section is wiped out" (*Jack London and the Great Earthquake and Fire*, n.d.). But in the midst of this near-apocalyptic devastation, San Franciscans set to work setting up their own "alternative city," a project they would organize and undertake of their own accord (Allan & Bryant, 2011). What they managed to create resembles what the participants in the Seattle Community Emergency Hubs might seek to create if they found themselves in a similarly disastrous situation.

Needless to say, thousands and thousands of local residents had lost their homes and businesses in the quake and fires. With these privately-owned buildings gone, they began to assemble makeshift shelters in San Francisco's public spaces. They started by congregating in local parks, plazas, and wider streets to be safe from falling debris, as well as to exchange information with one another and experience a stronger sense of security amongst other people (Allan & Bryant, 2011). Many picked open spaces and streetscapes that were close to their wrecked homes, which they must have already been familiar with from their everyday lives. A multitude of others set themselves up in the 1,000-acre Golden Gate Park, which would develop into what was essentially a fully functioning displaced persons camp (Solnit 2009). With their homes gone, these unhoused individuals and families would have to come up with some form of shelter. They began to erect "earthquake shacks"

using whatever objects were available, from sheets of cloth to park bunches to even the city's iconic cable cars, to create entire neighborhoods worth of temporary homes (Hansen & Hansen, 2013).



Figure 4.2 – "San Francisco is gone," Jack London wrote after viewing the devastation firsthand (Taylor, 2016).

The enterprising San Franciscans set up not only makeshift housing in their "alternative city." They did something similar with the commercial establishments they had lost in the quake and fire, including restaurants. With many having their own kitchens and cooking implements buried under the rubble, San Franciscans demonstrated an impressive degree of adaptability and altruism, improvising stoves and cooking pots from whatever items they could get a hold of, and sharing their food with one another (Solnit, 2009). The preparation and consumption of food became an open-air and communal activity, and these camping-style meals in San Francisco's streets and public spaces would soon evolve into ad hoc restaurants, dubbed "tent cafés," complete with names and menus (Hansen & Hansen, 2013). At one such spot, a certain Hoffman Café that had existed before the disaster, but had been made defunct by it, was resurrected as a tent café in the adjacent street and carried on its business as before. Additionally, and importantly, these interim establishments not only provided a source of food, but a sense of community as they became places to socialize and share news. They created, as Eric Klinenberg would have called them, features of *s*ocial infrastructure at



Figure 4.3 – The resurrected Hoffman Café (Hansen & Hansen, 2013).

which social capital could be fostered and cultivated (2018). Beyond tent cafés, other businesses and facilities were erected in temporary outdoor form, including barber shops and hospitals (Hansen & Hansen, 2013).

While public authorities would certainly perform their own herculean efforts to keep San Francisco fed and sheltered post-disaster, activities of a humanitarian nature didn't seem to be their initial main priority. Some 1,500 troops from state guard and militia units arrived in San Francisco by noon on the day of the quake, and more military personnel arrived later as time went by (Hansen & Hansen, 2013). Under the leadership of Gen. Frederick Funston, they acted as if they had the city under martial law, being concerned that widespread looting and chaos would give them reason to suppress the local populace. In *A Paradise Built in Hell*, Rebecca Solnit recounts how suspected looters were summarily shot by soldiers in the streets, guilty or not, but actual acts of theft and violence were miniscule in the big scheme of things (2009). The genuine compassion and mutual support San Franciscans showed each other totally eclipsed any misdeeds done by an inconsequential minority of their number. Nevertheless, Funston's troops undertook their draconian mission with the explicit support of Eugene Schmitz, mayor of San Francisco, who released a proclamation authorizing them to kill his own constituents suspected of criminal activity. Solnit uses all this as an object lesson on the fallacy of "elite panic," a notion commonly held by those in power that the common folk will turn to uncivilized barbarism in a disaster, and authorities will have to act to subdue and re-civilize them (2009). As I have established in my literature review, consulting such experts as Samuel Henry Prince and Charles E. Fritz, the exact opposite has proven to be true. We see this truth in San Francisco in 1906, as we have seen this truth in other disasters across the globe and across history. In the inevitable future earthquake that will someday strike Seattle, we can dare to be confident that its citizens will uphold that same truth here as well, and the Community Emergency Hubs can play a key role in that.

While the military was needlessly harsh towards the people of San Francisco, it also brought massive amounts of relief supplies to the city that would otherwise not have been available. They made arrangements to ship in rations for 100,000 people, they brought in clean water by the boatload,

and practically every tent in the inventory of the armed forces was sent to San Francisco (Hansen & Hansen, 2013). They also divided the city into manageable sections, and set up relief distribution centers in each of them. Although the military's logistical mobilization of supplies was certainly heroic, it should be mentioned that of the over 100 locals survivor encampments (which contained about 50,000 people total), only 21 of these camps fell under military supervision (Allan & Bryant, 2011). The rest were left to be independently operated by local residents. Overall, when it came to organizing community disaster relief, the people of San Francisco had most of it covered without needing guidance from the authorities.

So, what lessons can we draw from the 1906 San Francisco earthquake and fire that apply to the modern-day subject of the Seattle Community Emergency Hubs? Firstly, public spaces are obvious settings at which to organize community relief activities, from aid distribution to temporary housing to food preparation. Additionally, locals who are affected by a disaster will most likely already be familiar with several public spaces in their community. Maybe there's a city park near their home with a playground that stands out. Or perhaps there's a large parking lot they know about behind their local library. There also could be a plaza they pass by during their commute which becomes quite popular when the weather is nice. In a disaster, these spots can become places where people congregate, set up temporary shelter, exchange information and supplies, and support one another in order to get through a difficult time. If the emergency hubs in Seattle's South End and West Seattle specifically make use of well known, easily visible public spaces, then they will be better situated to assist and mobilize their community after a quake hits.

What is inspiring – though certainly not unexpected – about San Francisco in 1906 is that its citizenry immediately and spontaneously self-mobilized and self-organized in the aftermath of the quake and fires. They took charge of their own disaster recovery. This reminds us of Samuel Henry Prince's lesson from the 1917 Halifax explosion: upon experiencing harm, a body of humans will set about healing themselves in the same way a human body can heal itself after an injury (1920). And while the San Franciscans were wonderfully effective in their self-recovery, imagine what they could have done if they had proactively prepared beforehand. What if they had mapped out emergency hubs in their community, organized a human network to accompany them, and actively practiced disaster relief activities in anticipation of future emergencies? Well, with the physical sites, social connections, and active preparations that are all part of the Seattle Community Emergency Hubs, it would seem Seattle should be able to harness the human potential of its citizenry far more quickly and effectively when disaster strikes here.



Figure 4.4 – Along with a shockwave and tsunami, the gargantuan 1917 Halifax explosion also sent a terrifying cloud of smoke towering into the sky (*Colourized photos of the Halifax Explosion's aftermath*, 2017)).

The Halifax Explosion – 1917

We've already touched on the Halifax Explosion of 1917 in my literature review, and how it shaped the views of Samuel Henry Prince, who helped found disaster studies as an intellectual field of inquiry. Let's return to that historical episode again here. Of course, a main theme of this thesis is how individuals and organizations in a community respond and self-organize during emergencies. In Halifax in 1917, just as was done in San Francisco in 1906, early 20th Century equivalents of our present day Seattle Community Emergency Hubs were set up in the wake of a disaster. In the case of Halifax, guess what sort of local institution set up its very first aid station. Go ahead, I'll give you a second. What do you think?

Well, although we know local churches played a big role in relief efforts, it wasn't a church. While Halifax was established as a garrison town and had a major military presence, it wasn't the army (Solnit, 2009). It wasn't a medical clinic either, and actually a dearth of public health facilities in Halifax fueled the need for unofficial emergency hubs to be created (Rodin, 2014). In actuality, this very first hub was organized by the Academy Stock Company – a local acting troupe. Imagine if you find yourself in the midst of a major disaster, and the first people you get any assistance from aren't the fire department, paramedics, or national guard, but a group of theater nerds from an improv group. Remarkable, right? Well, that's what happened in Halifax. It may seem unconventional, but the fact that the Academy Stock Company jumped into this disaster relief role mere hours after the explosion at the harbor shows that practically anyone can be, as author Judith Rodin calls them in her book *The Resilience Dividend: Being Strong in a World Where Things Go Wrong*, "unofficial responders" (2014). What's more, Rodin points out that while these actors may not have been trained emergency workers, their acting background equipped them with applicable skills that were useful in a disaster. These included teamwork, quick thinking, and a finely tuned sense of situational awareness. This harkens back to what Cindi Barker, Scott James, and the other community disaster preparedness experts I've consulted have said: everyone in a community has something they can contribute – whether that's skills or knowledge or equipment or supplies – when their community comes into a time of trouble.

The Chicago Heat Wave – 1995

This brings us to our next precedent, which I've selected to exemplify how social isolation, largely caused by a lack of social capital and social infrastructure, can have truly lethal results. This is the 1995 heat wave in Chicago, which serves as the subject for another book by Eric Klinenberg – *Heat Wave: A Social Autopsy of Disaster in Chicago*. In this writing, Klinenberg specifically focuses on the neighborhoods of North Lawndale and South Lawndale, the latter of which is also called "Little Village" (2015). Located on either side of US Highway 66's eastern origin point, these two communities were quite similar demographics-wise. Both had populations largely made up of ethnoracial minorities, the elderly, and the poor. However, North Lawndale experienced a higher number of deaths during the heat wave than did Little Village.

If you were living around Chicago in July of 1995, you'd likely experience multiple days when the thermometer on the thermostat in your home read over 120° F, which is about 48° C (Klinenberg, 2015). The heat and humidity made the city feel more like the tropics instead of the American Midwest. Temperatures were so extremely high that they even caused train tracks and metal bridges to warp and buckle. With every indoor air conditioning system in the city running at full blast, the power grid became overwhelmed in places and electrical outages occurred. With no electricity, residents weren't able to get emergency health advisories via radio and television. Some locals opened up fire hydrants to try to cool off in their spray, but this consumed so much water that some buildings weren't able to have any running water for days. People began to fall ill with dehydration, heat exhaustion, and other medical conditions brought on by the weather. Hospitals began to overflow with the ill, and many patients wouldn't live to see the end of the heat wave.

Although heat waves may not come to mind as easily as other natural disasters, we should not underestimate their lethality, especially as we face the oncoming specter of climate change. If we can deviate from our future Great Seattle Earthquake scenario for a moment, just imagine a deadly heat wave happening every summer in Seattle and many other American cities. Some estimate that the number of deaths in the 1995 Chicago



Figure 4.5 – Chicago first responders remove a deceased victim of the devastating 1995 heat wave (Forgotten souls: Chicago's killer heat wave of 1995, 2015).

heat wave exceeded 700 (Solnit, 2009). Even before this event, heat waves usually killed more people in the U.S. every year than floods, tornados, and earthquakes *combined* (Klinenberg, 2015). Picture how worse that could get in the future as our planet's weather becomes more extreme. And, on second thought, let's bring our future major earthquake back into play. Remember how co-occurring and cascading disasters can take place, such as an earthquake causing a massive fire and/or tsunami(s) too? Well, imagine a severe heat wave AND a large earthquake occurring in tandem one Seattle summer. Or keep the earthquake in the picture, but substitute summer for winter and the heat wave for a snowstorm, like the one in 2009 that prompted the creation of the Seattle Community Emergency Hubs, or the one we had in early 2019 we jokingly called the "Snowpocalypse." Or imagine an earthquake happening at the same time as, I don't know … how about a disease outbreak? (And I just happened to write this paragraph slightly before the 2020 wildfire season really took off and gave us smoky, unhealthy air to accompany our ongoing Coronavirus Pandemic here in Seattle, so there's your real-life example of multiple emergencies taking place at once.) What I'm getting at is that we should remember that simultaneous or sequential disasters can happen in the same span of time, and we'll likely be experiencing more of this due to climate change.

Getting back to Chicago in 1995, the reason the Seattle Freeze was brought up earlier is that, along with extreme temperatures, another factor contributing to people dying in the heat wave was social isolation. In his book on this event, Klinenberg compares the heat-related death rates in the Chicago neighborhoods of North Lawndale and Little Village, and investigates how social capital featured in their respective community experiences. Across the board, 73 percent of Chicagoans who died because of the heat wave were over the age of 65 (Klinenberg, 2015). Obviously, the elderly would be more vulnerable to heat-related medical problems due to commonly experiencing poor overall health, physical weakness, and chronic illnesses – you know, being *elderly*. Senior citizens also often live alone and are more socially isolated, as the inevitable march of time causes their long-time loved ones to pass away. Furthermore, they may be geographically distant from relatives and friends that, while being still alive, live further afield and aren't immediately reachable.

This wasn't the first notable heat wave Chicago had experienced, and earlier heat waves in 1955 and 1964 weren't too far back in recent memory (Klinenberg, 2015). These heat waves had been far less deadly. Interestingly enough, in these prior heat waves entire households got through them by sleeping outside at night in parks, front yards, and other outdoor spaces where they could stay cooler. They did so because these outdoor areas were familiar to them, and they recognized or knew most of the neighbors surrounding them, so this seemingly unorthodox nighttime sleeping arrangement felt safe enough. However, the Chicago of 1955 and 1964 was quite different from the

Chicago of 1995. The city had taken on a reputation of having high levels of crime, and this reputation was furthered in part by the sensationalist attitudes of local news media. Given their commonly frail physical state, along with their social isolation, many senior citizens throughout Chicago – and particularly in North Lawndale – were hesitant to spend much time out on the streets, especially at night when temperatures might be cooler, or even to leave their homes at all. Not to be macabre, but because of these factors causing seniors to be isolated in their own homes, leading to many dying of heat related causes, often nobody knew of their deaths until a neighbor or landlord walked by their door and detected the smell of their corpse.

As mentioned earlier, though the neighborhoods of North Lawndale and Little Village were similar demographically, they had very different experiences as neighborhoods getting through the 1995 heat wave. North Lawndale had 19 heat related deaths, or 40 per 10,000 residents, and Little Village had 3, which was less than 4 per 10,000 residents (Klinenberg, 2015). While most of the residents in both neighborhoods – over 90 percent in each – were from ethnoracial minorities, they differed in that North Lawndale was primarily African American and Little Village was primarily Latinx. Some people might theorize that Little Village had fewer fatalities because Latinx folks, having their roots in the warmer climates of Latin America, are physiologically equipped to handle severe heat. This isn't so. There is no science to back up such a notion, and seriously considering it just makes you sound like you've been possessed by the ghost of Joseph Goebbels. Moreover, elderly Caucasians living in Little Village also fared better than elsewhere in Chicago during the heat wave, despite being especially vulnerable, so the explanation we're looking for isn't a racial one.

Although his main background is in sociology, Klinenberg turns to the urbanist and community organizer Jane Jacobs for socio-spatial explanations as to why Little Village fared better than North Lawndale in the heat wave. Jacobs's 1961 book *The Death and Life of Great American Cities* could easily be described as the Holy Bible of urban planning, at least in North America. (We can say this is not just because it's a foundational piece of writing for that field, but like the Bible it' lengthier than one might expect, and seems to jump between topics suddenly and without transition). Although Jacobs's book covers a variety of concepts, the two Klinenberg feels are most relevant for comparing North Lawndale and Little Village are density in people and diversity in land uses (2015). North Lawndale scored low in these categories in 1995. It had lower residential density than Little Village, as economic decline had caused something of an exodus of residents. Many businesses left too, and the neighborhood had no shortage of vacant lots. Because of all this, the streets of North Lawndale were severely lacking in the everyday activities (commercial, civic, social, etc.) of public life that would otherwise foster human interaction, social capital, and community resilience.

Conversely, Little Village had a much higher level of residential density, had fewer vacant lots as wasted spaces, and had a bustling main commercial street with numerous businesses. These factors all helped cultivate the sort of public life North Lawndale lacked, but which promoted in Little Village a healthier amount of in-person socialization and, with that, superior community cohesion and resilience going into the 1995 heat wave.

The nature of the community institutions found in these two Chicago neighborhoods in the mid-1990s also helped shape social capital and resilience there. In North Lawndale, these community organizations were mainly churches and "block clubs," the latter of which were a sort of hybrid neighborhood watch and community beautification program (Klinenberg, 2015). On the upside, the approximately 120 North Lawndale churches sought to assist all members of the community, regardless of church attendance or religious affiliation, in the humanitarian work they performed. On the downside, many churchgoers living in North Lawndale preferred to attend services outside the area, and some congregants attending services in North Lawndale didn't actually live in the neighborhood itself. Because of this, churches in North Lawndale weren't as strongly connected to the surrounding community as they could have been. As for the block clubs, well, they did try to tidy up the declining neighborhood and promote healthy social norms. Unfortunately, with residents moving out of North Lawndale over the years, and many of the elderly ones passing away with time, it was hard to keep long-time, active members in these block clubs. Additionally, these clubs were founded largely as a response to crime – or at least the perception of crime – in the neighborhood, and reflected the internalized mindset of many locals that it was unsafe to spend much time out in public in North Lawndale.



Figure 4.6 – The social infrastructure found in the largely Latinx and Catholic "Little Village" neighborhood helped its residents weather the 1995 heat wave better than their neighbors in North Lawndale (Pointer, 2016).

Unlike North Lawndale, Little Village didn't really have anything like the block clubs, and only had about 20 churches, and this appears to be the full extent of civic life there circa 1995 (Klinenberg, 2015). Despite having only about a fifth of the congregations found in North Lawndale, we might say when it came to churches and how they performed as social infrastructure, North Lawndale had quantity but Little Village had quality. In the latter neighborhood, it being primarily Latinx, most of the churches were Roman Catholic. Catholicism tends to be more hierarchical, centralized, and

structured as a Christian denomination. Because Little Village's Catholic churches all fell under the Archdiocese of Chicago, they were all interconnected in a network that cultivated social capital. What's more, Little Village had much less residential turnover than North Lawndale, and multiple generations of local families might attend the same church for years and years. Because of all this, these churches had stronger roots in the community than their counterparts over in North Lawndale. So, in Little Village, because of the dynamic public life fostered by residential density and commercial activity, along with a stronger sense of community strengthened by the Catholic church, the elderly living in this part of Chicago were less isolated, more socially connected, and therefore less likely to succumb to the deadly effects of the heat wave in isolation.

Let's wrap up these paragraphs on the Chicago heat wave by pointing out that in the updated preface for the second edition of *Heat Wave*, Klinenberg makes sure to state that while this heat wave happened in the past, it surely foreshadows the future many of our cities face with the extreme weather conditions brought on by climate change (2015). He also wants us to understand that along with the goals to reduce carbon emissions, the engineering responses to sea level rise, and the other better-known adaptations and mitigations for climate change, enhancing social infrastructure and nurturing social capital should also be part of those endeavors (especially for the sake of the vulnerable amongst us). He writes that in "studying the sociology of cities, communities, and climate change, I'm persuaded that civil society will play a key role in determining who lives and who dies during disasters" (2015). As a component of civil society in the era of extreme weather – and in a region characterized by seismic activity – the Seattle Community Emergency Hubs will have some influence over such life-and-death determinations. An evenly distributed, physically accessible, socially connected network of hubs can help keep people alive when disaster strikes, as well as combat the harmful "Seattle Freeze" in the meantime. Conversely, a network of hubs lacking in even distribution, accessibility accommodation, and (as the Chicago heat wave teaches us) genuine connections with community institutions won't be as effective in these goals.

Hurricane Sandy in Rockaway – 2012

Moving forward another decade and a half in our timeline of precedents, let's depart from Chicago and head over to New York City for an inspiring and unique story of grassroots community disaster relief, this time from the aftermath of Hurricane Sandy in 2012. Like the 1995 Chicago heat wave, Hurricane Sandy has been touted as a foreboding example of the extreme future weather events we'll face thanks to climate change. During this storm, higher overall temperatures resulted in

heavier rainfall, and rising sea levels caused larger storm surges in coastal areas (The Center for Climate and Energy Solutions, 2012). Sandy has been described as one of the costliest storms in the history of the United States. This hurricane affected cities and towns across the northeastern U.S., but Rockaway in the New York City borough of Queens – being located on a peninsula jutting into the ocean – surely caught the worst of it. If you envision New York City as an ocean-going ship heading into the storm, then Rockaway is rather like the prow of the vessel receiving the full brunt of the wind, rain, and waves. Hundreds of homes there were flooded, and scores of them actually burned down after the water caused an electrical fire in one of them (Rodin, 2014). Public utilities and nearby mass transit infrastructure were also knocked out of action.



Figure 4.7 – One of the many Rockaway homes destroyed by Hurricane Sandy in 2012 (*Surveying Queens' Rockaway Peninsula After the Storm*, 2012)

Similar to the theatrical Academy Stock Company in 1917 Halifax, the catalyst of social capital that first initiated grassroots relief efforts in Rockaway came from an unconventional, but still wonderfully effective, source. This time, it's not actors. It's surfers. Some may not consider the Big Apple when thinking of places where one might go surfing, but you can totally surf at Rockaway and there exists a subculture of surfing devotees. In fact, as a form of local social capital, they also had their own community institution acting as social infrastructure: the Rockaway Beach Surf Club. This business, where people could buy and store surf boards and other equipment, order meals from an on-site café, and hold gatherings in an event space, was already a community hub of the non-emergency sort before Hurricane Sandy (Rockaway Beach Surf Club, n.d.). While it was popular with surfers, non-surfing locals didn't think much of the surf club, and there was even some palpable tension between the surfers and non-surfers (Rodin, 2014). These things changed when Sandy hit on October 29th of 2012.

The purveyors of the Rockaway Beach Surf Club, Bradach Walsh and Brandon d'Leo, started clearing debris and mud away from the property the very next day (Rodin, 2014). They also sent out a call for volunteers, via social media, to help in local relief efforts. About 5,000 people responded back to say they'd help, and most were fellow surfers. Say what you will about surfers being aloof and laidback, as the stereotype goes. When their community faces disaster, they show up

and work hard alongside every other sort of person. When these volunteers arrived at the Rockaway Beach Surf Club, they were sent out into the surrounding area to canvass nearby residents, seeing what sort of items were needed. They then returned to the surf club, compiled a list of what their neighbors required, sent out requests for donations, and turned their club into a distribution center for relief supplies. Since the club had lots of available storage space, was centrally located in the urban landscape, and was recognizable as something of a local landmark, it was an ideal facility for this role. In addition to supplies, the volunteers also provided physical labor, helping locals clear out over 700 swamped houses that had to be gutted.

Starting out as a hub for supplies, the activities at the Rockaway Beach Surf Club expanded and evolved to include other functions. One of these that stands out is Power Rockaway Resilience (PRR), which was a homegrown, small-scale electrical project based out of the surf club. The storm had barely passed when volunteers with specialized technical knowledge assembled some solar panels and wiring on the surf club roof for charging batteries, along with electronic communication devices like laptops and smartphones (*Delivering Power for Now, Resilience for the Future*, n.d.). This project became a de facto local utility provider, and helped make up for the fact hundreds of nearby homes no longer had electricity (Rodin, 2014). Also, many locals recognized that PRR wasn't just a once-in-a-while project, but a practice they may have to revisit and reuse for the next disaster that knocks out the power (*Delivering Power for Now, Resilience for the Future*, n.d.).



Figure 4.8 – Brandon d'Leo and the vibrant, eye-catching artwork of the Rockaway Beach Surf Club (*Rockaway Beach Surf Club*, n.d.)

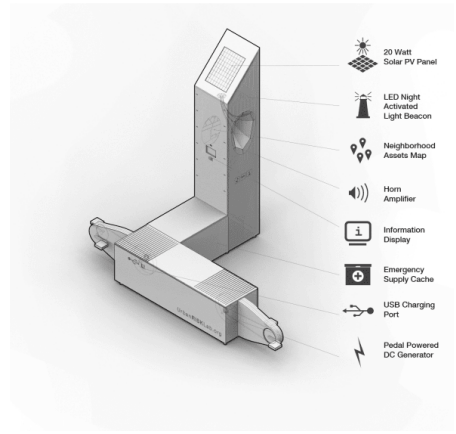

Figure 4.9 – Volunteers maneuver a solar panel at Rockaway Beach Surf Club, where it was used to temporarily provide electricity for storm-stricken residents (Cardwell, 2012).

And speaking of lasting changes for the future, the collective experience of surviving and recovering from the hurricane fostered a stronger sense of community in Rockaway (Solnit, 2009). According to one local resident, post-Sandy Rockaway got to experience "a whole new level of social camaraderie

that never existed. We're all in it together. It's a real positive thing" (Rodin 2014). Not only did the community in general feel more socially cohesive, but any divide between the surfers and non-surfers had been replaced with a bond, forged in their endeavor to rebuild after the storm.

So, what are the key takeaways from the Rockaway Beach Surf Club following Hurricane Sandy that apply to our own Seattle Community Emergency Hubs? Well, we saw how community spaces can become disaster hubs in 1906 San Francisco. We saw how community organizations started their own disaster hubs in 1917 Halifax. We saw how people relied on preexisting human relationships and community networks to get them through the 1995 heat wave in Chicago. Looking at the Rockaway Beach Surf Club in 2011, we see all three of these phenomena happening at once. More specifically, we see how beneficial it can be to have a centrally located community institution act as a hub, especially one that has a suitable amount of space, an on-site organization to manage it, and numerous social connections that can be called upon for help. When we get into Seattle's own hubs, we'll see that some of them (like parks and parking lots) are spaces which will be attended only by the hub organizers themselves, but other hubs (like churches and neighborhood clubs) have another community organization that extends beyond the actual hub volunteers (like a religious congregation or a fraternal organization), and expands the social capital available to such a hub. This will be a practice to consider as we look at the hubs more closely, and is why I'll be looking for "steward" organizations to partner with hubs, enhancing the social support they receive from the community.

In addition to these key takeaways, Rockaway Beach Surf Club also shows us that although the cellular phone network in the United States is vulnerable to damage during disasters, whatever communication infrastructure is still operational post-disaster should be put to use, sending out messages to mobilize and coordinate people and resources (Klinenberg, 2015). We already know that, in addition to their radio operators, digital communications are something the Seattle hubs would utilize. In fact, during the activation of the hubs during the current Coronavirus Pandemic, hub volunteers performed the majority of their relief activities online, using social media to organize donations and deliveries of food and other assistance (Barker, personal communication, August 7th, 2020). Similarly, the use of message runners is also something the Seattle hubs would employ, similar to the canvassers the surf club deployed in Rockaway.







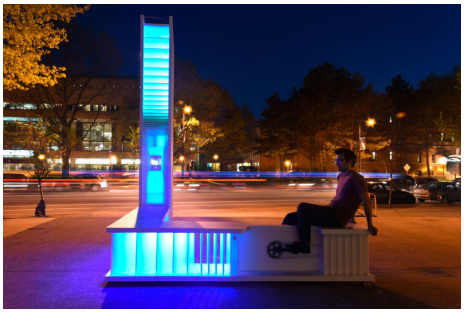


Figure 4.10 – The PREPHub, the customizable, technology-driven emergency hub of the future. It an already by seen installed in Portland, OR (*M.I.T. PREPHUB*, n.d.).

PREPHubs – The shape of things to come . . .

Let's finish off this precedents section with an example not from the past, but an exciting proposal for an innovative, high-tech community emergency hub we might see more of in the future. Let's go back to that article by Miho Mazereeuw and Elizabeth Yarina. The concepts they recommend we consider while designing and implementing community emergency response programs – key amongst these being "integration" and "redundancy" – are manifested in a new development known as the PREPHub, which is an abbreviation of Emergency Preparedness Hub (2017). These enticing, angular objects are intended to be placed in an urban landscape as public art and seating, standing out as attention-grabbing landmarks which the public can recognize and appreciate. But that's just a secondary function; the other is to act as an emergency hub. The PREPHub contains within it compartments for first aid supplies, USB ports for charging digital devices, audio speakers and touchscreens for providing information, LED emergency lighting, and independent sources of electricity in the form of solar panels and a pedal powered DC generator (*PREPHubs*, n.d.). The system is meant to be modular and customizable, with different designs and optional features being available. It was designed at the Massachusetts Institute of Technology, and a prototype has been installed at the campus of Portland State University down in Oregon as of this writing. One could easily foresee these as a high-tech, automated successor to the 50 BEECN (Basic Earthquake Emergency Communication Node) sites already established in that city.

Admittedly, we can grant an amount of "wow factor" to the PREPHub due to its multifunctionality, its futuristic appearance, and the agency it affords the wider public. However, looking forward to the upcoming recommendations of this thesis for the Seattle Community Emergency Hubs, we won't necessarily advocate the installation of PREPHubs throughout West Seattle and the South End. While the PREPHubs are an exciting new development, there are a couple reasons for not considering them for Seattle. Firstly, PREPHubs are installed and operated by municipal authorities, not by grassroots community groups. An underlying aspect of the Seattle Community Emergency Hubs is that while they complete an official application process to be recognized as a hub, connect with government EOCs (Emergency Operations Centers) via radio, and might individually request grant funding for certain items, our hubs are meant to operate largely independent of public agencies and instead harness resources that exist organically in the community. That's a big part of what we'll be looking at in the upcoming case study; instead of bringing in new resources to the community, what existing resources already in the community can be utilized in an emergency?

Another reason for not considering the adoption of PREPHubs is that while they incorporate a degree of flexibility in their design, they are still anchored to the ground and can't be moved to an alternative site the same way our current hubs can. Remember, one of our Seattle emergency hubs can start off with just a notebook and pen, and then equipment and resources can be gathered from the community as it develops, and said notebook and pen are far more mobile than a PREPHub. Furthermore, as PREPHubs are meant to stand out as landmarks in the urban landscape, their conspicuousness might make them targets for vandalism and theft. In contrast, several current Seattle hubs have stored their emergency equipment onsite in large metal toolboxes, like one might see at a construction site or next to a maintenance shed. While these toolboxes lack the pizzazz of the PREPHubs, they can be integrated inconspicuously into the urban landscape, and can be moved between locations. Still, despite these perceived drawbacks, the fact that something like the PREPHub has been developed reinforces the notion that, in a disaster, a populace equipped with information and public gathering areas can self-organize its own community relief efforts, and do so with minimal support from the authorities.

Table 4.1 – Summary of Precedents		
Precedent Example	**Effective in utilizing existing social capital?**	**Effective in generating *new* social capital?**
San Francisco Earthquake and Fire (1906)	Yes.	Yes. New social connections made, overall increase in community social cohesion.
Halifax Explosion (1917)	Yes.	Yes. New social connections made, overall increase in community social cohesion.
Chicago Heat Wave in North Lawndale (1995)	No. Lack of existing social capital	No.
Chicago Heat Wave in Little Village (1995)	Yes.	Possibly.
Rockaway during Hurricane Sandy (2012)	Yes.	Yes. New social connections made, overall increase in community social cohesion.
PREPHubs (future)	Possibly. If connected to community organizations and programs.	Possibly. Depends on how community members choose to use them

Table 4.2 – Summary of Precedents – Continued			
Precedent Example	**Utilization of specific forms of social infrastructure?**	**Support provided by public authorities?**	**Overall successful in supporting community through disaster?**
San Francisco Earthquake and Fire (1906)	Yes. Golden Gate Park and other public spaces.	Yes. Humanitarian relief.	YES
Halifax Explosion (1917)	Yes. Churches (much of the rest of the city destroyed).	Yes. Humanitarian relief.	YES
Chicago Heat Wave in North Lawndale (1995)	No. Lack of local social infrastructure.	No. Not directly.	NO
Chicago Heat Wave in Little Village (1995)	Yes. Catholic churches, public realm in general.	No. Not directly.	YES
Rockaway during Hurricane Sandy (2012)	Yes. Rockaway Beach Surf Club	No. Not directly.	YES
PREPHubs (future)	Yes. Will be placed conspicuously in public areas.	Yes. Information, conveyed remotely.	Possibly. We shall see . . .

CHAPTER 5 – CASE STUDY

- **Disqualifying Problematic Existing Hubs**
- **Suitable Existing Hubs**
- **Combined Walkshed Coverage Areas of Suitable Existing Hubs**
- **Social Capital at Suitable Existing Hubs – "Degree Centrality" Scores**
- **Selecting Hub Stewards for Remaining Existing Hubs**
- **Selecting New Potential Hub Sites**
- **Combined Walkshed Coverage Areas of Potential New (and Suitable Existing) Hubs**

Disqualifying Problematic Existing Hubs

As I covered in my methods section, the first step in our examination of the hubs in the study area is to see which of them are threatened by the three earthquake hazards; ground liquefaction zones, overhead electrical power lines, and unreinforced masonry buildings (URMs). The hubs that lie within the liquefaction zones are easy to determine, having mapped all the existing hubs in the study area in ArcMap (the GIS software) and overlaid them upon a map of said liquefaction zones.



Figure 5.1 – Giant cowboy hat and boots, which can be found next to the P-Patch in Oxbow Park. A most conspicuous landmark for a hub site, but unfortunately a site disqualified for being in a liquefaction zone (Stueve, 2020).

