# COVID-19 Rapid Response: Design Determinants of Seattle Food Retail Business Continuity

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**The current pandemic, with its associated need for physical distancing and the accompanying transformation of the built environment, generates the pressing need for built environment researchers to refocus their research and respond to the current public health crisis. An interdisciplinary team from the College of Built Environments at the University of Washington (UW) with backgrounds in economics, urban planning, and architecture raised the following question: How do the physical design and service models of essential services and businesses improve or worsen the prospect of business continuity, economic success, and social welfare in the COVID-19 pandemic?**

**The team successfully participated in two calls for COVID-19 Research by the UW Population Health Initiative in March and May 2020, funding a comprehensive project of data collection and analysis in Seattle. It is designed as empirical, mixed-methods research, surveying for patterns of facility designs, service models and modifications, and economic outcomes for providers, before and during the pandemic. The project is laid out in three steps: (1) spatial typology and business closure data collection, (2) semi-structured interviews regarding service delivery modifications and financial outcomes (3) and analysis of the economic effects of physical design and service choices. The data collection was set up in conjunction with the state's safe reopening efforts, under COVID-19 physical distancing guidelines. The material changes are used to infer types of responses to keep the businesses operating during the stay-at-home order. The fieldwork is followed by interviews of companies on their experience and critical business continuity data. The project concludes with a spatial and economic analysis of the data. This paper reports on the research design, data collection process, and first findings of this ongoing research project with a focus on food retail and restaurants.**

## 1. INTRODUCTION

This research asks how the physical design and service models of the food retail industry worsen or improve business continuity and economic success during the COVID-19 pandemic. In many parts of the United States (US), policies encourage essential businesses to continue operations while asking people to avoid indoor gatherings and maintain a physical distance of six feet or more, as recommended to slow the rate of infection in the population. Yet, businesses may find that their facilities leave them with limited ability to maintain the recommended physical distance, and limited capacity to transition to take-out and delivery service. This paper is the first in a series documenting patterns of facility design, service delivery and their economic consequences in a sample of 17 percent of businesses from Seattle's pre-COVID food retail industry, funded by Rapid Response and Economic Recovery Research grants from the University of Washington Population Health Initiative.

The study began with field research from May to June of 2020, at the height of the first round of COVID-related policies. An interdisciplinary team of architects, planners, and economists organized to document conditions in the food retail industry, newly recognized as essential businesses in COVID-19 related policy. Typologies of urban form, internal design, external design, and service delivery strategies, developed from these observations represent hypothesized design determinants of economic success and business continuity for the industry. Preliminary results from the food retail industry, which consists of a sample of 926 restaurants and other food retail establishments, such as grocery stores, convenience stores, cafes, farmers markets, and supermarkets, show that 32 percent of businesses were closed during the height of physical distancing measures in May and 14 percent in December 2020. Structured interviews of business owners and public agencies are currently underway to quantify financial impacts, providing the data needed to test the effectiveness of these designs and service models for their possible relationship to economic success during the pandemic. This research is part of a larger project to examine public infrastructure services (e.g., electricity, water,