Straightaway, we're going to have to nix seven of the existing 55 hubs in the study area. These are the hubs at the Alki Community Center, Courtland Place P-Patch, Estelle Street P-Patch, Hillside Garden P-Patch, Oxbow Park P-Patch, Snoqualmie P-Patch, and South Park Neighborhood Center. This is unfortunate, particularly since the community centers at Alki and South Park serve as multifunction public buildings and would make excellent hubs. (That

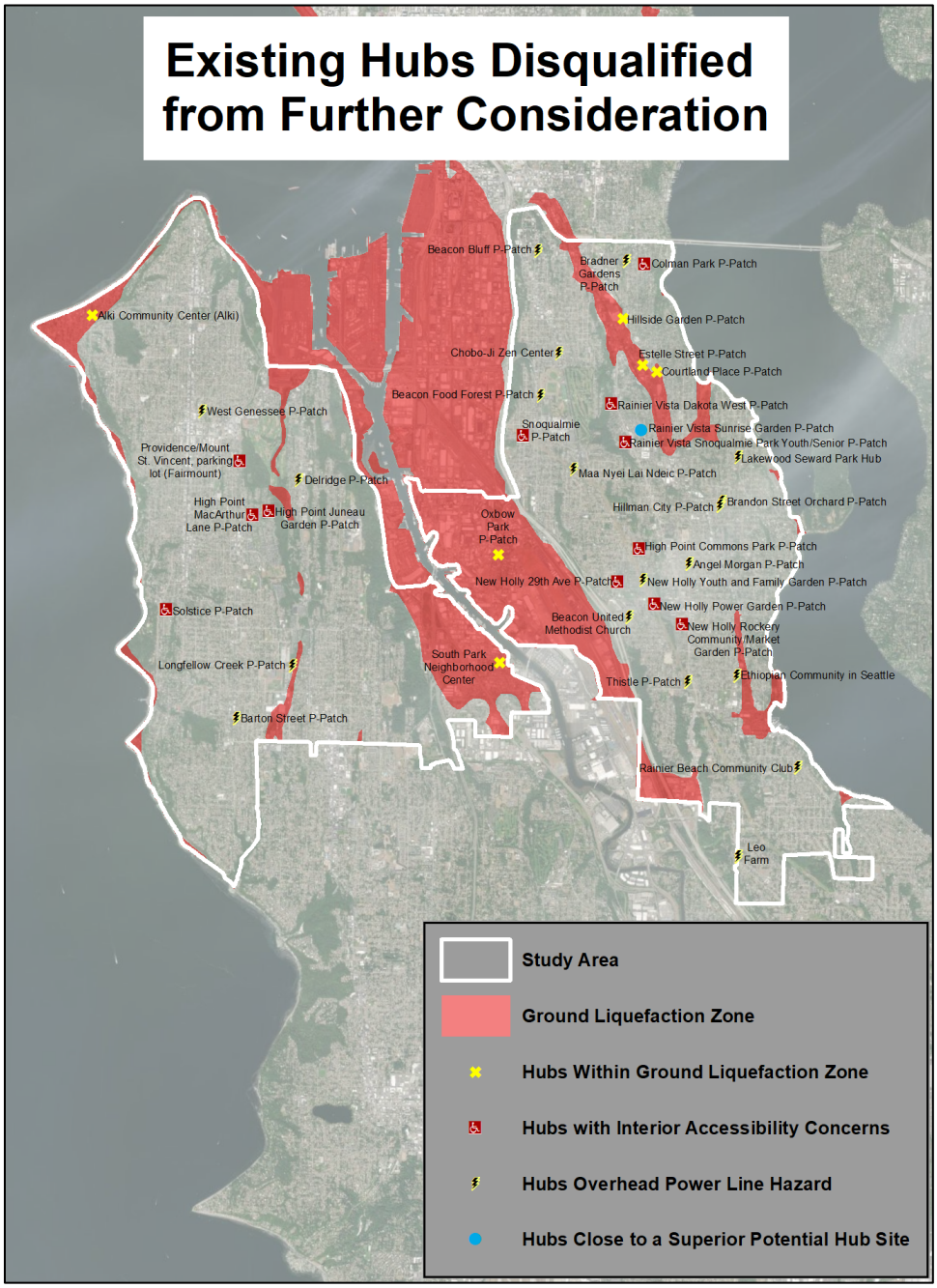


Figure 5.2 – According to my evaluation of these sites, these are all the existing hubs we should discontinue.

is, they would have made excellent hubs if it weren't for the threat of ground liquefaction.) It's especially unfortunate to write-off the South Park Neighborhood Center, considering how that underserved neighborhood isn't exactly overflowing with public spaces and community institutions. Moreover, since we've established the benefit of having landmarks at our emergency hub sites to make them stand out in the urban landscape, it's a shame I had to disqualify the hub at the P-Patch in

Georgetown's Oxbow Park. Seriously, what more conspicuous landmarks could you ask for besides a 44-foot-wide cowboy hat and a 22-foot-tall pair of western boots (City of Seattle, n.d.)? Another potential advantage of Oxbow Park is that it contains multiple amenities; a children's playground, a community garden, public seating, and did I mention the giant cowboy hat and boots? A hub site that has a variety of amenities, as I mentioned previously, is more likely to attract a variety of users pre-disaster, so more members of the local populace will be familiar with it when disaster does strike and its hub participants mobilize. Still, since Oxbow Park and these other hubs are all situated in liquefaction zones, I'm going to have to strike them from the list without further consideration.

Turning now to the danger of overhead or adjacent power lines, I'm going to have to disqualify 19 more existing hubs due to their proximity to such a hazard. Most of these, 14 to be exact, are P-Patches, including the Angel Morgan P-Patch, Barton Street P-Patch, Beacon Bluff P-Patch, Beacon Food Forest P-Patch, Bradner Gardens P-Patch, Brandon Street Orchard P-Patch, Delridge P-Patch, Hillman City P-Patch, Leo Farm P-Patch, Longfellow Creek P-Patch, Maa Nyei Lai Ndeic P-Patch, New Holly Youth & Family P-Patch, Thistle P-Patch, and West Genesee P-Patch. As the hub organizers are considering abandoning P-Patch-based hubs altogether – Cindi referred to them as "imitation" hubs which were included by the City of Seattle less for picking ideal hub sites and more for making a better-looking map of hubs – disqualifying these existing hubs because of power lines isn't all that disadvantageous (Barker, personal communication, February 22nd, 2021). Furthermore, during the course of my research, while I interacted with numerous hub organizers who were knowledgeable and exceedingly enthusiastic about the Community Emergency Hubs, the gardeners I encountered while visiting the P-Patches hub sites were largely unaware of these gardens' secondary role of community disaster preparation and response. In the brief conversations that took place between them and I, in which I explained exactly why I was there taking pictures and writing notes, they admitted they knew hardly anything about the hubs. They might know of the existence of one at their P-Patch, but they didn't seem to know how the hubs functioned, or who in their community was involved with them.

On the other hand, it could be argued that discontinuing the P-Patches as hubs, whether this is done selectively or wholesale, also discontinues a potential source of social capital for the hubs. These beloved community gardens do serve as social infrastructure in their own right, acting as community spaces where local residents – both gardeners and non-gardening visitors – can interact and connect with one another (Hou & Grohmann, 2018). Though the social connections between the hub organizers and P-Patch gardeners are weak, stronger connections could be cultivated with time, if such an effort was to be made. Additionally, it is common knowledge that Seattle's P-Patch

gardeners come from diverse backgrounds and include members of our local immigrant and minority populations. During my visits to them, I noticed a lot of gardeners appeared to be of Latinx or Southeast Asian heritage and spoke languages other than English. The text on the signs at P-Patches is commonly translated into multiple languages, further demonstrating their connection to local minorities. In other circumstances, the P-Patches might be a way for the Seattle Community Emergency Hubs to engage a more multicultural group of citizens. For now, that is not what's being recommended in this thesis, as there are other locations in the South End and West Seattle at which diverse social capital can be sourced, and which are also more physically suitable to serve as hubs.



Figure 5.3 – Multilingual sign at P-Patch featuring six languages – a testament to the ethnoracial diversity that can be found at these beloved community gardens. Fortunately, even though I'm recommending discontinuing most of the emergency hubs at P-Patches, we can still tap into these communities' rich diversity and promote cultural inclusivity by recommending potential hub "steward" organizations later in this case study (Stueve, 2020).

In addition to those 14 P-Patches, the other five hubs I'm disqualifying because of overhead or nearby power lines are the ones placed at Beacon United Methodist Church, the Chobo-Ji Zen Center, the Ethiopian Community in Seattle (ECS), the Lakewood Seward Park Community Club, and the Rainier Beach Community Club, all of which are in the South End. Starting with Beacon United Methodist, if it wasn't for the power lines strung across both entryways into parking lots, this church would make a marvelous hub. The terrain around it is fairly level, and it's located along the well-traveled Beacon Avenue South traffic corridor, so it's easily accessible and visible to the rest of the community. It's home to a long-standing and

diverse religious congregation, and also houses IDIC Filipino Senior & Family Services (*IDIC History*, 2014). It even has large signs advertising the fact it's an emergency hub, and holds hub training events like the one I attended during my research. Nevertheless, if an earthquake brings down the power lines along its perimeter, then it essentially could be made unusable as an emergency hub.

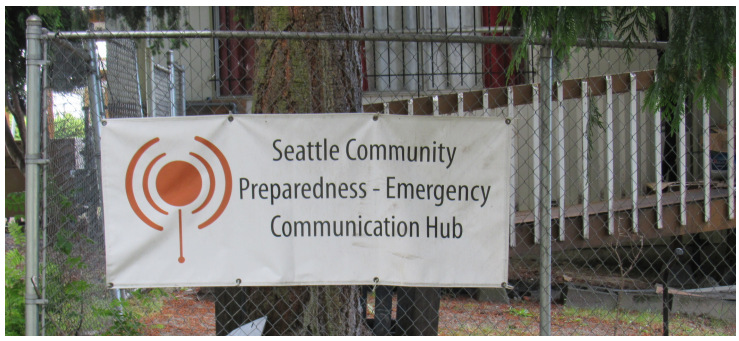


Figure 5.4 – Large signs advertise the disqualified hub site at Beacon Hill United Methodist Church (Stueve, 2020).



Figure 5.5 – The Ethiopian Community in Seattle (ECS) is an existing hub site I've disqualified due to overhead power lines (Stueve, 2020).

Let's quickly run through the other hubs I'm crossing off the list due to electrical lines. In the case of the Chobo-Ji Zen Center, power lines run along the front of this facility, creating a potential hazard at that site. Noted, they may not actually stretch across the Zen center's rear garden and parking area, where the emergency hub is meant to be placed. Still, people looking for this particular hub during a disaster might approach it from the more public-facing front of the building instead of the rear, so the presence of the power lines should still be considered. Similar to Beacon United Methodist Church, the Ethiopian Community in Seattle (ECS) cultural center has power lines all along its street-facing eastern edge, right above the entrances to both the building and its parking lot. The Lakewood Seward Park Community Club has electrical cables running alongside and above it, endangering the entrances and outdoor areas of this site, and the Rainier Beach Community Club has a single overhead power line that cuts diagonally across the property and the adjacent sidewalk. It's particularly unfortunate to have to disqualify the hubs at the Lakewood Seward Park Community Club and the Rainier Beach Community Club, since they both have radios and participants trained in how to operate them. What's more, Lakewood Seward Park Community Club has even been gracious enough to advertise the existence of their hub on their website (*Lakewood Seward Park Emergency Communications HUB*, 2014). On the bright side, while these specific hubs may be unsuitable for spatial reasons, Beacon United Methodist, Chobo-Ji Zen Center, the ECS, IDIC Filipino Senior &

Family Services, Lakewood Seward Park Community Club, and the Rainier Beach Community Club all have something to offer in regard to social capital. While they may not be able to host a hub onsite, they can certainly help steward one at another location. More on this later.

Satisfyingly, having cross-checked the locations of the remaining existing hubs with the official list of URMs, it was revealed that no unreinforced masonry buildings stand upon or near those sites. (That being said, we'll still have to be mindful of URMs while selecting new hub sites later on.) However, with the remaining current hub sites that are sufficiently free of liquefaction zones, power lines, and URMs, we still see that several may be ill-suited serve as hub sites when we consider how they shape up according to my accessibility measurements and my 12 design criteria, as described in my methods section. Again, the goal here isn't to require the hubs to meet an exact set of design and accessibility requirements, but to look at how high they scored according to those standards, and ask ourselves "is there a better site nearby?" In addition, while it would be wonderful to have *all* the approaches to *all* the hub sites have a slope of five percent or less – as recommended for "accessible routes" by ADA standards – we may just have to settle for sites where a minimum of at least one approach is accessible to those with limited mobility. Cases like this aren't ideal, but they might just be the best the built environment and topographical landscape can provide in parts of my study area.

Speaking of which, let's talk about the hub labelled "Providence/Mount St. Vincent, parking lot (Fairmount)." As you can gather from this lengthy, punctuation-strewn name, this hub is at the southeast parking lot of the Providence Mount St. Vincent senior assisted living complex, which is in the Fairmount Park section of West Seattle. Ideally, I should simplify and standardize the names of the hubs as much as possible, and I'll do this for the final set of suitable existing and proposed hub sites I come up with. Although its large parking lots provide ample open space for a hub, and the care home itself could offer additional assets in a disaster situation (like trained nurses and large



Figure 5.6 – Providence Mount St. Vincent's parking lots are characterized by steep driveways. Not ideal for an emergency hub when we consider accessibility for those with impaired physical mobility (Stueve, 2020).

kitchen areas), Providence Mount St. Vincent scores very low on accessibility. Most of the street from which people would access the hub – SW Hudson Street along the southern perimeter of the property – exceeds a five percent incline. This includes both approaches to the southwest parking lot, making them too steep, and giving this hub an accessibility percentage of zero. There are a couple other entrances to parking lots on the north and west sides of the complex, but we can assume the driveways there are too steep for a wheelchair just by glancing at them, so there's no sense in just moving the hub's location to another part of the property. Basically, by having a hub placed at this property, there is no way for it to meet our accessibility goals. Therefore, I won't have to change the hub name "Providence/Mount St. Vincent, parking lot (Fairmount)" to something more concise, because I'm taking this one off the list too.

Similar to the hub at Providence Mount St. Vincent, I'm going to have to disqualify a couple more hubs (both of which are P-Patches) because, well, they're straight-up accessibility nightmares. These are the hubs at the Colman Park P-Patch and Solstice P-Patch. At both sites, all of the pedestrian approaches exceed a five percent incline, making them essentially off-limits to people with limited mobility. What's more, not only are the approaches to these P-Patches too steep, but the gardens themselves are built right on top of abrupt hillsides. So not only are the exterior surroundings of these hubs inaccessible, so are their interiors. Even if someone using a wheelchair, walker, crutches, or cane was able to reach these P-Patches, there wouldn't be much point as they're going to have their mobility hindered inside the P-Patches too. So, the hubs at Colman Park P-Patch and Solstice P-Patch are also getting taken off the list.

This lack of interior accessibility is a recurring issue with many of the P-Patch-based hubs. There are several more P-Patches that have at least one accessible approach leading into them, but there isn't much point in retaining them as hubs if someone with limited physical mobility will face obstacles once they're inside. These community gardens, while they frequently offer useful amenities like storage sheds, seating, and even food preparation areas, commonly lack the paved pathways, hardscapes, and ADA accommodations which better suit the physically impaired. Certainly, someone using a wheelchair might make it to the perimeter of a P-Patch with multiple accessible approaches, and perhaps past the entrance. But a P-Patch consisting of large planter boxes, wide growing areas, dirt paths which turn to mud in poor weather, fences partitioning the individual gardening plots, some ditches, and other physical obstacles will effectively exclude many people with physical disabilities.

The majority of the remaining P-Patch-based hubs have this problem of a lack of interior accessibility. On the positive side, many are located close to more suitable sites that feature paved pathways and flat hardscapes. In fact, some are situated directly adjacent to such spaces, most of

which are parks whose names are similar to those of the P-Patches in question. So, for the hubs located at John C. Little P-Patch, Marra-Desimone Farm P-Patch, New Holly Lucky Garden P-Patch, and West Crest Garden P-Patch I can propose slightly adjusting their locations and monikers to tie them to John C. Little Sr. Park, Marra-Desimone Park, Central Park – Shaffer Avenue S (there are other spots at Seattle public housing developments named "Central Park"), and West Crest Park – South Playground, respectively. A number of hubs at other P-Patches, including High Point Commons Park P-Patch, High Point Juneau Garden P-Patch, High Point MacArthur Lane P-Patch, New Holly 29th Ave P-Patch, New Holly Rockery Market Garden P-Patch, Rainier Vista Dakota West P-Patch, and Rainier Vista Snoqualmie Park Youth/Senior P-Patch, which also lack accessibility in their interior spaces, all sit a within a few blocks of a more appropriate existing or potential hubs site, so it makes sense to just take these eight off the list too.

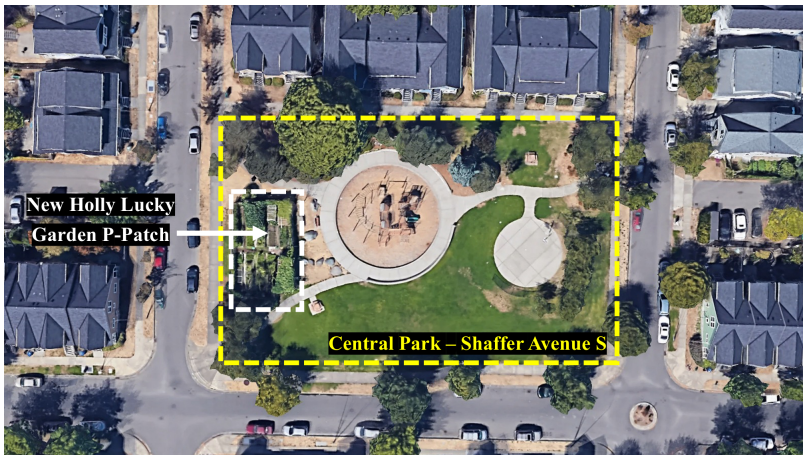


Figure 5.7 – The existing emergency hub at the claustrophobic, single amenity New Holly Lucky Garden P-Patch can be easily improved by locationally adjusting it to be at the much more useful and expansive Central Park – Shaffer Avenue S instead.

One specific P-Patch-based hub, the one at Rainier Vista Sunrise Garden P-Patch, doesn't share most of the same drawbacks of other P-Patch-based hubs. With the slopes of four out of its six approaches not exceeding a five percent incline, it has an accessibility score of 66 percent. It also has a small cement plaza that provides over 1,000 square feet of open space, and the site is bisected by a number of paved walkways that look like textbook examples of ADA accessible routes. Overall, the site scored 8.5 out of 12 according to my design criteria. Considering all this, it seems to make for an appropriate hub site. Still, as we go through this process we're supposed to be asking ourselves, "is there a better site nearby?" And in this case, there is. Just a block away, the Rainier Vista Boys & Girls Club and the adjacent Rainier Vista Playfield (if we treat them as a singular potential hub site), score 10.5 out of 12 on the design criteria and 100 for their accessibility percentage. And as this spot hosts a dynamic community organization– the Boys & Girls Club – it may have more to offer in the way of social capital than a P-Patch. Thus, I'll remove Rainier Vista Sunrise Garden P-Patch from our remaining eligible hubs, knowing that there's a superior site close by.

Suitable Existing Hubs

At this point, of the 55 existing hubs in the study area, 38 have been disqualified for being at problematic sites, or are in close proximity to a superior existing or potential hub site. This leaves us with 17 hubs in the study area that should either be kept in place, or slightly relocated to a neighboring site with a similar name. Four of these are in the South End, and 13 are in West Seattle. I'll discuss the proposed sites of the slightly relocated hubs later in this case study, but here I should go over the hubs that should remain in place and why. There are two of these in the South End, and 11 in West Seattle. Let's begin in the South End and work north to south.



Figure 5.8 – The existing hub at Daejeon Park receives the benefits of a cultural landmark, ADA ramps and pathways, multiple modes of adjacent transportation, and natural surveillance from nearby residences (Stueve, 2020).

Named in honor of Seattle's South Korean sister city, Daejeon Park is an elongated, mainly grassy space running northwest to southeast along Interstate 90, in the northernmost part of Beacon Hill. Despite the sloped terrain surrounding it, none of the walkable routes that lead to this park have a slope that exceeds five percent (at least according to the measurements taken using Google Earth). This gives it an accessibility score of 100 percent. Having been built in 1998, several years after the 1990 Americans with Disabilities Act, the interior of the park meets ADA requirements and is surely accessible for those with limited physical mobility. A pagoda inspired by traditional Korean designs makes an excellent landmark for visitors and passersby, and will hopefully help them remember this park when the time comes for it to act as an

emergency hub. There aren't any real visual barriers to interrupt one's view into the park when standing on the street outside it, and the roadway, sidewalk, and the cycle-friendly I-90 Trail along its western edge (the eastern edge is just a wall standing between the park and I-90) should allow passing motorists, pedestrians, and cyclists the opportunity to visually recognize the space. A paved plaza around the pagoda provides over 2,000 square feet of level space for a hub, and although this isn't quite the 4,700 square feet of a basketball court it's still a useful asset. An ADA-compliant accessway connects the plaza to the I-90 Trail alongside the park, and an ADA-compliant ramp leads from the plaza into the pagoda, so people with limited physical mobility should be able to access this space. A series of duplexes and townhomes can be found on the opposite side of the street (Sturgus Ave S) to the west of Daejeon Park, providing the "natural surveillance." The only drawbacks this hub site presents, in addition to not having the maximum amount of paved open space desired, is the homogeneity of the building uses around it – they're residential only – and the lack of an actual enclosed building at the site. In quantifying these spatial features using the criteria outlined in the methods section, Daejeon Park scored 7.5 out of 12.

Further south, nestled in the Seattle Housing Authority (SHA) community of Rainier Vista, the existing hub labelled on the Seattle Community Emergency Hub list as "Rainier Vista (West)" really ought to change its fairly non-specific name. Since it's meant to be placed in the parking lot of the local Neighborhood House non-profit office, let's retitle this hub Neighborhood House Rainier Vista for the sake of specificity. Like Daejeon Park, this hub scores 100 on its accessibility percentage, as none of the pedestrian approaches that lead to it are steeper than a five percent gradient. The parking lot at this hub site covers an area measuring over 17,000 square feet, which is enough space in which to fit over three basketball courts, and should be accessible for the physically impaired. Across the street to the west is a space called Central Park – as several of the centrally-located parks in SHA housing communities are designated – and still more space for a hub can be found over there if any was ever needed. A variety of residential units, organizations, and businesses can be found in the multistory, mixed-use buildings surrounding this parking lot. These provide the natural surveillance, identifying signage, mixture of building uses, diverse amenities, and potential indoor space we should ideally have at the emergency hubs, as per my design criteria. Streets with sidewalks surround this site, and a stop for the #8 King County Metro bus route can be found a block to the south along the Martin Luther King Jr Way S arterial. And, for what it's worth, the Columbia City light rail station is one more block to the south after that. According to my design criteria, the only drawbacks to this site is the fact that the buildings partially block the view of the parking lot

from the outside, and there isn't a designated cycle route nearby. Overall, I can give the hub at Neighborhood House Rainier Vista a score of 10.5 out of 12.

Moving over to West Seattle, and starting with the northernmost site from the remaining eligible hubs, the "Hiawatha Playfield/Community Center (Admiral)" is centrally located in West Seattle along California Ave SW. Like other hub names, this one is a bit on the wordy side, so I'll redesignate it as the Hiawatha Playfield & Community Center hub. The hub participants based at this site have made arrangements with the City of Seattle Parks and Recreation Department to use not just the multi-acre park grounds – which include 17,000 square feet of flat and hard surface at the park's tennis courts – but to access and utilize the onsite community center building in the event of a disaster (K. Beck & S. Sachs, personal communication, August 20th, 2020). Aside from the radio links between some of the hubs and the official city EOCs, this appears to be one of the only other examples of any collaboration between city agencies and the grassroots Seattle Community Emergency Hubs, at least in this study area. While city employees may not be directly or officially involved at the Hiawatha Playfield & Community Center hub in the aftermath of a quake, this sets a precedent for hubs to appropriate municipal facilities for their own uses in an emergency situation. We should remember this when exploring potential new hub sites later.



Figure 5.9 – A variety of amenities can be found at and around Neighborhood House Rainier Vista hub site (Stueve, 2020).

Located on fairly level terrain, all the walkable approaches to Hiawatha Playfield & Community Center have a slope that calculates to five percent or less, giving this hub an

accessibility percentage of 100. I already established that it more than exceeds the desired square footage of flat and open hardscape, and has a building that can be used. While some parts of this large park, like the grassy lawns and various sports fields, may not be accessible to those with mobility limitations, we can see ADA accommodations throughout the site, including wheelchair ramps at the community center building and curb cutouts at most park entrances. It also meets criteria for natural surveillance, multiple amenities, a mixture of surrounding building types and uses (everything from housing to schools to shops to churches), and all transportation modes except for designated cycle lanes. The only other drawback are that trees, shrubs, and some raised parts in the topography along the perimeter partially obscure the view of the park from the street. Out of the total of 12 site evaluation criteria, this hub scores 10.5.



Figure 5.10 – It's easy to see the benefit of having a hub here at Hiawatha Playfield & Community Center. Not only is there a lot of outdoor space to use, but there's also a lot of indoor space (West Seattle Blog, 2013).

Southeast from Hiawatha Playfield & Community Center, on a bluff close to the Duwamish River, we find the hub for the neighborhood of Pigeon Point. With an accessibility percentage of 100 and a site evaluation score of 10 out of 12 (only losing two points for a lack of cycle lanes and transit stops), this hub is rather unique in its actual location. According to the official list of hubs, this hub is nominally located at the three-way intersection of 20th Ave SW & SW Genesee St (*Community Emergency Hubs*, 2018). In fact, you can actually spot the locked metal tool chest containing the supplies for the hub here, right behind a sign for the West Duwamish Greenbelt walking trails. This may seem strange at first. Considering some of the other sites we've covered, a street intersection



Figure 5.11 – Here we see the Pigeon Point hub's emergency supplies cache in its natural environment (Stueve, 2020).

doesn't seem optimal for fulfilling the purposes of an emergency hub. There's not a lot of useful open space that's not part of the roadway, it's probably not much of a recognizable landmark in the minds of locals, and unless a nearby resident opens their home to be used for the hub there aren't any buildings open to be used. However, the participants at the Pigeon Point hub have gotten around these drawbacks – a lack of open space and a lack of an enclosed building – by connecting with a nearby community institution.

After communicating with the captain of this hub, I found out that an "unofficial agreement" exists between them and Pathfinder K-8 School, which can be found across a field about 150 yards to the south of the nominal hub site (J. Sander, personal communication, August 16th, 2020). During a disaster, after any students presently at the school have been sent home, the members of the Pigeon Point hub have permission to use Pathfinder K-8's large, open grounds for their emergency activities. The parking lots and play areas combined offer over 100,000 square feet of flat, paved, ADA-compliant surfaces. It's not difficult to imagine further arrangements being made with the school to utilize their buildings, as has been done with Seattle Parks and Recreation at the Hiawatha Community Center. This arrangement between the hub and school could serve as the catalyst for further cooperation, and perhaps even direct collaboration, between the Pigeon Point hub and the school's ASB or PTA on disaster preparation and relief efforts.

A ways to the west of Pigeon Point, and just a couple blocks to the east of West Seattle's well-travelled California Ave SW throughway, we come to the hub at Hope Lutheran Church. As with other hubs before, I'm simplifying the naming convention of this one from "Hope Lutheran Church (Alaska Junction)" to just Hope Lutheran Church. This is the church mentioned previously which, in the event of a disaster, will open its facilities to serve as a temporary shelter on behalf of the American Red Cross (D. Kannas personal communication, August 21st, 2020). On the west side of the property the ground is fairly level, but on the east side of the property the topography slopes downward sharply. Because of this, one of the four pedestrian routes that lead to this hub is too steep, with a slope measuring around nine percent, giving it an overall accessibility percentage of 75. In addition to its church and school buildings, Hope Lutheran fulfills most of the other expectations of my site evaluation criteria, including hosting multiple amenities in the form of a school (*Hope School Seattle*, 2013). It scores 9.5 out of 12, its only drawbacks being having no cycle lanes on the neighboring streets, no transit stops within a couple blocks, and the parking lot and front patio combined provide only about 3,700 square feet of flat pavement to work with. An extra church parking lot, located eastwards across the back alley, might have offered additional open space, but overhanging electrical lines and steeper topography rule it out from further consideration.

Moving south and west into a residential area consisting largely of single-family homes, we come to the hub at Ercolini Park. One caveat we have to contend with at this site is while no overhead power lines cross directly over the park, some do run right along its southern perimeter. Recall, however, that in some parts of the study area, the urban landscape may not offer us numerous alternate hub sites to choose from. Looking around this part of West Seattle, the only other potential hub site we might consider is Genesee Hill Elementary School, but there are even more power lines to contend with there. Also recall, however, that if there is a distance of at least 35 feet between overhead wires and the main part of the hub site, we can consider that distance a sufficient safety buffer and make an exception in order to include such a site (*Power Lines Safety Tips*, 2015). At Ercolini Park, there is at least 100 feet of space between the main hardscapes and the power lines at the south end of the site, so seems we can make Ercolini Park one of these exceptions. Like Hope Lutheran, just one of the four approaches leading to Ercolini Park is on too steep a slope, so its accessibility percentage is also 75. It scores a bit lower on my design evaluation criteria – 8.5 out of 12 – its shortcomings being the residential homogeneity of the surrounding blocks (no diversity in building uses), having no onsite buildings to speak of, and a lack of nearby cycle lanes and transit service. Still, this park is sure to be a center of activity for the surrounding residents, especially those with children that might use the playground. It should still make a suitable hub.



Figure 5.12 – While Ercolini Park does have power lines along its southern edge, the park is large enough that a hub could be positioned far enough away to avoid these (Stueve, 2020).

Located quite a way further south, right on the west side California Ave SW, is the Morgan Junction Park hub site. Being on flat ground, both of its two approaches have less than a five percent slope, so its accessibility percentage is 100. With a site evaluation score of 10.5 out of 12, it has most of the attributes we're looking for in a hub. All four modes of travel can be found along this stretch of California Ave SW. I'd say it offers at least a minimum of multiple amenities, as it contains a community notice board, one of those "little libraries" in a cabinet with a glass front on a wooden post, and some bench seating. On the downside, the park is a bit smaller than some of the

others that host hubs, offering only about 1600 square feet of flat, paved space, and scoring only half credit in that category. There are also no buildings for the hub to use at this park.

Travelling due east from Morgan Junction Park, we find the "Neighborhood House (High Point)" hub. Let's improve this name by taking out the parentheses, and just call it Neighborhood House High Point, which will also differentiate it from the Neighborhood House Rainier Vista hub over in the South End. Just like Neighborhood House Rainier Vista, Neighborhood House High Point is situated in the SHA residential community that provides part of its name – High Point. Overall, the ground beneath and around this site is only gently sloped, so all the pedestrian approaches to it have a gradient measuring less than five percent, and the resulting combined accessibility percentage is 100. For the site evaluation criteria, the score is 10.5 out of 12. Like it's Neighborhood House counterpart over in Rainier Vista, the buildings at this hub site contain a number of non-profit organizations and an office for SHA, as well as the High Point Homeowners Association / Open Space Association for local residents. Additionally, High Point Commons Park extends out northward from Neighborhood House High Point, acting as a sort of extended campus. Its features include an amphitheater (which has served as the initial meet-up point for this hub in past training exercises), a playground, paved walking trails, a P-Patch, a parking lot, and a basketball court, so this hub definitely has more than enough open space as well as numerous amenities to attract people (J. Schmidt, personal communication, August 20th, 2020). It fulfills most of the other criteria I'm looking for, the only shortcomings being that the buildings, trees, and topography at this site occasionally interrupt sightlines, and there's no cycle lanes here. Because of the benefits offered by this site, some of the other existing hubs close by seem far less useful, and have been crossed off our list. To no surprise, all three of these unsatisfactory hubs are P-Patch-based. They are High Point Commons Park P-Patch (located in the park right next to Neighborhood House High Point), High Point Juneau Garden P-Patch, and High Point MacArthur Lane P-Patch.

Moving along into the neighborhood of Highland Park, we come to the hub at the Highland Park Improvement Club (HPIC), a sort of community clubhouse. The ground is level enough so that all approaches to the site are on gradual inclines that don't exceed five percent, giving this hub an accessibility percentage of 100. HPIC also fulfills 10 out of the 12 desired site evaluation criteria, the only missing items being transit service and designated cycle routes. One of this hub's strong points is it can offer a variety of amenities. Neighborhood events are occasionally held here – notices advertising free community meals on weekdays have been visible as of late – and the building and outdoor area can be rented for private events. I have also been informed by the captain of this hub that they are applying for the city-funded "Hub-in-a-Box," and that they have a good working

relationship with the Highland Park Improvement Club organization that operates this facility (E. Harnett, personal communication, September 6th, 2020). On the downside, while they don't cross over the property or run directly along its main entrance, there are overhead power lines running along the southern and eastern edges of this site. If one of them was to come down, there should theoretically still be at least 35 feet of space between it and most of the rest of the outdoor areas. So, while the hub participants may not be able to use the outdoor wooden deck in the southwest corner of the HPIC in such a situation, or might have to yield a portion of the parking lot to a potentially live downed cable, there should still be a good amount of outdoor space to utilize and the building entrance shouldn't become blocked. Considering all this, and the benefits the HPIC hub can offer, I'll keep this one on the list.

Down the street to the west of HPIC is E.C. Hughes Playground, part of a versatile park that makes for an appropriate emergency hub. It has an accessibility percentage of 75, with one of the four pedestrian routes to its ADA-compliant entrance having a slope as steep as 11 percent. This hub scores 9 out of 12 on the site evaluation, since there's no cycle routes or transit service in the immediate surroundings, and the only public building onsite is the bathroom. Still, a variety of building types and uses can be found in the general vicinity, including homes, a children's daycare, a medical clinic, and several schools. The park also fulfills our multiple amenities, landmarks/signage, interior accessibility, and open space requirements, having a basketball court, barbeque pits, picnic tables, a notice board, a playground, paved ADA pathways, and (though they're likely not wheelchair accessible) some large lawns and playfields.



Figure 5.13 – Advertising for just one of the socially-distanced events HPIC managed to put on to support its community during the Coronavirus Pandemic of 2020-2021 (Stueve, 2020).

Moving further west and further south, we come to another Lutheran house of worship which hosts a hub. This is Peace Lutheran Church which scores well enough on the site evaluation criteria – 10.5 out of 12 – but presents us with the less-than-ideal (but still passable for the purposes of this project) accessibility percentage of 50 percent. The sidewalk on both the northern and eastern approaches to this church is sloped at less than five percent, but the southern and western approaches are both a bit steeper than five percent. Like Ercolini Park, Peace Lutheran does have overhead



Figure 5.14 – We should maintain the existing hub at Peace Lutheran Church, if we can just manage to avoid the power lines that border it (Stueve, 2020).

power lines running alongside the property, both to the north and south. There should be just enough space between both sets of wires and the patio entry of the church – at least 35 feet – so that this might still be used as a hub, but we should consider this with caution. As in the case of Ercolini Park, there aren't any alternate hub sites available in the vicinity, so while maintaining the existing hub at Peace Lutheran Church isn't optimal – thanks to the power lines and lower accessibility percentage – it may be just practical. And on the matter of providing multiple amenities, a glance at the church's website shows that it hosts a few different events open to the community, so I can check off that box on the site evaluation criteria (*Peace Lutheran Church – West Seattle*, 2020).

In the more southerly reaches of the Highland Park neighborhood is our second to last existing hub, located in the parking lot of The Salvation Army Seattle White Center. Here we find not just a perfect accessibility percentage of 100, but a perfect site evaluation score of 12 out of 12. Conspicuous signage, the absence of visual barriers, a good amount of flat hardscape, several useful onsite buildings with numerous amenities, variety in the functions of neighboring buildings (which also provide natural surveillance), ADA accommodations, and all four transportation modes can be found here. Unfortunately, unlike the hubs at Highland Park Improvement Club, Hiawatha Playfield & Community Center, and Pigeon Point's Pathfinder K-8 School, there isn't an agreement – official or unofficial – between the hub participants and the Salvation Army itself to access and utilize the built facilities here in the event of a disaster. Nevertheless, arrangements for this could be made in the future (A. Barnes, personal communication, August 20th, 2020).

Moving over into the Fauntleroy neighborhood, we come to our last existing hub – the aptly-named Fauntleroy Church. Like Peace Lutheran Church, one drawback of this church-based hub is the fact its accessibility score is only 50 percent. Sitting on a winding, descending street, the stretch downhill from Fauntleroy Church has a slope of about three percent, but the portion uphill from the site calculates closer to six percent, making it too steep to be considered accessible for those with physical disabilities. As in the case of Peace Lutheran Church, Fauntleroy Church comes close to being disqualified because of overhead power lines. Though they mainly run on the opposite side of the street from the church, some cross diagonally over to a pole at the northwest corner of the church parking lot. Fortunately, this is a larger parking lot (over 16,000 square feet), and the church buildings are located on the opposite side of it from the power lines, so there should still be enough space for the hub to function while still avoiding any downed power lines. With an almost perfect site evaluation score of 11 out of 12, one highlight of this site is the extra amenities it offers through a partnership with The West Seattle & Fauntleroy YMCA, which leases some of the church's space for its own programs.

Combined Walkshed Coverage Areas of Suitable Existing Hubs

Now that we've reviewed all the existing hub sites in my study area, determined which – according to my methods – are suitable to remain part of the Community Emergency Hubs system, and which are flawed in their attributes and should be omitted, let's turn to the geographic placement of the remaining hubs in the study area and how their physical locations affect people's access to them. Recall from the earlier methods section that we can use the Network Analyst function in the ArcMap GIS software to map the hub sites, determine the outline of a 15-minute "walkshed" around each hub (extending out to 3,900 feet), and see how much the study area the aggregated walksheds actually cover. As mentioned before, a person who finds themself within one of the larger combined walkshed coverage areas should have easier access to an emergency hub, and someone who finds themself outside of these walkshed areas will find their access to the hubs diminished.

If I map the original 55 hubs in my study area without subtracting any of the ones I found to be unsatisfactory, and then calculate 15-minute walksheds around them, we find that their aggregated walksheds cover 21.31 square miles (55.19 square kilometers) or about 77 percent of this study area. Now, if I complete the same process with just the 17 existing hub sites I identified as being worthy of continued use, having removed all the problematic hubs I described earlier, the situation is far different. In this case, the walkshed areas only encompass 10.94 square miles (28.33 square

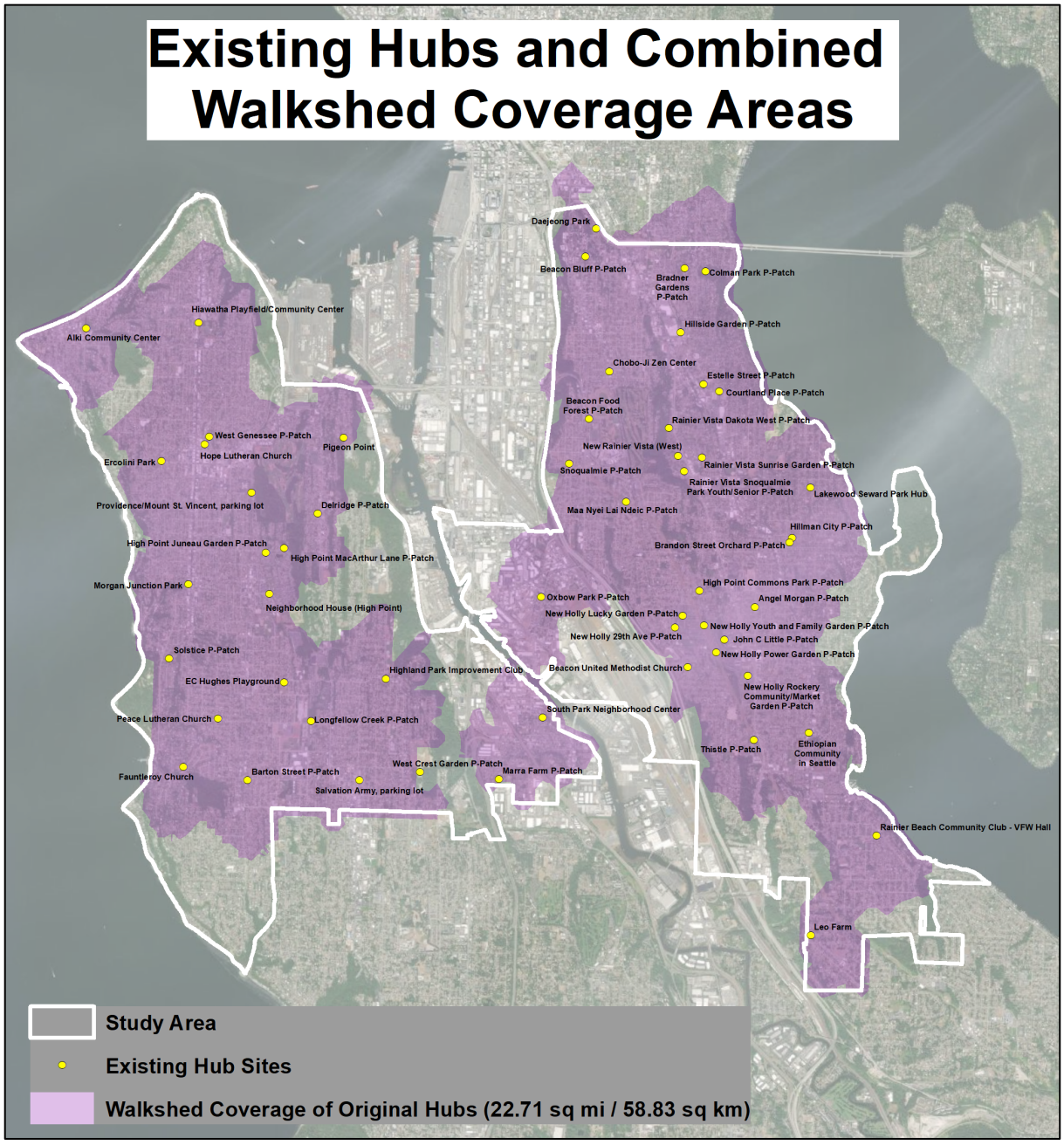


Figure 5.15 – After determining the 15-minute "walksheds" around all the existing hubs, and mapping the combined walkshed area they form, we can see that these walksheds cover 77 percent of my study area. Next, we'll see how these walksheds play out once the problematic hubs I've disqualified are removed from the map.

kilometers) or about 40 percent of the study area. Things are especially sparse in the SE Sector of the hub system. Since only four justifiable hubs remain there, entire South End neighborhoods from Mount Baker to Seward Park to Rainier Beach (and not just the geographically and seismologically problematic Georgetown) lie entirely or almost entirely outside of the walkshed areas afforded by

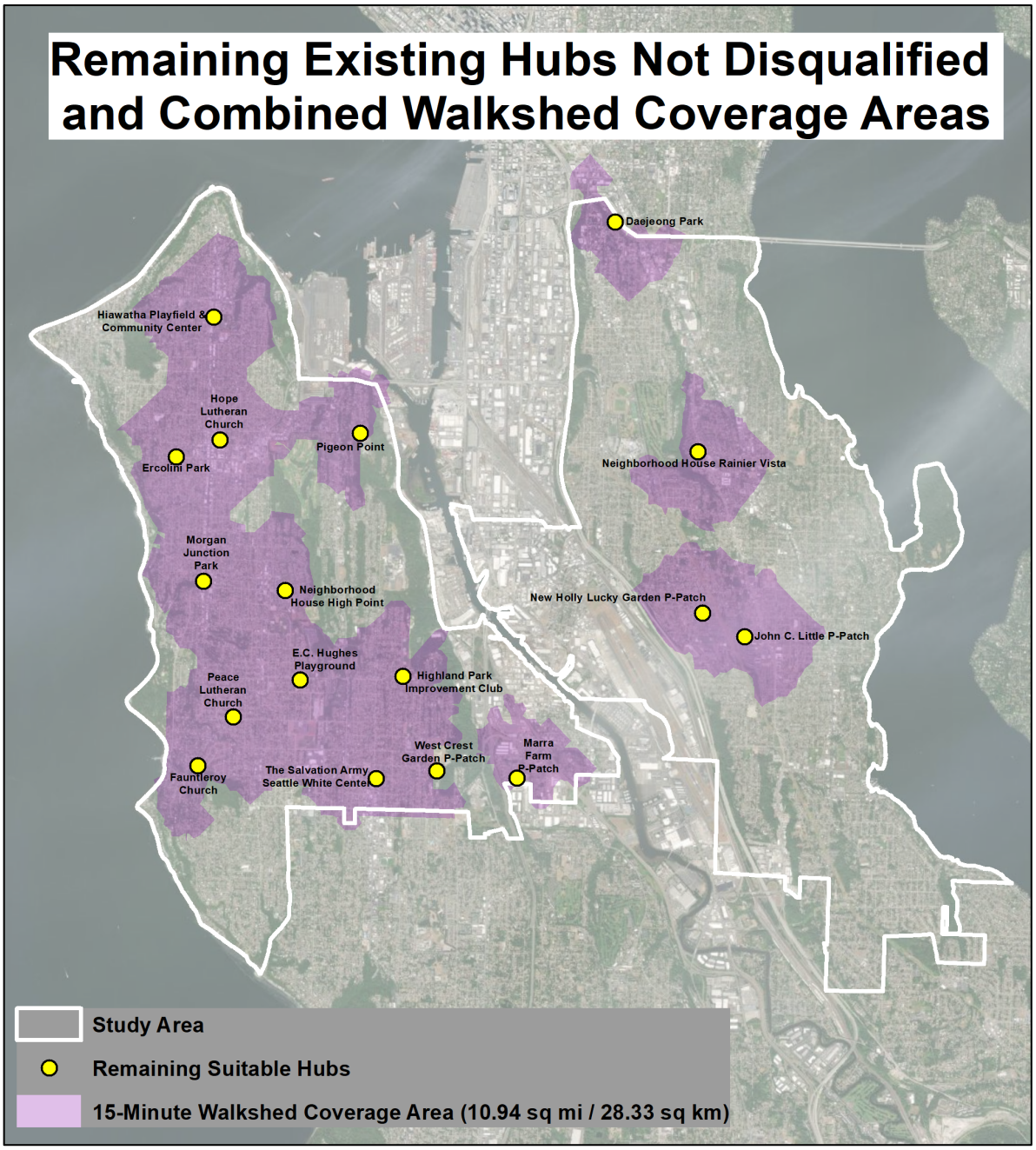


Figure 5.16 – After removing the 38 disqualified existing hubs from the map, and recalculating 15-minute walksheds for the remaining 17, we can see that the combined walkshed coverage areas have been significantly diminished, and now only cover about 40 percent of the study area.

those few acceptable hubs. Bear in mind that I eliminated those 38 other hubs for valid reasons related to safety, design, access, and the overarching concern that their flaws detracted from their usefulness as hub sites. That being said, disqualifying these deficient hubs has cut the combined walkshed area they serve almost in half. Fortunately, the remaining portions of this project will

include searching for superior alternate sites for hubs, so that combined walkshed area that's been shrunk might grow itself back again. Perhaps we can even make it a little bigger than it was before.

Social Capital at Suitable Existing Hubs – "Degree Centrality" Scores

To reiterate a key theme of this project, part of what the Seattle Community Emergency Hubs are meant to do is function as "social infrastructure," or physical places in the built environment where people interact, establish connections with one another, and develop "social capital" which might prove beneficial – even vital – in an emergency. If a hub is rendered unusable to participants due to the quake hazards of ground liquefaction, URMs, or overhead electrical lines, or is generally inaccessible to people with impaired physical mobility, then it's ability to serve as social infrastructure is drastically reduced, and the links it might offer to local social capital can become tenuous. So, just as removing inadequate existing hubs due to quake hazards, access issues, and other concerns reduces the overall geographic coverage of the hub system in the study area, removing

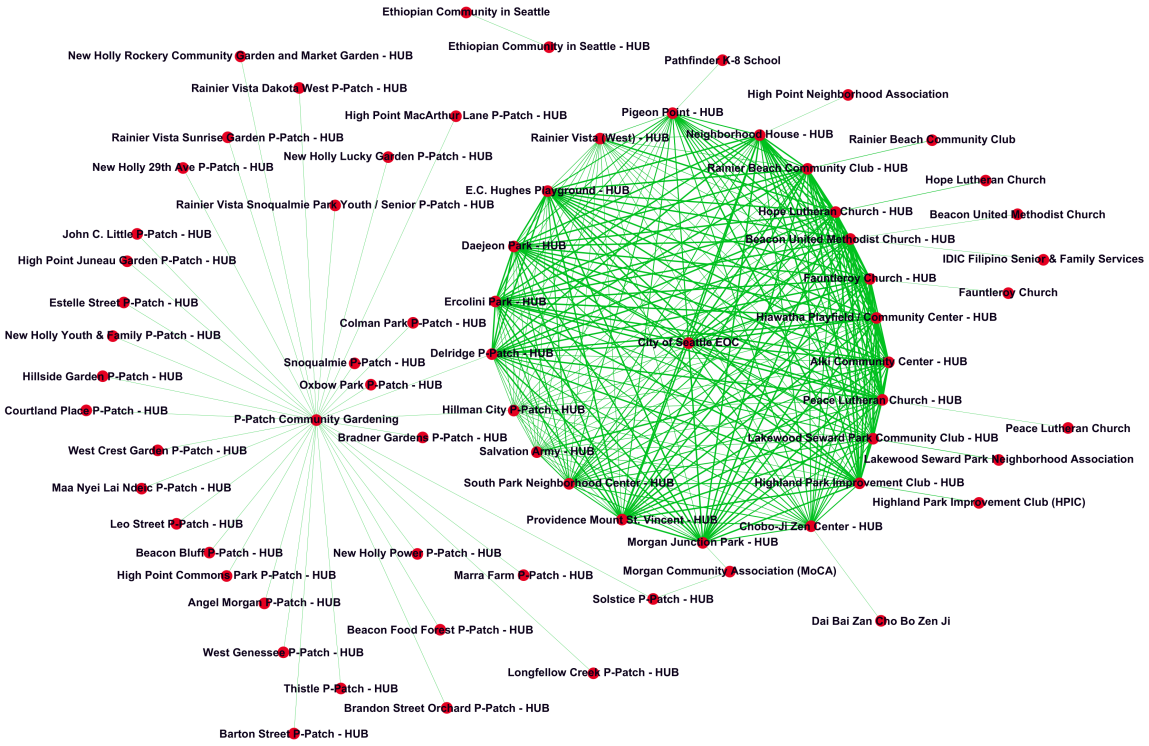


Figure 5.17 – My initial hub social capital model, visualizing the various connections between existing hubs and external organizations. Note that the Ethiopian Community in Seattle (ECS) and its hub are detached from the rest of the network, due to their lack of communication and coordination with other hubs. This is why the hub at ECS has such a low "degree centrality" score, 0.5. Hubs that communicate and coordinate with other hubs have much higher scores, the highest being Hope Lutheran Church with 59.

these hubs also reduces the amount of social capital the wider system has at its disposal. Indeed, in the event of a major earthquake where ground liquefaction and downed electrical lines make it impossible to use these unsatisfactory hubs, and people miss out on the social capital that might otherwise be found therein, the quake will have disrupted the connections to social capital that might be used for community disaster relief anyway.

To review, for measuring the amount of social capital that each hub is connected to I'll determine each hub's "degree centrality." This is done by diagraming the hubs, their partner organizations, and the relationships between them using a software called Gephi. The hubs and organizations are represented as "nodes," and the relationships between them are displayed as "vertices" which are weighted to reflect the level of coordination taking place (radio communication, regular meetings, external partnerships, etc.). A hub's "degree centrality" score – essentially its quantity of social capital - is the summation of the weighted vertices connected to its node within the model. In my initial social capital diagram of the South End and West Seattle hubs, we see that the two main organizational anchors that connect to the vast majority of the hubs are the City of Seattle's EOCs (the Emergency Operations Centers that have a radio link to many of the hubs) and the organization that oversees the P-Patch community gardens. The only hub that doesn't connect to anyone else, aside from the cultural center that hosts it, is the one at the Ethiopian Community in Seattle (ECS). The hub participants here seem fairly aloof towards the wider hub network, since they have no radio and aren't involved in the regular meetings between hub participants. In fact, we can't

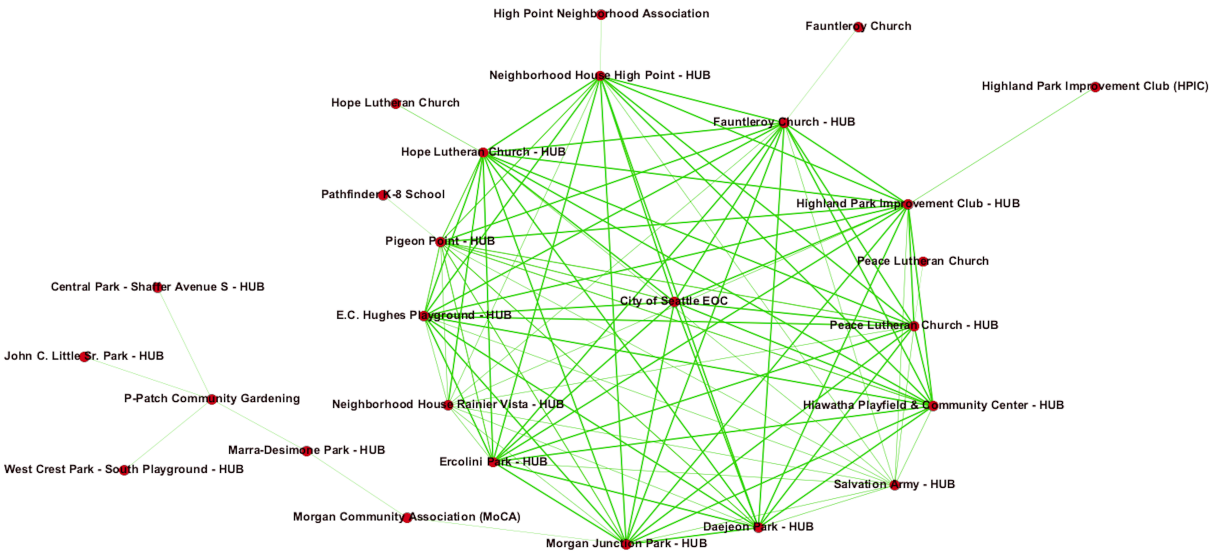


Figure 5.18 – As with the walkshed area maps, disqualifying problematic existing hubs shrinks my social capital model, as removing problematic hubs also detaches the hub system from the sources of social capital connected to those hubs.

be sure that a hub even still exists there, as they didn't respond to any email messages I sent to them. It's essentially an example of what we *don't* want the hubs to be, in that it's rather inactive and disconnected. With this initial diagraming, however, the remainder of the hubs seem fairly well connected. The average weighted degree centrality score is 16.86, and the highest score of 59 is held by the hub at Hope Lutheran Church. On the other hand, 32 other hubs (including ones at the ECS and most of the P-Patches) tie for the lowest score of 0.5.

After we've removed all the disqualified hubs, and we're down to the 17 eligible hubs we're planning to keep or slightly reposition, we can see from our next Gephi model that the pool of social capital has shrunk considerably. Interestingly, the weighted average degree centrality has gone up from 16.86 to 18.62, but the highest score is now down to 32 (in the case for the hub at the Highland Park Improvement Club).

Although I've disqualified the majority of the existing hubs in my study area, and thus called into question the utility of their associated sources of social capital, we are fortunate that both West Seattle and the South End offer numerous potential hub sites that could possibly be incorporated into the Seattle Community Emergency Hubs system, as well as untapped community organizations and institutions that could be utilized as social capital. Now, let's go over the proposed new hub sites discovered in the study area and deemed acceptable based on their attributes. I'll also go over the local steward organizations – onsite and offsite – that might partner with the hub participants in order to provide social capital in general, and to enhance the individual hubs' degree centrality scores. Again, we'll start in the South End, work north to south, and then work north to south in West Seattle. It should be mentioned that in the course of explorations for new potential hubs – which was done both on foot and online – there were over 100 sites in the study area which were considered as possible candidates, but were disqualified for being in close proximity to the likely quake hazards of ground liquefaction, overhead power lines, and URMs.

Selecting Hub Stewards for Remaining Existing Hubs

Since I'll later get into some detail about why our hub steward candidates for the newly proposed hubs were selected, here I can briefly cover which potential stewards have been selected for our remaining handful of 17 existing hubs. For the sake of brevity, I won't cover the exact reasons why each specific potential steward was selected for our remaining existing hubs, but I can say that special attention was given to finding would-be stewards that had a stake in the well-being of the surrounding community and/or would help the existing hubs connect with local ethnoracial minority

populations. To start out, the hub at Daejeon Park could be stewarded by Eritrean Hall (which is a community center for local residents with cultural ties to Eritrea), and the ASB and/or PTA of the nearby Beacon Hill Elementary School; the E.C. Hughes Playground hub could be stewarded by Filipino American Seventh-day Adventist Church and Vietnamese Thien-Baptist Church; the Ercolini Park hub could be stewarded by Genesee Hill Elementary School ASB/PTA; Fauntleroy Church can act as one of its own stewards, being both a hub site and a community institution, but it might also partner with the Fauntleroy Community Association and Fauntleroy Community Service Agency across the street, as well as the Christian Science Church up the road; the Hiawatha Playfield & Community Center hub might find stewards in the ASBs and PTAs of Lafayette Elementary School and West Seattle High School, as well as St. John the Baptist Episcopal Church (and let's remind ourselves here that while we might have public schools and religious groups steward the same hub site, in order to maintain "separation of church and state" I'll refrain from having faith communities steward a hub located at an actual public school, and vice versa); the socially active Highland Park Improvement Club (HPIC) effectively already acts as a hub steward for that location, and we might enlist as an additional hub steward the nearby church known as Paradise of Praise COGIC; the hub at John C. Little Sr. Park (moved just slightly from the adjacent John C. Little P-Patch) could use Debre Mihret St. Michael Ethiopian Orthodox Church and Samoan Community Church as stewards; the Marra-Desimone Park hub (formerly identified as being at Marra-Desimone Farm P-Patch) will be particularly important as the only suitable hub location in all of ground-liquefaction-endangered South Park, so I'll give it a few extra potential stewards, these being Concord International Elementary School ASB/PTA, Holy Protection of the Theotokos Orthodox Church, Oromo Church-God-Prophecy, and South Park Missionary Baptist Church; the hub at Morgan Junction Park could use the Gatewood Elementary School ASB/PTA and Morgan Community Association, the latter of which leading hub organizer Cindi Barker is already involved with; the hub at Neighborhood House High Point already has eligible on-site stewards in the form of the High Point Homeowners Association and High Point Open Space Association, which have offices there, and the High Point Masjid mosque and ASBs and PTAs of Fairmount Park Elementary School and West Seattle Elementary School could also become stewards; the hub at Central Park – Shaffer Ave S (formerly designated as being at New Holly Lucky Garden P-Patch) could be stewarded by Community of Christ: Rainier Valley Congregation; Peace Lutheran Church can help steward the existing hub on its property, as can their neighbors at The Hallows Church West Seattle Expression; the hub participants at Pigeon Point can build upon their "unofficial agreement" with Pathfinder K-8 School, and recruit its ASB and PTA as stewards; the hub at Salvation Army Seattle

White Center – Parking Lot might bring Westwood Christian Community onboard as a steward, along with the Salvation Army itself; the West Crest Park – South Playground hub (minorly adjusted from West Crest Garden P-Patch) is close to a diverse set of churches that could steward this hub site, including Highland Park Baptist Church, Highland Park United Methodist, Iglesia Adventista del Séptimo Día White Center, and Iglesia Seattle.

As for the Neighborhood House Rainier Vista hub, it's lucky enough to share a parking lot with the SE Seattle Tool Library. This is one of several "tool libraries" found throughout Seattle where residents who may not possess a certain power tool, gardening implement, or other piece of home improvement equipment (but have temporary need of it) can "check it out" like a library book, either using it at the tool library site or borrowing it temporarily to use at home. This is a well-suited potential steward that comes with a wealth of useful equipment and enthusiastic volunteers (as I know from experience), and other likely stewards for the Neighborhood House Rainier Vista hub might include Church At South Seattle, Columbia City Church of Hope, and a non-profit serving immigrants and refugees known as Kandelia.



Figure 5.19 – The SE Seattle Tool Library is an especially unique and useful community organization, just the sort of hub steward we'd want on our side in a disaster situation (*Southeast Seattle Tool Library*, n.d.).



Figure 5.20 – A plaque at Jimi Hendrix Park, with the Northwest African American Museum in the background (Scruggs, 2017).

Selecting New Potential Hub Sites

Now, let's get into the *new* hubs I can propose based on my evaluations of them, using my accessibility and site criteria. In the northernmost part of the South End is Jimi Hendrix Park, and the neighboring Northwest African American Museum. A proposed hub at the combined site of the Northwest African American Museum / Jimi Hendrix Park could be awarded an almost perfect site evaluation score of 11.5 out of 12, its only shortcoming being that the view into the grounds from the street is partially blocked by trees and topography. While it's accessibility percentage ranks low at approximately 33 percent, since only one of the three walkable approaches has an acceptable slope, it still meets the minimum accessibility requirement to be considered as a viable hub.

As an institution that invests in and represents Seattle's black community with its exhibits and events, appeals could be made to the Northwest African American Museum to act as an onsite steward for this hub, helping to organize and train community members pre-disaster, as well as provide leadership during and after a disaster. Their enclosed building is also one of the useful features I'm considering as part of this hub. Several other possible stewards can be found in close

proximity to this site, including five churches and one disability advocacy organization. The churches are Holgate Street Church of Christ, Japanese Presbyterian Church, Our Lady of Mount Virgin Parish, and St. Clement's Episcopal Church. Like the museum, a couple of these churches can help connect ethnoracial minorities to this hub and make it more culturally inclusive. These are Japanese Presbyterian Church and Our Lady of Mount Virgin Parish, the latter of which performs services in Chinese, Lao, and Vietnamese (*Multi-lingual Communities*, 2010). Also close by is The Lighthouse for the Blind, established over a century ago in 1918, whose mission is to "empower people who are blind, DeafBlind, and blind with other disabilities by creating diverse, sustainable, and meaningful employment opportunities" (*The Lighthouse for the Blind, Inc.*, 2020). Since we want to make sure these hubs are as accessible to the physically disabled as possible, it would be fortuitous to recruit such an organization as Lighthouse for the Blind as a hub steward, so that it can advocate on behalf of the visually impaired for their disaster relief needs.

Our next proposed hub in this portion of the South End is Mt. Baker Park. There are some power lines along parts of the southern edge of the park, but these might be avoided by entering the park from its southeast corner. (It should be said, this is another one of the portions within the study area where there aren't a whole lot of other good candidates for new hub sites.) Like the site of Northwest African American Museum / Jimi Hendrix Park, Mt. Baker Park's accessibility percentage only comes to 33, since only one of its three walkable approaches isn't too steep. Unfortunately, while this stretch of road only has about a three percent slope, it doesn't have sidewalks, but in an emergency situation seeing a wheelchair traveling in the middle street (for practicality's sake) isn't inconceivable. According to its site evaluation, Mt. Baker Park scores 10 out of 12. It has about 1,500 square feet of hard, level ground in the form of a tennis court, giving it half a point in the open space category. It has no onsite buildings, and the view from the outside is partly obscured by trees, so it receives zero points and half a point in those categories, respectively. Thankfully, it fulfills all the other criteria I'm looking for. Of course, being just a park and not an actual community institution, Mt. Baker Park doesn't come with an onsite steward organization. Franklin High School, the Mount Baker Community Club, and Mt. Baker Park Presbyterian Church were all considered as potential new hub sites but were disqualified, the former for having a "critical risk" URM and the latter two for having overhead power lines (*Unreinforced Masonry Buildings*, 2020). Since Mt. Baker Park has no ready-made steward, but those three rejected sites do, it makes sense to assign Mt. Baker Park Presbyterian, the Mount Baker Community Club, and the Franklin High ASB/PTA as the hub stewards for Mt. Baker Park.



Figure 5.21 – While the steeper terrain around Hawthorne Elementary gives it an accessibility percentage of only 33 percent, it still has a lot to offer in regards to space and social capital (Google Earth, 2021).

Heading south from Mt. Baker Park, Hawthorne Elementary School is another potential hub site. It does have power lines on its western side, but there should be enough space within the school grounds to avoid those if they become downed. Again, we see an accessibility score of about 33 percent, as only two of the six approaches leading to the school aren't too steep. The site evaluation score we arrive at is higher, hitting 11 out of 12 (only the cycle routes are missing). Finally, the school's ASB and PTA organizations could partner with the hub participants as a steward group for the site.

Jogging back up to the north for a second, the long-standing, multi-faceted, much beloved minority services organization of El Centro De La Raza should make an excellent hub. It's been advocating on behalf of the local Latinx population for decades, and provides human services to ethnoracial minorities, so including El Centro De La Raza (or "El Centro") as a hub can help the Seattle Community Emergency Hubs better connect with people of color. It also manages a couple low-income apartment buildings on its property, and the residents there might be persuaded to become involved at a future El Centro emergency hub. Five of the seven approaches that lead to the large, historic schoolhouse that contains the myriad services of El Centro are of an acceptable gradient, giving this site a rounded accessibility score of 71 percent. It possesses all the desired attributes from the site evaluation criteria, with the exception of the view from the outside being

interrupted by some of the buildings there, leading to a score of 11.5 out of 12. Power lines do skirt along its eastern side, but the site has so much space that these can be avoided if they were to become a problem. We can assign three nearby churches to this hub as stewards. These are Beacon Hill First Baptist Church, Christ The Son Of God Church, and Emmanuel Ethiopian Orthodox, the latter of which can increase the already rich diversity at the hub with its connection to the local Ethiopian population.

Moving south from El Centro, along the Beacon Ave corridor, we come to the sprawling, amenity-rich space that is Jefferson Park. This is one of the main centers of activity for the Beacon Hill neighborhood, and considering I disqualified the existing hub at the neighboring Beacon Food Forest, as well as the Chobo-Ji Zen Center hub a couple blocks to the north, I really should find a spot in Jefferson Park that can act as a hub. There's plenty of space for a hub to spread out in this large park, depending on its needs, but for now the Jefferson Tennis Courts seem like the best possible hub site within the wider park. Two of the three walkable approaches (about 66 percent) leading there are adequately accessible, and 11 of the 12 site evaluation criteria are fulfilled. There's a handful of buildings on the park grounds, there are wide and uninterrupted viewsheds inside and outside, all four modes of transportation run alongside, there are amenities galore, there's over 15,000 square feet of open ground in just the tennis courts alone, and the large veterans' hospital next door should fulfill the role of natural surveillance. Honestly, it's hard to find anything negative to say about Jefferson Park, other than it doesn't come with its own hub steward organization. To deal with that, I might recommend that Beacon Hill Church of the Nazarene, the previously mentioned Chobo-Ji Zen Center, and Rainier Valley Corps act as stewards here. While Rainier Valley Corps (RVC) actually has its offices over in the International District, outside of the study area, it works to promote social justice and empower minorities inside the South End, so it would be valuable to have as a steward organization (*Rainier Valley Corps*, 2020).

Our next proposed hub site, situated on the far side of Jefferson Park from the tennis courts, is Mercer International Middle School. Both pedestrian approaches to this school have slopes of only about two percent, so the overall accessibility percentage here is 100. Like many of the other schools we've looked at, Mercer has a considerable quantity of flat pavement (something like 65,000 square feet). This site scores 10 out of 12 on its evaluation, missing two points because of the trees, topography, and school buildings which block views from the outside looking in, and which also deny opportunities for natural surveillance. The ASB and PTA at this school can help steward the hub. While the Beacon Hill Church of the Nazarene sits right next door it was assigned as steward for

the Jefferson Tennis Courts hub instead, since this is a public school and we want to maintain separation of church and state.

Although it may not have the same name recognition as El Centro De La Raza, Asian Counseling and Referral Service (ACRS) should be made a hub for many of the same reasons as El Centro. This organization, according to its website, offers services in "over 40 languages and dialects," manages about 700 civic-minded volunteers every year, and is involved in numerous advocacy programs, from eldercare to behavioral health and from employment programs to political activism on behalf of the local Asian and Pacific Islander populations (*Asian Counseling and Referral Service*, 2016). An entity like this probably has much to contribute to the Seattle Community Emergency Hubs, considering its association with minority groups and the large amount of volunteers it could mobilize to assist with citizen disaster preparation and relief.



Figure 5.22 – Cooperating with community institutions that specifically serve minorities, like Asian Counseling and Referral Service (ACRS), can help increase ethnoracial diversity and inclusivity in the emergency hubs system (*Asian Counseling and Referral Service*, 2016).

Not only could the ACRS organization benefit the hubs network as an steward, but its siting is beneficial too. Sitting on fairly level ground, its pedestrian approaches have a 100 percent accessibility score. It earns 10.5 out of 12 points on its site evaluation, only losing half a point for some trees which partially conceal the property from the outside, and losing another single point for having no adjacent designated cycle routes. Along with public buses, the Sound Transit light rail passes right by on this stretch of MLK Wy. While there's no stop nearby for the train as there is for the King County Metro #106 bus route, riders on the light rail can still catch sight of Asian Counseling and Referral Service's location as they travel by, and might later remember its location during a natural disaster. Think of this as a sort of variation of "natural surveillance," but one which takes place from a moving vehicle.

Although ACRS certainly must have a depth of community connections to draw on for social capital, several of its neighbors would make convenient partners. We can recommend four potential stewards to serve at a proposed Asian Counseling and Referral Service emergency hub, in part because their own facilities might be affected by quake hazards. The Berean Church of God In Christ and John Muir Elementary School both sit atop one of the smaller liquefaction zones in this area, so

perhaps the congregants, ASB, and PTA from those institutions might connect with a more safely-placed hub at ACRS. Another couple faith communities – This is Holy Ground: Community Church and United House Of Prayer For All People – are also not far away, but sit underneath power lines. With their own facilities compromised by quake hazards, maybe they could be enlisted to steward an ACRS hub too.



Figure 5.23 – Considering how close Rainier Vista Boys & Girls Club's building is to the flat, open surfaces of Rainier Vista Playfield, it only makes sense to designate a hub here that includes both of these items (Google Earth, 2021).