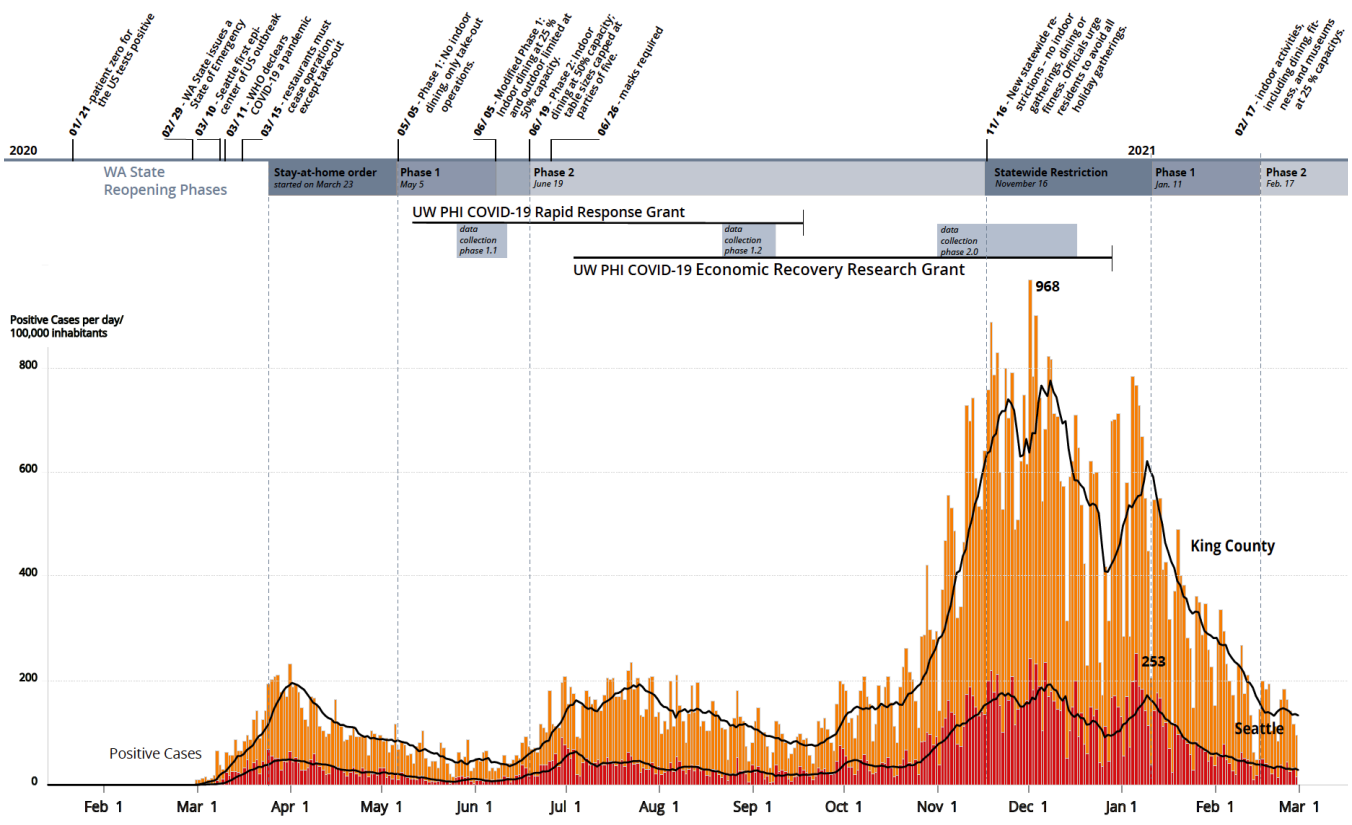



Figure 1. Timeline of the phases of UW PHI COVID-19 RR + ERR grants and number of covid cases in Seattle and King County.

parks, transportation) and commercial offices in Seattle, as well as the foodservice industry. This paper provides an overview of the research design, data collection, and preliminary results for restaurants conducted during the first wave of policy restricting business operations and reopening during COVID-19. The data collection focuses on modifications of the built environment and business operation under COVID-19 physical distancing guidelines. The material changes are used to infer types of responses to keep the businesses operating during the stay-at-home order. The fieldwork is being followed up with interviews of companies on their experience and critical business continuity data, and economic analysis.

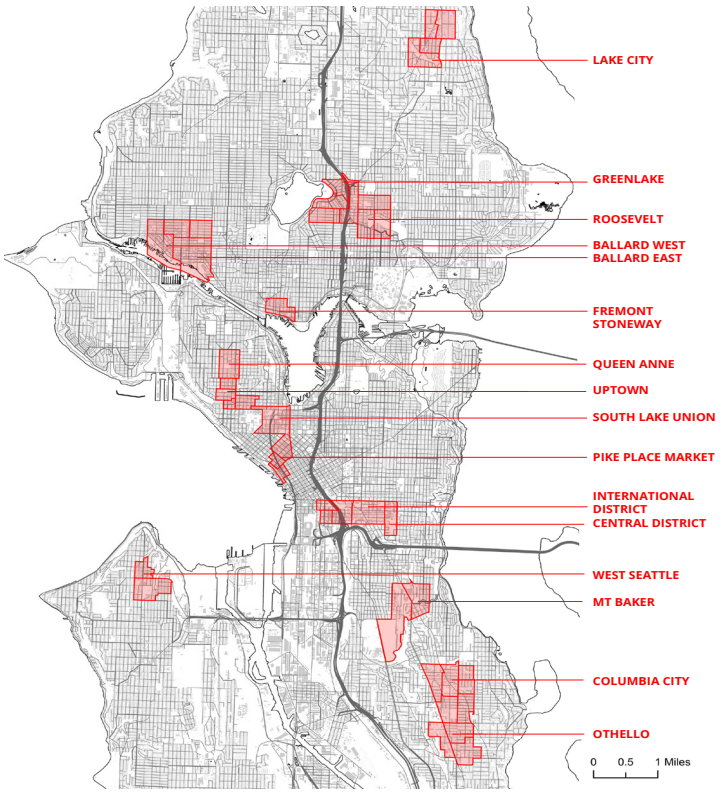
The project's primary goal is to make recommendations to business owners and local legislators to help ease the impact of the stay-at-home order. Besides, the team will consider this project successful if it will be able to apply built environment methodologies to document, analyze, and differentiate successful from detrimental physical designs and strategies. It intends to reach an interdisciplinary audience in urban planning, architecture, economics, health, and medicine.

## 2. RESEARCH DESIGN AND METHODS

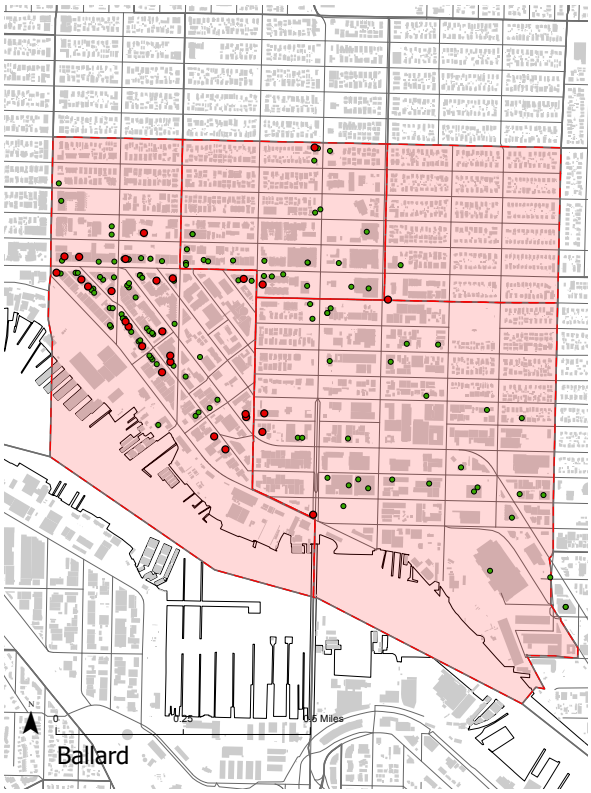
The interdisciplinary team applies built environment methodologies to document, analyze, and identify urban location, facility designs, and strategies that contribute to a successful commercial operation and business continuity. The project is designed as empirical, mixed-methods research, surveying for patterns of facility designs, service models and modifications, and economic outcomes for providers, before and during the pandemic. The project is laid out in three main steps: (1) data collection, (2) semi-structured interviews/ survey, and (3) the spatial and economic analysis of changes. Two separate grants allowed data collection to span the period of emergence of the virus in the United States, through the first three peaks of observed cases of COVID-19 in Seattle, and associated policies.