Further down MLK Way, not far from the existing Neighborhood House Rainier Vista hub, is Rainier Vista Boys & Girls Club and Rainier Vista Playfield. As mentioned earlier in this portion of the project, I'm proposing a hub here because it has some advantages over the Rainier Vista Sunrise Garden P-Patch a couple blocks to the east. While this P-Patch does well enough as a hub, with an accessibility percentage of 66 and a site evaluation score of 8.5 out of 12, a future hub at the combined facilities of Rainier Vista Boys & Girls Club / Rainier Vista Playfield can achieve a 100 percent accessibility percentage and fulfill 10.5 out of 12 on my site evaluation criteria. Moreover, since there's usually a lack of an organizational relationship between the P-Patch gardeners and hub participants – even when a P-Patch and hub share the same site – Rainier Vista Boys & Girls Club seems well suited to partner with the hub participants as an onsite steward organization. In particular, since the organizational objectives of the Boys & Girls Club include educating, motivating, and empowering school-age youth and children through a variety of programs, it's not difficult to imagine

their Rainier Vista site introducing community disaster preparation and relief into the activities it offers (*Joel E. Smilow Clubhouse @ Rainier Vista*, 2020). It should be mentioned that if hub participants can reach out to young people, through public school ASBs or groups like the Boys & Girls Club, and help them to become directly involved in the efforts of the Seattle Community Emergency Hubs, then that also helps build resilience in the local community by cultivating a knowledge and enthusiasm for disaster preparation amongst the youth. In addition to its onsite steward, a future hub at Rainier Vista Boys & Girls Club / Rainier Vista Playfield could reach out to and recruit a couple additional nearby stewards from the community. In this case, Umoja PEACE Center (which advocates primarily on behalf of Seattle's black community) and Lutheran Volunteer Corps seem like fitting options, as they both work on matters of racial equity and social justice (*Umoja Peace Center*, 2020).

Orca K-8 School is another educational facility we should consider as a hub for the South End. It's parking lot and play areas offer over 30,000 square feet of open space, or over six times the basketball-court-sized 4,700 square feet minimum. It earns 9.5 out of 12 points according to the site evaluation criteria, missing two points for a lack of cycle and transit routes and half a point for some visual obstacles along its perimeter (in the form of school buildings and trees). Its accessibility score is 50 percent, since three of its six pedestrian approaches are too steep. The school's ASB and PTA can work with the hub participants as stewards, but there's a few other groups nearby that also might work well as stewards for this hub site. RainierAvenueRadio.World is a local radio station close to the school, which could partner with this hub site to broadcast useful information across the radio waves during a disaster. On its website, it describes itself as a "South Seattle community radio Station and digital media hub dedicated to amplifying the diverse voices of our community," so they likely would be interested in informing and mobilizing the listening public for the good of the community during a major quake (*RainierAvenueRadio.World*, n.d.).

A couple more organizations close to Orca K-8 School seem like they'd make appropriate stewards for a hub there. New Freeway Hall is an indoor community meeting space and political bookstore operated by the Seattle-based Freedom Socialist Party (FSP). I might have considered New Freeway Hall as a possible new hub site, but it's bracketed by power lines and has no outdoor space to speak of. Still, an entity like FSP seems like it would care about the well-being of the community, especially the most vulnerable, and could probably contribute a considerable amount of social capital to a hub at Orca K-8 School (*New Freeway Hall*, 2020). There's also Horn of Africa Services, a social services non-profit based in this neighborhood, and serving "individuals and families from Djibouti, Eritrea, Ethiopia, Sudan, Somalia, and neighboring countries that are living in the Greater

Seattle area" (*Horn of Africa Services*, 2018). It seems possible that this sort of organization could be recruited to support a hub, and its involvement could help foster ties between the hubs and minority communities.

I've already recommended a few potential sites and steward organizations that can help strengthen connections with Seattle's Asian, black, and Latinx minorities. A hub at Congregation Ezra Bessaroth, a synagogue in the Seward Park neighborhood, can similarly help develop ties with Seattle's Jewish community. First of all, this site scores well according to our spatial considerations.



Figure 5.24 – Including synagogues like Congregation Ezra Bessaroth as hubs and stewards can expand the reach of the emergency hubs amongst Seattle's various religious communities (*Office/daycare space available in Seward Park*, 2021).

Two of the three pedestrian approaches have an acceptable slope, making its accessibility percentage 66. It satisfies 11 of our 12 site evaluation criteria, but it doesn't seem to fulfill our expectations for hosting multiple amenities. Whereas other ethnoracial and religious organizations we've gone over seek to offer a variety of services to a variety of people, Congregation Ezra Bessaroth comes off as a bit more insular. Looking at this temple's website, it's key – and possibly only – demographic isn't just Jewish Seattleites, or even more specifically Seattleites who are *Sephardim* (Jews specifically of Mediterranean heritage), but local *Sephardim* whose ancestry is connected quite specifically to the Island of Rhodes in modern-day Greece (*Congregation Ezra Bessaroth*, n.d.). While the websites of other houses of worship commonly include a welcoming statement that's some variation on "all are welcome" or "feel free to join us," Congregation Ezra Bessaroth wants you to fill out an online application in order to be considered for membership. Despite this perceived religious provincialism, establishing a hub at this faith community can help connect the Seattle Community Emergency Hubs to another minority demographic in Seattle's diverse cultural landscape. And in the interest of promoting stronger diversity at the hubs, I might suggest that three nearby churches – New Light Christian Church, Rainier Avenue Church, and Seward Park Seventh-day Adventist Church – connect with the Congregation Ezra Bessaroth hub to help out as stewards. Since the existing hub at the Lakewood Seward Park Community Club hub was discounted on account of power lines, we can retask their hub participants to the Congregation Ezra Bessaroth hub,

seeing as the former already has a radio and trained members to operate it, and add Lakewood Seward Park Community Club as a steward there (Barker, personal communication, August 10th, 2020).

Heading west along the axis of S Orcas St, we encounter a string of four possible hub sites. Thus far, I have covered existing and potentially new hubs connected to Christian and Jewish institutions. In the interest of promoting further religious inclusivity – and overall human diversity – in the Seattle Community Emergency Hubs, Abubakr Mosque of Washington should be considered as a potential hub site. Found along the western side of MLK Wy, this mosque has an accessibility percentage of 100, and a site evaluation score of 10.5 out of 12. It's a little light on open space, as its parking lot is about 3,500 square feet and a bit smaller than the ideal 4,700 square feet of a basketball court, and there's no designated cycle routes there. However, we can put it down as having multiple amenities, since while the services and activities it offers are specific to Islam, they aren't ethnically specific like the more exclusive Congregation Ezra Bessaroth synagogue (*Abubakr Islamic Center of Washington*, 2020). For stewards, St. Edward Catholic Church (which also has a school) and the Ming Ya Buddhist Foundation Of Seattle are close by, and connecting them to the mosque can help promote interfaith relationships in the community.

Continuing with the goal of connecting the Seattle Community Emergency Hubs with this city's diverse minorities, let's talk about the Filipino Community Center. Located on the east side of MLK Wy, this Filipino-American cultural and social justice organization undertakes efforts similar to El Centro and ACRS, including senior support services, a food bank, youth programs, civic engagement activities, and arts programs (*Filipino Community of Seattle*, 2020). There are also future plans to erect a school and low-income housing at the Filipino Community Center, so the amenities it can offer to a potential hub here will multiply going forward. Looking at its location, two of the three walkable approaches are almost completely flat, while the third is too steep, so its accessibility percentage is about 66. There are some power lines at the back of the building, but there are none at the front nor over the 7,000 square foot parking lot, so this should be alright. According to our site evaluation, the Filipino Community Center has an almost perfect score and meets 11 of our 12 criteria. There are also plentiful potential steward organizations nearby, some which can add additional layers of diversity to this hub. These are the ASB and PTA of Dearborn Park International Elementary School, the Buddhist temple known as Co Lam Pagoda, a Kingdom Hall of Jehovah's Witnesses, the Seattle Chinese Assembly of God, and the West African Community Council.

Next on the list is Chinese Baptist Church in Seattle, at the nexus of Beacon Ave S and S Orcas St. The topography around this site allows for an accessibility percentage of 75, with one of

the four pedestrian routes leading there having a steep ten percent slope. The street also lacks not just cycle lanes, but sidewalks, so those with limited physical mobility trying to reach this church-based hub will have to use the roadway. Another drawback is the homogenous surroundings of only single-family homes, which fails to meet the criterion of a mixture of nearby building types and uses. Overall, Chinese Baptist Church in Seattle meets nine of the site evaluation criteria. Recommended nearby stewards are all Christian churches, but despite this commonality they serve a diverse set of ethnoracial demographics. They include Bethany United Church Of Christ, Our Lady of Zarvanycia Ukrainian Greek Catholic Church, Saint George Catholic Church (and Saint George Catholic School), Seattle Chinese Alliance Church, and Templo El Redentor.

Coming to the western terminus of S Orcas St, we reach Grover Cleveland STEM High School. Coming equipped with potential sources of social capital in the form of its own ASB and PTA, this school achieves 11.5 points out of 12, as some of its buildings block the view from the outside of its interior open spaces. Two of the five walkways that connect to it exceed a five percent grade, so the accessibility percentage here is about 60. The PTA and ASB at nearby Maple Elementary School, which is disqualified as a possible hub due to its overhead power lines, can help steward this proposed hub.



Figure 5.25 – With so much of Georgetown being situated on top of a ground liquefaction zone, this branch of Big Brothers Big Sisters may not be a perfect hub site, but it's the only one available to us in this neighborhood (Google Earth, 2021).

Now we come to the part in our hub-seeking survey where I have to find at least a partial solution to the conundrum of finding a suitable hub site in Georgetown, one of the two neighborhoods in my study area that sits almost entirely within a ground liquefaction zone. With so much of its territory at risk of ground liquefaction, it's impossible to centrally locate a hub to cover all of Georgetown with its walkshed. Our best option to at least extend the walkshed coverage as much as possible here is to recommend a hub at the Seattle location of Big Brothers Big Sisters. This is hardly an ideal hub site, specifically because its steep driveway might pose an obstacle for the physically disabled, but unfortunately it's what we have to work with in this part of the city. Three out of four pedestrian routes conform to the slope requirement, but only seven of the site evaluation criteria are met. Sightlines into the site are partially blocked by shrubs and trees. There's no natural surveillance, and no diversity in building types in this primarily industrial setting. There's also no cycle routes or transit connections here. On the bright side, Big Brothers Big Sisters can clearly provide a source of social capital, and its youth-focused programming can help involve young people at the hubs (much like the aforementioned Rainier Valley Boys & Girls Club). And attendees of New Direction Missionary Church and South Seattle College Georgetown – while their own locations sit within the dangerous ground liquefaction zone – can still help steward the Big Brothers Big Sisters hub. Those college students could be especially useful in dealing with the damage created by an earthquake, as a key focus of this branch campus is providing apprenticeships in about 50 different technical trades (*Apprenticeship & Education Center*, 2020). When a seismic event heavily damages one's community, having welders, plumbers, electricians, and other such professionals close at hand seems quite advantageous.

Doubling back east towards the interior of the South End, we leave Big Brothers Big Sisters and follow S Graham St itself to get to Graham Hill Elementary School. In regards to its level of accessibility for those with physical mobility concerns, well, it's a bit wanting on that matter. Of the five pedestrian approaches that lead to this site, only one qualifies as accessible. It squeaks by with a four percent slope, but the other routes are too steep, so its overall accessibility percentage is a disappointing 20 percent. Still, it meets our criteria of having at least one pedestrian walkway that should be accessible. It achieves 8.5 out of 12 on our site evaluation criteria, so at least *that's* not too bad. As with the other schools I'm considering, the PTA and ASB at Graham Hill Elementary are social capital assets to be utilized, as are their counterparts over at Aki Kurose Middle School, who can all potentially act as stewards.

Just one block south of Graham Hill Elementary School is another synagogue – this one of the Orthodox sort – Bikur Cholim Machzikay Hadath. It may seem needlessly redundant to have two

potentially new hubs so close together, but having both of these sites as hubs can help us promote diversity and inclusion in the Seattle Community Emergency Hubs while still maintaining separation of church and state. Its accessibility percentage is 75, and it fulfills nine of my site evaluation items. One of the other advantages of including this hub is the clustering of other Jewish institutions in the surrounding area, which can be utilized as stewards. These include two synagogues: Sephardic Bikur Holim Congregation and Minyan Ohr Chadash. A nearby Mormon temple – Community of Christ: Rainier Valley Congregation – can also act as a steward for this hub.

New Holly is a residential area which consists of low-income housing operated by the Seattle Housing Authority (SHA). It also contains the NewHolly Neighborhood Campus, a site that can't be recommended highly enough as an emergency hub. The main reason for this is that this spot contains several organizations that serve the diverse, low-income residents that live in the surrounding New Holly public housing community. One of these is East African Community Services (EACS), which seems like it would make an excellent onsite steward for an emergency hub. EACS's main focus is empowering the youth and supporting the families of the local Ethiopian, Eritrean, and Somali immigrant communities (*East African Community Services*, n.d.). Similar to the hubs recommended for Rainier Valley Boys & Girls Club and Big Brothers Big Sisters, a hub located at NewHolly Neighborhood Campus and working with EACS can help get more young people involved to support community disaster preparation and relief. Moreover, since many adult émigrés tend to learn new information (dialects, customs, public resources, etc.) about their adopted hometown via their immigrant and first-generation children, connecting a hub to young people and their advocates at EACS can create yet another link between the Seattle Community Emergency Hubs and ethnoracial minorities.

Aside from EACS, NewHolly Neighborhood Campus is also home to the NewHolly Learning Center (a branch facility of South Seattle College), the NewHolly Early Childhood Center, and an indoor event space called the NewHolly Gathering Hall. So here we have the multiple amenities and onsite building we're looking for in potential future hub sites. In all, 10.5 of the 12 site criteria are met here, the only downsides being that trees and bushes along the site perimeter interrupt the view from the outside, and there aren't any homes or additional establishments around to provide natural surveillance. Unfortunately, only two of the four walkable approaches to the NewHolly Neighborhood Campus aren't steeper than five percent – making for an accessibility percentage of 50 – but this location still has much to offer if it were to be designated as an emergency hub.

Moving east towards the MLK Wy corridor, we arrive at Iglesia ni Cristo – Locale of Seattle, a house of worship belonging to a Philippines-based offshoot of Christianity. Think of Iglesia ni Cristo (INC) as like the Mormons or Jehovah's Witnesses, but founded specifically on the island of Luzon instead of in the American Northeast. Overall, this spot scores very high on the accessibility and site criteria. Five of the six pedestrian approaches (about 83 percent) have a five percent grade or less, and 11 of the 12 site criteria are fulfilled here. I should highlight that the Seattle INC location has some truly unique architecture, specifically characteristic of this faith group, and this makes their building here practically a landmark unto itself. It's also notable that although Iglesia ni Cristo centers around a specific religious and national identity, this congregation has reached out to connect with the surrounding community. Some of this outreach was done specifically in the wake of a 2018 hate crime, an arson attack which took place during an evening service at Seattle INC, in order to build bridges and understanding with their neighbors (Crowe, 2019). Continuing in our practice of interconnecting the South End's sundry faith communities, Maranatha Adventist Church and the Vietnamese Buddhist center at Duoc Su Temple are close to the Iglesia ni Cristo and could help steward a hub there.



Figure 5.26 – Iglesia ni Cristo (INC) congregations are known for their distinct religious architecture, so this potential hub site would have the advantage of its own built-in "landmark" (*Iglesia Ni Cristo, Seattle Washington USA*, 2020).

Another house of worship, Rainier Valley Church, is also close to this stretch of MLK Wy. All four – 100 percent – of its pedestrian access ways meet my slope requirement, but one route (while still level enough) lacks a full sidewalk. A hub here would meet 11 of my 12 site criteria, including a sizable building and a large parking lot for open space. We can put Rainier Valley Church down as supporting multiple amenities, as it partners with other organizations that address sex trafficking, domestic abuse, and homelessness, including a branch of the Seattle Union Gospel Mission next door (Rainier Valley Church, 2020). Such partnerships also demonstrate this congregation's desire to serve the vulnerable, and such an ethos should benefit the Seattle Community Emergency Hubs in their disaster preparation and relief work. Additionally, a couple

other nearby churches, Israelite Community Church of God in Christ and Holly Park Community Church, could probably be enlisted as hub stewards.

Continuing away from New Holly, but still along MLK Wy, our next stop is Rosehill Missionary Baptist Church (also called Rosehill MBC). Be warned, there are power lines in the rear of the facility, so it would be best to concentrate any hub activities at the front entrance facing MLK Wy in order to avoid this hazard. From perusing their website, we can tell that the clergy and other leadership at this congregation are African American, so a hub at Rosehill MBC can serve as yet another linkage between the Seattle Community Emergency Hubs and local ethnoracial minorities (*Rosehill MBC*, 2020). Only one of the six walkways leading to Rosehill MBC exceeds a five percent slope so, its accessibility percentage rounds to 83 percent. The only specific site criterion this church seems to be missing is multiple amenities, as I wasn't able to locate any information on community activities they host or contribute to, so their site evaluation comes to 11 out of 12. Nearby, Emerald City Bible Fellowship is another faith community that might contribute as a hub steward here.



Figure 5.27 – Wat Lao Dhammacetiyaram is another potential hub site that really stands out in Seattle's architectural landscape (*Wat Lao Dhammacetiyaram*, n.d.).

Amongst the proposed faith-based stewards I've already mentioned some local Buddhist institutions, but I haven't recommended one yet as an actual hub site. In the interest of religious inclusivity, I should probably do something about that. Like the aforementioned Iglesia ni Cristo site further north, the religious architecture at Wat Lao Dhammacetiyaram makes their Buddhist temple a most conspicuous landmark, with its brightly colored flags, statues, and structures. Power lines over the southwest corner of this property can be avoided by placing the hub activities in the over 10,000 square foot parking lot on its northern side. This sort of Buddhist establishment is commonly associated with people of Laotian heritage – hence the "Lao" in Wat Lao Dhammacetiyaram – so a hub placed here would help reach yet another local minority community. All three pedestrian routes are within a five percent gradient for a 100 percent

accessibility score, and all but two of the 12 site evaluation criteria are met. Potential stewards to support this hub might include First Samoan Congregational, along with Unity Church of God In Christ.

After a string of suggested hubs and stewards at faith communities, let's look at another public school. Located along Beacon Ave, a hub site at Rising Star Elementary School should specifically be placed in the north parking lot of this educational facility, and I'll denote this in the potential hub's name when appropriate (it should say "Rising Star Elementary School – North Parking Lot" on any lists). This is to avoid power lines along other parts of the grounds, and to allow hub participants to get from this outdoor area to the school building without passing underneath any electrical quake hazards. And speaking of the school building, hopefully a future hub at this location could make arrangements to utilize their indoor facilities, as the Pigeon Point hub and Pathfinder K-8 School have done. Rising Star Elementary has an accessibility percentage of 100, with all three approaches being of an acceptable gradient, but I'll have to dock two points off its site evaluation for a total of ten. This is because the surrounding land use is quite homogenous, consisting only of only single-family homes. I should also take off a point for landmarks and signage, because while the school building itself has a sign and a flagpole the north parking lot specifically doesn't, and that's where we want people to gather for the hub. Well, at least this site has a cycle trail which passes close by. As you've probably noticed, a lot of the aforementioned hub sites lacked this. About a two-minute drive from this school is another, Wing Luke Elementary School, which I disqualified as a site because of – you guessed it – power lines. However, the ASB and PTA from both Wing Luke and Rising Star can come together at the latter school, potentially acting as steward organizations to support the hub participants there.

South Shore K-8 can be found near the bustling intersection of Rainier Ave S and S Henderson St. The Rainier Beach Community Center next door was considered, but disqualified as a potential hub due to the power lines along its perimeter. South Shore K-8 doesn't have that problem, accomplishes an accessibility percentage of 100, and scores 11.5 of 12 on my site criteria (again losing half a point for plantings that partially block the view from outside). Another one of those pesky ground liquefaction zones comes close to the school grounds, but doesn't reach all the way to this site. The ASB and PTA groups from nearby Dunlap Elementary School and South Lake High School can help steward this proposed hub, as well as the ASB and PTA from South Shore K-8 itself. Since I had to disqualify the existing hub at the Ethiopian Community in Seattle, we can assign it as a steward at South Shore K-8 too, so we don't miss out on including that valuable piece of social capital.

Further west near the intersection of S Henderson St and MLK Wy is Flock Christian Church. Here, again, we have a potential hub site with an accessibility rating of 100 percent. It meets ten of my site evaluation criteria, missing two points on cycle lanes (as usual) and multiple amenities. The latter seems to be true because in looking at their Facebook page, which is practically its only web presence, there's not really any evidence of the church hosting community events or playing a big role in the surrounding neighborhood (*FLOCK Christian Church*, 2020). While this congregation may not display large quantities of social capital, we can certainly augment what it has by suggesting some stewards for a hub site here. Close by are two Islamic entities, the Oromo Cultural Center and a Mosque called the Oareao OCC Masjid, along with Paradise Baptist Church and Somali Community Services of Seattle. Ideally – again – such a diverse grouping of hub partners should help to build bridges across ethnic and religious lines, as well as provide additional sources of social capital for the hub participants to draw from.

The city park known as Benefit Playground can be found in a more secluded residential area in the South End. While the pedestrian approaches to this potential hub site all have a satisfactory slope, this proposed hub site only scores 7.5 out of 12 on the site evaluation criteria. It loses half a point for trees interrupting the view from the outside and loses an additional point each for lacking a building, lacking sidewalks along the outside, lacking designated cycle routes on the surrounding streets, and the residential homogeneity of the surrounding area. Of course, a park like this doesn't come with an onsite organization to partner with the Seattle Community Emergency Hubs, so I should consider recommending a steward from the surrounding community. Involved in a wide array of community development activities, and holding the motto "Empowering community, moving Rainier Beach forward," the Rainier Beach Action Coalition (RBAC) makes an excellent candidate for this role (*Rainier Beach Action Coalition*, 2020). An organization involved with economic development, urban agriculture, promoting local public transportation, and other quality of life issues in the Rainier Beach area likely would be interested in promoting disaster resilience there too.

Hutchinson Community Center / Hutchinson Playground is the hub site I'm recommending to replace the current hub at Rainier Beach Community Club. I had to disqualify this neighborhood clubhouse due to an overhead power line that crosses the property. This is a shame, as the hub participants there have a radio (and knowledge of how to operate it), a gasoline generator, and a good working relationship with the Rainier Beach Community Club itself (R. Angeles, personal

communication, August 20th, 2020). Emerson Elementary School, located just a couple blocks to the west, also seemed like a possible replacement candidate, but its main building is a URM of the "critical risk" category (*Unreinforced Masonry Buildings*, 2020). However, the property containing the Hutchinson Community Center and Hutchinson Playground doesn't have either of the problems of URMs or power lines, so it's being recommended here as a better site for a hub. Three of the four walkable approaches to this site are within a five percent slope, so the accessibility percentage here is 75. Ten of the 12 site evaluation criteria are met, the only exceptions being a lack of nearby transit and cycle routes. There's also a wealth of potential steward organizations to consider in the vicinity, including Emerson Elementary School's ASB and PTA, Kibre Qidusan Medhanealem Ethiopian Orthodox Tewahedo Church, Rainier Beach Presbyterian Church, and St. Paul Catholic Church. And although I'm not recommending the continuation of the Rainier Beach Community Club hub, members of that club currently involved with that existing hub would likely maintain their participation, switching over to the Hutchinson Community Center / Hutchinson Playground hub instead.



Figure 5.28 – As an unreinforced masonry building (URM) I wasn't able to consider Emerson Elementary School as potential hub site (Morton, 2019).

The final potential hub site recommended for the South End is Garden of Gethsemane Church of God In Christ. Although it's not as ornate, and therefore not as noticeable as other religious establishments in Seattle, it has some other attributes that would benefit it as an emergency hub. All approaches meet my slope expectations, and (as usual) the only item missing from its site evaluation is any cycling infrastructure. We can also join it with St. Luke's Lutheran Church and the Wat Lao Mixayaram / Laotian Buddhist Society as hub stewards.

Moving now from the proposed hubs of the South End to those in West Seattle, let's consider placing a hub at Admiral United Church of Christ. The northernmost site I considered in this part of town was Hamilton Viewpoint Park, but all of the walkways to this scenic overlook exceeded a five percent slope, making it completely inaccessible to those with limited mobility (at least by the standards for this project). Five blocks south and two blocks west at Admiral United Church of Christ, however, pedestrian approaches to the site are within a five percent slope, and only two items from on our site criteria are missing. Along with no cycle routes, the area around this church is

lacking in land use types, which consist only of residential homes and apartments. This area also has no nearby stewards to offer this proposed hub. The only possible candidate is Lafayette Elementary School, and if we pair them with Admiral United Church of Christ we'll be breaking my separation-of-church-and-state rule. Still, with Lafayette Elementary having the issue of power lines disqualifying it as a hub site, it's the only eligible site this far north in West Seattle we have to work with.

Named for the wooded area it borders upon, Schmitz Park Elementary School scores a little lower than most of the other proposed new hub sites. It only has an accessibility percentage of approximately 66, since one of its three pedestrian approaches is too steep. It gets a score of nine on its site evaluation criteria, missing points for infrastructure, transit stops, and diversity in the surrounding land uses. Like with other schools, it's ASB and PTA can help steward a hub here, along with the ASB and PTA at nearby Madison Middle School. Like with Admiral United Church of Christ, Schmitz Park Elementary is in an area lacking in appropriate hub sites, and so while it's missing a few features it remains our best option thereabouts.

The Youngstown Cultural Arts Center and the West Seattle Tool Library share a parking lot in the Riverview section of West Seattle, close to Pigeon Point. Both could be valuable as emergency hubs, so I'll just join them together as a proposed Youngstown Cultural Arts Center / West Seattle Tool Library hub. Like the SE Seattle Tool Library next to the Neighborhood House Rainier Vista hub, this other tool library affords additional benefits for this proposed hub in the form of equipment and community volunteers. In regard to the Youngstown Cultural Arts Center, it should be mentioned that it's housed in a historic brick building classified as an unreinforced masonry building, but this URM has been placed in the safer category of "Substantial Alteration" since it's been retrofitted against earthquakes (*Unreinforced Masonry Buildings*, 2020). The Youngstown Cultural Arts Center describes itself as "an inclusive contemporary multi-arts hub [...] that incubates the arts, artists, and organizations from our multicultural, intergenerational communities in order to engage in civic dialogue and meaningful community transformation," so we can be sure that



Figure 5.29 – While the Youngstown Cultural Arts Center is indeed a URM, it is one that has undergone a "Substantial Alteration" retrofit, thereby mitigating much of the seismic dangers such buildings present (*Youngstown Cultural Arts Center*, 2018).

the programming and socialization that takes places there adds to its value as a proposed hub (*Youngstown Cultural Arts Center*, 2018).

At this Youngstown Cultural Arts Center / West Seattle Tool Library site, three of the four pedestrian approaches meet the accessible slope requirement, and the only other criteria missing is a clear view into the property, as the steep driveway leading uphill into the parking lot means the interior is hidden out of sight from the sidewalk below. It should be noted that although this route into the potential hub site might be too steep for someone with limited physical mobility, an ADA-compliant ramp can be found partway along the west side of the building. In the interest of cultural inclusivity, the nearby Duwamish Longhouse and Cultural Center could be assigned to steward a hub here (along with the actual tool library and arts center organizations onsite), seeing as this Native American institution sits within the liquefaction zone further down the hill.

Just a block north of the Providence Mount St. Vincent hub I opted to remove from the list, the West Seattle Legion Hall veterans club and event space should make for a better hub site than that retirement community, which was problematic according to my accessibility considerations.



Figure 5.30 – A retired artillery piece, seen at West Seattle Legion Hall, also doubles as a landmark for this potential hub (*American Legion Post 160 of West Seattle*, 2020).

There are some power lines that come up against the rear areas of the Legion Hall, but the site can still be accessed from the front without those being a problem. It scores 11.5 out of 12 on its evaluation, with its only shortcoming being that its paved hardscape area is only about 1,200 square feet in size. That surpasses the absolute minimum of 100 square feet we're hoping for, but falls short of the ideal 4,700 square feet we wished it had. Sitting on fairly level terrain, three of the four pedestrian approaches (75 percent) meet my slope limit of five percent. There are a couple other benefits this site offers, particularly due to its connection to the military. Firstly, the veterans of American Legion Post 160 who meet there likely have useful skills and experience from their armed forces careers that would be valuable in a disaster situation (*American Legion Post 160 of West Seattle*, 2020). Secondly, there's an antique 155mm howitzer sitting on the front lawn at the Legion Hall, and that's a true landmark that's hard to miss.

Like the American Legion facility, the Alki Masonic Center is another fraternal organization I ought to consider for a future hub site. Between its role as a public events space and the groups of Freemasons who meet here, we have here a site that offers multiple amenities, has both indoor and outdoor spaces, and has a potential onsite steward to work with the hub participants (*Alki Masonic Center*, n.d.). Three of the four pedestrian approaches at the Alki Masonic Center meet my slope expectations, and nine of my site evaluation criteria are accounted for. Along with the Freemasons, the Fraternal Order of Eagles and the West Seattle Junction Association are in the area and might also serve as hub stewards. The latter should be especially beneficial as a partner organization, as it can mobilize volunteers and coordinate local events (*The West Seattle Junction Association*, 2020). It also has the potential to develop connections between local small businesses and the Seattle Community Emergency Hubs which, as hub organizer Cindi Barker mentioned in her conversations with me, is a future endeavor she and her fellow hub participants want to undertake (personal communication, August 7th, 2020).

While I've included a number of schools as useful hub candidates and considered one community college as a steward in Georgetown, a proposed South Seattle College – North Parking Lot hub would be the only one actually located on a college campus. One of the two pedestrian approaches, while maintaining a modest two percent slope for most of its extent, has a short but steep stretch of 12 percent gradient along its way from the nearest three-way intersection. Because of this, I'll have to give this site a 50 percent accessibility rating. At least it scores 11 out of 12 on my site criteria, the only missing item being a lack of natural surveillance from neighboring buildings. Just the north parking lot alone offers almost 200,000 square feet of flat, paved, open space, enough for over 40 basketball courts, so we can be pretty confident that an emergency hub placed here won't run out of room for its activities. On the topic of harnessing social capital and utilizing the unique abilities of locals for the benefit of the hubs, South Seattle College has a lot to offer in this regard. The campus offers academic programs for tradesmen, engineers, healthcare workers, and other professions for which the knowledge of an experienced instructor or aspiring student might prove beneficial for disaster relief purposes (*South Seattle College*, 2020). Another nearby community institution, Full Gospel Pentecostal Church, was disqualified as a potential hub due to power lines but can probably help steward the hub at South Seattle College – North Parking Lot instead.

Over along Delridge Wy SW, both of the pedestrian routes leading to Louisa Boren STEM K-8 are of an acceptable slope, and the school meets 11 of the 12 site criteria I'm looking for. Like with other academic facilities, its parking lot and grounds exceed our ideal objective of 4,700 square feet, actually providing about 64,000 square feet of useful outdoor space. As with other schools, the

PTA and ASB organizations at Louisa Boren might be recruited to help support the activities of an emergency hub, and arrangements might be made to utilize the school building there. As the school name suggests, Louisa Boren's school curriculum has a heavy focus on science, technology, engineering, and mathematics (or "STEM") so there could be ways to intertwine the educational activities of the school to the disaster training and relief activities of an emergency hub (*What is STEM?*, 2020).

About halfway between the proposed hub at South Seattle College – North Parking Lot and the existing hub at Highland Park Improvement Club (HPIC) is Riverview Playfield, another appropriate future hub site. It has a rounded accessibility percentage of 66, with one of the three pedestrian routes to the park being steeper than five percent, and meets nine of my site criteria. The ASB and PTA at nearby Sanislo Elementary School could help steward this hub, as there isn't a community organization present at the site to back-up the hub members.

A hub at Lincoln Park – Parking Lot 1, this title being selected to be geographically specific without being too lengthy, would help make up for the fact that the existing Solstice P-Patch hub in this area was disqualified from my final list of hubs. With no onsite steward candidate, the Westside Unitarian Universalist Congregation up the road might be approached to fill that role. We can gather from their website that this religious community seeks to be culturally inclusive and to promote social justice, so they seem like they should be a good fit (*Westside Unitarian Universalist Congregation*, 2020). Like Riverview Playfield, this site has an approximate accessibility percentage of 66, with only one of the three walkable approaches surpassing a five percent grade. Of our 12 site evaluation criteria, 11 are accomplished at this site, the only missing item being a building to use at the hub.

There were a few sites around A.T. Milo Park I could consider for new hub sites, but in the end this city park was deemed preferable over other spots nearby. In an area with somewhat hilly terrain, we're lucky that three of the four (75 percent) approaches to these sites fall within a five percent slope. A.T. Milo Park has a few flat hardscapes in its southwestern corner, which combined equal to a little under 2,000 square feet, so the site earns half a point in that category. There are no onsite buildings, designated cycle routes, or transit connections in the immediate vicinity, but the park fulfills all the other desired criteria. The ASBs and PTAs at a couple nearby schools – Chief Sealth High School and Denny International Middle School – could become stewards for the site and cooperate with the hub participants there. Their campuses didn't meet the site criteria we were looking for, but their involvement at a A.T. Milo Park hub would be beneficial.

Just like Georgetown over in the South End portion of my study area, South Park is a neighborhood in the SW Sector that presents us with the same wicked problem of geography, for which we again only have a partial solution. Located just across the Duwamish Waterway from Georgetown, South Park is another area that also lies almost entirely in a ground liquefaction zone. It's here that we find the current Marra-Desimone Farm P-Patch hub, which I'm recommending be



Figure 5.31 – Slightly adjusting the existing Marra-Desimone Farm P-Patch hub to include the larger Marra-Desimone Park would also allow us to keep at least one hub in South Park that doesn't sit on top of a ground liquefaction zone (Google Earth, 2021).

spatially adjusted so as to be centered on the wider Marra-Desimone Park instead. While keeping the hub solely at the community garden would limit disability access and usable open space, adjusting it allows us to include a paved parking lot on the other side of the 8.7-acre park that measures almost exactly at 4,7000 square feet, and which has a driveway that someone with reduced physical mobility should be able to surmount. According to the City of Seattle, the park will be redeveloped in the coming years, so a hub site here might benefit from future changes (*Marra-Desimone Park*, 2020). Hopefully those future changes might alter how the park shapes up on my site evaluation criteria, as it only scores 7.5 out of 12 in its current state. There's no building at the site, and some trees partially obscure the view from the outside. There are also no sidewalks, cycle infrastructure, or transit options in the immediate vicinity. Despite the omissions of sidewalks, three of the four roads leading to Marra-Desimone Park are level enough to be considered accessible. The 15-minute walkshed

emanating out from this hub – sitting just outside the main ground liquefaction zone hereabouts – should be able to cover at least part of liquefaction-endangered South Park, but not in its entirety. This is just an unavoidable issue with so much of this neighborhood – and any other possible hub sites within it – sitting inside a ground liquefaction zone. Despite this dilemma, the surrounding community does have some potential hub steward organizations to offer, including Concord International Elementary School's ASB and PTA, Holy Protection of the Theotokos Orthodox Church, Oromo Church-God-Prophecy, and South Park Missionary Baptist Church.

A hub at The Church of Jesus Christ of Latter-day Saints – Myers Way ought to be named so specifically as not to confuse it with The Church of Jesus Christ of Latter-day Saints – 4th Ave SW, a Mormon congregation assigned to steward the existing Hope Lutheran Church hub I covered earlier. Both walkable routes to this site aren't too steep, according to my measurements, so the accessibility percentage is 100. However, the sidewalk is incomplete along these streets, so someone with limited physical mobility may have to use the shoulder of the road for part of the way. Not ideal, but not impossible. In addition, this potential hub scores the lowest on the site evaluation criteria of any on my final list, existing or proposed. Out of 12 items, it scores just a measly six. Part of this is due to its more remote location, sitting in a wooded area with little in the way of built-up development. Because of this, there's no mixture of buildings surrounding it, no opportunities for natural surveillance, no transit stops, and no cycle routes. Looking at this Mormon temple's website, we don't see enough in the way of community involvement and events to check the box "yes" for multiple amenities (*Belong to a Caring Community*, 2018). Nevertheless, as has been said before with other less-than-optimal sites, there are hardly any other viable options to pick from around this part of Seattle.

Sitting right at one of the southern stretches of the city line, Holy Family Roman Catholic Church is home to a both a congregation and a parochial school, offers services and classes in both English and Spanish, and also has congregants of Filipino, Vietnamese, and Cambodian (as well as Hispanic) heritage. Continuing with the effort to involve as much of Seattle's ethnically diverse human landscape as we can, an emergency hub placed at Holy Family could connect with the multicultural, multigenerational group of community members who attend there (*Holy Family Roman Catholic Church*, 2020). There's a stop for the #120 and #560 King County Metro buses right in front of the church entrance, so frequent riders of these transit routes should be familiar with this location, and therefore more likely to come to know about an emergency hub placed there. Overall, Holy Family satisfies 10.5 of the 12 site criteria. While it has ample open space throughout the church and school grounds, a lot of it is close to power lines, so it seems best that a hub here would

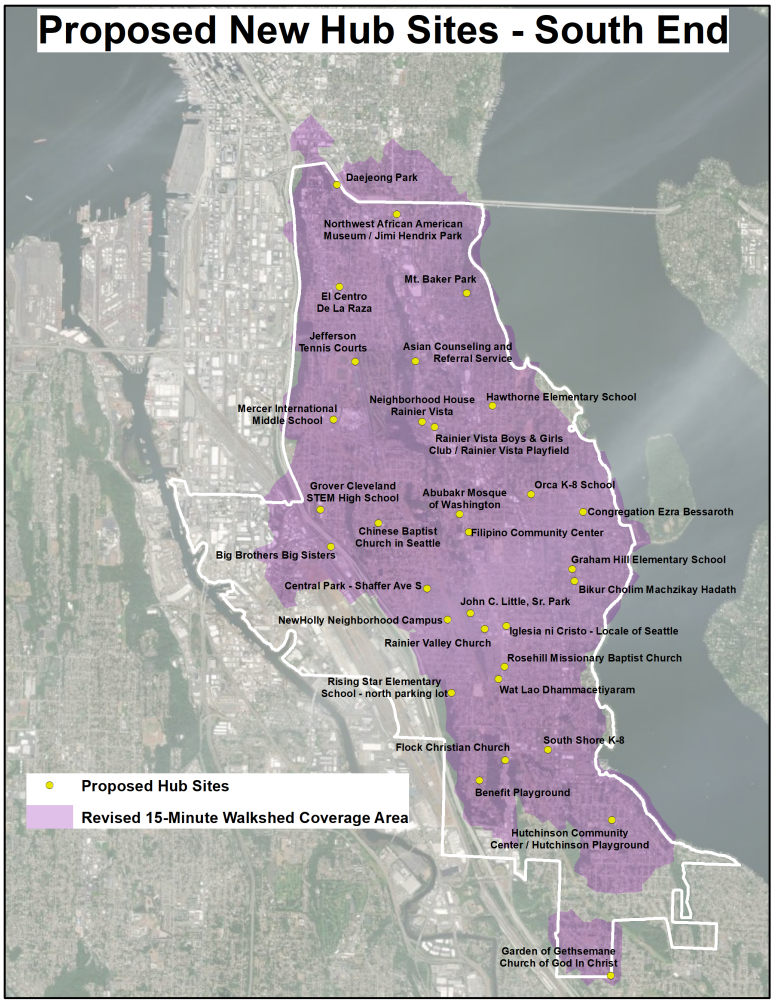


Figure 5.32 – After mapping my proposed hubs sites (a combination of the non-disqualified existing hubs AND newly identified potential hubs), and recalculating their 15-minute walkshed areas, this is the result in the South End.

set itself up at the church entrance. There's about 2,400 square feet of pavement there, no overhead electrical lines, and the church steeple above it makes an appropriate landmark for the hub. As to the four pedestrian approaches to this spot, three have passing slope measurements, adding up to an accessibility percentage of 75.

Combined Walkshed Coverage Areas of Potential New (and Suitable Existing) Hubs

Having theoretically broken down and rebuilt the entire hub system within my study area, let's see how successful I was with expanding the geographic reach of this re-envisioned hub network. Before eliminating any of the problematic existing hubs we had a total of 55 in the study area – 32 in the South End and 27 in West Seattle – and their combined walksheds covered 21.31 square miles (55.19 square kilometers) or 77 percent of this study area. After discounting the troublesome hubs and recalculating the walkshed coverage area for the 17 suitable ones that remained – in the South End and 13 in West Seattle – this was reduced down to 10.94 square miles (28.33 square kilometers) or 40 percent. By writing off the existing hub sites I considered to be inadequate to serve in this role, I practically cut their overall geographic reach in half. Fortunately, both the South End and West Seattle offered a wealth of alternative sites I could consider including in our reimagined hub system. By adding suitable potential hub sites to the network, I was able to more than make up for the ones I had to delete.

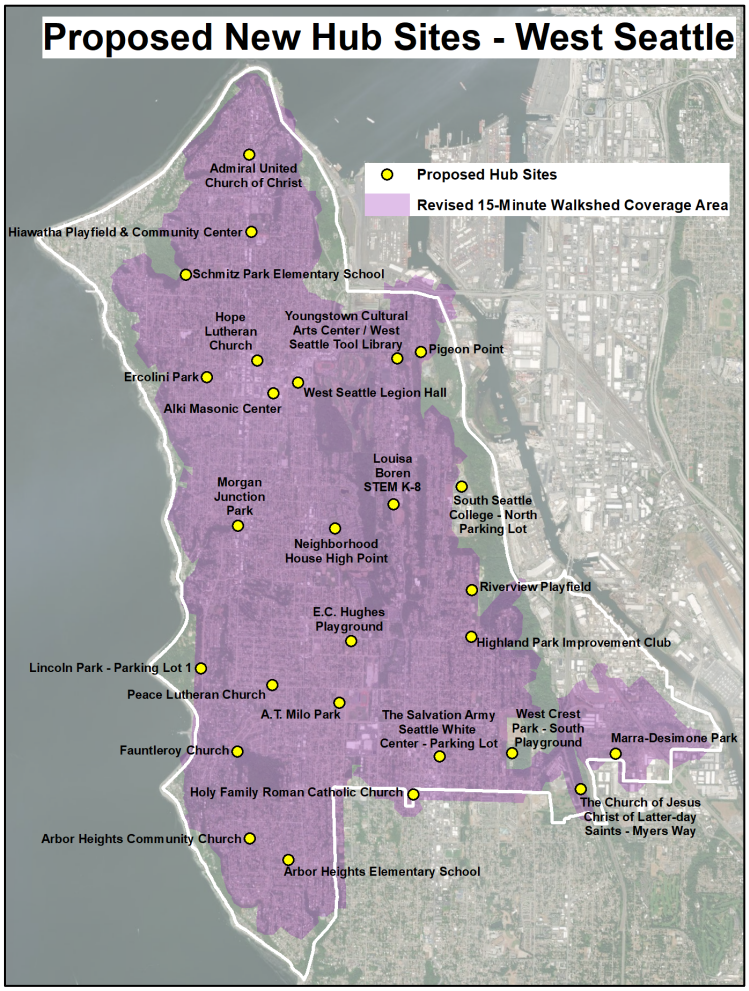


Figure 5.33 – After mapping my proposed hubs and recalculating their 15-minute walkshed areas, this is the result in West Seattle.

I finished with a combined total of 59 hubs, with 32 for the South End and 27 for West Seattle, which is a slight increase over the original number I started with. I was also able to surpass the original size of the combined walksheds, which measures to 22.45 square miles (57.63 kilometers) or 81 percent of the study area. On the downside, some gaps still remain in the walkshed coverage of my final proposed set of hubs, specifically around the neighborhoods of Alki, Georgetown, South Park, and Rainier Beach. This is unfortunate but, again, we're just working with what we have. We can't magically disappear the quake hazards where they exist, and we can't magically generate eligible hub sites where there are none. Nonetheless, it's encouraging to see that I was theoretically able to improve and expand the hubs in the study area using sites that already exist.

My study, along with a wealth of social infrastructure that could be utilized for hub sites, also contains an abundance of community organizations and institutions that can provide additional social capital if they were to be brought on as hub stewards. My final social capital model of proposed hubs and stewards turned out to be so bounteous that it's hard to portray it graphically in its entirety, so it's been broken into separate South End and West Seattle models out of necessity. Remember, some of the current hubs have their participants meet up with their counterparts at other hubs regularly, to conduct training events and share ideas, and some don't. Furthermore, some hubs have radios to communicate with EOCs and other hubs, and some don't. Some hubs have radios, but none of their participants are trained in operating them. In my newly recommended network of hubs and stewards,

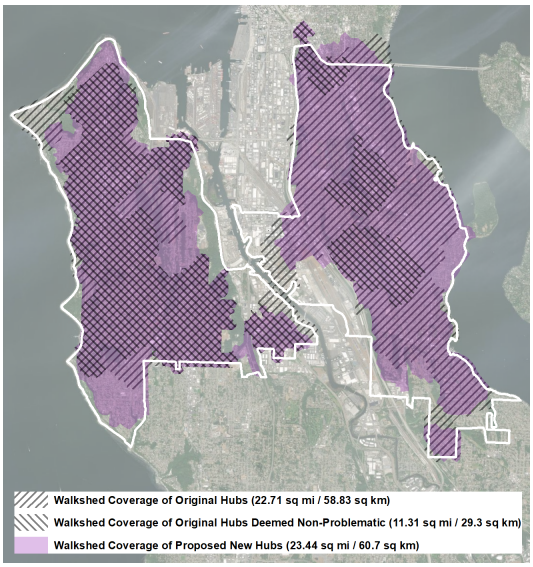


Figure 5.34 – A visualization of how the combined walkshed coverages areas changed over the course of this project. While I wasn't able to cover the entirety of my study area, I was still able to expand what existed before.

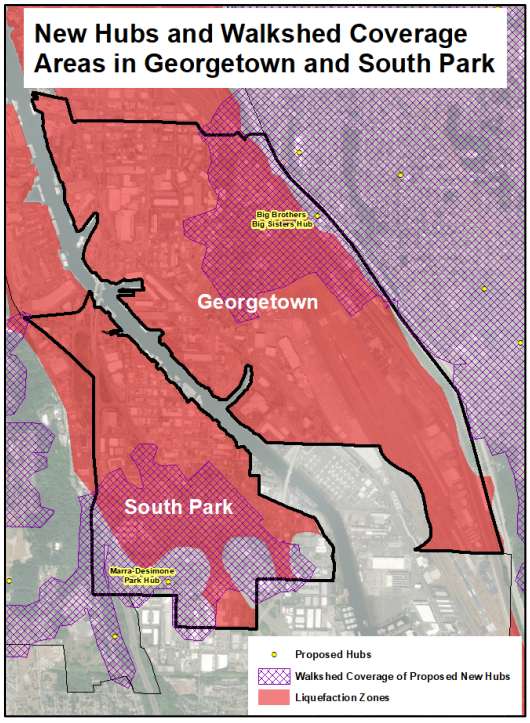


Figure 5.35 – While large walkshed gaps still remain in Georgetown and South Park, with their large liquefaction zones, I was able to provide at least some coverage by locating a single suitable hub in each neighborhood.

ideally *all* the hubs should regularly meet with one another, *all* the hubs should possess a radio, and *all* the hubs should have participants who are trained in operating their radio.

Making that happen would be an ambitious undertaking for the Seattle Community Emergency Hubs, but if this was to be done it would enhance the social capital connections throughout the hub network, and lead to much higher weighted degree centrality scores. Speaking of higher weighted degree centrality scores, let's go over the newly calculated ones we'd achieve with our re-envisioned hubs and stewards for the study area. Our new average hub weighted degree centrality score is a satisfying 92.69, much higher than the 16.86 I had for the original set. While I started out with some of the original existing hubs having individual scores as low as 0.5, with my new social capital model there isn't a hub with a score below 82. The highest score I was able to attain is at the Bikur Cholim Machzikay Hadath synagogue, which would have a weighted degree centrality of 103. To summarize, if the Seattle Community Emergency Hubs were to fully utilize the wealth of community organizations and institutions available in the South End and West Seattle, there is quantifiably much to gain from that, all in the effort to enhance community disaster resilience.

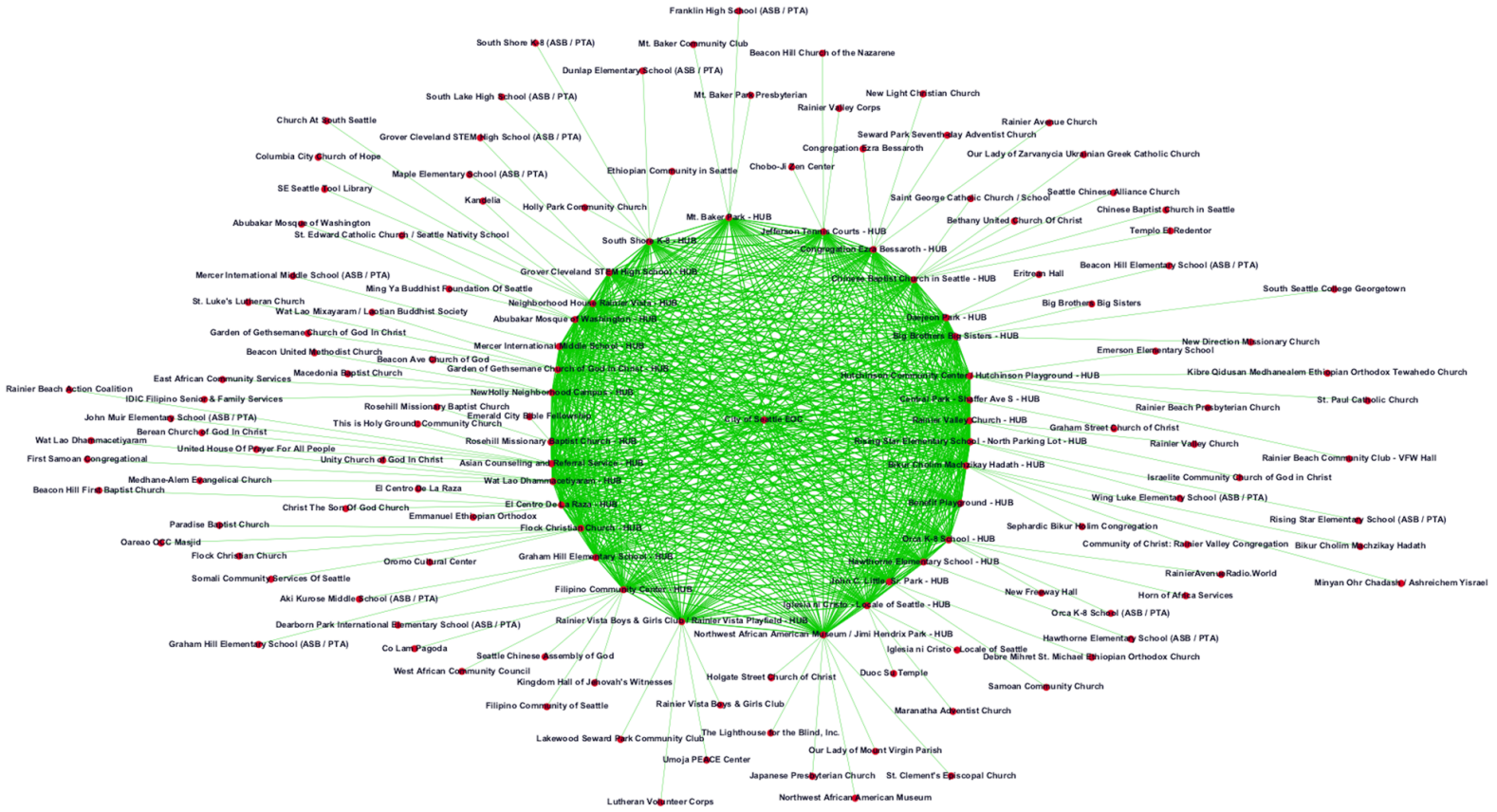


Figure 5.36 – Thanks to the wealth of potential hub stewards available in my study area, my final social capital model is so large that it has to be divided into two parts in order to fit on these pages. Here is the part of the model for the South End . . .

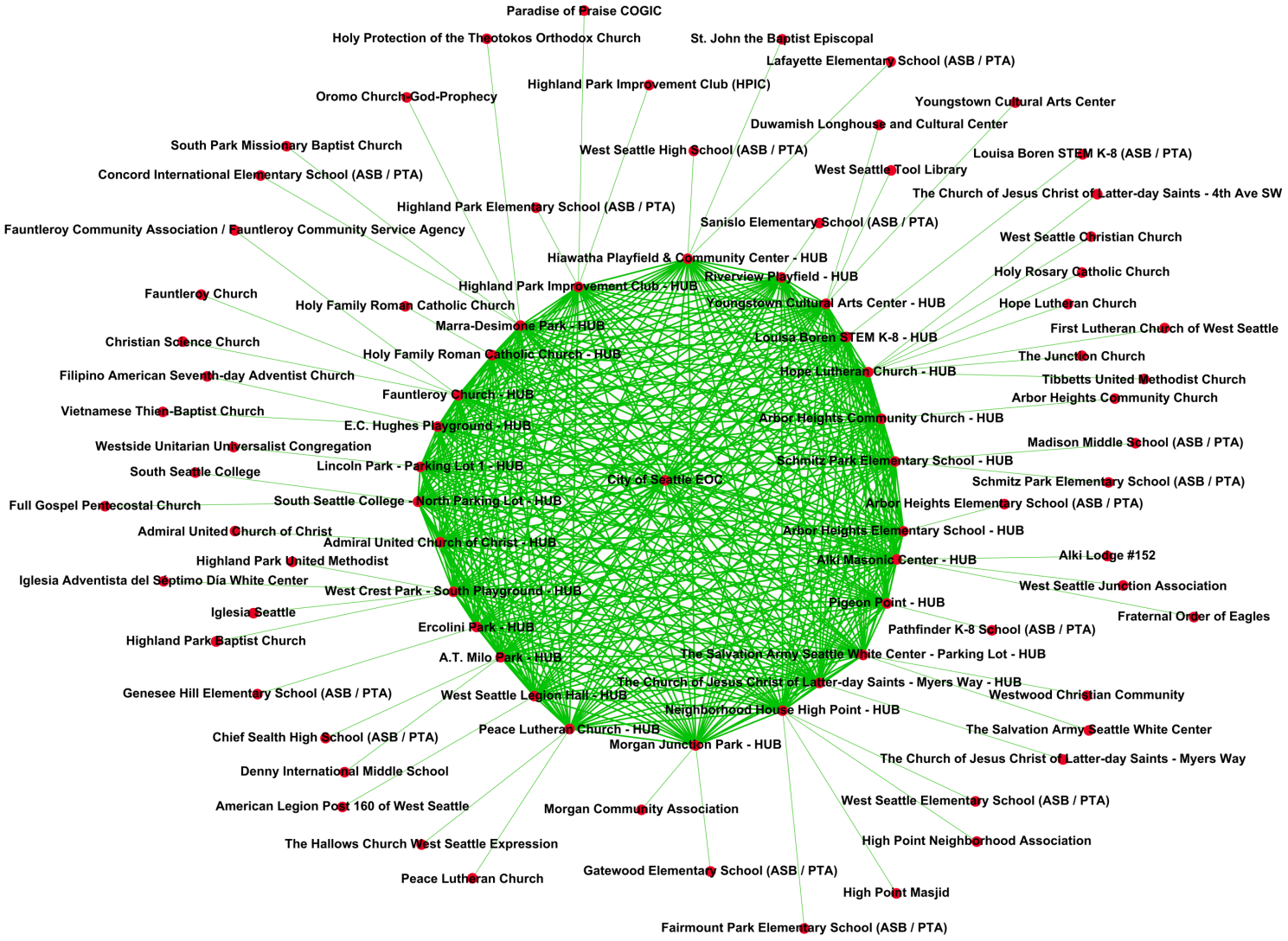


Figure 5.37 – . . . and here is the part for West Seattle. In comparing these models to my previous ones (prior to the introduction of potential stewards and potential additional hubs), note how the inclusion of these numerous stewards *considerably* increases the overall quantity of social capital available to the hubs.

CHAPTER 6 – CONCLUSION

- **Severity and Opportunity of Findings**
- **Lesson for Practice – Greater Municipal Guidance in Selecting Hub Sites**
- **Lesson for Practice – An "Order of Battle" of Community Organizations**
- **Lesson for Practice – Measuring Social Capital, Simply and Hyperlocally**
- **Ongoing and Future Adaptations**
- **Study Limitations**

Severity and Opportunity of Findings

In investigating the Seattle Community Emergency Hubs of the South End and West Seattle, and considering the implications of a major earthquake, I found that in its current state (and according to my study methods) 38 of the 55 existing hubs faced an issue that brought its feasibility into question. About two-thirds of the existing hubs were too close to quake hazards, lacked adequate accessibility for the physically disabled, or happened to be in close proximity to a superior potential hub site. When I presented these findings to my thesis committee, Prof. Manish Chalana commented on their overall "severity" of this situation. Yes, an earthquake isn't the only type of disaster Seattle might face in the future, and other scenarios might call for a less stringent evaluation of the hubs. Still, considering the certainty that a major quake will rattle Seattle in the future, shouldn't the City of Seattle have taken this into account in establishing the hub system?

Despite these drawbacks, the urban landscape within my study area offers a wonderful variety not just of potential additional hub sites, but of potential partner organizations that could act as hub "stewards," thereby significantly expanding the quantity of social capital the hubs have access to. Considering in this thesis I was able to recommend a revamped set of 59 hubs in my study area, surpassing the original quantity of 55 existing hubs, and also recommend a total of 170 onsite and offsite hub stewards, this goes to show that West Seattle and the South end possess a wealth of social capital and social infrastructure to enhance its resilience in the face of disaster.

Lesson for Practice – Greater Municipal Guidance in Selecting Hub Sites

The independence and initiative with which the volunteer organizers of Seattle Community Emergency Hubs operate is one of the defining characteristics of this grassroots organization. As I've explained earlier, the hub participants get to determine their own hub site, and the easy application process for official recognition by the City of Seattle is practically just a formality. The level of agency and autonomy the authorities grant the community hubs certainly is empowering for the community members involved. Still, considering how many hub sites I disqualified in this project due to quake hazards or accessibility concerns, and how many more suitable alternative sites I was able to locate in my study area, it seems possible that city authorities could provide some additional guidance when it comes to picking hub sites. Perhaps they could use some of the criteria I outlined in my own project methods, or perhaps they would develop an altogether different set of considerations. Either way, practicing a higher level of discernment in choosing hub sites could increase their overall effectiveness.

Lesson for Practice – An "Order of Battle" of Community Organizations

Several weeks before completing my thesis project, I sent Cindi Barker a partial draft of this document for her review. Along with considering my findings and providing feedback, she later reached out to me about sending a list of the 170 community organizations I proposed as hub stewards to the City of Seattle Department of Neighborhoods. This was during the period which newly developed Coronavirus vaccines were being distributed and administered in the United States, in hopes of bringing the ongoing global pandemic to a close. Given her leadership role in the Seattle Community Emergency Hubs and her connections in the community, the Department of Neighborhoods had reached out to Cindi to inquire about organizations she knew of – particularly any connected to ethnoracial minorities and vulnerable populations – which might cooperate with them on vaccine administration and outreach (personal communication, March 4th, 2020). Now, I'm not sure how many or how few community organizations the Department of Neighborhoods has an established relationship with, let alone the quantity of such local groups they're privy to. But whether they have a pretty substantial list or not, developing a comprehensive record of civic-minded local organizations (neighborhood clubs, youth programs, activist groups, religious congregations, ethnoracial cultural centers, charities, etc.) would surely be in the best interests not just of any emergency hubs group, but of any municipal authority.

In many books on military history, you can find detailed records on the makeup of the armed forces being documented there which detail the different functions, numerical strengths, locations, and other attributes of the military units involved. Such a list is referred to as an "order of battle." As municipalities work to prepare their public agencies and their citizenry for future disasters, and particularly as they march towards the coming "battle" with the severe weather events brought on by climate change, it would be immensely beneficial for cities if they had their own "order of battle" of community groups, which would be an all-encompassing inventory of the local organizations they can call upon for cooperation.

Lesson for Practice – Measuring Social Capital, Simply and Hyperlocally

Making degree centrality models using the software Gephi was exceedingly tedious and time consuming. However, some of the benefits of using this method for quantifying sources of social capital were simplicity and a hyperlocal scale. In his seminal book on social capital, *Bowling Alone: The Collapse and Revival of American Community*, political scientist Robert D. Putnam describes what he calls his Comprehensive Social Capital Index (2000). This consists of a set of 14 indicators, which range from voter turnout in presidential elections, to the number of non-profit organizations per 1,000 population in a state, to surveyed opinions on social trust. It goes without saying that measuring these indicators requires an enormous amount of collected data. What's more, when such an index is compiled using Putnam's methods, the results are typically only specific to the state or county level (The Geography of Social Capital in America, n.d.). While I could easily obtain social capital metrics from Putnam or his acolytes for Washington state or King County from the internet, the data wouldn't be specific enough for my hyperlocal study area of West Seattle and the South End. Thankfully, even though calculating my degree centrality figures on my Gephi models was a lengthy and complex process, the actual data collection was fairly straightforward. All I had to do was determine how many community organizations each hub had – or could have – a relationship with, and how strong those relationships were. This method of quantifying social capital through degree centrality scores could easily be replicated in other research projects.

Ongoing and Future Adaptations

Just as the individual emergency hubs are meant to be adaptable in their own specific endeavors, the Seattle Community Emergency Hubs as a group are meant to be adaptable in their organization-wide practices. In fact, in the time it took me to complete this project, the hub

participants have had to adapt to "social distancing" during the as-yet-unfinished Coronavirus Pandemic. I have to admit, since so much of what the hubs are set up to do involves in-person, face-to-face interaction, I was a little worried that the social distancing precautions recommended by government and medical authorities – while unquestionably valid – might make the hubs a moot point when it comes to disaster relief. While the hubs expect to be able to respond to earthquakes and other disasters, would an infectious disease outbreak just render them impractical? It turns out I had nothing to worry about. As I briefly mentioned when talking about the Rockaway Beach Surf Club's use of digital communications after Hurricane Sandy, the Seattle Community Emergency Hubs have similarly used smartphones, computers, and the internet to adapt to the Coronavirus. Classes and presentations that usually would be conducted at hub sites have been done via videoconference instead. Additionally, the exchange of resources that would take place at a hub during a natural disaster is instead taking place in cyberspace, as hub volunteers use that virtual setting to offer "mutual support" to neighbors in need in the form of food, monetary donations, and other items (Barker, personal communication, August 7th, 2020).

According to Cindi Barker (who obviously was a crucial source of information for this project), another adaptation she and her fellow volunteers are currently working on is expanding their outreach to local ethnoracial minority communities (personal communication, February 22nd, 2021). While Cindi is excited for these upcoming outreach efforts, and the increased multiculturalism and inclusivity they're seeking to accomplish for the hubs, she recognizes that certain cultural barriers will have to be overcome in order for these efforts to be successful. Of course, there will likely be linguistic differences to consider, and Cindi is already trying to anticipate those by reaching out to translators at El Centro De La Raza and other organizations that can help with that (personal communication, August 7th, 2020). Hub meetings are currently conducted in English, and hub instructional and publicity materials are written in English, but those both could likely be translated into Spanish, Chinese, Somali, Ukrainian, and other languages in order to mitigate any language barriers.

Cindi also recognizes that in order to reach out to and connect with non-Caucasian minorities, there might be cultural customs to consider along with matters of language. She has pointed out that in Ethiopian culture, ethnic outsiders may be expected to partake of a coffee ceremony as part of being accepted into their community (personal communication, August 7th, 2020). She has also mentioned being informed that if one brings spring rolls to a social event with people of Vietnamese heritage, one is expected to have prepared those spring rolls themselves and not have purchased them elsewhere. Such observances might act as a stumbling block for Americans

of a more mainstream sort, but if they can be successfully navigated as part of the Community Emergency Hubs' outreach there surely are benefits to be had in the ways of social capital.

Another outreach area Cindi and the hub participants hope to work on is recruiting not just the involvement of private citizens and community groups, but local businesses as well. Now, commercial entities were left outside the scope of this project for a few different reasons. While the main activities of such neighborhood institutions as the Chobo-Ji Zen Center, Highland Park Improvement Club, and Hope Lutheran Church are social, the activities of local businesses are economic and profit-driven. Yes, businesses may also benefit from being in a more socially cohesive and resilient community, but that isn't their main focus: making money is. And since (as the old adage goes) "time is money," the owners, managers, and employees of these businesses may be less willing to take time during which they could be making money, and put it towards hosting or stewarding an emergency hub. Cindi has also found this to be the case, specifically in overtures she's made to funeral homes, asking if they'd be willing to help store the remains of deceased victims during mass casualty events (personal communication, August 7th, 2020). Those working at these funeral homes seemed unsure, surprised even, about being asked to participate in community disaster activities. Nevertheless, they have resources they might contribute, as might other for-profit businesses in Seattle.

Study Limitations

In addition to the current hub sites, a total of 147 potential new hub sites in my study area were considered as a part of this study, 42 of which were considered sufficient to be included in the final proposed hub network. Of the 101 rejected potential sites, 89 of them were too close to overhead power lines. Herein lies one of the limitations of this project. Again, earthquakes aren't the only disaster Seattle is prone to experience, and different disasters would render a different set of considerations for local emergency hubs. Ground liquefaction zones, power lines, and URMs may not factor as hazards in other scenarios, like heat waves and disease outbreaks. Needless to say, avoiding power lines was a major constraint in recommending new hub sites. In the effort to steer clear of power lines, I had to write-off the vast majority of potential sites I was considering for new hubs. If I didn't require myself to avoid these potential quake hazards, I would have had many more potential sites to choose from.

In investigating possible new hub sites, another limitation of this project was not knowing how large or small the sites I was considering factor in the minds of locals. In selecting potential

sites, I relied on a set of primarily spatial considerations (presence of landmarks, quantity of open space, accessible routes to the site, etc.). However, without performing an extensive survey of the general populace of West Seattle and the South End, it was difficult to know for certain whether or not the sites I selected were well known to them.

We'll close this thesis project with acknowledging that one final limitation – as it is with many things in life – is uncertainty. These specific hubs and the participants involved with them might come and go, as existing hubs and volunteers discontinue their involvement and new ones become involved. My study of hubs in the South End and West Seattle is a sort of snapshot of a system as it currently stands, and it could be altered as soon as tomorrow. And while I have tried to work around known quake hazards, just as one can't fully predict the timing of an earthquake one also can't predict which known hazards will manifest themselves, which known hazards will go unmanifested, and which unknown hazards will seemingly come out of nowhere. Still, while we can't fully plan for every uncertainty, we can certainly work to prepare as best we can. And one of the best ways for preparing for uncertainty is to do it with others in your community.