### 2.1 TIMELINE

SARS-CoV-2, also known as coronavirus 2019, is a novel virus, first discovered in humans through an outbreak in the Wuhan area of China in the Autumn months of 2019. With the discovery of SARS-CoV-2, there are now seven forms of coronavirus known to infect humans, four of which are known to cause the common cold [CDC]. The others impact humans less often, with greater impact, such as SARS and MERS. As the number of infections and deaths grew within and outside of China, people began to compare the disease it creates, COVID-19, to outbreaks of other novel viruses. It did not take long for researchers to realize that this would become the most deadly outbreak of a novel virus since the Spanish Flu of 1918 [ICL]. Patient zero for the US arrived at SeaTac Airport on a flight from Wuhan on January 15, 2020 [Bloomberg]. Experiencing symptoms, he walked into an urgent care clinic in a suburb north of Seattle on January 19, and tested positive for SARS-CoV-2 on




a. Selected neighborhood study areas in Seattle




b. Food businesses in Ballard (green open/ red closed in May/ June 2020)

| | Selected Neighborhood Areas | City of Seattle |
|---|---|---|
| # of **census block groups** | **40** (8.5%) | **482** |
| # of **food businesses** | **926** (17%) | **5402** |
| Avg. **restaurant price** | $$ sign | $$ sign |
| Avg. **population density** | **65** people/ km$^2$ | **57** people/ km$^2$ |
| Avg. median gross rent | **1400** USD/ month | **1600** USD/ month |
| Percent **age 65 and over** | **14%** | **13%** |
| Percent **white** | **62%** | **69%** |
| Percent **female** | **51%** | **50%** |

c. Analysis of census data to demonstrate representativeness of neighborhood study area sample

Figure 2. Map of selected neighborhood study areas in Seattle (a), distribution of food businesses in Ballard West and Ballard East (b) and analysis of representativeness of sample (c).

January 21. By March 10, the Seattle area had become the epicenter of the US outbreak, with 118 infections and 18 deaths. On March 11, 2020, severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) was characterized as a pandemic by the World Health Organization, when the Director General, citing a 13-fold increase in infections in 114 countries, explained,

> We have never before seen a pandemic sparked by a coronavirus. This is the first pandemic caused by a coronavirus. And we have never before seen a pandemic that can be controlled, at the same time. [WHO]

To prevent cases from overwhelming health care facilities, prominent researchers observing conditions in Wuhan advised officials in the US to introduce interventions including case isolation, the closing of schools and universities, household quarantine, and social distancing [ICL] (i.e., Ferguson et al. 2020). On February 29, Governor Inslee issued a State of Emergency for Washington State and King County, where Seattle is located, stood up their Emergency Operations Center. Public activities were gradually curtailed, until March 15, when King County Executive Dow Constantine ordered all gatherings of 50 or persons to cease and, particular to the food retail industry:

- Restaurants, bars, dance halls, clubs, theaters, health and fitness clubs, and other similar indoor social or recreational venues must cease operations until March 31, 2020.

- Restaurants and food service establishments may remain open only for drive-through, delivery, and pick-up only, until March 31, 2020.

> • All other retail such as groceries, pharmacies, banks, gas stations, hardware stores, shopping centers, etc. may remain open provided they meet Public Health directives in the previous Local Health Order [King County 1]

By March 23, the entire state was under orders to stay home, with the exception of essential businesses and critical functions [King County 2]. The success of these measures in stemming the rate of infection resulted in gradual, partial reopening of restaurants as of June 5 and 19, under Governor Inslee's Safe Start program, to include in-person dining at 50 percent of capacity [King County 3]. Witnessing a resurgence of the virus, on November 16, Governor Inslee once again ordered all restaurants to eliminate in-person dining, resorting to take out and delivery services only [WA Gov]. The holiday season 2020 generated a tidal wave of Covid-19 cases in Seattle and King County. Despite the new restrictions, it took three months until the caseload was back to mid-summer levels. On February 17, the governor moved King County back into the 2nd reopening phase, allowing indoor dining at a 25 percent capacity.

As shown in Figure 1, funds from a Rapid Response grant supported field research during the period of most suppression, identified in Washington State plans as Phase 1. An Economic Recovery Research grant supported field research again in August, when restaurants were allowed to operate at 50 percent capacity. Research continues with structured interviews of business owners, to collect retrospective data on business activities and financial impacts throughout the year, including the months of January (pre-COVID), May/ June, August, and November/ December 2020.