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APPENDIX – Existing Hub Site Evaluations

Final Status	Hub Name	Sector	Disqualifying feature?	Are the pedestrian routes leading to the site accessible for those with limited mobility?	Are there signs or landmarks present at the site for recognition?	Are there any large barriers obstructing, or partially obstructing sightlines, between the hub and the adjacent street?	Is there a building onsite that can be utilized?	Do nearby residences and businesses overlook the site and provide natural surveillance?	Is there a mixture of building types/uses around the site?	Does the site offer multiple amenities or forms of programming that can attract a variety of users during everyday life?	Roadway?	Sidewalk?	Cycle or sharelane?	Transit stops?	Is the interior the site accessible for those with limited mobility?
Disqualified	Alki Community Center (Alki)	SW	In liq. zone.	-	-	-	-	-	-	-					-
Disqualified	Angel Morgan P-Patch	SE	Pwr lines.	4of4 approaches (100%)	YES	NO	NO	YES	YES	YES					Partially
Disqualified	Barton Street P-Patch	SW	Pwr lines.	4of4 approaches (100%)	YES	NO	NO	YES	YES	YES	x	x		x	Partially
Disqualified	Beacon Bluff P-Patch	SE	Pwr lines. Interior not ADA.	5of5 approaches (100%)	YES	NO	NO	YES	NO	NO					NO
Disqualified	Beacon Food Forest P-Patch	SE	Pwr lines. Interior, some appraches not ADA.	2of4 approaches (50%)	YES	NO	NO	YES	NO	YES					NO
Disqualified	Beacon United Methodist Church	SE	Pwr lines.	4of4 approaches (100%)	YES	NO	YES	YES	YES	YES					YES
Disqualified	Bradner Gardens P-Patch	SE	Pwr lines. Most approaches not ADA.	1of4 approaches (25%)	YES	NO	YES	YES	NO	YES					Partially
Disqualified	Brandon Street Orchard P-Patch	SE	Pwr lines. Interior not ADA.	4of4 approaches (100%)	YES	NO	NO	NO	NO	NO					NO
Disqualified	Chobo-Ji Zen Center (in lot behind bldg)	SE	Pwr lines.	5of5 approaches (100%)	YES	NO	YES	YES	YES	NO	x	x			?
Disqualified	Colman Park P-Patch	SE	Interior, approaches not ADA.	0of4 approaches (0%)	YES	YES	YES	NO	NO	NO					NO
Disqualified	Courtland Place P-Patch	SE	In liq. zone.	-	-	-	-	-	-	-					-
Existing	Daejeon Park	SE		4of4 approaches (100%)	YES	NO	NO	YES	YES	YES	x	x	x		YES
Disqualified	Delridge P-Patch	SW	Pwr lines.	-	-	-	-	-	-	-					-
Existing	EC Hughes Playground (Olympic Heights)	SW		3of4 approaches (75%)	YES	NO	NO	YES	YES	YES	x	x			YES
Existing	Ercolini Park	SW		3of4 approaches (75%)	YES	NO	NO	YES	NO	YES	x	x			YES
Disqualified	Estelle Street P-Patch	SE	Pwr lines.	-	-	-	-	-	-	-					-

Disqualified	Ethiopian Community in Seattle	SE	Pwr lines.	4of4 approaches (100%)	YES	NO	YES	YES	YES	NO	x	x		x	YES
Existing	Fauntleroy Church	SW		1of2 approaches (50%)	YES	NO	YES	NO	YES	YES	x	x		x	YES
Existing	Hiawatha Playfield/Community Center (Admiral)	SW		7of7 approaches (100%)	YES	NO	YES. Confirmed this with hub captain.	YES	YES	YES	x	x		x	YES
Disqualified	High Point Commons Park P-Patch	SW	Interior not ADA.	4of4 approaches (100%)	YES	NO	NO	YES	YES	YES	x	x			?
Disqualified	High Point Juneau Garden P-Patch	SW	Interior, some approaches not ADA.	1of3 approaches (33%)	YES	NO	NO	YES	NO	NO					NO
Disqualified	High Point MacArthur Lane P-Patch	SW	Interior, some approaches not ADA. Also lacking in space.	1of2 approaches (50%)	YES	NO	NO	YES	NO	NO					NO
Existing	Highland Park Improvement Club	SW		4of4 approaches (100%)	YES	NO	YES	YES	YES	YES	x	x			YES
Disqualified	Hillman City P-Patch	SE	Pwr lines.	3of4 approaches (75%)	YES	NO	NO	YES	YES	NO	x	x			NO
Disqualified	Hillside Garden P-Patch	SE	In liq. zone.	-	-	-	-	-	-	-					-
Existing	Hope Lutheran Church (Alaska Junction)	SW	Pwr lines. Add pkng lot as satellite.	3of4 approaches (75%)	YES	NO	YES	YES	YES	YES	x	x			YES
Relocated	John C. Little P-Patch	SE	Interior not ADA. Add park in neighboring site.	4of4 approaches (100%)	NO	NO	NO	YES	YES	YES (if we consider adjacent park)					NO
Disqualified	Lakewood Seward Park Hub	SE	Pwr lines.	3of4 approaches (75%)	YES	NO	YES	YES	YES	NO					YES (except for lawn)
Disqualified	Leo Farm	SE	Interior, some approaches not ADA, pwr lines.	2of3 approaches (66%)	NO	NO	NO	YES	NO	NO					NO
Disqualified	Longfellow Creek P-Patch	SW	Interior, approaches not ADA, pwr lines.	0of2 approaches (0%)	YES	NO	NO	NO	YES	YES					NO
Disqualified	Maa Nyei Lai Ndeic P-Patch	SE	Pwr lines.	-	-	-	-	-	-	-					-
Relocated	Marra Farm P-Patch	SW	Interior not ADA. Add park in neighboring site.	2of2 approaches (100%)	YES	NO	NO	NO	NO	YES					NO
Existing	Morgan Junction Park	SW		2of2 approaches (100%)	YES	NO	NO	YES	YES	NO	x	x	x	x	YES
Existing	Neighborhood House (High Point)	SW		6of6 approaches (100%)	YES	NO	YES	YES	YES	YES	x	x		x	YES

Disqualified	New Holly 29th Ave P-Patch	SE	Interior not ADA. Add neighboring park as satellite.	2of2 approaches (100%)	NO	NO	NO	YES	NO	NO					NO
Relocated	New Holly Lucky Garden P-Patch	SE	Interior not ADA. Add neighboring park as satellite. (Renamed/relocated to Central Park - Shaffer Ave S)	5of6 approaches (83%)	NO	NO	NO	YES	NO	YES (if we consider adjacent park)					YES
Disqualified	New Holly Power Garden P-Patch	SE	Interior, approaches not ADA.	-	-	-	-	-	-	-					-
Disqualified	New Holly Rockery Market Garden P-Patch	SE	Interior not ADA.	4of4 approaches (100%)	YES	NO	NO	YES	YES	YES					NO
Disqualified	New Holly Youth & Family Garden P-Patch	SE	Pwr lines.	-	-	-	-	-	-	-					-
Disqualified	Oxbow Park P-Patch	SE	In liq. zone.	-	-	-	-	-	-	-					-
Existing	Peace Lutheran Church	SW	Approaches not ADA, pwr lines.	1of4 approaches (25%)	YES	NO	YES	YES	NO	NO					YES
Existing	Pigeon Point	SW		3of3 approaches (100%)	YES	NO	YES	NO	NO	NO	x	x			YES
Disqualified	Providence/Mount St. Vincent, parking lot (Fairmount)	SW	Concerns about accessibility.	0of2 approaches (0%)	YES	NO	YES	YES	NO	NO	x	x		x	YES
Disqualified	Rainier Beach Community Club - VFW Hall	SE	Pwr lines. Interior not ADA.	1of3 approaches (33%)	YES	NO	YES	YES	YES	YES	x	x		x	NO (no ADA into site/bldg)
Existing	Rainier Vista (West)	SE		6of6 approaches (100%)	YES	NO	YES	YES	YES	YES	x	x			YES
Disqualified	Rainier Vista Dakota West P-Patch	SE	Interior, some approaches not ADA.	1of2 approaches (50%)	YES	NO	NO	YES	YES	NO					NO
Disqualified	Rainier Vista Snoqualmie Park Youth/Senior P-Patch	SE	Hard to find garden behind bldgs.	4of4 approaches (100%)	NO	NO	YES	YES	YES	YES	x	x			YES
Disqualified	Rainier Vista Sunrise Garden P-Patch	SE	Moved to Boys and Girls Club, better site.	4of6 approaches (66%)	YES	NO	NO	YES	YES	YES	x	x			YES
Existing	Salvation Army, parking lot (South Highland Park)	SW		4of4 approaches (100%)	YES	NO	YES	YES	YES	YES	x	x	x	x	YES
Disqualified	Snoqualmie P-Patch	SE	In liq. zone.	-	-	-	-	-	-	-					-
Disqualified	Solstice P-Patch	SW	Interior, approaches not ADA.	0of2 approaches (0%)	YES	NO	NO	NO	YES	NO					NO
Disqualified	South Park Neighborhood Center	SW	In liq. zone.	-	-	-	-	-	-	-					-

Disqualified	Thistle P-Patch	SE	Pwr lines.	-	-	-	-	-	-	-					-
Relocated	West Crest Garden P-Patch	SW		1of2 approaches (50%)	YES	NO	NO	NO	NO	YES	x				Partially
Disqualified	West Genesee P-Patch	SW	Pwr lines.	1of3 approaches (33%)	YES	NO	NO	YES	YES	NO					Partially

APPENDIX – Final Hub Site Evaluations

Existing, Relocated, or Proposed	Hub Name	Sector	In liquefaction zone?	Has overhead or adjacent power lines?	Any URMs on site?	Are the pedestrian routes leading to the site accessible for those with limited mobility?	Are there signs or landmarks present at the site for recognition?	Are there any large barriers obstructing (0) or partially obstructing (0.5) sightlines between the hub and the adjacent street?	Is there (1) at least 4700 sq ft or at least (0.5) 100 sq ft of open, level, paved ground on/near hub?	Is there a building onsite that can be utilized?	Do nearby residences and businesses overlook the site and provide natural surveillance?	Is there a mixture of building types/uses around the site?	Does the site offer multiple amenities or forms of programming that can attract a variety of users during everyday life?	Roadway?	Sidewalk?	Cycle or sharelane?	Transit stops?	Is the interior the site accessible for those with limited mobility?	Score (out of 12)
Proposed	A.T. Milo Park	SW	NO	NO	NO	3of4 approaches (75%)	YES	NO	YES (0.5)	NO	YES	YES	YES	x	x			YES	8.5of12
Proposed	Abubakar Mosque of Washington	SE	NO	NO	NO	4of4 approaches (100%)	YES	NO	YES (0.5)	YES	YES	YES	YES	x	x		x	YES	10.5of12
Proposed	Admiral United Church of Christ	SW	NO	NO	NO	4of4 approaches (100%)	YES	NO	YES (1)	YES	YES	NO	YES	x	x		x	YES	10of12
Proposed	Alki Masonic Center	SW	NO	NO	NO	3of4 approaches (75%)	YES	NO	YES (1)	YES	YES	YES	YES	x	x			YES	9of12
Proposed	Arbor Heights Community Church	SW	NO	Along W and S side (space is large enough so that this isn't a big problem)	NO	3of4 approaches (75%)	YES	NO	YES (0.5)	YES	YES	YES	YES	x				YES	8.5of12
Proposed	Arbor Heights Elementary School	SW	NO	NO	NO	2of3 approaches (66%)	YES	NO	YES (1)	YES	YES	YES	YES	x	x			YES	10of12
Proposed	Asian Counseling and Referral Service	SE	NO	NO	NO	2of2 approaches (100%)	YES	Partially, trees and bushes along perimeter.	YES (1)	YES	YES	YES	YES	x	x		x	YES	10.5of12
Proposed	Benefit Playground	SE	NO	Along E side (space is large enough so that this isn't a big problem)	NO	4of4 approaches (100%)	YES	Partially, trees.	YES (1)	NO	YES	NO	YES	x			x	YES	7.5of12
Proposed	Big Brothers Big Sisters	SE	NO	NO	NO	3of4 approaches (75%)	YES	Partially. Bushes interrupt sightinlines.	YES (0.5)	YES	NO	NO	YES	x	x			YES	7of12
Proposed	Bikur Cholim Machzikay Hadath	SE	NO	NO	NO	3of4 approaches (75%)	YES	NO	YES (1)	YES	YES	YES	NO	x	x			YES	9of12
Relocated	Central Park - Shaffer Ave S	SE	NO	NO	NO	5of6 approaches (83%)	YES	NO	YES (0.5)	NO	YES	NO	YES	x	x			YES	7.5of12
Proposed	Chinese Baptist Church in Seattle	SE	NO	Along E side (space is large enough so that this isn't a big problem)	NO	3of4 approaches (75%)	YES	NO	YES (1)	YES	YES	NO	YES	x			x	YES	9of12

Proposed	Congregation Ezra Bessaroth	SE	NO	NO	NO	2of3 approaches (66%)	YES	NO	YES (1)	YES	YES	YES	NO	x	x	x	x	YES	11of12
Existing	Daejeon Park	SE	NO	NO	NO	4of4 approaches (100%)	YES	NO	YES (0.5)	NO	YES	NO	YES	x	x	x		YES	7.5of12
Existing	E.C. Hughes Playground	SW	NO	Along S side (space is large enough so that this isn't a big problem)	NO	3of4 approaches (75%)	YES	NO	YES (1)	NO	YES	YES	YES	x	x			YES	9of12
Proposed	El Centro De La Raza	SE	NO	Along E side (space is large enough so that this isn't a big problem)	NO	5of7 approaches (71%)	YES	Partially, bldgs.	YES (1)	YES	YES	YES	YES	x	x	x	x	YES	11.5of12
Existing	Ercolini Park	SW	NO	Along S side (space is large enough so that this isn't a big problem)	NO	3of4 approaches (75%)	YES	NO	YES (1)	NO	YES	NO	YES	x	x			YES	8.5of12
Existing	Fauntleroy Church	SW	NO	Along S side (space is large enough so that this isn't a big problem)	NO	1of2 approaches (50%)	YES	NO	YES (1)	YES	YES	YES	YES	x	x		x	YES	11of12
Proposed	Filipino Community Center	SE	NO	At SE corner (space is large enough so that this isn't a big problem)	NO	2of3 approaches (66%)	YES	NO	YES (1)	YES	YES	YES	YES	x	x		x	YES	11of12
Proposed	Flock Christian Church	SE	NO	NO	NO	3of3 approaches (100%)	YES	NO	YES (1)	YES	YES	YES	NO	x	x		x	YES	10of12
Proposed	Garden of Gethsemane Church of God In Christ	SE	NO	NO	NO	4of4 approaches (100%)	YES	NO	YES (1)	YES	YES	YES	YES	x	x		x	YES	11of12
Proposed	Graham Hill Elementary School	SE	NO	NO	NO	1of5 approaches (20%)	YES	Partially, trees and bldg.	YES (1)	YES	NO	YES	YES	x	x			YES	8.5of12
Proposed	Grover Cleveland STEM High School	SE	NO	Along N side (space is large enough so that this isn't a big problem)	NO	3of5 approaches (60%)	YES	Partially. Bldgs block view of rear open spaces.	YES (1)	YES	YES	YES	YES	x	x	x	x	YES	11.5of12
Proposed	Hawthorne Elementary School	SE	NO	Along W side (space is large enough so that this isn't a big problem)	NO	2of6 approaches (33%)	YES	NO	YES (1)	YES	YES	YES	YES	x	x		x	YES	11of12

Existing	Hiawatha Playfield & Community Center	SW	NO	NO	NO	7of7 approaches (100%)	YES	Partially, trees and grade changes	YES (1)	YES	YES	YES	YES	x	x		x	YES	10.5of12
Existing	Highland Park Improvement Club	SW	NO	Along S side (space is large enough so that this isn't a big problem)	NO	4of4 approaches (100%)	YES	NO	YES (1)	YES	YES	YES	YES	x	x			YES	10of12
Proposed	Holy Family Roman Catholic Church	SW	NO	Along S and part of W side (space is large enough so that this isn't a big problem)	NO	3of4 approaches (75%)	YES	NO	YES (0.5)	YES	YES	YES	YES	x	x		x	YES	10.5of12
Existing	Hope Lutheran Church	SW	NO	Along S side (space is large enough so that this isn't a big problem)	NO	3of4 approaches (75%)	YES	NO	YES (0.5)	YES	YES	YES	YES	x	x			YES	9.5of12
Proposed	Hutchinson Community Center / Hutchinson Playground	SE	NO	On N side (may or may not block access)	NO	3of4 approaches (75%)	YES	NO	YES (1)	YES	YES	YES	YES	x	x			YES	10of12
Proposed	Iglesia ni Cristo - Locale of Seattle	SE	NO	NO	NO	5of6 approaches (83%)	YES	NO	YES (1)	YES	YES	YES	YES	x	x		x	YES	11of12
Proposed	Jefferson Tennis Courts	SE	NO	NO (but along/over some approaches to site)	NO	2of3 approaches (66%)	YES	NO	YES (1)	YES	YES	YES	YES	x	x	x	x	YES	12of12
Relocated	John C. Little, Sr. Park	SE	NO	NO	NO	4of4 approaches (100%)	YES	NO	YES (1)	NO	YES	YES	YES	x	x			YES	8of12
Proposed	Lincoln Park - Parking Lot 1	SW	NO	NO	NO	2of3 approaches (66%)	YES	NO	YES (1)	NO (at least not in this part of park)	YES	YES	YES	x	x	x	x	YES	11of12
Proposed	Louisa Boren STEM K-8	SW	NO	Along N side (space is large enough so that this isn't a big problem)	NO	2of2 approaches (100%)	YES	YES	YES (1)	YES	YES	YES	YES	x	x		x	YES	11of12
Relocated	Marra-Desimone Park	SW	NO			3of4 approaches (75%)	YES	Partially, trees.	YES (1)	NO	YES	YES	YES	x				YES	7.5of12
Proposed	Mercer International Middle School	SE	NO	Along W side (space is large enough so that this isn't a big problem)	NO	2of2 approaches (100%)	YES	YES (grade change and some trees)	YES (1)	YES	NO	YES	YES	x	x	x	x	YES	10of12
Existing	Morgan Junction Park	SW	NO	NO	NO	2of2 approaches (100%)	YES	NO	YES (0.5)	NO	YES	YES	YES	x	x	x	x	YES	10.5of12

Proposed	Mt. Baker Park	SE	NO	Along S side (space is large enough so that this isn't a big problem)	NO	1of3 approaches (33%)	YES	Partially, due to some trees and the size of the space.	YES (0.5)	NO	YES	YES	YES	x	x	x	x	YES	10of12
Existing	Neighborhood House High Point	SW	NO	NO	NO	6of6 approaches (100%)	YES	Partially, trees and and bldgs.	YES (1)	YES	YES	YES	YES	x	x		x	YES	10.5of12
Existing	Neighborhood House Rainier Vista	SE	NO	NO	NO	6of6 approaches (100%)	YES	Partially, bldgs.	YES (1)	YES	YES	YES	YES	x	x		x	YES	10.5of12
Proposed	NewHolly Neighborhood Campus	SE	NO	NO	NO	2of4 approaches (50%)	YES	Partially, trees and bushes along perimeter.	YES (1)	YES	NO	YES	YES	x	x	x	x	YES	10.5of12
Proposed	Northwest African American Museum / Jimi Hendrix Park	SE	NO	NO	YES (Medium Risk w/ Substantial Alteration)	1of3 approaches (33%)	YES	Partially, trees and grade change.	YES (1)	YES	YES	YES	YES	x	x	x	x	YES	11.5of12
Proposed	Orca K-8 School	SE	NO	NO	NO	3of6 approaches (50%)	YES	Partially, trees and and bldgs.	YES (1)	YES	YES	YES	YES	x	x			YES	9.5of12
Existing	Peace Lutheran Church	SW	NO			2of4 approaches (50%)	YES	NO	YES (0.5)	YES	YES	YES	YES	x	x		x	YES	10.5of12
Existing	Pigeon Point	SW	NO	NO	NO	3of3 approaches (100%)	YES	NO	YES (1)	YES	YES	YES	YES	x	x			YES	10of12
Proposed	Rainier Valley Church	SE	NO	NO	NO	4of4 approaches (100%)	YES	NO	YES (1)	YES	YES	YES	YES	x	x		x	YES	11of12
Proposed	Rainier Vista Boys & Girls Club / Rainier Vista Playfield	SE	NO	NO	NO	4of4 approaches (100%)	YES	Partially, bldg.	YES (1)	YES	YES	YES	YES	x	x		x	YES	10.5of12
Proposed	Rising Star Elementary School - North Parking Lot	SE	NO	NO (at least not along this pkng lot)	NO	3of3 approaches (100%)	NO	NO	YES (1)	YES	YES	NO	YES	x	x	x	x	YES	10of12
Proposed	Riverview Playfield	SW	NO	NO	NO	2of3 approaches (66%)	YES	NO	YES (1)	NO	YES	NO	YES	x	x			YES	9of12
Proposed	Rosehill Missionary Baptist Church	SE	NO	NO	NO	5of6 approaches (83%)	YES	NO	YES (1)	YES	YES	YES	NO	x	x	x	x	YES	11of12
Proposed	Schmitz Park Elementary School	SW	NO	Along E side (space is large enough so that this isn't a big problem)	NO	2of3 approaches (66%)	YES	NO	YES (1)	YES	YES	NO	YES	x	x			YES	9of12
Proposed	South Seattle College - North Parking Lot	SW	NO	NO	NO	1of2 approaches (50%)	YES	NO	YES (1)		NO	YES	YES	x	x	x	x	YES	11of12
Proposed	South Shore K-8	SE	NO			4of4 approaches (100%)	YES	Partially, trees and bushes along perimeter.	YES (1)		YES	YES	YES	x	x	x	x	YES	11.5of12

Proposed	The Church of Jesus Christ of Latter-day Saints - Myers Way	SW	NO	NO	NO	2of2 approaches (100%)	YES	NO	YES (1)		NO	NO	NO	x				YES	6of12
Existing	The Salvation Army Seattle White Center - Parking Lot	SW	NO	NO	NO	4of4 approaches (100%)	YES	NO	YES (1)		YES	YES	YES	x	x	x	x	YES	12of12
Proposed	Wat Lao Dhammacetiya ram	SE	NO	Along half of S side. Should be ok.	NO	3of3 approaches (100%)	YES	NO	YES (1)		YES	YES	NO	x	x		x	YES	10of12
Relocated	West Crest Park - South Playground	SW	NO	NO	NO	1of2 approaches (50%)	YES	YES	YES (1)		NO	YES	YES	x				YES (at least in this section of park)	7of12
Proposed	West Seattle Legion Hall	SW	NO	Along E and part of W side.	NO	3of4 approaches (75%)	YES	NO	YES (0.5)		YES	YES	YES	x	x	x	x	YES	11.5of12
Proposed	Youngstown Cultural Arts Center / West Seattle Tool Library	SW	NO	Along S side (space is large enough so that this isn't a big problem)	YES (High Risk but underwent Substantial Alteration)	3of4 approaches (75%)	YES	YES (grade change)	YES (1)		YES	YES	YES	x	x	x	x	YES	11of12

APPENDIX – Proposed Hub Stewards

Onsite OR Offsite	Steward Name	Org Type	Address	Sector	Associated Hub	Notes
ON	Abubakar Mosque of Washington	Religious	5511 Martin Luther King Jr Way S	SE	Abubakr Mosque of Washington	
ON	Admiral United Church of Christ	Religious	4320 SW Hill St	SW	Admiral United Church of Christ	
OFF	Aki Kurose Middle School (ASB / PTA)	School	3928 S Graham St	SE	Graham Hill Elementary School	
ON	Alki Lodge #152	Fraternal	4736 40th Ave SW	SW	Alki Masonic Center	Several other "Masonic Bodies" are based here, including Masonic Lodge Alba #315, Order of the Eastern Star (OES) – Amethyst Chapter #138, Order of the Eastern Star (OES) – Crown Chapter #249, Order of the Amaranth – Alki Court #21, International Order of Rainbow for Girls (IORG) – West Seattle Rainbow #18
ON	American Legion Post 160 of West Seattle	Fraternal	3618 SW Alaska St	SW	West Seattle Legion Hall	
ON	Arbor Heights Community Church	Religious	4113 SW 102nd St	SW	Arbor Heights Community Church	
ON	Arbor Heights Elementary School (ASB / PTA)	School	3701 SW 104th St	SW	Arbor Heights Elementary School	
ON	Asian Counseling and Referral Service	Ethnoracial	3639 Martin Luther King Jr Way S	SE	Asian Counseling and Referral Service	
OFF	Beacon Ave Church of God	Religious	7225 Beacon Ave S	SE	NewHolly Neighborhood Campus	
OFF	Beacon Hill Church of the Nazarene	Religious	4352 15th Ave S	SE	Jefferson Tennis Courts	Small, but seems inclusive and wanting to engage community. Also has free indoor playspace for kids.
OFF	Beacon Hill Elementary School (ASB / PTA)	School	2025 14th Ave S	SE	Daejong Park	
OFF	Beacon Hill First Baptist Church	Religious	1607 S Forest St	SE	El Centro De La Raza	
OFF	Beacon United Methodist Church	Religious	7301 Beacon Ave S	SE	NewHolly Neighborhood Campus	
OFF	Berean Church of God In Christ	Religious	3417 Rainier Ave S	SE	Asian Counseling and Referral Service	
OFF	Bethany United Church Of Christ	Religious	6230 Beacon Ave S	SE	Chinese Baptist Church in Seattle	
ON	Big Brothers Big Sisters - Seattle Office	Volunteer	1600 S Graham St	SE	Big Brothers Big Sisters	
ON	Bikur Cholim Machzikay Hadath	Religious	5145 S Morgan St	SE	Bikur Cholim Machzikay Hadath	
OFF	Chief Sealth High School (ASB / PTA)	School	2600 SW Thistle St	SW	A.T. Milo Park	
ON	Chinese Baptist Church in Seattle	Religious	5801 Beacon Ave S	SE	Chinese Baptist Church in Seattle	
OFF	Chobo-Ji Zen Center	Religious	1733 S Horton St	SE	Jefferson Tennis Courts	
OFF	Christ The Son Of God Church	Religious	1720 S Forest St	SE	El Centro De La Raza	Primarily African-American church.

OFF	Christian Science Church	Religious	3601 SW Barton St	SW	Fauntleroy Church	
OFF	Church At South Seattle	Religious	3019 S Angeline St	SE	Neighborhood House Rainier Vista	
OFF	Co Lam Pagoda	Religious	3503 S Graham St	SE	Filipino Community Center	
OFF	Columbia City Church of Hope	Religious	3818 S Angeline St	SE	Neighborhood House Rainier Vista	Progressive, inclusive church with connections to other orgs.
OFF	Community of Christ: Rainier Valley Congregation	Religious	4820 S Morgan St	SE	Bikur Cholim Machzikay Hadath	LDS resilience.
OFF	Community of Hope Church of the Nazarene	Religious	8600 9th Ave SW	SW	West Crest Park - South Playground	
OFF	Concord International Elementary School (ASB / PTA)	School	723 S Concord St	SW	Marra-Desimone Park	
ON	Congregation Ezra Bessaroth	Religious	5217 S Brandon St	SE	Congregation Ezra Bessaroth	
OFF	Dearborn Park International Elementary School (ASB / PTA)	School	2820 S Orcas St	SE	Filipino Community Center	
OFF	Debre Mihret St. Michael Ethiopian Orthodox Church	Religious/Ethnoracial	6718 Martin Luther King Jr Way S	SE	John C. Little Sr. Park	
OFF	Denny International Middle School (ASB / PTA)	School	2601 SW Kenyon St	SW	A.T. Milo Park	
OFF	Dunlap Elementary School (ASB / PTA)	School	4525 S Cloverdale St	SE	South Shore K-8	Has an ASB and PTA.
OFF	Duoc Su Temple	Religious/Ethnoracial	6918 42nd Ave S	SE	Iglesia ni Cristo - Locale of Seattle	Vietnamese religious community.
OFF	Duwamish Longhouse and Cultural Center	Ethnoracial	4705 W Marginal Way SW	SW	Youngstown Cultural Arts Center / West Seattle Tool Library	Indigenous organization.
ON	East African Community Services	Ethnoracial	7050 32nd Ave S	SE	NewHolly Neighborhood Campus	
ON	El Centro De La Raza	Ethnoracial	2524 16th Ave S	SE	El Centro De La Raza	Already does community organizing.
OFF	Emerald City Bible Fellowship	Religious	7728 Rainier Ave S	SE	Rosehill Missionary Baptist Church	Believes in "works" of the gospel.
OFF	Emerson Elementary School (ASB / PTA)	School	9709 60th Ave S	SE	Hutchinson Community Center / Hutchinson Playground	
OFF	Emmanuel Ethiopian Orthodox	Religious/Ethnoracial	2101 14th Ave S	SE	El Centro De La Raza	Minority religious congregation.
OFF	Eritrean Hall	Ethnoracial	1954 S Massachusetts St	SE	Daejeon Park	Ethnic minority org/space. Community events.
OFF	Ethiopian Community in Seattle	Ethnoracial	8323 Rainier Ave S	SE	South Shore K-8	
OFF	Fairmount Park Elementary School (ASB / PTA)	School	3800 SW Findlay St	SW	Neighborhood House High Point	
ON	Fauntleroy Church	Religious	9140 California Ave SW	SW	Fauntleroy Church	

OFF	Fauntleroy Community Association / Fauntleroy Community Service Agency	Neighborhood	9131 California Ave SW	SW	Fauntleroy Church	
OFF	Filipino American Seventh-day Adventist Church	Religious/Ethnoracial	2620 SW Kenyon St	SW	E.C. Hughes Playground	Minority religious congregation. Boy scouts.
ON	Filipino Community of Seattle	Ethnoracial	5740 Martin Luther King Jr Way S	SE	Filipino Community Center	Ethnic org. Variety of programs.
OFF	First Lutheran Church of West Seattle	Religious	4105 California Ave SW	SW	Hope Lutheran Church	ELCA
OFF	First Samoan Congregational	Religious/Ethnoracial	8433 Renton Ave S	SE	Wat Lao Dhammacetiyaram	Minority religious congregation.
ON	Flock Christian Church	Religious	9065 Martin Luther King Jr Way S	SE	Flock Christian Church	
OFF	Franklin High School (ASB / PTA)	School	3013 S Mt Baker Blvd	SE	Mt. Baker Park	Racially/ethnically diverse. PTO. Multiple existing committees and task forces.
OFF	Fraternal Order of Eagles	Fraternal	4426 California Ave SW	SW	Alki Masonic Center	Does local charity work.
OFF	Full Gospel Pentecostal Church	Religious	5071 Delridge Way SW	SW	South Seattle College - North Parking Lot	
ON	Garden of Gethsemane Church of God In Christ	Religious	11925 Beacon Ave S	SE	Garden of Gethsemane Church of God In Christ	
OFF	Gatewood Elementary School (ASB / PTA)	School	4320 SW Myrtle St	SW	Morgan Junction Park	Has an ASB and PTA.
OFF	Genesee Hill Elementary School (ASB / PTA)	School	5013 SW Dakota St	SW	Ercolini Park	Has an ASB and PTA.
ON	Graham Hill Elementary School (ASB / PTA)	School	5149 S Graham St	SE	Graham Hill Elementary School	
OFF	Graham Street Church of Christ	Religious	3108 S Graham St	SE	Central Park - Shaffer Ave S	
ON	Grover Cleveland STEM High School (ASB / PTA)	School	5511 15th Ave S	SE	Grover Cleveland STEM High School	
ON	Hawthorne Elementary School (ASB / PTA)	School	4100 39th Ave S	SE	Hawthorne Elementary School	
ON	High Point Homeowners Association / Open Space Association	Neighborhood	6400 Sylvan Way SW	SW	Neighborhood House High Point	
OFF	High Point Masjid	Religious	6558 35th Ave SW	SW	Neighborhood House High Point	
OFF	Highland Park Baptist Church	Religious	1505 SW Barton St	SW	West Crest Park - South Playground	Maybe too fundamentalist? At least seems racially/ethnically diverse.
OFF	Highland Park Elementary School (ASB / PTA)	School	1012 SW Trenton St	SE	Highland Park Improvement Club (HPIC)	
ON	Highland Park Improvement Club (HPIC)	Neighborhood	1116 SW Holden St	SW	Highland Park Improvement Club (HPIC)	
OFF	Highland Park United Methodist	Religious	9001 9th Ave SW	SW	West Crest Park - South Playground	Both English and Spanish language services.
OFF	Holgate Street Church of Christ	Religious	2600 S Holgate St	SE	Northwest African American Museum / Jimi Hendrix Park	Primairly Afro-American church. Seems to be involved in the wider community.

OFF	Holly Park Community Church	Religious	4308 S Othello St	SE	Rainier Valley Church	
ON	Holy Family Roman Catholic Church	Religious	9622 20th Ave SW / 9615 20th Ave SW	SW	Holy Family Roman Catholic Church / School	Also has school.
OFF	Holy Protection of the Theotokos Orthodox Church	Religious	833 S Thistle St	SW	Marra-Desimone Park	
OFF	Holy Rosary Catholic Church	Religious	4139 42nd Ave SW	SW	Hope Lutheran Church	Also has school.
ON	Hope Lutheran Church	Religious	4456 42nd Ave SW	SW	Hope Lutheran Church	
OFF	Horn of Africa Services	Ethnoracial	5303 Rainier Ave S Suite D	SE	Orca K-8 School	Ethnic minority org. Can mobilize volunteers.
OFF	IDIC Filipino Senior & Family Services	Ethnoracial	7301 Beacon Ave S, Seattle	SE	NewHolly Neighborhood Campus	Ethnic org. Variety of programs.
OFF	Iglesia Adventista del Séptimo Día White Center	Religious/Ethnoracial	8611 11th Ave SW	SW	West Crest Park - South Playground	Minority religious congregation.
ON	Iglesia ni Cristo - Locale of Seattle	Religious/Ethnoracial	7100 42nd Ave S	SE	Iglesia ni Cristo - Locale of Seattle	
OFF	Iglesia Seattle	Religious/Ethnoracial	8831 16th Ave SW	SW	West Crest Park - South Playground	Minority religious congregation.
OFF	Israelite Community Church of God in Christ	Religious	7149 Martin Luther King Jr Way S	SE	Rainier Valley Church	
OFF	Japanese Presbyterian Church	Religious/Ethnoracial	1801 24th Ave S	SE	Northwest African American Museum / Jimi Hendrix Park	Minority religious congregation.
OFF	John Muir Elementary School (ASB / PTA)	School	3301 S Horton St	SE	Asian Counseling and Referral Service	
OFF	Kandelia	Volunteer	3829 S Edmunds St Box 9	SE	Neighborhood House Rainier Vista	Formerly known as Vietnamese Friendship Association. Youth, family, and refugee services. Multicultural staff and board.
OFF	Kibre Qidusan Medhanealem Ethiopian Orthodox Tewahedo Church	Religious/Ethnoracial	5500 S Roxbury St	SE	Hutchinson Community Center / Hutchinson Playground	
OFF	Kingdom Hall of Jehovah's Witnesses	School	5933 39th Ave S	SE	Filipino Community Center	
OFF	Lafayette Elementary School (ASB / PTA)	School	2645 California Ave SW	SW	Hiawatha Playfield & Community Center	Has an ASB and PTA.
ON	Lakewood Seward Park Community Club	Neighborhood	4916 S Angeline St	SE	Congregation Ezra Bessaroth	
ON	Louisa Boren STEM K-8 (ASB / PTA)	School	5950 Delridge Way SW	SW	Louisa Boren STEM K-8	
OFF	Lutheran Volunteer Corps	Volunteer	3808 S Angeline St	SE	Rainier Vista Boys & Girls Club / Rainier Vista Playfield	ELCA social justice org.
OFF	Macedonia Baptist Church	Religious	7126 Beacon Ave S	SE	NewHolly Neighborhood Campus	
OFF	Madison Middle School (ASB / PTA)	School	3429 45th Ave SW	SW	Schmitz Park Elementary School	
OFF	Maple Elementary School (ASB / PTA)	School	4925 Corson Ave S	SE	Grover Cleveland STEM High School	

OFF	Maranatha Adventist Church	Religious	7132 43rd Ave S	SE	Iglesia ni Cristo - Locale of Seattle	
OFF	Medhane-Alem Evangelical Church	Religious/Ethnoracial	8445 Rainier Ave S	SE	Wat Lao Dhammacetiyaram	Minority religious congregation.
ON	Mercer International Middle School (ASB / PTA)	School	1600 S Columbian Way	SE	Mercer International Middle School	
ON	Ming Ya Buddhist Foundation Of Seattle	Religious	5518 Martin Luther King Jr Way S	SE	Abubakr Mosque of Washington	
OFF	Minyan Ohr Chadash / Ashreichem Yisrael	Religious	6721 51st Ave S	SE	Bikur Cholim Machzikay Hadath	Part of cluster of Jewish institutions.
ON	Morgan Community Association	Neighborhood	7125 Fauntleroy Way SW	SW	Morgan Junction Park	
OFF	Mount Baker Community Club	Neighborhood	2811 Mt Rainier Dr S	SE	Mt. Baker Park	Organizes neighborhood events and activities.
OFF	Mt. Baker Park Presbyterian	Religious	3201 Hunter Blvd S	SE	Mt. Baker Park	
OFF	New Direction Missionary Church	Religious	755 S Homer St	SE	Big Brothers Big Sisters	
OFF	New Freeway Hall	Community	5018 Rainier Ave S	SE	Orca K-8 School	Community center run by radical feminist socialists.
OFF	New Light Christian Church	Religious	4620 S Findlay St	SE	Congregation Ezra Bessaroth	Racially/ethnically diverse congregation.
ON	Northwest African American Museum	Community	2300 S Massachusetts St / 2400 S Massachusetts St	SE	Northwest African American Museum / Jimi Hendrix Park	
OFF	Oareao OCC Masjid	Religious	8810 Renton Ave S	SE	Flock Christian Church	
ON	Orca K-8 School (ASB / PTA)	School	5215 46th Ave S	SE	Orca K-8 School	
OFF	Oromo Church-God-Prophecy	Religious/Ethnoracial	850 S Cloverdale St	SW	Marra-Desimone Park	
OFF	Oromo Cultural Center	Religious	8817 Renton Ave S	SE	Flock Christian Church	
OFF	Our Lady of Mount Virgin Parish	Religious	2800 S Massachusetts St	SE	Northwest African American Museum / Jimi Hendrix Park	Multilingual church.
OFF	Our Lady of Zarvanycia Ukrainian Greek Catholic Church	Religious/Ethnoracial	5321 17th Ave S	SE	Chinese Baptist Church in Seattle	Minority religious congregation. Seems small, but active and cohesive.
OFF	Paradise Baptist Church	Religious	4353 S Henderson St	SE	Flock Christian Church	
ON	Pathfinder K-8 School (ASB / PTA)	School	1901 SW Genesee St	SW	Pigeon Point	
ON	Peace Lutheran Church	Religious	8316 39th Ave SW	SW	Peace Lutheran Church	
OFF	Rainier Avenue Church	Religious	5900 Rainier Ave S	SE	Congregation Ezra Bessaroth	Diverse racially/ethnically and age-wise.
OFF	Rainier Beach Action Coalition	Neighborhood	9013 Martin Luther King Jr Way S	SE	Benefit Park	Efforts in include community economic development, transit advocacy, food innovation district, and so on.