## 3. DATA COLLECTION

Data collection in the field during the first months of COVID-19 orders to stay home was restricted to observations and other publicly available data. The aim of data collection was to record facility design, makeshift changes, and visible signs of operation while businesses were limited to take out and delivery service. Many such changes may be ephemeral, as businesses sought to adapt to difficult circumstances. To satisfy the needs of the research design, the sample would have to be representative of the population of food retail businesses in Seattle.

### 3.1 SAMPLING OF STUDY AREAS

To capture a representative sample of food businesses in Seattle, the team selected 16 neighborhood study areas. The neighborhood study areas are geographically distributed throughout the city proper (Figure 2a). Each neighborhood area consists of 1 to 4 census block groups and contains a central business district. To illustrate, the Ballard East and West neighborhood is shown (Figure 2b). In total, 926 food businesses (n=926) in 40 census block groups were included in the May and June period of field research, which accounts about 18 percent of all food businesses in Seattle (n=5402). Field research continues as of this writing with the same sample, interviewing business owners. The surveyed neighborhoods present a fair representation of the city, with similar pricing and socio-demographic characteristics (Figure 2c).

### 3.2 SITE SURVEY

The first phase of field work consisted of a documentation of all food businesses in the neighborhood areas on site. At the end of May and the first week of June -- before the start of the reopening allowed under Phase 2 -- ten researchers surveyed the 16 study areas following the protocol documented in a shared Field Documentation Guide. During the site visits, every food business within the site boundary was documented. While on site, researchers took special note of changes and adaptations of the exterior of the business, such as signs and posters, use of additional furniture, and any change to the movement of customers, as well as changes to the interior of the food business, visible from the outside, such as makeshift takeout

Table 1. Data Description and Sources

| Dataset | Description | Source | Match Strategy |
|---|---|---|---|
| Food Businesses Permit Data | Addresses, coordinates of each food business | King County Health Department | By documented business name and neighborhood |
| Restaurant Price Range | Price range indicated by number of dollar signs | Google Knowledge Panel | By spatial proximity and by name |
| American Community Survey | Social demographic characteristics | ACS 2013-2018 | By census block groups within a one-mile buffer |
| Building Footprint | GIS data of Building footprints in Seattle | gisdata.seattle.gov | By spatial overlay |

## Spatial Typology

| | | |
|---|---|---|
| Storefront |  | Ground floor business facing walkable sidewalk, multi-use street |
| Freestanding |  | Business is a stand-alone building, generally with on-site parking |
| Stripmall |  | Business is part of a row or group of businesses within the same structure and does not face a walkable, multi-use street. Generally faces a parking lot |
| Drive Thru |  | Freestanding building, you can complete your transaction from your car, usually a chain, fast-food restaurant |
| Converted Home |  | Business that operates from a building that was most likely originally built to be a residence |
| In Larger Building |  | Business that operates from within a larger structure and/or as part of a group of other businesses, does not face outside/the sidewalk |

## Exterior Changes

| | | |
|---|---|---|
| Signs/ poster (in windows or on storefront) |  | A sign, homemade or professional that is attached to the business window |
| Large Banner |  | A sign, homemade or professional that is attached to the exterior wall of the business |
| Sidewalk Signage |  | A sign, homemade or professional standing on the sidewalk in front of business |
| Official sign indicating pick-up zone for parking |  | Official Seattle Department of Transportation to-go pick up sign standing on sidewalk |
| Provisions for waiting/ spacing of lines |  | Bollards and cones designating waiting areas, markings or posts showing 6' distances |
| Tents to cover customers on sidewalk |  | Temporary coverings used to shelter customers waiting outside businesses |

## Interior Changes

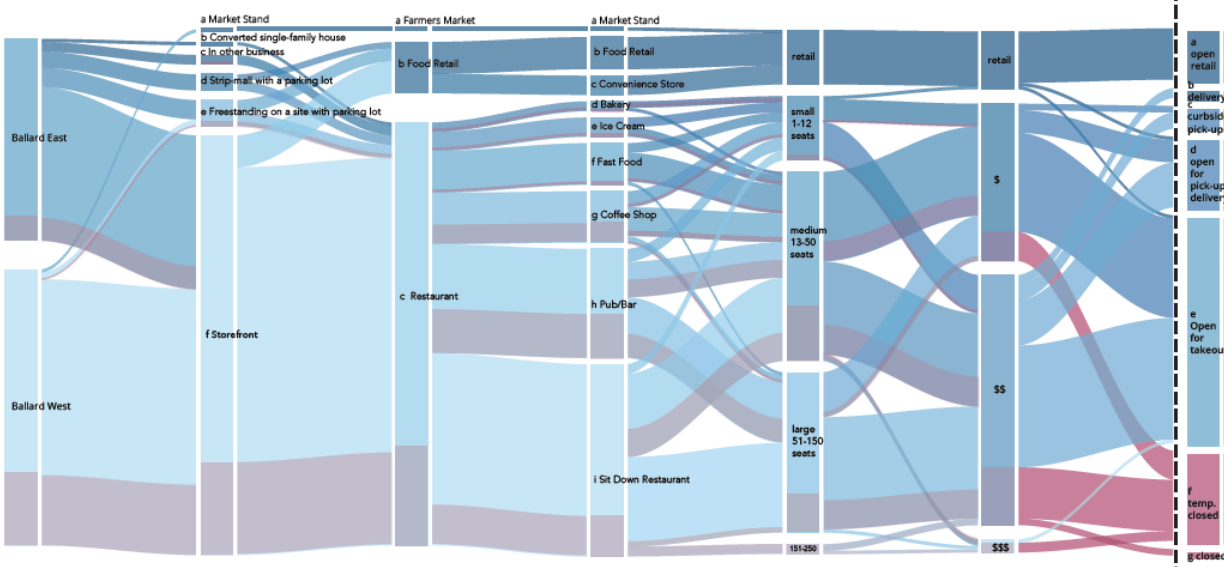
| | | |
|---|---|---|
| Doorway Table |  | Table or other furniture blocking customers from entering door |
| Makeshift takeout windows<br>Exterior window |  | Business uses a window to interact with customers |
| Existing counter |  | Customer can enter up to an existing counter or similar |

Figure 3. Spatial typologies of urban locations, exterior changes, and interior changes of food businesses .

**Research Matrix – Ballard**

| *phase* | PRE-COVID-19 | | | | | |
|---|---|---|---|---|---|---|
| *typologies* | Neighborhood Area | Spatial Typologies | Business Type | Program Typologies | Physical Size | Price Range |
| *source* | *census block data* | *observed, field survey* | *observed, field survey* | *observed, field survey* | *permit data* | *google data* |
| | Ballard West (86/ 24, 28%)<br>Ballard East (63/ 6, 10%) | a - market stand (1/ 0)<br>b - single-family house (1/ 0)<br>c - in other business (3/ 1)<br>d - strip-mall (5/ 0)<br>e - free-standing (8/ 1)<br>f - storefront (131/ 28, 21%) | a - farmers market (1/ 0)<br>b - food retail (17/ 0)<br>c - restaurants (131/ 30) | a - market stand (1/ 0)<br>b - food retail (11/ 0)<br>c - drug store (6/ 0)<br>d - bakery (3/ 1)<br>e - ice cream (6/ 1)<br>f - fast food (13/ 1)<br>g - coffee shop (16/ 4, 25%)<br>h - pub/ bar (34/12, 35%)<br>i - sit-down rest. (59/11, 17%) | a - retail (12/ 0)<br>b - small (25/ 2, 8%)<br>c - medium (59/ 16, 27%)<br>d - large (50/ 9, 18%)<br>e - extra large (3/ 3, 100%) | a - retail (15/ 0)<br>b - $ (51/ 9, 18%)<br>c - $$ (79/18, 23%)<br>d - $$$ (4/ 3, 75%) |

**a. Research Matrix of Ballard neighborhood area, each entry is followed by data, (# of businesses/ # of businesses closed)**




**b. Analysis of Spatial Variables, Ballard West + Ballard East**

Figure 4. Research matrix documents spatial typologies in conjunction with data directory information and project timeline (a). The analysis of spatial variables compares datasets collected for the two Ballard study areas and indicates temporarily and permanently closed businesses (b).

windows.The researchers recorded their observations using Google survey forms and took photographs of the changes observed. The photographs were archived and serve as primary documentation and evidence for the information input into the structured interviews to be conducted with business owners. In addition to food businesses (restaurants, grocery stores, convenience stores), the eight farmers markets in Seattle, which were operating in summer 2020, were surveyed over the course of the summer.