OFF	Rainier Beach Community Club - VFW Hall	Neighborhood	6038 S Pilgrim	SE	Hutchinson Community Center / Hutchinson Playground	
OFF	Rainier Beach Presbyterian Church	Religious	9656 Waters Ave S	SE	Hutchinson Community Center / Hutchinson Playground	Racially/ethnically diverse congregation.
ON	Rainier Valley Church	Religious	3800 S Othello St	SE	Rainier Valley Church	
OFF	Rainier Valley Corps	Neighborhood	1225 S Weller St #400	SE	Jefferson Tennis Courts	Advocacy on behalf of communities of color
ON	Rainier Vista Boys & Girls Club	Volunteer	4520 Martin Luther King Jr Way S	SE	Rainier Vista Boys & Girls Club / Rainier Vista Playfield	
OFF	RainierAvenueRadio.World	Neighborhood	5256 Rainier Ave S	SE	Orca K-8 School	Hyperlocal radio station covering South Seattle. Community involvement.
ON	Rising Star Elementary School (ASB / PTA)	School	8311 Beacon Ave S	SE	Rising Star Elementary School - North Parking Lot	
ON	Rosehill Missionary Baptist Church	Religious	7550 Martin Luther King Jr Way S	SE	Rosehill Missionary Baptist Church	
OFF	Saint George Catholic Church / School	Religious/School	5306 13th Ave S / 5117 13th Ave S	SE	Chinese Baptist Church in Seattle	Racially/ethnically diverse. Usual Catholic mixture of church, school, charities, outreach, other parish entities.
OFF	Samoan Community Church	Religious/Ethnoracial	6757 38th Ave S	SE	John C. Little Sr. Park	
OFF	Sanislo Elementary School (ASB / PTA)	School	1812 SW Myrtle St	SW	Riverview Playfield	Has an ASB and PTA.
ON	Schmitz Park Elementary School (ASB / PTA)	School	5000 SW Spokane St	SW	Schmitz Park Elementary School	
ON	SE Seattle Tool Library	Community	4425 Martin Luther King Jr Way S	SE	Neighborhood House Rainier Vista	
OFF	Seattle Chinese Alliance Church	Religious	2803 S Orcas St	SE	Chinese Baptist Church in Seattle	
OFF	Seattle Chinese Assembly of God	School	4205 S Graham St	SE	Filipino Community Center	Minority religious congregation.
OFF	Sephardic Bikur Holim Congregation	Religious	6500 52nd Ave S	SE	Bikur Cholim Machzikay Hadath	
OFF	Seward Park Seventh-day Adventist Church	Religious	5200 S Orcas St	SE	Congregation Ezra Bessaroth	
OFF	Somali Community Services Of Seattle	Ethnoracial	8810 Renton Ave S	SE	Flock Christian Church	Ethnic minority org. Connections with variety of public agencies. Work with refugees.
OFF	South Lake High School (ASB / PTA)	School	8601 Rainier Ave S	SE	South Shore K-8	
OFF	South Park Missionary Baptist Church	Religious	8510 8th Ave S	SW	Marra-Desimone Park	
ON	South Seattle College	School	6000 16th Ave SW	SW	South Seattle College - North Parking Lot	
OFF	South Seattle College Georgetown	School	6737 Corson Ave S	SE	Big Brothers Big Sisters	
OFF	South Shore K-8 (ASB / PTA)	School	4800 S Henderson St	SE	South Shore K-8	Has an ASB and PTA.

OFF	St. Clement's Episcopal Church	Religious	1501 32nd Ave S	SE	Northwest African American Museum / Jimi Hendrix Park	
OFF	St. Edward Catholic Church / Seattle Nativity School	Religious	4212 S Mead St / 4200 S Mead St	SE	Abubakr Mosque of Washington	
OFF	St. John the Baptist Episcopal Church	Religious	3050 California Ave SW	SW	Hiawatha Playfield & Community Center	
OFF	St. Luke's Lutheran Church	Religious	5350 S Fountain St	SE	Garden of Gethsemane Church of God In Christ	
OFF	St. Paul Catholic Church	Religious	10001 57th Ave S	SE	Hutchinson Community Center / Hutchinson Playground	Racially/ethnically diverse. Usual Catholic mixture of church, school, charities, outreach, other parish entities.
OFF	Templo El Redentor	Religious/Ethnoracial	5500 17th Ave S	SE	Chinese Baptist Church in Seattle	Part of Latin American Assemblies-God denomination.
OFF	The Church of Jesus Christ of Latter-day Saints - 4th Ave SW	Religious	4001 44th Ave SW	SW	Hope Lutheran Church	LDS
ON	The Church of Jesus Christ of Latter-day Saints - Myers Way	Religious	9500 Myers Way S	SW	The Church of Jesus Christ of Latter-day Saints - Myers Way	
OFF	The Hallows Church West Seattle Expression	Religious	3420 SW Cloverdale St	SW	Peace Lutheran Church	
OFF	The Junction Church	Religious	4157 California Ave SW	SW	Hope Lutheran Church	
OFF	The Lighthouse for the Blind, Inc.	Community	2501 S Plum St	SE	Northwest African American Museum / Jimi Hendrix Park	
ON	The Salvation Army Seattle White Center	Community	9050 16th Ave SW	SW	The Salvation Army Seattle White Center - Parking Lot	
OFF	This is Holy Ground: Community Church	Religious	3425 Martin Luther King Jr Way S	SE	Asian Counseling and Referral Service	
OFF	Tibbetts United Methodist Church	Religious	3940 41st Ave SW	SW	Hope Lutheran Church	
OFF	Umoja PEACE Center	Religious	3100 S Alaska St	SE	Rainier Vista Boys & Girls Club/Rainier Vista Playfield	Black advocacy organization.
OFF	United House Of Prayer For All People	Religious	2801 S Walden St	SE	Asian Counseling and Referral Service	
OFF	Unity Church of God In Christ	Religious	8302 Renton Ave S	SE	Wat Lao Dhammacetiyaram	
OFF	Vietnamese Thien-Baptist Church	Religious/Ethnoracial	2900 SW Myrtle St	SW	E.C. Hughes Playground	
ON	Wat Lao Dhammacetiyaram	Religious/Ethnoracial	3946 S Kenyon St	SE	Wat Lao Dhammacetiyaram	
OFF	Wat Lao Mixayaram / Laotian Buddhist Society	Religious	11815 59th Ave S	SE	Garden of Gethsemane Church of God In Christ	
OFF	West African Community Council	Ethnoracial	6322 44th Ave S	SE	Filipino Community Center	Ethnic minority org.
OFF	West Seattle Christian Church	Religious	4400 42nd Ave SW	SW	Hope Lutheran Church	
OFF	West Seattle Elementary School (ASB / PTA)	School	6760 34th Ave SW	SW	Neighborhood House High Point	

OFF	West Seattle High School (ASB / PTA)	School	3000 California Ave SW	SW	Hiawatha Playfield & Community Center	
OFF	West Seattle Junction Association	Neighborhood	4210 SW Oregon St	SW	Alki Masonic Center	Cooperates with local biz. Organizes local events.
ON	West Seattle Tool Library	Community	4408 Delridge Way SW	SW	Youngstown Cultural Arts Center / West Seattle Tool Library	
OFF	Westside Unitarian Universalist Congregation	Religious	7141 California Ave SW	SW	Lincoln Park - Parking Lot 1	Social justice and inclusivity. Also, Unitarian Universalists are pretty open minded and should work well with others.
OFF	Westwood Christian Community	Religious	9252 16th Ave SW	SW	The Salvation Army Seattle White Center - Parking Lot	Seems open to engaging with surrounding community.
OFF	Wing Luke Elementary School (ASB / PTA)	School	7201 Beacon Ave S	SE	Rising Star Elementary School - North Parking Lot	Racially/ethnically diverse.
ON	Youngstown Cultural Arts Center	Community	4408 Delridge Way SW	SW	Youngstown Cultural Arts Center / West Seattle Tool Library	

APPENDIX – Disqualified Potential Hub Sites

Site Name	Address	Sector	Reason Disqualified
Amy Yee Tennis Center	2000 Martin Luther King Jr Way S	SE	Overhead power lines.
Arbor Heights Swim and Tennis Club	11003 31st Ave SW	SW	Lack of accessibility.
Beacon Hill Elementary School	2025 14th Ave S	SE	Overhead power lines.
Belvidere Park	3600 SW Admiral Way	SW	Overhead power lines.
Boys & Girls Club of America / Brighton Childcare	6725 45th Ave S	SE	Overhead power lines.
Chief Sealth High School	2600 SW Thistle St	SW	Lack of accessibility.
Christian Science Church	3601 SW Barton St	SW	Overhead power lines.
Colman Playground / Seattle Children's PlayGarden	1740 23rd Ave S / 1745 24th Ave S	SE	Overhead power lines.
Community of Christ: Rainier Valley Congregation	4820 S Morgan St	SE	Overhead power lines.
Concord International School	723 S Concord St	SW	Overhead power lines.
Dakota Place Park	4304 SW Dakota St	SW	Overhead power lines.
Damascus Baptist Church	5261 Rainier Ave S	SE	Overhead power lines.
Debre Mihret St. Michael Ethiopian Orthodox Church	6718 Martin Luther King Jr Way S	SE	Overhead power lines.
Delridge Branch - The Seattle Public Library	5423 Delridge Way SW	SW	Overhead power lines.
Dunlap Elementary School	4525 S Cloverdale St	SE	Overhead power lines.
Duoc Su Temple	6918 42nd Ave S	SE	Overhead power lines.
Emerson Elementary School	9709 60th Ave S	SE	URM (Critical Risk grade)
Eritrean Hall	1954 S Massachusetts St	SE	Ground liquefaction zone.
Filipino American Seventh-day Adventist Church	2620 SW Kenyon St	SW	Overhead power lines.
First Lutheran Church of West Seattle	4105 California Ave SW	SE	Overhead power lines.
First Samoan Congregational	8433 Renton Ave S	SE	Overhead power lines.

Franklin High School	3013 S Mt Baker Blvd	SE	Overhead power lines.
Full Gospel Pentecostal Church	5071 Delridge Way SW	SW	Overhead power lines.
Gatewood Elementary School	4320 SW Myrtle St	SW	Overhead power lines.
Genesee Hill Elementary School	5013 SW Dakota St	SW	Overhead power lines.
Green Dot Rainier Valley Leadership Academy	6020 Rainier Ave S	SE	Overhead power lines.
Hamilton Viewpoint Park	1120 California Way SW	SW	Lack of accessibility.
High Point Branch - The Seattle Public Library	3411 SW Raymond St	SW	Overhead power lines.
Highland Park Baptist Church	1505 SW Barton St	SW	Overhead power lines.
Highland Park Elementary School	1012 SW Trenton St	SW	Overhead power lines.
Highland Park Playground	1100 SW Cloverdale St	SW	Overhead power lines.
Highland Park United Methodist	9001 9th Ave SW	SE	Overhead power lines.
Holly Park Community Church	4308 S Othello St	SE	Overhead power lines.
Holy Rosary Catholic Church / School	4139 42nd Ave SW	SW	Overhead power lines.
Iglesia Adventista del Séptimo Día White Center	8611 11th Ave SW	SW	Overhead power lines.
Iglesia Seattle	8831 16th Ave SW	SW	Overhead power lines.
Interagency Academy	3528 S Ferdinand St	SE	Overhead power lines.
Junction Plaza Park	4545 42nd Ave SW	SW	Overhead power lines.
KVRU 105.7FM	3642 33rd Ave S suite c-5	SE	Ground liquefaction zone.
Lafayette Elementary School	2645 California Ave SW	SW	Overhead power lines.
Lakeridge Elementary School (pkng lot)	7400 S 115th St	SE	Overhead power lines.
Lakeridge Playfield	10145 Rainier Ave S	SE	Overhead power lines.
Lakewood Park	5013 S Angeline St	SE	Overhead power lines.
Lee House	7315 39th Ave S	SE	Lack of accessibility.

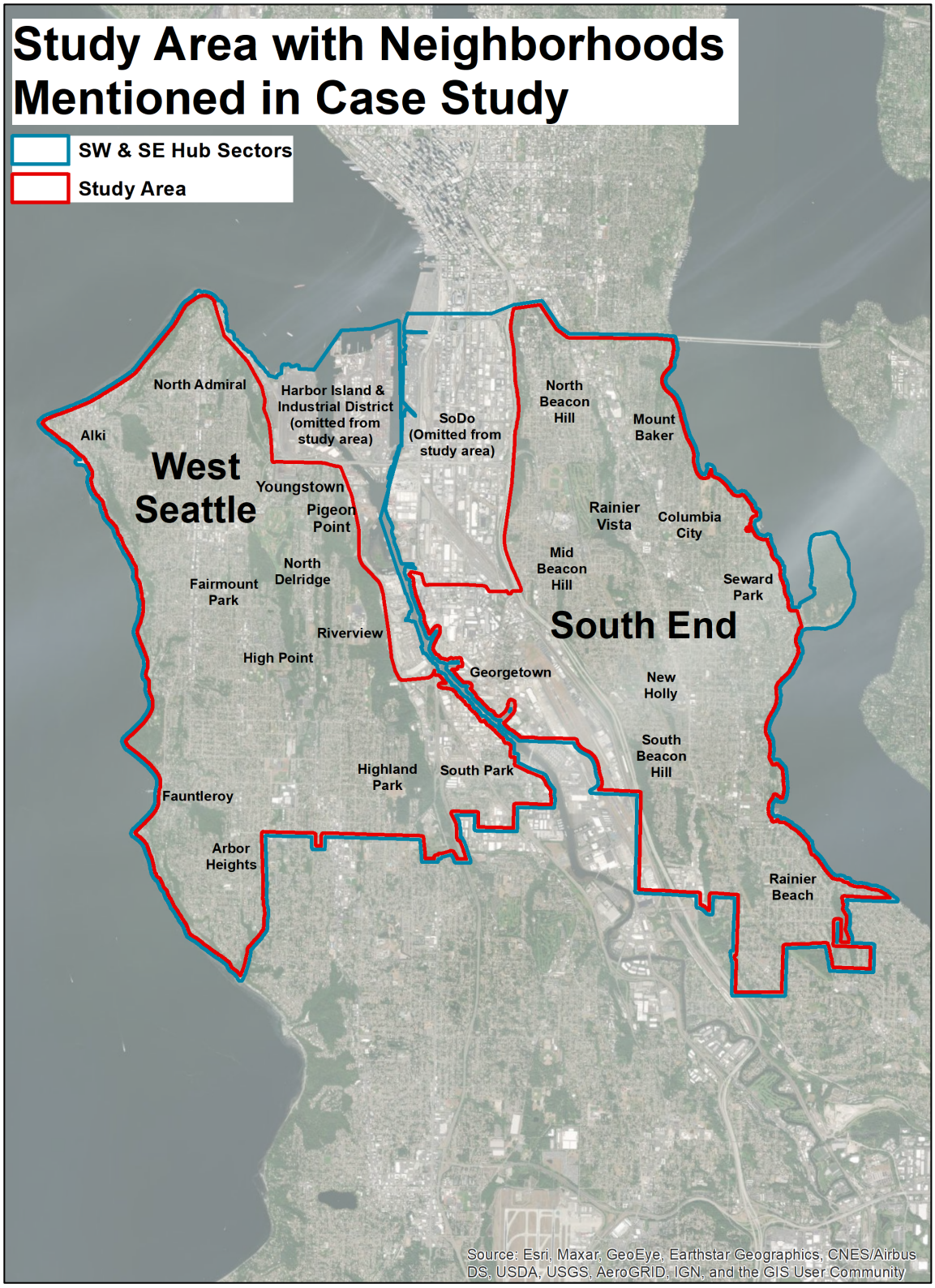
Maple Elementary School / Maple Wood Playfield	4925 Corson Ave S / 4801 Corson Ave S	SE	Overhead power lines.
Maranatha Adventist Church	7132 43rd Ave S	SE	Overhead power lines.
Martha Washington Park	6612 57th Ave S	SE	Overhead power lines.
Medhane-Alem Evangelical Church	8445 Rainier Ave S	SE	Overhead power lines.
Mount Baker Community Club	2811 Mt Rainier Dr S	SE	Overhead power lines.
Mount Moriah Seattle Church	4055 38th Ave S	SE	Overhead power lines.
Mt Baker Park Presbyterian	3201 Hunter Blvd S	SE	Overhead power lines.
New Light Christian Church / Magic Lantern Montessori	4620 S Findlay St	SE	Overhead power lines.
Northwest Zen Community EISHOJI Soto Zen Temple	9822 61st Ave S	SE	Overhead power lines.
Oareao OCC Masjid	8810 Renton Ave S	SE	Overhead power lines.
Oromo Cultural Center	8817 Renton Ave S	SE	Overhead power lines.
Othello Playground	4351 S Othello St	SE	Overhead power lines.
Our Lady of Mount Virgin Parish	2800 S Massachusetts St	SE	Overhead power lines.
Our Lady of Zarvanycia Ukrainian Greek Catholic Church	5321 17th Ave S	SE	Overhead power lines.
Paradise Baptist Church	4353 S Henderson St	SE	Overhead power lines.
Paradise of Praise COGIC	1316 SW Holden St	SW	Overhead power lines.
Pentecostal Missionary Church of Christ	2855 S Alaska Pl	SE	Overhead power lines.
Rainier Avenue Church	5900 Rainier Ave S	SE	Overhead power lines.
Rainier Beach Branch - The Seattle Public Library	9125 Rainier Ave S	SE	Overhead power lines.
Rainier Beach Community Center	8825 Rainier Ave S	SE	Overhead power lines.
Rainier Beach Presbyterian Church	9656 Waters Ave S	SE	Overhead power lines.
Rainier Chamber of Commerce	5290 Rainier Ave S	SE	Overhead power lines.
Rainier Community Center	4600 38th Ave S	SE	Overhead power lines.

Rainier Playfield	3700 S Alaska St	SE	Ground liquefaction zone.
Rainier View Elementary School	11650 Beacon Ave S	SE	Overhead power lines.
Roxhill Park	2850 SW Roxbury St	SW	Ground liquefaction zone.
Saint George Catholic Church / School	5306 13th Ave S / 5117 13th Ave S	SE	Overhead power lines.
Samoan Community Church	6757 38th Ave S	SE	Overhead power lines.
Samoan Community Church	6757 38th Ave S	SE	Overhead power lines.
Sanislo Elementary School	1812 SW Myrtle St	SW	Overhead power lines.
Seattle Chinese Assembly of God	4205 S Graham St	SE	Overhead power lines.
Seattle Lutheran High School	4100 SW Genesee St	SW	Overhead power lines.
Seattle Urban Academy	10056 Renton Ave S	SE	Lack of accessibility.
Seward Park Seventh-day Adventist Church	5200 S Orcas St	SE	Lack of accessibility.
Solstice Park Tennis Courts	7400-7498 Fauntleroy Way SW	SW	Overhead power lines.
South Lake High School	8601 Rainier Ave S	SE	Overhead power lines.
Southeast Seattle Senior Center	4655 S Holly St	SE	Overhead power lines.
Southwest Athletic Complex	2600 SW Thistle St	SW	Lack of accessibility.
St Luke's Lutheran Church	5350 S Fountain St	SE	Overhead power lines.
St. Clement's Episcopal Church	1501 32nd Ave S	SE	Overhead power lines.
St. Edward Catholic Church / Seattle Nativity School	4212 S Mead St / 4200 S Mead St	SW	Overhead power lines.
St. John the Baptist Episcopal	3050 California Ave SW	SW	Overhead power lines.
St. Paul Catholic Church	10001 57th Ave S	SE	Overhead power lines.
Summit Public Schools: Atlas	9601 35th Ave SW	SW	Overhead power lines.
Templo El Redentor	5500 17th Ave S	SE	Overhead power lines.
The Church of Jesus Christ of Latter-day Saints (4th Ave SW)	3928 S Graham St	SE	Overhead power lines.

The Hallows Church West Seattle Expression	3420 SW Cloverdale St	SW	Overhead power lines.
Umoja PEACE Center	3100 S Alaska St	SE	Overhead power lines.
Van Asselt Community Center / Van Asselt Playground	2820 S Myrtle St / 7050 Beacon Ave S	SE	Overhead power lines.
Wat Lao Mixayaram / Laotian Buddhist Society	11815 59th Ave S	SE	Overhead power lines.
West Seattle Branch - The Seattle Public Library	2306 42nd Ave SW	SW	Overhead power lines.
West Seattle Junction Association	4210 SW Oregon St	SW	Overhead power lines.
West Seattle Stadium	4432 35th Ave SW	SW	Overhead power lines.
Westside Unitarian Universalist Congregation	7141 California Ave SW	SW	Overhead power lines.
Westwood Christian Community	9252 16th Ave SW	SW	Overhead power lines.
Wing Luke Elementary School	7201 Beacon Ave S	SE	Overhead power lines.
YMCA (non-profit office)	3401 Rainier Ave S C	SE	Overhead power lines.

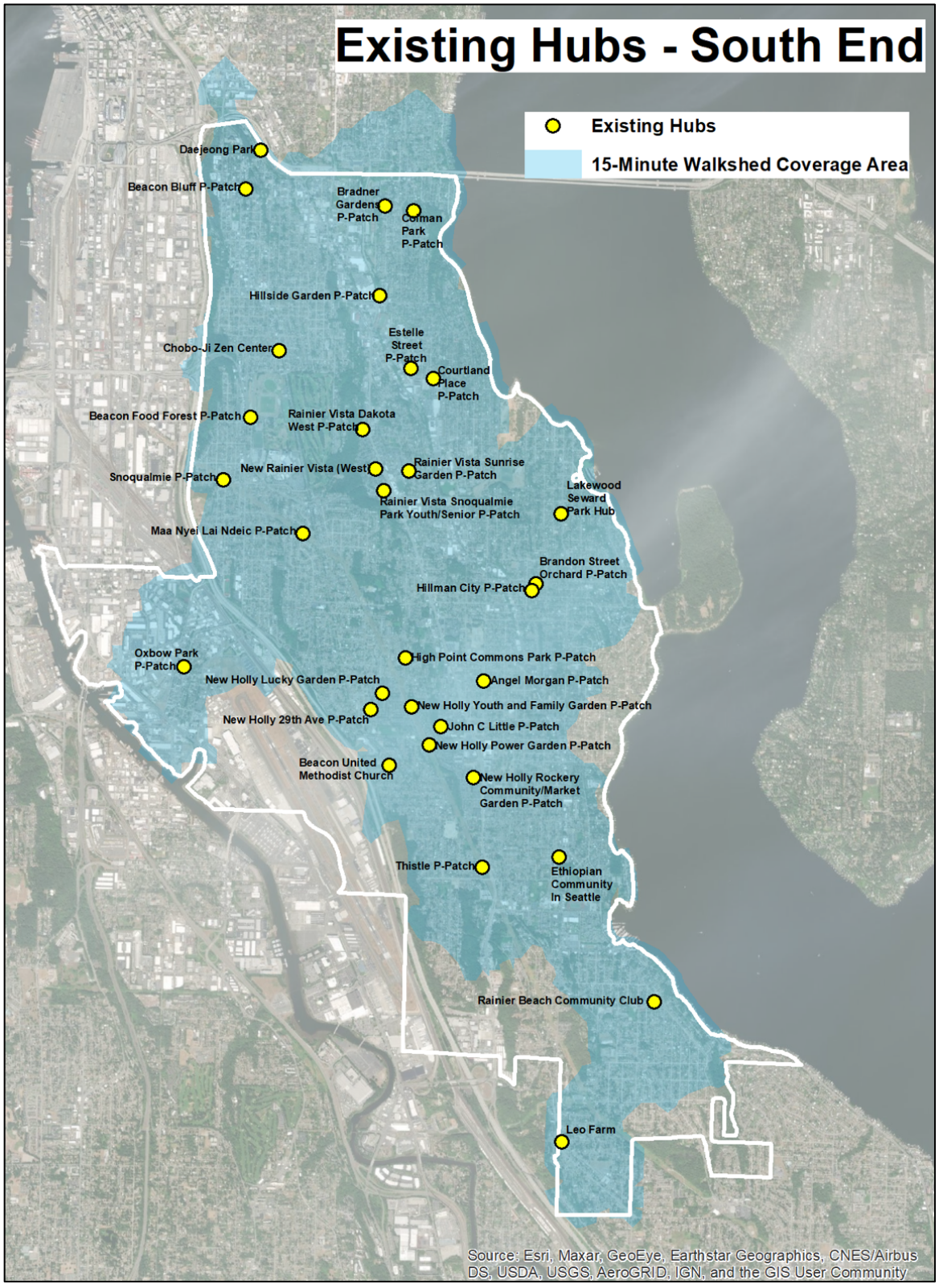
APPENDIX – Map of Study Area

Data courtesy of WAGDA and the City of Seattle



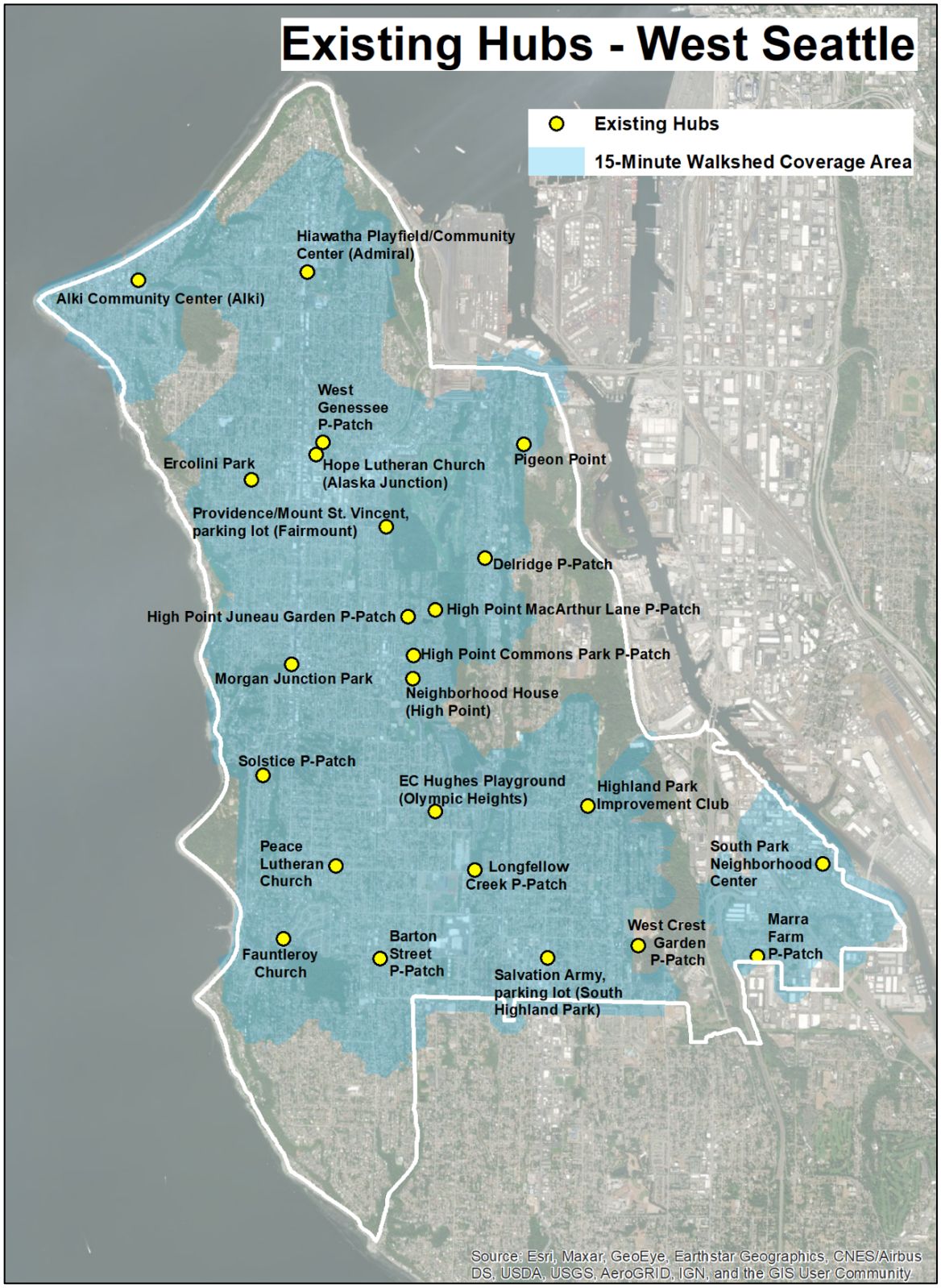
APPENDIX – Existing Hub System with Combined 15-Minute Walkshed Coverage Areas – South End

Data courtesy of WAGDA and the City of Seattle



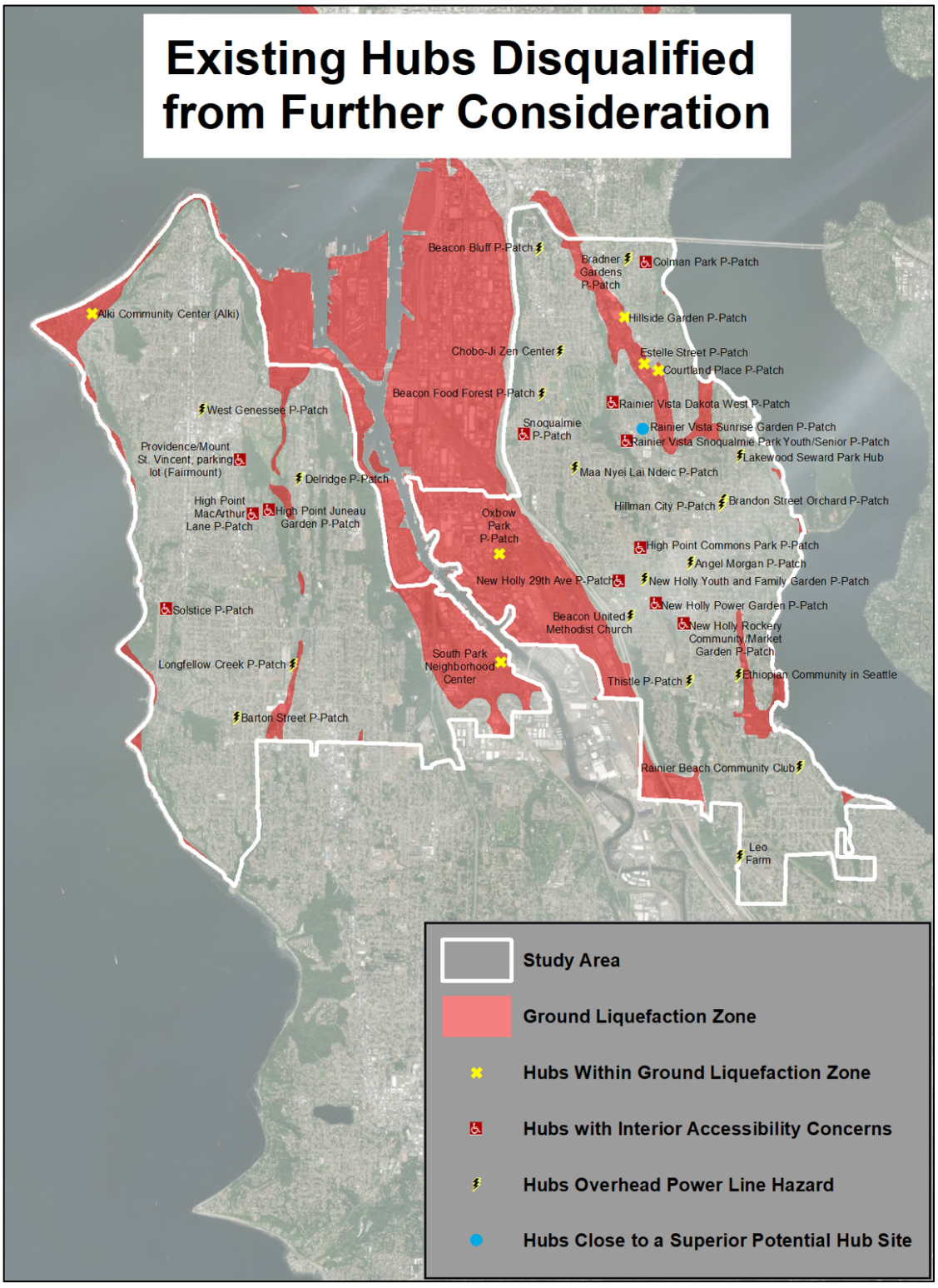
APPENDIX – Existing Hub System with Combined 15-Minute Walkshed Coverage Areas – West Seattle