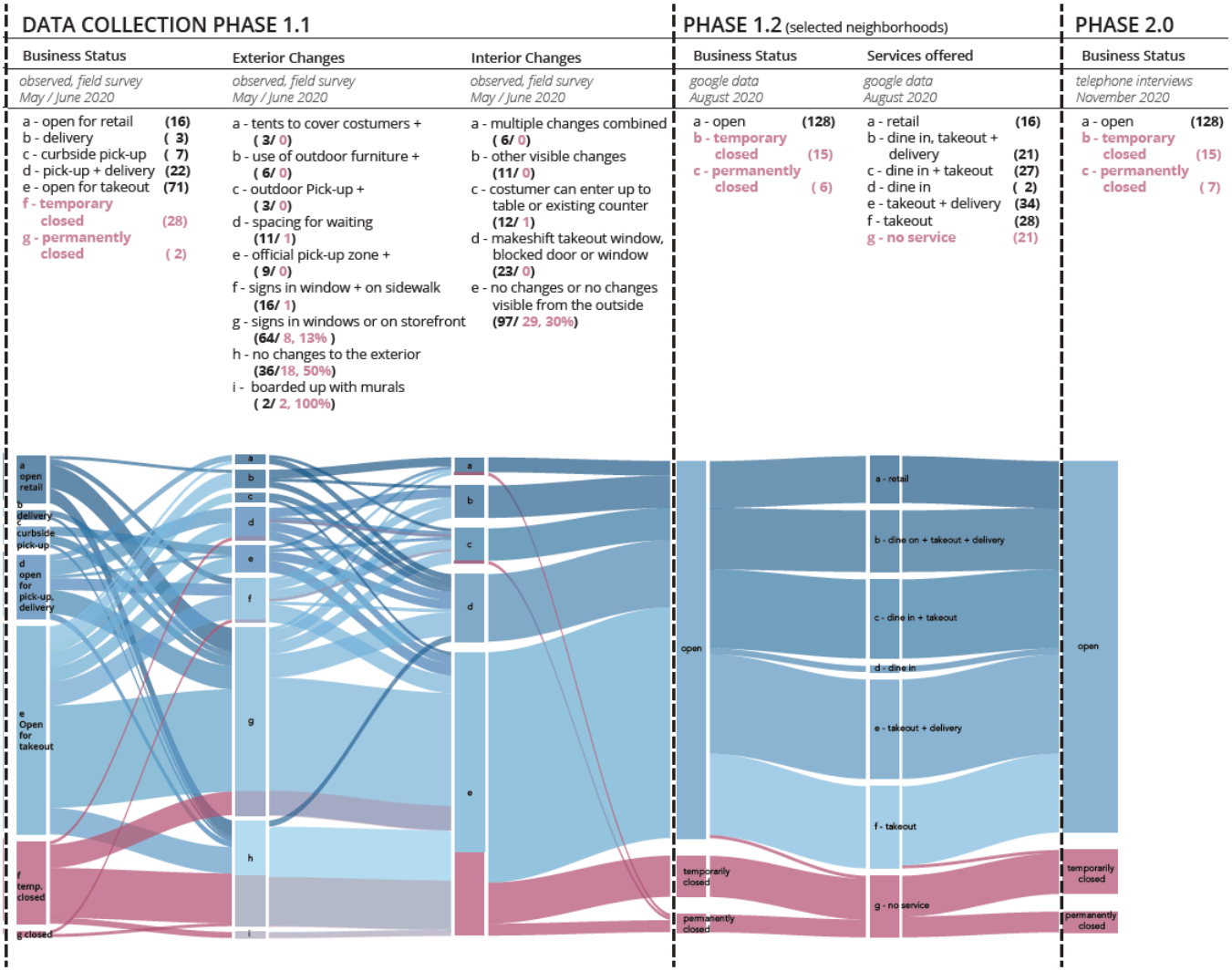
### 3.3 DATA FROM OTHER SOURCES

To evaluate the initial sampling of neighborhood areas and to categorize the food businesses based on their pre-COVID-19 characteristics and business conditions, the team collected several other publicly available datasets during these first months of the research. Table 1 presents the current data directory with all dataset, their descriptions and sources.

## 4. TYPOLOGICAL AND SPATIAL ANALYSIS

Based on these observations, the team inferred spatial typologies based on the spatial configuration of the food businesses. This inductive process was considering conditions that existed before the COVID-19 outbreak as well as makeshift changes the businesses made in response to the COVID-19 spatial distancing requirements and other public health recommendations (Figure 3).

The team identified spatial typologies based on the types of buildings observed as premises for food service, such as, storefronts along walkable sidewalks within the urban block structure, freestanding big-box retail, stripmalls, drive-thrus, converted homes, market stands, and food businesses located in food courts, hotels, and other businesses. The team identified a series of common changes and interventions made to the exterior and interior. Most exterior changes were signs to




indicate that the business is open in windows, on the storefront, and in front of the business, and official signs from the City of Seattle indicating pick-up zones for short term parking. Other changes focused on public health recommendations and the well-being of customers, such as provisions for waiting and spacing of lines and pedestrian flows, tents and other protection for waiting customers, and innovative use of outdoor furniture that provides separation, wayfinding and outdoor seating options. Interior changes often pertained to moving the point of sales to the exterior of the building. Many of the recorded changes were considered makeshift takeout windows, created by either turning a regular window into the customer interface or by blocking the entrance door with a table allowing the exchange of takeout goods while preventing the customer from entering the premises. Many observed food businesses combined multiple exterior and interior changes to signal their customers that they are open for business.

### 4.1 RESEARCH MATRIX

Spatial typologies allow the categorization of approaches taken in response to COVID-19 physical distancing requirements, which can then be tested for their role in business performance and business continuity. The research matrix is a tool the team developed to set the spatial and economic variables in context, to probe their dependencies (Figure 4). The research matrix charts the typologies identified and the datasets collected by the team in relation to a timeline of the COVID-19 pandemic in Seattle and the research design of the project. As described above, the data collection falls into three distinct phases: the pre-COVID-19 conditions, the data collection in May and June (phase 1.1), continued in August (phase 1.2) and November (phase 2.0) collection of financial and economic data from business owners. The data collected for the pre-COVID-19 condition characterizes the basic spatial, economic, programmatic, and operational conditions of the food businesses before

the pandemic. The data collected during phase 1.1 reflects the initial (often makeshift) responses of businesses to stay in business while complying with the initial stay-at-home order and the requirements during the first reopening, known in Seattle (King County) as Phase 1. The changes that the businesses made during reopening Phase 2, when partial in-person indoor dining was permitted again, have been collected through an online data collection on Google for a set of selected neighborhoods (Phase 1.2). In May and June it was possible to observe whether a business was open or closed. The 2nd phase of data collection will eventually be complemented with observations from a second site visit and a structured interview that focuses on the financial and economic impacts to businesses.

### 4.2 ANALYSIS OF SPATIAL VARIABLES

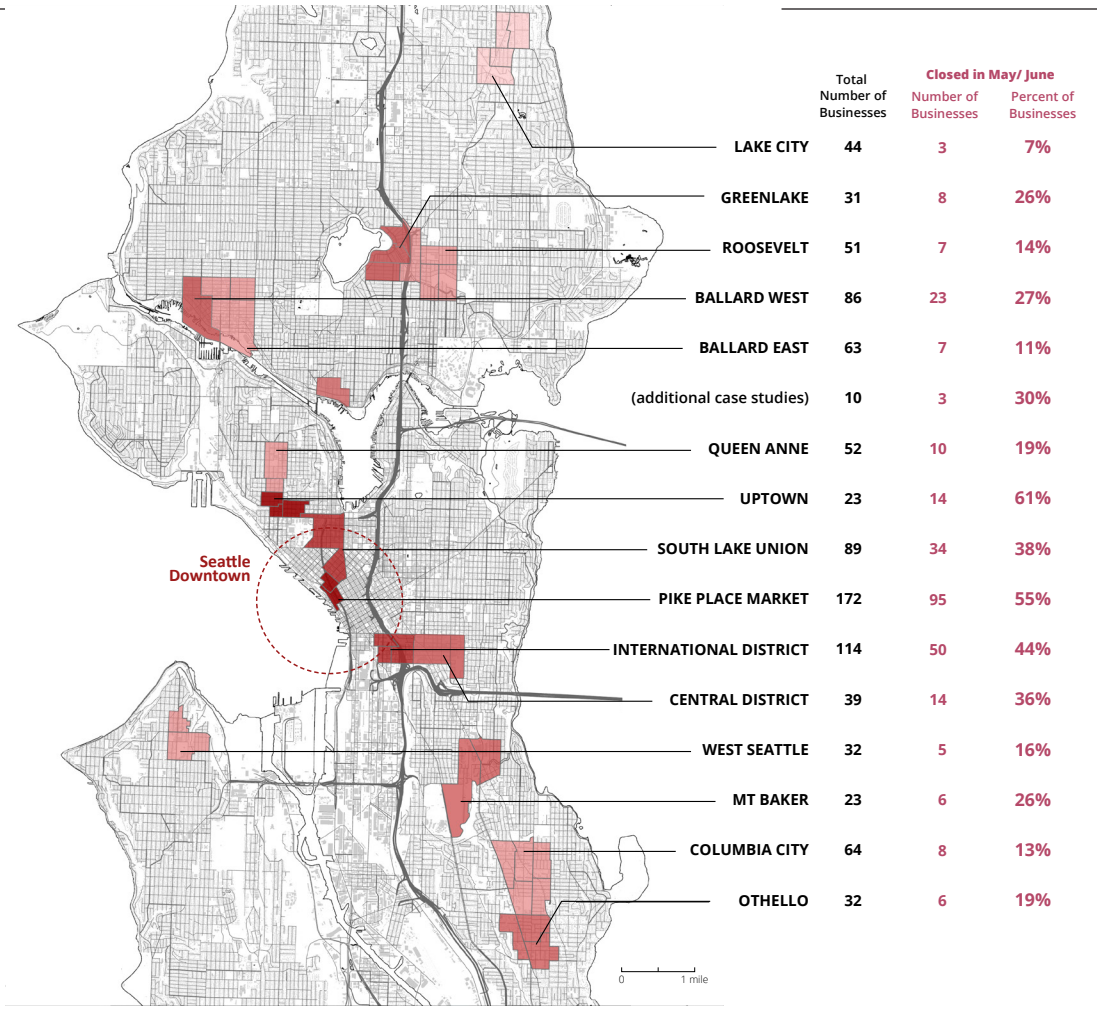
Figure 4 demonstrates one potential application of the research matrix with data from two neighborhood study areas, Ballard West and East, with 149 food businesses. Ballard is a neighborhood known for its food industries -- fisheries, breweries, and restaurants. In Ballard West, the historic core with masonry brick buildings, 97% of the recorded food businesses are restaurants in storefronts. Relationships between study areas, business types and spatial typologies are shown in columns 1-3. The analysis by program typology shows that Pubs and Bars closed at a higher rate (35 percent) than other food businesses, such as sit down restaurants (17 percent) and coffee shops (25 percent). The size of the business has a smaller impact on their business, with proportional numbers closed in each size group by seats, with an exception of the very small sample of extra large restaurants (151-250 seats) which were all three temporarily closed in the first phase of reopening. In terms of the price range of dishes (rated by Google), businesses in the higher price brackets were observed to be closed in greater proportion than those that offer the least expensive fare.

During the data collection period of May and June, 20 percent of the food businesses were temporarily (n=28) or permanently closed (n=2). While in-person dining was not permitted, restaurants adopted a variety of takeout models using a combination of pickup and delivery options. During this time, review of exterior changes revealed that most businesses (43 percent) used simple banners and signs to indicate they were open (type g), 31 percent of businesses added additional measures (types a-f) and 24 percent did not make any changes to their exterior appearance (type h). The observation of business continuity showed that the exterior changes correlate to staying in business. Of the business of types a-f with multiple changes only 4 percent closed, of type g with simple signs 20 percent closed, and of those that made no changes to their exterior 67 percent closed. A smaller number of businesses made visible changes to the interior of their operation; 65 percent made no changes (type e), 15 percent created makeshift takeout windows (type d), and 20 percent made other or multiple changes to their point of sales (types a,b,c). None of the businesses that applied the strategies connected to the latter four types (a-d) closed.