Data courtesy of WAGDA and the City of Seattle



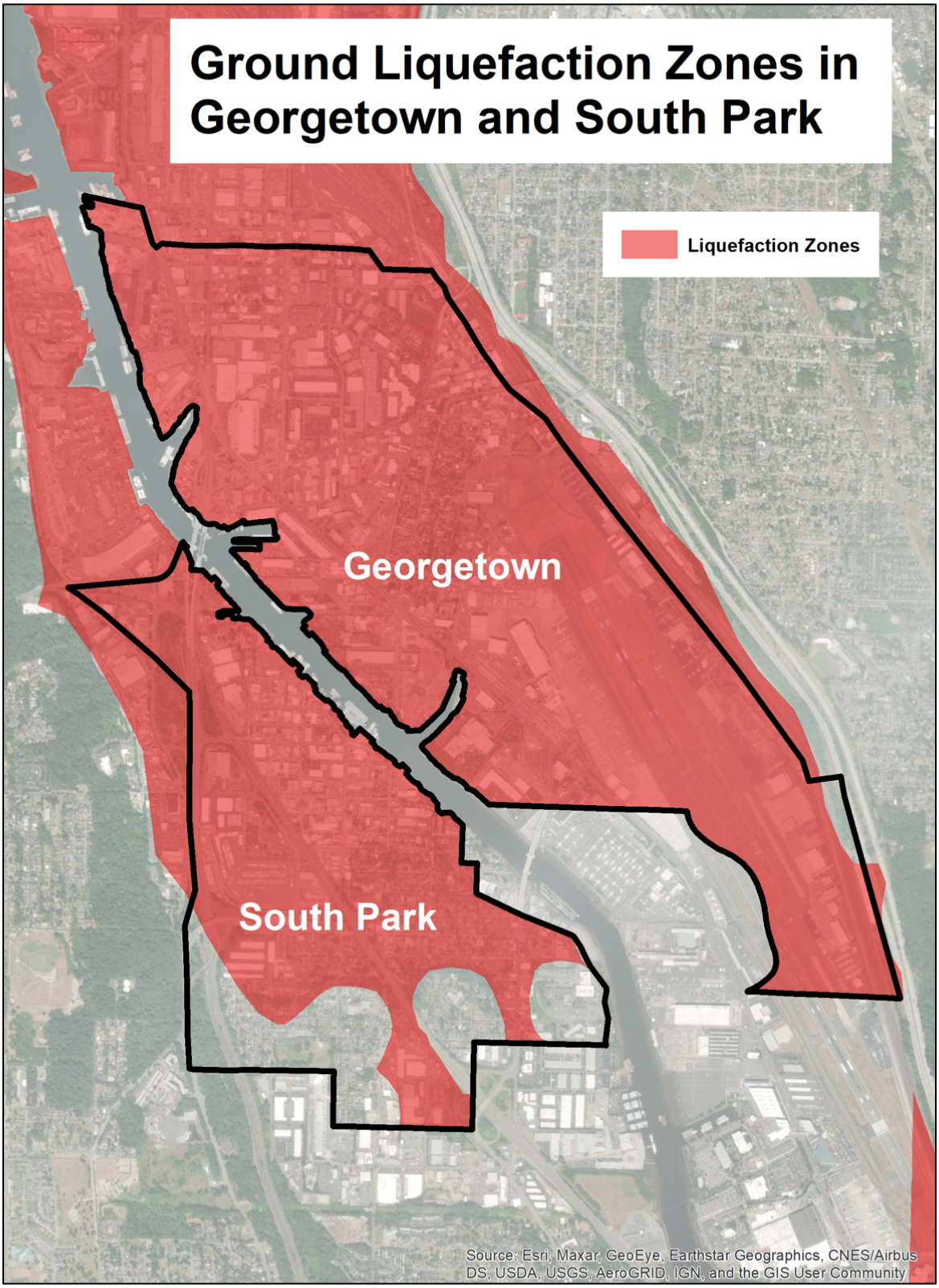
APPENDIX – Existing Hubs Disqualified From Further Consideration

Data courtesy of WAGDA and the City of Seattle



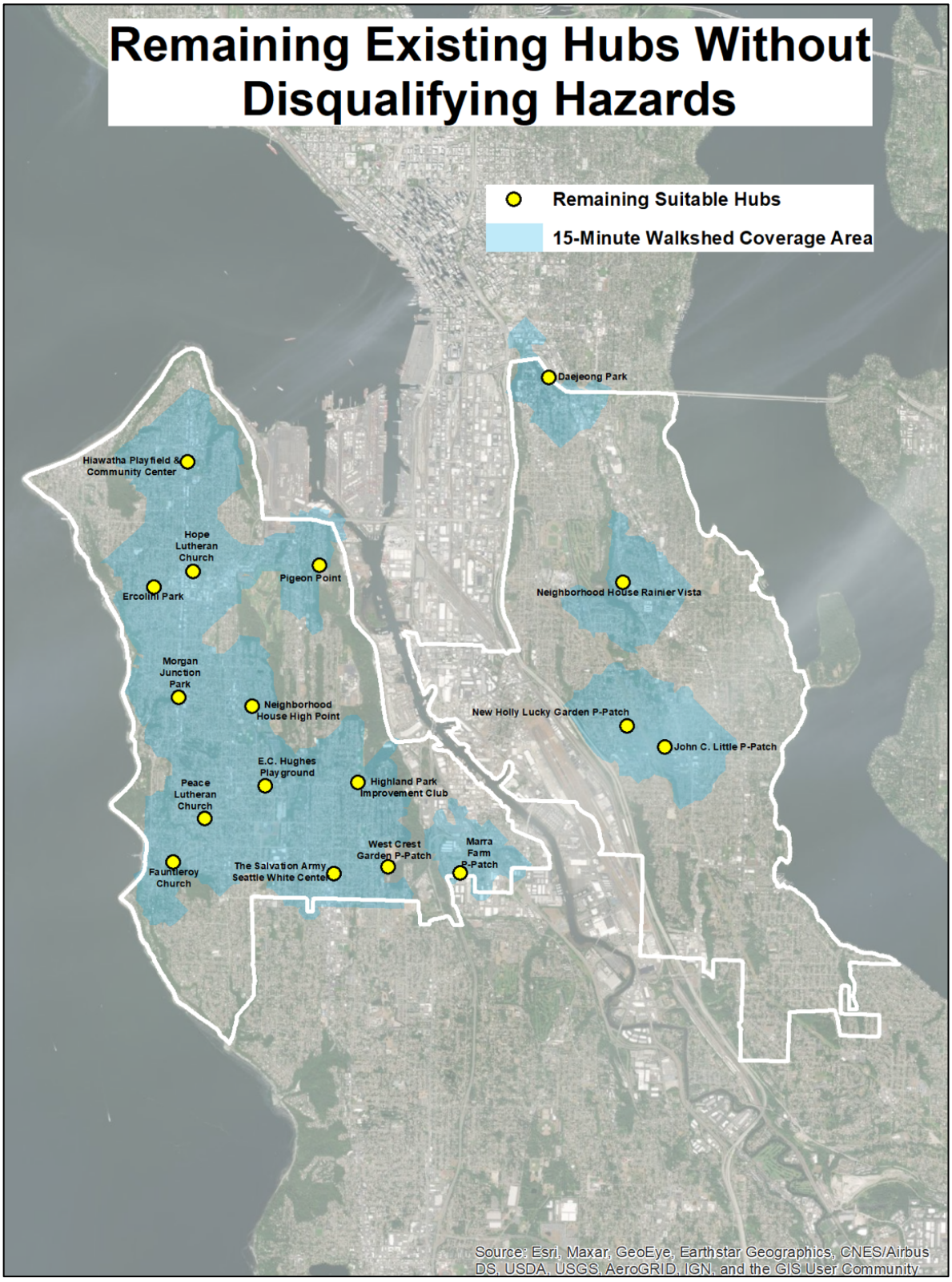
APPENDIX – Ground Liquefication Zones in Georgetown And South Park

Data courtesy of WAGDA and the City of Seattle



APPENDIX – Remaining Existing Hubs Without Disqualifying Hazards

Data courtesy of WAGDA and the City of Seattle



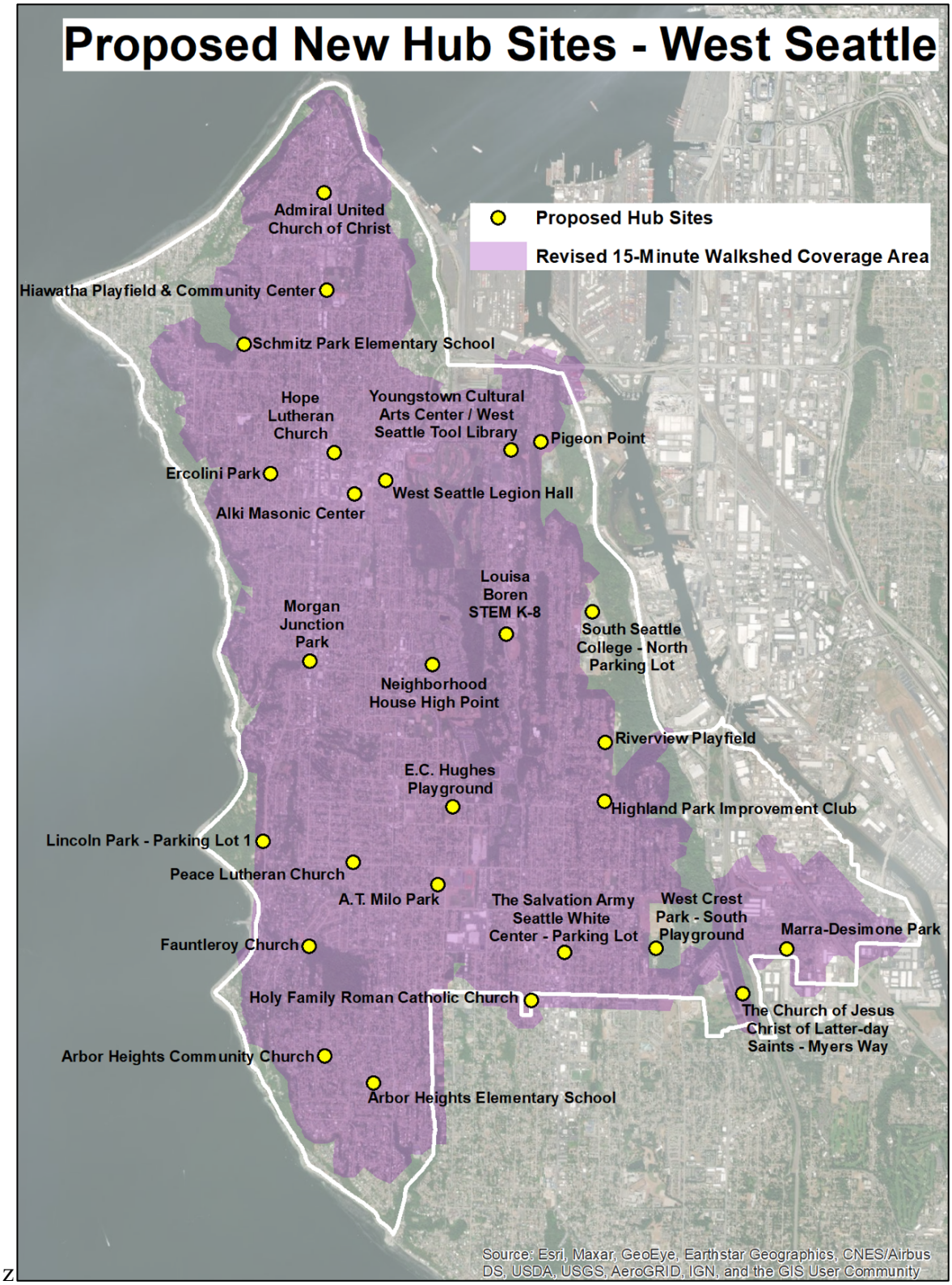
APPENDIX – Proposed New Hub Sites – South End

Data courtesy of WAGDA and the City of Seattle



APPENDIX – Proposed New Hub Sites – West Seattle

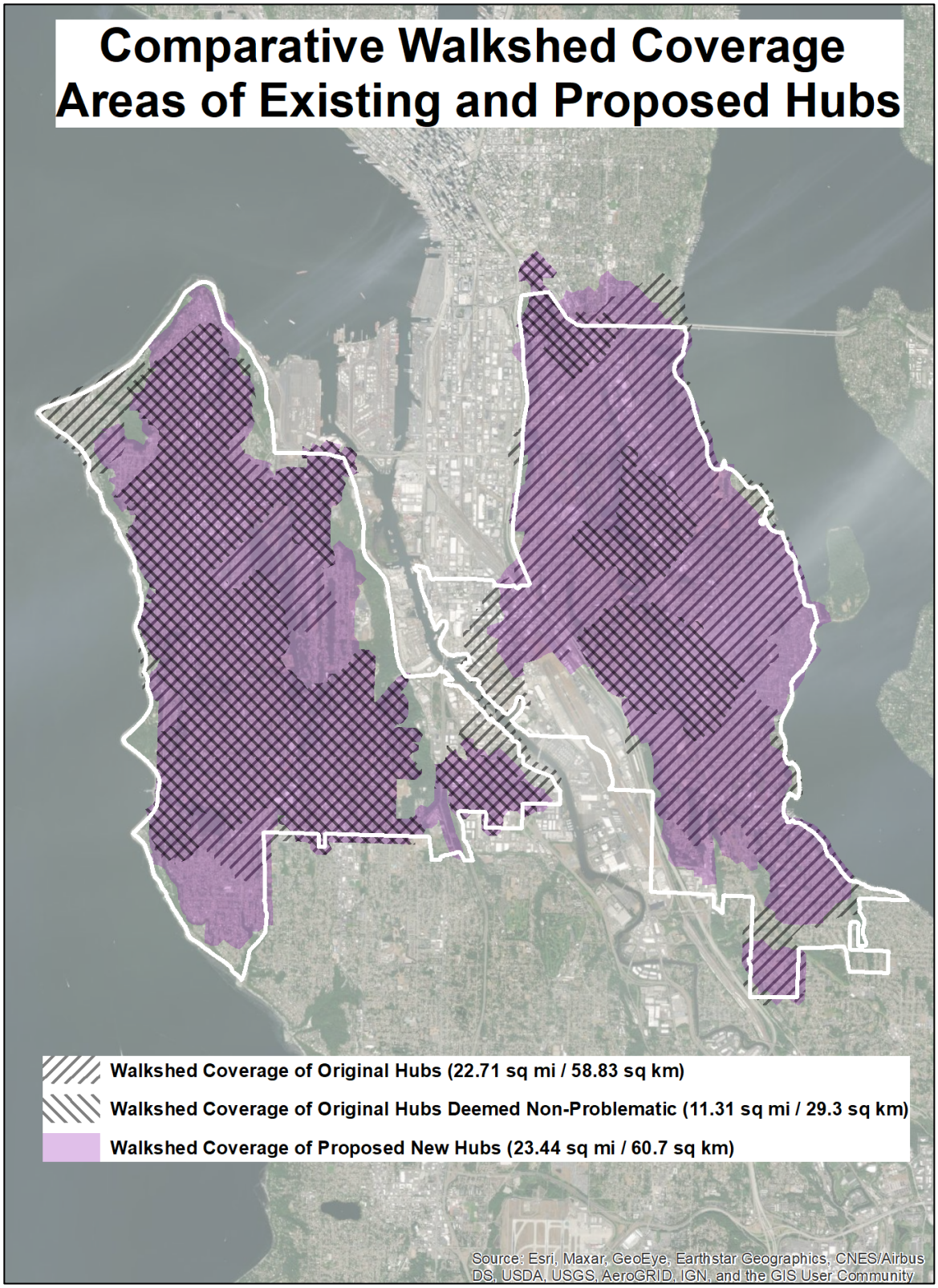
Data courtesy of WAGDA and the City of Seattle



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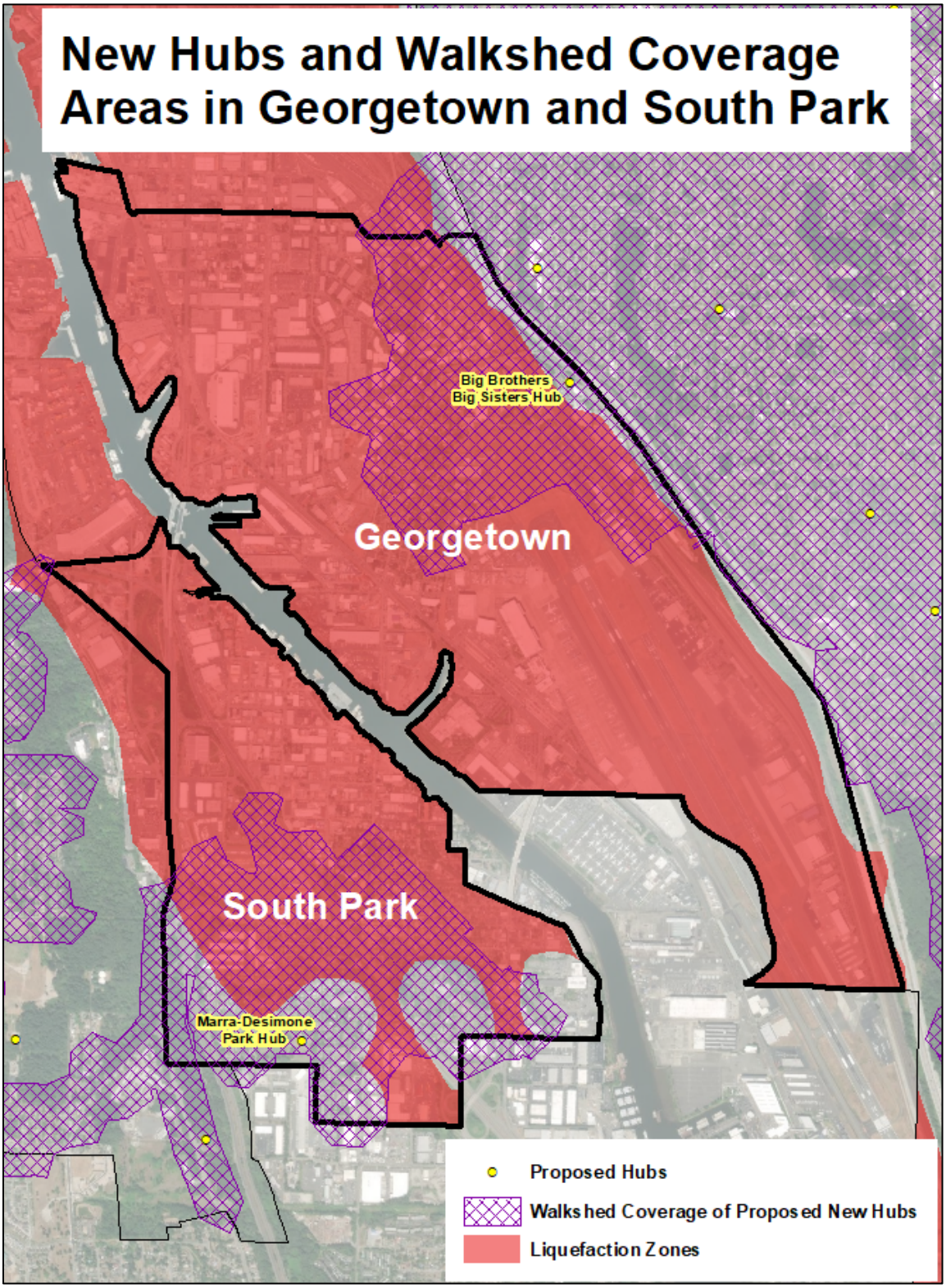
APPENDIX – Comparative Walkshed Coverage Areas of Existing and Proposed Hubs

Data courtesy of WAGDA and the City of Seattle



APPENDIX – New Hubs and Walkshed Coverage Areas in Georgetown and South Park

Data courtesy of WAGDA and the City of Seattle



APPENDIX – Final Hub Degree Centrality Scores (Social Capital Measurements)

Hub Name	Sector	Weighted Degree Centrality - Original	Weighted Degree Centrality - Removed problematic sites (within ground liquefaction zones, close to power line hazards, and having inaccessible interiors)	Weighted Degree Centrality - Final
A.T. Milo Park	SW	-	-	83
Abubakar Mosque of Washington	SE	-	-	99
Admiral United Church of Christ	SW	-	-	82
Alki Community Center	SW	41	-	-
Alki Masonic Center	SW	-	-	84
Angel Morgan P-Patch	SE	0.5	-	-
Arbor Heights Community Church	SW	-	-	82
Arbor Heights Elementary School	SW	-	-	82
Asian Counseling and Referral Service	SE	-	-	101
Barton Street P-Patch	SW	0.5	-	-
Beacon Bluff P-Patch	SE	0.5	-	-
Beacon Food Forest P-Patch	SE	0.5	-	-
Beacon United Methodist Church	SE	16	-	-
Benefit Playground	SE	-	-	94
Big Brothers Big Sisters	SE	-	-	99
Bikur Cholim Machzikay Hadath	SE	-	-	103
Bradner Gardens P-Patch	SE	0.5	-	-
Brandon Street Orchard P-Patch	SE	0.5	-	-
Central Park - Shaffer Avenue S [formerly New Holly Lucky Garden P-Patch]	SE	0.5	0.5	97
Chinese Baptist Church in Seattle	SE	-	-	102
Chobo-Ji Zen Center	SE	12.5	-	-

Colman Park P-Patch	SE	0.5		
Congregation Ezra Bessaroth	SE	-	-	101
Courtland Place P-Patch	SE	0.5	-	-
Daejeon Park	SE	15	4	101
Delridge P-Patch	SW	37.5	-	-
E.C. Hughes Playground	SW	41	30	100
El Centro De La Raza	SE	-	-	100
Ercolini Park	SW	41	30	82
Estelle Street P-Patch	SW	0.5	-	-
Ethiopian Community in Seattle	SE	0.5	-	-
Fauntleroy Church	SW	42.5	31.5	87
Filipino Community Center	SE	-	-	102
Flock Christian Church	SE	-	-	101
Garden of Gethsemane Church of God In Christ	SE	-	-	102
Graham Hill Elementary School	SE	-	-	98
Grover Cleveland STEM High School	SE	-	-	98
Hawthorne Elementary School	SE	-	-	97
Hiawatha Playfield & Community Center	SW	41	30	82
High Point Commons Park P-Patch	SW	0.5	-	-
High Point Juneau Garden P-Patch	SW	0.5	-	-
High Point MacArthur Lane P-Patch	SW	0.5	-	-
Highland Park Improvement Club	SW	43	32	99
Hillman City P-Patch	SE	6.5	-	-

Hillside Garden P-Patch	SE	0.5	-	-
Holy Family Roman Catholic Church	SW	-	-	88
Hope Lutheran Church	SW	42	31	88
Hutchinson Community Center / Hutchinson Playground	SE	-	-	99
Iglesia ni Cristo - Locale of Seattle	SE	-	-	100
Jefferson Tennis Courts	SE	-	-	99
John C. Little P-Patch	SE	0.5	0.5	100
Lakewood Seward Park Community Club	SE	13	-	-
Leo Street P-Patch	SE	0.5	-	-
Lincoln Park - Parking Lot 1	SW	-	-	82
Longfellow Creek P-Patch	SW	0.5	-	-
Louisa Boren STEM K-8	SW	-	-	82
Maa Nyei Lai Ndeic P-Patch	SE	0.5	-	-
Marra-Desimone Park [formerly Marra Farm P-Patch]	SW	0.5	0.5	91
Mercer International Middle School	SE	-	-	97
Morgan Junction Park	SW	41.5	30.5	83
Mt. Baker Park	SE	-	-	99
Neighborhood House High Point	SW	41.5	30.5	85
Neighborhood House Rainier Vista [formerly Rainier Vista (West)]	SE	6	1	100
New Holly 29th Ave P-Patch	SE	0.5	-	-
New Holly Power P-Patch	SE	0.5	-	-
New Holly Rockery Community Garden and Market Garden	SE	0.5	-	-
New Holly Youth & Family P-Patch	SE	0.5	-	-

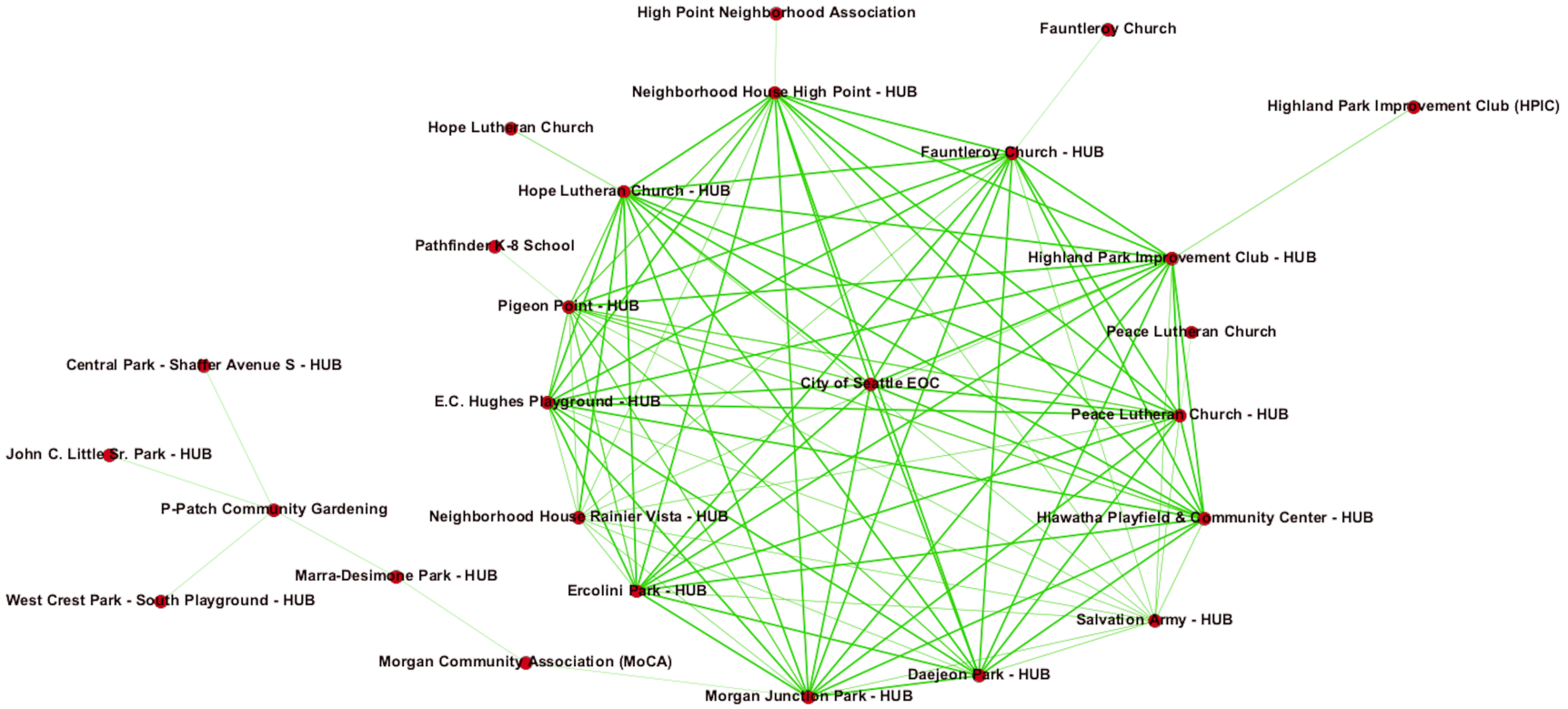
NewHolly Neighborhood Campus	SE	-	-	101
Northwest African American Museum / Jimi Hendrix Park	SE	-	-	102
Orca K-8 School	SE	-	-	100
Oxbow Park P-Patch	SE	0.5	-	-
Peace Lutheran Church	SW	41.5	30.5	84
Pigeon Point	SW	30.5	23.5	82
Providence Mount St. Vincent	SW	41	-	-
Rainier Beach Community Club	SE	16	-	-
Rainier Valley Church	SE	-	-	99
Rainier Vista Boys & Girls Club / Rainier Vista Playfield	SE	-	-	99
Rainier Vista Dakota West P-Patch	SE	0.5	-	-
Rainier Vista Snoqualmie Park Youth / Senior P-Patch	SE	0.5	-	-
Rainier Vista Sunrise Garden P-Patch	SE	0.5	-	-
Rising Star Elementary School - North Parking Lot	SE	-	-	98
Riverview Playfield	SW	-	-	82
Rosehill Missionary Baptist Church	SE	-	-	98
Schmitz Park Elementary School	SW	-	-	83
Snoqualmie P-Patch	SE	0.5	-	-
Solstice P-Patch	SW	1	-	-
South Park Neighborhood Center	SW	29	-	-
South Seattle College - North Parking Lot	SW	-	-	83
South Shore K-8	SE	-	-	95
The Church of Jesus Christ of Latter-day Saints - Myers Way	SW	-	-	82

The Salvation Army Seattle White Center	SW	17	10	84
Thistle P-Patch	SE	0.5	-	-
Wat Lao Dhammacetiyaram	SE	-	-	100
West Crest Park - South Playground [formerly West Crest Garden P-Patch]	SW	0.5	0.5	85
West Genessee P-Patch	SW	0.5	-	-
West Seattle Legion Hall	SW	-	-	82
Youngstown Cultural Arts Center	SW	-	-	84

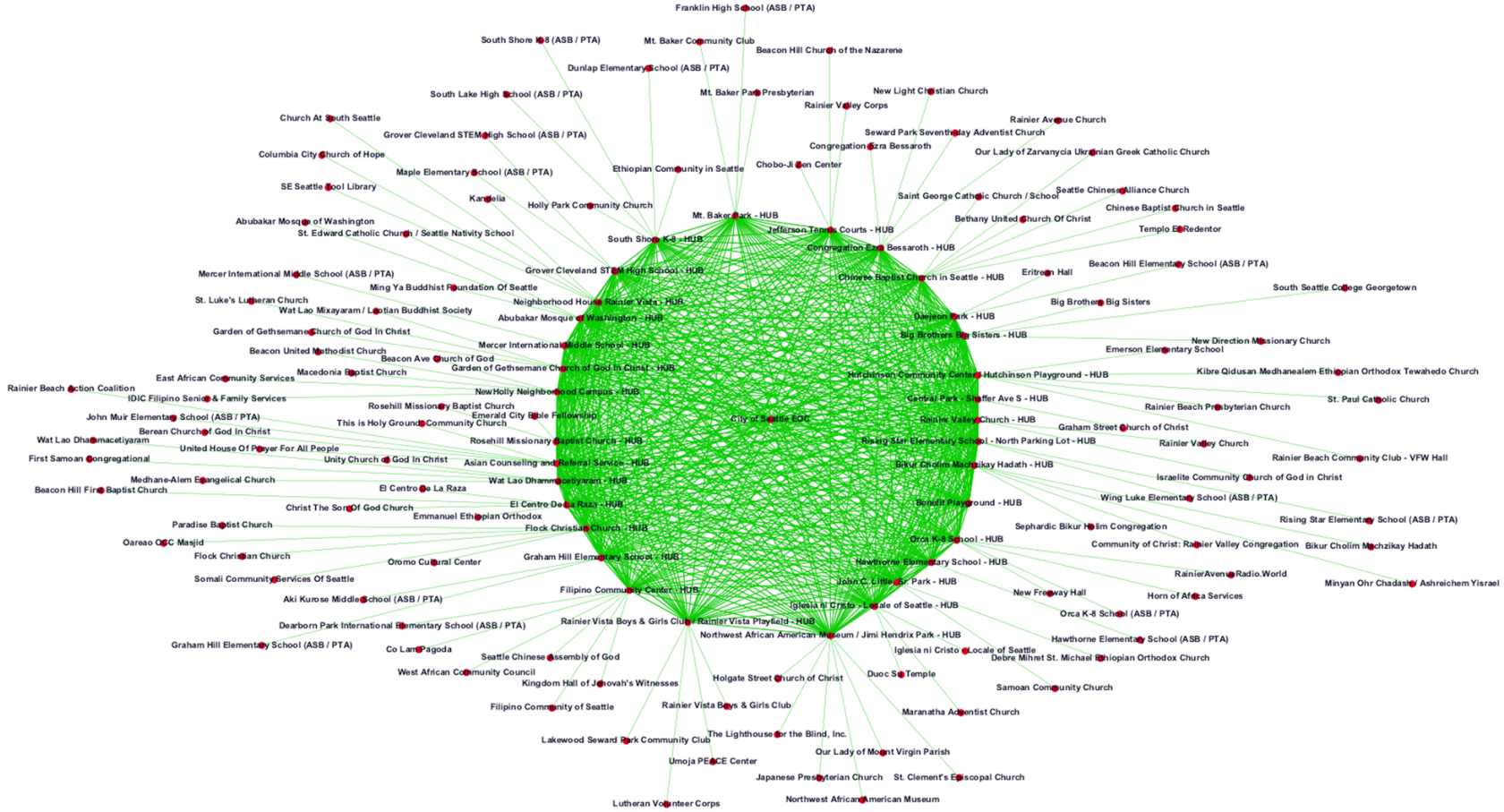
APPENDIX – Hub Degree Centrality Model (Social Capital Measurements) – Original Hub System



APPENDIX – Hub Degree Centrality Model (Social Capital Measurements) – Original Hub System with Problematic Hubs Removed



APPENDIX – Hub Degree Centrality Model (Social Capital Measurements) – Hub System with Proposed New Hubs – South End



APPENDIX – Hub Degree Centrality Model (Social Capital Measurements) – Hub System With Proposed New Hubs – West Seattle