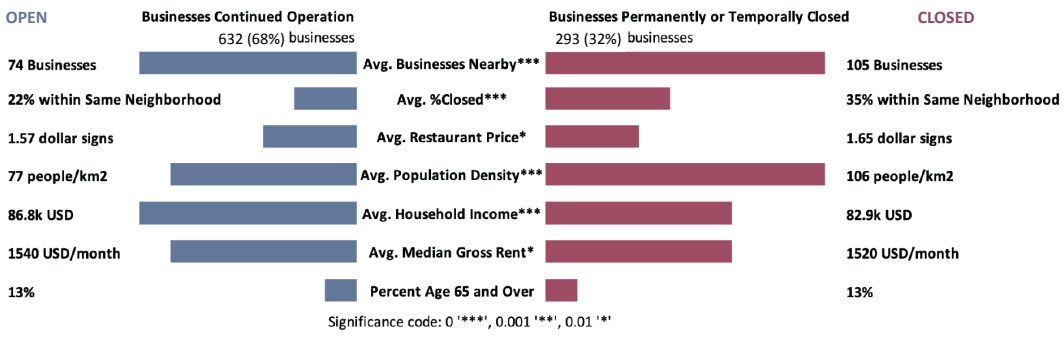
During the summer, when in-person dining was permitted indoors at 50 percent capacity and many restaurants were able to provide outdoor seating, the number of closed businesses dropped to 14 percent (15 temporarily, 6 permanently closed). An systematic attempt to contact all food businesses in the sample for semistructured interviews confirmed the same numbers in November/ December 2020. Food retail --deemed essential-- continued to operate throughout the pandemic and so far none of the retail businesses in Ballard East or Ballard West has closed.

### 5. STATISTICAL ANALYSIS

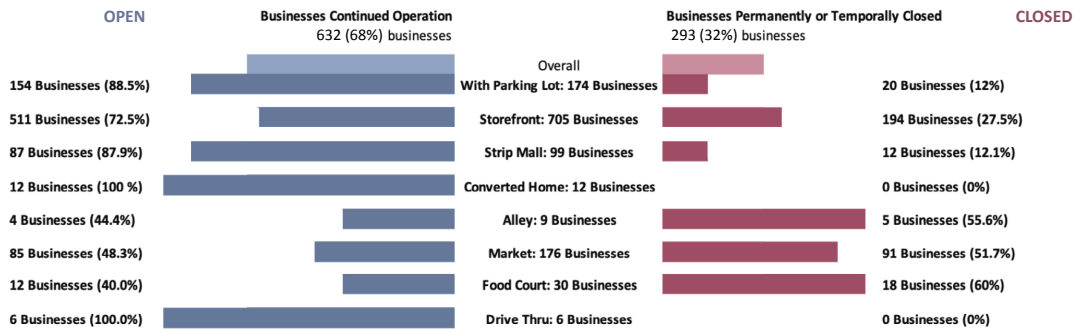
Overall, this research is designed to show the economic effects of COVID-19 and associated policies on the food retail industry. The research design is inductive and deductive, beginning with observable characteristics of food retail businesses before and during the pandemic. Organized into a typology, these characteristics can then be transformed into independent variables, understood for their effect on the financial and economic outcomes of businesses. At the time of writing, the first available measures of financial outcomes are simply the record of businesses open and closed--business continuity--during the May and June field observations (Figure 5). Just over 32 percent of businesses in the sample were closed during this period of observation. Several factors internal and external to the business can influence whether a business stays open or closes. Considering the conditions that exist within one mile of each of the businesses (Figure 5b), we can observe statistically significant differences between business continuity and the density of businesses nearby, the percentage of businesses closed within a one-mile radius, the population density of the area, and average household income. A smaller yet significant effect was observed for the price of the food and average household rent. The role that spatial arrangements may play in business continuity begins to come into view when comparing exterior typology to observations of businesses open and closed (Figure 5c). A more significant proportion of food retail businesses located in less visible and less accessible locations like alleys, within food courts, and within markets were closed. Businesses in sites easily accessible by car, like those with their parking lots, located in strip malls, which associated parking, and drive-thru business were found open in May/ June in more significant proportions than those that did not have these features. The small number of restaurants observed to operate in converted homes remained all open. Based on their spatial typology, these were all located in residential neighborhoods, which points to the general observations that food retail in residential areas performed better than those in den commercial centers. The comparison of business continuity of food retail and restaurants in all neighborhood areas (Figure 5a) shows that businesses downtown and iin adjacent neighborhood areas were more likely closed than those in residential neighborhood areas.




a. Business continuity of all neighborhood areas




b. Business continuity by price range and social demographic features within one-mile




C. Business continuity by spatial typology

Figure 5. Business continuity by neighborhood area (a), price range and social demographiv features (b), and spatial typology (c).

## 6. PRELIMINARY FINDINGS / NEXT STEPS

This paper presents initial findings from research designed to reveal the factors that improve or worsen the prospect of business continuity, economic success, and social welfare for essential businesses under restrictions required to reduce the rate of infection during COVID-19. Results suggest that facility design can play a role in business continuity for the food retail industry and that statistically significant patterns of impact may be found across neighborhoods. The data and set of typologies at the core of this investigation represent actual interventions that businesses in Seattle used to adapt to the restrictions imposed by the COVID-19 pandemic. By analyzing the success of the interventions through a design and spatial lens and an economic one, research may be able to highlight simple strategies to offset and perhaps overcome the potentially adverse financial impacts of Covid-19 physical distancing requirements.

The analysis will continue to trace the steadiness of food businesses in Seattle through the first year of the COVID-19 pandemic. It will continue to analyze how structural characteristics, physical design, makeshift changes, and the neighborhoods' socioeconomic profile impact business continuity and resilience. Further research is underway to tie these observations to the details of the businesses' financial and economic performance in the sample with data collected in Phase 2. With the results of assessing the business performance across the city, the project intends to discern how these spatial and economic findings might change the design of food businesses and cities in the future.

## ACKNOWLEDGMENTS

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